

A SYSTEMATIC INVESTIGATION OF OPEN STATION SHELL
MIDDEN SITES ALONG THE SOUTHWESTERN CAPE COAST

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CONTENTS

	<u>Page</u>
<u>SECTION A</u>	
Chapter 1 <u>INTRODUCTION</u>	1
Chapter 2 <u>ENVIRONMENT</u>	5
Physical Environment	5
i) Major Geological Formations	6
ii) Physiographic Regions	7
iii) Climate	9
iv) Soils	10
v) Vegetation	12
Human Environment	15
Chapter 3 <u>OPEN STATION SHELL MIDDEN SITES :</u> <u>HISTORICAL REVIEW</u>	24
Chapter 4 <u>ETHNOGRAPHY AND THE ARCHAEOLOGICAL PERSPECTIVE</u>	50
Archaeology and Ethnology	50
The Indigenous Population:	
i) Review of evidence from early travellers	55
ii) Description of way of life	63
a) Hunter-gatherers	63
b) Herders	67
iii) Distribution	69
Hypothetical Differences and Archaeological Context	72
i) Physical Type	73
ii) Material Culture	74
iii) Group Size	76

CONTENTS - Continued

	<u>Page</u>
iv) Site Location	79
v) Grazing Systems:	
a) Background and evidence	81
b) Herder Grazing System... ..	85
vi) Burial Practices	92
Chapter 5 <u>EXPECTATIONS AND VARIABLES</u>	94
 <u>SECTION B</u>	
Chapter 6 <u>RESEARCH AREA</u>	98
Pearly Beach Area	102
i) Coastline	102
ii) Inland	107
Hawston Area	109
i) Coastline	109
ii) Inland	110
Chapter 7 <u>PEARLY BEACH : MIDDEN SAMPLES AND OTHER FEATURES</u>	111
<u>HAWSTON : MIDDEN SAMPLE AND OTHER FEATURES</u>	117
 <u>SECTION C</u>	
Chapter 8 <u>DISCUSSION</u>	
Location of sites	120
Comparison of sample components	
i) Shellfish	126
ii) Other fauna	136
Crustacea	136
Pisces	136

CONTENTS - Continued

	<u>Page</u>
<u>CHAPTER 9 - CONCLUSION</u>	158
<u>ACKNOWLEDGEMENTS</u>	165
<u>REFERENCES</u>	166
<u>APPENDICES I - IXb</u>	177-216
<u>FIGURES</u>	
<u>PLATES</u>	

	<u>Page</u>
<u>LIST OF TABLES</u>	
TABLE 1 Summary of major geological subdivisions and their characteristics	7
TABLE 2 Historical seasonal distribution - Hunter gatherers	89/90
TABLE 3 Historical seasonal distribution - Strandloopers	91
TABLE 4 Intertidal zone accessibility	105
TABLE 5 Average mass per individual of species represented in middens	106
TABLE 6 Relative frequency of site by category	121
TABLE 7 Percentage frequency by meatmass of most common subtidal animals, <u>Haliotis</u> spp. and <u>Turbo</u> spp. ...	126
TABLE 8 Area, volume and meatmass calculations for midden samples with approximations for middens	132
TABLE 9 Comparison of shellfish diversity and the occurrence of other components	133
TABLE 10 Comparison of stone artefact categories from PB4 0, Gordon's Bay midden and Die Kelders Cave samples	147

SECTION ACHAPTER 1INTRODUCTION

Open station shell midden sites received little systematic attention in the past. Although a vast amount of material has been published on shell midden culture, a large proportion of early effort in this direction was turned to excavations of the more lucrative coastal cave sites. Furthermore, the work which was undertaken produced very little in the way of information on midden components as elements of diet and reflectors of human activity in coastal contexts.

Early shell midden studies were based largely on the theory that the shellfish and other fish and animal remains represented the food debris of a degenerate group of coastal dwellers known as the Strandloopers. Published descriptions and discussion revolved mainly around collections of stone implements selected from surface occurrences or relatively uncontrolled excavations. Skeletons and beautiful stone implements were much sought after and writers were invariably concerned with material culture and the Strandlooper physical type and its relation to the Hottentot, Bushman and Hybrid types. Observations on dietary economy were more or less confined to the obvious mass of marine shells with perfunctory comment on other components. Indeed, although such problems were considered on occasion by some authors, almost nothing was known about the living patterns which should have existed if these people were coastal dwellers. Nothing was known of the manner in which these living patterns could have articulated with the overall socio-economic systems which might

be assumed to have been operating along the coast and inland during the 2-3000 years before European contact which began to affect the indigenous population in the fifteenth century and gained tremendous momentum from the seventeenth century onwards. Some writers hinted at the possibility, but their ideas remained in isolation.

As early as 1935 Goodwin commented that little was known about shell midden sites. Three decades later Inskip discussed the existence of precisely the same problems and extended a plea for the study of coastal shell midden sites and their relevance to the prehistory of South Africa. He suggested that a great deal of useful information was readily available, especially through the study of open station shell midden sites. Such sites were more numerous, and likely to be of less complex structure than cave deposits.

Largely through the encouragement of Professor Inskip the writer initiated the present study. Broadly the aim of the project was to study the so-called Strandloopers through the excavation of open station shell midden sites. Aspects such as who they were, how they interacted with the coastal environment and their relationship to inland peoples were to be considered. This was to involve the investigation of an area considered to be representative of varying environmental conditions and therefore offering different opportunity and scope for coastal occupation. The existence of subsistence strategies related to these differing conditions was to be explored through a study of the structure and composition of midden sites. Evidence for coastal/inland links and their meaning would be sought.

A strip of coastline between Kleinmond and Cape Agulhas was chosen for

the investigation. This area was selected in order to link work on open station shell midden sites to work on coastal caves already being undertaken there by the Department of Archaeology at the South African Museum. Furthermore the area was relatively far from densely populated areas and therefore unlikely to have been too badly disturbed by collectors. Initial checking through Museum accessions and with J. Rudner, who had visited parts of the area in a previous study, revealed that a number of site localities were already known. Site location covered the total project area. An excavation was conducted at Hawston and detailed investigation took place within the vicinity of Pearly Beach which provided an area suitable for sampling.

The aim of this thesis is to present some of the results of this study. The scope covers much of the background and practical work undertaken. The body of the thesis has been divided into three sections which are subdivided into chapters.

Section A contains the general aims of the thesis in the form of this Introduction and other background information considered necessary to the study. An extended description of the environment of the southwestern Cape is given in order to provide the physical setting for the chapters following. A review is given of past work on open station shell midden sites providing an assessment up until 1975. Socio-economic systems in operation in the southwestern Cape during the contact period are then discussed, information being derived mainly from early traveller records and ethnographic accounts.

The discussion is related to ecological considerations and archaeological

principles and observations. An attempt is made to provide a picture of the indigenous inhabitants both on the coast and inland and thereby a hypothetical framework from which the archaeologist might extrapolate into the past. Thereafter all the background information for this section is drawn together in a short discussion of the expectations and variables which emerge from the background study.

Section B describes field observations for the project area and other data obtained by the excavations conducted at Hawston and, in particular, the Pearly Beach area. Information is presented on the distribution, structure and components of the middens and features associated with them are described. Section C contains the interpretative discussion of the data as a reflection of human activity and the conclusions derived therefrom.

CHAPTER 2

ENVIRONMENT

For the purpose of this discussion the environment is dealt with at two levels. The physical environment is described in order to provide background information and a framework for aspects such as the geology, climate, soils and vegetation of the southwestern Cape. Thereafter an attempt is made to relate the physical divisions which are shown to exist in the area to implications of human activity. Streuver (1971: 11) wrote that "Since cultural activities are closely related to limitations and potentialities of the physical environment, reconstruction of the available natural plant and animal food resources, the fertility and extent of arable land, the distribution and reliability of water resources, etc. must be undertaken for the prehistoric period involved. Patterning of cultural activity on the landscape will be interpreted in part on the basis of these environmental data".

Physical Environment

Detailed investigation has been undertaken in the area between Kleinmond ($34^{\circ}21'S$, $19^{\circ}02'E$) and Cape Agulhas ($34^{\circ}50'S$, $20^{\circ}01'E$) (Fig. 1). Some knowledge of the structure and surface of the southwestern Cape, together with the climate, vegetation and soils is, however, necessary for an understanding of the conditions affecting the indigenous populations during the post-Pleistocene.

Although the primary physical features, such as the folded mountain belt, its marginal slopes and valleys and the coastal areas, are primarily the work of long periods of erosion and peneplanation and folding and faulting, the secondary physical features owe their character very largely to the effects of weathering and erosion on rocks of varying hardness and make-up. The steepness of gradient of river courses, common juxtaposition of hard and soft formations and nature of the rainfall all tend to emphasise the importance of rock character and structure in the formation of physical features. Underground water supplies are controlled mainly by geological and rainfall influences; with soil formation, whilst climatic factors are dominant on the more level plateaux and plain surfaces, the nature of the parent rock becomes an important factor whenever there is a considerable degree of slope and soils are therefore immature. In Southern Africa, with its large areas of youthful topography and delicate adjustments between climate and water availability, the far-reaching effects of the geology can rarely be ignored in geographical problems (Wellington 1955: 11).

i) Major Geological Formations

The distribution of the major geological subdivisions of the area is shown in Figure 2, whilst the subdivisions and their most important characteristics are tabulated in Table 1. (Geological map, 1970: Spies et al 1963; de Villiers et al 1964; Visser and Schoch 1973).

Table 1: Summary of major geological subdivisions and their characteristics

Code	Series	System	Characteristics
	Upper	Tertiary and Quaternary	Superficial sand, consolidated dunes (Bredasdorp), conglomerate, surface limestone
	Lower	Cretaceous	Conglomerate, sandstone, shale, limestone
	Beaufort Ecca Dwyka	Karoo	Shale, mudstone, sandstone Shale, mudstone, sandstone Shale, sandstone, tillite
	Witteberg Bokkeveld Table Mountain	Cape	Quartzite, shale Shale, sandstone Quartzite, shale, tillite
	Cape Granite		Granite, syenitic rocks, quartz and porphyry
		Nama (Malmesbury Formation)	Phylitic shale, greywacke, sandstone
	Namaqualand belt of metamorphism and granitization		Migmatite, gneiss, ultra-metamorphic rocks

ii) Physiographic Regions

The area falls within physiographic region 11: the Southern Cape, of Wellington (1955). The Southern Cape Region includes three distinct physiographic elements: the Folded Belt, the Coastal Foreland and the Great Karoo Basin which lies between the Folded Belt and the South African Plateau. The areas relevant to this discussion fall roughly between the Berg River to the north-west and the Breede River to the south-east,

reaching inland to the Folded Belt. Considerable variation in elevation is found, ranging from sea level to over 1500 m at the highest points on the folded mountain ranges further inland.

The region is dominated by the Cape Folded Belt which forms a considerable barrier between the Coastal Foreland and the interior (Fig. 2). Ranges are mainly of Table Mountain Sandstone with subsidiary ridges of Witteberg quartzites. Softer Bokkeveld shale beds occur as synclinal valleys between the ranges. The orographic lines shown on Figure 3 reveal two clearly distinguished zones of folding. A western zone where north/south and east/west folding pressures caused folding in various directions, and to the east of the Hottentots Holland range a zone where folding follows an easterly trend.

The Coastal Foreland can be regarded as a marginal area of the folded zone, outliers of which extend coastwards in both directions, e.g. Piquetberg, Riebeeck's Kasteel, Cape Peninsula, Potberge, etc. The Hottentots Holland orographic line reaches the coast between Gordon's Bay and Cape Hangklip where it divides the Coastal Foreland into two distinct zones which are relevant to indigenous settler patterns. To the east the Langeberge form the inland margin of the Coastal Foreland.

The general topographic character of the western Foreland is that of a plain. The major portion falls within the area known as the Malmesbury plain which is formed by shales and slates of the Malmesbury Series. The western and southern parts of the plain are covered with drift sand often of considerable depth, forming the coastal sandveld and the sand-covered Cape Flats. Limestone beds and surface limestone occur over large parts

of the coastal areas, but are often obscured by sand. Limestone outcrops do occur in the Saldanha area. The fairly even surface of the plain is occasionally broken by mountain features in the form of Table Mountain Sandstone outliers or granite bosses.

The southern Foreland is also somewhat composite in nature. The east/west folding trends can be seen in the Riviersonderend ranges to the west of Swellendam. As they meet the north/south folds they form southwesterly-trending ridges in the Caledon-Bredasdorp area. The larger area of this Foreland is covered with Bokkeveld shales and slates. Peneplanation has resulted in a series of low ridges, shallow valleys and gentle slopes which contrast sharply with the folded mountains of Table Mountain Sandstone. A coastal strip, 15-30 km wide is occupied by limestone beds of the Bredasdorp Formation which rise to a height of 200-250 m above sea level.

iii) Climate

Climatically the area falls within the Mediterranean type with relatively cool wet winters and warm to hot dry summers. Rainfall is influenced to a large degree by the pronounced orographic features. These result in annual amounts of the order of over 3000 mm in some mountain kloofs as against 400-500 on the Cape flats and less than 250 mm in the Breede River Valley (Weather Bureau 1965). Proximity of both the Atlantic (west) and Indian (east) Oceans causes temperatures to be moderate and extremes are rare. Strong winds and rough and stormy weather can occur during both seasons. Rainfall occurs mostly as soft showers, but thunderstorms and downpours are encountered (Spies et al 1963; De Villiers et al 1964; Visser and Schoch 1973). Snow can fall on the higher mountain peaks during winter or early spring.

In the western zone the prevailing northwesterly and southwesterly winds bring most of the rainfall from April to October (Appendix 1). A little rain may fall during summer. Rainfall varies from north to south. North of the Berg River it averages about 250mm per annum and increases to about 350 mm between Hopefield and Darling. The hilly terrain around Darling receives just over 500 mm. At Cape Town the rainfall is about 700 mm and Somerset West receives 630 mm. Coastal precipitation is on average less than further inland. Coastal fogs occur during winter. Summers are dry, hot and windy. A moderate to strong wind blows from the south practically every afternoon. Temperatures on the coast range between a maximum of 21,1°C during February and a minimum of 10,0°C during July (Cape Columbine). Inland they range between 40,0°C and -0,6°C (Wellington) (Visser & Schoch 1973; Appendix 1).

In the eastern zone (Appendix 1) southeasterly and northwesterly winds bring most of the rainfall from May to September. During summer the prevailing southeasterly winds bring fog to the coasts and a little rain may fall on south-facing mountains. Average coastal rainfall varies from about 400-600 mm per annum. Inland rainfall varies a great deal due to the effects of the mountain ranges. High points receive the greatest amount, e.g. 3216,4 mm at Dwarsberg. Inland areas of the Coastal Foreland receive less, e.g. 542,1 mm at Caledon. Areas in the rain shadow of mountain ranges may receive as little as 286,5 mm (Worcester). Likewise, the coastal ranges rob the summer southeasterly winds of what little moisture they carry, causing them to become dry and searing in the interior. Further east the Riversdale area falls within the all-season rainfall of the South Coastal belt. Temperatures on the coast range from a maximum of 21,8°C to a minimum of 10,1°C (Danger Point). Inland temperatures range between 41,4°C and 1,1°C (Worcester). Generally, however, temperatures are

pleasant and extremes seldom last very long, although snow falls on mountain peaks every winter and summer temperatures may rise about 40°C (Spies et al 1963; de Villiers et al 1964; Appendix 1).

iv) Soils

The area forms part of the South Western Soil Province which covers the winter rainfall zone and the south coastal all-season rainfall zone (Wellington 1955). Two major subdivisions have been made on the basis of the west mountain zone, formed predominantly of Table Mountain Sandstone, and the drier lowland areas of softer shaley ground. The grey sandy soils and Table Mountain Sandstone zone (van der Merwe 1941) occupy an area formed in the west mainly by the high ridges of Table Mountain Sandstone and quartzites and in the south by the wetter Table Mountain Sandstone ridges running parallel to the coast. The mountainous topography of the Table Mountain Sandstone causes the soils of the area to be generally poorly developed and great exposures of bare rock occur. The soils are characteristically sandy, highly acidic and extremely low in plant food content. Narrow strips of Bokkeveld shales also occur within this zone. The shales produce completely different soils which are very clayey. Chemically the Bokkeveld soil has a high potash content and medium percentages of sodium and magnesium, but like the Table Mountain Sandstone soils it is very acidic and leached of all soluble ingredients.

To the west of the Olifants River Mountains and to the south of the Riversonderend and Langeberg mountains extensive low lying areas of Malmesbury and Bokkeveld shales are found. The soil type found here is

a gravelly-sand clay loam on clay. For more than a century these relatively fertile areas have been the main wheatlands of South Africa. In the west, the swartlands of the Malmesbury plain, an undulating surface, mainly formed by shales and slates of the Malmesbury Formation, extends from near Stellenbosch in the south to the north of Piquetberg. Where the intrusive granite base occurs, relatively fertile clayey soils which are rich in potash are found. In the east the shales, mudstone, micaceous flagstones and greywacke of the Bokkeveld Series form a rather more uneven surface known as the rûens. The name indicates its character of alternating low ridge and valley. Consequently the ridges and slopes are well drained while the valleys contain much fine surface wash which interferes with the drainage. In certain coastal areas massive accumulations of sands have so dominated the soils that a special class of "Littoral Sandy Soils" is recognised (Wellington 1955). They are subdivided according to their distribution and content.

In the south coastal area between Mossel Bay and Stanford the superficial sand is underlain by a layer of hard limestone. Along the coast a belt of dunes runs parallel to the shoreline. The sands are mainly of marine origin and consist mostly of comminuted seashell fragments. Behind the dunes the surface is formed of limestone ridges or flats of loose sand on hard limestone. The sandy soils which are extremely calcareous and lacking in essential minerals are able to support a very scanty natural vegetation.

The western sandveld of the Cape Province extends from the Cape Flats to the Orange River. Three soil types are found: sand on limestone, sand on clay and sand alone. The sand on limestone zone lies to the west and

southwest of Hopefield where an extremely hard limestone pan underlies light greyish brown sandy material which ranges from a few centimetres to several metres thick. The sand on clay soil is found to the east of this zone. The sandveld proper lies to the north of the Great Berg River where it occurs east of the coastal dunes.

Clayey sand containing soluble salts occurs on vlei ground in the sandveld, and the alluvial deposits of the lower flood plains of large rivers such as the Great Berg and Oliphants Rivers are impregnated with salt, partly derived from the general salinity of the tidal reaches.

These sandy soils are generally lacking in essential trace elements such as copper, manganese and cobalt, and are relatively infertile. Where trace elements do exist, the excessive lime content of the soils tends to make manganese and other trace elements insoluble. Regular water-logging of the Cape Flats has resulted in the leaching-out of the manganese content.

v) Vegetation

The southwestern Cape with its specialised physiography, geology, soils and climate, has a distinct vegetation which is known as Fynbos. This sclerophyllous scrub is well adapted to the Mediterranean type of climate and is noted for its richness of species, both in small areas and over its whole range. The Fynbos has an irregular L-shaped distribution with its centre in the angle formed through Worcester, Stellenbosch and Caledon. It extends northwards to beyond the Cedarberg (Van Rhy'n's Pass; Kamiesberg) and eastwards as a thin double line along the two major mountain chains, the Swartberg-Baviaanskloof inland and the Langeberg-

Outeniqua-Tsitsikama along the coast as far as Port Elizabeth. Outliers in the summer rainfall area are not important here. The vegetation area ranges in altitude from sea level to over 2100m, though the country over about 700m is all mountainous. Taylor (1972) defined the Fynbos on the basis of the lack of single species dominance and/or the conspicuous presence of members of the Restionaceae (Cape Reeds or Riete). The latter gives the vegetation its most characteristic physiognomic feature, the restioid element consisting of tufted plants with near-leafless tubular or wiry stems. The ericoid element with small narrow rolled leaves is another constant feature. The proteoid element (mainly Proteaceae) of taller bushes with moderately-sized hard leaves with dull surfaces may or may not be present depending on habitat factors.

Wellington (1955) states that "soil appears to play a very minor part in the general distribution of this vegetational type, for while it is found perhaps most characteristically on the sandy soil of the Table Mountain Sandstone, it occurs also on the clayey soils of the Bokkeveld and Malmesbury shales and on the granite soils of the Kamiesberg escarpment". Taylor (1972), however, states that topography and soil coupled with precipitation determine the character of the vegetation which varies in response to different conditions.

Mountain Fynbos occurs typically on high mountain slopes and extends down to the plains. The plains and lower slopes to about 900m where rainfall is between 500 and 750 mm are built of shales or granite. A relatively tall and dense climax community with three layers is found here: 1) the proteoid upper layer of 1,5 to 3,0 m which varies in height and density with moisture and aspect; 2) the ericoid middle layer of shrubs to about 1m; 3) a ground layer of smaller woody plants, herbs,

geophytes and especially Restionaceae. Annuals are infrequent. Although they were more extensive in the past climax communities are not often found, according to Adamson (1938). They are absent over considerable stretches or occur in very small patches. This is caused by the destruction of the climax, usually by fire, resulting in large tracts of much simpler single - or two-layer communities. On talus slopes of boulders or soil from the sandstone cliffs above, shrubs such as Taaibos (Rhus spp.) and small gnarled trees like Kliphout (Heeria argentea) and Sybos (Maytenus acuminatus) can develop into a closed scrub or forest community in the absence of fire. Protected kloofs have a moister type of forest with Rooi-els (Cunonia capensis), Wit-els (Platylophus trifoliatus) and Without (Ilex mitis). The forest is related to the Knysna forest further east. Above 900 m where shallow acidic soils of coarse sandy nature derived from the Table Mountain Sandstone occur temperatures decrease with altitude and rainfall may increase to 5000 mm per year. Snow may occur on the highest peaks. In this region the Fynbos becomes progressively lower and less stratified usually consisting of ericoids and restioids only. Distinct communities are also found in small specialised habitats: streamsides with dense Fynbos to 5 m high where a single species (e.g. Leucodendron or the endemic Berzelia) may be locally dominant; flushes with almost impenetrable thickets of Restionaceae; seepages or drainage lines with dense spindly mixed shrubs; shalebands with low matted shrubs and many grasses. In the eastern extension of the mountain Fynbos with its more evenly distributed rainfall grasses increase, while forest patches develop in the folds and valleys on the coast side when protected from fire. Although it is now covered mostly by Renosterveld the area stretching from Swellendam to Mossel Bay was covered a century ago by large tracts of grassland occupied by Red grass (Themeda triandra) (Marais 1937).

Coastal Fynbos occurs on the relatively recent marine sands which are rich in lime. The restioid element, although generally less conspicuous, still forms the matrix of the ground layer. The ericoid element is very much in evidence; rounded bushes are often found scattered as a discontinuous upper layer. This zone harbours more grasses, most of which are nutritious and palatable. Succulent plants, such as Carpobrotus cinaciformis (Sour fig) occur over large areas of the low-lying sandy coastal region.

In sheltered troughs between the dunes where soil moisture is greater thickets of woody shrubs may develop with Melkhout (Sideroxylon inerme) as the dominant small tree. These shrubs do not belong to families of the Fynbos but to the Temperate Coastal Forest.

Human Environment

The importance of the role played by vegetation in the human environment should not be under-estimated (Wellington 1955). The occurrence of natural vegetation in the form of raw materials or plant foods and grazing is very closely related to geology and soils (J. Rourke, pers. comm.). Seasonal factors such as water availability and temperature play an important part, together with the fertility of the soil and other plant requirements, in the distribution of various plant types and the state of their nutrient values.

From the point of view of human settlement and economy, the valleys of the folded zone should potentially have been of greater importance to indigenous hunters and herders than the relatively infertile rugged mountains. It was the valleys and plains with fertile soils derived

from Bokkeveld and Malmesbury shales and perennially watered from mountain springs which were settled in the 17th and 18th Centuries by European colonists who recognised their farming potential. It was over these areas, too, that the Hottentot herders ranged with their herds and flocks (Thom 1954; Maingard 1931).

The Cape Folded Mountains have far-reaching effects on the rainfall distribution. They invariably receive more rain than the surrounding low-lying areas and their importance lies in that they form excellent aquifers, liberating water slowly into the perennial streams and rivers which make the low-lying valleys, plains and parts of the coastal belt inhabitable during the dry summer months when all other surface water disappears. The mountain zones although peripheral to the main resource-bearing areas were occupied by hunter-gatherer bands who were able to or were forced to exist upon the relatively meagre resources for some periods during the year (Parkington 1972; Parkington and Poggenpoel 1971). Site visibility is enhanced by the occurrence of numerous rock shelters which were occupied. The vegetation which is predominantly sour grass and low bushes provides some pasture which is only nutritious during the wet winter growing season and lacks many trace elements which are essential for the support of grazing animals over long periods. Oreotragus oreotragus (Klipspringer) and Pelea capensis (Vaal Ribbok) manage to thrive in these areas. Taurotragus oryx (Eland) could have moved about the area when suitable food stuffs and water were available. Raphicerus spp. (Steenbok/Grysbok) would tend to occur on the fringes of sour vegetation. Food exploitation in Table Mountain Sandstone areas tends to be adapted to forms such as plant foods, especially Iridaceae, Procavia capensis (Rock Hyrax), Testudo sp. (Tortoise), which occur fairly

abundantly (Parkington 1972; Parkington & Poggenpoel 1971). J. Rourke (pers. comm.) indicates that the concentration of Iridaceae etc. on T.M.S. soils is rather low except in valleys where clay particles are washed down and concentrated. The Coastal Foreland provides a far greater mass of edible plant foods of this type. Furthermore, the high mountain ranges and also river courses seem to have formed natural subdivisions, which, while they were not entirely effective barriers, nevertheless did affect the distribution of animal and human populations within the coastal area and between the coast and the interior. The Coastal Foreland itself is divided into a western and an eastern zone by the Hottentots Holland range. Access was possible over passes, the best known of which are those now known as the Sir Lowry and Houw Hoek Passes, over the Hottentots Holland.

The Coastal Foreland presents a rather different picture of human environment. The topography is far less rugged, large tracts of undulating surface covering most of this region. Soils derived from the predominantly shale or granite bed-rock are clayey and fertile. The vegetation includes dominant grasses (Acocks 1953) and other plants which provide excellent grazing. Edible plant foods, especially of the Iridaceae family, grow extremely prolifically in the clayey soils and provided a staple for both herders and hunter-gatherers. Historic and more recent records indicate that an extremely diverse fauna was able to survive on these areas when suitable environmental niches existed.

Large and small predators; Loxodonta africana (Elephant); Procavia capensis (Rock Hyrax); Diceros bicornis (Black Rhinoceros); Equus burchelli (Zebra); Equus quagga (Quagga); Potamochoerus porcus (Bush pig); Hippopotamus amphibius (Hippopotamus); Sylvicapra grimmia (Grimm's Duiker); Raphicerus spp. (Steenbok/Grysbok); Oreotragus oreotragus

(Klipspringer); Pelea capreolus (Vaal Ribbok); Hippotragus leucophaeus (Blue Antelope); Alcelaphus caama (Hartebeest); Damaliscus dorcus (Bontebok); Tragelaphus scriptus (Bushbuck); Taurotragus oryx (Eland); Syncerus caffer (Cape Buffalo); Lepus capensis (Cape Hare); Hystrix africae-australis (Porcupine); Bathyergus suillus (Dune Mole-rat).

Birds, including waterfowl, such as Anatidae (Ducks) and Fulica cristata (Red-knobbed Coot), and game birds, such as Phasianidae (Francolins and Quails) and Otidae (Bustards), abound under suitable conditions.

During the winter wet season water was available over most of the Coastal Foreland, allowing large animal populations to move about freely, and making this zone particularly attractive for human occupation and exploitation of the plant and animal elements of its biomass. During the dry summer months, however, surface water disappeared and the vegetation became parched and unpalatable except along the widely-spaced perennial rivers which provided water and pasture. The effective resource base of the area was considerably reduced as many animals trekked in search of water and pasture.

It is well known that this zone was extensively occupied by herders and hunter-gatherers. Although rock shelters occur in rare instances, the nature of the terrain generally dictated the occupation of open station sites. Consequently site visibility is very restricted and a meaningful distribution is unknown as yet.

The sandy Coastal Strip provides another contrast. Surface water is generally scarce except for temporary pools and vleis which form during the rainy season, but disappear rapidly thereafter. Most of the water

coming off the Folded Mountains and Coastal Foreland disappears as soon as it reaches the sands, only to emerge again at the coast where impermeable bed-rock acts as an aquifer. Areas along the west coast tend to be drier than those east of the Hottentots Holland. But perennial rivers such as the Oliphants, Verloren Vlei and Great Berg etc., do flow across the sandveld to the Atlantic Ocean. Occupation in these areas seems likely to have followed the river courses to the shore. The eastern parts are better endowed with surface water. Perennial rivers and streams such as the Palmiet, Bot, Onrust, Klein, Uilenkraal, Hagelkraal, and Ratel cross the coastal plain at regular intervals. Large pans and vleis such as the Hagelkraal, Voëlvlei, Zoetendalsvlei and De Hoop hold water throughout the year. Many springs rise from the Table Mountain Sandstone and Limestone. Large tracts of parched land must have existed during the dry season, especially on the west coast, but summer fog conditions along the eastern parts provided supplementary moisture which allowed the vegetation to remain relatively green. Smaller antelope such as Raphicerus spp. (Steenbok/Grysbok) and Sylvicapra grimmia (Grimm's Duiker) were probably more common than the larger antelope and animals due to trace element deficiencies, but this could have been a seasonal phenomenon with dry-season coastal water supplies attracting larger game. Where suitable habitats existed faunal types similar to those listed for the Coastal Foreland did occur.

Bathyergus suillus (Dune Mole-rat) and other Mole-rat species are extremely common and were no doubt collected together with Testudo spp. (Tortoise) and snakes such as Pseudaspis cana (Mole Snake); Bitis arietans (Puff Adder) and Naja nivea (Cape Cobra), which are common and contain significant amounts of flesh. Birds, as in the Coastal

Foreland, abound in suitable habitats. Francolinus capensis (Cape Francolin) is very common in the low scrub of the coastal region, especially near water. Vlei birds abound where suitable water expanses are located. Edible seasonal fruits and berries such as Carpobrotus edulis (Hottentots Fig) and Carpobrotus cinaciformis (Sour Fig) and Nylandtia spinosa (Skilpadbessie or Duinebessie) occur. Iridaceae are not common in sandy soils, but do extend down where clayey soils occur, for instance along river-courses or around permanent vleis. Site visibility is restricted in this zone where open station occupation was necessary over large areas. Rock shelters exist in some areas within ten kilometres of the sea, both along the west coast (J. Parkington, pers. comm.) and on the east coast (Avery 1974, 1975). Open station occupation appears to have been fairly sparse on the coastal plain which is situated between the areas of optimum resources situated on the Coastal Foreland and coastline.

The coastline itself provides a resource base rich in a vast array of foods and other resources. Marine mammals such as Arctocephalus pusillus (Cape Fur Seal) and Cetacea (Dolphins and Whales) occur in the Cape seas. Seals are known to breed on the islands and rocks off the coast and it is possible that dead or dying animals were cast up onto the shore at times. P. Shaughnessy (pers. comm.) comments that an annual increase of mortality among yearling seals is experienced during the period from about October to December when they are weaned rather abruptly.

There are also records (Thom 1954) which refer to seals' living on the shores where they were utilised by hunter-gatherers and herders. Dead or ailing dolphins and whales are sometimes found on the shores and were

eaten. P. Best (pers. comm.) says that the occurrence of whales coming close inshore is seasonal in southwestern Cape waters. Eubalaeria australis (Southern Right Whale) occurs from June to December and Megaptera nodosa (Hump-backed Whale) has a peak in mid-winter during July and August and occurs until December. Crustacea such as Jasus lalandii (Cape Rock Lobster) and crabs occur. Coastal shell middens testify to the exploitation of many intertidal shellfish species. Many species of fish such as Pomatomus saltator (Elf), Lithognathus lithognathus (White Steenbras), Cymatoceps nasutus and Sparodon durbanensis (Mussel Crackers), Chrysoblephus laticeps (Roman), Diplodus sargus (Dassie), Rhabdosargus globiceps (White Stumpnose), Pachymetopon blochii (Hottentot), Coracinus capensis (Galjoen) and others which occurred in large numbers during historical times were available.

Bird populations are far larger along the coasts than inland. Bird remains occur regularly in coastal middens. Spheniscus demersus (Jackass Penguin), Diomedeidae (Albatrosses), Procellariidae (small, medium and large Petrels), Morus capensis (Cape Gannet), Phalacrocorax carbo (White-breasted Cormorant), P. capensis (Cape Cormorant), P. africanus (Reed Cormorant) and Larus dominicanus (Southern Black-backed Gull) have been recorded. Most of these animals are found in large numbers along the shores or breed in colonies on off-shore rocks and islands. Where they occur, coastal caves such as at Elands Bay (Parkington 1972) and Die Kelders (Schweitzer 1975) were occupied. Faunal lists from these sites indicate the exploitation of the above resources. Terrestrial animals found further inland were also exploited. Parkington (1972) shows that while plant foods were eaten, they were clearly not important factors in coastal exploitation. Site visibility in this zone is good.

By far the greatest number of occupations took place on open station sites up to about 300m from the shore. Occupation was concentrated along rocky stretches on which the maximum marine biomass and fresh water was to be found.

Although not quite as attractive perhaps, extended sandy shores were also exploited where suitable resources occurred. J.E. Parkington (pers. comm.) has shown that Donax serra was exploited over extensive sandy coasts on the west coast. This has yet to be demonstrated for the south coast. It seems highly likely, however, that a similar pattern will be found.

CHAPTER 3OPEN STATION SHELL MIDDEN SITES : HISTORICAL REVIEW

The terms shell mound, kitchen midden or shell midden, which may or may not be prefixed with the word Strandlooper (Strandloper) refer to accumulations of shells which are considered to represent human food debris. They also contain other food debris in the form of bones and artefacts of stone, bone, shell and clay. Human remains are also associated occasionally. Open station shell midden sites are known to occur on or close to the coast where marine shellfish were exploited as well as inland, along river courses, where fresh water mussels (Unio spp.) were collected.

In order to provide a fair perspective, studies and developments which have taken place during the past decade should be compared with the methods of earlier workers from an evolutionary point of view. Much maligned by later more sophisticated archaeologists, it must be appreciated that the early workers and their reports have provided a great deal of useful basic information on shell middens. Incontrovertably, however, the value of early work is often considerably diminished by the lack of adequate recording and the practice of selective collecting. Furthermore, the situation now exists where as Deacon (1974: 5) remarked in his study of the prehistory of the Eastern Cape "recent observations contribute the greater part of the present understanding and give more definition to problems that might be studied in further investigations". Paterson (1790: 109) provided the first description of open station shell midden occupations while journeying near the Orange River mouth. "Colonel Gordon and myself ... pursued our journey along the shore, where we saw several huts. Great

numbers of shells lay in heaps about those huts, which inclined us to suppose that the inhabitants subsisted entirely on the fish which they contained". Further on, he described contact with a group of 'Shore Boshmen' still living at the coast.

Goodwin (1935) included a comprehensive documentary on the development of midden studies which formed an important aspect of early descriptions beginning with a sixty year controversy, initiated by Barrow who mistakenly referred to shells found in the Cape St Blaize cave as being the food of birds. In 1858 Gregory (1858) replied to the suggestion mooted that cave deposits were laid down under marine conditions, saying that "The whole affair is very easily accounted for. It is an historical fact that a great number of natives were located in the Cape Peninsula at the period of its first colonization and there is little doubt that their habits were similar or identical with those natives now existing. Out of the influence of civilization many tribes of Namaqua Bushmen live at the present time from such shell-fish as they can procure from the sea shore, and carry them to their dens, caves or bush, as the case may be. There they cook and eat them; and in accordance with their careless and lazy habits, the shells are thrown on any side which, for the moment, may be least troublesome ... As for the bones, they would naturally be thrown away after being well stamped and picked, and thus become mingled with the shells. As far as regards the human remains, they have no doubt been inhumed there as the easiest mode of getting rid of them. I have seen the skeleton of a bushwoman dug out of a heap of shells placed on a flat shelf of rock on the side of a hill, fully a mile and a half from the sea ... I may mention that the body had been placed in a sitting position, exactly facing the rising sun and propped up with large stones

before being covered with shells'. It seems in this case, that the term 'bushwoman' could refer to the remains of either a hunter-gatherer or a herder. Some interesting comments regarding the location of open station middens came from Martin (1872: 55). 'I have often been surprised when walking round the coast to come upon heaped-up mounds of fresh-looking shells, in very bare parts. I now find that where the mounds are there was a dense clump of melkbosch - a bush so close that, as all know who ever camped out at Cometjie, is almost as good a shelter as a house. The bush has long been cut down and burnt, but its roots can be found running down under the shells. These mounds were kitchen middens, without doubt; and the conditions attending their situation invariable are, shelter, which the bush would give, suitability of sea-shore for successful fishing and a fresh-water spring near'. In reply to this article Baucher (1872: 56) referred to the shell mounds which '... are to be found at many spots on the coast; particularly at a rocky point near a fresh-water fountain, about midway between the Kleiremond and the Fish Rivers, and thence right along to the Bashee. The mounds are from one to, say, ten feet high, and composed entirely of the broken remains of edible shellfish, bones of animals and also broken remains of the stones used in breaking up the shells, while the flat summit of the hills is often covered with the stones used for the same purpose. This mound was made by people residing some distance inland, which is explained by the fact that for three or four miles inland from the beach large quantities of edible shell-fish remains are found, and in all or most cases mixed up with broken clay pots and charcoal. Beyond this the shell deposit ceases, from which it may be taken for granted that the shells collected by those living at a distance were broken up and the flesh extracted for the purpose of lightening the load. There can be no doubt of this as the same thing is done by the coast tribes at the present day'.

In 1881 Rickard (1881 a, b, see Goodwin 1935: 302) contributed the suggestion that middens could be divided into two groups. Early kitchen middens in which pottery was absent or scarce, and late kitchen middens in which there were no cutting implements of stone; only rubbers, grinders etc., beads, bone pins and ornamented pottery. During the same year Gooch (1881: 154) commented that 'The age of these is ill-defined; many no doubt are accumulating at the present time, as in Natal, where the natives dwelling a little inland make periodic visits to the coast at the spring and neap tides, to collect shell-fish; camping on the same spot regularly, where the shells gradually form heaps, of more or less magnitude, which becoming covered with drift-sand, lie buried until exposed by severe weather.' He added that the contents of middens near Simon's Town and Cape Point 'are noticeably made up of Haliotis shells ... and mussels while in Natal the small rock oyster and mussels are abundant'.

Schönland (1896: 120) reported on material from a shell mound in the sand dunes south of the Swartkops river mouth. 'Mr Leslie writes "The principal food-remains were shells, bones of fishes and birds; also a few herbivorous mammalian bones, probably the small gazelles". The same kitchen midden yielded broken pieces of pottery and stone implements ... The former appear to me to belong to the same type as the pots ascribed to "Strandloopers" in the South African Museum.' Discussing the racial affinities of the associated skull which Mr Leslie had identified as Strandlooper, Schönland stated that 'it is only reasonable to conclude that it belonged to a race which built up the kitchen midden in which it was found; and its importance will at once be recognised when we consider that the stone implements found in the kitchen middens along the coast of the Eastern Province have been frequently ascribed to Bushmen. I may state at once that the Swartkops skull is, in my opinion, not Bushman; it

may, however, belong to a race forming another side-branch of the Kio-Koin'. Although Schönland stated that he did not wish to be dogmatic on the matter, the problems concerning the Bushmen, Hottentot, Strandlooper racial triangle are very apparent.

Leith (1899: 265, 266) gave further information on the ecology of coastal dwellers and commented on the variation in the artefactual content of shell middens. 'Among the shells of edible molluscs and sand (which constituted the mass of the mounds) I found a great deal of broken pottery,... bones mostly of small game, hogs' teeth, broken ostrich egg-shells, two or three bone needles, and a good many quartzite flakes, but scarcely a single well-shaped implement ... a long series of shell-mounds near Port Elizabeth and a few on the west side of the Buffalo River at East London, yielded practically the same result. The exception to this rule I found at Port Alfred, near the mouth of the Kowie River, where some shell-mounds yielded, in addition to what I have already mentioned, some very beautifully formed implements, chiefly scrapers in chert, jasper, agate and chalcedony.' He recorded similar occurrences from near the mouth of the Umzinkulu River in Natal, and the mouth of the Liesbeck River on the Cape Flats, and suggested that the availability of suitable raw material may have been the cause. He added, on the basis of the undecorated pottery found in the non-implement bearing middens, that the middens were formed by Hottentots visiting the coast 'when times were bad on land, or for a change of diet ... The mouths of rivers are the favoured spots for these shell-mounds. Fresh water and shelter from the fierce south-east winds seem to have determined the selection of camps ... If shell-mounds are found at a considerable distance from a stream, water will be found trickling from a rock in the near neighbourhood; or if there are no rocks, then it will be found in the sands below high-water mark'. Later, Schönland (1903: 25, 27) provided additional information on the living patterns of

coastal dwellers and his views on their identity. He discussed Theal's theory that Bushman as well as impoverished Hottentots were responsible for coastal middens and concluded that the convenience of the extended meaning of the term Strandlooper should always be considered in the light of the ethnographical view point in which clear definition of the term was not possible and usually signified 'Primitive Hottentots'. He described an occurrence 'about 4 miles east of Port Alfred, and only separated from the sea by a range of sandhills ... the wind recently removed the surface soil and exposed what must have been the camping place of a Hottentot horde. There are still some heaps of stones on the ground which show plain signs that they were used as fire-places and there are a few mounds of shell which prove that these people lived to a certain extent on shells ... The following shells were represented on the mounds: Cominella porcata, Haliotis midae, Oxystele merula, Patella rustica, P. tabularis, P. sp., Purpura capensis, Turbo cidaris ... A few broken marrow bones of a large animal (Buffalo ?) were also found. Bits of pottery were strewn all over. There are also numerous pieces of ochre in various colours. Of stone implements, rubbers (or "mullers") were very numerous ... We also brought away the following ... 1 grooved stone ... one complete shallow bi-concave stone dish; halves of 2 other shallow dishes; flat digging stones (2 complete ..., 1 in which the perforation is not complete, and one half of another); 2 stone knives and a scraper. As cutting stone implements were very scarce, and as there was almost an entire absence of stone implements that could be used as spear-heads or arrow-heads, though they are frequent in kitchen-middens only a few hundred yards distant (at the mouth of the Rufanes river), it is possible that this encampment was used at a comparatively recent date.

Johnson (1903: 10) provided the first well documented stratigraphic sequence for an occurrence in Algoa Bay which included middens:

midden	feet	0,75
blown sand	"	2,5
midden	"	1,0
compact blown sand	"	4,5
surface plane	"	-
compact blown sand.....	"	13,5

'The midden', he wrote, 'is divided into two layers, it no doubt having been abandoned for a time, during which more blown sand accumulated.

This midden, like those previously mentioned, consists chiefly of mussel shells (Mytilus meridionalis) mixed with dirty sand, but Turbo sarmaticus, Haliotis midae, gigantic examples of Patella rustica and the scutes of a large Amphineur are also conspicuous. The species lists provided by Gooch, Schönland and Johnson support the suggestion made on ethnographic grounds that at least some prehistoric coastal exploitation was related to periods of spring tides.

Colson (1905: 165, 167) described shell midden occurrences near Port Nolloth on the west coast, but noting that they occurred right down the coast to the Cape Peninsula, he also compared an example found on the Cape Flats. 'In both localities the contents of the middens are the same, except as is natural, that those on the rocky seashore at Port Nolloth contain enormous quantities of shells, chiefly limpet, while in the midden on the Cape Flats, situated about eight miles from the sandy coast of Table Bay, the shells are not present to the same extent'. This

comment raises the problem of the definition of a shell midden. At what level does a midden become an occurrence merely containing shellfish remains, and what relation does this have to distance from the sea? Colson continued his description saying that 'The middens contain, besides the shells, large quantities of bones of the smaller carnivorae, as well as those of herbivorous animals, and ostrich egg shell also occurs. The chipped implements such as scrapers and sharp flakes are of a very rude character, but, as very well worked specimens are found elsewhere, the few obtained by me may be discarded failures. Grinding stones and querns, which are common, are simply any suitable pebbles and slabs of stone. At Port Nolloth I found two bone awls, large quantities of potsherds, the greater portion of a small shallow pot, and an almost complete pot about 9 inches in height conical in shape ... It was about half full of magnetic iron sand ... This midden, like all the others near Port Nolloth, is about thirty feet above the beach level, on the top of a line of sand dunes quite close to the sea'. It is noteworthy, too, that in 1875 a similar conical pot containing 'specular iron' had been found inland in the Fraserburg district by J.X. Merriman (SAM-AA 5344). Colson also described stone groups consisting of 5 - 8 natural slabs, approximately 1m in length, which were buried to about half their length in two parallel lines about 45 cm apart. Fifteen such stone groups occurred within a radius of 75 m at a distance of about 200 m from the middens. Although he excavated several groups no conclusion could be drawn as to the purpose of their erection. These groups are clearly different from those described by other writers and as yet no comparable feature has been described further south.

In 1919 Stapleton (1919) described deposits of fresh water mussels inland along the Sundays River on the farm Dunbrody which is located approximately

36 km inland from Algoa Bay. He mentioned two types of pottery as being present in the mounds and equated their decoration to that on 'strandlooper' pottery from the Port Alfred shellmounds. Leith (1899) attributed the Port Alfred middens to herders visiting the coast periodically. Describing Strandlooper activities in the Eastern Cape, Hewitt (1920: 305) quoted a Mr A.E. Cronwright who informed him that 'when food is scarce the wives and children of the Bantu servants hereabouts always repair to the sea during times of spring tides, each with a rock and some sort of rude line to wrench the shells from the rocks. They will travel miles to do this, and carry their full bags back on their heads a few hours later.' He commented favourably on Stapleton's finds at Dunbrody and added that Strandlooper type pottery was known from rock shelters near Grahamstown and Alicedale and was thus not confined to the coast. He commented that in addition to similarities between Strandlooper pottery and that found inland on occasions, fresh water and marine molluscs found in inland caves also provided links between the inland cave dwellers and the coast. Mounds of fresh water shellfish, containing coastal type potsherds occurred along the banks of inland rivers. He discussed the possibility that Gonaqua Hottentots were responsible for at least some of the coastal pottery and middens along the eastern Cape coast line. Goodwin and van Riet Lowe (1929: 157, 148) commented of the Strandloopers that 'Along the coastal regions the term Strandlooper has been applied to any person of no fixed abode, with a predilection for shell-fish and a habit of leaving shells about'. They regarded this term and Bushmen as useless, preferring to use the term San to imply the physical type dominant in all the Later Stone Age peoples. Comment on physical type will be made in the next chapter. In 1934 Dreyer (1934: 165, 166) provided stratigraphic evidence for the development of open station shell middens at Mossel Bay:

'Layer I - Wind-blown surface sand on which are kitchen-middens of recent date, with pottery and with skeletons of both Bushmen and Hottentots.

Layer II - An intensely black soil, representing a period of continuous, but gentle rainfall. The middens which were formed during this period carry comparatively few stone artefacts; these are apparently of the same rough, jagged type which are found in Layer I, but pottery is absent ...

Layer III - A grey sandy layer of very variable thickness. This ... is the only stratum in which the writer has found flakes belonging to the Mossel Bay Industry ... In the gorge just west of that in which is situated the Tunnel Cave there is an open-site kitchen-midden with the refuse embedded in a grey sand, and with a very rich store of artefacts of the Mossel Bay Industry.'

Although these occurrences may not be directly relateable, the significance of Dreyer's paper lies in the presentation of evidence for the extension of coastal exploitation to the Middle Stone Age and the late arrival of pottery on the southern coast.

Shapiro (1934) described material from the shell middens at Gordon's Bay. He commented that 'the bored-stone would seem to be a late addition to the kitchen middens or "Strandlooper" culture. Pottery would seem to be late, and is not present in all the middens. Previous to the appearance of these two elements the culture produced only formless stone instruments shaped by their use, and without intention. No formal flakes or implements appear. The middens seem to overlie natural dunes, and do not appear to be superposed over earlier deposits at this site. Two skeletons ... were discovered ... An analysis of shell and bone refuse is given'. This report appeared as part of the minutes of the Royal Society and unfortunately no further details were given therein. Shapiro's

comment on the late arrival of the use of bored stones is interesting. Although no direct evidence is available as yet, F.R. Schweitzer (pers. comm.) has recorded fragments from a pre-pottery level containing marine shell at Byeneskranskop Cave. The use of these artefacts is, therefore, likely to extend further back in time than was suggested. Van Noten (1965; 1967; 1974) later conducted a further excavation at Gordon's Bay confirming most of Shapiro's information and adding a great deal.

Laidler (1935: 560, 561) wrote that 'the term "Strandlooper" ... appears to be firmly fixed in common usage'. But added that 'neither in the physical nor in the cultural side is there a consensus of opinion, except that most relegate these shell mound industries to the Late Stone Age. An investigation of the coasts of the Union shows that shell mounds are restricted neither to an industry nor to a race'. He also added further information on the variability of the cultural contents of shell middens.

He described (Laidler 1935: 563) a series of sites along the Transkei coast on which, although Bantu pottery is common, he also found Gonaqua type pottery and 'Hottentot' pottery. He recorded an early Middle Stone Age industry associated with large oyster shells and fragments of bone beneath the storm beach at the Blind River, East London, although it is not clear whether this represented a midden occurrence. A superficial shell mound produced 'a late Hottentot lugged pot, early Hottentot fragments, a digging stone, a few nondescript jasper flakes'. A more significant record, however, which may throw light on the temporal relationship of herders and Bantu is that 'the mound at the Buffalo-Quigney junction shows numerous layers of shell separated by aeolian sand, making a depth of ten feet. Most pottery is found in the upper layers. Bantu highest, Hottentot below ...' For the Port Nolloth coast he described (Laidler

1935: 567) assemblages which he considered as 'being of a Wilton type that varies from the Eastern Wilton, accompanied by ostrich eggshell plaques and pendants, ostrich eggshell waterbottles ornamented and plain. The small chalcedony lunate and double lunate scrapers are not true crescents ... and are sometimes found in large numbers within a small area, and are then not associated with the cruder "midden flakes", but with ostrich eggshell beads ... Some mounds produced only chalcedony implements, others only quartz, and others again only flakes of cherty material. Pottery of Hottentot type occurred mainly on those mounds on which stone implements were scarcest.' In his conclusion he stated that 'shell mounds are always thickest along the banks and mouths of rivers, or around springs. They are not confined to coastal areas. Small middens of fresh water shells occur far inland ... The use of shellfish was therefore common among both coastal and inland people'.

Goodwin (1935: 367, 368) summed up the situation to that date.

'While we already know that the midden sites which surrounded our southern coast are in part ascribable to peoples using either Wilton or Smithfield cultures, there still remain a large number of middens and midden deposits which contain no conventional stone implements whatever. The middens of this latter type seem only to contain sea-pebbles, broken in use as instruments, and no true artefacts'. He suggested that the discovery at Oakhurst in 1933 'that crescents have there been made in shell in very considerable numbers, suggests that this is a sufficient explanation for the complete absence of conventionalized stone tools. It implies too that in future excavation careful search should be made for both crescents and other implements of this material'. He commented further that

Burkitt (1928) 'wisely divided the midden material from his other cultures'. He stated that 'our middens still need to be carefully surveyed in general and in particular. Strict attention must be paid to relative age and to stratification within each deposit, and the series related with others about our coast. We have very little since Johnson's early attempts to enumerate the shell content of our midden deposits ...'. In summing up he wrote that "The relationship between midden cultures and true stone age cultures is not yet known; the presence of bored-stones in deposits of pottery, of shell-implements, - all these things demand a careful resurvey. Similarly the relation between these deposits and the vis-kraals on our coast ... is not yet known'.

Confusion appears to have developed around the concept of midden cultures as opposed to true stone age cultures and that of coastal exploitation being an integral part of the living patterns of at least some Later Stone Age people, although it is apparent that there was an awareness that a far broader spectrum of problems needs to be considered. Burkitt (1928: 105, 106) was aware of this problem although he found it 'more convenient to class these industries as belonging to a separate culture since the mode of life lived by the people themselves must have been very different from that of the Wilton folk. This is shown by the fact that a number of special tools suitable for such a sea-coast existence have been discovered. It has been usual to describe the Kitchen Midden folk as "strand-loopers" and to consider them as somewhat different from the ordinary Bushmen; but in all probability we should rather talk of "strand-looping" than "strand-looper", and consider that we have to deal with a particular mode of life rather than a particular people. It would seem that for the most part the "strand-loopers" were really Bushmen who took to the seashore (Schapera

1926) and that they were really allied to the folk belonging to the Wilton culture'. Following his comments in 1935, Goodwin (1946) discussed pre-historic fishing methods in South Africa and their relation to shell midden sites. While concentrating on fishing, he nevertheless provided an interesting but brief insight into the variability of the food components of separate middens within open site localities near the Slang River mouth, Humansdorp district. 'About the edge of the lagoon are to be seen midden heaps, quite fresh and untrodden, and still standing in the natural conical heaps, 9 or 10 feet in diameter and 3 or 4 feet high, where the shells were originally thrown ... each separate shell heap is composed of a single type of shell, almost exclusively. Quite certainly this neat arrangement is fortuitous and merely reflects the way in which the midden makers consumed the available supplies of a particular shellfish from one source and then turned to another, alternating between rock mussels, periwinkles, sand mussels and back again. The eating sites in the lagoon were shifted at the same time so one heap yields sand mussels, a second rock mussels, a third periwinkles, a fourth Donax and so on. Near the mouth of the lagoon three shallow bowls of roughly built stone, each 3 feet in diameter and about the same distance apart, were used as fireplaces ... The abundance of ash and carbon shows that these were fireplaces, though at Slang River there is no local accumulation of midden, which would suggest that the cooked food was carried some 25 yards away for eating'. He also quoted from a letter sent to him by a Mr E. Pike of Great Brak River near Mossel Bay: "The shells also seem sorted out; at one place you will find a heap of Venus' Ear shells (Haliotis) of the large variety (about 5 inches or so) partly buried on the sand, but very worn, perhaps due to the actions of sand and wind. Then another heap will be of ordinary mussel and so on'. Goodwin recorded evidence he collected for the quantity of shell-fish consumed by an

individual at one meal. 'I have watched a man collect, cook and devour a petrol tin full of shell-fish. The bulk of the discarded shells therefore measured 5-sixths of a cubic foot. It is no uncommon sight to see this quantity of shell-fish being prepared for one individual and the quantity of edible fish contained in that volume of shell would not seem to be excessive for what may be the only meal of the day'. At the rate of consumption described it is quite clear that shellfish exploitation could produce a vast residual bulk very rapidly. Information of this type is also very important to the interpretation of shell midden accumulations in terms of the effective biomass they reflect. It is unfortunate, however, that no record of the species involved or the number of animals consumed, is given. Concerning tidal fish traps Goodwin suggested that they might be indirectly associated with shell midden sites immediately inland of them. Information on their age and resource potential could therefore be obtained from such sites. Based on evidence from Oakhurst Cave which Goodwin claimed (1938) demonstrated the beginning of inshore fishing during Wilton times, Goodwin considered the fish traps to be of Wilton and post-Wilton date.

In 1954 Rudner and Rudner (1954) presented evidence for what they termed the Sandy Bay Industry which they considered to be a local development of the late Smithfield Culture. This attempt to add some clarity to the variability found on open station shell midden sites is noteworthy, but requires substantiation. It is not yet known whether the Sandy Bay Industry represents a distinct cultural variation or an activity response. No stratigraphic information or date is available. From what is known it appears that the 'slug', the artefact characteristic of the industry, may well be 'the worn-out residuum of a different type, the convex scraper, which is known to occur in various sizes in almost all Late Stone Age

industries, as well as in earlier industries. Should this be demonstrated to be the case, then the evidence for yet another local variant would fall away and the industries would have to be classified according to their affinities elsewhere, (Inskeep 1967a: 570). On a functional level, in order to explain the presence of the characteristic type Rudner and Rudner (1954: 106) suggested that 'We are perhaps concerned with a people who at certain seasons or during drought periods came from inland to the coast to live on shellfish, and then only required certain of the implements they generally used'.

The following year Mabbutt et al (1955) published a detailed description of occurrences at Bok Baai in the Darling district. In his section on the geomorphology, Mabbutt (Mabbutt et al 1955: 85, fig. 2) illustrated the presence of stone hearths and pottery. In the archaeological section Rudner and Rudner (Mabbutt et al 1966: 87) described 'low middens of Mytilus shells with heaps of blackened stones, but no stone implements'. In another locality the 'middens consist mostly of Patella shells and contain much archaeological material'. A skeleton was also found 'lying on its right side in a contracted position and facing south. Artefacts found on the middens included a broken bored-stone, a small bored-disc, several unfinished bored-stones and discs, a broken reamer, several grooved sharpening stones of shale, many upper and lower grind stones, and a few peckers and fabricators ... several small blade cores were also found, but no finished implements, only some rough flakes of midden type and a few Middle Stone Age flakes brought from the ferricete site below. On the large midden were also found a bone arrow-head and two bone awls, and some pottery of typical Khoisan type ... The owner of the farm ... informed us that he found a fresh-looking spear-head of iron on this midden. A piece of glass ... is probably a fragment of a Dutch gin-bottle'. In the section

on the skeletal material Singer (Mabbutt et al. 1955: 93) concluded that the remains belonged to a 'young adult female Southern Bushman.' He also recorded the bones of 'Felis serval serval; ... Syncerus caffer caffer; an unidentifiable carnivore ... (probably hyaena).'

In 1958 Schoute-Vanneck (1958) published a careful description of the contents of shell middens relating to Bantu occupations on the Durban Bluff. The introduction contained an outline of the motivation for the study and the local environment in which the occurrences were situated. The following year Schoute-Vanneck and Walsh (1959) continued in the trend of providing more comprehensive description of material and context which appears to have gained momentum in the 1950's. Their description of shell middens at the Ingane River mouth is the first example of a carefully excavated and recorded open station shell midden site. Once again, the introduction includes a description of the local environment. The body of the publication contains a meticulous description of the midden and its components, and an attempt to demonstrate variability of shell and fish remains and stone artefacts with depth. Later in the same year Rudner and Rudner (1959) mentioned the occurrence of thin-walled pottery on Wilton sites in the Upington area. They equated this material with Khoisan pottery found on coastal middens, and associated by Schofield (1948) with the Hottentots.

In their description of archaeological sites along the southern coast of South West Africa, Rudner and Grattan-Bellew (1964) described open station shell midden sites containing microlithic industries of Wilton affinity and pottery. The Elizabeth Bay South midden, situated on the coast, combined mainly Lutraria, Patella and Mytilus shells. The authors commented that the potsherds seemed to represent one pot only and might relate to a later

date. The Claratal midden, located 1,6 km inland, contained Patella and Mytilus shells. Pottery occurred, but was only found on part of the site. They demonstrated variability between the proportions of microlithic implements, and within the tool classes found on the two sites. The Buntveldschuh midden, situated about 7 km inland, consisted mostly of Patella shells, but with some Mytilus and a few gastropod shells present. Typologically they described this site (Rudner & Grattan-Bellew 1964: 75) as 'showing a merging of the Elizabeth Bay South Industry with the Claratal Industry. The result is very reminiscent of the typical midden Wilton with pottery as we know it from the Cape, where we have also found engraved ostrich eggshells. No typical single crescents were, however, present'. The Chameis Spring midden, situated on the edge of the Chameis salt pan about 8 km inland, consisted mainly of Patella, Mytilus and snail shells. It was noted that very little cultural material occurred on this site and that finished tools were rare. Those found were all scrapers. They described the occurrence as a late development of the Claratal Industry. The Jammer Bay midden situated on the coast, consisted of 'several large heaps of very fresh-looking and unbroken Patella and Mytilus shells, on which artefacts, pottery, bones and ostrich eggshell pieces are found. The number of finished tools is very small. In the assemblage are hammerstones on pebbles, a trimming stone, two blade-cores, three core-, and four end- and side-scrapers and two ostrich eggshell beads. The main interest of this material is that it is the most recent and probably can be attributed to the last strandlopers of historical times'. Aware of the shortcomings inherent in their sequence based on typology and weathering, the authors, nevertheless, provided a useful working framework for the area they studied. To date, no additional information has been published to substantiate or modify this framework, although archaeologists are now considering such questions as relative date, activity variation and locality,

i.e. man/land relationships. In 1965 Van Noten (1965) conducted an excavation of the Gordon's Bay Midden, thereby providing the first stratified samples from an open station shell midden site in the southwestern Cape and the first series of absolute dates for open station shell midden occurrences. His preliminary paper was followed by a further publication with illustrations of the locality and finds (Van Noten 1967). The final report was unfortunately delayed by Editorial process and only appeared several years later (Van Noten 1974). Van Noten excavated a sequence of three occupation occurrences on the Gordon's Bay Midden and published the following radiocarbon dates (Van Noten 1965: 60):

1. GrN 4372 GB1 (L1, depth: 15-75 cm): 2700[±] 40 B.P.
2. GrN 4373 GB2 (L2, depth: 170-190 cm): 2980[±] 60 B.P.
3. GrN 4374 GB3 (L3b, depth: 265-275 cm): 3220[±] 55 B.P.

Although Shapiro (1934) mentioned the presence of pottery on some of the Gordon's Bay middens, it is not clear whether pottery can be associated with the dated samples. No pottery was found in Van Noten's excavation. He commented that the Rudners described material they collected from the surface of the mound as belonging to the Sandy Bay Industry and also concluded (1974) that the Gordon's Bay material had Smithfield affinities.

Inskip (1967b) commented on the fact that 'relatively little systematic work had been done in South Africa on fish, shellfish and Crustacea as elements of diet, and as reflectors of human activity. The papers which appear in this issue by Maggs and Speed on the excavations at Bonteberg and by Grindley on the crayfish remains, are therefore particularly welcome ... But much systematic research remains to be done; more questions are

raised than are answered. Just how much did the coastal dwellers in Later Stone Age times exploit the sea? Did they fish and collect all the year round, or was "fruta di mare" only a seasonal delicacy? What was the range of fishing techniques and devices in use? Did the marine contribution exceed the terrestrial in those coastal sites? The answers to the questions we have asked can only be found in the coastal caves and middens, and there is every indication that they can be found. But they will not be found easily, nor yet in the investigation of a single site. The more sites that are investigated the more certain and detailed will be the evidence. Because of this it seems likely that the quickest results would be obtained from open midden sites, which are more likely to be short-term occupations, which are generally more easily investigated than caves, and which are more abundant'. Although they do not fall within the scope of open station shell midden sites the publication of results from the Bonteberg Shelter (Maggs and Speed 1967; Grindley 1967) marked an important development in approach to the interpretation of coastal sites. Details for shell analysis were presented by Maggs and Speed while Grindley provided an excellent example of the advantages of an interdisciplinary approach to archaeological problems. Speed (1969) later produced a discussion on the problems of shell analysis.

In 1968 Rudner (1968) published a monograph on Strandlooper pottery from South Africa and South West Africa in which he described nearly all the pottery found along the coasts to that date. This useful report is now rapidly becoming out of date in some respects as additional distributional data and the dates for pottery from primary archaeological contexts are becoming available. It is to be hoped that this survey will be revised at some stage, taking in these new data, and those from inland sites as well.

With regard to cultural associations, Rudner provided tantalizingly vague but interesting comments on the variability of shellfish and artefact assemblages observed on midden sites. In the discussion he demonstrated the possible existence of stylistic evidence for movement both along the coast and between the coast and interior. He also recorded the locality of shell middens on the Berg River 24 km from the sea. The question of the definition of a shell midden is again brought to light. It is perhaps timely to suggest that careful note should be taken of the frequency of shellfish remains present in a site. To be defined as such a shell midden accumulation should consist of at least 60-70 per cent or more of shell. It could be predicted that shell content will drop off fairly quickly as the importance of marine shellfish as a resource changes inversely with distance from the sea. Under such circumstances the term midden would no longer be appropriate. In view of the variability and localized similarities Rudner found in coastal pottery it seems possible that suitable analyses could well be used to test the historical tribal distribution of herders, such as that described by Maingard (1931), with interesting results. Of interest in connection with the usage of the term Strandlooper is the following statement made by Rudner (1968: 593): 'Pottery from Strandlooper Type C2 has been collected in the painted shelters of the coastal belt from Vanrhynsdorp in the west to Albany district in the east ... In, for example, the famous Wilton Cave near Grahamstown a decorated pot neck of Type C2 was found in the Wilton deposit, but pottery of Bushman type is also said to have been found here'. In spite of the apparent contradiction, this occurrence, and others, may not be surprising if viewed in the light of hunter-gatherer clientship which will be discussed below. Differences, however, may still exist between herder and hunter-gatherer pottery sensu stricto. Identification of socio-economic affinities, however, may be very difficult if not impossible in

other contexts.

Deacon's (1970) contribution to the study of the ecology of the Strand-loopers did not describe open station contexts but is noteworthy for two reasons:

1. It firmly established the consideration of man/land relationships in archaeological method.
2. The information derived from that approach.

Two middens, located near to each other but overlooking different marine ecological niches, were excavated and the faunal contents, especially shellfish and fish, were examined in order to obtain information on coastal exploitation. Both components showed evidence of having been collected from restricted areas along the coastline, Site 1 near the mouth of a river and exposed to wave action and Site 2 in a more sheltered locality away from the influence of fresh water. This information correlated very well with the coastline immediately adjacent to the respective sites, indicating that exploitation took place within restricted areas and that selection was not marked. The fish sample provided similar information and the species composition, together with the discovery of stone sinkers provides clear evidence for line fishing as opposed to scavenging. Deacon concluded (1970: 47) that, 'it would seem that prehistoric groups were exploiting the food resources of the coastal habitat more efficiently than is apparent from the somewhat prejudiced observations recorded by seventeenth century writers'. With regard to seasonal visits to the coast, Deacon commented that there is "At present indeed little evidence for specialized groups occupying the coastal habitat exclusively in the south and east Cape at any period during the post-Pleistocene. The

persistent occurrence of marine shell fragments and ornaments in excavated caves and shelters within the mountains of the eastern portion of the Cape Folded Belt ... evidences regular contact if not movement between the coast and the immediate hinterland. This pattern was probably well established in the early post-Pleistocene ... and appears to have been a feature of the climax phase of the Wilton Culture that dominated the eastern Cape region between at least 5000 and 2500 years before the present ...'. Deacon also described an oral tradition which involved the seasonal movements of a hunter-gatherer group between the coast and a mountain habitat in the Langkloof. In 1968 Parkington began work at De Hangen, a project which was later to cover the coastline between the Berg and Olifants River mouths and inland to the Karoo. Parkington (Parkington and Poggenpoel 1971; Parkington 1972) has provided evidence for movement between the coast and interior and produced a convincing model for seasonal transhumance in the project area based on excavations at De Hangen and Elands Bay. In 1972 Derricourt (1972) published a preliminary report on his excavation of an open station shell midden site at the Chalumna River mouth, Eastern Cape. He recorded the occurrence of four stratified midden horizons. Derricourt (1973: 454) later published two dates for this site:

Pta - 734 Chulumna River Mouth, East London : CHE/RC1 from lowest midden level. Marine shell 2240 ± 60 B.P. (290 B.C.).

Pta - 718 Chulumna River Mouth, East London: CHE/RC3 third midden level (up). Marine shell 935 ± 55 (A.D. 1015).

He comments that the dates 'confirm the existence of "Strandloping" activity and open midden accumulation by the third century B.C. and the continuation of accumulation in a single favourable spot over a range of

time'. Pottery was present in the uppermost layer.

Schweitzer's work at Die Kelders Cave (Schweitzer 1970) had been progressing since 1969 and in 1973 Schweitzer and Scott (1973) published the first dated evidence for the early presence of domesticates and therefore herders in South Africa during Late Stone Age times by about 1500 B.P. Schweitzer (1975) commented that dogs were probably also present by that time. Prior to this the only domesticate recorded from an archaeological context was the undated occurrence of a dog buried with a male 'Bush Type' on a midden at Cape St Francis (Chappel 1969).

The work of Parkington and the dating of domesticate occurrences have led to a significant rearrangement of thought amongst archaeologists studying the post-Pleistocene period in the southwest Cape. Similar information is becoming available from other sites, both open and closed, in other areas. In 1972 Voigt published a report on a burial found exposed just south of Pearly Beach (Voigt 1972). M.O.V. Taylor (unpublished) undertook the excavation of a sample from a vast open station midden at Elands Bay. This material is now being analysed by Parkington and promises to provide data for comparison with the nearby Elands Bay Cave. Sampson (1974) attempted to synthesise available information on shell middens in general. Following the traditional descriptions he provided a brief historical development of midden studies, and was sceptical of the concept of transhumance. It is indeed unfortunate that although the book was published in 1974 Sampson appears unwilling to accept early evidence for coastal inland contacts and was unable to utilize the valuable contributions of Deacon, Klein, Inskeep and Parkington. Avery (1974) described preliminary information for open station shell midden occurrences in the Pearly Beach area. Comment was made on the presence of stone structures, and variation

in individual middens was recorded. He also discussed the use of tidal fish traps. Cairns (1975) published a report on a stone structure associated with open station shell middens at Cape St Francis. In the same year Thackeray and Feast (1975) described a skeleton with shell ornamentation from the same area.

From the foregoing it is clear that it is virtually impossible to define the term Strandlooper beyond the literal meaning. In view of ethnographic and physical evidence the suggestion Sampson (1974: 404) made that Strandlooper be defined in archaeological terms seems too simplistic. The very nature of the activities associated with coastal exploitation would tend to obscure hunter-gatherer living patterns and later the complex system of hunter-gather and herder interrelationships if viewed in isolation. Indeed ethnographic evidence suggests that it will only be under exceptional conditions that archaeological definition beyond the obvious economic level will be possible.

In the past work undertaken on open station sites and indeed even cave sites was object orientated. The tendency was to think of sites and the people who occupied them in isolation. Attempts were then made to fit very limited data into the broad picture which was being drawn for the South African Stone Ages. This has resulted in a confusion of types and cultural nomenclature for local industries which are even now poorly known in both time and space.

A few workers did, however, attempt to relate their observations to the indigenous populations and the environments in which they lived, albeit at a low level, and with little or no supporting data. The situation has now changed, and the tendency is the broader view, taking in a tremendous spectrum of variables concerned with human ecology. But the publications

of early workers should not be ignored. They contain a wealth of information, which provides a large part of the basis for present problem orientated research. The degree to which it will be substantiated remains largely to be seen, and will depend even then on the quality of observation made in the past. Even by 1975 there was very little advance in the solution of the problems Goodwin tabled in 1935. Indeed the hypothetical framework of current archaeological thought on coastal exploitation still revolves largely around the acute observation of a number of past workers.

CHAPTER 4ETHNOGRAPHY AND THE ARCHAEOLOGICAL PERSPECTIVE

The earliest records indicate that the western and southern Cape was inhabited by yellow-skinned people who were small and lightly built and spoke a language which made extensive use of clicks. By 1652 and before the early recorders became aware of the fact that different economic groups were to be encountered within this area, the term Hottentot was used rather loosely at times to refer to all indigenous people. Later, as the area was explored and the Europeans became more familiar with the various population groupings, the term reverted to the description of herding people although problems do occur from time to time. The indigenous terms Khoikhoi (Hottentot, herder) and San (Sonqua, Bushman, hunter-gatherer) are also confusing as they can mean different things to workers in different disciplines (Westphal 1963). For this reason, and in order to avoid such misunderstanding, the socio-economic descriptions hunter-gatherer and herder will be used in this discussion.

Archaeology and Ethnography

Previous discussions on problems concerning the exploitation patterns and mobility of prehistoric populations have described the activities of hunter-gatherers. Data for these studies were collected mainly from cave or rock-shelter occupation sites (MacNeish 1964; Shawcross 1967; Vita-Finzi & Higgs 1970; Carter 1970; Parkington 1972). Archaeological evidence shows that the southwestern and southern Cape was occupied by hunter-gatherers prior to the arrival of pottery and domesticates (Elands Bay Cave, J.E. Parkington, pers. comm.; Byeneskranskop, F.R. Schweitzer,

pers. comm.; Nelson Bay Cave, Klein 1974, R.R. Inskeep, pers. comm.; Melkhoutboom, H.J. Deacon 1969; Wilton, J. Deacon 1972). Similar information is becoming available from many other sites. With the introduction of the use of pottery and domestic animals circa 2000 B.P. (Klein 1974), it has become necessary to include the possibility that some sites were occupied by herders. It is also assumed that herding activities effected shifts in existing hunter-gatherer exploitation patterns as competition for resources increased (J. Deacon 1972; H.J. Deacon 1974; Schweitzer 1975; Avery 1975). Archaeological evidence presented by Parkington (1972) indicated that hunter-gatherers visited the Elands Bay coast sometime during winter or early spring.

Klein (1974) also suggested a winter occupation for the Nelson Bay hunter-gatherers and Schweitzer (1975) presented evidence supporting occupation of Die Kelders cave between May and September in occupations earlier than those including sheep remains. During the latter period he suggested that herders occupied the site for periods between May and November. Without losing sight of the fact that the change from hunter-gatherer to herder must have been gradual, it seems unlikely on the basis of the discussion below that herders would have occupied a cave site. An alternative interpretation, that the sheep represent the booty of hunter-gatherer raiders, seems a more likely possibility. Under these circumstances the site could be described as being situated in an area peripheral to that occupied by herders. The presence of herders at or near the coast would, however, support the contention that the later occupations at Die Kelders extended into summer.

In order to place these observations in perspective, an attempt will be made to relate the distribution and man/land relationships of hunter-

gatherers and herders in time and space by means of data extracted from historical records. Ideally, a study of the ethnographic sources concerning the situation existing at the time of European contact should provide a framework which could serve as a starting point from which the investigation may extrapolate back into the past to determine how the indigenous population utilised the land and its resources and how this exploitation pattern affected such aspects as group size, site location and mobility among the various socio-economic groups. Practical utility of such a framework in the examination of problems arising out of early accounts of economic and social systems is inevitably restricted to the limits of what is preserved in archaeological contexts and to the degree that this data can be recovered and tested by the methods used in archaeology.

It will become apparent, however, that early sources do not provide anything approaching a complete picture of herder/hunter interaction, economy and mobility. Observation was by no means regular or directed at the problems with which archaeologists concern themselves. There are instead a tantalizingly limited series of observations into what was almost certainly a far more complex system than emerges. But as Schapera (1933: iv) comments 'A survey of their contents shows that actually they contain a good deal of the information we still wish to have about primitive peoples in general'.

The lack of detail and even accuracy results in there being several problems involved in the use of ethnographic information to provide a framework for application to archaeological problems (Shawcross 1970). For instance, although it is sometimes clear that certain food-types are important in various areas at different times, the relative importance of

the different food components is never discussed; nor are areas compared. In fact, the over-emphasis of some aspects tends to result in a wrong impression being given of the importance of some components. The Fishermen were considered to be Hottentots with cattle but no sheep, when in fact they are later described as hunter-gatherers who had stolen cattle from herders (Thom 1954, Vol. 1: 127, 305). After contact, the modification and break-down of the existing system took place at a relatively rapid pace so that by the time the need for more careful observation was realized, such changes as the shifting of resource emphasis and the movement of populations had already begun to take place as European settlers continued to spread outwards, causing the indigenous inhabitants to be either absorbed into the new system or to be driven out of the optimum areas into resource areas ever decreasing in size and potential. This in itself initiated adaptations. Thus generalisations based on early or even more recent ethnographic sources should be applied with caution and in the face of rigid testing of problems where comparable situations may have existed in the past. With these limitations in mind it is, nevertheless, still possible to build up a useful body of data on the ecology of the indigenous populations of the western Cape.

Recently more general social anthropological research into the principles and processes involved in aboriginal living patterns has made the meaning and significance of such ethnographic and archaeological observations clearer. It has been found that while important differences do exist between hunter-gatherer societies throughout the world, some basic similarities occur consistently (Lee & De Vore 1968; Dumas 1969). Parkington (1972) has emphasised the importance of such a basic hunter-gatherer structure in studies of the recent prehistory of the southwestern Cape. He discussed characteristics which broadly include the hunter-

gatherer's wide knowledge of resources and their exploitation. This exploitation included the hunting of game by males and the gathering of plant foods and small, less mobile, ground animals such as tortoises, lizards, snails or shellfish by females. He described the manner in which flexibility contributed to the mechanism of such living patterns. This resulted in a pattern which provided 'a series of alternative strategies and thus ensures against the failure of a particular food resource' (Parkington 1972: 226).

Following Parkington's model we should expect that 'the hunters had an intimate knowledge of the edible plantfoods, where to collect them and when they became available, and we would imagine that the women made such collections. It could be supposed that they moved constantly from site to site, not aimlessly, but in a regular beat designed to provide a varied diet and to exploit the resources of a territory. Territories would not have been rigidly defined nor defended, but probably included a range of different ecosystems thus ensuring a variety of food stuffs and a spread throughout the year. It could be predicted that the bulk of the diet was collected and that meat was an important aspect of the diet but by no means a staple. Stimulus to move on would come from a scarcity of plant foods rather than hunted meat' (Parkington 1972: 226-227). It seems likely in coastal contexts that the exploitation of shellfish replaced plant foods as a reliable staple (Deacon 1972). Parkington (1972) has documented this at Elands Bay Cave.

The fact that herding is considered to have been implanted on an existing hunter-gatherer system in South Africa results in a great deal of similarity between the two socio-economic groups. As such the model may be applied to herders to some extent although changes will have taken

place in response to herder activities. In order to separate hunter-gatherers and herders it will be necessary to find differences between the two groups which are likely to be visible in the archaeological record.

The Indigenous Population

(i) Review of evidence from early travellers

The indigenous people of the Cape were first observed along the coast by Portuguese explorers of the 15th Century. Both Diaz and Da Gama mentioned contact with swarthy-skinned peoples with cattle at Mossel Bay. Da Gama also described a group at St Helena Bay, but without mention of any domesticated other than the dog (Axelson 1954: 3). It was not until the 17th Century, however, that the presence of two economic groups, one being herder, could be inferred from an entry by Mundy in 1634: 'refreshing to be had in former tyme vizt. beefe, sheepe, etts ... but now not to be procured ... Theis that are hereabouts (by report) are of a baser sort and live in feare of others called Saldania men, who are further in the Land.' (Raven-Hart 1967: 140-141). Mendelslo who visited the Cape in 1639 clarified the position by a description of the inhabitants of the country. 'Some which live very miserably by the waterside, but without ships or boats. They live on herbs, roots and fishes, and especially on the dead whales which are cast ashore by storms, which must serve as their best food. They are called the Watermen, because they live by the shore. The other sort, which live further inland are called Solthanimen, from which this bight is called Solthani Bay (sic). They live somewhat better than the Watermen. They also do not cultivate the soil, which is excellent and rich and produces all sorts of ground- and tree-fruits. But they have lovely cattle, sheep, and goats'. (Raven-Hart 1967: 152). (Solthani Bay = Table Bay).

The Watermen later became known as Strandloopers, by reason of their way of living by exploiting shore resources. Such was the position when Van Riebeeck landed at the Cape in 1652 with a view to establishing a supply station for the Dutch East India Company, although he loosely refers to the local inhabitants as Hottentots. Herry, the head of the original group named the Watermen, added another group to the list in describing the local population and its movements to Van Riebeeck: 'this Table Valley was annually visited by 3 tribes of peoples, similar in dress and customs, one is called the Strandloopers, or as they call themselves, in the broken English they have learned, Watermen, because they live on mussels which they find on the rocks and some roots from the earth. As far as we have observed they are not above 40 or 50 in number, and in any case, have no cattle. The second kind are those from Saldanha, called by them Saldanhamen, who arrive here every year with countless cattle and sheep. The third kind were called by him Fishermen, who, after the departure of the Saldanhamen arrive here with cattle only and no sheep, and who subsist by fishing, without boats, from the rocks with little fishing lines. On this they were very keen. The Watermen and Saldanhamen ... are continually at war with these Fishermen (about 400-500 strong) ... these Fishermen were always travelling in secret and hiding from the Saldanhamen not daring to make fires like the Saldanhamen ... for ... the Saldanhamen (whose numbers are countless) ... always sought to catch them; and of this the Fishermen were greatly afraid. They lived beyond the mountains east of the Cape towards the Bay de Sambras' (Thom 1954. Vol. 1: 80). (Bay de Sambras = Mossel Bay). A further cultural group was discovered by Jan Wintervogel while on an exploratory trip into the interior (Thom 1954 Vol. 1: 305). These men reported that they had been inland about 50 miles to the north from here, where they had come across a certain people of very small stature, subsisting very meagrely, quite wild, without huts,

cattle or anything in the world, clad in small skins like these Hottentots and speaking almost as they do ... Our men had also met some Souquas, named Fishermen, who had no cattle and were enemies of the Watermen and Saldanhamen!

Thus within the first three years of Van Riebeeck's arrival at the Cape it is recorded that the local indigenous population is made up of four cultural groups with differing living patterns, which involve some kind of rotational movement: coastal collectors, herders with cattle and sheep, coastal fishermen with cattle only, and inland hunter-gatherers without cattle or sheep. It seems, however, that misconceptions were already apparent in this situation. The term Strandlooper was first used by early Dutch callers at the Cape synonymously for the Watermen, a small group of coastal dwellers living in Table Bay. Thereafter it took on ethnic identify and, although no parallel group seems to have been found, was applied indiscriminately to any cattleless person or persons observed on the coast. The name and usage persisted to the present in spite of a later report that members of the original Watermen/Strandlooper group were not a distinct people.

The term Watermen refers only to Herry and his group who lived in the vicinity of the Cape Peninsula. There is evidence to show that this group, also known as the Goringhaikona, had originally been herders. For some unknown reason they had been exiled from the Goringhaiquas under Gogosoa thereby losing their herds and being forced to live a purely strandlooping existence at the coast (Maingard 1931: 492). Later, when the opportunity presented itself, they acquired cattle at the Dutch East India Company's expense and reverted to a herding way of life (Moodie 1960: 94). The possibility therefore exists that the Strandloopers in

general were herders who had lost their stock. An interesting comment, however, is made in Van Riebeeck's Journal (Thom 1954. Vol. 1: 297) where reference is made to a group of Strandloopers being more difficult to understand than the herders. It is not made clear, however, whether this group was different in other ways. Furthermore, the communication difficulties could simply reflect a new group unfamiliar with the ways of the Dutch who usually relied on the help of people such as Herry for translation. This does not provide evidence for such activities, but the possibility that the hunter-gatherers also made use of coastal resources cannot be excluded.

Herry told Van Riebeeck that the Fishermen, who were called Sonqua by the Saldanhas lived on nothing but what they had stolen from the Saldanhas who consequently hunted them down at every opportunity (Thom 1954. Vol. 1: 127). In his report Wintervogel also equated the Sonqua (inland hunter-gatherers) and the Fishermen (Thom 1954. Vol. 1: 305). He mentioned that the Fishermen were not always seen with cattle. Records show that those who had cattle had stolen them from the herders (Thom 1954. Vol. 1: 127). It is well known that the Sonqua were in the habit of stealing cattle from the herders. It would appear, then, that the Fishermen were in fact Sonqua hunter-gatherers who moved to the coast at fixed times during the year, sometimes driving stolen herds with them. In such circumstances hunters could readily fall into the category of Strandloopers. Schapera (1926) in discussing the relationship between Bushmen and Hottentots concluded that 'The so-called Strandloopers appear to be nothing more than Bushmen, who lived along the southern and western coasts ... The use of the word "Strandlooper" is undesirable, as the latent implication that they form a distinct group is not justified. If it is necessary to have a special term for these people, the name "Coast

Bushmen" is quite adequate'. Although it shows a considerable advance in thinking, this view is perhaps too simplistic. There may well have been groups of hunter-gatherers subsisting at the coast, but he did not consider the existence of a dynamic system involving regular trans-humance between the coast and the interior as discussed by Parkington (1972), or the fact that herders are known to have exploited marine resources when their annual movements brought them to the coast (Thom 1954. Vol. 1: 176; Schapera 1933: 57).

It is also interesting to note that sometimes there seems to have been no clear cut distinction between hunters and herders. An intermediate situation appears to have existed in the form of clientship whereby men without stock served stockowners in return for which they received food (Moodie 1960: 327, 342, 353). In 1685 Simon van der Stel commented in his journal that 'these Sonquas are just the same as the poor in Europe, each tribe of Hottentots having some of them and employing them to bring news of the approach of a strange tribe. They steal nothing from the kraals of their employers, but regularly from other kraals, whether it be war or peace' (Waterhouse 1932: 122).

Wilson (1970b: 12) stated that 'It is through this institution of clientship that hunters are gradually transformed into herders, for hunters, living on their own, are very slow to change their manner of life. When hunger presses they eat what comes to hand'. Elphick (1974) illustrated a complex gradation between Khoi and San. He showed how Hottentot groups having lost their stock existed as hunter-gatherers or Strandloopers and documented records of Sonqua with considerable cattle holdings. He contended that the use of the term Sonqua, which was given by the Hottentots to hunter-gatherers and renegades, had therefore a widespread application.

He concluded (Elphick 1974 : 70) that 'the rigid classification must be replaced with a dynamic model of interaction which can explain the seemingly irregular variation of culture traits among the Khoisan'. Elphick based his identification of intermediate groups as hunter-gatherer cattle-keepers on the presence of the bow and arrow. The assumption that herders did not possess these weapons at the time of contact seems unlikely, however, in view of what is now becoming known about Khoisan origins. The assumption is probably based on Maingard (1932) who postulated that Hottentots received the bow and arrow from the hunters. It is true that the earliest contacts recorded herders with spears only. Axelson (1954: 7) quoted from the voyage of Da Gama, however, stating that 'it is the custom of these men for the youths to remain with their arms in the bush, but the men came to talk to us ... We saw the youths moving about in the bush, ducking down, and carrying arms in their hands'. This practice was not taken into consideration by Maingard or Elphick (1974: 15) and such weapons could have remained hidden and therefore unrecorded. Elphick's (1974: 59-60) identification of some groups as Sonqua cattle-keepers can be doubted, therefore, and the possibility exists that these observations describe the inland equivalents of Herry's group of Strandloopers who stole cattle in order to resume a herding way of life. These comments are not intended to argue against the process, merely some of the evidence; there were doubtlessly hunter-gatherers who kept cattle temporarily after raids, as the evidence indicates, and the process of acculturation cannot be ignored. On the other hand it is noteworthy that the so-called San groups who were cattle keepers were living in the open. It is suggested here that development from hunter to herder required a) clientship, either by treaty or physical proximity to a herder encampment, b) the acquisition of sufficient cattle, by raiding or as payment for services rendered, to

enable the group to become independent, c) a consequent increase in group size, and d) a willingness to adopt the herder way of life, moving about in the open in order to provide protection and supplies of water and grazing suitable for the needs of stock. At this stage the hunter became a herder.

An extremely fluid economic and social system appears to have operated during the period under review, not only within hunter or herder groups in the form of changes in group size and mobility, but also between socio-economic or cultural groups. If these assumptions are true then complexities lie not in a large number of cultural groups living within a small area, but in the widely differing living patterns available to a smaller number of cultural groups. At the coast, then, marine resources and not social grouping would have been the crucial criterion in strandlooping activities.

The possibility of identifying intermediate socio-economic situations in the archaeological record is doubtlessly extremely remote especially while so little is known about hunter living patterns and the adaptations and shifts which should theoretically arise in situations where the complexities of both hunting and herding systems and their interrelationships need to be tested. What is required first is a series of criteria whereby it will be possible to test situations within the socio-economic range which can be interpreted as either hunter-gatherer or herder. If this is achieved it may become possible to examine the broader system. Although the case for there being groups living purely a Strandlooper type of existence must be investigated, it seems clear that the indigenous inhabitants of the Cape range between two main cultural groups, namely

hunter-gatherers and herders. As a part of the rotational movement that seems apparent in the exploitation of the country, both major groups reached the coast at times, whereupon a strandlooping kind of existence was sometimes adopted as part of or a complement to the living pattern of such a group. That the movements of some groups did not include visits to the coast is apparent in the fact that hunter-gatherers also inhabited the interior parts of South Africa; at some point the coast ceases to be a potential resource. On the question of permanent coastal occupation J.F. Brock (pers. comm.) commented that trace element deficiencies excepting iodine were not considered to have important effects on man. A move from inland to the iodine-rich coast would be favourable, while a move from the coast was likely to be neither unfavourable nor necessary as man was infinitely adaptable to different foods and could, therefore, easily make up the necessary nutrient balance.

The problem is clearly far more complex than when it was originally supposed that language, economy and physical type were inextricably linked (Wilson 1970a: 43). The hypothesis that herders spoke Khoikhoi and were physically different to hunters who spoke San is no longer tenable. The diversity of economy has already been indicated while linguistic studies of the so-called Khoikhoi and San languages (Westphal 1963) have clearly demonstrated the dangers involved in using such criteria as constants in the classification of primitive societies. Westphal's study (1963: 252) revealed that some groups who spoke Khoikhoi languages lived by hunting and gathering, while some San speakers lived by herding. Wilson (1970a) argued that adaptation to particular environments and activities was not correlated with language usage or physical type. She quoted Hahn (1881: 101) who wrote that 'the poor Namaquas are also called

by the others, Bushmen, especially when they are servants, or lead a Bushman's life, and have no cattle and sheep'. Wilson (1970a: 43) added that 'There were small groups of hunters scattered throughout the country. Some living on the desert; some spoke a San language, i.e. a language peculiar to hunters; others Khoikhoi. Adaptation to the desert was not correlated with one type of language rather than another, and there is no reason to suppose that fishing was either'.

ii) Description of way of life

Hunter-gatherers and herder ways of living will be illustrated from early accounts in order to provide information on similarities and differences which might provide criteria for archaeological interpretation.

a) Hunter-gatherers

Ship-wrecked Portuguese met possible hunter-gatherers on the eastern Cape coast near the River Infante in the 17th Century who 'spoke with clicks. They go naked and only wear a few skins. They sow no grain, and live only on roots, the produce of the chase, and some shell fish when they come down to the shore ... their arms are of fire-hardened wood and a few iron assegais' (Theal 1902. Vol. 8: 307). Although this description omits the presence of cattle the likelihood exists that they were impoverished Gonaqua Hottentots living as hunter-gatherers and Strandloopers (Maingard 1931).

In 1663 (Thom 1954. Vol. 3: 299-300) a party exploring to the north of the settlement 'had come across a poverty-stricken band of tiny people,

who had helped them to cross the first range and had been very friendly to them, giving them some honey and dried fish. These small people, who have already been encountered somewhat nearer here by previous exploring parties live in a state of poverty in shabby, low huts made of branches ... They are well provided with bows and arrows, and they are adept at using these for shooting all kinds of game for food. Honey also forms part of their diet'.

In 1668 Dapper (Schapera 1933: 31) described the hunter-gatherers as 'The Sonquas are a people dwelling in massive mountainous country. They number several thousands and are very small in size, both men and women. They have no cattle, but live by shooting rock-rabbits with the bow and arrow, which they use with remarkable skill ... they also go out hunting big game, especially wild horses and mules ... The meat of the rock-rabbit constitutes a pleasant food for the Sonquas, who live principally on it and certain roots growing in the ground. They also keep many hunting dogs, trained to hunt the rock-rabbit ... They are extremely great plunderers and marauders. They steal from other Hottentots all the cattle they can get, with which they then flee immediately to the mountains, where they cannot be found in their retreats and hidden caves by anybody, not even by other Hottentots ... their huts, made only of branches twined together, without woven mats, and covered solely with rushes are several thousand in number; for they move about from one place to another, and never break up the huts, but erect still others wherever they camp'. Sparrman (1786. Vol. 1: 197, 201) adds further information. 'There is another species of Hottentots, who have got the name boshies-men, from dwelling in woody or mountainous places ... The dwellings of these foes to a pastoral life are generally not more

agreeable, than their maxims and manners ... bushes and clifts in rock by turns serve them instead of houses ... they are obliged to wander about over hills and dales after certain wild roots, berries and plants'.

W. Paterson (1790: 59) who travelled through the northern Cape in 1779 recorded while in the interior that 'we saw several natives approaching, armed with bows and arrows, whom we supposed to be Bush Hottentots ... One, who spoke Dutch, told me that they had no cattle, and that they lived upon roots and gums; and sometimes feasted on an antelope, which they occasionally shot with their poisoned arrows.' Along the coast near the Orange River mouth Paterson (1790: 109) 'observed the print of human feet, which appeared to be fresh. Upon this we resolved to pursue the tracks, and on our way saw several snares laid for the wild beasts. After travelling about five miles to the northward we perceived some of the natives on a sandy hillock, about one mile from us ... We continued to follow their path which brought us to their habitation ... the whole family immediately betook themselves to flight, except a little dog ... Here we stayed some time and examined their huts (Plates 1 and 2). In them we found several species of aromatic plants which they had been drying, with the intention of mixing them up with grease, to form an ointment which they use as we do perfume; this ointment they call Buche. We found also a few skins of seals, which are used for garments, and called kerosé. Their huts were much superior to those of the generality of Hottentots; they were loftier, and thatched with grass; and were furnished with stools made of the back bones of the Grampus. Several species of fish were suspended from poles stuck into the ground ... They were eleven in number, and were the only natives who inhabited this part of the country. We enquired after other natives, but they could

give us no account, except of the Nimiquas, whence we had just come. A Nimiqua woman who lived with them, was the only one of the company who knew anything of Europeans. Though few in number they were governed by a chief whose name was Cout. The mode of living among these people was in the highest degree wretched; and they are apparently the dirtiest of all the Hottentot tribes. Their dress is composed of the skins of seals and jackals, the flesh of which they eat. When it happens that a Grampus is cast ashore, they remove their huts to the place, and subsist upon it as long as any part of it remains; and in this manner it sometimes affords them sustenance for half a year, though in a great measure decayed and putrified by the sun ... They carry their water in the shells of ostrich eggs and the bladders of seals, which they shoot with bows. Their arrows are the same as those of all the other Hottentots ... As we observed a great number of huts along the shore which were uninhabited, and yet found only eleven persons dwelling in this part of the country, we conjectured that by some accident several of these people had perished. Those that remain are distinguished by the name of the Shore Bushmen'. Paterson's description, coupled with the drawings of Col. Gordon who accompanied him, provided by far the most complete description of a group living by strandlooping. Although Gordon's caption described them as Coast Bushmen, it is interesting to note that the version of Plate 2 which is reproduced in Paterson (1790) refers to Hottentots living at the mouth of the Orange River. Furthermore, the presence of a Namaqua woman and the fact that the group was led by a chieftain suggests that these people had been herders, perhaps in the same manner as Herry and his group at the Cape. The description of their way of life, however, clearly placed them in the category of hunter-gatherers. Dart (1955) described the remnants of what was reported to have been a large body of Strandloopers. The small group were clients

of a group of Topnaar Hottentots who allowed them to travel annually to the coast about 120 km away. Here they were able to subsist for several months on the narras fruit which was then ripe on coastal dunes, and sea food which was especially common on the rocks at river mouths.

This description suggests that, like Herry's, there were other groups who were known to have made specific use of coastal resources.

Unfortunately nothing is known of the seasonal movements of the original group. It is interesting to note that the Topnaars had not allowed their clients to visit the coast for three years 'because of the bad seasons' (Dart 1955: 179). This might represent indirect evidence for the need to move seasonally, if coastal occupation was dependent on the food and moisture supplied by the narras.

b) Herders

Portuguese sailors shipwrecked on the eastern Cape coast also met herder groups who were described as follows (Theal 1902. Vol. 8: 76-78). "These negroes are whiter than mulattoes ... they brought as a present an ox ... and a leather bag of milk ... they make clicks with their mouths ... The inhabitants lived solely upon shell-fish, certain roots found in the earth and the produce of the chase'. Herein lies the principal difference and similarities between hunter-gatherers and herders; the herder possessed cattle and drank milk, yet in spite of this both groups subsisted mostly on foods which were hunted and gathered. This aspect was elaborated upon by Dapper (Schapera 1933: 55) who stated that they eat little by way of vegetables, except for certain species of bulbs as big as ground nuts.

'This is their daily provender, which the women go every day to dig from

the rivers and other places and then eat cooked or roasted. They slaughter no cattle for food, except those which owing to sickness, old age or lameness are unable to follow the hunt; nor any sheep, except when two people get married ... When they find no dead animals they look along the shore for dead fish, and for limpets, periwinkles and oysters. They also delight in the flesh of sea-doggs or seals, which they kill at night with sticks when these beasts come by thousands to the beach ... They are likewise no strangers to the blubber of whales and other sea monsters which are now and then washed upon shore ... The Saldanhas or Kochoquas and other neighbouring Hottentots live in the dry summer time on their cattle, but in the winter on certain roots growing in the ground during the rainy season ... Many of the Hottentots ... hunt as a means of livelihood ... they live ... in huts made of some sticks bent over crooked and ranged in a circle, and covered over with reed mats ...'

Sparman (1786. Vol. 1: 194-197) described herder habitations. 'Their habitations are as simple as their dress, and equally adapted to the wandering pastoral life they lead in those parts ... in a Hottentot's kraal, or village, the huts are all built exactly alike ... Every hut is disposed in the following manner. Some of them are of a circular and others of an oblong shape, resembling a round beehive or a vault. The ground-plot is from eighteen to twenty-four feet in diameter. The highest of them are so low, that even in the centre of the arch, it is scarcely ever possible for a middle-sized man to stand upright ... The fireplace is in the middle of each hut, by which means the walls are not so much exposed to danger from fire ... The frame of this arched roof ... is composed of slender rods or sprays of trees ... Large mats are then placed very neatly over this lattice-work ... These mats are made

of a kind of cane or reed ... When a Hottentot has in mind to take his house down and remove his dwelling, he lays all his mats, skins and sprays on the backs of his cattle ... The order or distribution of these huts in a kraal or clan, is most frequently in the form of a circle with the doors inwards; by this means a kind of yard or court is formed, where the cattle is kept on nights ...'

iii) Distribution

While the herders have totally disappeared as a socio-economic group and their previous distribution is no longer apparent, even that of the living hunter-gatherer groups bears no resemblance to the extent of their previous territories. If it is accepted that prior to the introduction of herding the inhabitable parts of the country were occupied purely by hunter-gatherers then demographic changes could be expected to have taken place as the concept of herding was accepted by parts of the population and a herding pattern was slowly implanted. As in other sections, care should be exercised when making use of historical records as sources of the past distribution of herders and hunters. The observations recorded generally are isolated and separated in space and time. It has been stated that a rather fluid socio-economic system existed among the indigenous populations of the southwestern and southern Cape at the contact period. Within a very short time thereafter it became clear that demographic changes were beginning to take place in response to the lure of the settlers' metal, tobacco, trinkets and alcohol. The subsequent expansion of the settlement and colonization resulted in the ultimate breakdown of the indigenous system. Maingard (1931) commented for instance on the mistake made by Kolben (1733) who described the visiting

Chainouquas as having their territory in the vicinity of the Cape of Good Hope, whereas in fact they lived further east between the Hottentots Holland mountains and the Breede River.

The early travellers in the southwestern Cape frequently recorded that the hunter-gatherers occupied the inland mountain ranges such as the Cedarberg (Moodie 1960: 26; Thom 1954. Vol. 3: 315, 348), the Groot Drakenstein mountains (Theal 1897. Vol. 1: 352), the Hottentots Holland mountains (Theal 1897. Vol. 1: 352), and the Riviersonderend mountains (Krüger 1965: 21) from which they descended periodically to steal stock. The herders, on the other hand, occupied the coastal plains and only extended inland in rare instances when grazing was good. Schapera (1933: v) commented that 'The early Dutch settlers found the Hottentots thinly scattered in small loosely-organized groups all along the western and southern coasts of the country. Later expeditions revealed their presence beyond the Orange River to the north, and as far as the Kei River in the east, although nowhere had they penetrated far inland'.

Little is known of hunter-gatherer territories, but many writers have described the various territories occupied by herder tribes. In a critical synthesis of the available information Maingard (1931) showed very clearly how the Hottentot tribes were distributed mainly along the Coastal Foreland while the mountain strongholds were occupied by the Bushmen (Fig. 3) during the 17th Century.

Competition for land and resources was very likely to have become an issue as herder groups moved in to make use of the good grazing occurring on the Coastal Foreland and their numbers increased. Many hunter-

gatherer groups were actually expelled from the best grazing areas and forced to retreat to peripheral mountainous areas from which they carried out periodic food gathering raids on herder stock, an activity which led to further depredations on them. It is also clear, however, that a carefully integrated system existed which in some cases allowed non-aggressive hunter-gatherer and herder interaction and the continuation of hunter-gatherer movement between the mountains and plains and the coast. Where enmity existed between herder and hunter groups early records indicate the possibility that hunters moved into and occupied coastal areas after the herders had moved on in their search for pastures. The seasonal visit of the hunter-gatherers called Fishermen to Table Bay took place after the departure of the Saldanhas (Thom 1954. Vol. 1: 80). A similar situation may be inferred at Saldanha Bay where Strandloopers, owning no cattle, are recorded as living at the coast after the departure of the Saldanhas for Table Bay (Thom 1954. Vol. 1: 185-186).

Paterson (1790: 114-117) observed Shore Bosmen at the mouth of the Orange River. Van Der Stel's expedition of 1685 (Waterhouse 1932: 147) saw only Sonquas on the west-coast shore near the Buffels River and inland near the Berg River (Waterhouse 1932: 117). In 1597 Vasco da Gama observed hunter-gatherers at St Helena Bay (Axelson 1954: 3) (near the Berg River Mouth). Hunter-gatherers were reported inland along the Breede River in 1679 (Moodie 1960: 370). Deacon (1969: 163) recorded the existence of an oral tradition which described the seasonal movement of hunter-gatherers between the Langkloof and Tsitsikama coast. Thus Wilson (1970b: 5) said that "From the sixteenth century and almost certainly from much earlier there was no exclusive occupation of territory by herders, or hunters; repeatedly we have evidence that their terrain overlapped."

Hypothetical Differences and Archaeological Context

The possibilities and problems of identifying hunter-gatherers and herders from the archaeological record rest on two assumptions -

- a) that the addition of herding activities to a hunting and gathering economy would produce changes, and
- b) that some of these might generate differences which might be expressed in forms visible and intelligible to archaeologists.

Although at face value hunters and herders represent two distinct socio-economic systems, the problem lies in the fact that because herding practice was added to a basic hunting and gathering system very little difference is expected to emerge from the archaeological record. Both the hunter-gatherers and herders fit the hunter-gatherer model, although herding clearly added certain advantages and some constraints in the case of herder societies. Food resources supplied by domestic stock in the form of milk products, and to some degree meat, provided herders with a permanent food base which hunter-gatherers did not have. Consequently it was possible for herder groups to become much larger than hunter-gatherers although flexibility still existed. In spite of this, however, ownership of stock placed certain restrictions upon living patterns. Being larger, herder groups were probably required to be even more mobile than hunter-gatherers in their search for sufficient food for their own consumption. The need for good grazing and sufficient water for their stock, however, must certainly have been the most important factor motivating the course of the annual beat. Gijssels (Raven-Hart 1967: 148) who visited Table Bay in February 1638 recorded from Herry 'that it was not now the season to

have any cattle, since the herbage on the plain was burnt up by the sun and therefore no cattle could be kept there at that time.' Discussing the Naman of dry South West Africa, Hoernlé (1923: 514) stated that 'a good supply of fodder and water are the true essentials of their existence ... it is water which must be the first thought in planning any settlement, or in deciding on any trek, and the quantity of water available will determine the number which can settle in any one spot and the length of time during which they can stay there.' Their habitations were portable, being transported upon cattle, and were usually erected in the form of a circle in order to provide protection for the stock at night. In addition, certain wooden utensils not found in hunter-gatherer technology were used to deal with dairy products. It seems, therefore, that important differences were to be found between hunter-gatherers and herders although archaeological criteria which could be exclusively tied to herding must be found. It is important to note, however, that such observations reflect conditions at the time of European contact; the earliest herders may well have differed.

i) Physical Type

For a long time the herders and hunter-gathers of Southern Africa were separated into two distinct physical types on the basis of external and skeletal observations. Later, however, the tendency was to accept the likelihood that no distinct types existed. Tobias (1955) commented that not all people practising a Hottentot culture were physically alike and concluded that no one Hottentot physical type could be distinguished. He did suggest, however, that shortness of stature was a physical asset to a hunter, as well as being admired by the women, and that therefore

cultural selection favoured shortness (Tobias 1960).

Serological (Nurse 1973) and linguistic studies have shown the Khoikhoi and San to be distinct at those particular levels. Tobias (1975: 76) quoted Jenkins as having found evidence for San being a distinct race in Southern Africa for 15 - 2000 years. Jenkins (1973) commented that the possibility that Khoikhoi could be included in the same race remained to be established. Wilson (1970a: 47) noted that 'there is a marked similarity in the techniques and material culture of all the hunters and herders, and some similarity in their religious ideas which argues long interaction; but there are also cleavages as between painters and non-painters.'

The old hypothesis that Khoikhoi herders migrated from East Africa is now being questioned. The evidence of physical and social anthropology, genetics and archaeology indicate that the herders were more likely to have formed part of a basic hunter-gatherer population living throughout East and Southern Africa before contact was made with stock-owners and cultural changes took place (Inskeep 1970: 24; Wilson 1970a: 47). No distinct physical type can yet be agreed upon. Moreover, it is doubtful that physical type, if determined, would provide a useful criterion at a socio-economic level.

ii) Material Culture

Bökönyi (1969: 211) suggested that the following characteristics would invariably identify an assemblage as pastoralist:

- (a) the presence of domesticated animal bones

- (b) The presence of art objects associated with domesticated animals
- (c) The presence of items of material culture associated with herding.

The mere presence of domesticated animal bones might well have been the most obvious criterion for identification if stock raiding had not been so prevalent among the hunter-gatherers. In view of this, however, this evidence must be excluded, unless additional supporting evidence can be found. The existence of art objects other than painted stones and decorated bone work has not been recorded from Late Stone Age contexts. They have not been recorded historically either and it seems unlikely that this factor will ever become a consideration in South Africa.

Because both hunter-gatherers and herders have basically similar economies it is assumed that the similarities will be reflected in their material cultures. Schapera (1926) came to this conclusion but added that wooden vessels and skins were used as milk containers by Hottentots in the nineteenth century. Preservation of such materials in the archaeological record is likely to be limited to exceptional circumstances. Furthermore, as in the case of pottery, the possibility that hunter-gatherers also possessed these objects cannot be ruled out. The institution of clientship could easily account for their presence in hunter-gatherer sites. Herein may lie the solution to the problems Rudner (1968: 595, 596) experienced concerning the differences between Strandlooper, Hottentot and Bushman pottery in the southwestern Cape. The introduction and use of tidal fish traps by herders has been suggested by Avery (1975). This observation has not been conclusively demonstrated yet and the flexible

inter-relationship between hunter-gatherers and herders may have allowed for hunter-gatherer use of traps when herders were elsewhere. Material remains from herder camp sites could look essentially like those from hunter sites. A combination of the similarities between hunter-gatherers and herders and the mobile nature of their way of life makes it impossible to use criteria which have proved valuable elsewhere in identifying more sedentary groups.

iii) Group Size

As mentioned above herder groups were generally much larger than those of hunter-gatherers. Available evidence for hunter-gatherers suggests that size varied from as few as about 10 members to as many as 80 (Thom 1954; Stow 1905). An average of about 20 - 30 seems to be more realistic. Maggs (1967), using rock art data, estimated that the average hunter-gatherer band ranged from 12 to 20 people. Herders, on the other hand, moved about in large groups or hordes made up of a single clan or parts thereof. Dapper (Schapera 1937: 23) described the Saldanhas as living in 15 or 16 camps a quarter of an hour's distance apart with 400 - 500 huts all told. A single camp of Saldanhas is described in Thom (1954 Vol. 1: 101) as consisting of 15 huts, 250 men, women and children, and 1500-1600 cattle, and sheep besides. Tachard (Strangman 1936: 190-191), recording the description of the journey of some survivors of a ship wrecked along the Agulhas coast in April 1686, wrote that 'These folk proved to be three or four Hottentots ... they turned and marched forward ... pointing ... to three or four wretched huts that stood on a hill. When we arrived at the foot of this hill they would not permit us to go any nearer to their huts. There was a little side-track along which they led us

towards another village ... When we reached this village, which consisted of about forty huts covered with branches of trees, where there might be four or five hundred persons, they then ... approached us ... we implored them ... to sell us some of their oxen or sheep which we saw grazing in large numbers on the plain.' This reference apparently provides an example of the clientship situation. With regard to coastal occupation it is clear, therefore, that both herders and their clients, who might be hunter-gatherers, could conceivably have lived together at the same time. Kolben (1738. Vol. 1: 218) wrote of Hottentot kraals: 'I have seen Hundreds of Kraals, and never one that consisted of less than Twenty Huts. There are many so large that the Huts are not easily counted: And it is, in the Eye of a Hottentot, a very contemptible Kraal that contains not more than a Hundred Souls. The Generality of the Kraals contain each from Three Hundred to Four Hundred Souls. Some contain above Five Hundred. On the Area of a Kraal they can and do sometimes lodge several Thousands of Small Cattle: Now, since the Huts are always built as close as possible to one another, in order to keep the Cattle in, the reader will easily conceive, there can be no inconsiderable Number of Huts in such a Kraal ...' The frontispiece of Sparrman (1786), however, shows a herder encampment of only 8 huts. This could represent artistic licence or the degeneration of herder society, but the possibility cannot be excluded that smaller groups existed as Kolben himself indicated. The more extreme situations, described during the first years of contact, are, however, more likely to be useful in archaeological contexts.

Herry's group of Strandloopers was about 20 strong when first recorded in 1647 (Raven Hart 1967: 169). In 1652 they numbered 40 - 50 (Thom 1954. Vol. 1: 80). In 1666 Commander Wagenaar (Moodie 1960: 291) commented

that their number had risen from 30 at his arrival to over 80, including women and children. The flexibility of numbers is noteworthy and probably related to European contact. The earlier total of 20 members is perhaps a better reflection of the original size of the group and perhaps the carrying capacity of the area they exploited. The size of herder groups would preclude occupation of all but a very few of the rock shelters which have been excavated or exist. The possibility that herders would occupy caves or rock shelters is lessened even further by their need for protection. Schweitzer (1974) suggested that Die Kelders Cave was occupied by herders at the time when the sheep remains were deposited, on the basis of herd composition and certain material cultural shifts. It seems, however, that the sexing of indigenous sheep on the basis of horns alone could be ambiguous, as Epstein (1937: 638) commented of Hottentot sheep that 'The ewes are mostly hornless.' The possibility that ewes could have horns should therefore be borne in mind. Furthermore, a raided flock should in fact reflect herder flock composition. Moreover, very little is known about the technology of coastal hunter-gatherers and herders. Interpretation of the significance of apparent cultural changes is likely to prove extremely complicated in view of problems concerning variation caused by activity differences and the possibility of hunter-gatherer/herder inter-relationships. It appears reasonable, therefore, to assume from the start that herder groups occupied open sites on which they erected their portable huts for shelter and protection. Open sites were, however, occupied by both herders and hunter-gatherers. Wilson (1970a) commented that 'No matter how wide the territory they occupy, or how much individual families may have to scatter during drought to find food, when a band moves as a group the members camp and build their shelters close together.' Barrow (1801: 275)

described a Bushman encampment of 25 huts, each about three feet high and four feet wide. Sparrman (1786) described the diameter of Hottentot huts as being from 18 to 24 feet. The number of habitations erected for a single occupation shows considerable overlap although the pattern of arrangement and individual plan size of huts seem to show significant variation in ideal form. In practice again, not all herder encampments were necessarily of circular arrangement. Lye (1975: 52) showed a Korana kraal of only 7 huts, scattered as expected of a hunter-gatherer encampment. The Korana had been displaced from their traditional territory by this time, which might account for the apparent departure from the norm. Sydow (1973), however, commented that he had observed the remains of what he identified as Topnaar Hottentot kraals in both circular and dispersed form on the coast. E.M. Shaw (pers. comm.) indicated that hunter habitations could also achieve a roughly circular plan. In such cases the plan size of huts might represent the only criterion for archaeological identification.

iv) Site Location

It may be predicted that the successful operation of two socio-economic systems should require different location strategies (Clarke 1968: 503). It is known that a) in order to follow the resources which they require, both hunter-gatherers and herders conduct exploitation strategies which cover large areas along a regular annual beat, b) both hunter-gatherers and herders utilized coastal resources at times, and c) the possibility could still exist that either hunters or herders may have lived purely by strandlooping. This would have been possible for humans (J.F. Brock, pers. comm.). In view of the marked detrimental effect coastal trace

element deficiencies have on stock, however, it would be essential for herders to move to alternative grazing inland after relatively short periods of coastal occupation.

If it is assumed then that both herders and hunter-gatherers followed regular annual beats (Thom 1954. Vol. 1: 80) and 'Assuming that the physical environment is structured and that culture as an adaptive system articulates with it, then the subsistence economy and the closely linked settlement pattern should reflect this environment. Plant, animal and soil resources are differentially distributed and so are cultural activities related to them' (Streuver 1971: 11), then it should be possible to determine the location of essential resources and to relate them to cultural activities. Humphreys (1972: 80) suggested that the following would be the essential requirements of all sites: a) water supply, b) food resources, c) fuel for fire, d) facilities for artificial or natural cover and e) raw materials for tools or artefacts. All five elements are required by hunter-gatherers and herders.

Hunter-gatherer groups, being small and mobile, were able to plan exploitation strategies which could take in a great variety of different resources covering large tracts of land. Herder groups on the other hand were essentially much larger and had large stock holdings to take care of. These additional requirements place a qualitative load on herder requirements. Thus herders could only occupy localities which could provide sufficient basic staples for consumption by a large number of members. In addition to this, grazing and water supplies would need to be accessible and large enough to supply the needs of the stock. Thus site location might provide some basis for the identification of herder groups.

This, however, could not without supporting evidence exclude the possibility that hunter-gatherer groups, requiring the same basic resources, would utilize the same localities as herders.

v) Grazing Systems

a) Background and Evidence

If stock holdings place a qualitative load on herder site location, it should be useful to examine modern grazing systems with a view to relating them to the indigenous populations.

Rowland (1933: 307) commented on the importance and seasonal limitation of the water supply on the numbers and natural movement of grazing animals in the Potgietersrus district. 'The grazing animals relied for their water upon the natural drinking places of which there were two main types: permanent watering places, by no means evenly distributed, and often at distances greater than ten miles from each other; and watering places which were used in summer, but which dried up in winter. These were far more numerous and were comparatively evenly distributed over the whole area. In winter, therefore, since so many natural watering places dried up, the area of land available for grazing was definitely limited, since cattle, and to a large extent game also, do not graze much further than five miles from water ... Another factor ... the veldtype, controlled these still further. There are three main veld types, differentiated on the grounds of seasonal palatability, the sour, the sweet, and the mixed veld.'

Although the southwestern Cape receives winter rainfall, there exists a

similar rotation of seasonal palatability which is affected further by mineral deficiencies in the various soil types. All sections of the Fynbos produce grazing, but the quality and quantity vary considerably. Thus the Mountain Fynbos found mainly on Table Mountain Sandstone soils is 'mostly sour and unpalatable and is only readily grazed by small stock in the young, sprouting stage subsequent to burning. As practised in the past, and present, this pastoral usage is slowly but surely eliminating much of the flora. This is caused by the cropping, especially by sheep, of the young plants, particularly those which are aromatic - and not essentially by fires' (Wood 1975: 1). The clayey soils of the Coastal Foreland produce good grazing which is sweet for part of the year, but which becomes dry and unpalatable during the summer months when water is absent over most of the countryside, except along widely spaced water courses. For instance, Erharta longiflora, a winter annual grass, found on granitic or shaley rocks, occurs through the winter months to early summer (November) affording excellent grazing inland (J. Rourke, pers. comm.). The lime-rich marine soils along the coasts produce sweet grazing, some of which is perennial where wet enough conditions occur. Perennial streams do cross the sandveld in places and in the eastern parts large vleis hold water throughout the year providing water and grazing at a time when they are extremely sparse inland. Summer fog conditions supplement moisture over large parts of the coastal belt and keep pasturage green and palatable. J. Rourke (pers. comm.) says that Agropyron distichum, a perennial grass, occurs within one kilometre of the coast on driftsands, providing excellent grazing which is available during summer as well as winter. In addition, the seeds make good eating for humans.

Taylor (1972: 14) commented that 'Farmers have known for centuries that their stock need the sweetveld of the coast as a change from the mountain

sourveld. Indeed there is evidence that, before the Cape was settled, game trekked seasonally from mountain to shore in search of this alternative diet. So we can expect the coastal vegetation to be different. Yet it is still fynbos. The restioid element, if generally less conspicuous, still forms the matrix of the ground layer, and the ericoid element is very much in evidence. Many of these fine leaved plants are quite bushy and rounded in form, often scattered as a discontinuous upper layer. There are more grasses, most of which are nutritious and palatable, hence the good grazing.' Such conditions would provide good supplies of grass and the small edible bushes which form nutritional essentials for stock (Tidmarsh 1957).

Van der Merwe and Perold (1967: 361; F.J. van der Merwe, pers. comm.) showed that 'pastures in the western Cape coastal area are generally deficient in copper and cobalt ... On the acid, leached, sandy soils of T.M.S. origin on the foothills of the western Cape Mountains ... the cobalt status of the pastures is too low.' Cobalt deficiencies cause appetite depression and consequent starvation of animals and copper deficiencies cause various nervous disorders which also result in death, if the deficiencies are not compensated for in time. The lack of sufficient traces of calcium, phosphorous and copper in the Table Mountain Sandstone regions cause bone deficiencies which can cripple or kill animals. Coastal pastures are extremely susceptible to cobalt deficiencies which are aggravated by the fact that the lime concentration retards plant intake of the small trace of this mineral which is present, resulting in slow starvation known as dune sickness.

Deficiency symptoms develop after exposure for any period of longer than two to three months. Modern pastoral farming systems along the Coastal

Foreland make use of dietary supplements and fodder. But seasonal rotation of animals between the interior and the coast has long been practised in the southwestern Cape and, taking Taylor's comment a step further, may well derive from human adaptation to the movements of grazing animals, first for hunting purposes and later for herding.

Information on present and past grazing systems was requested from a number of farmers within the research area. Replies proved to be extremely interesting, and showed without exception that in the winter rainfall area of the Caledon and Bredasdorp districts, coastal grazing was utilized during the summer months after which animals were returned to inland or rûens farms on the Coastal Foreland. The grazing system reported for the Heidelberg district east of Swellendam which falls within the summer rainfall area was completely different. Here the process was reversed and coastal pastures were utilized during winter. It was noted that the indigenous stock breeds were hardy and well adapted to the conditions under which they lived. They could survive on very little food. Water, however, was essential, and its effect on stock and vegetation was considered to be perhaps the most important factor governing grazing systems. Although the area is apparently experiencing a dry phase in the climatic cycle, it was formerly much wetter and old inhabitants still remember the excellent summer grazing on the dune-veld and dunes. Coastal habitation would have been within a few miles of the sea, not far from a permanent drinking-water supply. Grazing would have been over a fairly small area around habitations as it was necessary to kraal animals at night for their protection. Rowland (1933) gave a distance of about eight kilometres as the maximum distance stock will move to find water. Under modern conditions stock require changes of grazing areas at intervals

of as little as one week in order to provide the variety of food and nutrients required. In the past stock moved unheeded across the veld. For the research area a regular rotational grazing system was not only necessary, but has been practised since the advent of European pastoralists who learnt the system from the indigenous herders from whom they obtained stock. But the system operating in this area cannot be taken to be the general rule for herding communities in the southwestern Cape. It has been noted that the grazing system for the summer rainfall area is seasonally reversed, although rotation still exists. The strandveld north of Cape Town becomes progressively drier and dry season surface water very scarce. Differences are likely to exist in these regions with coastal occupation by herders being restricted to spring or early summer while water was still to be found and grazing relatively green. Thereafter, with the grazing dried out and burnt, summer occupation would have to be confined to areas straddling perennial river courses and their estuaries.

b) Herder Grazing System

This shift in seasonal water and grazing availability can be seen in the annual movements of the Saldanhas down the coast to Table Bay, from which they moved eastwards across the dry Cape Flats to the coast at The Strand and Gordons Bay where the weather conditions in the vicinity of the Hottentots Holland range provided water and grazing. Thereafter they moved inland along the mountains and across the Coastal Foreland before returning to Saldanha Bay by April.

In the journal kept on an exploratory trip to Saldanha Bay in November 1652 (Thom 1954, Vol. 1: 96) the book-keeper reported that they 'Again saw the Saldanha people burning fires and feared that they would leave if we

delayed ... Asked them whether they had any oxen or boebas, to which one of them ... replied saying: Caep, Caep. From this we understood that they had left with the boebas, sheep and wares, there being nothing here (as they showed us) to eat for them and the cattle. We firmly believe that they would remain there or wherever it was green until the country here, which has fine plains, once more became suitable for grazing.'

On the 19 October 'a few natives from Saldanha arrived at the gate requesting speech with the captain (meaning the Commander) ... bringing news and intelligence that within 4 or 5 days all the Saldaniers with wives and children and thousands of cattle, elephants' tusks and musk, would arrive' (Thom 1954. Vol. 1: 75). By the 24 December 'Our men reported that many Saldanhars had already left with their cattle' (Thom 1954. Vol. 1: 118). On the 9 January 'Our men returned ... reporting that all the Saldanhars with their camps and cattle had departed in an easterly direction towards the bay de Sambras, whither - Herry explained to us - they trekked every year and from there across the country to the west again, returning hither via the bay of Saldanha ... sheep and cattle had been obtained from the captain of those Saldanhars who had been the first to come to us; and who are now encamped all by themselves a good 7 or 8 miles due east from here almost on the beach. They number about 80 able-bodied men, living in 16 huts, and having with them 500 or 500 extraordinarily fine cattle ... and approximately 2 000 equally fine sheep ... Discussing the departure of the Saldanhars with Herry, we learnt from him that we need not expect them back before next year ... But as soon as the Saldanhars ... who are always moving short distances with their cattle from one good pasture to another, had moved far away enough, the Fishermen ... would come' (Thom 1954. Vol. 1: 126).

It is not clear whether the Saldanhas actually went to Bay de Sambras, or

whether this is simply directional information given by Herry. It seems unlikely, however, as areas to the east of the Hottentots Holland (Fig.3) were occupied by other Hottentot groups. Furthermore, grazing was likely to have been minimal in inland areas at this time of the year. The Saldanhas (Cochoqua) were considered to be subordinate to the Chainouquas who occupied the area immediately east of the Hottentots Holland. The possibility could exist that the Saldanhas moved into the areas in order to pay tribute. In terms of time, it should be noted that they are reported to have been at Saldanha Bay by March/April (Thom 1954. Vol. 1: 176). It seems that the time allowed after leaving Table Bay is not great enough although herders are known to be extremely mobile. It is suggested, therefore, that the Saldanhas travelled to the Hottentots Holland, after which they moved north west following suitable grazing, until they again reached the Saldanha Bay area.

The Saldanhas' grazing system, therefore, illustrates a pattern of the utilization of changing coastal and inland grazing conditions. In the Saldanha Bay/St. Helena Bay districts shale-and-granite-derived soils extend down to the coast line over large areas. The Saldanhas could therefore spend more time at the coast, without trace element deficiency problems. It is known that such problems do exist but they are localized and related to areas of surface limestone (Schulz et al 1951). Constant moving about the area ensured a balanced intake of the necessary nutrients. In the Bredasdorp district it is interesting to note that survivors of the Nossa Senhora de los Milagros saw herders inland during April (Strangman 1936) in what is estimated to have been the Elim area, where the Nuwejaars River flows. Their journey from this kraal to the coast took a morning, which is well beyond the 2 hour limit set by Vita-Finzi and

Higgs (1970). On occasions when their journey took them to the coast they do not record sighting any indigenous peoples. Not all herder groups rotated between the interior and the coast. It is recorded that the herder groups living inland in the vicinity of the Tygerberg hills could remain there throughout the year because there was always enough grazing and water (Waterhouse 1932: 114). In January 1660, the Caepmans were at war with the Dutch East India Company and had moved to the Saldanha area but wished to return to the Cape to make peace. 'They said it was their birth place, and their own land, full of pure water, after which their hearts always longed, that in Saldanha Bay all was dry and brackish; and that Oadasoa would not allow them to lie on the best places and rivers' (Moodie 1960: 198). It was therefore possible for herders to spend the dry summer in the Saldanha area, but only in extremis. Rotation emerges as a system of conservation for the following season.

Although there were slight overlaps it is indicated from the historical record that hunter-gatherers did not come down to the coast at Table Bay or Saldanha while the herders were in occupation. Dates given in Tables 2 and 3 show that they consistently arrived after the herders had left. Herry was the first to document this when he described the annual movements of people at the Cape (Thom 1954. Vol. 1: 80). Several groups of herders made use of the varying grazing conditions of the Cape Peninsula and it would be difficult to predict the rotation of hunter-gatherers and herders for an area more extensive than Table Bay. Herry and his group of Strandloopers complicate the picture, but before 1652 had been accustomed to move away, behind Table Mountain when herders or hunter-gatherers arrived.

TABLE 2HISTORICAL SEASONAL DISTRIBUTION : HUNTER-GATHERERS

Date	Place observed at	Reference	Remarks
8-15 Nov 1495	St Helena Bay	Axelson: 3	
9 Jan 1653	Cape Peninsula	Thom vol. 1	Reference to fact that Sonqua would arrive after Saldanhars had left.
6 March 1654	Near Fort ?	Thom vol.1: 218	Herry's allies said they had been attacked by Sonqua
10 Feb 1655	Cape Peninsula	Thom vol.1: 292	Had some cattle, were causing trouble in forest and road
2-3 April 1655	Interior to north	Thom vol.1: 305	Wintervogel's meeting with Sonqua
30 May 1655	Beyond Salt River	Thom vol.1: 313	Herry's allies pursued by Saldanhars from interior, robbed by Sonqua
1 Aug 1655	Cape Peninsula	Thom vol.1: 334	Kaapmans say that they have seen Sonquas
14 July 1656	Table Bay	Thom vol.2: 49	Sonqua chasing Kaapmen along beach
7 March 1659	Berg River Mouth (near)	Thom vol.3: 24	Freeburgers helped by Sonqua
14 Dec 1660	Interior to north	Thom vol.3: 299	Travellers helped by Sonqua to cross mountains
4 Feb 1661	Beyond Ribeecks Casteel	Thom vol.3: 345	P. Cruijthof Journey Sonquas
7 Feb 1661	Little Berg River	Thom vol.3: ,345	P. Cruijthof Journey Sonquas
12 Feb 1661	Near Olifants River Mountain Crossing	Thom vol.3: 348	P. Cruijthof Journey Sonquas

TABLE 2 - Continued

Date	Place observed at	Reference	Remarks
15 Feb 1661	Olifants River	Thom vol. 3: 349	P. Cruijthof Journey Sonquas
1 April 1661	Olifants River	Thom vol. 3: 377	P. Meerhof Journey Sonquas
5 April 1661	Olifants River	Thom vol. 3: 379	P. Meerhof Journey Sonquas
10 April 1661	Olifants River	Thom vol. 3: 381	P. Meerhof Journey Sonquas
12 April 1661	Olifants River	Thom vol. 3: 382	P. Meerhof Journey Sonquas
7 Sept 1679	Breede River (inland)	Moodie vol.4: 370	Cattle stolen by Sonqua living on river
4 Sept 1685	Berg River (in- land)	Waterhouse: 117, 118	Sonquas who lived near Piketberg
1-2 Oct 1685	Groot Doornbosch River (inland)	Waterhouse: 128	Sonquas seen (clients of Amaqua)
7 Dec 1685	Buffels River (shore)	Waterhouse: 147	Van der Stel saw Sonquas captured one
7 Dec 1685	Buffels River ($\frac{1}{2}$ mile inland)	Waterhouse: 147	Kraal of Sonqua seen

TABLE 3

HISTORICAL SEASONAL DISTRIBUTION : STRANDLOOPERS

Date	Place observed at	Reference	Remarks
26, 27, 31 Nov - 2 Dec 1652	Saldanha Bay	Thom vol. 1: 93	Daily observations. <u>Gap of 5 days during which no natives seen</u>
15 Jan 1653	Saldanha Bay	Thom vol. 1: 134	
18 Jan 1653	Saldanha Bay	Thom vol. 1: 135	
*22 Oct 1653	Saldanha Bay	Thom vol. 1: 185	*Letter written on that date
*19 Dec 1654 - 3 Jan 1655	Saldanha Bay	Thom vol. 1: 283	*actual date was saw Strandloopers for 10 days before 3 Jan when letter was written
*17 Feb - 5 March 1655	Saldanha Bay	Thom vol. 1: 295, 297	*Actual date † 20 Feb - 1 March Strand- looper with stolen cattle
24 Oct 1655	Near Gordons Bay	Thom vol. 1: 353	referred to as Strand- loopers who had been seen at fort in past
*21 Oct - 7 Nov 1659	Saldanha Bay	Thom vol. 3: 152	*Actual date probably between 23-5 Nov 1659
* 9-23 Mar 1660	Saldanha Bay	Thom vol. 3: 188, 193	*Actual date would have been † 11-21 March 1660
* 10 July 1660	Saldanha Bay	Thom vol. 3: 243	*Had been there since at least mid June. But no previous ref- erence to Strand- loopers.

On modern evidence it seems, however, that rotation within the Caledon and Bredasdorp districts would have been more strictly controlled by water and grazing factors. The existence of occupied rock shelters within six kilometres of the coast indicates that hunter-gatherers also exploited coastal resources. It seems reasonable to predict that herder coastal occupation took place during the summer months and that hunter-gatherers exploited the coastline at times when the herders were inland. Archaeologically this means that coastal occupation identified as having taken place during summer would relate to herders. Hunter-gatherers, however, doubtlessly lived on the coast as well as in rock shelters. Furthermore, the presence of hunter-gatherer clients could complicate the situation. Following the hypothesis being presented here, seasonal evidence would be required to confirm the type of occupation. In order to cover the possibilities that all-year occupation by one or other socio-economic group or unseasonal occupation could have taken place, it is still necessary to find criteria with which to identify herders and hunter-gatherers specifically.

vi) Burial Practices

Burials occur frequently on open station midden sites, although few well-documented skeletons are on record. There is, however, evidence that different burial methods were employed. Most bodies appear to have been buried in a flexed position, some skeletons being found lying on their sides while others were clearly seated. Although historical records differ slightly in detail, all records of herder burial which were consulted describe the body as being buried in a flexed-seated position. Bodies were placed into a small recess at the bottom of a 1-1,3 m grave, which was then filled in and covered with a pile of stones as a protection against

predators (Schapera 1930: 1933). Stow (1905: 126) recorded Arbousset's description of hunter-gatherer burial customs. 'His relatives rolled him up in his kaross and carried him out, by removing the back of his hut ... "The dead were first anointed with red powder mixed with melted fat, and then they were coarsely embalmed. The friends of the deceased attended the funeral, and laid the body on its side in an oblong pit" ... His bow and staff were deposited in the grave by his side. His face was placed towards the rising sun'. He comments that although Arbousset does not record the use of stones as a protection, this was nevertheless practised by most. This being the case, and certainly all cave burials have been described as flexed-lying on side, the method of burial could conceivably be used as a criterion for identifying hunter-gatherer or herder burials and through them the occupations they were associated with. As yet, however, this represents rather tenuous evidence, especially in view of the social overlapping which has been described. In view of this it is not proposed to make use of this possibility until further information becomes available.

CHAPTER 5

EXPECTATIONS AND VARIABLES

Following along the lines of Parkington's model for hunter-gatherer coastal usage and using information on herders which was collected from ethnographic sources, it is possible to form a hypothetical framework for the study of coastal occupation. It is assumed that coastal exploitation formed part of the seasonal round of at least some indigenous groups and that this phenomenon should be observable in the archaeological record.

While it is clear that a complete social gradation existed at the time of European contact, and probably for some time before this, it is assumed from an archaeological point of view and for the purposes of this study that only two basic socio-economic systems were operating, namely hunter-gathering and herding. Although intermediate situations representing clientship or the process of acculturation may be encountered, it is not yet clear whether they would be recognisable as entities distinct from the basic systems.

It has not been possible to arrive at clear-cut criteria for the specific distinction of hunter-gatherer and herder occupations and it remains to be seen whether archaeological investigation will reveal any information. In spite of this problem, however, certain predictions regarding the system which could have operated in prehistoric times can be made on archaeological and ecological grounds. Thus, whereas hunter-gatherers could theoretically occupy the coast throughout the year, this seems unlikely in view of what is known of their exploitation strategies. Herder occupation of coastal areas was also most likely to have been seasonal,

covering periods when inland water and grazing supplies were at their minimum. Furthermore, trace element deficiencies, which affect stock, are likely to have limited coastal occupation to short periods of not more than two or three months. Occupation at any single locality would probably have been restricted to an even shorter period due to the constant need to follow grazing supplies. While herders occupied the coast, hunter-gatherers would have been restricted to peripheral inland or even coastal areas. Raiding of herder stock could have been undertaken from such stations.

Details of coastal exploitation are largely unknown. Previous studies suggest that shellfish formed the dietary staple, although other marine and terrestrial animals were utilised. It has further been suggested that coastal exploitation was geared to the tidal cycle (See Appendix II). Determination of the shellfish species represented in midden samples, together with their contribution to the total meat mass involved, should provide evidence concerning the validity of these postulations. Shellfish species exploited should be related to zonation found in the intertidal zones. Zonation is related to the tidal cycle and should provide a measure for testing the hypothesis that exploitation was geared to the occurrence of spring tides which allowed access not only to the total intertidal zone but also to the subtidal zone which contained animals with maximum meat yield per individual. It should be possible to establish the contribution of other faunal components by comparison with the shellfish. Information obtained from site localities examined and the samples taken from middens should provide some evidence for testing hypotheses concerning seasonal activities and movement.

Following the preliminary report written on this project (Appendix II) the

distribution of the various midden types, namely Haliotis, Turbo and Oxystele Patella Turbo and the stone features situated around them should be relevant to coastal occupation. It should be possible to test for the existence of some correlation between tidal fish traps and shell middens perhaps through a study of the quantities and species of fish represented (Appendix III).

Since middens represent the refuse dumps resulting from human occupation, they should constitute only a portion of the total area over which an occupation might have extended; other habitation features, perhaps in the form of huts, windbreaks or hearths (cooking areas) would have been situated within the occupation area but apart from the dumps. On the basis of this assumption and earlier publications, there seems to be definite potential in the location and investigation of such features.

It emerges that a basic assumption in the study rests on the expectation that the shell middens and other habitation features are directly associated and represent contemporaneous features in more or less original form. It must be noted, however, that a serious problem is attached to this assumption as it is virtually impossible to demonstrate the contemporaneity of individual middens and the features around them. The theoretical definition of an occupation area is, therefore, difficult to apply in practice. Even with these limitations in mind it is still considered likely that evidence on patterning will emerge from the distribution plans and samples taken. In order to lessen the problem, sampling was only undertaken on middens containing, or considered to be associated with, pottery. The use of metrical information on midden sizes and the relative distances between middens and other habitation

features is considered to have limited application in the localities studied due to the effects of erosion and driftsand. Erosion results in the deflation of midden deposits often causing dispersal and destruction of features. Driftsand movement and the Department of Forestry's stabilisation programme have obscured large areas which are assumed to contain midden material.

In summary, it is postulated that the study of open station shell midden sites will provide information on a wide range of aspects concerning coastal occupation, many of which were commented on by earlier workers, but with little substantiating evidence. It is also postulated that evidence on coastal occupation and exploitation will be linked to socio-economic systems which have been demonstrated in the model for seasonal transhumance.

SECTION 8CHAPTER 6RESEARCH AREA

The research area (Fig.4) is situated between Kleinmond ($34^{\circ}21'S$, $19^{\circ}02'E$) and Cape Agulhas ($34^{\circ}50'S$, $20^{\circ}01'E$). The Cape Folded Belt forms a natural boundary to the north and west (Cape Hangklip) of the research area. The southeast limit does not represent a natural boundary and was selected for convenience. The area shows considerable variation in elevation ranging from sea level to 1000 m on the highest points of the Cape Folded Mountains further inland. The coastal zone consists of a low-lying plain up to 100 m in altitude which ranges from about 500 m along the mountainous zone north of Kleinmond to approximately 6 km near Pearly Beach. East of Cape Agulhas the coastal plain widens to as much as 20 km and is bounded inland by mountains of Table Mountain Sandstone and in some cases ridges of Bredasdorp Limestone which reach altitudes of 250 m. In some areas the coastal lowlands extend inland for considerable distances where Tertiary erosion cut into the shales, forming valleys which may contain Bredasdorp Limestone and recent aeolian deposits. Seasonal rivers which hold some water throughout the year, although sometimes only in the form of pools, flow to the sea via these low-lying areas. Sand bar formation has blocked the mouths of the Bot River, Onrust River and Klein River where large vleis occur. The Palmiet and Uilenkraal Rivers discharge straight into the sea while smaller streams such as the Hagelkraal and Rietel Rivers cross the coastal sands but only break through the low dune barriers to reach the sea in exceptional circumstances. Perennial water is also available at the coast in the form of springs where fresh water flows out at the inter-

face between the limestone and underlying Table Mountain Sandstone. Such springs are readily visible as runnels in the sand at mid-tide level, and water can be obtained by digging shallow holes where they occur. There is, therefore, no shortage of fresh water along the coast although larger supplies are only available along the rivers, streams and vleis. The occurrence of summer fogs provides coastal precipitation which ensures that the vegetation which would otherwise dry out remains green during the dry season, enhancing the grazing potential of the area for both game and domesticates.

Approximately 60 percent of the coastline is made up of Table Mountain Sandstone in the form of rocks and gullies. A small granite outcrop occurs in the Pearly Beach area. The remaining 40 percent is made up of sandy beaches which are up to a maximum of 16 km in length but are usually no longer than 1 - 5 km.

In the context of the research area it is only necessary to consider soils on a broad basis because, although finer subdivisions do occur, they do not affect the situation significantly. The coastal plain is made up of sandy calcareous soils with driftsand occurring in some areas along the coast. Clayey concentrations occur along river and stream courses. Clayey soils, derived from underlying shales, extend coastwards where valley formation has exposed them in areas such as the Bot River valley. Other occurrences are found in the Klein River valley, Uilenkraal River valley, the Boesmans River valley which extends into the inland shale areas and the Hagelkraal River valley at the inland extend of the coastal plain. The mountainous boundaries, excluding the limestone ridges, are made up of sandy soils derived from Table Mountain Sandstone. As described above, vegetation

varies with soil type. The vegetation of the area has been depleted by human activity and driftsand movement. J. Acocks (pers. comm.) commented that in the past the driftsand areas would have been more stable and better bushed with more Sideroxylon inerme (Milkwood) stands, such as survive at Pearly Beach and Die Dam, to provide shelter. River valleys would have been covered by reed swamps. Inland, the Rhenosterveld of the Caledon and Bredasdorp areas, was probably grassland. He also suggested that the Fynbos was probably much grassier than it is now, and that there was a definite post-burn grassland stage in the succession. Wet flats were likely to have been covered with reed swamps and big grasses like Hemarthria altissima (Rooigras) and Andropogon appendiculatus (Blue Grass) and sedges like Scirpus littoralis (Steekbiesie), S. maritimus (Steekbiesie) and Cladium mariscus (Sedge). Forests were likely to have been more extensive than the small relics which survive now. Vegetation extends down to the coast except where driftsand areas exist and it has been noted that the extent of driftsand areas was probably far less in the past (Avery 1974). Thus, although coastal occupation often appears to have taken place on dunes in driftsand areas, the occurrence of root casts and humified horizons indicates that some occupation was actually on vegetated areas, probably consisting of small trees, bush and grass. Trees such as Sideroxylon inerme (Milkwood) and Euklea spp. (Ghwarrie) would have provided good shelter. Although veld-burning is documented for hunter-gatherers and herders (Wilson 1970a : 49; Thom 1954. Vol. 3 : 112) and could have been responsible for reductions in bush and forest distribution, Wood's (1975) comments on the effects of stock should not be disregarded (see Chapter 4). Acocks further suggested that, in the past, the area had provided a richer habitat with niches for larger game. Open grassland would have been available for the big antelopes, forests and scrub for elephants and rhino, as well as small antelopes and

swamps would have provided habitats suitable for hippo. The occurrence of grazing on the coast, especially during the dry summer, can be expected to have had an effect on animals such as Equus spp. (Zebra), Alcelaphus caama (Hartebeest) and Damaliscus dorcas (Bontebok) which require good quality grazing. These animals are known to follow grazing during dry periods and it is possible (R.G. Bigalke pers. comm.) that the occurrence of good grazing and water in coastal areas, especially where shale-derived soils extended coastwards, could have attracted these animals during summer. Syncerus caffer (Buffalo) and Taurotragus oryx (Eland) are known to have occurred along the coast (Paterson 1790). The marine environment is rich in resources; shellfish are abundant on all rocky shores whilst Donax serra (White mussel) occurs on sandy shores. Whales make seasonal migrations to the Antarctic during the southern summer and are stranded in relatively large numbers, although widely spaced and not necessarily consistently at one locality. The presence of Dyer Island provides another resource in the form of colonies of marine birds such as Spheniscus demersus (Jackass Penguin), Morus capensis (Cape Gannet) and Phalacrocorax spp. (Cormorants) and a small colony of Arctocephalus pusillus (Cape Fur seal) (Rand 1963).

Remains of dead birds regularly wash up along the coast at Pearly Beach and doubtlessly elsewhere, whilst seals are also known to be washed up. Offshore rocks near Die Dam hold seal colonies, but few birds. Taking all environmental factors into account the coastal area is likely to have presented an extremely attractive situation to hunter-gatherers and herders. While occupation was possible throughout the year, there are clearly advantages in the availability of fresh water and grazing during the dry summer months.

Pearly Beach Area (Plate 3 a-c, Fig. 5).

Pearly Beach is a village and holiday resort situated approximately 200 km southeast of Cape Town. The site localities which were sampled are situated approximately three kilometres southeast of the resort where a driftsand area has affected vegetation stability thereby providing good site visibility.

(i) Coastline

Where erosion has not taken place vegetation occurs down to the littoral dunes and varies from stands of Sideroxylon inerme (Milkwood) and Euclea racemosa (Ghwarrie), which form dense cover and provide excellent protection from wind and sun, to lower bush with grasses like Agropyron distichum (Sea Wheat), which may extend down to the high watermark, and Ehrharta villosa (Pipe Grass) and Stenotaphrum secundatum (Quick Grass) (Walsh 1968). Eroded areas show a limestone pan exposed beneath the superficial sands. The seaward extent of the limestone pan is visible in some areas as an eroded bank between 50 and 100 m from the shore.

The coastline at Pearly Beach varies from sandy beach to rocky shore with granite substrate and rocky shore with Table Mountain Sandstone substrate. The sandy beach is not likely to have played a significant role as a resource base, since Donax serra (White mussel) does not occur along this beach at the present and environmental factors make it unlikely that it did so in large numbers in the past. The resource potential of this area is very low and can only be measured as providing periodic attraction in the form of washed-up animals such as whales, dolphins, seals and birds. Even with Dyer Island situated offshore, with large colonies of seals and birds, it

is unlikely that the sandy beach alone could provide a reliable resource base.

The rocky shore, however, presents a different situation, providing a stable resource base in the form of shellfish and fish which are available throughout the year. It is assumed that, while local differences in shellfish populations do exist, the area can be regarded as a relatively uniform unit. Birds such as Phalacrocorax spp. (Cormorants) which roost on rocks may have been caught. The intertidal zone of the rocky shore is likely to have provided the basis for coastal occupation.

In order to provide an intertidal model a transect was taken some three kilometres southeast of the village. Shellfish cropping by holidaymakers was considered likely to have denuded the granite zone which lies closest to Pearly Beach. In order to obtain a sample which, as far as possible, would reflect the prehistoric availability and accessibility of shellfish, one transect was undertaken in an area which, if at all, was likely to have received only limited cropping of animals such as Turbo sarmaticus (Alikreukel) which is still collected for food. Haliotis midae (Perlemoen) was no longer expected in transects at any point along the coast due to commercial exploitation. A site was selected with a view to providing a representative sample of situations likely to have been exploited for shellfish, such as gulleys, rock pools and rock surfaces ranging upwards from the subtidal zone below Low Water Spring (LWS) tide level. Sampling was undertaken in 1m^2 units at 2 metre intervals, and only those animals likely to have been exploited were collected. The subtidal gully proved difficult to sample due to water surge and observations were derived by snorkeling.

The transect profile and sampling results (Fig. 6) show the normal zonation

expected for intertidal animals, although the undulating nature of the site and the existence of rock pools relatively high up in the intertidal zone clearly increased the extent of animals such as Patella spp. (Limpets) and Oxysteles spp. (Periwinkles) through vertical zonation. Around the pools occurred high ridges which were dry and where the area potentially suitable for exploitation was much reduced and situated closer to the LWS level.

A strong correlation is demonstrated between the occurrence of rock pools and animals such as P. oculus, Oxysteles spp. and Burnupena spp. (Welks).

It should be noted that O. trigrina which was not present on the sandy bottom of the uppermost pool, did nevertheless occur abundantly in crevices at the base of higher rocky ridges situated in other parts of the pool. Availability of this animal and Burnupena spp. can therefore be extended as shown. Although it occurs abundantly, O. variegata is a very small species and was apparently not exploited, whilst P. granatina, not represented in the transect, was present nearby in small numbers and tended to be attached to the more vertical sides of the surrounding higher ridges. The subtidal zone occurred in a gully which remained covered at LWS although rocks outcropped in places. P. argenvillei occurred on these rocks, just above the LWS level, together with P. cochlear which formed a mosaic. Lower crevices on the outcrops, covered by shallow water at least, contained O. sinensis, Burnupena spp. and Turbo sarmaticus. Within the gully, below 0,5m-0,9m, Turbo cidaris (Turban Shell) was abundant, especially in crevices and between Ecklonia spp. (Kelp) hold-fasts. Turbo sarmaticus occurred within the same areas but was less abundant. This may be the result of recent cropping but is perhaps more likely to reflect the deeper zonation of the larger species. A total of 26 T. cidaris and 35 T. sarmaticus was removed from crevices in an area covering approximately 1m^2 , which was situated in deeper

water adjacent to the furthestmost point of the transect where kelp growth was thicker. P. tabularis and P. compressa occurred subtidally within the same area but were sparse, only 1 per m². O. sinensis and Burnupena spp. occurred within the gulley while Patella spp. were almost absent except for an occasional P. argenvillei. Dinoplax gigas (Chiton) was present and Haliotis midae, although no longer found, would have occurred subtidally. The comments of older residents of the area indicate that Haliotis midae was abundant prior to its becoming commercially important.

Assuming ideal weather conditions and one collecting tide per day, it can be predicted that collection was possible every day of the month. However, because the levels reached by high and low tides vary at different phases of the lunar cycle and different species occur at different depths, it follows that not all species will be accessible during the entire tidal cycle which occurs twice-monthly. Table 4 illustrates this point.

TABLE 4 - Intertidal zone accessibility

Zone	Maximum exposure in days before and after L.W.S.	Days per month	% Accessibility
Total Intertidal (HWS-LWS)	+ 2 - 2	10	33
Subtidal (below LWS)	+ 1 - 1	6	20

Accessibility of the lower parts of the intertidal zone where animals with high meat yield per individual occur is therefore restricted to limited periods around LWS tides only. The part above the Low Water Neap (LWN) level

would be accessible virtually all the time, but contains almost exclusively animals with a low meat yield per individual (see Table 5 and Fig. 6). It should be noted, furthermore, that weather conditions, excluded here, are an important limiting factor which could drastically reduce accessibility.

TABLE 5 - Average mass per individual of species represented in middens.

Species	Mass/kg	Species	Mass/kg
Dinoplax gigas	0,045	P. argenvillei	0,040
Choromytilus meridionalis	0,010	P. tabularis	0,050
Perna perna	0,010	P. longicosta	0,005
Donax serra	0,010	P. granatina	0,010
Haliotis midae	0,25	P. oculus	0,010
H. spadicea	0,040	P. indet.	0,010
Fissurellidae spp.	0,005	Turbo cidaris	0,010
Patella cochlear	0,004	T. sarmaticus	0,040
P. compressa	0,020	Oxysteles spp.	0,004
P. granularis	0,005	Burnupena spp.	0,004

Choromytilus meridionalis (Black Mussel) and Perna perna (Brown Mussel) were not found in the transect. The only population of C. meridionalis which has been located is situated at the southern end of the beach about 100 m from the main granite outcrop on a series of small low rocks situated within the intertidal zone. During January C. meridionalis was observed on rocks which were not thought to have been exposed during winter months. Although observation was restricted and open to subjectivity, the possibility of

limited availability suggested that evidence for seasonality might be available for shell middens containing C. meridionalis. B.F. Kensley (pers. comm.) indicated that C. meridionalis populations were able to withstand extended periods of covering by sand. The problem was then discussed with an oceanographer who suggested (T.W.F. Harris pers. comm.) that, because the orientation of the Pearly Beach locality was oblique to the prevailing seasonal wind directions, long shore drift could be expected to move sand up and down the beach during both summer and winter. He further commented on the fact that the beach was bounded at both extremities by out-jutting rocky areas which would interrupt normal sediment flow along the coast, thereby creating an imbalance. He considered it quite possible, therefore, that the southeasterly winds prevailing in summer could push sand northwards up the beach causing the C. meridionalis population to be exposed, while the northwesterly winter winds could produce the opposite effect, causing sand to pile up against the southern end, thereby covering the C. meridionalis beds.

Small numbers of C. meridionalis, attached to Ecklonia hold-fasts, are occasionally washed up after rough weather and it is possible that Perna perna (Brown Mussel) which has not been located on the coast may also have occurred in this manner. This phenomenon is not likely to have represented a significant resource base, however, and could not account for the quantity of C. meridionalis and P. perna found in the middens.

(ii) Inland

This area consists of a sandy coastal plain which extends up to 5 km inland where it is bounded by relatively high Table Mountain Sandstone and limestone barriers. The Hagelkraal River flows down to the plain, where, like other

surface discharges, it pursues a flat, marshy course to the Hagelkraal vlei which is situated immediately behind the littoral dunes. The vlei is the only permanent source of surface water although water is also available during summer in pools along the Hagelkraal River if sufficient rain has fallen during winter. Springs rising in the Table Mountain Sandstone and limestone feed the vlei and travel underground to the coast where they discharge into the sea in the form of intertidal seeps. The sand veld and coastal plain is covered by low scrub vegetation although the presence of remnant stands of trees such as Sideroxylon inerme (Milkwood), Euclea racemosa (Ghwarrie), Rhus spp. (Taaibos) and Olea spp. (Ironwood) confirm Acock's comments concerning the former vegetations and greater stability of the area. Proteaceae are common, especially on higher ground and forest remnants are to be found on screeslopes beneath the limestone cliffs. Open areas between tree stands contain low bushes such as Chrysanthemoides molilifera (Bietou), Metalasia muricata (Blombos) and Nylandtia spinosa (Skilpadbessie), grasses such as Ehrharta villosa (Pipe Grass) and Stenotaphrum secundatum (Quick Grass) and reeds such as Thamnochortus insignis (Dekriet). Stream verges are lined with dense bushes and Typha spp. (Bulrush). Iridaceae species are sometimes found in suitable niches along these courses and Phragmites spp. (Vleireed) occurs where conditions allow. Immediately inland of the coastal plain lies the valley of the Boesmans River and then the Caledon-Napier-Bredasdorp plain. These areas have a shale substrate and provide good grazing. The general map of the Colony published in Barrow (1801) described the areas covered by the Boesmans River valley, the Caledon-Bredasdorp plain and that extending down to the shale-based hinterland around Elim as good pasturage. It located small antelope such as Paphicercus spp. (Steenbok/Grysbok) and Sylvicapra grimmia (Grimm's Duiker) nearer to the coast whilst Damaliscus dorcas (Sontebok) is shown to have lived further inland on the Caledon-Bredasdorp plain. A small shale zone occurs at the inland boundary

of the Pearly Beach coastal plain at the point where the Hagelkraal River reaches it. The localized high class grazing which would result from this is likely to have affected game movement. The range of small antelope can also be extended to the coastal plain where these animals are known to have occurred together with larger game as has already been discussed.

Hawston Area (Fig. 7)

The village of Hawston is situated approximately 110 km southeast of Cape Town. The site which was sampled is situated on the coast approximately 1 km to the west of the village in an area which has been partially stabilized by exotic vegetation.

(i) Coastline

The Hawston coastline is essentially similar to that of the Pearly Beach area. The site is situated at the landward end of a rocky promontory which is covered by partially stabilized driftsand, with limestone exposed in places. A long sandy beach extends from the mouth of the Bot River to the base of the promontory from which position the coastline becomes rocky with a Table Mountain Sandstone substrate forming pools and gulleys. The intertidal fauna differs slightly from that found at Pearly Beach; Donax serra (White Mussel) occurs along the sandy beach and is reported by fishermen to have been more abundant in the past, while the fauna of the rocky coast shows a greater admixture of warmer forms than Pearly Beach, such as Perna perna (Brown Mussel) and Haliotis spadicea (Venus Ear) in the same manner as described for Die Kelders Cave (Schweitzer 1975). Colder forms such as Choromytilus meridionalis (Black Mussel) and Jasus lalandii (Cape Rock Lobster) also occur. Fresh water occurs in seasonal streams on

the mountain slopes, and in the Bot and Onrust Rivers. Coastal seepage also occurs at the mid-tide level.

(ii) Inland

The coastal plain at Hawston is relatively narrow due to the presence of Table Mountain Sandstone mountains immediately inland. The plain widens considerably to the north, however, where the low-lying Bot River valley is situated. The vegetation and fauna of the area can be assumed to have been similar to that of Pearly Beach, although the proximity of the shale-based Bot River valley would have extended coastwards the distribution of vegetation usually found further inland down to the coastal sandveld in much the same manner as it does near Stanford.

CHAPTER 7PEARLY BEACH : MIDDEN SAMPLES AND OTHER FEATURES

Methods of fieldwork and data analysis are described, together with terminology, in Appendix IV. The location of midden samples and areas covered by plans is shown in Fig. 8 and data from the excavated samples is presented in Appendix V.

PB1 (Plan 1)

This locality consists of an extensive area covered by shell scatter, middens and stone features which extend from within 20 m of the coastline to approximately 280 m inland. Different midden types are evident with Haliotis middens invariably forming the seaward extent of occupation.

Most of the middens were too eroded to be sampled. The PB1 sample was excavated from an extensive Oxystele Patella Turbo occurrence, roughly 0,2 m thick, which capped a sandhill at a height of approximately 7 m above the surrounding deflated area (Plates 4-6; Fig. 9). The high concentration of apparently homogeneous shell deposit and the depth of the midden made it necessary to remove an area of 1 x 0,5 m only in order to provide an adequate sample size. The midden itself had been deposited on relatively clean white sand and there was no evidence of humification, although the possibility that the shells were laid down on a thin vegetation cover such as grass cannot be ruled out. Dune mole-rat activity was clearly visible in the section above and below the midden. Stone features occur in the area and include possible hearths and two others which appear to represent hut circles, one of which was excavated (Plate 7; Fig.10).

This feature consists of a rough circle of large stones about 5 x 4 m in area, enclosing a group of smaller stones, which suggest a hearth. Excavation under the inner feature revealed the presence of small amounts

of charcoal. Human remains occurred on the surface within the circle. Small midden heaps can be seen next to the circle, the closest having been an estimated 4 m² in area. Other occurrences include a concentration of stone artefacts alongside a small Oxysteles Patella Turbo midden on which a group of approximately ten Donax scrapers was observed, with a broken ostrich eggshell container, potsherds and a group of grindstones with haematite and manganese-containing nodules scattered about. Bone artefacts occurred on the surface and eroding out of middens.

PB2 (Plan 1)

This locality is separated from PB1 by driftsand. Observation showed the shell scatter to be continuous, however, and the separation can have no cultural significance. Shell scatter, middens and stone features extend from within 90 m of the coastline to approximately 280 m inland. Thereafter shell becomes extremely sparse on the limestone pans which provide visibility amongst the dunes. The PB2 locality provided the basis for the subdivision of middens given in Appendix II. Haliotis middens (Plate 8) form the seaward extent of occupation, with Turbo and Oxysteles Patella Turbo middens being situated relatively further from the coast. The limestone bank traverses the inland portion of this locality and midden material occurs on it, extending back in exposed patches to link with PB1 (Plate 4). Erosion had removed most of the in situ midden material and it was only possible to sample the Haliotis middens. In spite of apparently good preservation, the Haliotis shells proved so fragile that it was necessary to remove complete shells individually in order to provide a sample from which the average size, and thereby meat mass, could be calculated. The PB2 sample was excavated from a well-preserved Haliotis midden which showed peripheral erosion, but little

surface damage (Plate 8, 9). The area sampled appeared to represent a homogeneous depositional unit with the possibility that the occurrence of Turbo, although sparsely represented throughout, was concentrated at the base of the midden. Observation of other portions of the midden, however, suggest that at least part of it might be subdivided into two depositional units separated by a sandy lens. Charcoal occurred sparsely throughout the sample and burning was noted on a small proportion of Haliotis shells. Localized areas containing black, perhaps burnt, sand were to be seen in the eroded sections. A number of stone features was located in areas around the middens (Plates 10, 11). Some features were situated in burnt sand matrix while others were apparently deflated and no longer contained burnt material, although, as will be shown, not all features on this site are considered to represent hearths. Three features showing burnt matrix, of which two are shown (Plates 12, 13; Figs 11, 12) were excavated. All three examples produced large amounts of burnt material and charcoal from under and amongst the stones. A radio-carbon determination made on charcoal excavated from in situ amongst and under stones of PB2 S1 gave a date of 1680 ± 50 BP. Associated with PB2 S3 was an additional feature in the form of a broken whale rib of which approximately 0,5 m was still buried. It is estimated that the original rib could have extended at least 1 m above the ground (see Plate 1, 2). Two stone features which were not considered likely to have been hearths were located (Plate 11). Although dispersed they were made up of far more stones than appeared to be usual for hearths. Human remains were found amongst the stones of one. Measurements were taken of the stones from a number of features in order to determine whether differences could be demonstrated. Other features located in PB2 include potsherds, which occurred mainly on and around Oxysteles Patella Turbo middens and a

concentration of quartzite artefacts, which included flakes and cores. A broken incompletely bored stone was also observed. Further inland on a limestone pan at a distance of 300 m, fragments of elephant's teeth were located. Here, artefacts and shell were extremely sparse, in contrast to the situation observed about 600 m inland where a rhinoceros skeleton was associated with numerous flakes and cores and a sparse shell scatter.

PB4 (Fig.13)

This locality consisted of a relatively small deflated basin, with several midden deposits exposed (Plates 14, 15). Situated about 150 m from the coastline, it has been isolated by driftsand deposits, although the shell scatter can clearly be linked to the southernmost boundary of Plan 1. South of the PB4 locality shell scatter can be observed in dune mole-rat heaps. Driftsand and vegetation obscure details, but it is possible to trace the scatter across to the area covered by Plan 3. Haliotis middens were not present in the locality. It was possible to excavate two samples; K41 from a Turbo midden which appeared to be a separate dumping within a complex of midden material and M81 from an Oxysteles Patella Turbo midden (Plates 16, 17). An upper grindstone and a heap of five haematite nodules was exposed on the clean dunesand underlying the shell deposit of K41. M81 appears to represent the periphery of the midden. A flat oval area, containing much artefactual material and surrounded by a low ridge of preserved shells occurred adjacent to the sample. A number of pebble hammers was observed at the midden periphery. A similar flat area containing a number of borers was located near K41. A surface collection (Appendix VIII) covering 100 m² was made in this area (Plate 18).

Other features include potsherd occurrences and two separate occurrences of human remains. No stone features were observed.

PB5 (Plan 2)

The most outstanding feature of this locality is the limestone bank which extends in a northwesterly direction at a distance of approximately 50-100 m from the coastline and forms the seaward boundary of occupation remains. These remains can be observed only intermittently up to a distance of 150 m inland of the limestone bank as the locality is situated on the periphery of a large area of unstable driftsands. The isolated occurrence of Haliotis middens along the bank is quite clear, with stone features providing additional evidence for occupations being related to the limestone bank. To the north of these occurrences isolated stone features can be observed on deflated limestone hardpan surfaces on which only sparse shell scatter is present. The PB5 sample was excavated from the best preserved Haliotis occurrence (Plates 19, 21). The same procedure as that used at PB2 was employed in order to obtain complete Haliotis shells. The deposit appeared homogeneous and extended down to clean sand under which probing revealed the limestone ridge. Relatively large amounts of charcoal were present throughout the deposit and small patches of burnt shell were observed. A large number of stone features occurred on the periphery of the midden. Most could be termed hearths, while a few consisted of a small number of very large stones, with smaller rocks amongst them sometimes (Plate 22). Measurements of stones were taken in order to demonstrate differences of proportions. Some years back a flexed-seated burial was removed from the lower slopes of PB5. A group of large stones is reported to have been situated on the surface, but the first signs of the skeleton were only reached at a depth of

approximately 0,5 m beneath the surface. Potsherds, including a conical base fragment, occurred on the Haliotis middens.

PB6

This locality is situated at the point where the rocky coastline gives way to sandy beach and forms the northern extremity of large scale midden occurrences. Shell scatter, middens and stone features extend from within 20 m of the coastline to a distance of approximately 300 m inland. The locality forms a flat plain which extends from the littoral dunes to driftsand areas inland and to the north and south. Haliotis middens occur within 50 m of the littoral dunes after which Oxysteles Patella Turbo middens with Choromytilus meridionalis remains are common. The midden located furthest inland resembles PB1 where a capping of Oxysteles Patella Turbo midden covers a dune relic projecting about 5 m above the general flat surface (Plate 23). The PB6 sample was excavated from an Oxysteles Patella Turbo midden nearer to the coastline (Plates 24, 25). The shell deposit was homogeneous and a strip 2 x 0,5 m was excavated down to clean sand. Many potsherds occurred on the surface of the midden, together with manganese-containing nodules and some haematite. A single Tellina sp. valve, with signs of utilization on it was observed. Elsewhere on the locality remains of an elephant represented by teeth fragments, a few bone fragments and the distal epiphysis of a humerus occurred in apparent association with stone features containing charcoal.

SFT1 (Plan 3)

This locality, formerly a driftsand area, is now completely stabilized with the result that vegetation and stabilized dunes obscure site visibility to some extent. Shell scatter occurs from within 50 m of the

coastline and extends inland to a distance of 300 m at which point it appears to stop. Two midden occurrences in the form of isolated mounds occur at the southern extent of the locality in association with the limestone bank which can be observed intermittently. Other occurrences in the form of concentrations of shell scatter occur and could represent similar mounds in deflated condition. Small in situ middens are present where the limestone bank occurs in the northern part of the area. To the south of Plan 3 the coastline becomes sandy with little rock and few middens until the next rocky section is encountered (Fig. 5). The SFT1 sample was excavated from one of the mounds which were considered to represent Haliotis middens (Plates 26, 27). The sample was taken from the uppermost layer of the mound which was excavated to a sandy lens underlying the homogeneous deposit. The depth to which other occurrences extend is not known, but is not thought to be great. Pottery occurred sparsely throughout the locality. Stone features in the form of hearths were not observed, possibly due to the bad visibility mentioned above. Perhaps the most important features of this locality were the fish traps in the intertidal zone (Plate 28). Four definite and two possible traps were located within the area suitable for their construction. To the south the gullies became too deep and to the north an embayment marks the beginning of a steeper coastline.

HAWSTON : MIDDEN SAMPLE AND OTHER FEATURES

Only one excavation was conducted in the Hawston area and a single sample is presented for comparison with those from Pearly Beach.

HAWI (Fig. 7)

While the Hawston locality is still covered by some active driftsand,

reclamation has covered large areas with exotic bush. These two factors have restricted site visibility to relatively small areas where shell scatter or middens have been exposed. Within the driftsand area occupation material has been deflated almost completely, and is represented by a thin scatter of shell and artefacts. Two stone features in the form of hearths were observed in this area, one with ashy material still preserved amongst the stones. Other midden occurrences appear as eroded features where roads and building activities have exposed them. Most of the middens appear to have been Oxystele Patella Turbo occurrences with Choromytilus meridionalis (Black Mussel) and Perna perna (Brown Mussel) admixtures. Of further interest, however, is the occurrence of what could, on the basis of frequency dominance, be termed a Choromytilus midden. While the other middens located at the end of the sandy beach occur on the flat surface of the headland at a height of approximately 15 m above sea level, the Choromytilus midden is situated almost at sea level at the base of a steep slope leading up to HAWI. In addition, it is located in precisely the zone where the sandy beach begins to give way to rocky substrate and beds of Choromytilus meridionalis occur now. Pottery occurs on some middens and burials have been located in the past. The HAWI sample was excavated from an Oxystele Patella Turbo occurrence which was visible in a road section (Plate 29). It was necessary to clear the area of bush before excavation could commence. Excavation revealed that the occurrence was not homogeneous (Plate 30; Fig. 14), but was made up of a series of middens separated in part by thin lenses of what is thought to be driftsand. Where sand lenses did not occur subdivision was extremely difficult as shell material appeared to be homogeneous. Arbitrary subdivision was made between layer 1 and layer 2 on the basis of differing shell content. Layer 5 was separated from layer 6 which was sandy and may simply reflect the extent of disturbance caused by trampling and mixing

with the driftsand surface. Other subdivisions were made using the less satisfactory method of following artefact and shell orientations. Two potsherds occurred in layer 3 and a sheep bone was identified by K. Scott (pers. comm) in layer 1. Radiocarbon determinations were made on two charcoal samples from HAWI and gave dates of 1860 ± 60 BP (layer 2) and 1900 ± 40 BP (layer 6)(Appendix III).

SECTION CCHAPTER 8DISCUSSIONLocation of Sites

Because of difficulties involved in defining the limits of individual occupation areas and the fact that opportunity for observation varies, it should be borne in mind that sites located within the research area do not necessarily provide a true reflection of total site distribution (Appendix II). Furthermore, the area does not include site localities which are known to occur between Kleinmond and the Cape Hangklip area, which, it is now felt, formed part of the territory covered by the socio-economic systems operating southeast of the Hottentots Holland with access to the Elgin and Caledon valleys via the Palmiet and Bot Rivers. The southeastern boundary is considered to have been the Breede River, although site localities between here and Cape Agulhas have not been investigated.

These do not constitute major problems, however, and it is thought that enough observations have been made to demonstrate the locational patterning which is apparent. It should be noted that Figs. 4, 5 and 7 which illustrate this discussion are drawn to scales which do not always allow for the separation of localities and that some symbols, therefore, may represent more than one midden or cave. The frequencies on which the Figures are based are given in Table 6.

TABLE 6 : Relative frequency of site by category

CATEGORY	MARINE SHELL	NO.
Open	Midden	197
Open	Present	8
Open	None	5
Cave, coastal	Midden	17
Cave, inland	Present	12
Cave, inland	? None	3

Comparison of Table 6 with Figs. 4, 5 and 7 shows that approximately 92 per cent of open station middens are located along rocky shorelines, while only 8 per cent were found along sandy beaches. Of the latter, two are located at Pearly Beach (Fig. 5) and two to the north of Die Kelders (Fig. 4). The shellfish remains observed along the sandy shore at Pearly Beach are, however, more representative of the exploitation of a rocky environment than a sandy one; the frequency of *Donax serra* does not appear to increase in these localities by comparison with those on rocky shores and it must therefore be argued that occupation took place for reasons other than the exploitation of the immediate coastline.

The attraction of washed-up animals cannot be ruled out, although it seems likely, in view of the short length of the beach, that more important was access to a number of different resources, including the Hagelkraal vlei, grazing and rocky shores at both ends of the beach. The coastline between Die Kelders Cave and Hermanus, although essentially sandy and providing an

was located on the inland pass over the Danger Point mountains which links the Die Kelders area with the Uilenkraal River valley near Byeneskranskop.

Occupation also took place in caves and rock shelters where suitable situations occurred. Coastal caves with midden occupations are virtually restricted to the exposed limestone formations along a 2,5 km stretch of coastline in the Die Kelders area where 15 sites are located and a small exposure at Cape Agulhas from which one site is known. In the Die Kelders area open station middens occurred both at sea level and directly above caves and shelters containing middens, thereby indicating that the occurrence of coastal caves does not preclude the use of open station sites for occupation. The Klipkop cave (Goodwin 1938b), situated in Hermanus at a distance of about 800 m from the coast, and a shelter on the mountain above Kleinmond are the only occurrences in Table Mountain Sandstone. Other suitable locations are found inland.

One shelter is located on the shores of the Klein River vlei where a small outcrop occurs, while 10 sites are known from the area of extensive limestone formations situated at distances of 8-4 km from the coast between the Uilenkraal and Hagelkraal Rivers. The remains of marine shellfish, birds and mammals are present in these sites, although superficial observations suggested that marine resources formed only a part of the exploitation pattern represented by these situations. (Appendix II). This suggestion has been confirmed by F.R. Schweitzer's excavation at Byeneskranskop (pers. comm.). Rock shelter localities such as the one southeast of Stanford and one approximately northeast of Cape Agulhas, which are situated approximately 15 km from the coast, contained isolated examples of shellfish such as Choromytilus meridionalis and Donax serra

which are more likely to represent shells taken inland as raw materials rather than as food.

A total of 14 fish-trap localities is known in the research area and is restricted to the occurrence of suitable gently sloping intertidal areas with sufficient boulders for wall-building. These requirements are outlined in Appendix III, together with a discussion on their significance as factors which could affect coastal exploitation and the location of occupation.

The picture of site location in the research area provides evidence of coastal-inland exploitation and movement. Patterning shows, however, that maximum exploitation of marine resources, as reflected by shell middens, was clearly undertaken from as near to the shore as possible and was concentrated in those areas offering the greatest potential reward.

Comparison of sample components

i) Shellfish

Examination of the samples on the basis of minimum numbers of shellfish alone showed them to be generally dominated by those animals which occur higher up in the intertidal zone (Fig. 6; Appendix Va). Haliotis middens are the exception to this situation, with Haliotis midae being the numerically dominant species. It has already been noted above that species found in the upper parts of the intertidal zone are not productive in terms of meatmass, while the lower parts and subtidal region contain highly productive animals which yield many times the amount of meat per individual. The significance of minimum numbers is misleading, therefore, and meatmass

values were calculated to show the flesh yield and relative importance of different species (Table 5; Appendix Vb) which is illustrated in bar chart form in Fig.15 for all species representing values greater than 0,05 per cent of the total meatmass per sample. Three categories of accessibility have been used to provide a measure of the intertidal zone and species availability during the tidal cycle. Using meatmass it is noted that while variation between samples does exist, the c category which represents the subtidal zone never drops below 50 per cent of the total. This point is also illustrated by Table 7, which gives the percentage contribution of the most common sub-tidal animals, Haliotis spp. and Turbo spp., together with an indication of the dominant form.

TABLE 7 - Percentage frequency by meatmass of most common subtidal animals, Haliotis spp. and Turbo spp.

SITE	%	DOMINANT SPECIES
PB2	99,57	Haliotis
PB5	98,39	Haliotis
SFT1	88,18	Haliotis
BP4 K41	80,86	Turbo
PB1	63,16	Turbo → Haliotis
PB4 M81	54,10	Haliotis/Turbo
HAWI	50,87	Turbo (+ Haliotis)
PB6	50,30	Turbo (+ Haliotis)
BNK1	86,72	Turbo
DK1	19,90	Turbo/Haliotis

The data reflect, therefore, a considerable subtidal influence which ranges from 50-100 per cent, although the dominant form may vary. Similarly, the contribution of species found higher in the intertidal zone also varies in representation and an increase in the a category which represents maximum accessibility results in a corresponding decrease in the c, or subtidal, category and vice versa, producing a graph showing a tendency for the species contribution to be more evenly spread throughout the range of accessibility.

The nature of the variability of the meatmass contribution of different species provides information on the composition of the samples and thus the middens they are taken to represent. Fig. 15 illustrates an almost total contribution by subtidal forms in the cases of PB2, PB4 K41, PB5 and SFT1. Subtidally-occurring Haliotis midae is almost the only form represented in PB2 and PB5, while SFT1 shows a high H. midae contribution with a slight increase in other forms both the subtidal Turbo spp. and the more accessible Fissurellidae, Patella spp., Oxysteles spp. and Burnupena spp. PB4 K41, although showing a tendency towards dominance by one species, is different in that Turbo sarmaticus and not H. Midae provides the greater contribution. Dinoplax gigas also occurs subtidally and species from more accessible areas are present in the form of Patella spp. and Oxysteles spp. The HAWI, PB1, PB4 M81 and PB6 samples, on the other hand, show a more even representation of the a and c categories in the form of a reduction of subtidal forms and a considerable increase in more accessible forms such as Patella spp. and Oxysteles spp. with Choromytilus meridionalis and Perna perna where they occurred, while Turbo spp. tend to make up the bulk of the subtidal contribution. This grouping shows good correspondence with the Haliotis, Turbo and Oxysteles Patella Turbo middens

described in Appendix II. But the middens themselves reflect human activity and the significance of these groups, therefore, lies in their interpretation in such terms.

It has been noted that while some midden samples showed almost 100 per cent exploitation of the subtidal region, which is only accessible at LWS, others showed exploitation over a greater spread of the tidal cycle but, nevertheless, still included at least a 50 per cent subtidal contribution. This implies that the degree of subtidal exploitation could be used as a measure of the length of occupation, assuming that groups moved away from the coast when they were not exploiting shellfish. This postulation presupposes the fact that marine exploitation was selectively directed at species providing the greatest possible meatmass reward per individual. Evidence for this suggestion is clearly demonstrated by the high subtidal contributions in all cases indicating not only selection of subtidal species, sometimes to the exclusion of all others, but also regular selection of optimum tidal conditions for shellfish collecting during all or at least part of the period of occupation. This pattern can be extended to inland cave occupations where surface observations of shellfish frequency representation are confirmed by the BNK1 sample which was made available by F.R. Schweitzer. This sample, excavated from pre-pottery deposits situated above 3500 BP (F.R. Schweitzer pers. comm) shows an almost 100 per cent contribution from subtidal species of which Turbo spp. are dominant (Fig. 16; Appendix VI). The DK1 sample, from layer 3 of the coastal cave is dated to between 1500 and 2000 BP (F.R. Schweitzer pers. comm). The sample does not fit the above pattern, however, as the subtidal contribution makes up only 20 per cent of the total, while more accessible species such as C. meridionalis, P. perna, Patella spp. and Burnupena spp. dominate. In terms of the tidal postulation, these data suggest an occupation with very

little correspondence to subtidal accessibility, and probably of longer duration than is apparent from the other samples. The sample size, although relatively small, is not considered likely to have affected the composition to any great extent (F.R. Schweitzer pers. comm.), and it is noteworthy that observations of the excavated section also gives the impression that C. meridionalis and P. perna make up the greatest bulk of the deposit. It is possible that the Die Kelders exploitation pattern reflects local environmental conditions although this is considered unlikely to be the only factor involved and it should be noted that an open station midden containing large quantities of Haliotis midae is located within 50 km of the cave. Although there is no time check on their relationship this occurrence does indicate that environmental conditions were unlikely to have affected the DK1 sample to a great extent. Selection also extended to species within the subtidal zone and its fringe. Only one adult individual of Patella cochlear was found in the samples and this animal is generally rare on middens although it is extremely abundant at the subtidal fringe where it occurs. Those specimens which did occur in the samples are too small to have been utilized as a resource. The reason for the exclusion of P. cochlear appears to be that, while abundant, it only produces a minimal amount of meat and is extremely difficult to detach from the rocks. Turbo cidaris is another species which, although relatively abundant in subtidal gullies, was not exploited to its full potential. In the transect which was examined this species occurred in greater numbers than T. sarmaticus. The explanation for this is likely to lie not only in the fact that T. cidaris is a great deal smaller than T. sarmaticus, and is therefore less productive per individual, but also that the shell is greenish in colour and more difficult to observe under water than T. sarmaticus, which has light-coloured patches on the shell and is relatively easy to collect. It is evident that Deacon's (1970) observations on the Tsitsikama coast also hold true

for this area and that shellfish exploitation appears to have been directed at the coastline immediately adjacent to an occupation site. The restricted occurrence of C. meridionalis in middens located close to mussel beds is noted at PB6 and HAWI, while the increased representation of Patella longicosta at SFT1 reflects present conditions observed over a restricted niche covering no more than 800 m of coastline. It appears, therefore, that in terms of general hunter-gatherer strategy, coastal exploitation can be seen as a selective system devised to obtain the greatest possible reward. This being the case, the tidal cycle emerges as a major factor affecting the pattern of marine resource exploitation and therefore in the interpretation of samples derived from occupations reflecting such activity.

While an increase in the a category can be explained in terms of accessibility, and therefore inability to utilize animals which provide the greatest return in food bulk, it is surprising, in view of the selection which clearly existed, that Turbo spp. should surpass H. midae as the main subtidal resource in the case of middens such as PB4 '8 K41 and the Oxysteles Patella Turbo middens (Fig. 15; Table 7). It may be that the range of Turbo spp. should be extended into the intertidal zone, thereby making it accessible for longer periods than H. midae. This would suggest that two different strategies for coastal exploitation existed: a) short-term occupations coinciding with LWS and b) longer-term occupations covering a greater part of the tidal cycle. This is unlikely, however, as Turbo spp. require constant covering by water. If, however, occupation always corresponded in part with LWS, during which period H. midae was the largest and therefore optimum resource, it could be predicted that coastal exploitation would have concentrated on this species for as long as it was accessible; occupations covering longer periods would be forced to

utilize other, more abundant but less productive species found higher in the intertidal zone and a mixture would be reflected in middens. On the other hand, assuming that occupation, while periodic was nevertheless regular, the situation could arise in which massive exploitation of H. midae had so reduced that part of the H. midae population which could be reached, that only animals such as Turbo spp. remained to be exploited.

Even disregarding the question of time, it is quite evident from the number of Haliotis middens located along the coast, that large-scale exploitation did take place (Plans 1-3). A further illustration is provided by Table 8 which shows the total meatmass represented by the PB2 and PB5 middens from which it may be calculated that the PB2 midden represents 5724 H. midae individuals or approximately 97 per cent of the midden meatmass of 1,46 metric tons, while the PB5 midden represents 135024 individuals or approximately 95 per cent of the midden meatmass of 35,23 metric tons.

With regard to the possible effects of over-exploitation, G.G. Newman (pers. comm.) commented that while no data were available for unexploited populations, mature animals do not range far and recovery of a totally cleared area would be slow unless competition among surviving animals was great enough to fill the vacuum quickly. Juveniles are known to range further. This might explain to some extent the apparent increase in smaller animals found in Oxysteles Patella Turbo middens relative to Haliotis middens. Over-exploitation, then, could explain the existence of different midden types and the spatial separation of Haliotis middens from other types. This argues for a two-phase occupation and exploitation pattern, with H. midae being cleaned out first and the less productive

TABLE 8 - Area, volume and meatmass calculations for midden samples with approximations for middens.

Sample	Area/ m ²	Meatmass/ kg	Meatmass/ m ²	VOL/m ³	Meatmass/ m ³	Midden Area/ m ²	Meatmass/ kg
HAWI	1	65,82	65,82	0,17	387,18	> 150	9873
PB1	0,5	91,84	183,68	0,19	966,74	1005	184598
PB2	1	81,52	81,52	0,24	339,67	18	1467
PB4 MB1	1	16,56	16,56	0,075	220,25	Too eroded	-
PB4 K41	1	41,28	41,28	0,16	258,00	20	825
PB5	1	90,81	90,81	0,19	477,95	388	35234
PB6	1	53,98	53,98	0,22	245,36	100	5398
SFT1	1	80,14	80,14	0,12	667,83	25	2003

species being utilized later. Except for an occurrence near Hermanus where Haliotis middens were observed stratigraphically beneath Oxysteles Patella Turbo middens conclusive evidence for this is lacking and there is no time scale with which to compare different middens. The suggestion made in Appendix II concerning collecting and preparation activities also require consideration, although situations such as at PB5 still argue for occupations directed at the selective exploitation of H. midae. The presence of charcoal and burnt shell and the occurrence of burning on the outside of some H. midae shells also suggests that the animals were consumed at the coast.

Diversity indices reflecting the composition of the shellfish samples were calculated for both minimum numbers and meatmass (Appendix VII, Table 1) although meatmass values only were considered. As could be expected, diversity indices compared very well with the bar charts on Fig. 15

showing high diversity and low redundancy values for samples of Oxysteles Patella Turbo middens with a number of species covering the whole tidal range and low diversity and high redundancy values for Haliotis and Turbo middens which tended to be dominated by subtidal animals. There is, therefore, a direct correlation between diversity and exploitation of the intertidal zone. Given this, the time element involved in intertidal accessibility can be applied, with diversity or lack of it correlating with the length of occupation; the more diverse a site the longer the period of occupation could be expected to have been. With longer periods of time involved it could also be predicted that the frequency of components resulting from other food gathering and cultural activities would increase. Although the samples are small, comparison of shellfish diversity and the occurrence of other components shows a tendency towards correlation.

TABLE 9 - Comparison of shellfish diversity and the occurrence of other components.

	HAWI	PB6	PB4 M81	PB1	PB4 K41	SFT1	PB5	PB2
Shellfish Meatmass:d	2,657	2,587	2,518	2,515	1,843	1,625	0,329	0,194
Shellfish Meatmass:r	0,336	0,322	0,273	0,371	0,470	0,576	0,908	0,946
Bone Mass, grammes	507	222	89	146	12	55	49	7
No. of spp. excl. shellfish	14	11	8	12	6	11	6	2
Cultural	6	5	6	4	5	4	3	1

Table 9 illustrates this point and shows the samples arranged in order of

diversity (\bar{d}). Redundancy is seen to increase as diversity decreases. This situation has been observed on other middens, with highly diverse Oxysteles Patella Turbo middens including far greater amounts of bone, other fauna, and cultural material representing a diversity of activity, while Haliotis and Turbo middens tend to have far fewer other components. The question of length of occupation then arises. The middens sampled are thought to represent a reasonable cross-section of middens found in the area. The shell accumulations appear to be vertically homogeneous which suggests that only one tidal cycle, representing approximately 15 days, was being utilized. Horizontal homogeneity of individual middens cannot be demonstrated with the data collected and spatial homogeneity in terms of time is not clear where different midden types are located close together such as at PB2. In the case of the PB5 sampled midden horizontal homogeneity is apparent, although situations do exist where smaller accumulations of H. midae are possibly associated. It is not clear whether these represent separate occupations in terms of time or daily or individual contributions. If it is argued that both the Haliotis and other middens which may be located within the same locality represent different expressions of the same occupation then, utilizing the information in Table 8, the total occupation in terms of meatmass was enormous. Taking 1 Kg to represent a very generous man-meal per day requires the consideration of very large group numbers and extensive occupation periods in order to explain their accumulation as the result of one occupation. Even by invoking the largest known herder group sizes this seems unlikely, especially as the food contribution from other faunal sources has not been taken into consideration. In the light of the known period of pottery usage, however, a different picture emerges. For example, the PB1 sample represents 184 000 Kg of meat. This could have provided a group of 20 people 9100 meals, which over a series of seven-day

occupations could have provided for a total of 1300 days or three and a half years' occupation. Viewed against 1500-2000 years, however, this accumulation is by no means significant. It seems, therefore, that in spite of the apparent homogeneity of the middens, it must be accepted that they represent the accumulations of food refuse over a number of occupations in much the same way as the HAWI section indicates (Fig. 14), but with no deposition of sand lenses during period of non-occupation. Bigalke (1973: 164) comments on the Bantu's accumulation of middens in this manner. Evidence from PB4 in the form of two separate burials also suggests on ethnographic grounds that more than one occupation took place. The problem of the Haliotis middens remains and it is not clear how these accumulations relate to the pattern of occupation on the basis of either time and exploitation or preparation and other activities. If coastal occupation is to be measured in short-term periods involving days or weeks rather than months, the question regarding group activities between these periods arises. Did they remain on the coast, making use of other resources which would mean longer periods of occupation, or move elsewhere, either along the coast or directly inland to better grazing, or were these same groups responsible for the accumulation of marine remains in caves situated in the limestone ridges? It seems that each of these possibilities could have been the case as part of the dynamic socio-economic systems known to have operated at the contact period. The sample from Byeneskranskop, although it represents a site including marine shell rather than a midden, indicates that shellfish were being exploited to some degree at a distance of approximately 7 km from the coast and that this exploitation was restricted to LWS (Fig. 16). The relationship of cave occupation to coastal occupation cannot be established as yet and it remains to be seen whether analysis of the other components, presently being conducted by F.A. Schweitzer, will provide the necessary evidence to establish any seasonal

relationship. On the basis of the occurrence of Choromytilus meridionalis at Pearly Beach it is tentatively suggested that coastal occupation took place during the summer months. This possibility is restricted to middens such as HAWI and PB6, containing significant quantities of C. meridionalis and situated relatively close to the mussel beds, however, and excludes the majority of middens,

ii) Other fauna (Appendix Vc)

Frequencies of other fauna are extremely low, a factor which is compounded by the small size of the samples. In spite of this problem, however, the faunal list does provide evidence of the variety of forms utilized by coastal dwellers.

Crustacea

Small numbers of Jasus lalandii (Cape rock lobster) were found in the HAWI sample only. While it also occurred at Die Kelders Cave (F.R. Schweitzer pers. comm.) it is not known to extend south of Danger Point and was not therefore expected to have made any contribution in the Pearly Beach area. A single unidentified crab found in the SFTL sample is taken to represent a chance catch.

Pisces

Fish species found in the midden samples are typical of those found on the mixture of rocky and sandy substrate which occurs within the research area and may be caught from the shore. It is interesting to note that the environmental similarities affecting shellfish at HAWI and Die Kelders (see Chapter 6) appear to extend to the occurrence of fish, with large numbers of

veld. Unidentified remains of a small lizard are not thought to have been part of the diet, while the remains of snakes which seem to appear regularly in small numbers in archaeological deposits and are known to have been eaten when caught may represent individuals collected in the veld.

Aves

Remains of marine birds occur frequently in coastal occupation sites and it is noticeable in samples examined by the writer that the frequency of bird remains as a whole varies inversely with distance from the sea. This occurrence is clearly related to population distribution with very much greater populations of exploitable bird species occurring along the coast than inland. Spheniscus demersus (Jackass penguin), Morus capensis (Cape gannet) and Phalacrocorax spp. (Cormorants) occur in large breeding colonies on offshore islands while Phalacrocorax spp. may also be seen regularly roosting on the coast. The occurrence of oceanic S. demersus and M. capensis suggests that these remains represent birds washed up on the shore. An open midden occurrence at Stompneus Point, St. Helena Bay, however, provides evidence for the location and exploitation of a Phalacrocorax capensis (Cape cormorant) colony on the mainland. Here, the frequency of shell was low while bird bones were concentrated in high frequencies over the exposed area of shell scatter. The occurrence of an immature M. capensis individual suggests that occupation took place during summer when this species breeds offshore. Anatidae (Ducks) and Fulica cristata (Coot) are fresh-water birds most likely to have been taken on the Bot River vlei or the salt pan between Hawston and the Onrust River. Neotis denhami (Stanley bustard), a large terrestrial bird, occurs on open ground. The unidentified Passerines are small terrestrial birds which are unlikely to have been exploited by human beings and probably died on the site, or were introduced by predators such as owls or small carnivores.

Mammalia

The mammalian forms show variation in species and size. Micromammals such as Chrysochloridae indet. (Golden mole), Suncus infinitesimus (Pygmy shrew), Rhabdomys pumilio (Striped field mouse), Otomys spp. (Vlei rats and Muridae indet. (Rats/Mice) all occur in the coastal scrub but are thought to have died fortuitously on the site or to have been introduced as the food remains of predators other than man. Although the same likelihood also exists for Bathyergus suillus (Cape dune mole-rat) and Georchyehus capensis (Cape mole-rat), it should be noted that Schweitzer (1975) interpreted the high frequency of Bathyergus suillus in the Die Kelders deposits as reflecting human exploitation of this large rodent. This possibility should, therefore, not be discarded especially in view of the regularity of their occurrence in the samples. It cannot simply be assumed that Papio ursinus (Chacma baboon) died on the site by chance and was then included in the deposit. It is most probable that the animal or skull was brought in intentionally by the human occupants of the site although it seems unlikely to have been as a food resource. It is possible that the canines, which are missing from the maxillary fragment, were sought for utilisation as implements in the same manner as that described for Die Kelders (Schweitzer 1975). The occurrence of marine mammal remains in middens is common along this stretch of coastline and the dolphin individual was doubtlessly washed up and utilized for either flesh or bones, or both. This factor becomes important when discussing the significance of food representation in archaeological samples where potential dangers may lie in the assumption that catacean bones represent food remains rather than raw materials. Small mammals like Ictonyx striatus (Striped pole-cat) and Genetta sp. (Genet cat) occur commonly in coastal areas and are known to have been trapped for their skins and were possibly also utilised as food. Arctocephalus pussillus (Cape fur-seal) occurs off-

shore on Dyer Island and on large rocks some kilometres south of Pearly Beach. Immature individuals of about a year old may suggest occupation during summer when animals of this age are weaned abruptly and mortality rates rise causing an increase of washed-up carcasses. Although not well represented in the samples, Alcelaphus caama (Red hartebeest), a grazer, occurs in many of the Pearly Beach middens. The remains of two other grazers, Damiliscus dorcas (Bontebok) and Equus sp. (Zebra) have also been observed on the Pearly Beach middens while examination of faunal remains from a number of midden collections at the South African Museum suggests that grazers may have formed a regular feature of the diet represented by open middens in the research area. If the grazing hypothesis outlined in Chapter 4 is followed, the regular exploitation of these animals on the coast suggests that such occupations took place during summer months. Raphicerus campestris (Steenbok) is extremely common in coastal areas where it occurs throughout the year, managing somehow to acquire sufficient nutrients, presumably through a varied diet, to allow it to be independent of trace-element deficiencies. The steenbok is easily trapped and its remains occur regularly in middens. Remains which are considered to be of Ovis aries (Domestic sheep) occurred in the PB4 M81 sample, although this animal also occurred in other samples from HAWI and PB1. Remains of another domesticate, Bos. sp. (Cattle), were found on the surface of the PB1 midden.

iii) Cultural Material : Stone (Appendices Vd and VIII)

With the low frequency of stone expected in middens the sampling method did not provide enough material for detailed analysis. The PB4 O surface sample makes good this lack to some extent, although a great deal of variability perhaps reflecting different activities has been observed on

open middens in the distribution of stone implements. While the consideration of detailed aspects of coastal stone technology is beyond the scope of this study and would require analysis of many large samples, it is possible to make some broad generalisations.

Raw Materials

Quartzite. In all of the samples with the possible exception of HAWI, PB4 K41 and PB4 M81, quartzite was numerically dominant. The PB4 M81 sample, however, appears to represent a localised concentration of quartz chipping, correlating with a concentration of pebble hammers in the same area. With the use of both frequency and mass, however, larger samples would doubtlessly correct for such biases as with the PB4 0 sample, in which 76,27 per cent of the total sample is represented by quartzite. This not surprising for coastal contexts as quartzite is by far the most common local raw material. Much, if not all, of the quartzite was carried from the beach to the sites in the form of pebbles, cobbles and boulders which ranged from 30 grammes to over 15 kilogrammes in mass. This observation is supported by the occurrence of cortex on 39,94 per cent of the total quartzite sample.

Quartz. Although this raw material occurs consistently in the excavated samples it makes up only 4,28 per cent of the total PB4 0 sample which is thought to be representative. Quartz lumps from veins on the rocky shores and cobbles from the intertidal zone were utilised.

Limestone. As described above extensive limestone formations occur within the research area. Lumps of fine-grained limestone from these as well as cobbles which occur intertidally were utilised for artefact

manufacture, making up 19,27 per cent of the total PB4 0 sample.

Silcrete. This raw material is extremely rare in the samples and constituted only 0,18 per cent of the PB4 0 sample. This appears to be the case generally on the middens, although some localities have relatively more than others.

Granite. Although granite was used as a raw material, its occurrence is rare and restricted to those stretches of the coastline along which granite occurs as bed-rock.

Pigment nodules (Appendix Ve). Nodules of haematite and manganese were observed to occur on virtually all middens or deflated areas at Pearly Beach and Hawston, and it seems likely that this distribution can be extended to the research area as a whole. This occurrence is significant in the interpretation of coastal living-patterns as pigment represents the only imported raw material and must have been brought to the coast over relatively great distances. The Bot River-Caledon area lies between approximately 20-35 km from Hawston and the Napier area 40 km from Pearly Beach as the crow flies. This argues that the great majority of the open middens under consideration were associated with some form of direct inland-coastal movement which probably took place along river valleys and, furthermore, that this can be traced to a distance of at least 40 km inland.

Artefactual Material

Waste Category. This category forms by far the highest proportion in all the samples and represents 96,19 per cent of the total PB4 0 sample.

It is made up largely of untrimmed flakes, many of which are extremely crude in form, and chunks which occur in very similar proportions. The chip class, separated from chunks on the basis of size could, in the absence of a further breakdown of the chunks, probably be more realistically included with that class and would thus slightly increase the percentage represented by it. Quartzite cores, making up 0,95 per cent of the total, are crude and appear to be extremely poorly represented in the total artefactual sample (approximately 1:80) although the number may have been reduced by the inclusion of core-like artefacts such as flaked cobbles and heavy duty edge-damaged pieces in the utilised tool categories rather than with waste. By definition, chunks also show a certain amount of flake removal. The limestone waste, on the other hand, appears to derive from the multi-flaked cobble category at a ratio of 30:1. It is not known what proportion of the waste category, especially untrimmed flakes, may have been used without being damaged. This point is illustrated by a sample collected from a rhino kill site located approximately 600 m inland at Pearly Beach. The assemblage is made up almost entirely of flakes and chunks which would fall within the waste category and yet at least some of the artefacts must have been used to butcher the animal.

Utilised Category. This category formed the early basis of description of the characteristics of stone artefact assemblages found on midden sites. It is notable that this category which forms 2,44 per cent of the PB4 0 sample is, with the exception of one piece, made on 73,17 per cent quartzite cobbles or boulders, and 26,83 per cent limestone cobbles. Multi-flaked cobbles form the most common class, the affinity of which to the waste category has already been commented upon. Edge-damage to both quartzite and limestone examples suggests, however, utilisation

on the limestone cobbles which are a finer-grained raw material (Fig. 17: 1). Heavy edge-damaged pieces form a smaller proportion, but again show sufficient damage to suggest utilisation of the edges for cutting and bashing purposes although similar modification could result through repeated unsuccessful attempts to remove flakes from a worked-out core. The use of stones for hammering also appears to be a regular feature of coastal exploitation patterns. Isolated damage is generally found on one or more small areas of cobbles although the pebble hammers show far more extensive and regular damage to opposite ends of the long axis. While the damage to cobbles is assumed to relate to general flake-production or the breaking up of pigment nodules, there is a clear suggestion in the PB4 M81 sample that the pebble hammers were related to the production of the extensive quartz waste localised in that area. One lower grindstone was included in the PB4 O sample and a rubber occurred at the base of the PB4 K41 sample. Pigment and stained examples from Die Kelders indicated the use of these artefacts (Schweitzer 1975) and while no stains remained on the Pearly Beach examples, a small pile of five haematite nodules was found within 30 cms of the PB4 K41 rubber. The occurrence of raw pigment in this form, together with the extensive grinding and peripheral damage to the rubber, attest to the manner in which ochre was produced by pounding the raw pigment and grinding it to a fine powder. It also suggests that no great period of usage was necessary to produce the extensive wear common on rubbers and lower grindstones.

Formal Tool Category. This category formed 1,37 per cent of the PB4 O sample and only three classes occurred in the samples taken. Although other classes do exist the paucity of formal tools is perhaps a reflection of the small number of activities related to formal stone technology during

any one coastal occupation. In fact this number of classes may well be too high as it has been noted that the PB4 locality could represent at least two separate occupations. Although no incomplete or broken bored stones were found on PB4 the occurrence of 10 utilised borers (Fig. 17: 2,3) and three borer spalls in the PB4 O sample argues that bored stones were manufactured on coastal sites. The remains of incomplete or broken bored stones associated with borers were observed on a number of middens. Bored stones are most commonly described as weights for digging sticks employed mainly for digging up plant foods. This being the case it might be suggested that coastal exploitation included plant foods. While it is possible that some plant foods were eaten on the coast, it seems unlikely that they were exploited to any degree in view of their relative scarcity on the coast and the abundance of easily obtainable marine resources, especially shellfish (Deacon 1970). The fact that very few edible plant remains were recovered from the Elands Bay midden in spite of favourable preservation (Parkington 1972) and the fact that under similar circumstances none was recovered from Die Kelders cave (Schweitzer 1975) tends to support this contention. If this is so, it seems reasonable to suggest that coastal dwellers were either putting bored stones to some other use or that they were utilizing beach cobbles when the opportunity presented itself in preparation for a later need such as would arise if the group moved inland. The miscellaneous class is assumed to represent implements used variously for cutting and scraping purposes. Outils écaillés occurred in the PB5 sample only. Another form of tool which was not represented in the samples is mentioned here because examples were observed in localised concentration on at least one deflated area, and resembles very closely artefacts described by Schoute-Vanneck and Walsh (1960) along the Natal coast. Made on pebbles of about 5-8 cm in length these tools have straight or curved edges similar to outils écaillés at one

end of the long axis and damage, often in the form of large flake scars, at the opposite end as if the tool had been utilised in the same manner as a punch or chisel (Fig. 17: 4). The Wilton element, characterised by the occurrence of segments and small convex scrapers described by workers such as Rudner (1968), has not been observed in the Pearly Beach area although very low frequencies of small tools, finely made on silcrete, do occur on some of the midden sites. The apparent absence of segments from all but two middens within the research area is in keeping with the suggestion that small convex scrapers and segments which are characteristic of Climax Wilton assemblages become less frequent by Pottery Wilton times and were never present on the coast in the same proportions as further inland, possibly due to differing requirements of the environments. Problems of coastal sampling and chronology make it dangerous, however, to assess the situation on a simple presence or absence basis and such suggestions must remain tentative (Deacon 1972; Klein 1974). What is clear, however, is that formal stone tools and utilised pieces are hardly represented and that assemblages tend to be dominated by waste material. Activities reflected in utilised pieces and formal tools show variability from site to site, but it will require many surface samples or the excavation of large areas to provide detailed information. Table 10 shows the similarity between the percentage frequencies of the waste, utilised and formal tool categories for the PB4 0 sample, the total Gordons Bay open midden sample (Van Noten 1974), and the total Die Kelders Cave sample (Schweitzer 1975).

have again been recognising Donax scrapers (Schweitzer 1970, 1975; Van Noten 1974) which occur regularly in many middens both in cave and open situations. The shell is hard and compact and valves of newly-dead animals can be retouched with ease, producing a sharp sturdy edge (Fig. 18: 1-3). In the Pearly Beach area Donax scrapers were often observed in concentrations within areas ranging from $1m^2$ - $10m^2$ suggesting that they were discarded after use connected with a specific activity. Examples of scrapers made on Tellina sp. valves also occur, but are very rare. Schweitzer (1975) commented that Donax serra appeared to have been collected specifically for the manufacture of scrapers. This observation is repeated in the research area where the presence of this animal is almost exclusively represented by scrapers or fragments and invariably represents considerably less than 0,10 per cent of the meat contribution of samples. On the other hand, in areas where large populations of Donax serra exist, such as between Elands Bay and Lamberts Bay on the west coast (J.E. Parkington pers. comm.) and near the Matjes River Cave on the southern coast (Hoffman 1958), the existence of Donax middens attests to the importance of this animal as a food in certain environments.

Patella containers. Patella shells, mostly of P. compressa, showing signs of modification were observed in a number of middens in the Pearly Beach area and the PB2, PB5 and SFT1 samples produced examples. P. compressa which has a thin-walled, deep shell showed artificial reduction of the anterior and posterior margins by percussion (Fig. 18: 4-6). P. argenvillei showing definite signs of modification were only found in the SFT1 sample (Fig. 18: 7,8). While this animal also has a deep shell, the walls are far thicker and stronger than P. compressa and the modification is consequently more obviously the result of percussion with negative flake scars and crushing being easily recognisable. Only

specimens with obvious flaking were included in the counts and a number of doubtful examples showing the characteristic concentric fracture of Patella were discarded together with P. argenvillei with flattened areas on the margins which could have formed naturally while the animals were still alive (B.F. Kensley pers. comm.). The high frequency of these artefacts in the SFT1 sample provides further evidence of activities related specifically to one occurrence although the nature of the activity is not clear from the Pearly Beach examples. Archaeological evidence for the use of Patella spp. shells as pigment containers is available from a number of coastal cave middens in which shells were found with pigment adhering to the inner walls. Examples from the Matjes River excavation were on Patella shells (Hoffman 1958) as were those from Elands Bay where P. argenvillei were utilised (J.E. Parkington pers. comm.), while Schweitzer (1975) ascribed this use to several Patella spp. and Choromytilus meridionalis at Die Kelders. Although no evidence was presented for the modification of these shells, examination of the Die Kelders samples shows P. argenvillei to be the common species with two examples of P. tabularis and one of P. compressa, with modification being present on some of the P. argenvillei and the P. compressa. Further evidence regarding the use of Patella shells was suggested by Lady Anne Barnard, who commented while on a visit to Genadendal, approximately 50 km from the coast, that some of the Hottentots there owned ".... a couple of spoons made of bits of wood to the end of which a deep shell was spliced and tied on" (Anderson 1953: 185). The shells mentioned must almost certainly have been Patella species and the added factor of hafting could explain the need to modify some of the shells. The possibility exists that shells were put to different uses requiring a similar small receptacle which may or may not have been hafted

and it is perhaps of interest to note that the occurrence of shell containers in the Pearly Beach area is related to Haliotis middens which are considered to reflect minimal cultural activity and that no traces of ochre, which usually remains, were found.

Marine shell ornaments. From the very first reports on the indigenous populations of the southwestern Cape coast the extensive use of a variety of marine shells for ornamentation is apparent (Raven Hart 1967) while numerous archaeological reports have confirmed that this practice can be traced well back in time. It is necessary to comment on the possible use of Fissurellidae shells for the manufacture of beads (Fig. 18: 9) because while the form of these pieces appears to be regular and difficult to produce naturally it is perhaps better that this class should remain tentative until more direct evidence is found. The use of Nassa kraussiana has been commented on elsewhere (Schweitzer 1975) and suggests the exploitation of resources from estuarine situations often at a distance from occupation sites. The Bot River or Klein River vleis provide the most suitable sources relatively close to the Hawston locality and Schweitzer (1975) showed how these shells, together with Zostera capensis, an estuarine grass on which they live, were carried from the Klein River vlei to Die Kelders. The closest possible source to the Pearly Beach localities is the Uilenkraal River, although it must be borne in mind that it is not inconceivable that the shells came from much further afield. The Turbo discs cover a range which clearly shows the method of manufacture; a piece of shell was worked to roughly the required shape and the edge then ground to the final form which was not perforated and presumably then attached to articles of clothing or ornamentation.

Ostrich eggshell ornaments. The use of this raw material for the manufacture

of ornaments appears to have been ubiquitous among Late Stone Age populations. While the blank from SFT1 is likely to represent a stage in bead manufacture, the circular, unperforated example from PB6 seems more likely to have been made as an ornamental disc in the manner of the Turbo specimens.

Utilised Bone

Few pieces of utilised bone occurred in the samples, although bone-working has been shown to be a characteristic feature of coastal occupation (Schweitzer 1975). The examples found, however, do provide a fair range of the forms which were made, with one notable exception. This form was, however, observed regularly, in complete and unfinished form, on mixed middens with isolated broken examples being found on Haliotis middens. These artefacts, made from the split and shaped ribs of large mammals are long and spatulate in form with chisel-like edges at one or both ends (Fig. 18: 10). These ends often show wear in the form of bevelling at an angle which might be caused by forcing the tool between the margins of Patella or Haliotis shells and the underlying substrate in order to remove them. It is thought that these bone tools were produced for the purpose of shell-gathering rather than that stones were utilised as has been suggested on occasions in the past. Schweitzer's (1975) description of skin scrapers includes a slightly different form of these tools which shows extensive polishing of the edges.

Pottery

Although middens associated with pottery were excavated, only two of the samples yielded sherds, most of which were small and formless and provide little

information. Observation within the general area showed that typical lugged, conical-based pots were in use and that many had been painted with a thin ochre slip. Thickness varied enormously, not only between pots but in individuals, and temper varied from very fine-grained to extremely coarse quartz grit, some of which appeared to have been crushed for the purpose. No decoration was found although fragments of one pot had two small raised bosses which had been pressed out from the inside.

Pigment Nodules

The significance of these imports has been discussed above. In addition to providing evidence of movement, the consistent occurrence of pigment nodules serves to underline the known importance of this commodity amongst historic and prehistoric populations for body adornment, pot-decoration and, doubtlessly, other uses.

Mastic Fragments

A few fragments of material considered to be mastic occurred in the HAWI and PBI samples. Although the pieces were formless, the manner in which this substance could have been utilised is perhaps illustrated by the occurrence in coastal caves of stone implements and pieces of bone embedded in lumps of mastic which had served to bind them to hafts (Hewitt 1912; Schweitzer 1975; J.E. Parkington pers. comm.).

v) Plant Remains (Appendix Vf)

A small number of carbonised seed and fruit remains was recovered from the samples and although some belong to edible forms it is not thought that

they represent food remains. A more likely explanation probably lies in the observation already made concerning the distribution of prehistoric vegetation and the possibility that some coastal occupation was located on or near vegetated areas which would allow for the natural introduction of seeds and fruits from vegetation cover or on branches selected for firewood or raw materials. This possibility is supported by the fact that the remains were all carbonised and the presence of both Euclea cf. racemosa, a winter fruiting species, and Chrysanthemoides monilifera, a summer fruiting species, in the same midden sample, and Olea exasperata, an inedible perennial fruiting species, in a sample 20 km away.

Stone Features (Appendices II, III, IX)

Stone features associated with open shell middens have been described in the past (Schönland 1903; Colson 1905; Goodwin 1946; Mabbutt et al. 1966; Avery 1974; Cairns 1975). Various interpretations were put forward, the most obvious of which described hearths where ash and charcoal were still preserved (Fig. 11,12) and burial covers where human skeletal remains were associated in positions underlying stones. In addition, a small number of the Pearly Beach features is thought to represent base anchorages of huts or windbreaks which had hearths within them (Fig. 10). Tidal fish traps have also been commented upon (Goodwin 1946; Rudner 1968; Avery 1975). The maps which describe the distribution of stone features within three localities show them to be fairly common although the classes are not evenly distributed.

i) Stone features associated with middens

Little information was obtained through the measurement of stones making

up a sample of stone features and Appendix IXa shows that while some broad subdivisions are apparent, wide variability in the size of stones selected or available makes it impossible to define classes on this basis alone. Interpretation based on observation of size range and other features such as plan, presence or absence of ash or charcoal and skeletal material and the use of ethnographic sources appears to give a better basis for description. Following along these lines it is thought that the majority of stone features represent hearths. An ethnographic description exists for the use of stones in hearths for cooking purposes which might be reflected in the features found within the research area and elsewhere. Johan Schreyer, who visited the Cape in 1668 (Raven Hart 1971 vol. 1: 130) described two Hottentot methods of cooking meat. In the first method meat was placed in a pot and boiled on a fire, while in the second "They make a pit in the ground, throw a few stones therein, and make a fire onto these. When now the stones are hot enough, they take away the fire and lay the flesh thereon. On this again they throw stones and on these wood and fire and let it thus roast until the flesh is cooked to their taste". This method would not only produce very good heating properties for cooking, but also provide a useful cooking base out of the sand. A C14 determination run on a charcoal sample from beneath the stones of the PB2 S1 hearth yielded a date of 1680 ± 50 B.P. which extends this method back in time but indicates that it is still within the range of pottery usage. The proportions of the raw material classes in Appendix IXb show utilisation of the local abundance of cobbles and the tendency for resources to have been collected from areas near occupations. The average percentages of 95,65, 2,71 and 1,46 for quartzite, limestone and granite respectively in the PB2 sample reflect very closely the coastline at the site, as does the shift in raw material usage illustrated by average

percentages of 77,46, 18,53 and 12,21 for the same raw materials at P85 which is located at the southern end of the granite outcrop. Observation of stone features on sites located well within the bounds of the granite outcrop shows the granite proportion to increase even more significantly. Limestone is possibly over-represented in the samples as it breaks up when burnt although it must be noted that the high limestone content of some of the P85 hearths was caused by the fact that occupation took place on the limestone bank and that some hearths along the west coast are made up entirely of limestone where it outcrops close to the middens rather than of quartzite cobbles which are available further away at the sea. Distance from the sea and, therefore, resources appears to play an important part in stone feature distribution. At Pearly Beach quartzite cobbles were used up to a maximum of approximately 450 m although they become increasingly rare from 300 m, while local limestone outcrops were seen to be utilised increasingly up to a maximum distance of 600 m in one instance. No examples of any kind were observed further inland and although observation must be seen as being problematic it seems that stone features may be restricted in distribution through a lack of suitable raw materials or that, as also seems to be the case in coastal contexts, hearths, for instance, were not always made in this manner in spite of the availability of suitable raw materials. That stone hearths of this type do occur further inland cannot be disputed, however, as Deacon and Brooker (1976) mention similar features in the Boomplaas cave deposits.

Descriptions of the use of stone coverings to protect burials are often encountered (Schapera 1933: 6) and complementary situations have been found in archaeological contexts in midden localities. A single in situ burial covered by a group of large stones was recovered by holiday makers at Pearly Beach although no further information was available other than that it

was associated with the PB5 midden and that the corpse had been buried in a seated position facing east. The burial cover from PB2, which was deflated and somewhat dispersed, provides another example although the number of stones seems to be unusually high. It would be interesting here to postulate a situation analogous to the herder custom of each member of the group placing an object on the grave at the burial and for a period thereafter on passing it (Schapera 1930). Human remains were also associated with the PB1 Si feature although the relationship is not clear. It has already been suggested that the stone feature within the supposed hut circle is thought to be a hearth. That being the case it is possible that the corpse was buried or simply left within the hut.

ii) Tidal fish traps (Appendix III)

Appendix III describes the use of tidal fish traps in the research area, and attempts to correlate them with the introduction of herding activities. Evidence presented in Tables 1 and 2 indicated clearly that this successful modification of an existing environmental niche offered tremendous potential for the more effective exploitation of marine resources. Efficient use was restricted to the few days before and after spring tides, which, as has been described in the section on shellfish, doubtlessly affected the length of any occupation of a group relying solely on fish. Exploitation of a single resource does not seem to have been the case, however, as can be seen from the SFT1 sample. In this sample the shellfish and other faunal content suggests that, although the occupation was closely related to spring tides, it took place over a slightly longer period of time than would be possible with purely fish-trap or Haliotis exploitation. Although direct information is needed it seems likely that the

produce of fish traps supplemented a shellfish staple perhaps in much the same manner as the exploitation of terrestrial animals is thought to have done. There are additional problems in the possibility that all or part of the fish was dried and carried elsewhere or that fish were taken in quantities large enough to allow an entirely fish diet. In the former case no change would be visible in the normal composition of middens and in the latter localised concentrations of fish bones rather than shell middens would, in fact, be associated with fish-trap usage. The seasonal movement of two Coloured groups with their stock and families from Elim to Die Dam and Pearly Beach was commented upon in terms of herder grazing patterns and more recently information from the Bredasdorp area (E. Hayden pers. comm.) suggests that ownership of fish traps, whether by Coloureds or Europeans, was respected in the old days. Assuming that Coloured ownership is likely to have descended from herder ancestors, an argument exists for the traps having been important resources in coastal contexts within herder territories and for the existence, therefore, of well-defined exploitation strategies with different groups returning to certain localities or coastal stretches during summer months when grazing was also available. Unfortunately the problem of recognising herder activities in archaeological contexts still exists as ties such as kinship and clientship would doubtlessly have allowed for some flexibility of usage. In spite of complexities, however, it appears likely that fish traps could have provided incentive to expend the co-operative effort necessary for trap building and upkeep. The use of fish traps, therefore, may well have played an important role in determining location of occupation and cyclic or seasonal mobility within the routine exploitation strategies of groups utilising marine resources. As yet, however, no data have been obtained to provide further information on these problems.

CHAPTER 9CONCLUSION

It has long been contended that the so-called strandloopers lived at the lowest possible level of subsistence in much the same manner as the Kalahari Bushmen of today. Workers such as anthropologist Lee (1965) have argued convincingly against this case, however, and archaeologists are providing similar evidence for the past (Deacon 1970; Parkington 1972; Klein 1974) all of which may be summed up by the comments of Sahlin (1974: 5) who said that "we should entertain the empirical possibility that hunters are in business for their health, a finite objective, and that bow and arrow are adequate to that end." The foregoing discussion on coastal exploitation also argues for the fact that coastal occupation formed part of a carefully integrated system making use of both inland and coastal resources on a cyclic or seasonal basis and that the technological base was adequate for this purpose.

The distribution of sites has provided useful information on coastal occupation patterns. About 90 per cent of midden sites within the research area were located along rocky stretches, which made up 60 per cent of the available coastline, and were invariably located within 300 m of the shore. Sandy beaches in the research area are limited and do not appear to have had any significant effect on occupation whereas along the west coast where long sandy stretches predominate 90 per cent of sites are restricted to a rocky area which makes up only 16 per cent of the available coastline. Here sandy beach resources such as Donax serra, although common, were exploited only when occupation took place along sandy coastlines where no rocky stretch was within collecting distance. The distribution of sites,

also been suggested that this staple food was obtained at no great distance from the habitation area. A correlation between midden composition and length of occupation was also observed. Haliotis and Turbo middens clearly indicate exploitation, and therefore occupation, during the LWS period which is restricted to about six days per cycle. Oxystele Patella Turbo middens, on the other hand, represent exploitation, and therefore occupation, during the greater part of the tidal cycle of 15 days or longer. The calculation of diversity indices for the shellfish content of each sample made it possible to compare other components of the samples. It emerged that Oxystele Patella Turbo middens which contained variable amounts of a number of shellfish species were highly diverse, while Haliotis and Turbo middens dominated by one species were almost lacking in diversity and reflected a higher degree of selectivity. Diversity was shown to increase with length of occupation. This was also substantiated by the tendency for mixed midden occupations to have included the exploitation of additional dietary components such as fish, marine mammals, birds and terrestrial fauna and a greater variety of cultural components such as stone, bone and shell implement and ornament manufacture and the presence of pottery and pigment which are assumed to reflect a greater range of activities not entirely connected with dietary subsistence, and therefore length of occupation.

Although length of occupation was shown to be related to the tidal cycle and to vary between short occupations of less than a week and longer periods it was not possible to fix a limit to the latter. It must be accepted, however, that the midden accumulations probably represent the remains of a number of different occupations of relatively short duration extending over a long period of time. Explanation of the spatial significance of the different midden types is dependent on rather tenuous factors such

as the extension of the subtidal range of animals such as Turbo, over-exploitation of Haliotis populations and the lack of a chronological framework. The other sample components have been described but provided little in the way of new information.

Although the coastal diet was obtained from a large number of different animals it seems clear that the bulk was derived from marine sources, especially in the case of specialised middens representing short occupations, and that even where length of occupation dictated the need to utilise other marine elements and terrestrial fauna, the gross effect of the staple food would not be too drastically altered if measured over the total period of exploitation. This supports the contention that shellfish collecting provided the staple food for coastal dwellers while fishing, hunting and the occasional scavenging of washed-up animals augmented this to some extent. Resources were obtained from the sea shore as well as inland and it could be argued that their exploitation took place inversely, at distances of 500 m and less or up to about 5 km, depending on distribution and availability in each area and the period of time spent living at the coast. For the present there seems, however, to be little doubt, that like their modern counterparts elsewhere, prehistoric inhabitants of the southwestern Cape possessed an intimate knowledge of the available resources and conditions affecting them, and furthermore, that some utilised this knowledge to organise deliberate subsistence strategies aimed at the maximum exploitation of the resource potential available both inland and on the coast.

It is interesting to contemplate the social effect such activities might have had on groups rotating between the coast and interior. Gathering being the work of the females, it could perhaps be assumed that collection

of the shellfish staple was undertaken by them as it is nowadays in modern inland contexts, and that males undertook hunting activities. Ethnographic records suggest that fishing by means of spears, lines and possibly trapping, was a male occupation thus providing a coastal alternative when hunting was not undertaken. On this basis, however, the male contribution to Haliotis-orientated occupations was likely to have been very small unless they were occupied in activities not archaeologically visible or in fact, as may have been the case, helped the women to remove and collect the Haliotis. Daily tides restrict shellfish exploitation to part of the day only and it seems likely that the staple food was obtained over a relatively short time period, possibly measured in terms of two or three hours, and that shellfish gatherers would have fairly long periods in between food-gathering for obtaining other resources, cooking, making artefacts and for leisure, a situation which agrees well with modern hunter-gatherer data.

The question of strandlooper identity has been discussed at length and was shown to be a facet of a complex social system which included all socio-economic divisions of the indigenous population. A hypothetical framework for hunter-gatherer and herder living patterns was worked out on the basis of early records and grazing patterns, historical and modern, which affect not only domesticated animals but also game, although it has not yet been possible to demonstrate from the archaeological evidence which socio-economic group or groups was responsible for the accumulation of the shell middens. Evidence for seasonal occupation is rather scant, but suggests that at least some occupation took place during summer. In view of this it would be tempting to suggest that herders utilising summer grazing available on the coast were responsible, although it must be noted that occupation or its absence cannot be demonstrated for the other parts of the

year. Ethnographic evidence and the name Hagekraal or Hylekraal which originally described the Pearly Beach area suggests that herders were accustomed to live in the area during historical times. These lines of evidence and even the association of domesticated animals and fish traps with open middens are not sufficient to exclude the likelihood that hunter-gatherers who are known to have occupied inland shelters from which they exploited some marine resources also lived on the coast and could have contributed to the accumulation of shell middens. It is necessary, therefore, to conclude that no clear grounds could be found for associating any one socio-economic group with coastal occupation and that it must be conceded, in view of inland coastal links, that so-called strandloopers were often the same people whose remains are observed inland. Furthermore, although it is perhaps more desirable to describe coastal living as a strandlooping way of life, the patterning which has been observed is likely to obscure socio-economic grouping because hunting and gathering were common to all groups. In this context it is perhaps not as important to be able to demonstrate whether particular occupation remains are those of herders or hunter-gatherers sensu stricto as to provide data on the broad patterning which is becoming apparent. Finer division must remain for the future when more is known about coastal and inland living patterns.

That middens must be seen to represent only part of occupation areas has been clearly shown by the existence of associated features such as hearths, huts, burials, working areas and fish traps. This, together with the fact that middens may represent the accumulations of a number of occupations, has helped to explain some of the variability described in the past and provides some observations on the manner in which coastal occupation took place within the research area. This limited observation is not sufficient, however, as many questions remain unanswered. There is a need for many

more observations to be made along the western, southern and southeastern coasts if archaeologists wish to obtain sufficient data to understand coastal living patterns and the manner in which social, environmental and climatic variation might have affected them. The present results should present a better substantiated basis for the setting up of a working hypothesis for such a study and a problem of obvious interest which arises out of this work would be the sampling of coastal sites within summer rainfall areas as a control for testing the grazing-system hypothesis against evidence that coastal occupation on the west coast (Parkington 1972) and on the southern Cape coast (Klein 1974) took place during winter months rather than summer as is suggested for the southwestern Cape coast by this project and the work of Schweitzer (1975).

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LIST OF APPENDICES

- APPENDIX I Average monthly rainfall and minimum/maximum temperatures for selected stations.
- APPENDIX II Open station shell midden sites and associated features from the Pearly Beach area, south-western Cape.
ENCLOSED AT BACK
- APPENDIX III Discussion on the age and use of tidal fish traps (visvywers).
ENCLOSED AT BACK
- APPENDIX IV Method and terminology.
- APPENDIX V Basic data from midden samples
- a) Shellfish data from midden samples: minimum numbers of individuals.
 - b) Shellfish data from midden samples : meat mass
 - c) Other faunal data from midden samples: minimum numbers of individuals.
 - d) Cultural material: stone.
 - e) Cultural material: other.
 - f) Plant remains from midden samples.
- APPENDIX VI Shellfish data from Byeneskranskop and Die Kelders caves.
- APPENDIX VII Composition of midden samples: diversity indices.
G. Avery, P.H. Hamel and H. R  ther.
- APPENDIX VIII Basic data from surface collection of stone from PB4 Square O.
- a) Frequency and mass.
 - b) Frequencies of cortex and raw materials with percentages of total frequency.
 - c) Frequencies of cortex and raw material with percentages of total frequency in each category.
 - d) Mass with percentages of total mass.
- APPENDIX IX Stone features
- a) Class, mean, standard deviation, number of stones and range of length measurements for examples from PB2 and PB5.
 - b) Raw materials used in examples from PB2 and PB 5.

APPENDIX I - Average monthly rainfall and minimum/maximum temperatures for selected stations (Weather Bureau)

STATION	Latitude S	Longitude E	Altitude M.	AVERAGE RAINFALL IN MM.												
				JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
GHAARWATER	32°09'	18°36'	198	3,3	5,8	9,1	19,5	33,7	33,7	32,6	32,4	23,1	14,0	10,0	7,9	225,1
REDELINGHUIS	32°29'	18°32'	61	2,6	8,4	11,2	24,0	45,1	47,7	47,2	39,7	21,5	16,8	10,6	8,6	284,4
CAPE COLUMBINE	32°50'	17°51'	60	2,6	6,4	7,4	25,4	39,4	43,4	41,1	31,8	21,4	14,7	6,9	7,4	247,9
SALDANHA BAY	33°00'	17°56'	8	2,8	7,8	6,9	26,8	52,5	55,7	53,4	40,3	23,6	13,4	9,8	7,3	300,3
HOPEFIELD	33°04'	18°21'	30	5,2	6,5	6,6	23,0	47,3	63,2	55,5	52,4	31,7	18,0	11,7	6,0	327,9
GARLING	33°22'	18°23'	152	9,2	13,1	12,9	35,4	81,0	91,7	83,3	70,0	47,8	28,0	20,1	11,2	505,5
MALMESSURJ	33°27'	18°44'	140	9,7	10,8	13,7	36,6	69,2	75,0	69,6	64,0	45,8	29,9	17,7	10,5	452,6
WELLINGTON	33°38'	19°00'	107	18,3	14,2	20,6	56,4	95,3	122,2	90,4	87,6	58,4	51,3	27,0	18,0	660,6
CAPE TOWN (Woodstock)	33°56'	18°27'	15	21,6	13,2	29,0	57,9	95,8	117,3	84,1	106,2	56,6	45,7	32,8	38,3	698,5
TABLE MOUNTAIN	33°57'	18°24'	1067	57,9	50,8	61,2	153,6	165,1	189,9	222,6	167,4	144,0	95,5	73,1	41,5	1423,6
SOMERSET WEST	34°05'	18°51'	46	22,3	13,7	22,3	48,8	92,5	104,7	88,9	83,3	62,2	47,7	33,8	14,2	624,4
ELGIN	34°09'	19°02'	258	31,7	27,9	37,1	80,0	137,4	167,7	149,2	143,0	106,9	81,8	55,2	34,9	1052,8
WIDRIGESTER	33°39'	19°26'	221	6,1	9,8	12,5	23,1	37,0	47,1	41,7	36,9	27,4	22,9	13,3	8,7	266,5
GENADENDAL	34°02'	19°33'	290	37,1	37,3	56,6	55,1	54,4	61,2	64,3	65,0	69,6	60,5	58,7	32,8	653,6
CALEDON	34°13'	19°25'	244	21,6	22,7	33,8	45,5	63,8	68,1	65,7	64,9	53,0	47,2	33,2	22,6	542,1
KLEINMOND	34°21'	19°02'	15	25,2	38,1	35,2	83,4	123,2	105,1	101,8	105,3	75,3	76,0	43,9	28,3	840,8
HERMANUS	34°25'	19°14'	61	29,4	40,3	39,7	64,4	61,5	80,1	86,3	80,1	72,7	61,0	46,7	21,7	705,9
STANFORD	34°26'	19°28'	30	19,1	25,5	27,8	50,0	67,6	65,1	68,5	71,4	57,8	45,2	32,5	22,0	562,5
DANGER POINT	34°37'	19°18'	28	21,4	21,8	27,9	39,9	63,7	77,9	67,9	71,9	53,3	44,2	31,5	21,5	542,0
LOOFFONTEIN	34°33'	19°28'	152	13,0	49,8	37,6	67,0	100,6	87,7	112,7	133,3	64,2	73,1	64,0	41,4	844,4
FETERS GATE	34°39'	19°33'	61	16,2	30,3	37,5	55,9	90,0	77,7	73,5	82,9	54,0	65,5	28,5	29,2	647,6
CAPE AGULHAS	34°50'	20°01'	6	19,1	18,7	31,4	39,1	53,6	59,8	54,7	52,6	40,7	38,6	27,3	19,0	454,6
VOELVLEI	34°39'	19°52'	30	15,5	23,2	23,2	47,1	67,0	52,1	59,1	71,5	46,8	47,6	26,1	16,8	496,0
BREDASDORP	34°32'	20°02'	67	21,9	27,8	38,5	39,7	50,1	50,9	50,1	52,7	45,2	47,1	33,1	25,4	462,5
FORT BEAUFORT	34°23'	20°50'	15	16,0	4,7	22,8	24,9	30,4	30,8	32,6	22,2	36,3	27,9	33,9	8,7	293,2
RIVERSDALE	34°06'	21°16'	108	26,9	33,5	43,7	40,4	37,6	34,3	30,7	35,1	38,9	41,4	35,1	30,7	429,3

STATION	Latitude S	Longitude E	± Altitude	AVERAGE MAXIMUM/MINIMUM TEMPERATURE IN °C											
				JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
CAPE COLUMBINE	32°50'	17°51'	60	20,8	21,1	20,6	18,9	17,6	16,7	15,8	16,4	17,0	18,4	19,7	20,3
				13,1	13,4	13,1	12,4	11,5	10,6	10,0	10,1	10,1	11,4	12,2	12,8
DARLING	33°22'	18°23'	152	28,5	28,6	27,4	24,5	21,0	18,5	17,6	18,4	19,6	22,4	25,0	27,3
				15,7	16,2	15,3	12,8	10,3	8,4	7,5	7,9	9,2	10,7	13,0	14,7
WELLINGTON	33°38'	19°00'	107	30,8	30,7	28,8	24,8	20,7	18,5	17,4	18,3	20,5	23,4	26,8	29,8
				17,6	17,8	15,7	12,6	9,8	7,6	7,1	7,8	9,3	11,7	13,9	15,3
TABLE MOUNTAIN	33°57'	18°24'	1067	20,4	20,9	19,9	17,3	14,7	13,4	11,8	12,6	13,4	15,2	17,9	19,0
				12,4	12,8	12,3	10,6	8,9	7,7	6,2	6,5	6,9	8,1	10,0	10,9
SOMERSET WEST	34°05'	18°51'	46	27,4	27,4	25,4	23,3	20,3	18,5	17,1	17,8	18,4	21,3	23,8	26,1
				15,9	15,8	14,3	10,9	9,1	6,8	6,7	7,3	8,9	10,8	12,7	26,1
ELGIN	34°09'	19°02'	258	25,9	26,1	24,6	22,2	18,9	17,3	16,1	17,1	17,9	20,5	23,0	24,6
				12,4	12,5	10,6	7,9	5,0	2,9	3,2	3,4	5,6	7,4	9,9	11,1
WORCESTER	33°39'	19°26'	221	29,9	28,4	27,6	25,4	21,6	18,8	17,2	18,7	20,7	23,6	25,2	28,7
				15,5	16,0	14,5	12,2	8,3	6,3	5,6	6,8	8,7	10,9	12,7	14,3
CALEDON	34°13'	19°25'	244	26,4	26,3	25,0	22,7	20,4	18,2	16,9	17,7	18,6	21,8	23,9	25,7
				13,4	14,2	12,8	11,1	8,9	6,7	5,3	6,4	8,5	10,3	11,8	12,9
DANGER POINT	34°37'	19°18'	28	22,1	21,8	20,8	19,5	18,4	17,3	16,4	16,9	16,9	18,4	19,9	21,3
				15,6	15,4	14,7	13,8	12,2	10,9	10,1	10,3	11,1	12,5	13,9	14,9
CAPE AGULHAS	34°50'	20°01'	6	23,5	23,5	22,3	20,5	18,7	17,5	16,4	17,0	17,3	18,9	20,8	22,4
				17,2	17,5	16,4	14,6	12,5	11,1	10,0	10,4	11,3	12,9	14,7	15,9
RIVERSDALE	34°06'	21°16'	108	29,1	28,9	27,2	25,5	22,7	21,1	19,6	21,2	21,5	23,2	25,3	27,4
				14,4	15,3	14,3	11,1	7,6	4,9	4,5	5,6	7,7	10,3	12,7	13,7

APPENDIX IV : Method and terminology

Fieldwork was undertaken in the form of an initial site survey followed by sampling of selected occurrences by means of detailed site plans and excavation.

i) Site Survey

Except for the built-up area of Hermanus the total coastline included in the research area was examined. The localities of all visible sites were plotted on aerial photographs and 1: 50000 topographical maps in order to show their relationship to natural features such as sandy and rocky shores, water sources and topography. Inland observation, which was often hindered by ground cover and vegetation, was undertaken where possible. Although visibility was restricted in some areas, even along the coast, it was possible to make enough observations to provide a reasonably accurate picture of site distribution. This information was then utilized in the selection of the sites which were sampled.

ii) Detailed Site Plans

Site plans were produced for the Pearly Beach area only. Site localities were surveyed by means of normal land surveying procedures in order to show the relationship between the distribution of midden types, certain cultural information and the coastline. A total of 15 plans covering approximately 4 km of coastline was drawn to 1: 5000 scale and can be related to the national system of co-ordinates. For the purpose of this study a selection of these plans has been reduced in order to show site relationships.

iii) Excavation

In order to ensure some degree of temporal homogeneity only middens containing, or considered to be associated with, pottery were sampled. Selectivity was further aimed at occurrences which appeared likely to provide information on the problems outlined for the project. For this reason exposed sections where possible. Sampling was conducted within m^2 units following normal excavation procedures of looking for depositional change. Excavated material was collected in buckets with a record being kept of the number in order to provide an indication of the volume of deposit excavated. The material was then passed through half inch and eighth inch sieves and the residue sorted manually for components. Components were separated into categories of shellfish, bone and cultural material which included stone, bone and shell. Samples are small and, by comparison with midden areas, are considered to be most representative of shellfish content which makes up the bulk. It was predicted that relatively small quantities of other faunal components would be obtained and that cultural components would be extremely poorly represented. This provided a representative reflection of midden content and it was not intended to obtain large samples or cultural material.

iv) Analysis

In order to provide comparative data sample components were reduced to counts of minimum numbers which were arrived at in different ways according to the components concerned.

Shell Counts

The method used for obtaining minimum numbers is based on that used by Speed

(Maggs & Speed 1967) although certain adaptations have been introduced in order to reduce the possibility of duplicating individuals. The following criteria were used and where more than one count was obtainable, the highest value was taken to represent the minimum number.

TABLE 1 - SHELLFISH : CRITERIA ON WHICH MINIMUM NUMBERS ARE BASED.

SPECIES	CRITERIA
<i>Dinoplax gigas</i>	Head valve; tail valve
<i>Choromytilus meridionalis</i> <i>Perna perna</i> <i>Donax serra</i>	Umbo separated into left and right valves
<i>Haliotis</i> spp.	Inner point of whorl
<i>Crepidula</i> spp.	Anterior part
<i>Patella</i> spp. Fissurellidae spp.	Apex
<i>Turbo</i>	Protoconch; operculum - complete centre of the whorl, or any fragment which includes part of the centre of the whorl plus the point at which the growth edge is connected to the outer circumference.
<i>Oxysteles</i> spp. <i>Burnupena</i> spp.	Protoconch

Juvenile animals which are not considered to have been collected for food were excluded from the minimum values as it is assumed that they entered the site attached to larger animals, seaweed or stones. The Patella juv. category includes all species except P. barbara and P. miniata which were kept apart as they occur subtidally. Numerically this category is made up mainly of P. cochlear which live on P. argenvillei and other P. cochlear

shells and can reach a length of up to 4 cm in this situation.

In order to exclude biases caused by the use of shellfish frequencies alone, minimum counts were reduced to a common factor by conversion to meat mass. Live samples were collected, measured and weighed to obtain comparative data on the meat yield of different species. Averages for meat mass were worked out according to the size ranges represented in the samples and are presented in Table 5 (see Chapter 6: 106). A reasonably accurate approximation of the meat mass represented in the samples can be calculated by this method, although more accurate values could doubtlessly be obtained by detailed measurement of midden shellfish size ranges against comparative samples of sufficient size.

Values for species composition and dominance were calculated for each sample, using diversity and redundancy indices (Appendix VII). For the purpose of these calculations it was necessary to exclude Patella indet. values, and the presence of one adult P. cochlear individual (PB4 K41) which gave a value of zero in the calculation.

Other Faunal Remains

Bones and bone fragments were sorted into identifiable and unidentifiable categories. The identifiable material was then classified down to genus or species level and minimum numbers arrived at from the most represented body parts.

Cultural Material

The samples yielded small quantities of cultural material and basic

typological subdivision was undertaken, therefore, with no attempt at further analysis. The surface sample collected from PB4 0 (10 x 10 m) was analysed further, however, on the basis of class frequencies and mass only, in order to provide an indication of stone artefact composition.

Cultural Material : Raw Materials

All the raw materials utilized in the manufacture of the stone artefacts occur locally. Quartzite is readily available from the intertidal zone and beach deposits in the form of pebbles and cobbles. Quartz occurs mainly as veins within the Table Mountain Sandstone and granite although pebbles and cobbles are to be found in small numbers. Limestone occurs abundantly in the Pearly Beach area, where fine grained forms are found, and is also obtainable as pebbles and cobbles on the beaches. Silcrete is relatively rare in the samples and the source of this material has not been located as yet although it is reputed to occur in small quantities as outcrops or in nodular form in the lime-rich areas. A granite outcrop is situated in the Pearly Beach area as shown on Fig. 5. Pebbles and cobbles occur quite frequently in this locality and occasional examples are to be found elsewhere. Pigment, in the form of haematite and manganese, occurs in both the Table Mountain Sandstone and the Bokkeveld Beds. H. Theron (pers. comm.) suggested, however, that the form and structure of the pigment-bearing nodules occurring in the samples indicates that they originate from the Bokkeveld Beds. Occurrences of similar haematite nodules are known from near Napier and the Bot Rivier-Caledon area while manganese-containing nodules only occur inland on the Bokkeveld Plains.

Cultural Material : Stone typology and definitions

For the sake of comparability the stone has been classified, as far as

possible, into the categories utilized by Schweitzer who adapted his method from that of J. Deacon (Schweitzer 1975: 53-57). Problems were encountered, however, especially when dealing with categories such as cores, multi-flaked cobbles and heavy duty edge-damage, and it is felt that while this classification proved adequate in most aspects some general modification will be necessary in the future.

Waste

Chips: All artefactual material with a maximum dimension of less than 1 cm was included in this category for analysis of the PB4 0 sample. This category was not utilized for analysis of the midden samples although pieces which fitted Schweitzer's definition did occur.

Chunks: Pieces larger than chips, of irregular form, with no bulbs of percussion but showing evidence of working. It should be noted that chips occurring in the midden samples were included in this category.

Cores: Pieces which show a pattern of flaking consistent with the systematic production of flakes. The nature of the raw materials such as quartzite and especially quartz which tends to shatter, makes it difficult to recognise flake scars with the result that cores are likely to be under-represented.

Untrimmed flakes: Flakes showing no visible modification due to utilization or retouch.

Borer spalls: Small quartzite pieces, characterized by retouch and wear

patches, which appear to have broken from the ends of borers during utilization.

Utilized

Flakes: flakes showing signs of unsystematic modification or utilization on the lateral margins.

Multi-flaked cobbles: cobbles showing signs of utilization by the removal of more than one flake along an edge.

Heavy edge-damaged pieces: "cobbles usually retaining a substantial part of their original shape but modified by the removal of flakes due to utilization at right angles to their flattened surfaces. This results in a roughly straight flaked edge" (Schweitzer 1975). It should be noted that for the purpose of this study irregular-shaped pieces with little or no cortex, but showing edge-damage, were included in this category.

Rubbers, or upper grindstones: Quartzite cobbles of a size easily held in the hand, with at least one smoothed grinding surface which may show signs of bashing around the lateral edge.

Lower grindstones: Large flattish cobbles or boulders with smooth or concave grinding surfaces on one or both surfaces.

Hammerstones: pebbles and cobbles showing evidence of hammering in the form of pitted or flattened areas. a) pebbles: smooth oval-shaped pieces, up to 6 cm in length, showing evidence of wear at one or both ends of the

long axis, and b), cobbles of larger size with pitted or flattened areas usually at the ends of the major axis.

Anvils: cobbles, too large to be wielded in one hand, which show evidence of pitting on the surface.

Formal Tools

Borers or reamers: quartzite flakes or cobbles, up to approximately 12 cm in length, showing retouch along two or three lateral edges, forming a thick quadrilateral or triangular section. Abraded surfaces, sometimes showing evidence of hammering, occur on one or both ends of utilized examples.

Miscellaneous retouch: pieces of varying shape and size which show evidence of retouch which cannot be classified to any formal category.

Outils écaillés: small quartz flakes or chunks, up to 1,5 cm in length, on which one end of the long axis shows evidence of utilization in the form of crushing.

Cultural Material : Other

Other cultural components were placed into broad descriptive classes and their frequencies listed.

Utilized Shell

Donax scrapers: complete or fragmentary valves of Donax serra which show systematic retouch along all or part of the margins.

or showing signs of chipping.

Utilized Bone

Points: a) Projectile; long thin pieces of bone ground to a circular section along the total length, and comparable in overall appearance to known examples of projectile points, and b) Boring; bones or bone fragments ground to a circular section along only part of the total length of the object. Localized wear or polish may be visible at the tip.

Snapped projectile bases: short pieces, of circular section, with one end ground flat at right angles to the long axis and the other showing evidence of a groove cut around the circumference and a break at this point.

Pottery, Pigment Nodules, Mastic

These classes are self-explanatory and require no further definition.

Stone Features

Definition of stone features follows the description given by Avery (1974; Appendix II).

Hearths: a) groups of beach cobbles with ashy or burnt matrix, and b) groups similar to a) but with a clean sand matrix. The stones are often dispersed and it is assumed that they represent blown-out hearths.

Burial Covers: a) groups of large cobbles or boulders which cover burials,

and b) large numbers of varying-sized cobbles and boulders associated with human remains.

Unknown: small groups of large boulders or pieces of limestone which are not associated with human remains.

Hut circles: rough circles of variously-sized cobbles and boulders with a group of smaller cobbles thought to represent a hearth, situated within the feature.

Tidal fish traps: low boulder walls constructed across gullies or other suitable localities on gently shelving shores. Situated within the intertidal zone, the walls are built to the height of the surrounding bedrock and form completely artificial enclosures.

In order to provide data on the composition of some stone features length and breadth measurements were taken on a selection of features from PB2 and PB5. Length measurements were then utilized to obtain means, standard deviations and size ranges.

SPECIES	COMMON NAME	HAWI		PB1		PB2		PB4	K41	PB5	M81	PB5		PB6		SFT1	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Dinoplax giges	Chiton	5	0,09	41	0,58	-	-	8	0,42	16	1,21	2	0,34	6	0,13	1	0,05
Choromytilus meridionalis	Black Mussel	1239	23,25	14	0,20	-	-	-	-	-	-	-	-	203	14,91	-	-
Perna perna	Brown Mussel	96	1,80	20	0,29	-	-	-	-	-	-	-	-	-	-	-	-
Donax serra	White Mussel	3	0,06	1	0,01	-	-	2	0,11	1	0,08	-	-	-	-	-	-
Haliotis midae	Perlemoen	43	0,81	93	1,33	318	82,60	38	2,01	18	1,36	348	56,78	20	0,42	220	11,26
H. spadicea	Venus Ear	25	0,47	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurellidae	Keyhole Limpet	-	-	19	0,27	-	-	-	-	-	-	-	-	25	0,53	92	4,71
Patella cochlear	Limpet	-	-	-	-	-	-	1	0,05	-	-	-	-	-	-	-	-
P. compressa	"	-	-	3	0,04	2	0,52	1	0,05	-	-	3	0,51	1	0,02	17	0,87
P. granularis	"	35	0,66	-	-	-	-	-	-	-	-	-	-	-	-	58	3,02
P. argenvillei	"	110	2,06	111	1,58	4	1,04	39	2,06	19	1,43	10	1,59	64	1,36	67	3,43
P. barbara	"	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P. tabularis	"	2	0,04	3	0,04	1	0,26	-	-	-	-	-	-	5	0,11	2	0,10
P. longicosta	"	2	0,04	27	0,39	3	0,78	59	3,12	43	3,24	34	5,74	82	1,74	336	17,20
P. granatina	"	144	2,70	280	3,99	4	1,04	74	3,91	91	6,85	14	2,36	338	7,17	178	9,11
P. oculus	"	44	0,83	106	1,51	1	0,26	86	4,55	131	9,87	13	2,20	190	4,03	38	1,95
P. indet	"	5	0,09	34	0,48	-	-	16	0,85	15	1,13	11	1,86	17	0,36	61	3,12
Turbo cidaris	Turban shell	4	0,08	135	1,93	3	0,78	-	-	2	0,15	11	1,86	43	0,91	291	14,50
T. sarmaticus	Turban shell (Alikreukel)	542	10,17	835	11,91	41	10,65	597	31,55	111	8,36	56	9,46	543	11,52	312	16,33
Oxystele spp.	Periwinkel	2540	47,67	4117	58,72	-	-	925	48,89	873	65,79	43	7,26	2517	53,39	105	5,38
Burnupena spp.	Welk	489	9,18	1172	16,72	8	2,08	45	2,43	7	0,53	47	7,94	160	3,39	167	8,55
TOTAL		5328	100,00	7011	99,99	385	100,01	1892	100,00	1327	100,01	592	100,00	4714	99,99	1953	99,98
Dinoplax spp. juv.		-	-	3	-	-	-	-	-	2	-	1	-	15	-	35	-
C. meridionalis juv.		22	-	-	-	-	-	-	-	-	-	-	-	40	-	-	-
P. perna juv.		6	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-
Crepidula spp.		-	-	159	-	-	-	2	-	1	-	4	-	62	-	18	-
P. barbara juv.		1	-	-	-	21	-	-	-	-	-	84	-	5	-	-	-
P. minuta juv.		-	-	1	-	4	-	-	-	-	-	28	-	16	-	-	-
Patella spp. juv.		320	-	233	-	2	-	35	-	48	-	102	-	259	-	298	-
Oxystele spp. juv.		35	-	-	-	1	-	-	-	-	-	-	-	43	-	14	-
Burnupena spp. juv.		13	-	-	-	-	-	-	-	-	-	14	-	5	-	12	-
Bullia sp.		-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-
Indet spp.		-	-	2	-	1	-	-	-	-	-	6	-	4	-	-	-

APPENDIX Vb - SHELLFISH DATA FROM MIDDEN SAMPLES : MEAT MASS

SPECIES	COMMON NAME	HAWI		PB1		PB2		PB4	K41	PB4	M61	PB5		PB6		SFT1	
		Kg	%	Kg	%	Kg	%	Kg	%	Kg	%	Kg	%	Kg	%	Kg	%
<i>Diodoplax gigas</i>	Chiton	0,23	0,35	1,85	2,01	-	-	0,36	0,87	0,72	4,35	0,09	0,10	0,27	0,50	0,05	0,05
<i>Choromytilus meridionalis</i>	Black Mussel	12,39	18,82	0,14	0,15	-	-	-	-	-	-	-	-	7,03	13,02	-	-
<i>Perna perna</i>	Brown Mussel	0,96	1,45	0,20	0,22	-	-	-	-	-	-	-	-	-	-	-	-
<i>Donax serra</i>	White Mussel	0,03	0,05	0,01	0,01	-	-	0,02	0,05	0,01	0,06	-	-	-	-	-	-
<i>Haliotis midae</i>	Perlemoen	10,75	16,33	23,25	25,32	79,50	97,52	9,50	23,01	4,50	27,17	87,00	95,82	5,00	9,26	55,00	68,53
<i>H. spadicea</i>	Venus Ear	1,00	1,52	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fissurellidae	Keyhole Limpet	-	-	0,95	1,03	-	-	-	-	-	-	-	-	0,13	0,24	0,46	0,57
<i>Patella cochlear</i>	Limpet	-	-	-	-	-	-	0,04	0,01	-	-	-	-	-	-	-	-
<i>P. compressa</i>	"	-	-	0,60	0,65	0,04	0,05	0,02	0,05	-	-	0,06	0,07	0,02	0,04	0,34	0,42
<i>P. granularis</i>	"	0,18	0,27	-	-	-	-	-	-	-	-	-	-	-	-	0,30	0,37
<i>P. ergenvillei</i>	"	4,40	6,68	4,44	4,83	0,16	0,20	1,56	3,78	0,76	4,59	0,40	0,44	2,56	4,74	2,68	3,34
<i>P. barbara</i>	"	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>P. tabularis</i>	"	0,10	0,15	0,15	0,16	0,05	0,06	-	-	-	-	-	-	0,25	0,46	0,10	0,12
<i>P. longicosta</i>	"	0,01	0,02	0,14	0,15	0,02	0,02	0,30	0,73	0,22	1,33	0,17	0,19	0,41	0,76	1,68	2,10
<i>P. granatina</i>	"	1,44	2,19	2,80	3,05	0,04	0,05	0,74	1,79	0,91	5,50	0,14	0,15	3,38	6,26	1,78	2,22
<i>P. oculus</i>	"	0,44	0,67	1,06	1,15	0,01	0,01	0,86	2,08	1,31	7,91	0,13	0,14	1,90	3,52	0,38	0,47
<i>P. indet.</i>	"	0,06	0,08	0,34	0,37	-	-	0,16	0,39	0,15	0,91	0,11	0,12	0,17	0,31	0,61	0,75
<i>Turbo cidaris</i>	Turban shell	0,04	0,06	1,35	1,47	0,03	0,04	-	-	0,02	0,12	0,11	0,12	0,43	0,80	2,91	3,63
<i>T. sarmaticus</i>	Turban shell (Alikraukel)	21,58	32,94	33,40	36,37	1,64	2,01	23,88	57,85	4,44	26,81	2,24	2,47	21,72	40,24	12,75	15,92
<i>Cxytele spp.</i>	Periwinkel	10,16	15,44	16,47	17,93	-	-	3,70	8,96	3,49	21,07	0,17	0,19	10,07	18,66	0,42	0,52
<i>Burnupena spp.</i>	Welk	1,96	2,98	4,69	5,11	0,03	0,04	0,18	0,44	0,03	0,18	0,19	0,21	0,64	1,19	0,67	0,64
TOTAL		65,82	100,03	91,84	99,98	81,52	100,00	41,28	100,01	16,56	100,00	90,81	100,00	53,98	100,00	80,14	99,97

SPECIES	COMMON NAME	HAWI	PB1	PB2	PB4 K41	PB4 M61	PB5	PB6	SFT1
CRUSTACEA									
<u>Jasus lalandii</u>	Crayfish	22	-	-	-	-	-	-	-
Indet.	Crab	-	-	-	-	-	-	-	1
PISCES									
<u>Lithognathus sp.</u>	White steenbras	3	-	-	-	-	-	-	1
<u>Sparadon durbanensis</u>	Musselcracker	-	-	-	-	-	-	1	1
<u>Rhabdosargus globiceps</u>	White stumpnose	-	1	-	-	-	-	-	2
<u>Pachymetapon sp.</u>	Hottentot	37	3	-	-	4	-	-	2
<u>Coracoinus capensis</u>	Galjoen	-	-	-	-	1	-	-	3
Indet.		29	2	-	1	1	1	5	2
AMPHIBIA									
Indet.	Frog	1	-	-	-	-	-	-	-
REPTILIA									
<u>Felomedusa subruta</u>	Freshwater turtle	1	1	-	-	-	-	1	-
<u>Testudo sp.</u>	Tortoise	1	1	2	1	1	2	4	1
Indet.	Lizard	-	-	-	-	-	-	-	1?
Indet.	Snake	1	-	-	1	-	-	1	1
AVES									
<u>Spheniscus demersus</u>	Jackass penguin	-	-	-	1	1	1	-	-
<u>Morus capensis</u>	Cape gannet	-	-	-	-	-	1 Imm.	1	-
<u>Phalacrocorax capensis</u>	Cape cormorant	1	1	-	-	1	-	-	1?
Anatidae indet.	Duck	1	-	-	-	-	-	-	-
<u>Fulica cristata</u>	Red-knobbed coot	1	-	-	-	-	-	-	-
<u>Nentis denhami stanleyi</u>	Stanley bustard	-	1	-	-	-	-	-	-
Passerine indet.		-	1	-	-	-	-	1	1
Indet.		-	-	-	-	-	-	1	-
MAMMALIA									
Chrysochloridae indet.	Golden mole	-	-	-	-	-	-	-	1
<u>Suncus infinitesimus</u>	Pygmy shrew	-	-	-	-	-	-	-	1
<u>Papio ursinus</u>	Chacma baboon	1	-	-	-	-	-	-	-
<u>Bathyergus suillus</u>	Cape dune mole-rat	1	2	-	1	1	1	2	1
<u>Georchychus capensis</u>	Cape mole-rat	-	1?	-	-	-	-	-	-
<u>Rhabdomys pumilio</u>	Striped field mouse	-	-	-	-	-	-	-	1
<u>Otomys spp.</u>	Vlei rats	1	1	-	-	-	1	1	1
Muridae indet.	Rats/mice	-	-	-	1	1	1	1 Imm.	-
Delphinidae indet.	Dolphin	-	-	-	-	1	-	-	-
<u>Ictonyx striatus</u>	Striped polecat	-	1?	-	-	-	-	-	-
<u>Genetta sp.</u>	Genet	-	-	-	-	-	-	1?	-
<u>Arctocephalus pusillus</u>	Cape fur seal	1 Imm.	1	-	1	-	2 (1 Imm.)	1	-
<u>Alcelaphus caama</u>	Red hartebeest	1	1	-	-	-	-	-	-
<u>Raphicerus campestris</u>	Steentok	1	1	-	-	-	-	2(1 Imm.)	1
<u>Ovis aries</u>	Domestic sheep	-	-	-	-	1?	-	-	-
Indet.		-	-	1	-	-	-	-	-

APPENDIX Vd1 : HAWI stone sample : Frequency and mass

CATEGORY	FREQUENCY										MASS IN GRAMMES				
	Quartzite		Quartz		Limestone		Silcrete		Granite		Quartzite	Quartz	Limestone	Silcrete	Granite
	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.					
WASTE															
Chunks	8	1	22				1				2,8	2,9		1,0	
Cores															
Untrimmed flakes	8	3					1				3,4			0,1	
Total	16	4	22				2				6,2	2,9		1,1	
UTILIZED															
Flakes															
Cobbles, multi-flaked															
Rubbers															
Heavy edge-damaged pieces															
Hammerstones, pebble															
Total															
FORMAL TOOLS															
Miscellaneous retouch															
Outils écaillés															
Total															
TOTAL	16	4	22				2				6,2	2,9		1,1	
NON-ARTEFACTUAL	1080										273,7				

APPENDIX Vd2 : PBI stone sample : Frequency and mass

CATEGORY	FREQUENCY										MASS IN GRAMES				
	Quartzite		Quartz		Limestone		Silcrete		Granite		Quartzite	Quartz	Limestone	Silcrete	Granite
	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.					
WASTE															
Chunks	10	4	3		2	2					30,9	1,0	5,4		
Cores															
Untrimmed flakes	3	1			1	1					62,3		7,8		
Total	13	5	3		3	3					93,2	1,0	13,2		
UTILIZED															
Flakes															
Cobbles, multi-flaked															
Rubbers															
Heavy edge-damaged pieces															
Hammerstones, pebble															
Total															
FORMAL TOOLS															
Miscellaneous retouch															
Outils écaillés															
Total															
TOTAL	13	5	3		3	3					93,2	1,0	13,2		
NON-ARTEFACTUAL	100										142,3				

APPENDIX Va3 : FB2 stone sample : Frequency and mass of stone

CATEGORY	FREQUENCY										MASS IN GRAMMES				
	Quartzite		Quartz		Limestone		Silcrete		Granite		Quartzite	Quartz	Limestone	Silcrete	Granite
	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.					
WASTE															
Chunks	2	2	1	1							12,9	466,3			
Cores															
Untrimmed flakes	1	1									124,4				
Total	3	3	1	1							137,3	466,3			
UTILIZED															
Flakes															
Cobbles, multi-flaked															
Rubbers															
Heavy edge-damaged pieces															
Hammerstones, pebbles															
Total															
FORMAL TOOLS															
Miscellaneous retouch															
Outils écaillés															
Total															
TOTAL	3	3	1	1							137,3	466,3			
NON-ARTEFACTUAL															

CATEGORY	FREQUENCY										MASS IN GRAMS				
	Quartzite		Quartz		Limestone		Silcrete		Granite		Quartzite	Quartz	Limestone	Silcrete	Granite
	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.					
WASTE															
Chunks	8	2	8	1							52,7	37,2			
Cores															
Untrimmed flakes	4	4	6	2	1	1					93,3	3,9	1,2		
Total	12	6	14	3	1	1					146,0	41,1	1,2		
UTILIZED															
Flakes															
Cobbles, multi-flaked	1	1									354,8				
Rubbers	1	1									899,4				
Heavy edge-damaged pieces															
Hammerstones, pebble															
Total	2	2									1254,2				
FORMAL TOOLS															
Miscellaneous retouch															
Outils Coquilles															
Total															
TOTAL	14	8	14	3	1	1					1400,2	41,1	1,2		
NON-ARTIFACTUAL	13										1258,0				

CATEGORY	FREQUENCY										MASS IN GRAMMES				
	Quartzite		Quartz		Limestone		Silcrete		Granite		Quartzite	Quartz	Limestone	Silcrete	Granite
	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.					
WASTE															
Chunks	105	29	1147	222	2						469,8	1159,4	12,1		
Cores			20	7								221,8			
Untrimmed flakes	58	44	179	62	1						407,5	161,2	4,9		
Total	163	73	1346	291	3						877,3	1542,4	17,0		
UTILIZED															
Flakes															
Cobbles, multi-flaked	1	1									178,5				
Rubbers															
Heavy edge-damaged pieces															
Hammerstones, pebble	2	2									60,3				
Total	3	3									238,8				
FORMAL TOOLS															
Miscellaneous retouch			2									1,7			
Outils écaillés															
Total			2									1,7			
TOTAL	166	76	1348	291	3						1116,1	1544,1	17,0		
NON-ARTEFACTUAL	19										527,4				

CATEGORY	FREQUENCY										MASS IN GRAMMES				
	Quartzite		Quartz		Limestone		Silcrete		Granite		Quartzite	Quartz	Limestone	Silcrete	Granite
	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.					
WASTE															
Chunks	41	15	61	7	7	2					332,8	121,0	10,7		
Cores															
Untrimmed flakes	37	27	3		7	2					473,5	0,6	7,9		
Total	78	42	64	7	14	4					806,3	121,6	18,6		
UTILIZED															
Flakes															
Cobbles, multi-flaked															
Rubbers															
Heavy edge-damaged pieces															
Hammerstones, pebble															
Total															
FORMAL TOOLS															
Miscellaneous retouch															
Outils écaillés			2									1,1			
Total			2									1,1			
TOTAL	78	42	66	7	14	4					806,3	122,7	18,6		
NON-ARTEFACTUAL	183										773,1				

APPENDIX Vd7 : PB6 stone sample : Frequency and mass of stone

CATEGORY	FREQUENCY										MASS IN GRAMMES				
	Quartzite		Quartz		Limestone		Silcrete		Granite		Quartzite	Quartz	Limestone	Silcrete	Granite
	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.					
WASTE															
Chunks	5	3	6		5	4			1		56,1	0,9	39,5		30,4
Cores															
Untrimmed flakes	5	4	2	1		10					83,5	2,8	24,0		
Total	10	7	8	1	5	14			1		139,6	3,7	63,5		30,4
UTILIZED															
Flakes							1							8,6	
Cobbles, multi-flaked															
Rubbers															
Heavy edge-damaged pieces															
Hammerstones, pebble															
Total							1							8,6	
FORMAL TOOLS															
Miscellaneous retouch															
Outils écaillés															
Total															
TOTAL	10	7	8	1	5	14	1		1		139,6	3,7	63,5	8,6	30,4
NON-ARTEFACTUAL	645										311,3				

CATEGORY	FREQUENCY										MASS IN GRAMES				
	Quartzite		Quartz		Limestone		Silcrete		Granite		Quartzite	Quartz	Limestone	Silcrete	Granite
	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.					
WASTE															
Chunks	34	7	72	6			1				11,7	23,0		1,1	
Cores	1	1									2900,0				
Untrimmed flakes	6	4	8	2							6,2	3,0			
Total	41	12	80	8			1				2917,9	26,0		1,1	
UTILIZED															
Flakes															
Cobbles, multi-flaked															
Rubbers															
Heavy edge-damaged pieces															
Hammerstones, pebble															
Total															
FORMAL TOOLS															
Miscellaneous retouch															
Outils scalés															
Total															
TOTAL	41	12	80	8			1				2917,9	26,0		1,1	
NON-ARCHAEOLOGICAL	309										256,9				

APPENDIX Ve: Cultural material: other

CATEGORY	HAWI	PB1	PB2	PB4 K41	PB4 M81	PB5	PB6	S
UTILIZED SHELL								
Donax scrapers	17+			1+	2+			
Patella: compressa			1			1		1
argenvillei								
Fissurellidae "beads"		2					2	7
"bead" fragments							1	1
unfinished		8					4	1
Nassa "beads"	5				1			
"bead" fragments	16				7			
Other shell "beads"	2							1
Cypraea							1	
Turbo disc	1+			1*	2(1*)			
Ostrich eggshell beads	5			3	2		1	3
bead fragments	1							
blanks (bored or not)							1	1
plain fragments	8			3		1		
UTILIZED BONE								
Points projectile	1*							
boring					1			
fragments		1			1			
Snapped projectile bases					1			
Fragments						1		
POTTERY								
Fragments		15					9	
PIGMENT-CONTAINING NODULES								
Haematite	many chips	1		2	6		1	1
Manganese	chips	4					25	
MASTIC								
Fragments	3	1						

* unfinished

+ broken

APPENDIX Vf : Plant remains from midden samples. Identified by J. Rourke, Compton Herbarium, Kirstenbosch.

SPECIES	COMMON NAME	HAW1	P81	P82	P84 K41	P84 M81	P85	P86	SFT1
<i>Euclea cf. racemosa</i>	Kersbos					X			
<i>Olea exasperata</i>	Glashoutolien				X				
<i>Chrysanthemoides monilifera</i>	Bietou					X			
Indet. sp.		X							
Indet. sp.		X							
Indet. sp.			X						

APPENDIX VI - Shellfish data from Byeneskranskop and Die Kelders Cave

*Unpublished information supplied by F.R. Schweitzer, S.A. Museum

SPECIES	COMMON NAME	FREQUENCIES				MEAT MASS			
		BNK1*		DK1*		BNK1		DK1	
		No	%	No	%	Kg	%	Kg	%
<i>Dinoplax gigas</i>	Chiton	5	1,25	-	-	0,23	2,73	-	-
<i>Choromytilus meridionalis</i>	Black Mussel	9	2,25	468	45,26	0,09	1,07	4,68	46,57
<i>Perna perna</i>	Brown Mussel	4	1,00	129	12,48	0,04	0,47	1,29	12,84
<i>Donax serra</i>	White Mussel	1	0,25	4	0,39	0,01	0,12	0,04	0,40
<i>Haliotis midae</i>	Perlemoen	1	0,25	4	0,39	0,25	2,97	1,00	9,95
<i>H. spadicea</i>	Venus Ear	-	-	4	0,39	-	-	0,16	1,59
Fissurellidae	Keyhole Limpet	-	-	-	-	-	-	-	-
<i>Patella cochlear</i>	Limpet	-	-	7	0,68	-	-	0,03	0,30
<i>P. compressa</i>	"	-	-	-	-	-	-	-	-
<i>P. granularis</i>	"	-	-	20	1,93	-	-	0,10	1,00
<i>P. argenvillei</i>	"	3	0,75	5	0,48	0,12	1,42	0,20	1,99
<i>P. barbara</i>	"	1	0,25	-	-	0,01	0,12	-	-
<i>P. tabularis</i>	"	-	-	-	-	-	-	-	-
<i>P. longicosta</i>	"	7	1,75	-	-	0,04	0,47	-	-
<i>P. granitina</i>	"	4	1,00	29	2,80	0,04	0,47	0,29	2,89
<i>P. oculus</i>	"	3	0,75	7	0,68	0,03	0,36	0,07	0,70
<i>P. indet</i>	"	-	-	-	-	-	-	-	-
<i>Turbo cidaris</i>	Turban shell	78	19,50	-	-	0,78	9,25	-	-
<i>T. sarmaticus</i>	Turban shell (Alikreukel)	157	39,25	21	2,03	6,28	74,50	0,84	8,36
<i>Oxystele</i> spp.	Periwinkle	64	16,00	99	9,57	0,26	3,08	0,40	3,98
<i>Burnupena</i> spp.	Welk	63	15,75	237	22,92	0,25	2,97	0,95	9,45
TOTAL		400	100,00	1034	100,00	8,43	100,00	10,05	100,02
<i>Dinoplax</i> spp. juv.		-	-	-	-	-	-	-	-
<i>C. meridionalis</i> juv.		-	-	-	-	-	-	-	-
<i>P. perna</i> juv.		-	-	-	-	-	-	-	-
<i>Crepidula</i> spp.		-	-	-	-	-	-	-	-
<i>P. barbara</i> juv.		-	-	-	-	-	-	-	-
<i>P. miniata</i> juv.		-	-	-	-	-	-	-	-
<i>Fatella</i> spp. juv.		7	-	-	-	-	-	-	-
<i>Oxystele</i> spp. juv.		1	-	-	-	-	-	-	-
<i>Burnupena</i> spp. juv.		1	-	-	-	-	-	-	-
Species indet.									

APPENDIX VII - Composition of midden samples : diversity indices

G. Avery, P.H. Hamel and H. RÜther.

Diversity indices are usually employed by biologists to illustrate variety within a community. Maximum diversity is achieved where many species occur, each represented by the same number of individuals. Minimum diversity occurs where all individuals belong to the same species (Warren 1971: 342)(see tabulated examples). It was suggested that formulae for obtaining diversity indices could be used on shell samples in order to provide a measure of their composition. This possibility was tested and showed useful potential for archaeological method. The following description illustrates the formulae which were found to be most useful after testing.

It was found that reasonably accurate indices could be achieved very easily by using the formula (Warren 1971: 345):

$$\bar{d} = -\sum(n_i/n)\log_2(n_i/n)$$

where n is the number of individuals in the same and n_i is the number of individuals in the i 'th species. Checking showed, however, that indices obtained using this method did not always fall between the values for theoretical maximum and minimum diversity obtained by using the formulae (Warren 1971):

$$\bar{d}_{\max} = (1/n) [\log_2 n! - s \log_2 (n/s)!]$$

$$\bar{d}_{\min} = (1/n) \{ \log_2 n! - \log_2 [n - (s - 1)] ! \}$$

It was not possible, therefore, to compare indices from a number of samples. In order to resolve this problem an alternative diversity index was obtained using the following formula (Warren 1971):

$$\bar{H} = (1/N)(\log N! - \sum_1^s \log N_i!)$$

where N is the number of individuals in the sample, s is the number of species and N_i is the number of individuals in the i 'th species (and logarithms are evaluated to the base 2). The need to factorize N values in the above formulae proved extremely time-consuming and affected the practical viability of the methods where large N values were involved. The problem was solved ultimately by employing a combination of the formulae given in Warren (1971) and Stirling's approximation for $N!$ which was obtained from the following formula (Bromstein & Semendjajew 1968):

$$\ln (n!) = (n + \frac{1}{2}) \ln n - n + \ln \sqrt{2\pi}$$

In order to achieve an accuracy of 1 per cent an error of $\pm 0,5$ can be tolerated. Stirling's formula guarantees this accuracy for N values greater than 19 and was therefore employed on all values of 20 or greater, while lower values were factorized by means of the rigorous solution. Finally, in order to show the dominance of one or more species, a value for redundancy was calculated by means of the following formula (Warren 1971):

$$r = \frac{\bar{d}_{\max} - \bar{d}}{\bar{d}_{\max} - \bar{d}_{\min}}$$

An additional advantage in the use of a redundancy index is that it places the diversity index into its correct position relative to the \bar{d}_{\max} and \bar{d}_{\min} values. Problems which may be caused by the variation of \bar{d}_{\max} and \bar{d}_{\min} values in different samples are eliminated therefore. A redundancy index of 1 indicates complete dominance by one species, or minimum diversity whilst a redundancy index of 0 indicates a complete lack of variation or maximum diversity.

The results obtained for shell samples indicate that the use of diversity indices could have great potential in archaeological description. A combination of both diversity and redundancy indices appears to be the best approach, however, as together they provide data which can be used not only for the description of individual sample composition, but also for direct comparison of a number of samples. Provided that such samples are relatively large, it is suggested that the composition of other components in archaeological samples could also be illustrated by this method.

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Table 1.
Diversity: examples of minimum and maximum diversity
with indices of \bar{d} and r for sixteen samples.

EXAMPLE 1

SAMPLE ANALYSIS			
N	S	D(MAX)	D(MIN)
1000	10	3.282	0.090

SAMPLE	NO OF ELEM. IN SAMPLE
1	100
2	100
3	100
4	100
5	100
6	100
7	100
8	100
9	100
10	100

DIVERSITY D= 3.282 REDUNDANCY R= 0.000

N	S	D(MAX)	D(MIN)
1000	10	3.282	0.090

SAMPLE	NO OF ELEM. IN SAMPLE
1	1
2	1
3	1
4	1
5	1
6	1
7	1
8	1
9	1
10	991

DIVERSITY D= 0.090 REDUNDANCY R= 1.000

EXAMPLE 2

Key: N = minimum Numbers M = Mass

HAWI

N

N	S	D(MAX)	D(MIN)
5323	16	3.977	0.035

SAMPLE NO OF ELEM. IN SAMPLE

1	5
2	1239
3	96
4	3
5	43
6	25
7	35
8	110
9	2
10	2
11	144
12	44
13	4
14	542
15	2540
16	489

DIVERSITY D= 2.230 REDUNDANCY R= 0.443

N	S	D(MAX)	D(MIN)
6577	16	3.989	0.029

SAMPLE NO OF ELEM. IN SAMPLE

1	23
2	1239
3	96
4	3
5	1075
6	100
7	18
8	440
9	10
10	1
11	144
12	44
13	4
14	2168
15	1016
16	196

DIVERSITY D= 2.657 REDUNDANCY R= 0.336

M

PBI

N

N	S	D(MAX)	D(MIN)
6977	16	3.989	0.027

SAMPLE NO OF ELEM. IN SAMPLE

1	41
2	14
3	20
4	1
5	93
6	19
7	3
8	111
9	3
10	27
11	280
12	106
13	135
14	835
15	4117
16	1172

DIVERSITY D= 1.957 REDUNDANCY R= 0.513

N	S	D(MAX)	D(MIN)
9150	16	3.989	0.022

SAMPLE NO OF ELEM. IN SAMPLE

1	185
2	14
3	20
4	1
5	2325
6	95
7	60
8	444
9	15
10	14
11	280
12	106
13	135
14	3340
15	1647
16	469

DIVERSITY D= 2.515 REDUNDANCY R= 0.371

M

Table 1 (cont.)

PB2

N	S	D(MAX)	D(MIN)
385	10	3.302	0.200

SAMPLE	NO OF ELEM. IN SAMPLE
1	318
2	2
3	4
4	1
5	3
6	4
7	1
8	3
9	41
10	8

DIVERSITY D= 0.965 REDUNDANCY R= 0.754

N	S	D(MAX)	D(MIN)
8152	10	3.318	0.014

SAMPLE	NO OF ELEM. IN SAMPLE
1	7350
2	4
3	16
4	5
5	2
6	4
7	1
8	3
9	164
10	3

DIVERSITY D= 0.194 REDUNDANCY R= 0.946

PB4 K41

N

N	S	D(MAX)	D(MIN)
1875	11	3.453	0.058

SAMPLE	NO OF ELEM. IN SAMPLE
1	8
2	2
3	38
4	1
5	39
6	59
7	74
8	86
9	597
10	925
11	46

DIVERSITY D= 1.955 REDUNDANCY R= 0.438

N	S	D(MAX)	D(MIN)
4128	11	3.452	0.029

SAMPLE	NO OF ELEM. IN SAMPLE
1	36
2	2
3	950
4	2
5	156
6	30
7	74
8	86
9	2388
10	370
11	18

DIVERSITY D= 1.843 REDUNDANCY R= 0.470

PB4 M01

N

N	S	D(MAX)	D(MIN)
1312	11	3.440	0.079

SAMPLE	NO OF ELEM. IN SAMPLE
1	16
2	1
3	18
4	19
5	43
6	91
7	121
8	2
9	111
10	873
11	7

DIVERSITY D= 1.740 REDUNDANCY R= 0.506

N	S	D(MAX)	D(MIN)
1641	11	3.439	0.025

SAMPLE	NO OF ELEM. IN SAMPLE
1	72
2	1
3	450
4	76
5	22
6	91
7	131
8	2
9	444
10	349
11	3

DIVERSITY D= 2.518 REDUNDANCY R= 0.273

Table 1 (cont.)

PES				PBB				SFT1			
N	S	D(MAX)	D(MIN)	N	S	D(MAX)	D(MIN)	N	S	D(MAX)	D(MIN)
531	11	3.371	0.158	4697	14	3.805	0.034	1892	14	3.782	0.075
SAMPLE		NO OF ELEM. IN SAMPLE		SAMPLE		NO OF ELEM. IN SAMPLE		SAMPLE		NO OF ELEM. IN SAMPLE	
1	2	3	4	1	2	3	4	1	2	3	4
1	348	10	20	1	703	20	25	1	220	92	17
2	3	10	25	2	1	64	1	2	59	67	2
3	14	14	82	3	5	5	338	3	67	178	38
4	13	13	190	4	11	43	190	4	38	291	319
5	11	11	43	5	12	543	43	5	319	105	167
6	56	10	543	6	13	2517	543	6	105	167	
7	43	11	2517	7	14	160	160	7	167		
8	47			8				8			
9				9				9			
10				10				10			
11				11				11			
				12				12			
				13				13			
				14				14			
DIVERSITY D= 2.052 REDUNDANCY R= 0.410				DIVERSITY D= 2.215 REDUNDANCY R= 0.422				DIVERSITY D= 3.215 REDUNDANCY R= 0.153			
N	S	D(MAX)	D(MIN)	N	S	D(MAX)	D(MIN)	N	S	D(MAX)	D(MIN)
9070	11	3.447	0.014	5381	14	3.802	0.030	7953	14	3.799	0.021
SAMPLE		NO OF ELEM. IN SAMPLE		SAMPLE		NO OF ELEM. IN SAMPLE		SAMPLE		NO OF ELEM. IN SAMPLE	
1	9	2	3	1	27	3	4	1	5	5	6
2	8700	3	4	2	703	4	5	2	5500	6	7
3	6	4	5	3	500	5	6	3	46	7	8
4	43	5	6	4	13	6	7	4	34	8	9
5	17	6	7	5	2	7	8	5	30	9	10
6	14	7	8	6	256	8	9	6	268	10	11
7	13	8	9	7	25	9	10	7	10	11	12
8	11	9	10	8	41	10	11	8	168	12	13
9	224	10	11	9	338	11	12	9	178	13	14
10	17	11	12	10	190	12	13	10	38	14	
11	19	12	13	11	43	13	14	11	291		
		13	14	12	2172	14		12	1276		
		14		13	1007			13	42		
				14	64			14	67		
DIVERSITY D= 0.329 REDUNDANCY R= 0.908				DIVERSITY D= 2.597 REDUNDANCY R= 0.322				DIVERSITY D= 1.625 REDUNDANCY R= 0.575			

Table 1 (cont.)

BNK1

N	S	D(MAX)	D(MIN)
400	14	3.617	0.280

SAMPLE	NO OF ELEM. IN SAMPLE
1	5
2	9
3	4
4	1
5	1
6	3
7	1
8	7
9	4
10	3
11	78
12	157
13	64
14	63

DIVERSITY D= 2.355 REDUNDANCY R= 0.378

N	S	D(MAX)	D(MIN)
843	14	3.765	0.150

SAMPLE	NO OF ELEM. IN SAMPLE
1	23
2	9
3	4
4	1
5	25
6	12
7	1
8	4
9	4
10	3
11	78
12	628
13	26
14	25

DIVERSITY D= 1.507 REDUNDANCY R= 0.625

DK1

N	S	D(MAX)	D(MIN)
1034	13	3.613	0.116

SAMPLE	NO OF ELEM. IN SAMPLE
1	466
2	129
3	4
4	4
5	4
6	7
7	20
8	5
9	29
10	7
11	21
12	99
13	237

DIVERSITY D= 2.261 REDUNDANCY R= 0.387

N	S	D(MAX)	D(MIN)
1005	13	3.674	0.119

SAMPLE	NO OF ELEM. IN SAMPLE
1	468
2	129
3	4
4	100
5	16
6	3
7	10
8	20
9	29
10	7
11	84
12	40
13	95

DIVERSITY D= 2.516 REDUNDANCY R= 0.326

APPENDIX VIIIa : PB4 Square 0 stone sample : Frequency and mass

CATEGORY	FREQUENCY								MASS IN GRAMMES			
	Quartzite		Quartz		Limestone		Silcrete		Quartzite	Quartz	Limestone	Silcrete
	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.	Tot.	Cor.				
WASTE												
Chips	92	4	8		31	5			31	5	9	
Chunks	565	177	53	8	100	30	1		23430	258	1078	1
Cores	16	16							13988			
Untrimmed flakes	560	271	6	2	182	58			8964	11	961	
Borer spalls	3	1							17			
Total	1236	469	67	10	313	93	1		46430	274	2047	1
UTILIZED												
Cobbles, multi-flaked	7	7			11	11			2509		2068	
Heavy edge-damaged pieces	8	7							2926			
Hammerstones, pebble	1	1							62			
cobble	12	12							4493			
Grindstones, lower	1	1							15300			
Anvils	1	1							5900			
Total	30	29			11	11			31190			
FORMAL TOOLS												
Borers	10	8							1743			
Miscellaneous retouch	6	6	5				2		627	7		2
Total	16	14	5				2		2370	7		2
TOTAL	1282	512	72	10	324	104	3		82058	281	4115	3
NON-ARTEFACTUAL	125								24705			

APPENDIX VIIIc : PB4 Square O stone sample : frequencies of cortex and raw materials with percentages of total in each category.

CATEGORY	TOTAL	CORTEX		RAW MATERIALS							
	Total	Cortex	%	Qzte	%	Quartz	%	Limes.	%	Silc.	%
WASTE											
Chips	131	13	9,92	92	70,23	8	6,11	31	23,66		
Chunks	719	215	29,90	565	78,58	53	7,37	100	13,91	1	0,14
Cores	16	16	100,00	16	100,00						
Untrimmed flakes	748	331	44,25	560	74,87	6	0,80	182	24,33		
Borer spalls	3	1	33,33	3	100,00						
Total	1617	576	35,62	1236	76,44	67	4,14	313	19,36	1	0,06
UTILIZED											
Cobbles, multi-flaked	18	18	100,00	7	38,89			11	61,11		
Heavy edge-damaged pieces	8	7	87,50	8	100,00						
Hammerstones, pebble	1	1	100,00	1	100,00						
cobble	12	12	100,00	12	100,00						
Grindstones, lower	1	1	100,00	1	100,00						
Anvils	1	1	100,00	1	100,00						
Total	41	40	97,56	30	73,17			11	26,83		
FORMAL TOOLS											
Borers	10	8	80,00	10	100,00						
Miscellaneous retouch	13	6	46,15	6	46,15	5	38,46			2	15,38
Total	23	14	60,87	16	69,57	5	21,74			2	8,70
TOTAL	1681	628	37,36	1282	76,26	72	4,28	324	19,27	3	0,18

APPENDIX IXa Stone features : class, mean, standard deviation, number of stones and range of length measurements for examples from PB2 and PB5

PB2 (Plan 1)

NO	CLASS	\bar{x}	s	n	r
1	Hearth	14,30	3,38	33	15
2	Hearth	12,90	2,93	126	15
3	Hearth	13,50	3,81	42	15
4*	Hearth = PB2 S1	11,77	4,82	115	21
5	Hearth = PB2 S3	18,83	5,79	52	37
6	Hearth	13,35	4,05	84	23
7	Burial cover	14,58	5,30	565	31

PB5 (Plan 3)

NO	CLASS	\bar{x}	s	n	r
1	Unknown	16,73	5,42	11	16
2	Unknown	17,85	11,39	13	37
3	Hearth	10,81	2,60	64	13
4	Hearth	11,11	2,76	87	16
5	Hearth	17,67	7,13	54	30
6	Hearth	13,80	3,23	41	15
7	Unknown	20,33	11,87	12	32
8	Unknown	24,80	13,37	5	30
9	Unknown	29,11	17,19	9	46
10	Hearth	11,58	3,17	60	16
11	Hearth	14,84	5,78	51	25
12	Hearth	12,12	2,70	41	16
13	Hearth	16,25	3,65	28	14
14	Unknown	17,80	11,04	25	60
15	Hearth	11,38	2,73	95	14
16	Unknown	20,36	9,40	14	31
17	Unknown	38,25	15,54	8	51
18	Hearth	15,95	4,54	39	20
19	Hearth	11,28	3,50	85	16
20	Hearth	15,04	4,58	77	20

* Length measurements for PB2 S1 were taken at a later stage from a detailed plan as the feature was obscured by erosion after excavation.

APPENDIX IXb Stone features : raw materials used in
examples from PB2 and PB5

PB2

NO	QUARTZITE		LIMESTONE		GRANITE	
	No	%	No	%	No	%
1	32	96,97	1	3,03	-	-
2	124	98,41	-	-	2	1,59
3	41	97,62	1	2,38	-	-
4	110	95,65	5	4,35	-	-
5	51	98,08	-	-	1	1,92
6	82	97,62	2	2,38	-	-
7	552	97,70	8	1,42	5	0,88

PB5

NO	QUARTZITE		LIMESTONE		GRANITE	
	No	%	No	%	No	%
1	11	100,00	-	-	-	-
2	13	100,00	-	-	-	-
3	52	81,25	5	7,81	7	10,94
4	42	48,28	6	6,90	39	44,83
5	48	88,89	2	3,70	4	7,41
6	35	85,37	1	2,44	5	12,20
7	7	58,33	4	33,33	1	8,33
8	3	60,00	-	-	2	40,00
9	6	66,67	3	33,33	-	-
10	57	95,00	1	1,67	2	3,33
11	35	68,63	8	15,69	8	15,69
12	35	85,37	-	-	6	14,63
13	25	89,29	2	7,14	1	3,57
14	22	88,00	2	8,00	1	4,00
15	21	22,11	73	76,84	1	1,05
16	14	100,00	-	-	-	-
17	4	50,00	4	50,00	-	-
18	34	87,18	4	10,26	1	2,56
19	81	95,29	2	2,35	2	2,35
20	75	97,40	-	-	2	2,60

LIST OF FIGURES

1. Map of the southern Cape showing general localities.
2. Major geological subdivisions of the southwestern and southern Cape (after South African Geological Survey).
3. Distribution of herder and hunter tribes (after Maingard 1931).
4. Research area: site localities and geographical features.
5. Pearly Beach area: site localities and geographical features.
6. Pearly Beach: profile through intertidal transect.
7. Hawston area: site localities and geographical features.
8. Pearly Beach area: locations of middens sampled and areas covered by detailed plans.
9. PB1: west section of sampled midden.
10. PB1 S1: plan of feature thought to be a hut circle.
11. PB2 S1: plan of hearth feature.
12. PB2 S3: plan of hearth feature.
13. PB4: plan of locality showing areas covered by middens and the location of sampled middens.
14. HAWI: east section of excavation showing stratigraphy and location of the sample.
15. Pearly Beach area: bar charts relating midden composition to accessibility.
16. Byenekranskop and Die Kelders: bar charts relating midden composition to accessibility.
17. Cultural material: stone.
18. Cultural material: other.

LIST OF PLANS (enclosed at back)

1. Distribution of middens and features in the PB1 and PB2 site localities.
2. Distribution of middens and features in the PB5 site locality.
3. Distribution of middens and fish traps in the SFT1 site locality.

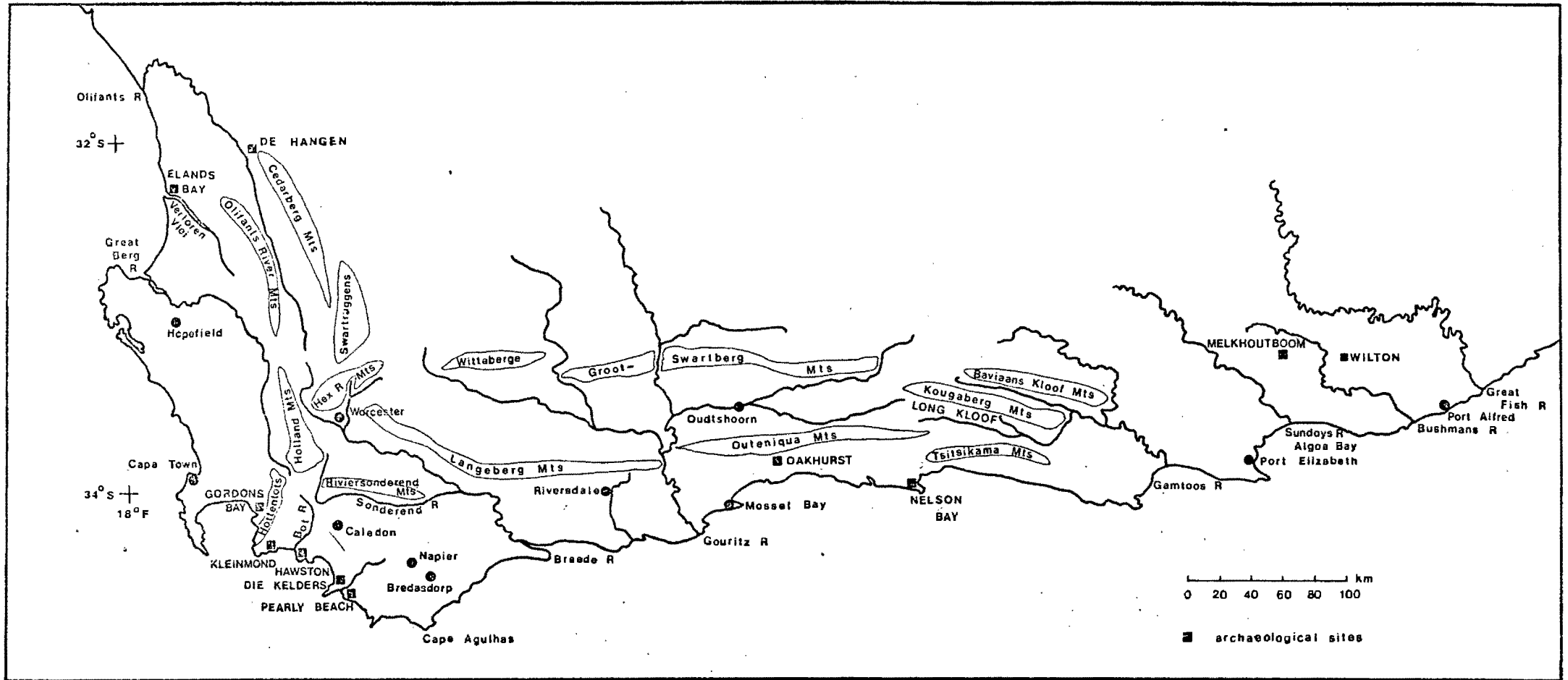
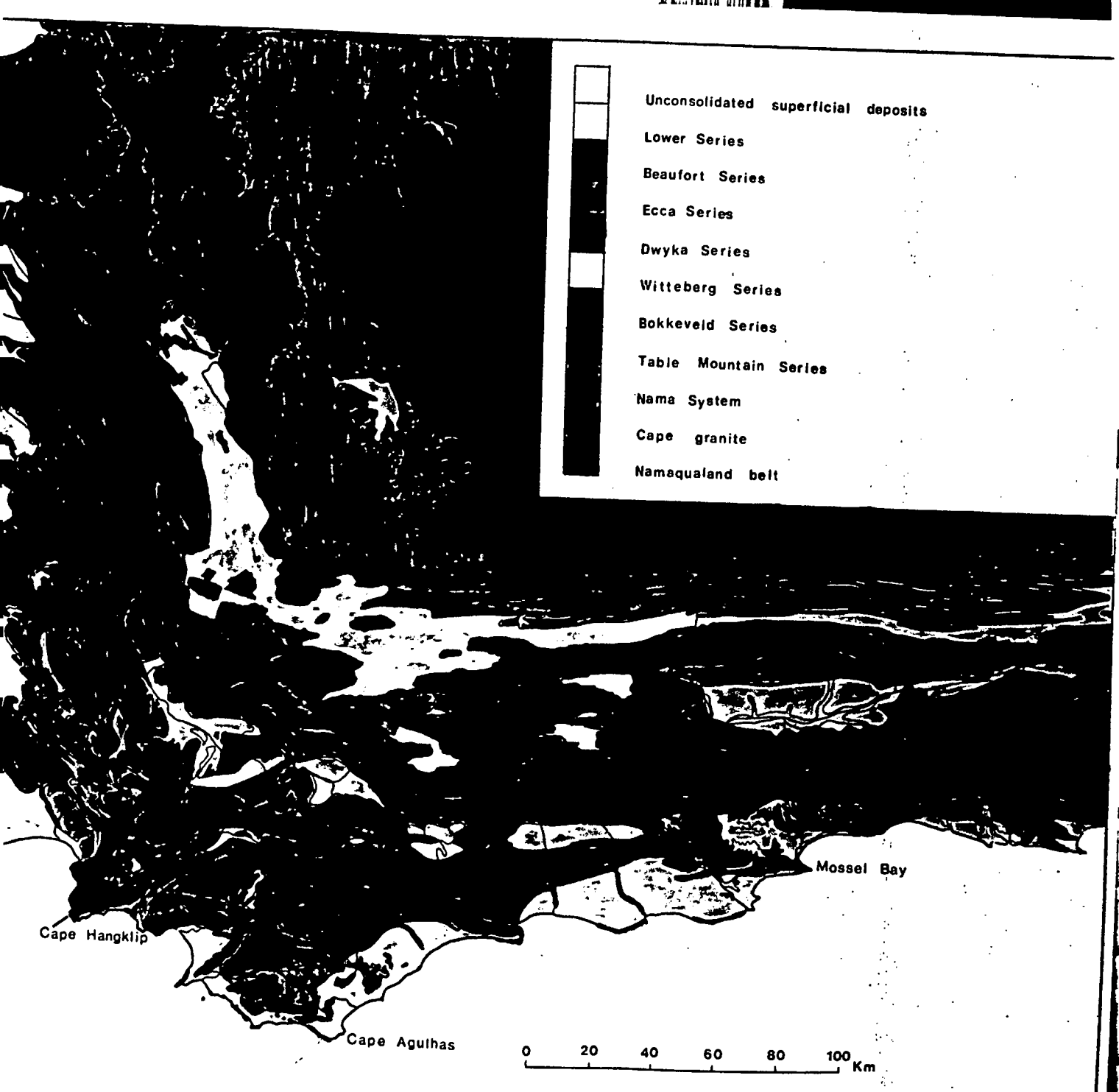


Fig.1 Map of the southern Cape showing general localities



Divisions of the southwestern and southern Cape (after South African Geological Survey)

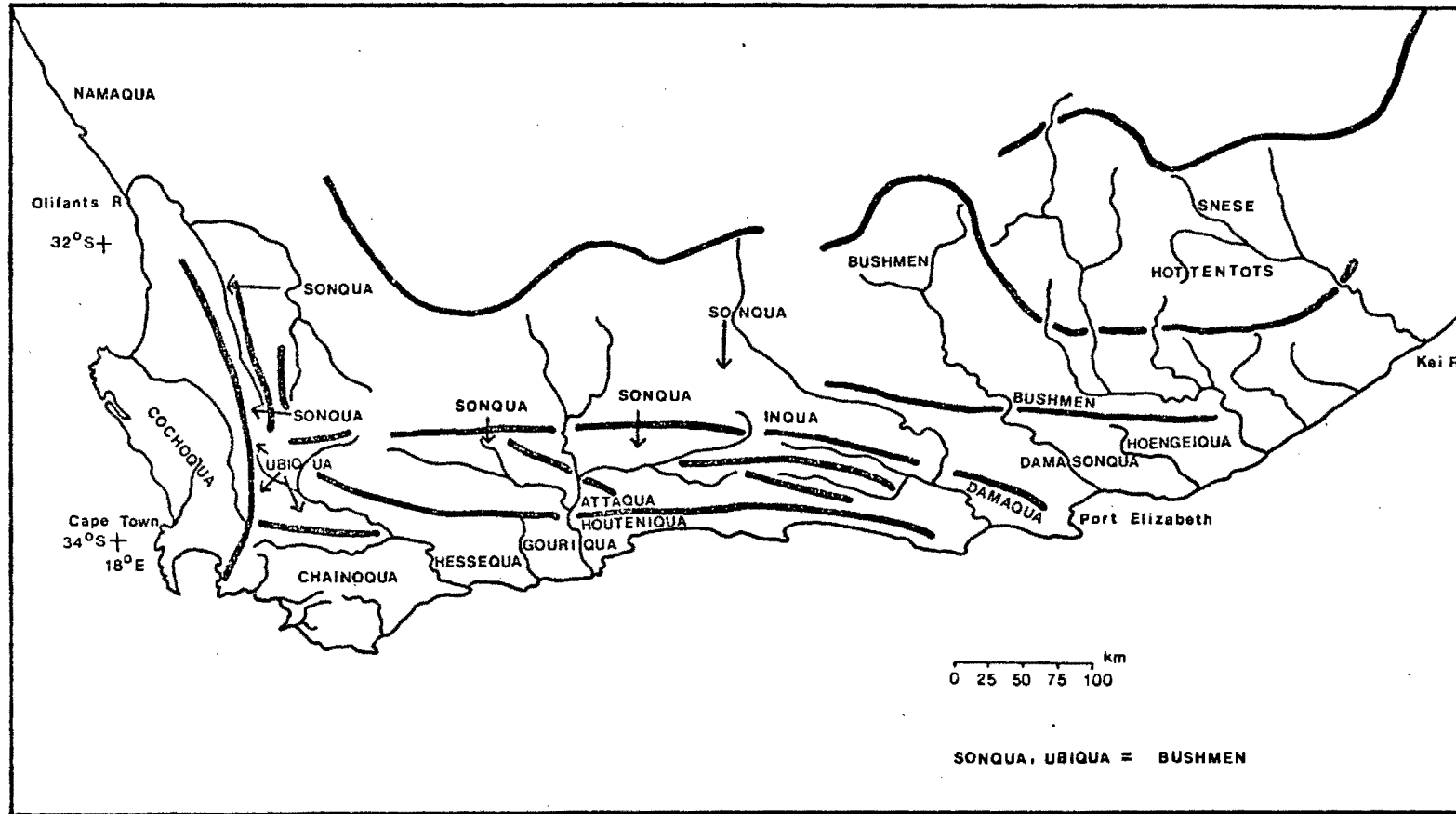


Fig.3 Distribution of herder and hunter tribes (after Maingard 1931)

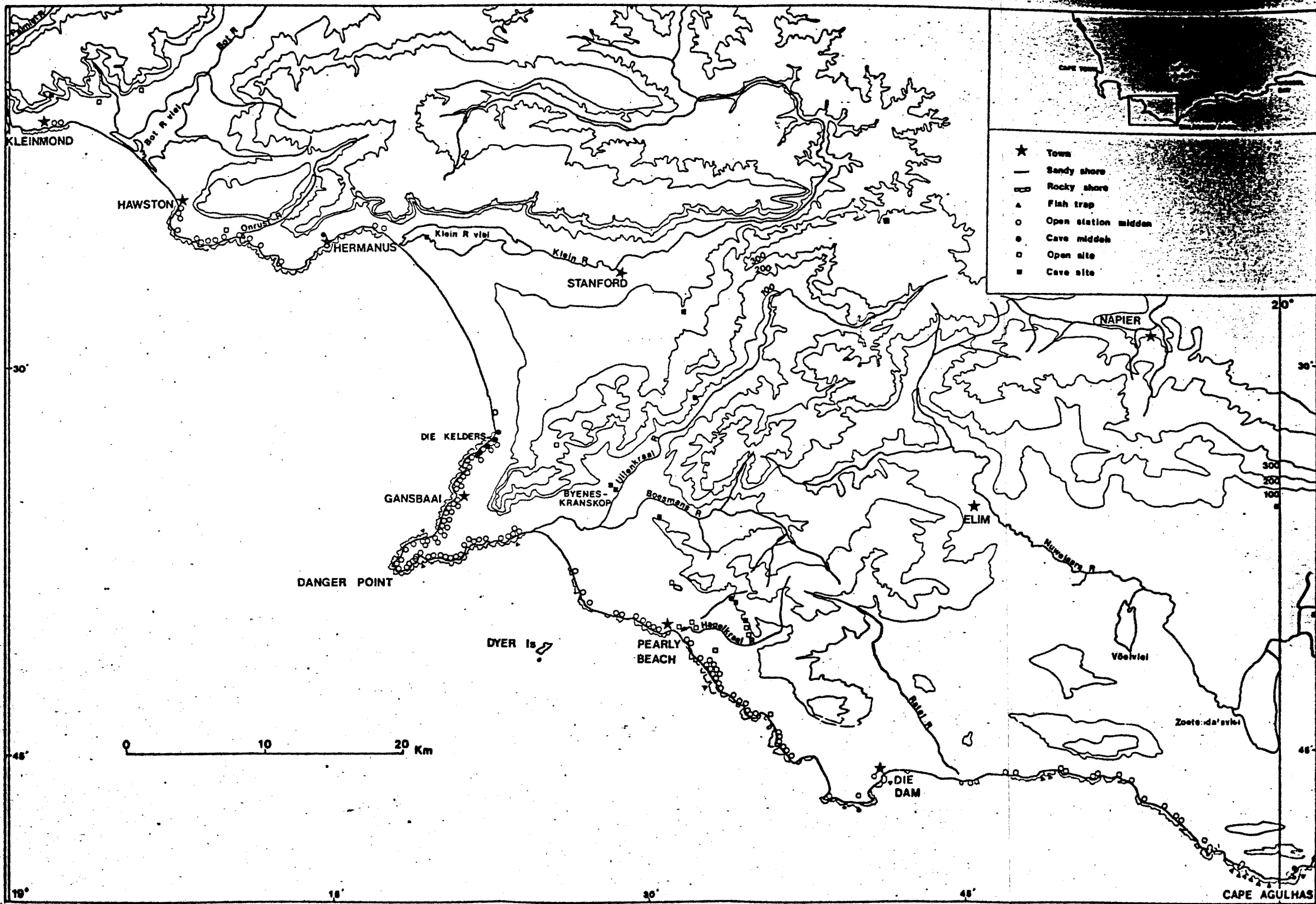


Fig.4 Research area: site localities and geographical features

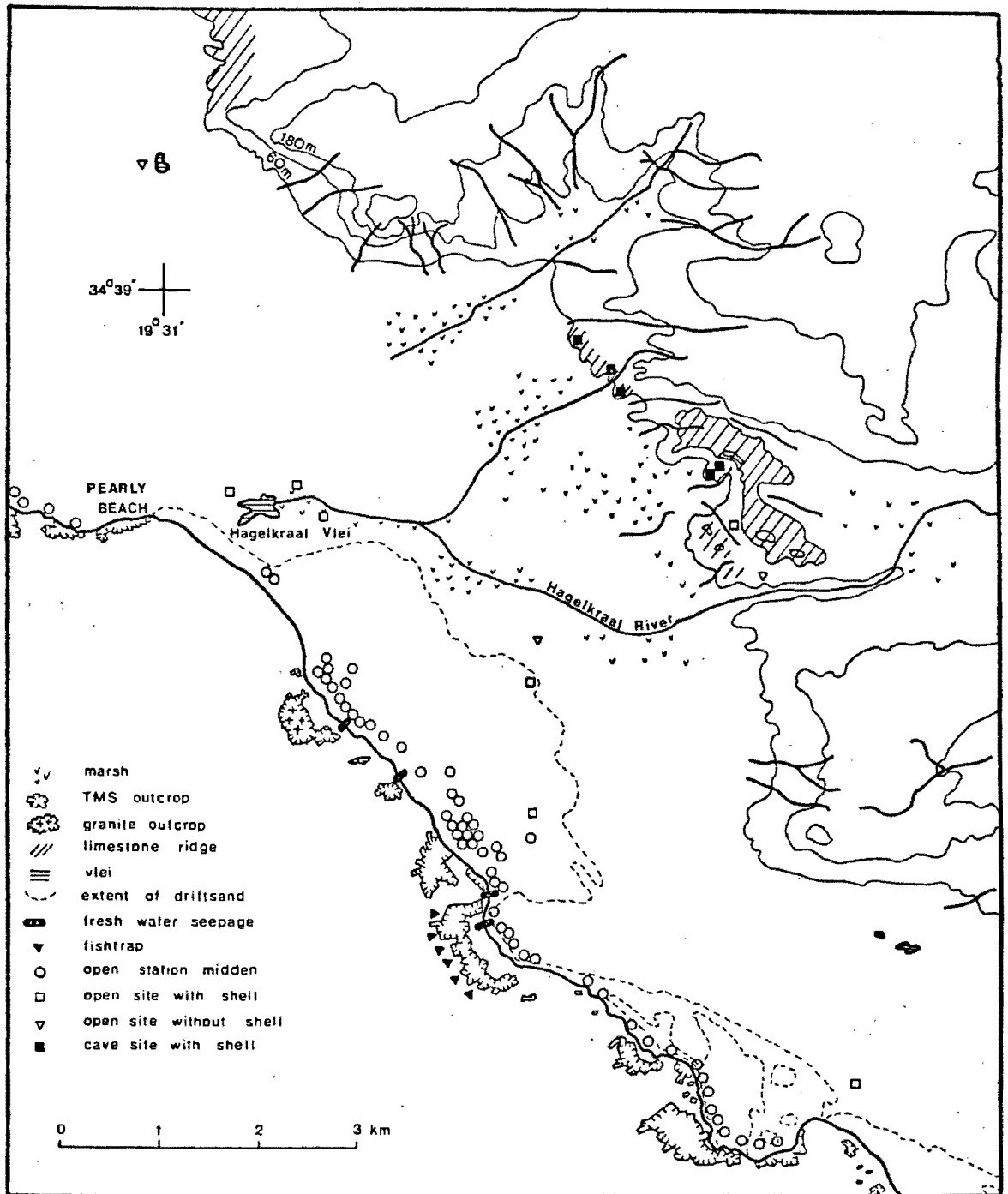


Fig.5 Pearly Beach area: site localities and geographical features

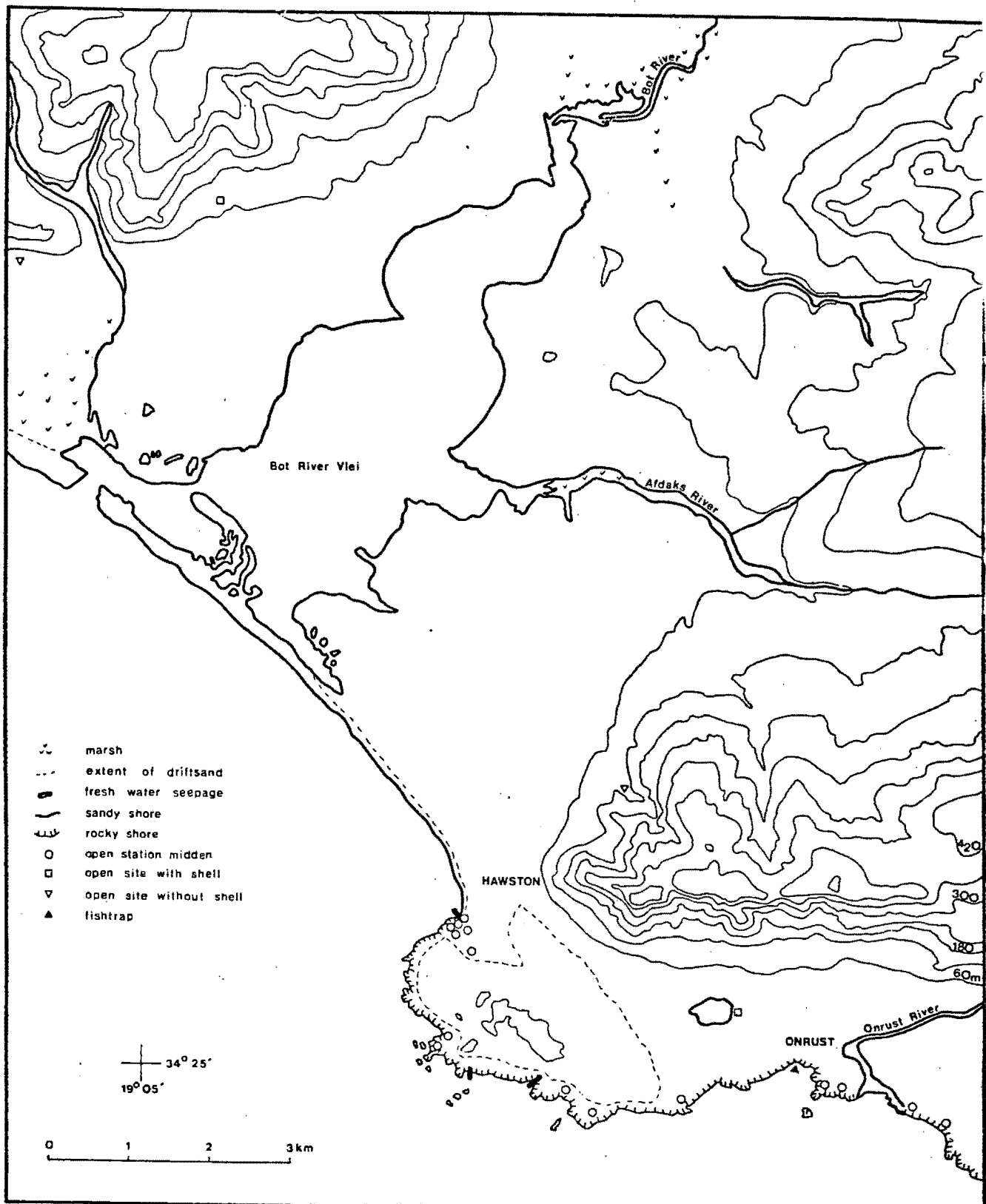


Fig.7 Hawston area: site localities and geographical features

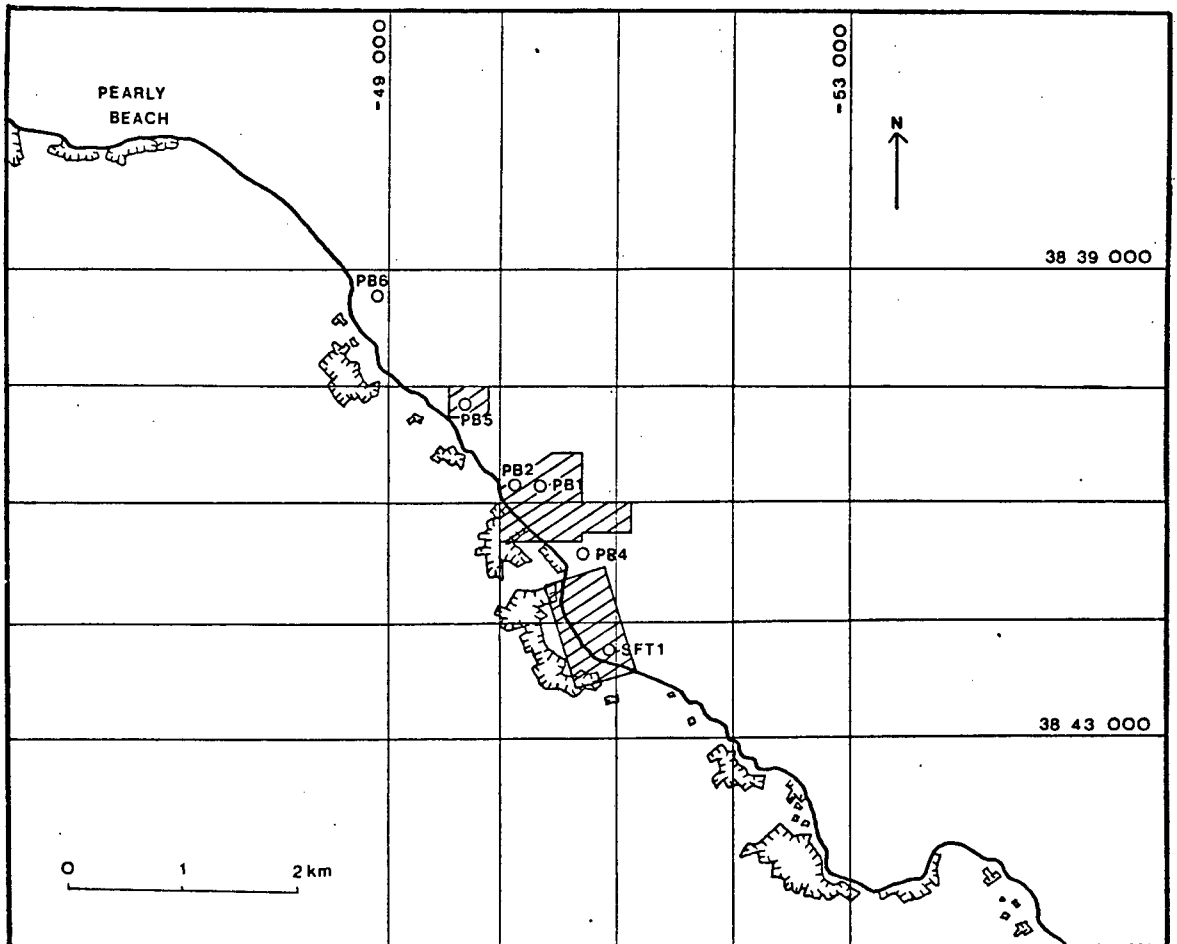


Fig.8 Pearly Beach area: locations of middens sampled and areas covered by detailed plans

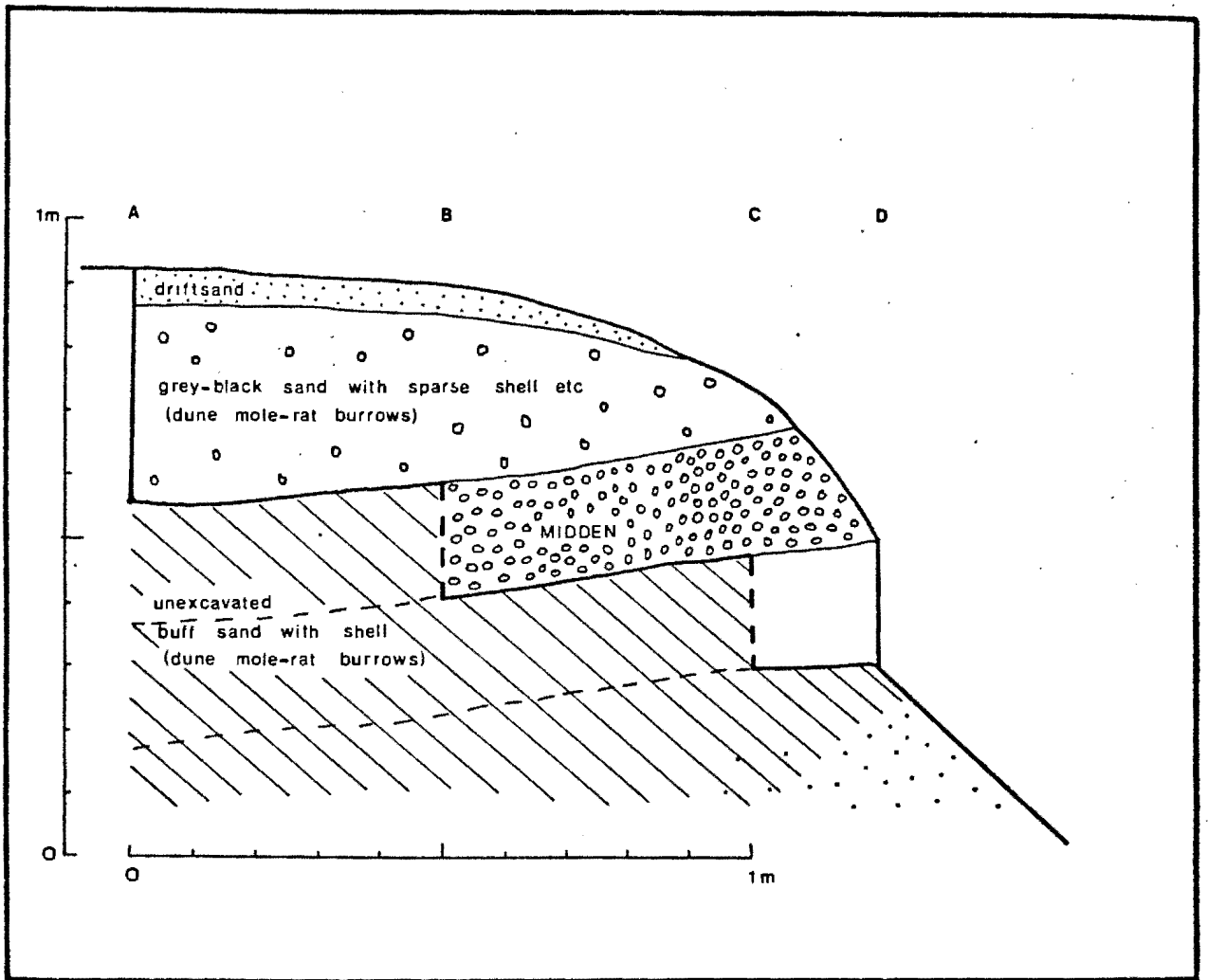


Fig.9 PB1: west section of sampled midden

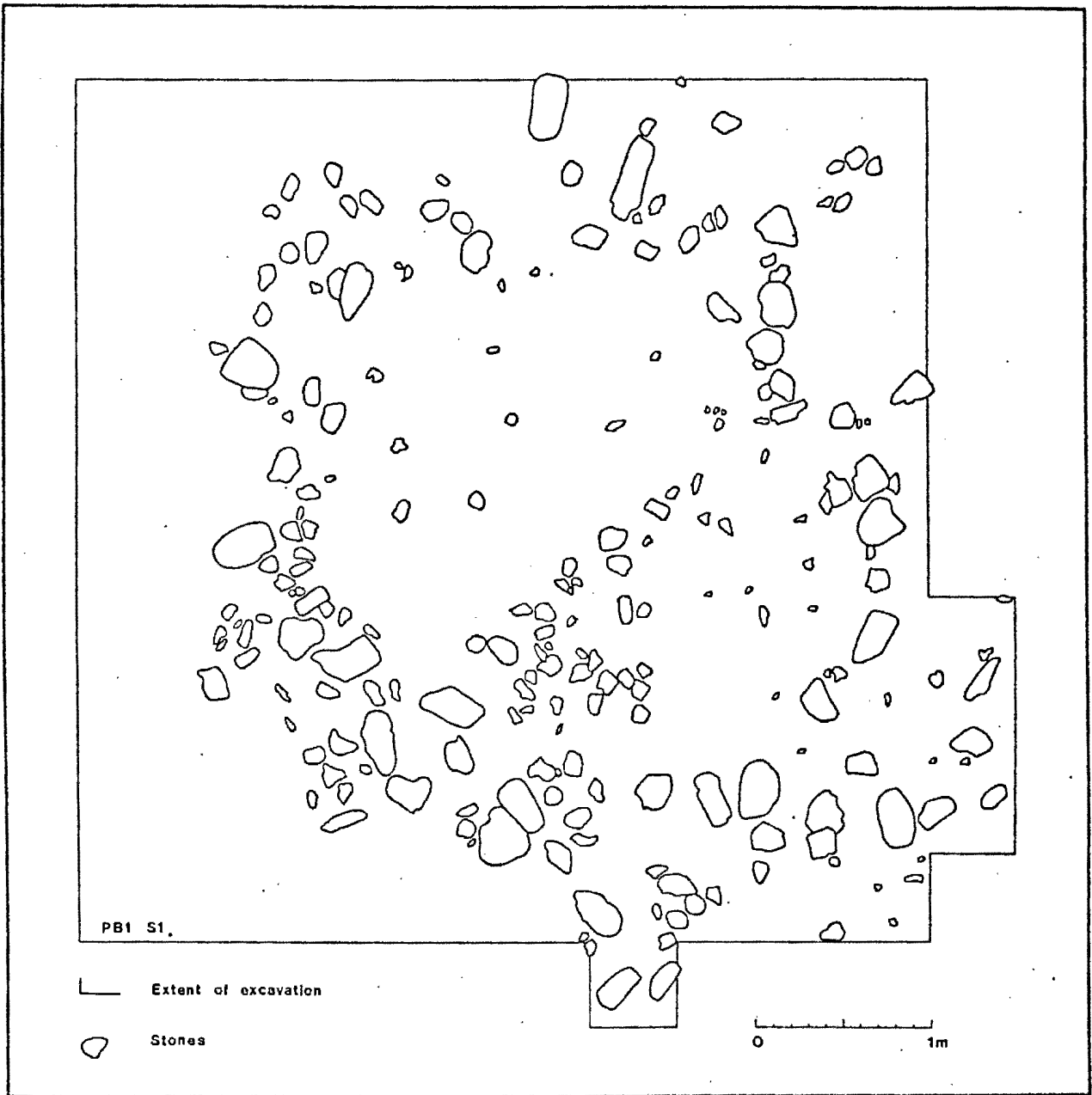


Fig.10 PB1 S1: plan of feature thought to be a hut circle

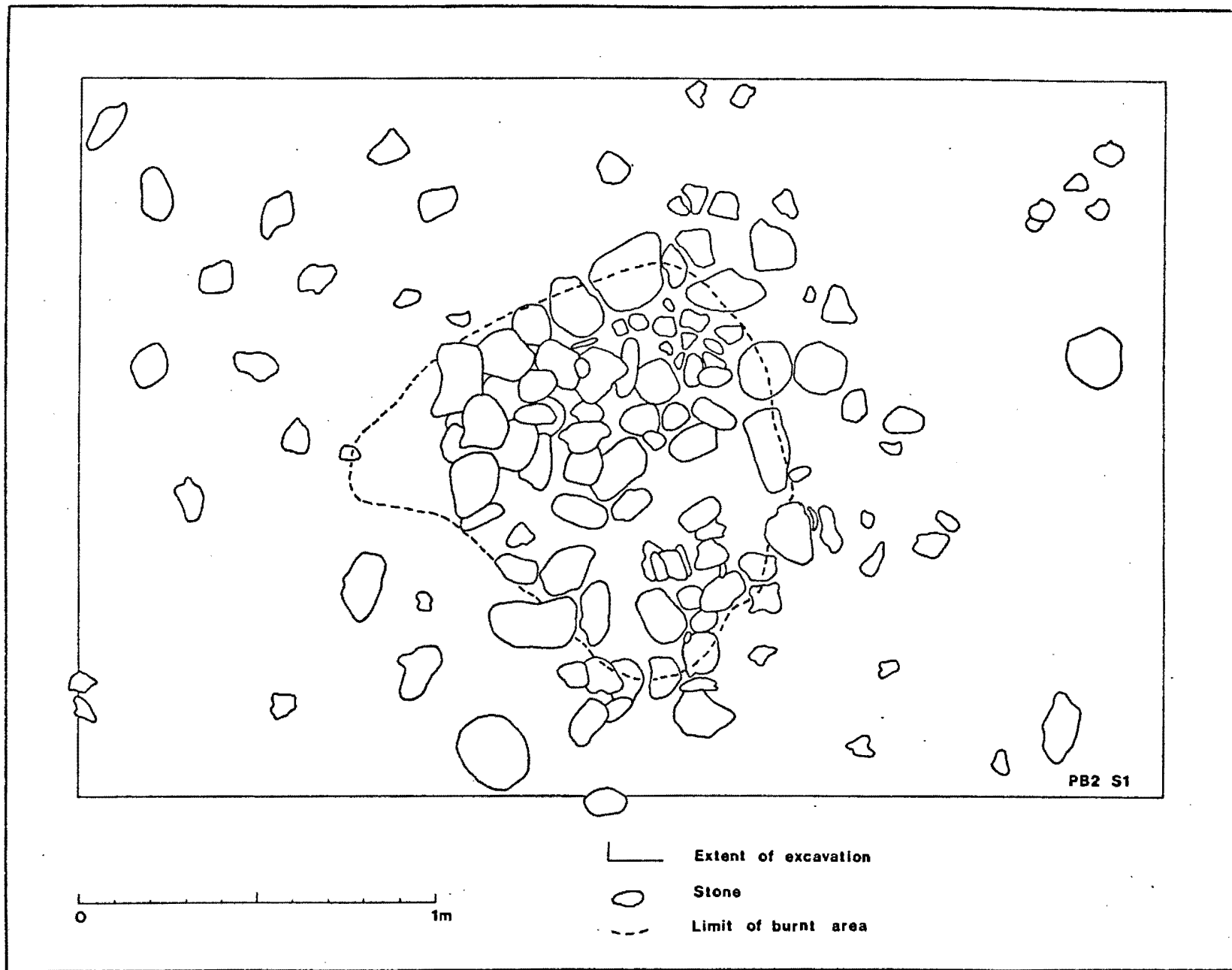


Fig.11 PB2 S1: plan of hearth feature

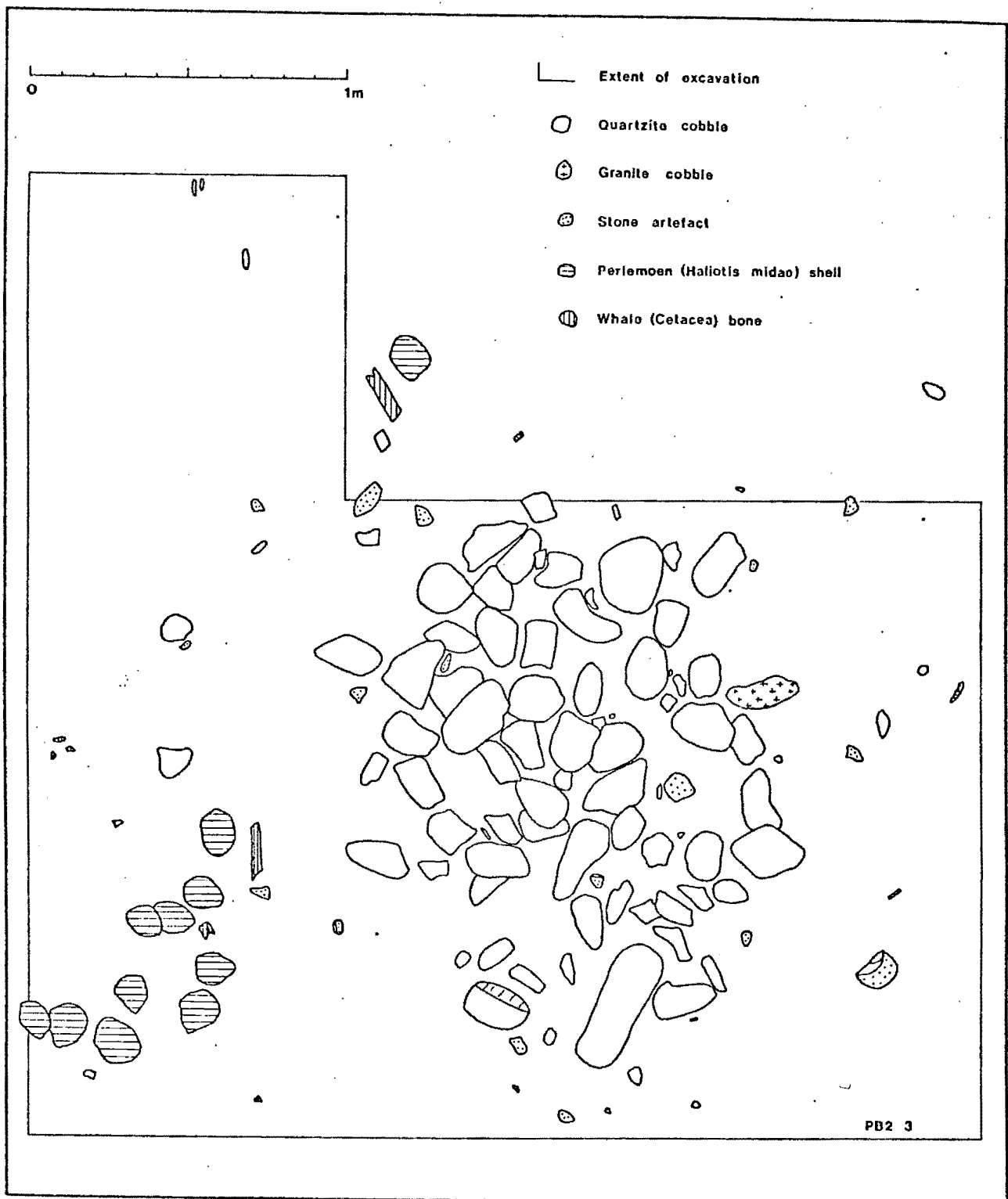


Fig.12 PB2 S3: plan of hearth feature

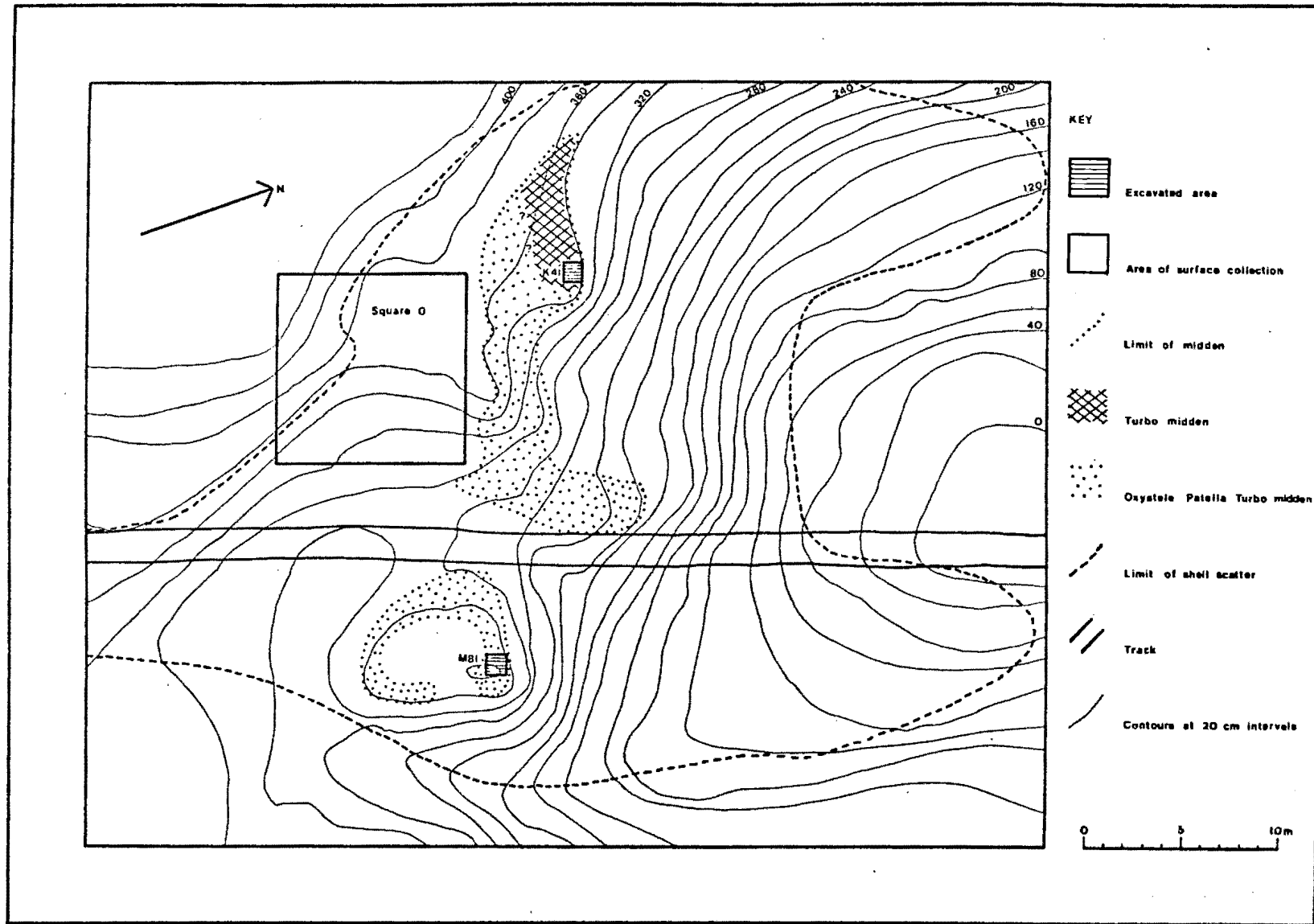


Fig.13 PB4: plan of locality showing areas covered by middens and the location of sampled middens

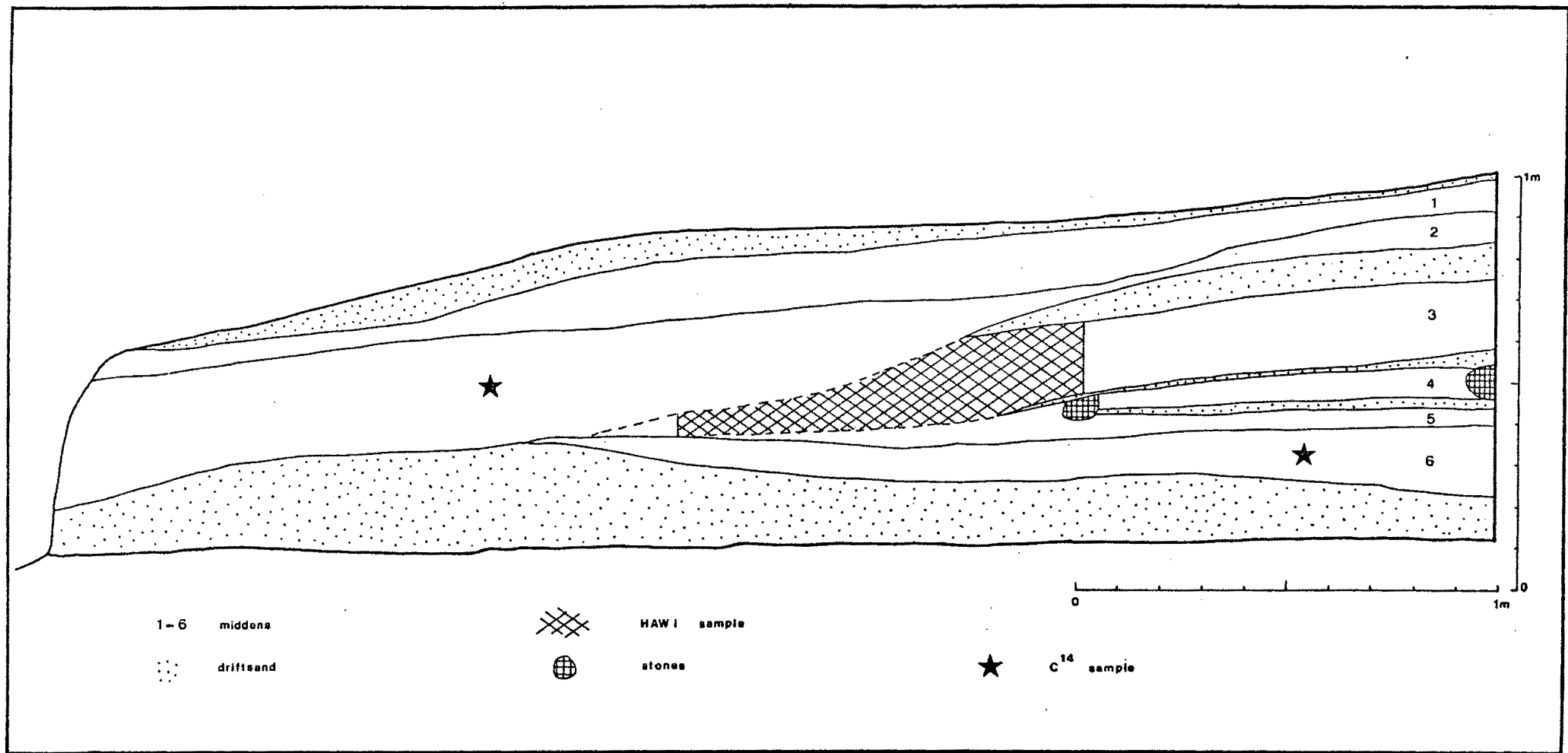


Fig.14 HAW I: east section of excavation showing stratigraphy and location of the sample

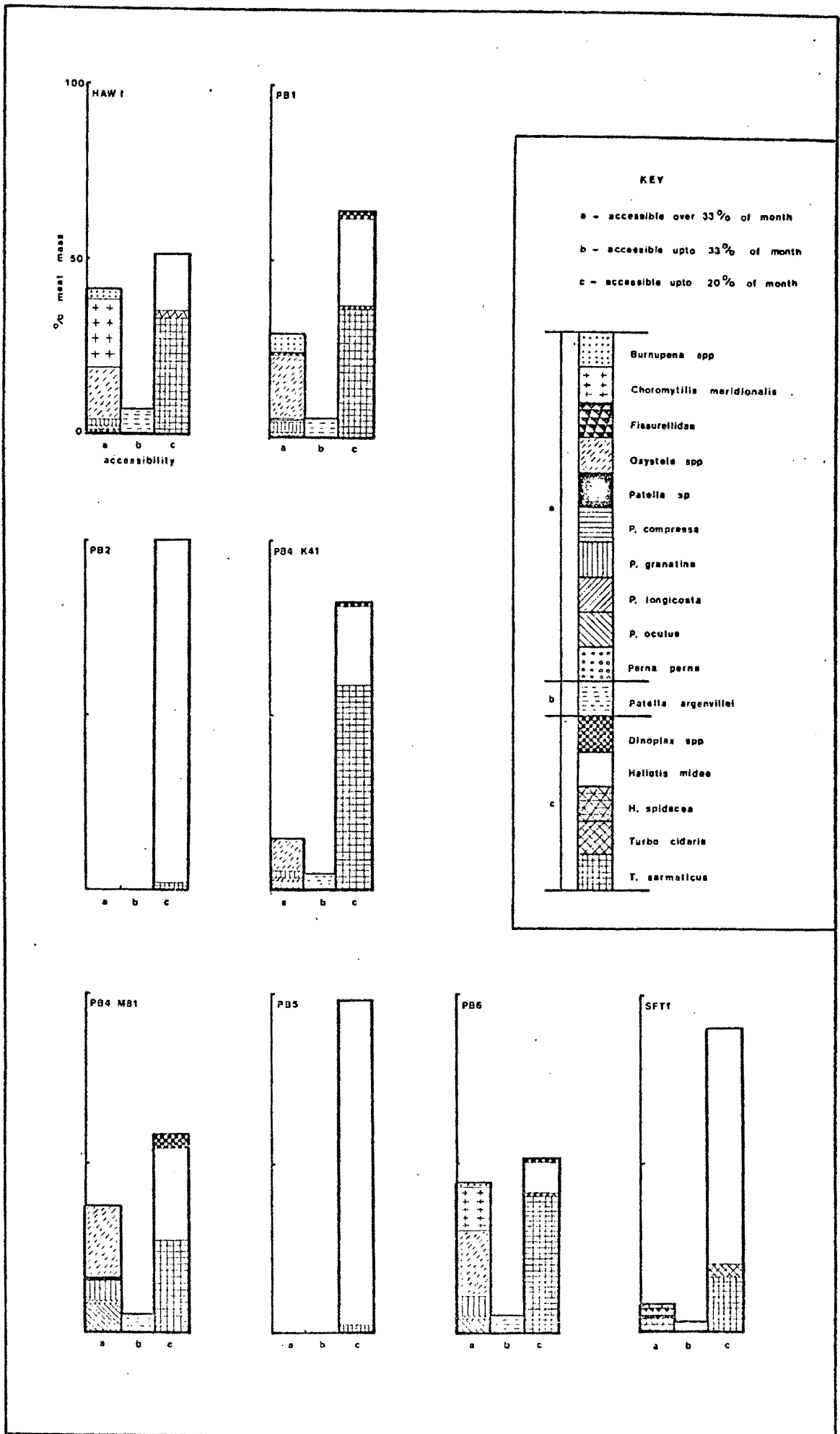


Fig.15 Pearly Beach area: bar charts relating midden composition to accessibility

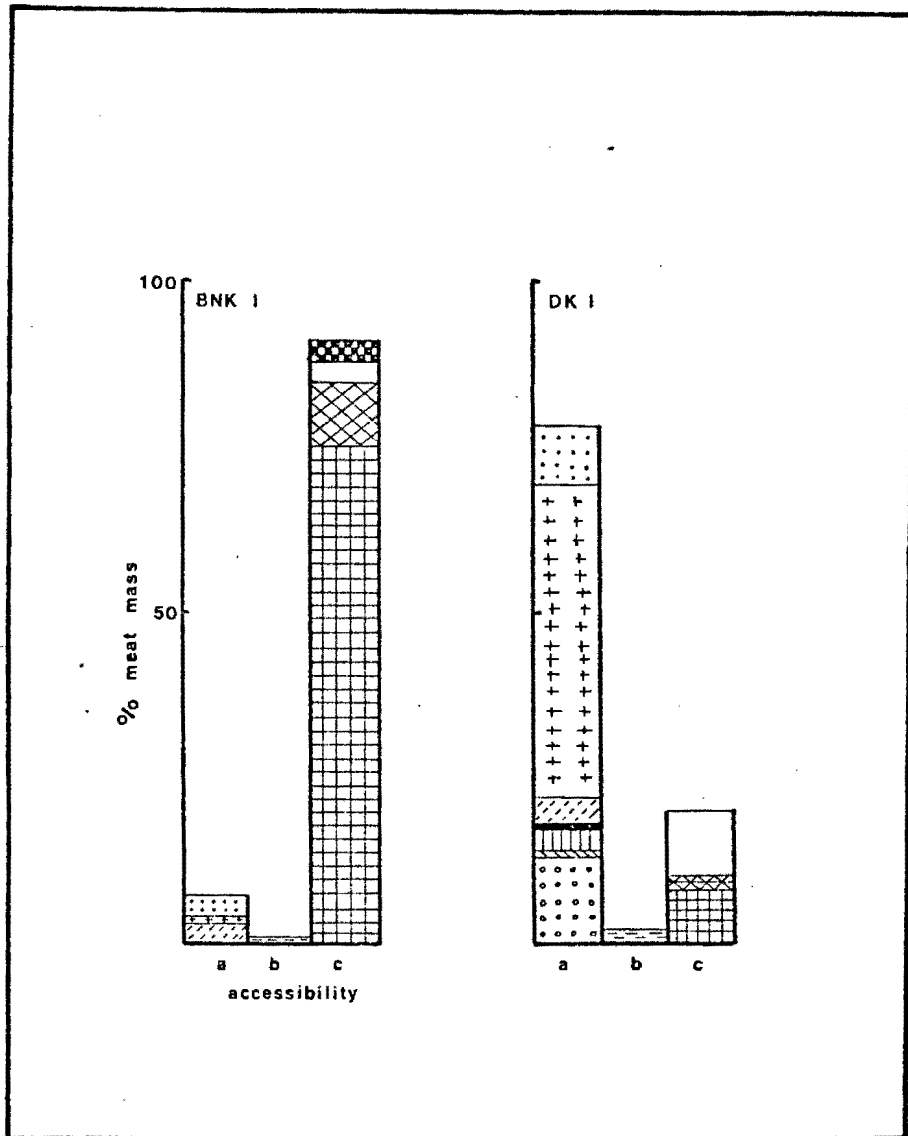
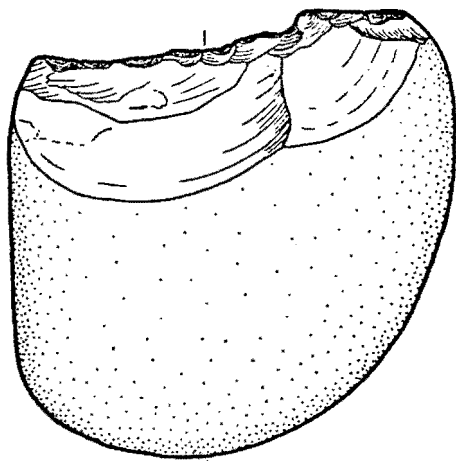
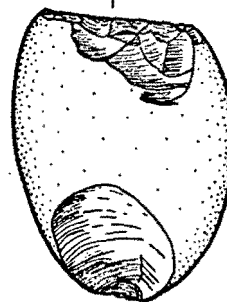


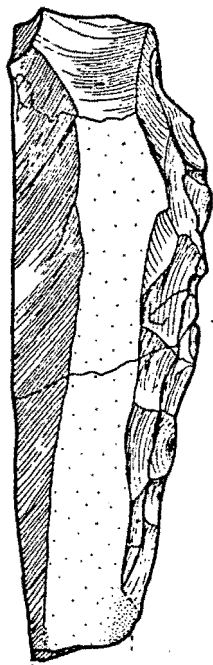
Fig.16 Byeneskranskop and Die Kelders: bar charts relating midden composition to accessibility



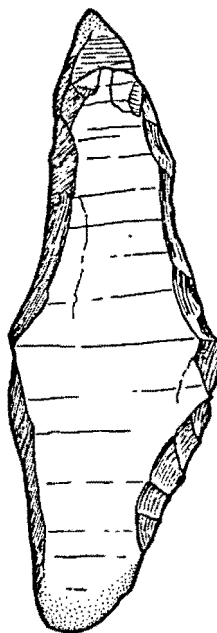
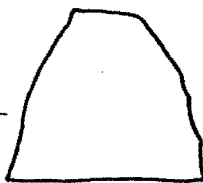
1



4



2



3



0 5 cm

Fig.17 Cultural material: stone

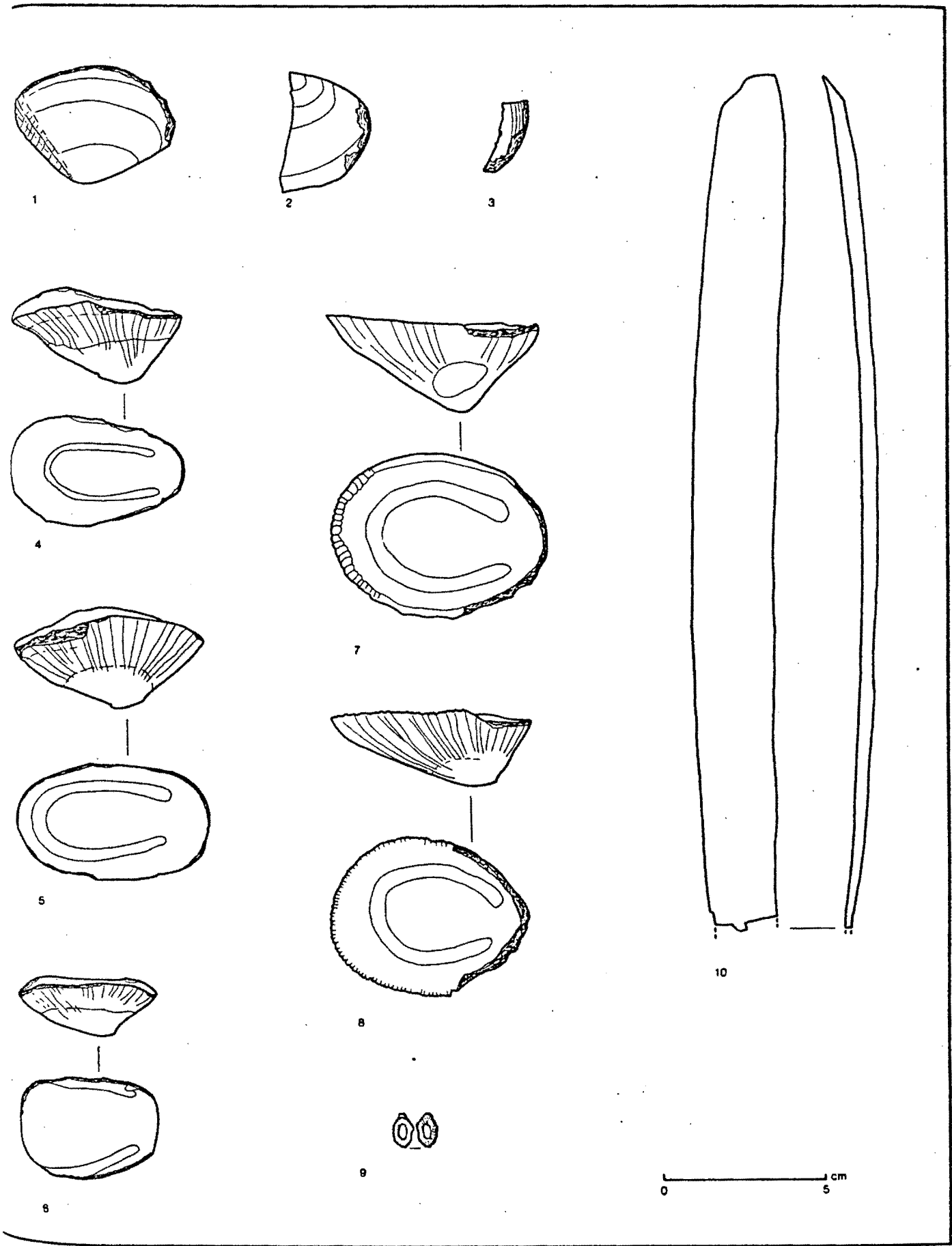


Fig.18 Cultural material: other

LIST OF PLATES

1. Shore Bushman's household.
2. Shore Bushman's household.
- 3a. Coastal plain and Pearly Beach.
- 3b. Coastal plain and driftsand area.
- 3c. Coastal plain and inland boundary formed by Bredasdorp Limestone and Table Mountain Sandstone barriers.
4. PB1: view from PB2 with limestone bank in foreground.
5. PB1: midden capping eroded driftsand mound with shell and artefact scatter on deflated surfaces.
6. PB1: detail of section.
7. PB1 S1: possible hut circle with hearth feature.
8. PB2: seaward side of Haliotis middens.
9. PB2: eroded section of Haliotis middens showing shell accumulation on driftsand.
10. PB2: general view of locality showing shell middens and stone features considered to represent hearths.
11. PB2: stone features.
12. PB2 S1: hearth feature showing stones and burnt area.
13. PB2 S3: hearth feature with Haliotis midden.
14. PB4: general view of locality.
15. PB4: roadway and exposure of Oxystele Patella Turbo middens with Turbo midden exposed at right near large boulder.
16. PB4 K41: Turbo midden showing excavation.
17. PB4 M81: Oxystele Patella Turbo midden from which sample was taken.
18. PB4: flat surface above midden sections.
19. PB5: Haliotis midden situated on limestone bank.
20. PB5: inland side of Haliotis midden.
21. PB5: Haliotis midden showing excavation.
22. PB5: stone feature consisting of a small number of large stones.
23. PB6: Oxystele Patella Turbo midden capping dune relic.
24. PB6: Oxystele Patella Turbo midden before sampling.
25. PB6: Oxystele Patella Turbo midden showing excavation.
26. SFT1: general view of mound and relation to coastline.
27. SFT1: midden showing excavation.
28. SFT1: tidal fish trap.
29. HAWI: Oxystele Patella Turbo midden which was sampled.
30. HAWI: east section of excavation showing sand lenses and underlying dune.

GROOTE



Plate 1. 'Shore Bushman's household. Being fish-eating and hunting Hottentots, these groups, made up of only a few people, eat even the dead washed-up right whales and seals, as if a great delicacy.' (Gordon Collection, photograph by courtesy of the Cape Archives.) Note the use of stranded whales both as food and as a raw material in the building of shelters, the presence of dogs, the use of collecting bags, what appears to be a net for carrying ostrich eggshells, and a dagga pipe.

Strand Bushmans Household
Spore No. 10000 in August 1860
with various articles and a net for carrying ostrich eggshells
and a dagga pipe.



Plate 2. Drawing of apparently the same group as that shown in Plate 1. (Gordon Collection, photograph by courtesy of the Cape Archives). A remarkably similar scene describing Hottentots residing at the Orange River mouth is illustrated in Paterson (1790). Note also the shellfish remains around the fire, pieces of whale bone and whalebone seats, confirmation of the use of nets for carrying ostrich eggshell water containers, the dagga pipe and wooden vessels.

Pearly Beach

Driftsand area

Rocky shore

Hagelkraal vlei

Resort



Plate 3a. Coastal plain and Pearly Beach

Driftsand area

SFT1

PB6

Hagelkraal vlei



Plate 3b. Coastal plain and driftsand area.

Bredasdorp Limestone

Hagelkraal River

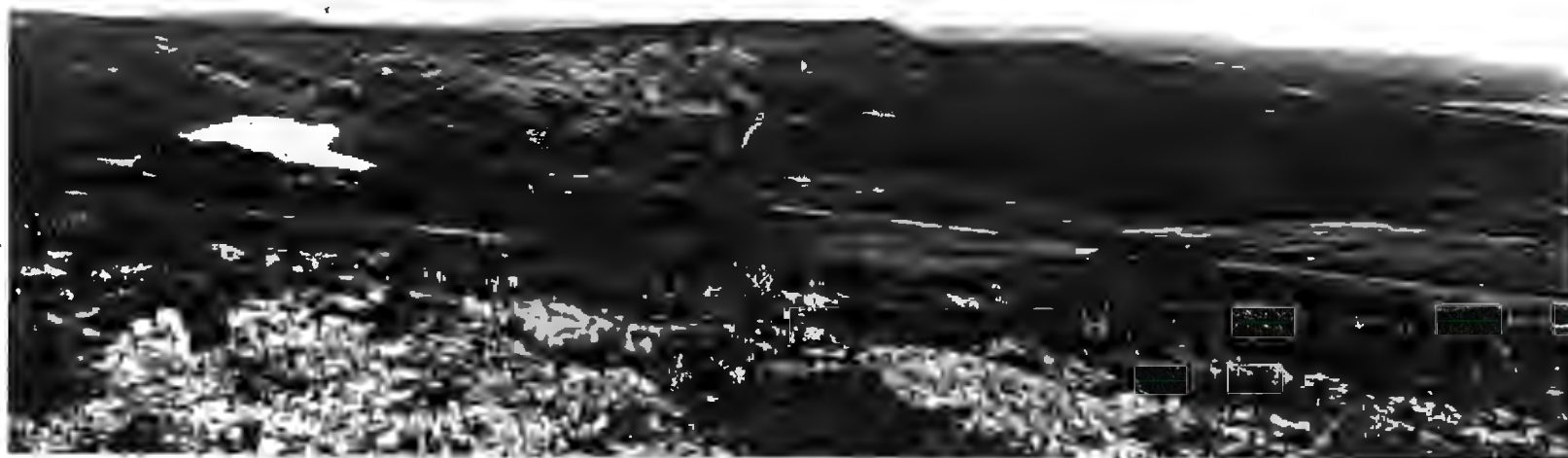


Plate 3c. Coastal plain and inland boundary formed by Bredasdorp Limestone and Table Mountain Sandstone barriers.

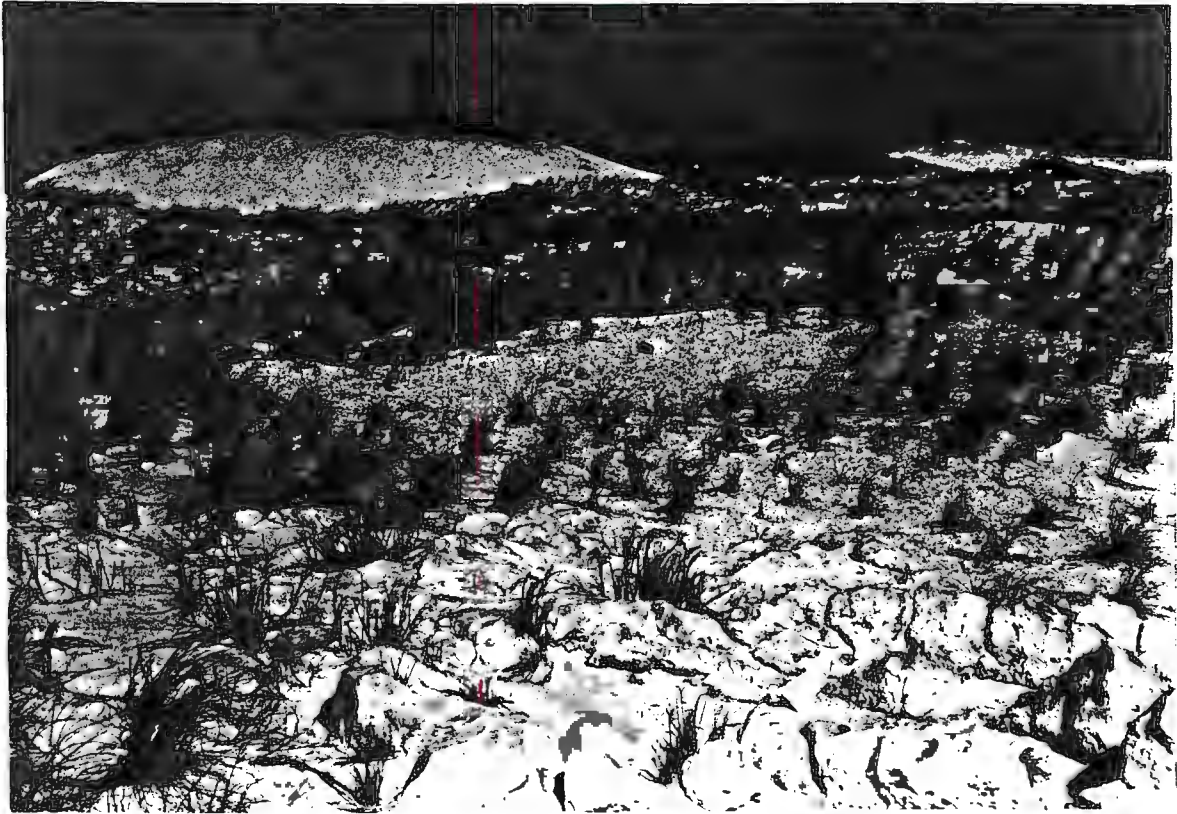


Plate 4. PB1: view from PB2 with limestone bank in foreground.



Plate 5. PB1: midden capping eroded driftsand mound with shell and artefact scatter on deflated surfaces. The PB1 sample was taken from the area between the seated figures.

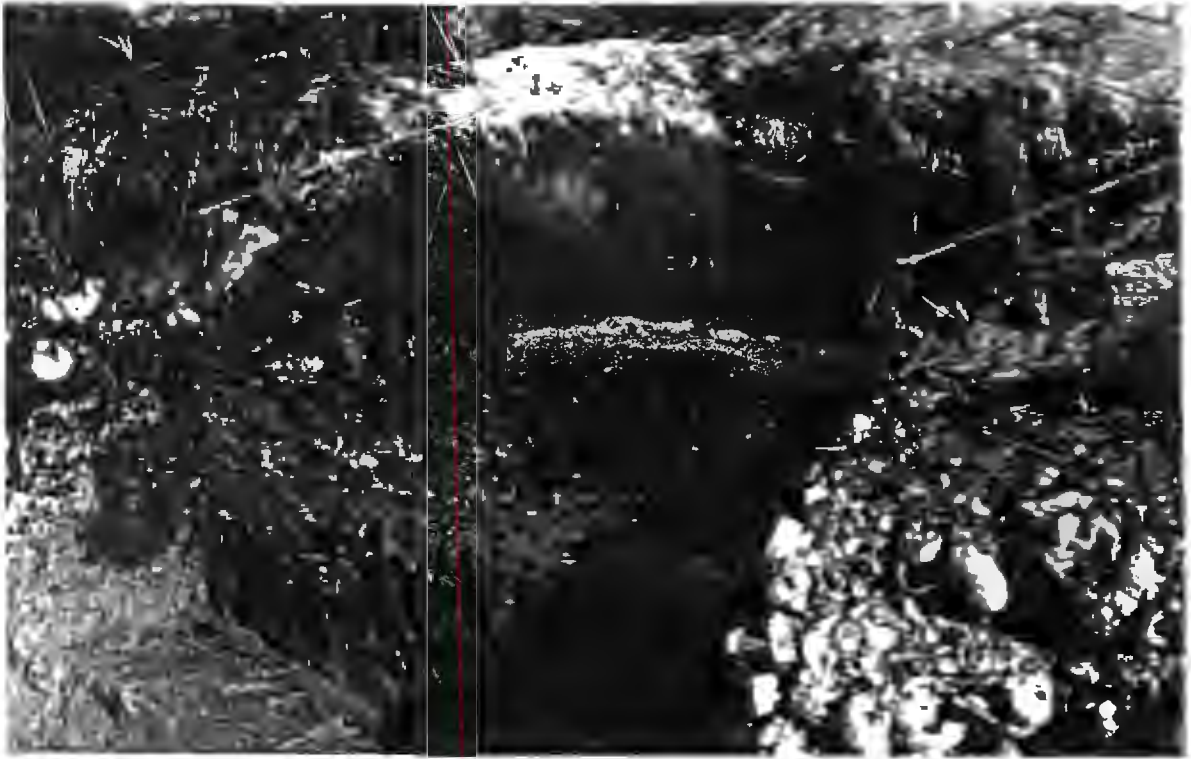


Plate 6. PB1: detail of section showing the midden dipping down from the eroded section (string outlines 1 m²). Evidence for dune mole-rat disturbance can be seen in lower left area beneath shell deposit.



Plate 7. PB1 S1: possible hut circle with hearth feature. Note small concentration of shell on left hand side and general scatter of shell covering deflated surfaces.

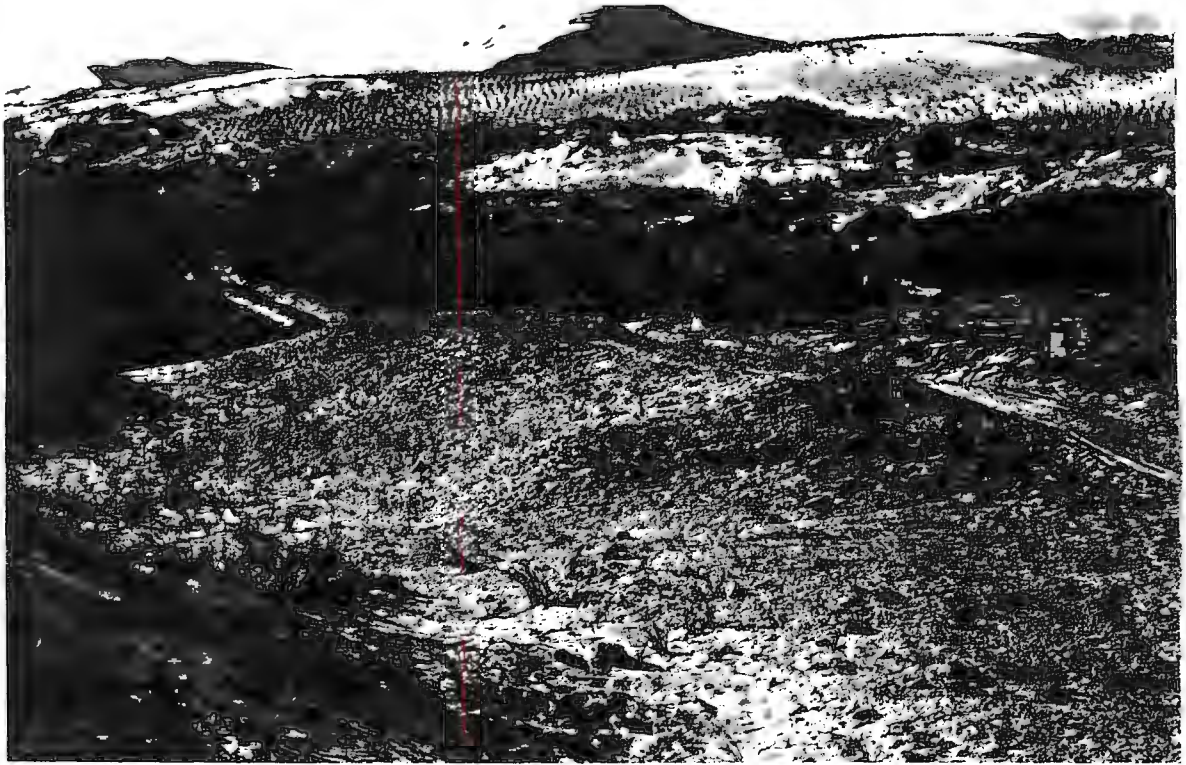


Plate 8. PB2: seaward side of Haliotis middens.

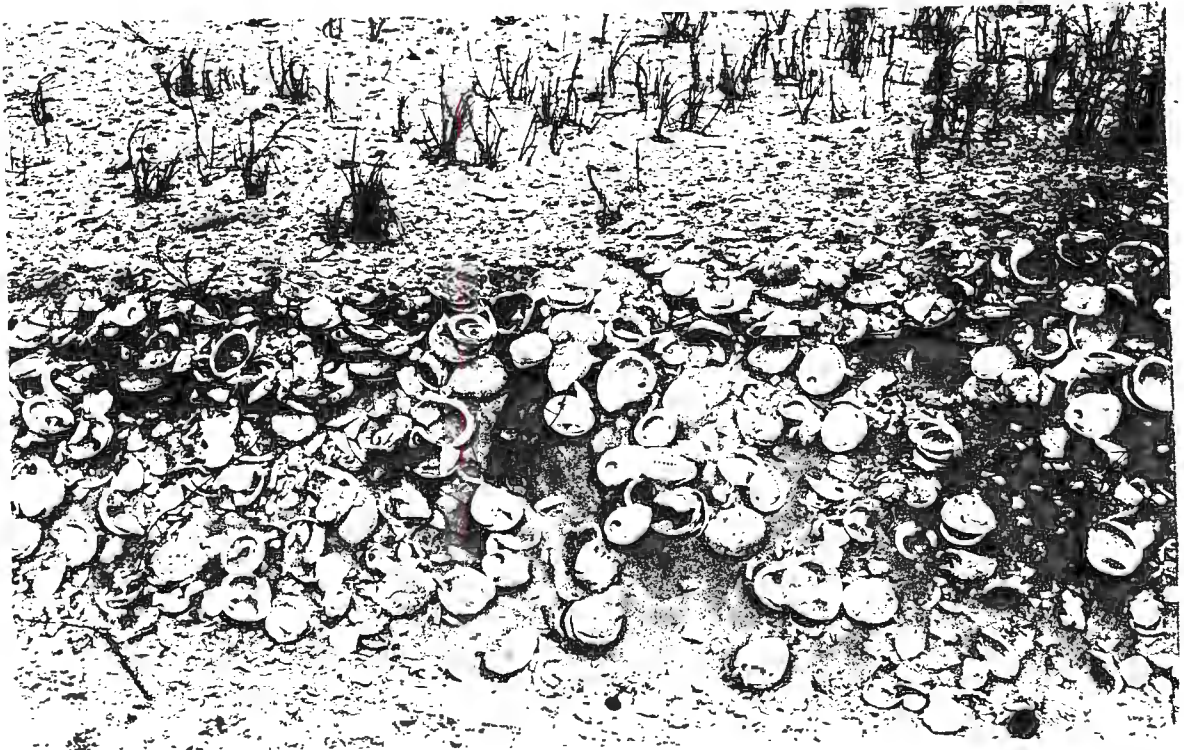


Plate 9. PB2: eroded section of Haliotis middens showing shell accumulation on driftsand.

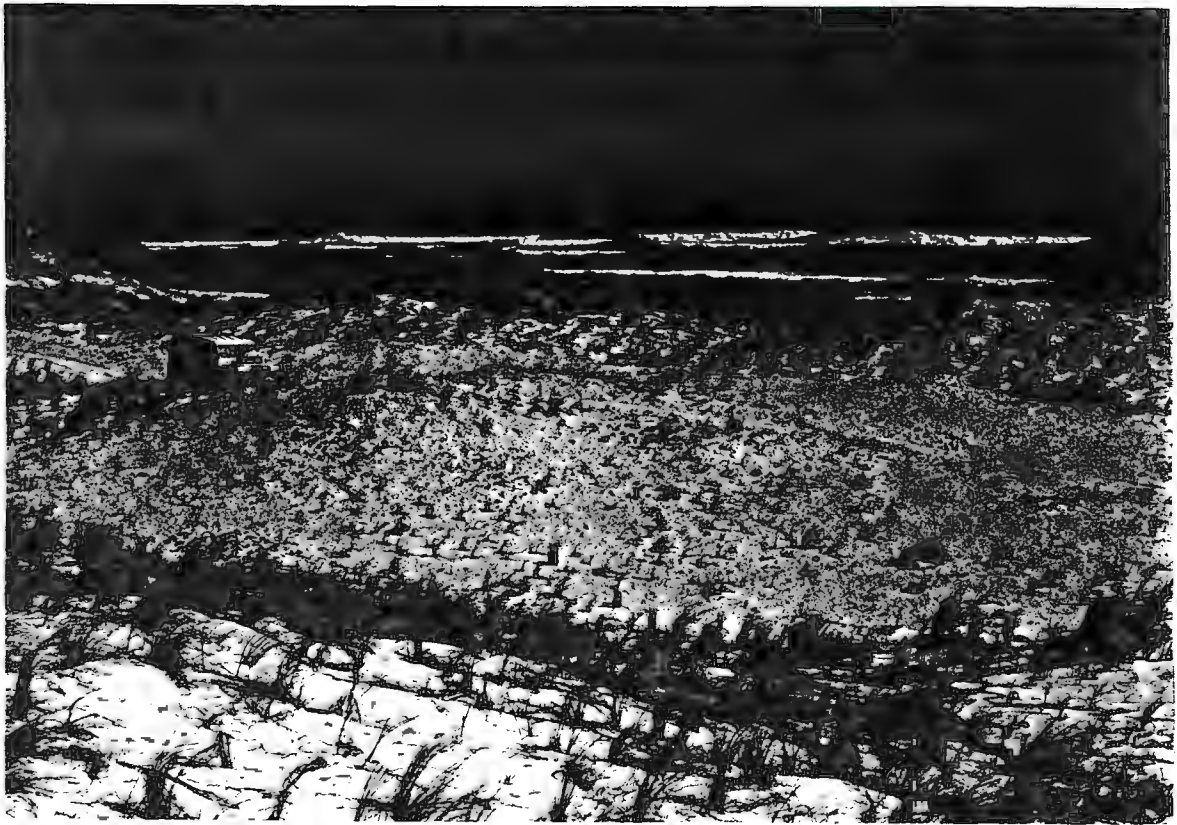


Plate 10. PB2: general view of locality showing shell middens and stone features considered to represent hearths. Note that Haliotis middens occur along the seaward extent of the locality with an Oxysteles Patella Turbo midden situated slightly to the left of the centre of the photograph.



Plate 11. PB2: stone feature on right hand side thought to be burial cover while smaller feature, centre rear, is of the same size order as a hearth.

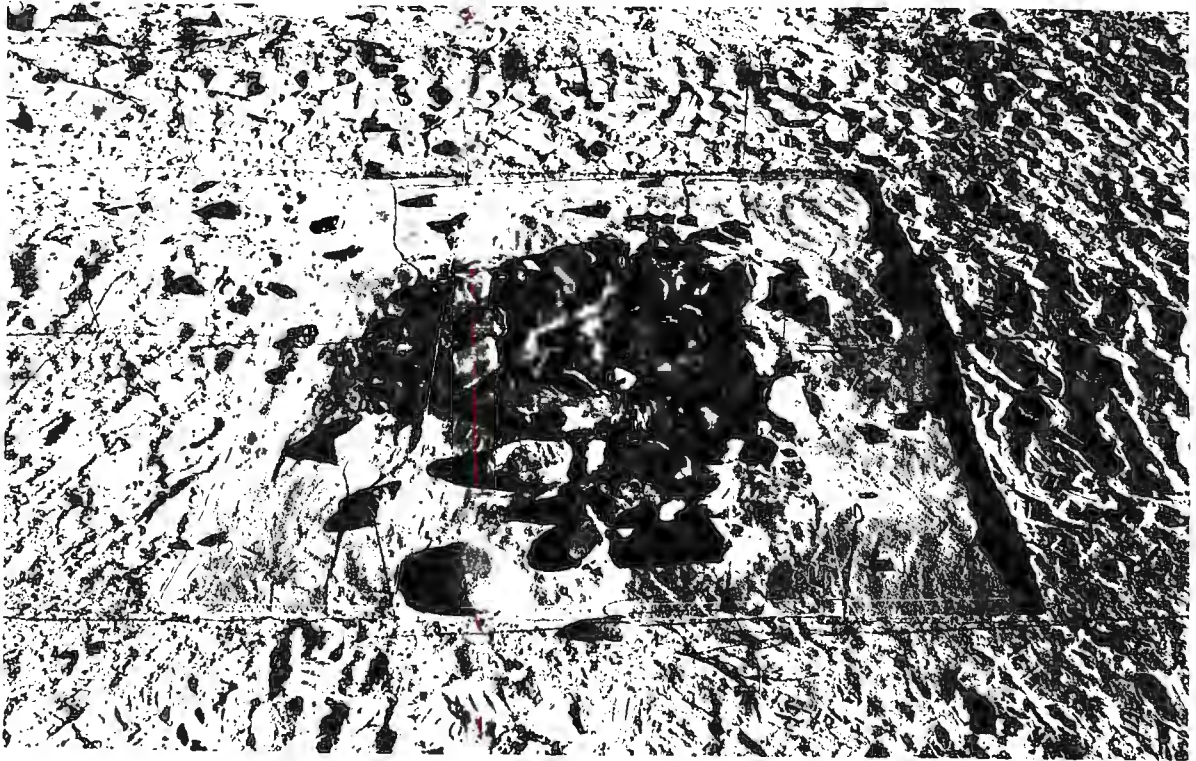


Plate 12. PB2 S1: hearth feature showing stones and burnt area (1 m² grid).



Plate 13. PB2 S3: hearth feature with Haliotis midden (1 m² grid).

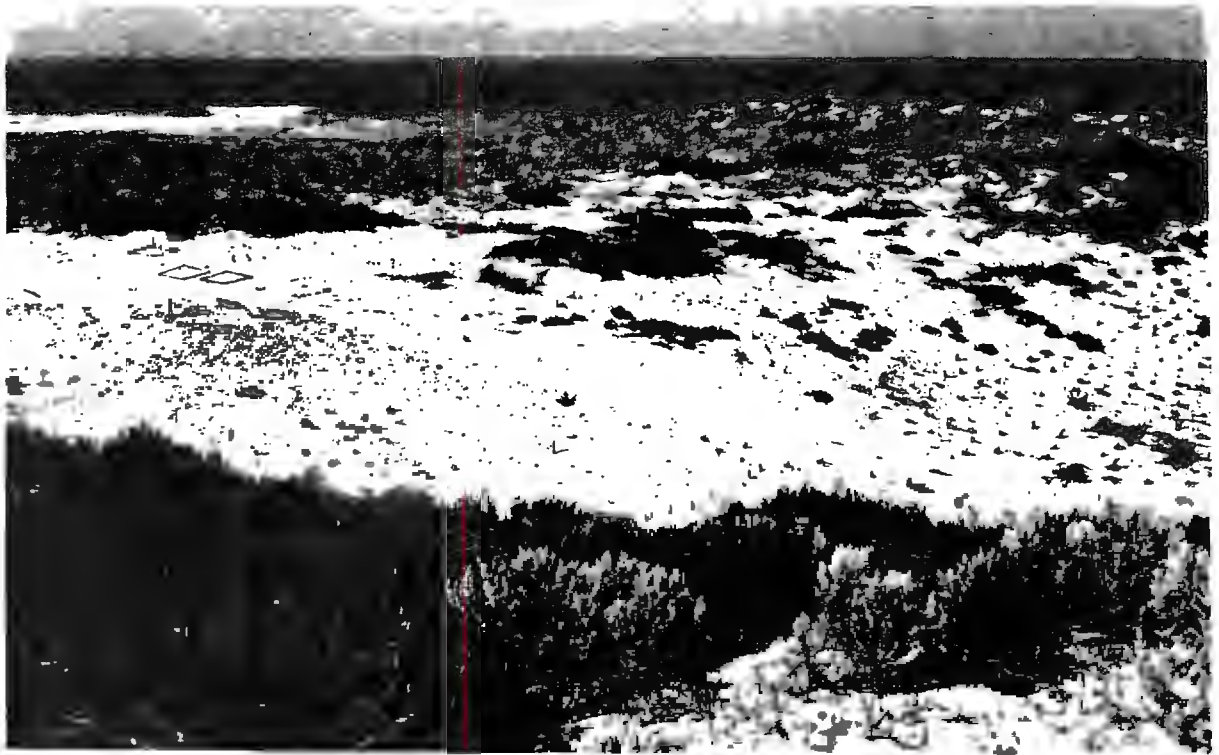


Plate 14. PB4: general view of locality (100 m² grid).

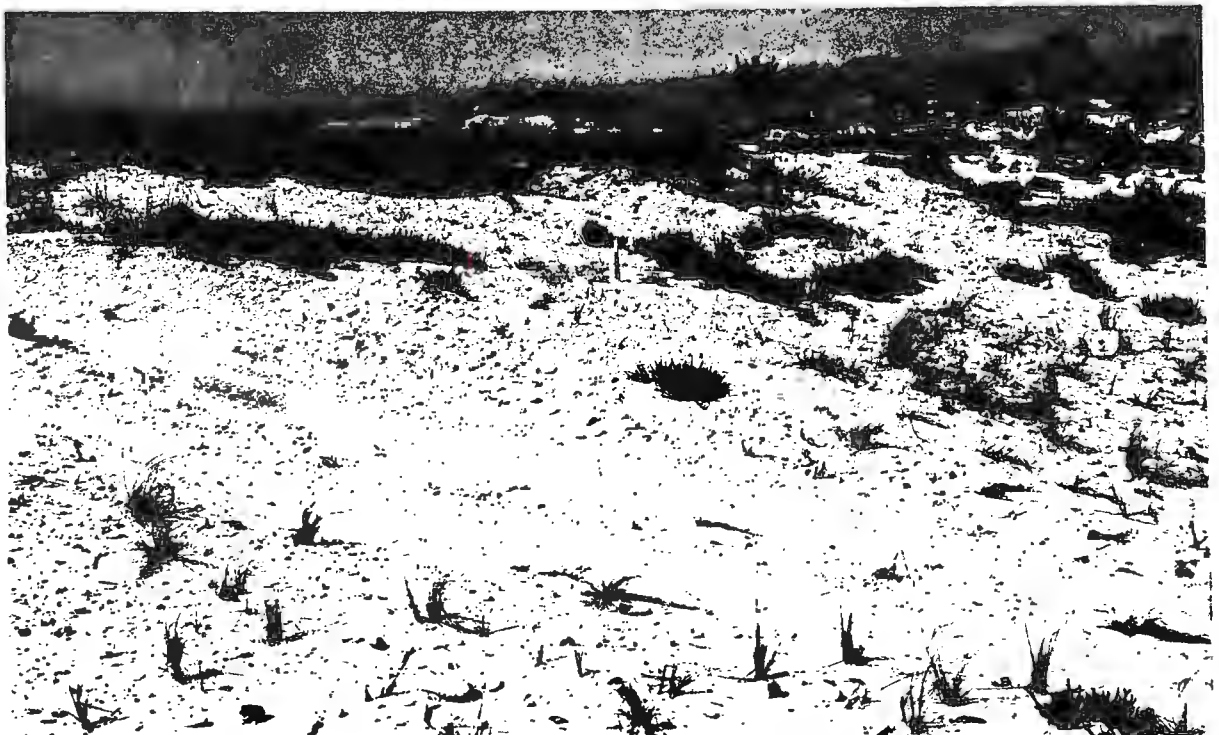


Plate 15. PB4: roadway and exposure of Oxystele Patella Turbo middens with Turbo midden exposed at right near large boulder.

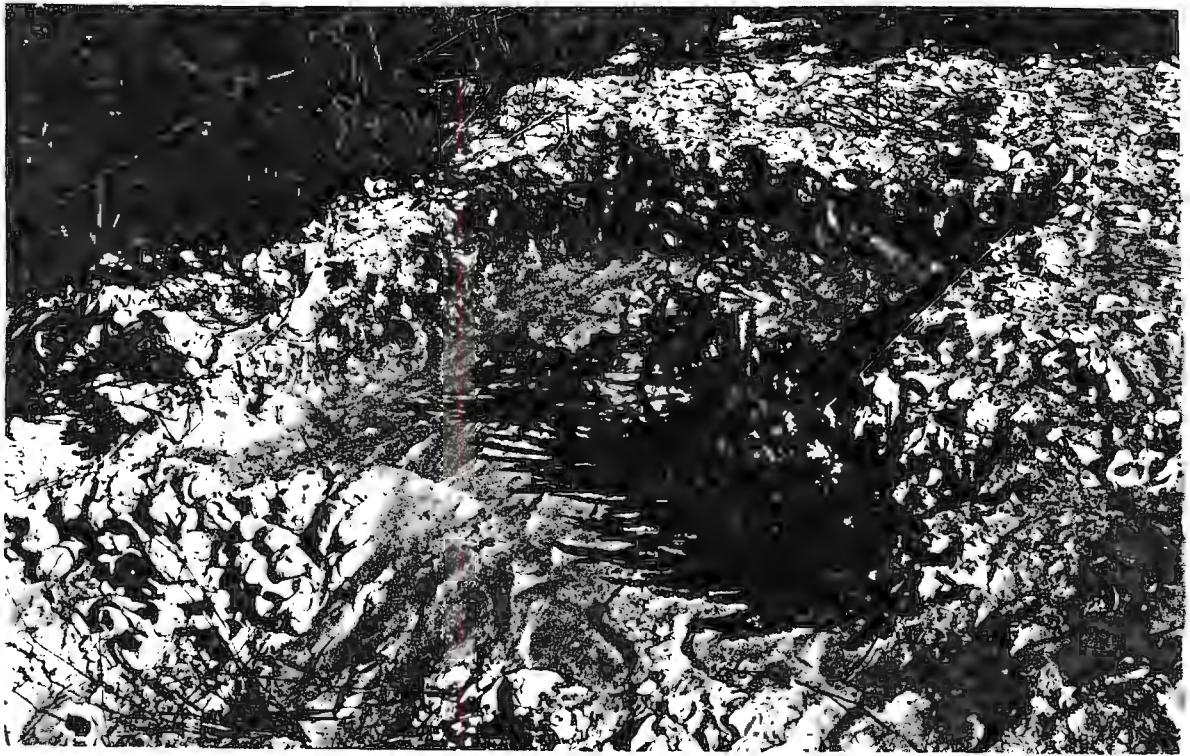


Plate 16. PB4 K41: Turbo midden showing excavation (1 m² grid). Vegetation left in situ in compliance with Dept of Forestry conditions.



Plate 17. PB4 M81: Oxysteles Patella Turbo midden from which sample was taken (1 m² grid).



Plate 18. PB4: flat surface above midden sections. Surface collection from Square 0 situated on left extremity of ridge and photograph (100 m² grid).



Plate 19. PB5: Haliotis midden situated on limestone bank.

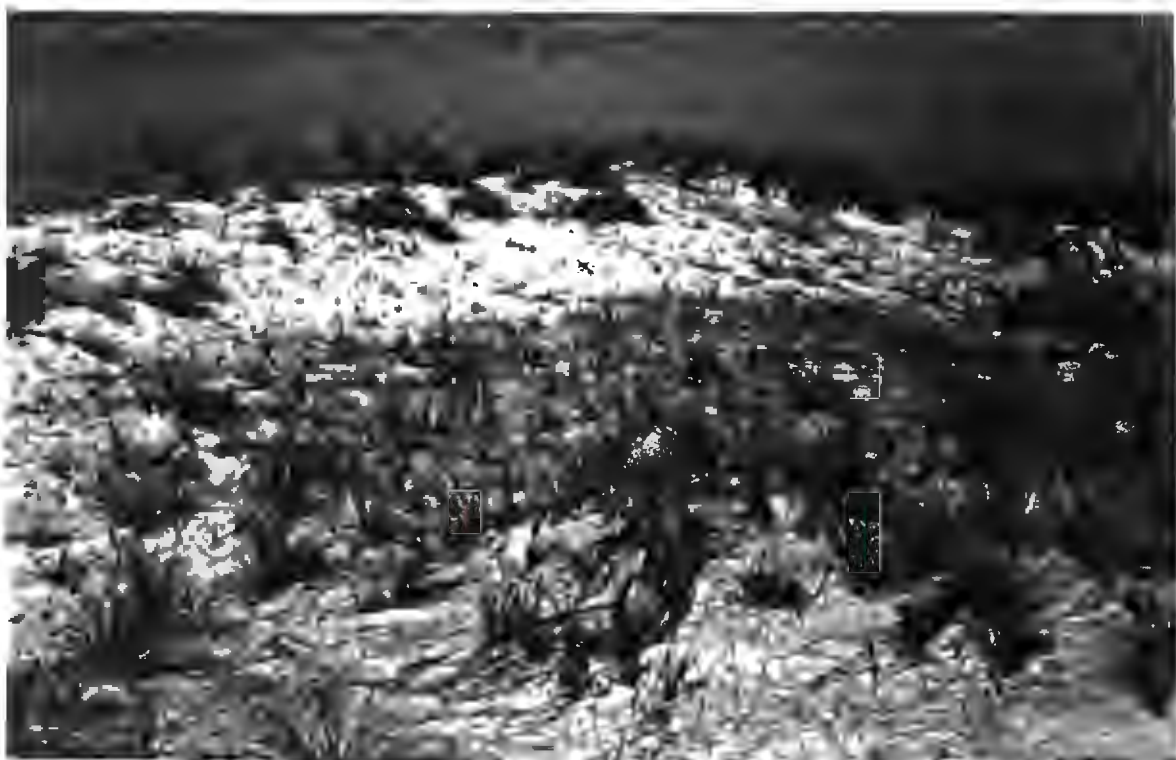


Plate 20. PB5: inland side of Haliotis midden.

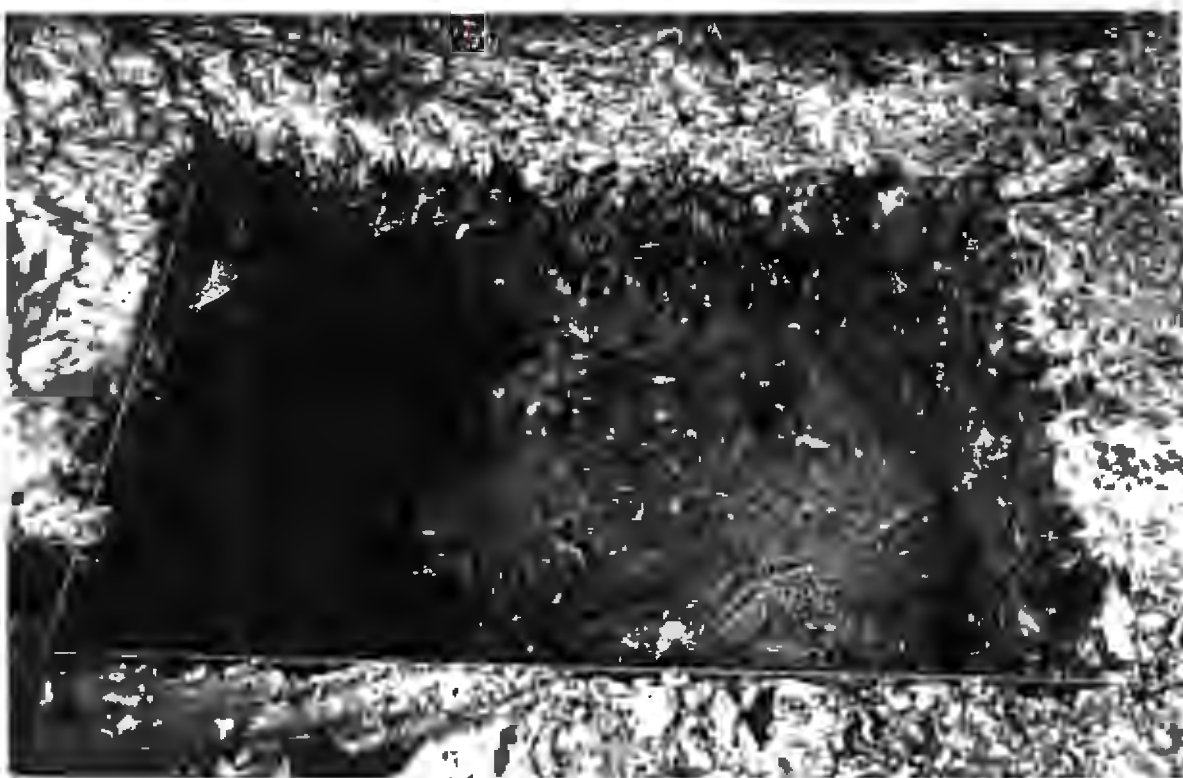


Plate 21. PB5: Haliotis midden showing excavation (1 m² grid).

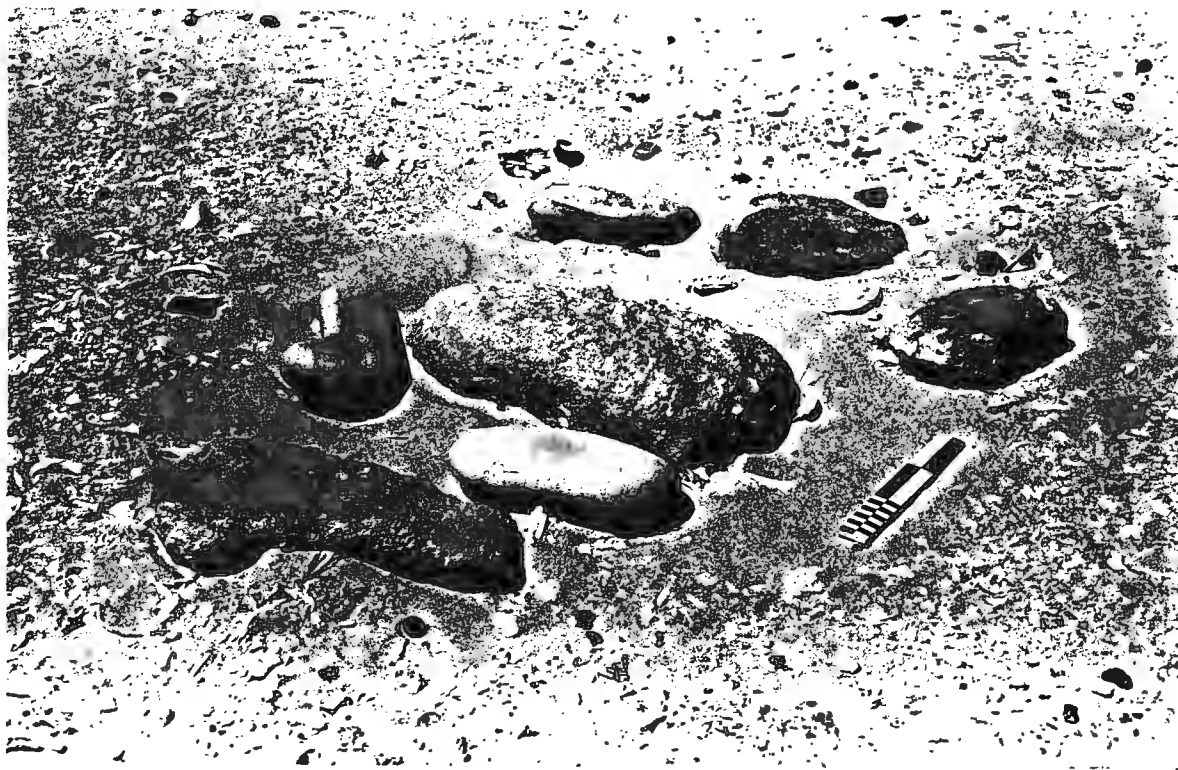


Plate 22. PB5: stone feature consisting of a small number of large stones (scale 30 cm).



Plate 23. PB6: Oxysteles Patella Turbo midden capping dune relic.

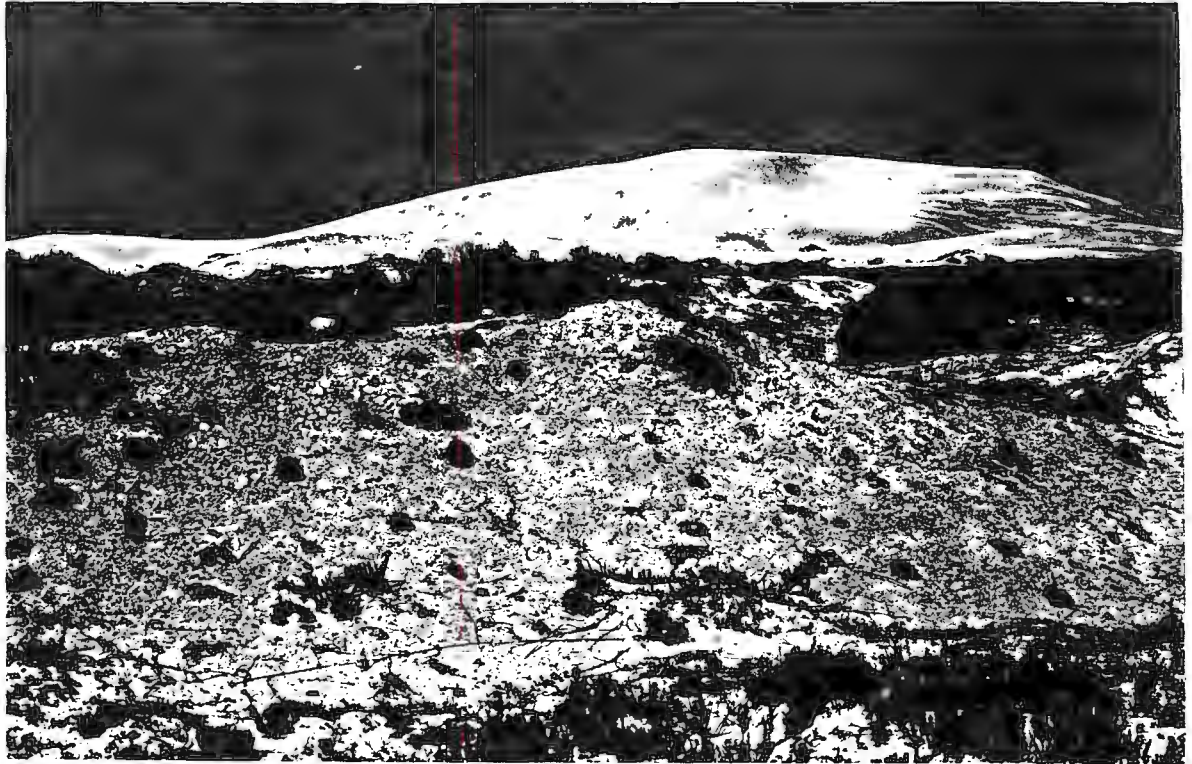


Plate 24. PB6: Oxysteles Patella Turbo midden before sampling.

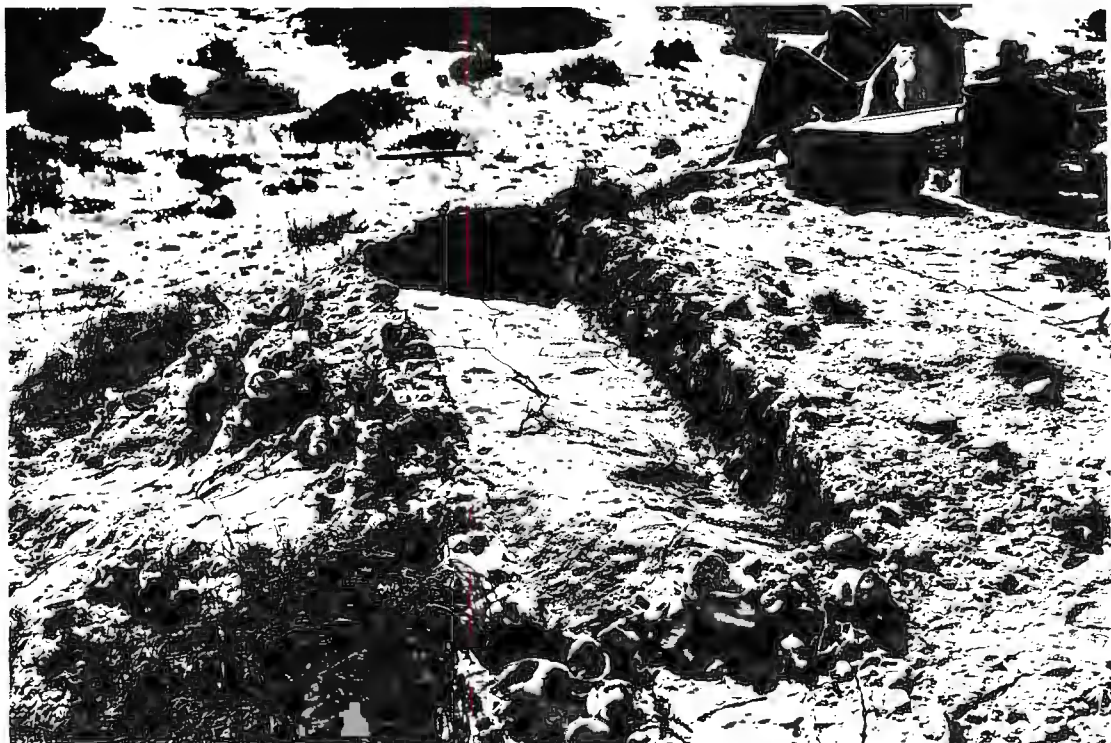


Plate 25. PB6: Oxysteles Patella Turbo midden showing excavation (2 x 0,5 m grid).

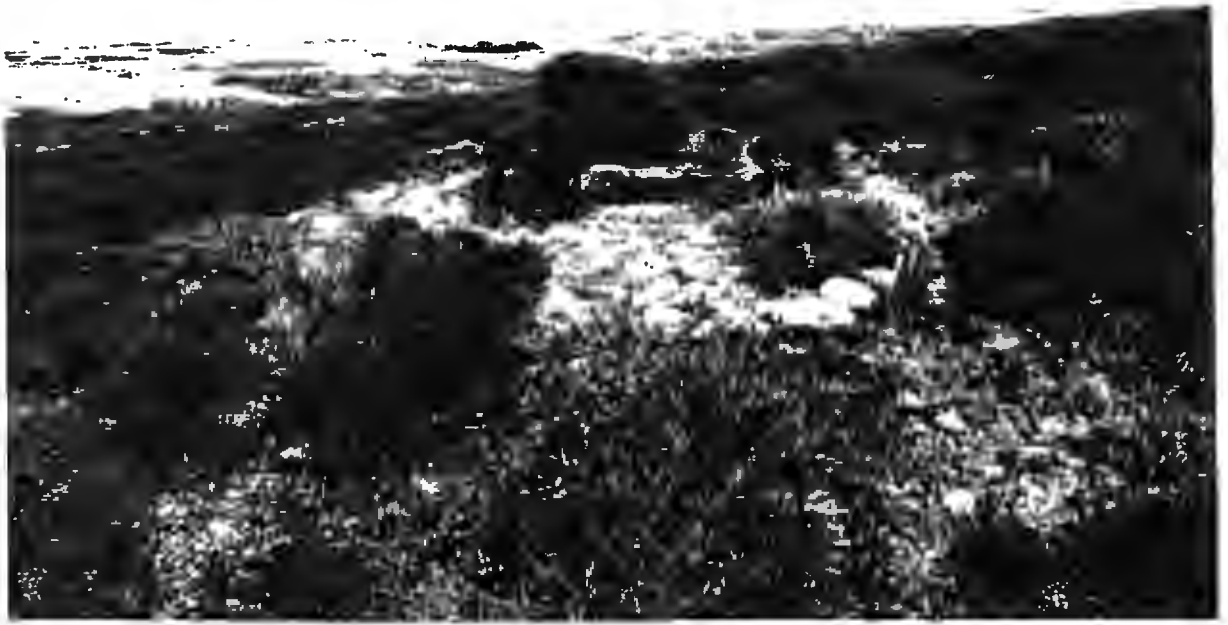


Plate 26. SFT1: general view of mound and relation to coastline. A fish-trap is located in the top left hand corner but is covered by water.

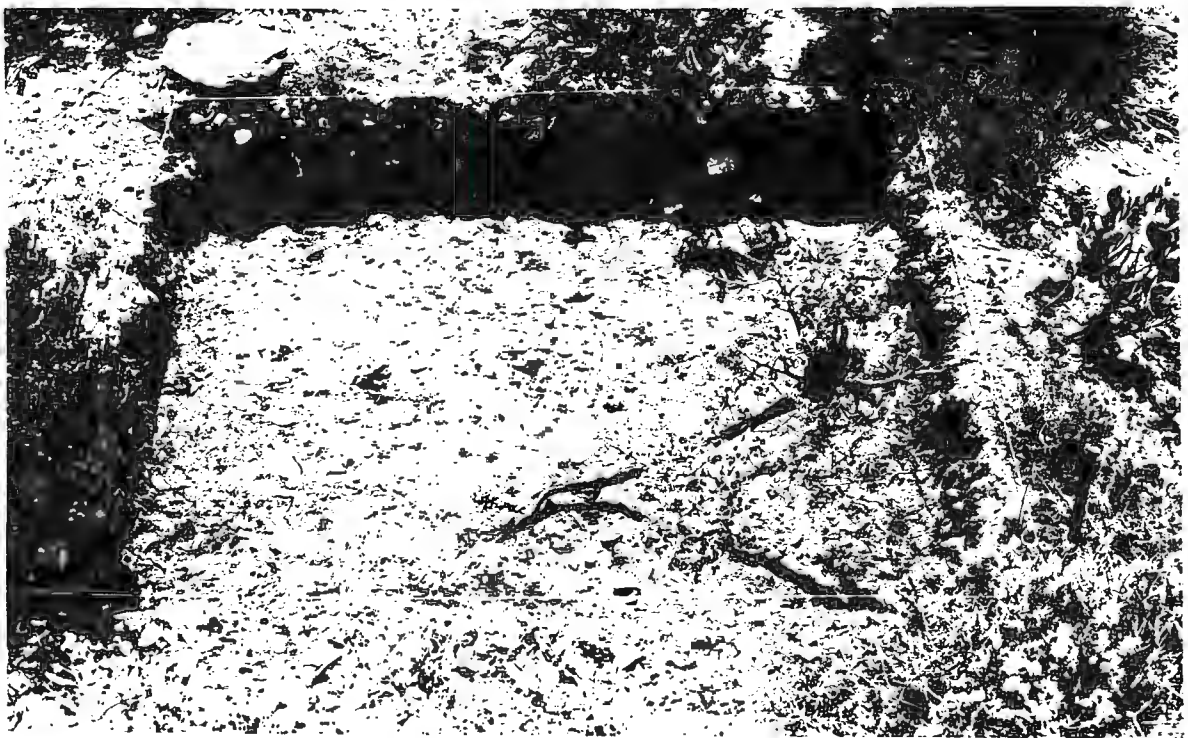


Plate 27. SFT1: midden showing excavation (1 m² grid). Vegetation left in situ in compliance with Dept of Forestry conditions.

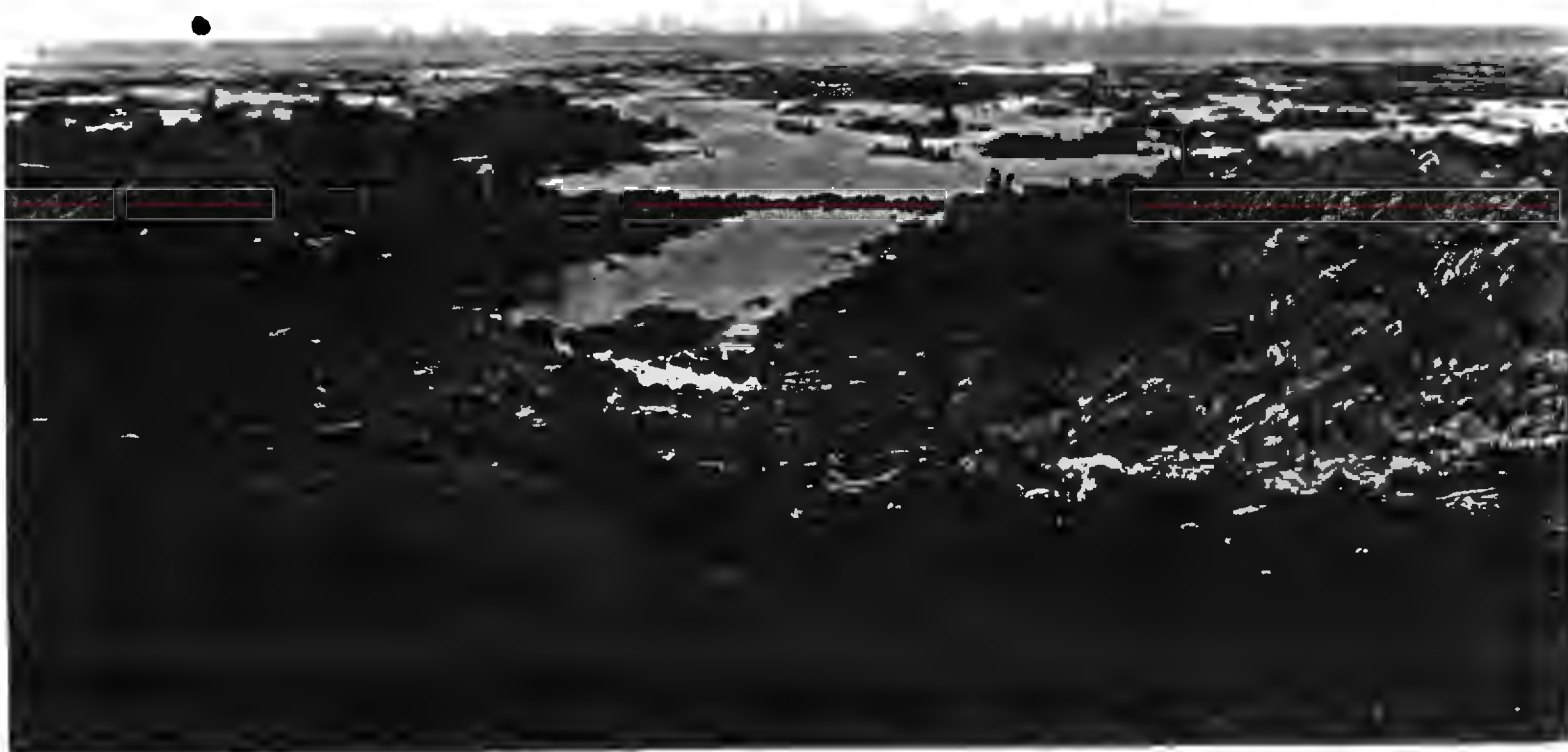


Plate 28. SFT1: tidal fish-trap consisting of a single wall of boulders constructed across the mouth of a low gully. HWS tide level is indicated roughly by the Ecklonia (Kelp) stalks on the rocks.

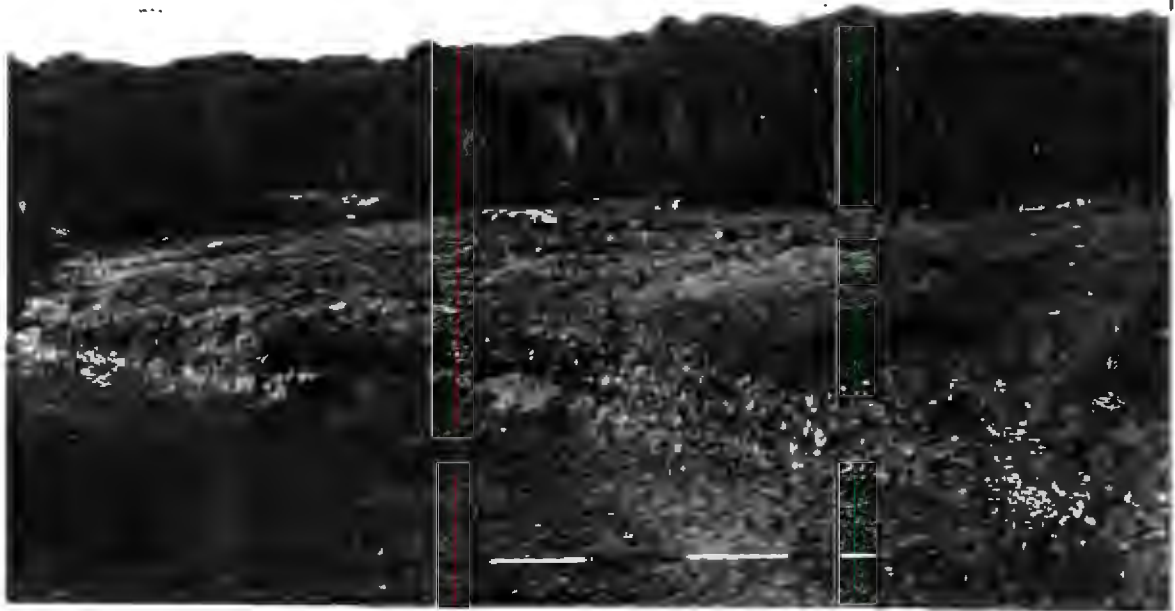


Plate 29. HAWI: Oxysteles Patella Turbo midden which was sampled. Midden covers total cleared area and extends beyond (scale in 0,5 m sections).



Plate 30. HAWI: east section of excavation showing sand lenses and underlying dune.



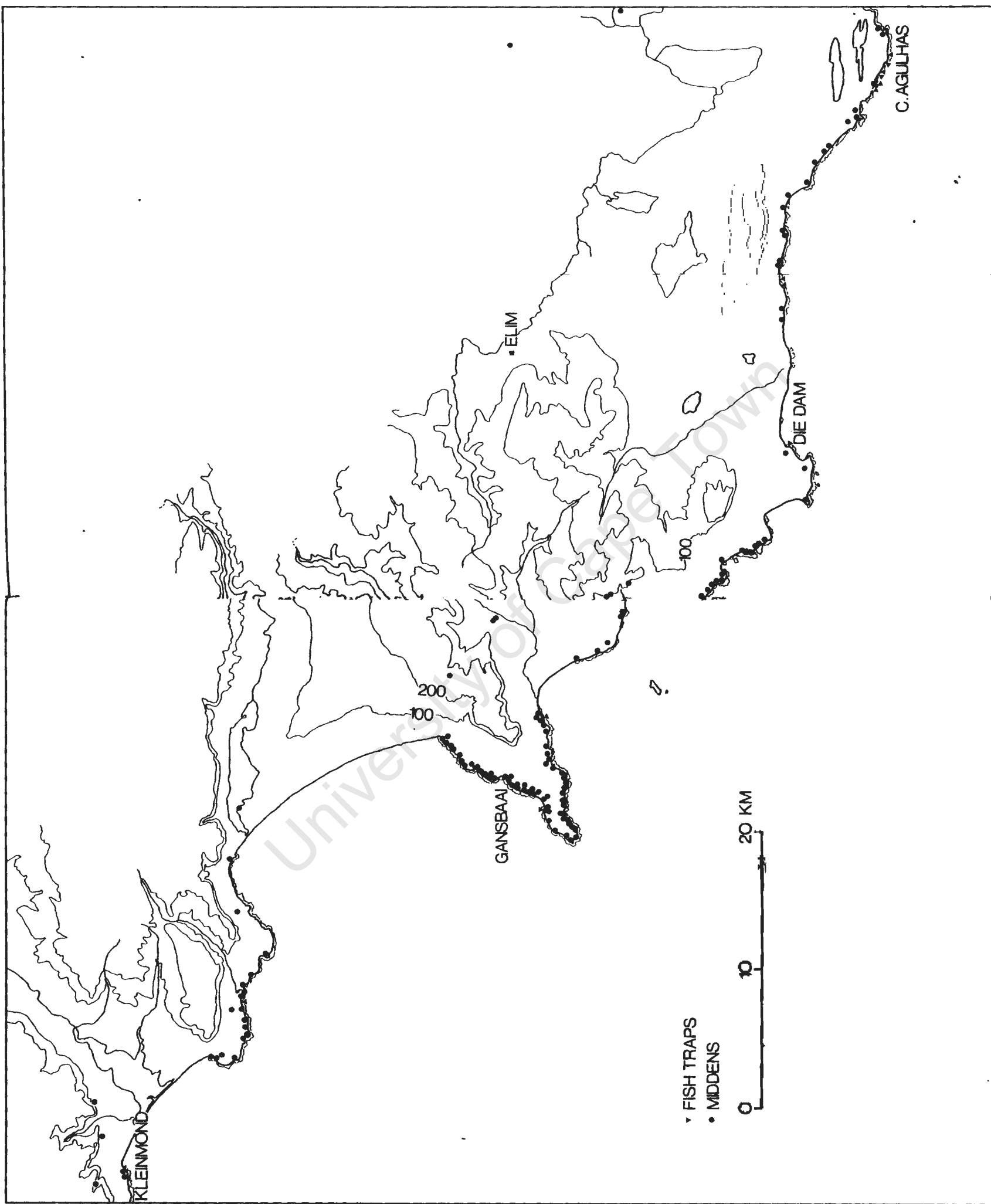


Fig. 1

(d) Ground bait: Absolom reported that ground bait could be used to attract fish, but that this was not necessary.

Preservation

Grobbelaar (pers. comm.) has indicated that some fish-traps could easily have been preserved for a considerable period. He pointed out that the traps were very often situated in localities where reefs or sand bars caused an offshore break which would considerably reduce the energy of waves reaching the shore and thus protect the traps. The preservation of traps related to lower sea-levels, however, would be minimal; in deeper water on a rock bottom marine action would be stronger and tend to disperse and move the stones shorewards.

Traps not recently rebuilt are easily recognized as the walls have generally collapsed and reached a stable position of rest in the form of low mounds of stones which preserve the original enclosure pattern. The fact that fish-traps require rebuilding has undoubtedly contributed to their preservation. Some traps are still used by local descendants of the original inhabitants as well as other fishermen, and may well have been in use since their initial introduction. Preservation has been helped in some instances where the stones have been cemented together by coralliform masses of *Pomatoleios kraussii*, a marine worm. Goodwin (1946: 6) describes traps in the Arniston area where the use of limestone blocks has resulted in their cementation into immovable structures which allow water to pass freely through the interstices between the stones.

Fish caught

Some times of the year, viz. October–May, were reported to provide better catches than other periods. Such seasonality may be a phenomenon caused by factors unique to particular localities. Some species are seasonal, e.g. elf, and if found in middens might be useful indicators. Species variation also occurs in different localities. It is quite clear, however, that large numbers of fish can be taken in fish-traps, especially shoaling fish, e.g. harders – up to several thousand in a catch. Sizes range from small to large, and even small catches would yield a considerable mass of edible resource. Table 1 shows the diversity of species taken, together with an indication of the individual size ranges involved. Table 2 is a record of catches kept by Daniels and illustrates the efficiency of the traps as a method for obtaining a considerable mass resource.

This numerical data is also converted to total mass in order to provide an indication of the potential resource fish taken in traps would represent. The totals arrived at, however, are varying estimates based on range extremes and range midpoint (Table 1) and not recorded mass. The inedible portion represented by bone mass has been ignored. Furthermore these counts do not include fish smaller than about 0.5 kilogram. This category numbered anything from 100 to 200 per catch and consisted mostly of dassies and white steenbras, with a few silverbream. Daniels was not impressed by his catches and stated that he had experienced a bad year. In the past they had removed anything up to 3000 fish per catch, and sometimes more.

Discussion on use of fish-traps

The local archaeological record shows that fishing has been carried out effectively for at least 12 000 years. This date is clearly related to the post-Pleistocene sea-level and it is probable that other relevant earlier sites have been inundated. This should be borne in mind when fish-traps are considered.

Tidal fish-traps may have had a marked influence on the locality and density of occupation in coastal exploitation patterns, as well as on group mobility. They provide an example of a successful attempt to modify an existing environmental niche in order to exploit a resource (i.e. fish). Data accumulated on use and catching potential suggest that fish-traps may have played an important role in coastal exploitation. It is not surprising that enough incentive existed to expand the co-operative effort which must have been necessary for the building and subsequent upkeep of these structures. Four to five men was the number given as being required to repack the stones every day at low tide. Their effective use is controlled by the tidal cycle; only when the spring tidal range is approached does enough water cover the walls for fish to be trapped. A seasonal factor might have further influenced catches. The situation was therefore more complex than a simple matter of casual utilization of fish-traps. Such a regular resource with a large reward for small effort may well have played an important role in determining location of occupation and cyclic (i.e. tidal) or seasonal mobility within the routine exploitation strategies of groups utilizing marine resources (see also Parkington 1972).

Because they are located within the intertidal zone, fish-traps are not directly associated with shell-midden sites. It has, however, been suggested that they may be indirectly associated with such sites, i.e. occupation immediately inland of traps (Goodwin 1946). Goodwin further suggests that information on their age and resource potential could be gained from a study of middens in the immediate vicinity of fish-traps, but this might not be entirely true as a far more complex situation seems likely. Although the presence of fish species in frequencies suggestive of their being taken in traps, e.g. shoaling types, might serve to relate midden occupations to fish-traps, it provides little information on the effect that such a resource might have had on a large area (fig. 1). People might have been prepared to travel considerable distances from their occupation areas to reap such a rich harvest. Fish might not always have been eaten on the spot and in such cases are not likely to be reflected in local shell middens. The possession of such a quantity of flesh is likely to have initiated handling problems. We know little of the extent of the knowledge of drying as a means of preservation or facilitating the transport of meat. Early travellers of the mid-seventeenth century certainly recorded the use of dried fish inland amongst the *Sonqua* in the south-western Cape (Thom 1952, 3: 300). The answers to these and many other problems are required.

Dating

Goodwin suggested that the use of fish-traps began with the Wilton culture and continued to the present.

He based this on the sudden increase of fish remains in these deposits at the Oakhurst Shelter (Goodwin *et al.* 1938). He lacked dating facilities and based his suggestion on culture association. We now know that the Wilton extends back 8 000–9 000 years and sea-level data suggest that the sudden increase in fish remains probably coincided with rising post-Pleistocene sea-levels which brought marine resources within effective exploitation range of groups occupying the Oakhurst Shelter.

Situated within the intertidal zone, fish-traps should be sensitive indicators of sea-level; with a tidal range of approximately 2,2 m, a variation of 0,5 m to a maximum of 1,0 m from mean sea-level seems permissible for the effective use of traps. It follows, therefore, that Goodwin's dating can be refined by the use of sea-level data which have been published recently.

When considering sea-level data we must take into account various physical conditions in operation around continental margins which may cause them to be unstable. Sea-level changes should, therefore, be considered together with tectonic influences. The course of sea-level rise relative to the continental margins varies with location; long-range correlations should thus be carefully checked. Even when curves show general agreement, variation is likely to be found (Tankard 1976).

Scholl & Stuiver (1967), working on the Florida coast of North America, give the following information on sea levels:

- 4400 BP sea-level 4,0 m lower than today.
- 3500 BP sea-level 1,6 m lower than today (30 cm/100 years).
- 1700 BP sea-level 0,5 m lower than today (only 3 cm/100 years since).

The Florida coast is considered to have remained comparatively stable for the period studied and these data indicate a more or less steady rise in sea-level over the past 4 400 years. This is in general agreement with the stable sea-level hypothesis which states that the sea reached its present level by about 5000–3000 BP and remained there (Jelgersma 1971). Scholl & Stuiver, however, correlate their data with other workers in North America and suggest that the stable sea hypothesis should not be adhered to quite so strictly, and still allows for a very slow continuation of the rise in sea-level after 5000–3000 BP. They could, however, find no evidence for the Holocene high sea-level oscillations of 2–4 m which are claimed by some workers (Fairbridge 1961). The Holocene high sea-level theory has been criticized and it appears that present evidence can only support the possibility that low amplitude surges in the order of 0,5 m could have occurred.

Tankard (in press) has constructed a sea-level curve from South African data:

- 15000 BP sea-level approximately 120,0 m lower than today.
- 9000 BP sea-level approximately 25,0 m lower than today.
- 6000–5000 BP sea-level approximately 1,0 m lower than today.
- 3000–2000 BP sea-level approximately 0,0 m present sea-level.

No evidence for Holocene shorelines higher than the present sea-level was found. The South African sea-level curve agrees with results from eastern Australia which is also considered to have remained comparatively stable during this period.

If the above information is applied to fish-traps, it is clear that the present fish-traps may have operated as far back as 6000–5000 BP. It is likely, however, that the depth variation given above for the effective use of the fish-traps is too great and that a date of between 3000 and 1700 BP would be more realistic.

The discussion so far does not exclude the possibility that the use of fish-traps was in fact established in South Africa *before* the sea reached the limits described and that earlier traps lie inundated or have 'migrated' coastwards through long-term repacking. This is possible as the present strike and dip of hard rocks is likely to continue beyond the present visible level. It is proposed to explore this possibility in the future with the aid of diving equipment (but see note on preservation).

It seems likely, however, that the dating refinement based on sea-level data will be substantiated by archaeological information now becoming available. There is increasing evidence for significant economic change during the latter half of this period which suggests that the problem of fish-trap usage extending back in time to periods of lower sea-level need not be a real one. There appears to have been a shift in the emphasis of material culture, perhaps as a result of new ideas coming in, and requiring different responses. Stone industries became more informal and developed into the type of industry found in later coastal contexts, viz. large flakes struck from pebbles or blocks of quartzite, with relatively little secondary trimming and a number of rather heavy, crude chopping or scraping tools (Inskeep 1965). Shell artefacts in the form of shell crescents, *Donax serra* scrapers, etc., are found and may take the place of smaller retouched stone implements such as segments and convex scrapers which appear to become significantly rarer than in earlier occupations. The meaning of this apparent shift requires clarification as it may simply represent a response to the proximity of the rising sea-level and increased use of marine resources (Klein 1974). If sea-level data are used it becomes apparent from hydrological maps (SA 37: Cape Seal to Cape St. Francis) that the coastline was within 2 kilometres of Nelson Bay Cave throughout the period under consideration:

- 9000 BP sea-level at –25,0 m: approximately 1,5–2,0 km from the present shoreline.
- 8000 BP sea-level at –11,0 m: approximately 0,8 km from the present shoreline.
- 6000–5000 BP sea-level at –1,0 m: approximately 0,05–0,1 km from the present shoreline.

The distances involved could hardly have played a significant role in the development of coastal exploitation during the period under discussion; changes observed from the archaeological record during this period of time are likely to relate to cultural pressure rather than encroachment of a marine environment.

Inland, Deacon (1972: 37–38, has demonstrated a correlation between the appearance of pottery and

the 'death' of the Wilton cultural system, and mentions that an apparent shift in the subsistence pattern from the use of marine to freshwater mussels occurs just prior to the arrival of pottery. She suggests tentatively that the shifts may be related to the arrival of pastoralist peoples and territorial competition along the coast.

The earliest dates for the occurrence of coastal pottery fall within the lower range of this period: 1930 ± 60 BP to 2540 ± 50 BP (Nelson Bay, Inskeep, pers. comm.); 2020 ± 95 BP (Die Kelders, Schweitzer 1970).

Similarly, the earliest dates so far available for the occurrence of domestic sheep on the southern Cape coast fall within this range; 1650 ± 90 BP (Die Kelders, together with ? cattle, Schweitzer & Scott 1973; Schweitzer 1974); 1930 ± 60 BP to 2540 ± 50 BP (Nelson Bay, Inskeep & Klein, pers. comm.); early sheep and pottery occurred between the dated levels of an open-station shell midden excavated by the writer near Hawston (fig. 3):

- Pta-834 Hawston I A, 27 cm 1860 ± 60 BP (AD 90) (charcoal)
- Pta-835 Hawston I B, 80 cm 1900 ± 40 BP (AD 50) (charcoal)

A considerable change in economy of at least some groups in the form of a shift from pure hunting and gathering to partial pastoralism is indicated. Another domesticate, the dog, seems to appear at this time also: remains of roughly the same size order but which appear to belong to dogs rather than to jackals have been identified by Scott at Die Kelders Cave (Schweitzer, pers. comm.) and Klein at Nelson Bay Cave (Inskeep & Klein, pers. comm.).

The arrival of concepts which appear to reach the southern Cape coast at about 3000-1500 BP, together with the fact that present sea-level seems to have been

reached at roughly the same period of time, is seen to be extremely relevant to the dating of fish-trap usage. There is every likelihood that the complex knowledge required to conceive of and build fish-traps became available during the same period of economic revolution in which significant changes in the attitudes and activities of at least some hunter-gatherers were taking place. Furthermore if, as suggested, the use of fish-traps was related to group size, it is possible that the need for a method of obtaining such large amounts of a resource gained importance, together with the increase in group size concomitant with the acceptance of pastoralism. Underlying this then, is the strong possibility that fish-traps along the southern Cape coast represented, at least initially, sites introduced built and utilized by pastoralist groups. This is underlined by the remarkable correlation between the distribution of fish-traps and the historical distribution of Hottentot and Bushmen tribes in the southern Cape as shown by Maingard (1931) (fig. 3). It is known that herders made use of marine resources during historical times and that some of the shell middens along our coasts were laid down by herder groups.

Both Daniels and Absalom reported that during summer in the near past their families with their stock had trekked from Elim to the coast where they used the fish-traps and lived on other marine sources. The fishing habits of these modern descendants of the Hottentot herders may well derive from past practices and provide indirect evidence for (a) the earlier association of fish-traps with herders and (b) coastal occupation by herders during summer when good grazing was available right on the coast. Inland grazing on shale-derived soils is at an optimum during the winter months (Rourke, pers. comm.). The correlation between winter and summer grazing and the seasonal use of fish-traps could have extended right along the coastal plain which was occupied by

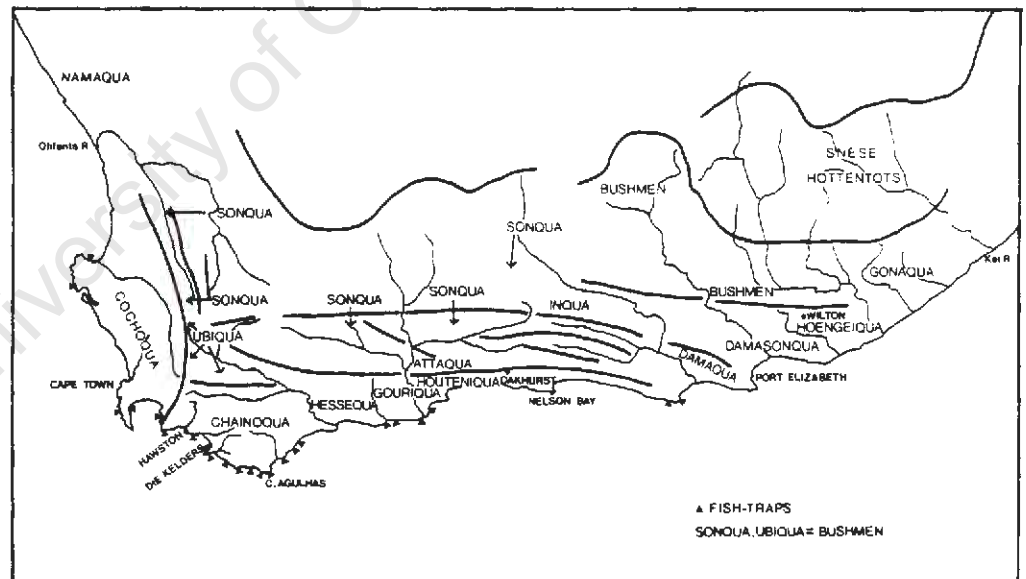


Fig. 3

herders. The appearance of pastoralism between 3000 and 1500 BP and the resultant territorial competition may well have generated the shifts in hunter-gatherer subsistence patterns shown by J. Deacon (1972).

Conclusion

Fish-traps are built within the intertidal zone. The relative ease with which one operation provides a large mass of food resource is likely to have had an effect on group size or permanence of occupation. The fact that periods of optimum reward coincide with the tidal cycle and possibly seasons, suggests that the location of fish-traps may have had an effect on mobility. The correlation between geology, soils and climate, and grazing ability and quality, is seen as an important factor in determination of location and seasonal use.

The assumed sensitivity of fish-traps to sea-level has made it possible to date existing traps (and the middens associated with them?) to between 3000 and 700 BP or earlier. Archaeological information becoming available, however, suggests that it may not be necessary to look further back than the introduction of pottery/pastoralism along the southern Cape coast between 3000 and 1500 BP for the origins of fish-trap usage; it is suggested therefore that fish-traps within this area represented at least initially a new concept introduced and utilized by pastoralist groups. Prior to this period other methods allowed for effective fishing, e.g. line-fishing and nets as illustrated by the use of fish gorges by about 10000 BP in the Albany levels, and the use of net sinkers within the Wilton levels at Nelson Bay Cave (Klein 1974).

Many problems have been left unanswered and it is hoped that completion of the present project on open-station shell midden sites will contribute further information.

Acknowledgements

The author gratefully acknowledges the help of Messrs A. Absalom, D. Daniels, W. J. Moolman and M. C. Human, who provided the information and data on modern fish-trap usage. This study could not have succeeded without their patience and kind co-operation. The C.S.I.R. and South African Museum provided financial aid and facilities for the establishment of a research post which resulted in this investigation.

Thanks are also due to the following: The Department of Forestry and the many private property owners who allowed access to the coast; Messrs B. D. Malan, J. E. Parkington, C. Poggenpoel, F. R. Schweitzer, R. F. H. Summers, Mrs J. Deacon and K. Scott for comment and discussion on this paper; Mr P. Grobbelaar, a marine engineer of the Fisheries Development Corporation, for comments on preservation; Mr A. J. Tankard for comments on sea-levels and the stability of the area; Prof. R. R. Inskoop and Dr R. G. Klein for permission to include unpublished information of on-going investigations on material excavated from Nelson Bay Cave, Plettenberg Bay; Mr F. R. Schweitzer for unpublished information on Die Kelders Cave, Dr J. C. Vogel of the National

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UNIQUE ART OBJECTS IN THE IRON AGE OF THE TRANSVAAL, SOUTH AFRICA*

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DISCOVERY

The material described and discussed in this report was discovered and collected by Dr K. L. von Bezing when still a schoolboy. He had first walked across the site in 1956 or 1957 when he was about 10 years old, and had noticed 'bits and pieces' lying about. Four or five years later, when his interests had grown to include things archaeological he recalled what he had seen there, and between 1962 and 1964 spent 'a few days' collecting from the site. Shortly thereafter Von Bezing came to the University of Cape Town to study medicine, and mentioned his finds to an archaeology student at a meeting of the Students Archaeological Field Club. Mrs E. Voigt (*née* Speed), the student, mentioned it to one of us (R.R.I.) and as a result the material was brought to the University of Cape Town for study. A preliminary note (Inskeep & Von Bezing 1966) placed the existence of the material on record, and a later note (Inskeep 1971) recorded a radiocarbon date for charcoals collected by Dr Von Bezing from the site.

In August 1973 a quantity of pottery was collected when one of us (R.R.I.) visited the site with Mr M. Evers of the Department of Archaeology in the University of the Witwatersrand, some of it coming from the filling of a pit, exposed in the side of an erosion gully.

The pottery collected on this occasion is not included in the present report, and is housed in the department in the University of the Witwatersrand. The material collected by Von Bezing is housed in the Department of Archaeology in the University of Cape Town. Evers (*pers. comm.*) has investigated a site yielding similar pottery about 1.5 km distant from the site here described. It is hoped that he will carry out excavations at 'the heads' site as part of his programme of Iron Age research in the eastern Transvaal.

THE SITE (Fig. 1)

The town of Lydenburg stands in a valley some 1 400 metres (4 500 feet) above sea-level, bounded by two mountain ranges with north-south trends. To the west the Steenkampsberg rises to a maximum of 2 332 metres (7 651 feet) at Mount Anderson before falling away to the Lowveld, while to the east the Drakensberg range reaches 2 825 metres (7 498 feet). It is a Highveld valley surrounded by some of the most elevated land in the Transvaal yet only 50 km from the Lowveld.

A stream, the Sterkspruit, runs westwards to join the Dorpspruit at Lydenburg. Its upper course is

* Received May 1975.

† Formerly of the University of Cape Town.

deeply incised in a narrow valley several hundred metres in depth, but for the lower 6 or 7 km the valley becomes more open and its slopes on both sides of the stream were intensively settled in Iron Age times, evident from the areas of terracing and the numerous homesteads built of stone. At a point 5.5 km above the confluence with the Dorpspruit and 3 km above the railway bridge the Sterkspruit is joined by a tributary watercourse from the south which has deposited a triangle of alluvial material in the area of the junction. The heads, pottery and other material described in this paper were found scattered widely in this area.

A prominent feature is the erosion donga that the watercourse has cut into the alluvium to a depth of more than 2 metres running in a north-east direction. Between this donga and a modern irrigation furrow to the north, a series of broad shallow basins and ditches slope northwards towards the Sterkspruit. These are presumably recent agricultural features which they are being eroded at present, but a number of pottery sherds and pieces of slag were found on the banks.

Immediately across the valley on the north side of the Sterkspruit the lower slopes have been terraced with stone lines or low stone walls more or less following the contours. Among the terraces and high on the slopes are numerous circular or elliptical walled enclosures which contain smaller enclosures. These would have been homesteads (settlement units) containing huts and livestock pens, and sometimes two or more of them were linked by roadways which were visible as two parallel stone walls. Such Iron Age settlements are common in the eastern Transvaal escarpment area between Carolina and Lydenburg where they are found in valleys or on hillsides generally between 1 400 and 1 800 metres above sea-level. Around Machadodorp they are particularly common and were first described from here by Van Hoepff 1939. However, it is only recently that any Iron Age sites in this part of the Transvaal have been excavated (Evers 1973*b* & *pers. comm.*) and the work is still in progress. At the Lydenburg site the south side of the valley also has numerous settlement units of irregular circular shape with connecting roadways, but terracing is less evident. The stone structures on the low slopes overlooking the watercourse on its western side extend to within about 100 metres of the area of the finds, but other than this proximity there is as yet no evidence of the relationship between finds and structures. It is however, important that only four possibly later Iron Age pottery sherds occurred among the original collection made by Von Bezing, and none have been found on subsequent visits; a fact which encourages us to suppose that the material collected is associated.

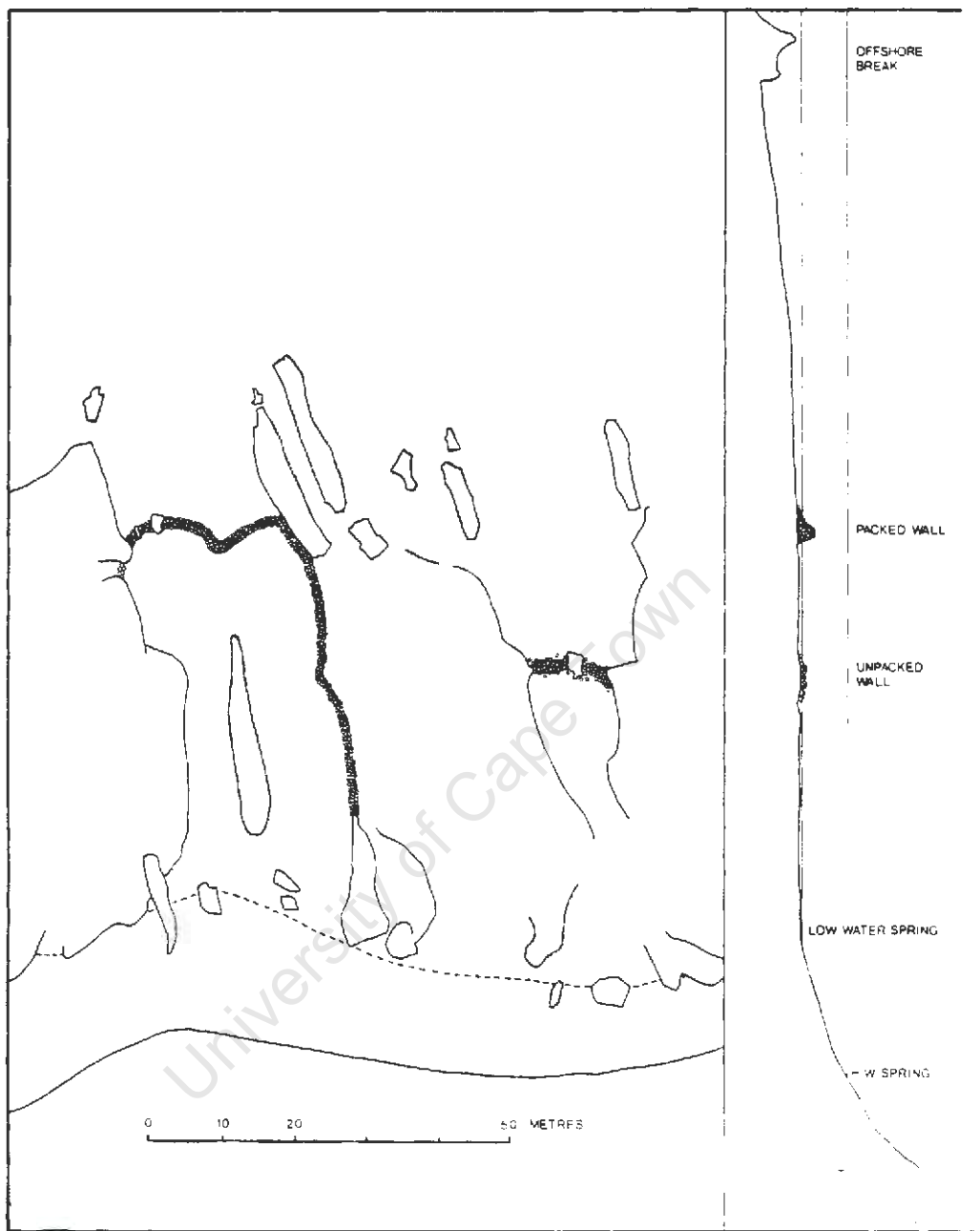
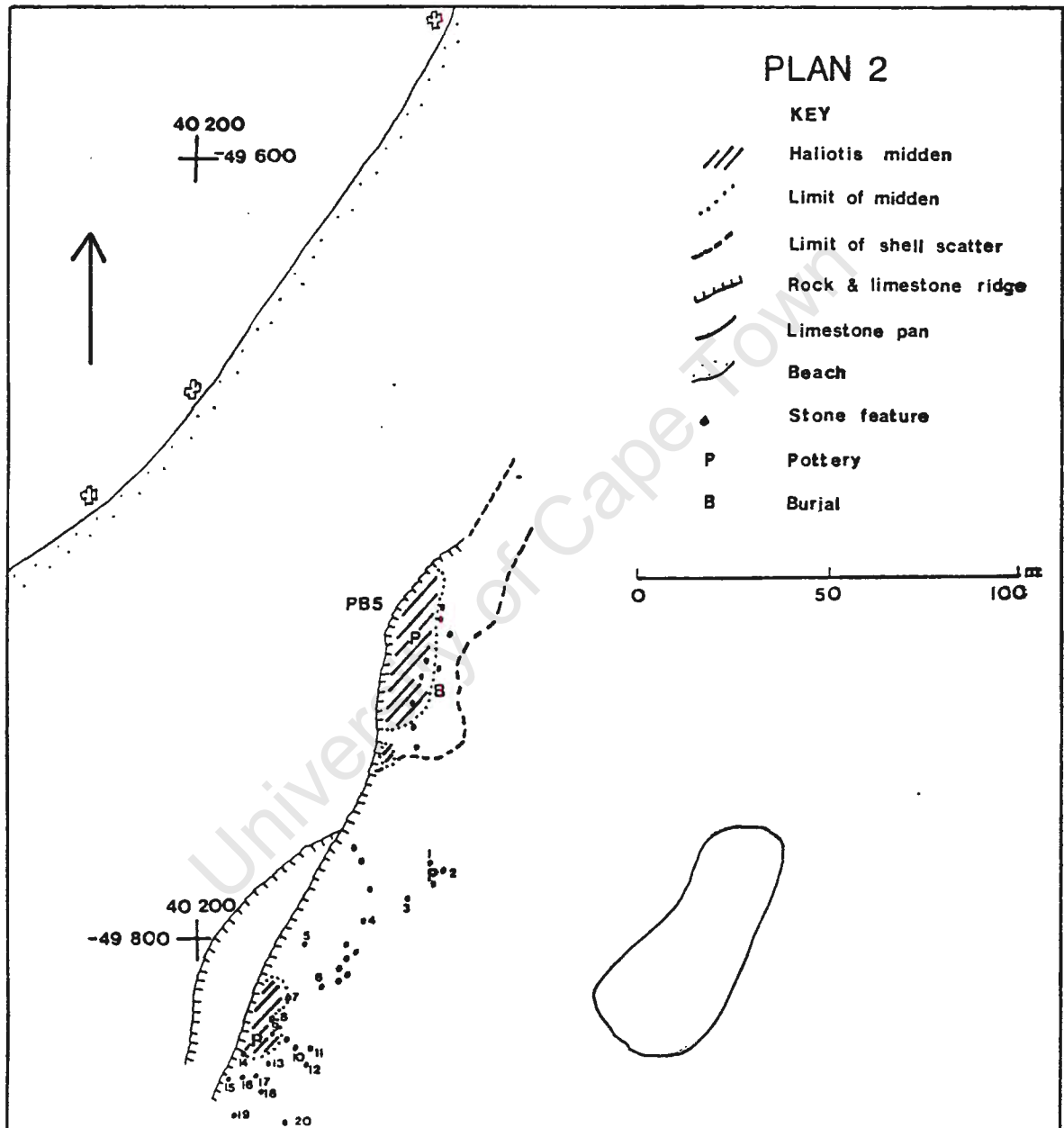


Fig. 2

Absolom indicated that after a period of usage an opening or 'rif' was made in the walls before the group left the coast so that fish which might otherwise be trapped would not die unnecessarily. Other factors that influence the efficiency of fish-traps are:

- (a) Tides: Informants all agreed that trapping was only effective during the few days preceding and following spring tides when the tidal range was great enough to cover the walls with sufficient

- water for the fish to swim over. New moon was better than full moon, probably as it was darker.
- (b) Day and Night: Better catches were made when the tide covered and emptied the traps at night or in the early morning.
- (c) Winds: Certain winds affect fishing generally. A light breeze however was reported to ripple the surface and to provide better results. Strong winds interfered with catches as the surf became too rough for the traps to work.



Plan 2 Distribution of middens and features in the PB5 site locality

...ge, took cognizance of the paintings on which they
se to execute another: certain categories were
oured as initial elements and the lower painting
reised a limiting influence on the range of subjects
n which the second could be selected. The rock
ntings of these regions constitute a complex
ifying system concerned largely with social
tionships.

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OPEN STATION SHELL MIDDEN SITES AND ASSOCIATED FEATURES FROM THE PEARLY BEACH AREA, SOUTH-WESTERN CAPE*

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Introduction

Relatively little work has been done in South Africa on open midden sites and their components as elements of diet and reflectors of human activity in coastal environmental contexts. Available data on coastal exploitation and living patterns is loaded in favour of isolated observations on dietary economy and certain aspects of material culture which may be observed through the excavation of shell middens. Almost nothing is known about coastal occupation and living patterns and the manner in which these articulated with the overall socio-economic systems which might be assumed to have been operating along the coast and inland during the 2-3 000 years before the contact period.

With this sort of problem in mind archaeologists are now aligning their research more in the direction

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of systematic regional studies rather than on the basis of isolated site descriptions. On a regional basis, analysis of site location and resource distribution, coupled with excavated data, may provide more meaningful information on occupation and living patterns.

Observations on the Pearly Beach area stem from a systematic investigation of open station shell midden sites which is being undertaken in the area between Kleinmond (34°21'S, 19°02'E) and Cape Agulhas (34°50'S, 20°01'E) (see fig. 1). The aim of the project is to examine coastal living and exploitation patterns, in space and through time.

Ideally, a study of the ethnographical sources concerning the situation existing at the time of European contact should provide a framework which could serve as a starting point from which the investigation may triangulate back into the past to determine how the indigenous population utilized the land and its

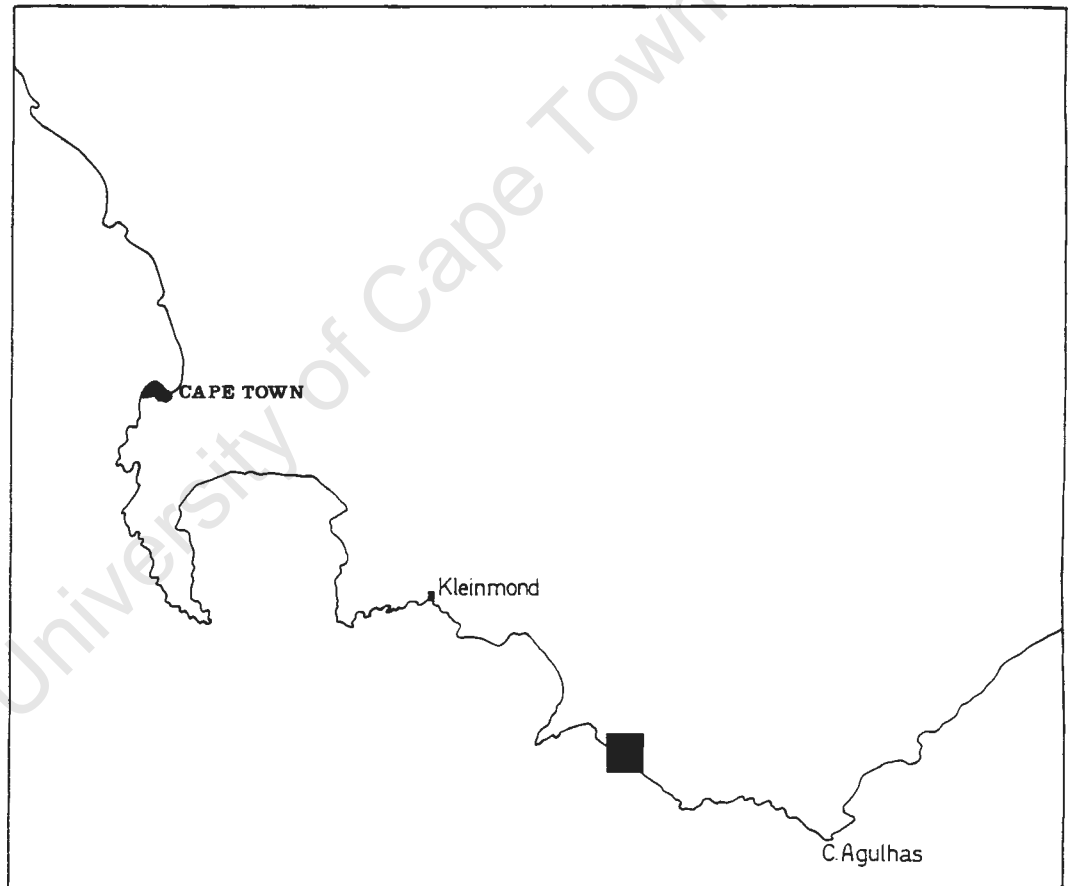


Fig. 1

sources and how this exploitation pattern affected such aspects as group size, site location and mobility among the various socio-economic groups. Such a framework of living patterns, together with a set of common characteristics which is being established for herders and hunters as a result of modern anthropological study, will be used as a model for the establishment of research strategy and for the interpretation of archaeological data which will in itself contribute to the development of the model in space and time. Practical utility of the model in the examination of problems arising out of early accounts of economic and social systems is inevitably restricted to the limits of what is preserved in archaeological contexts and to the degree that this data can be recovered and tested by the methods used in archaeology.

The records kept by early visitors, settlers and explorers of the Cape contain all that is known about the indigenous population at the time of contact. A broad outline, however, is generally all that has been recorded. The observations on material equipment, food resources and their utilization, and social organization of the indigenous groups, whilst very clear in some respects, are all too often inaccurate and lacking in essential detail and understanding, and include many biases which were inherent in European attitudes of the time. There are therefore several problems involved in the use of ethnographical material to produce frameworks as aids in archaeological research. Observations are isolated and there are numerous gaps in our knowledge which affect the utility of such a framework. It is perhaps understandable that earlier observers did not take into consideration the fact that they were dealing with complex systems covering vast areas of the country and varying conditions.

After European colonization began in 1652 the modification and breakdown of the existing system took place at a relatively rapid pace so that, by the time the need for more careful observation was realized, such changes as the shifting of resource emphasis and population density changes had already begun to take place as European settlers continued to spread farther afield, causing the indigenous inhabitants to be either absorbed into the new system or driven out into an ever-decreasing resource area which in itself initiated adaptations. Thus generalizations based on early or even more recent ethnographical sources should be applied with caution, and the face of rigid testing, to problems where comparable situations may have existed in the past. In view of the obvious shortcomings of this approach, there should still be a great deal to be learnt from the use of ethnographic material if it is understood that such data should uphold the premise, not vice versa, before interpretations can be accepted, and that ethnographical sources do not provide encyclopedias of important information. Treated in their proper context they can provide us with an opportunity for reconstruction which would otherwise be unattainable. With the aid of more general recent ethnographical research our awareness of the principles involved in original population dynamics is becoming more definite. Through a better understanding of the processes governing aboriginal living patterns, archaeo-

logists should be in a better position to formulate improved models based on sound principles, while continued refinements in archaeological technique and approach will result in the extraction of data which will either complement or modify the earlier ethnographical reconstructions as investigation progresses.

Since middens represent the refuse dumps resulting from human occupation they should constitute only a portion of the total area which an occupation might have covered. In this context a habitation area is taken to represent the area covered by a single occupation. Other habitation features, perhaps in the form of huts, windbreaks or hearths (cooking-areas) would have been situated within the habitation area but apart from the dumps. On the basis of this assumption and earlier reports (see below) there seems to be definite potential in the location and investigation of such features.

Basic to this study is the assumption that the stone features, middens and other cultural material are directly associated and represented contemporaneous habitation features preserved in more or less original form. It should be noted, however, that a serious problem is attached to this assumption in that it is virtually impossible to demonstrate the contemporaneity of individual middens and features preserved, or to show the relationship between habitations within a site locality. Rather it is hoped to be able to isolate different activities based on the spatial distribution of cultural items located in and around middens and stone features, and to attempt to integrate this data into systemic form on the basis of repeated relationships between certain features and associations. If it does prove possible to establish patterns, it should also be possible to identify different patterns, if indeed these exist, on the basis of the distribution, size, form and number of features within habitation areas. An important problem which concerns the successful application of such theory is that by virtue of their mobile subsistence strategies, which involved the use of temporary or even portable shelters made of organic materials, prehistoric herders and hunter-gatherers left few remains which were likely to be preserved for any length of time. This was not invariably the case, however, as the remains of some habitation features have been preserved, notably where stone was used as a raw material. It may be possible to identify the occupation remains of different socio-economic groups and thereby to contribute to the solution of the problem of differentiating between the remains left by herder and hunter-gatherer groups, both of which are known to have exploited marine resources and may well have occupied midden sites. The differences between these two groups are socio-economic and linguistic, not cultural; their technology is very similar (Schapera 1926 and Wilson 1970), the only difference perhaps being in the herder (*khoi*) use of utensils and equipment specifically characteristic of herding activities. As these were made of organic materials, which are not likely to have been preserved, there seems to be little potential in an attempt to differentiate between herding or hunting based economies on the basis of limited artefactual material preserved in archaeological sites. If, however, differentiation could be

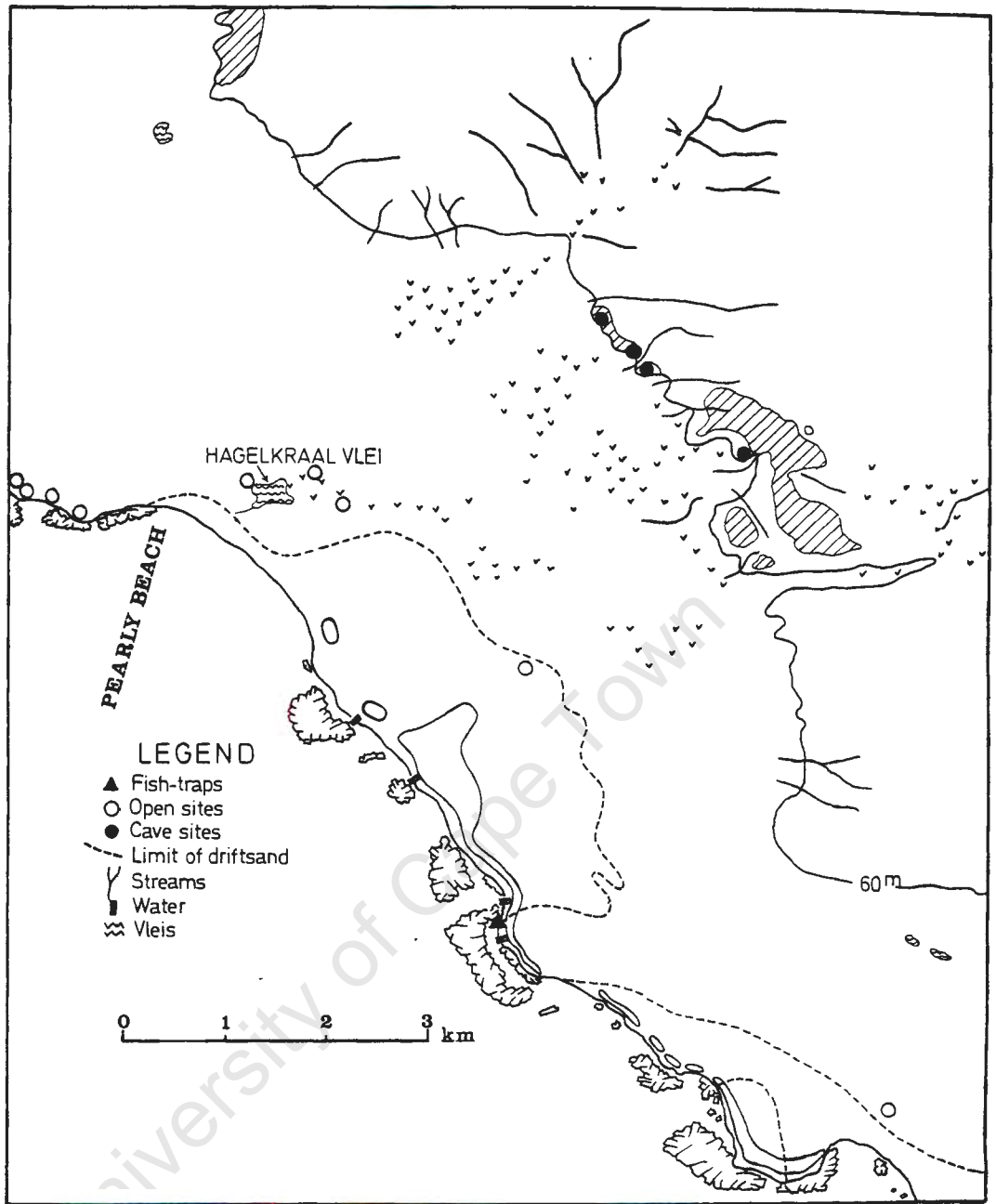


Fig. 2

made on the basis of different habitation patterns we might be in a better position to evaluate technological information on the two groups.

The Pearly Beach area (34°40'S, 19°30'E) (fig. 2)

Pearly Beach is a coastal resort situated about 210 km south-east of Cape Town. The site localities to be described below lie about 3 km south of the resort in a driftsand area where recent dune movement has exposed extensive scatters of marine shell and

artefacts on which stone features are found in apparent association with shell mounds. These appear to be the remains of almost completely preserved habitation areas, the interior structure of which can still be examined as far as archaeological method will allow.

The area concerned in this paper is confined to the low-lying coastal plain which is bordered inland by limestone ridges and Table Mountain Sandstone hills. This boundary is arbitrary and no socio-economic

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significance is attached to it as such. The coastal plain is about 4 km wide at this point and can be subdivided into a coastal dunefield and a fynbos vegetated zone. The dunefield extends about 1½ km inland but there is evidence in the form of palaeo-soil surfaces and root casts which suggests that the present extension is recent and that vegetation formerly covered areas nearer to the coast. Recent driftsand extension is also demonstrated by comparison of Admiralty charts (1853) with recent maps.

Concerning the vegetation, J. Acocks (pers. comm.) suggests that, without invoking climatic change, a somewhat different vegetation would have existed than at present; species would have been the same, but present in different proportions. The dunes would have been more stable and better bushed, with milkwoods (*Sideroxylon*); wet flats would have been largely covered with reed-swamps and big grasses like *Hemarthria altissima* and *Andropogon appendiculatus* and sedges like *Scirpus littoralis*, *S. maritimus* and *Cladium mariscus*: the fynbos would have been much grassier than it is at present and there would have been a definite post-burn grassland stage in its succession. Veld-burning, which is documented for hunter-gatherers (Wilson & Thompson 1970: 49) and was probably practised by herders, could have created a permanent scrub habitat. Forests would have been more extensive than the small relics which have survived. There would thus have been habitats suitable for the larger animals such as large antelope, elephants, rhino and hippo, which do not occur in the area now.

A sandy beach, approximately 2 km long, extends southwards from the resort. Table Mountain Sandstone is predominant intertidally along rocky sections of the coast except for a localized granite outcrop at the southern end of the sandy beach.

Water rises inland through springs situated in the limestone ridges, but there is a marked tendency for the shallow, slow-flowing streams to meander over the flat coastal plain, forming marshes and small lakes or 'vleis'. The Hagelkraal River is the only stream which reaches the sea, and then only during very wet seasons. Otherwise there is no surface outflow from the coastal 'vlei' which the river forms behind the littoral dunes. Apart from temporary pools of rain water retained on the exposed surfaces of limestone outcrops there is no permanent surface water within the driftsand area. Perennial water is available between the high and low water marks where fresh water flows out at the interface between the limestone and underlying Table Mountain Sandstone. Such springs are easily recognized as runnels in the sand, and water can be obtained by digging shallow holes where these occur.

Location of sites (fig. 2)

Site localities occur from immediately behind the littoral dunes to as far as 2 km inland. Occupation, however, seems to have been more concentrated near rocky areas right at the coast and no sites are found along the extensive sandy beaches. This distribution appears to reflect the typical locational response for the optimal exploitation of coastal resources. Potentially exploitable marine animals occur in far greater concentration along rocky coasts than along

sandy beaches. Streuver (1971: 11) comments: 'Assuming that the physical environment is structured and that culture as an adaptive system articulates with it, then the subsistence economy and the closely linked settlement pattern should reflect this environment. Plant, animal, water and soil resources are differentially distributed and so are cultural activities related to them.'

Clustering of sites is also evident around the Hagelkraal vlei and in the limestone ridges. Marine resources were exploited in both cases. The caves and shelters commonly found in the ridges would have been an obvious attraction as places of shelter. Water was present in spring form, as already noted. The caves contain Late Stone Age deposits (superficially) which include marine shells which provide evidence of coastal exploitation from at least 4 km inland. These sites have not been sampled as yet and nothing is known of the relative importance of the various resources exploited from this base.

Open station occupation was not confined to the dunefields. Apart from the obvious occupation concentration right at the coast where most of the middens occur on clean dune sand, there are several localities farther inland which were originally situated within the fynbos vegetated zone. The discovery of sites within this zone is haphazard and difficult because vegetation obscures the ground surface and thus the features by which sites are recognized. It should be borne in mind, therefore, that the sites located in this area do not necessarily give a true reflection of the site distribution as it originally existed. Erosion is virtually non-existent. Sites (e.g. those around the Hagelkraal vlei) can sometimes be located where dunemole rat action brings shell and artefactual material to the surface, or where vehicle tracks expose underlying archaeological occurrences. The recent extension of the coastal dunefield and subsequent erosion have resulted in the exposure of several sites within the devegetated zone. These sites lie exposed on the palaeo-soil surfaces already mentioned. The presence of humification and root casts attests to the fact that occupation probably took place in an area of typical fynbos with perhaps more thickets of *Sideroxylon inerme* (milkwood) than are to be found at present. *Sideroxylon* is an extremely slow-growing and long-lived tree. It might therefore also be suggested that occupation was related in some way to the location of *Sideroxylon* thickets. This appears to have been the case in the Danger Point area where site localities often occur under well-established *Sideroxylon* covers. This possibility is still to be explored.

Two kill sites have been located within the devegetated zone, the one of a rhino, the other of a buffalo and it appears that occupation at these localities took place in response to the presence of a large meat supply and that the people responsible camped around the carcasses at least until the meat was consumed or converted into a more portable state. The presence of scattered shells at these sites shows that marine resources were still exploited to some extent. Early records and rock-art describe groups hunting these animals with bows, arrows and spears and there are also records of pitfalls being used to trap large animals. The location of such pitfalls which were dug

along game-paths and near to water-resources would throw interesting light on some aspects of the hunting practices in the project area.

The location of two tidal fish-traps on the coast may have had a marked influence on the locality and density of occupation as well as group mobility. Tidal fish-traps provide evidence of a successful attempt to modify an existing environmental niche in order to exploit a resource (i.e. fish) more effectively. Because they are located within the intertidal zone, they are not directly associated with shell midden sites. It has, however, been suggested that they may be indirectly associated with shell midden sites, i.e. occupation immediately inland of the traps (Goodwin 1946). Goodwin further suggests that information on their age and resource potential could be gained from a study of middens in the immediate vicinity of fish-traps. Data accumulated by the writer suggests that fish-traps may have played an important role in coastal exploitation patterns. If they were the efficient and regular fish catchers that modern fishermen report them to be, it is not surprising that enough incentive existed to expend the co-operative effort which must have been required for the building and upkeep of these structures. Their effective use is determined by the tidal cycle. It appears that it is only when the spring tidal range is approached that enough water covers the walls for fish to swim over them and be trapped. There is evidence that a seasonal factor might have further influenced catches. The situation was therefore more complex than a simple matter of casual utilization of fish-traps. Such a regular resource with a large effort versus 'pay-off' potential may well have played an important role in determining location of occupation and mobility within the routine exploitation strategies of groups utilizing marine resources.

The existence of mobile subsistence strategies for the purpose of the effective utilization of resources occurring differentially in space and time is well known for herders and hunter-gatherers and, as might be expected, a rather fluid system of coastal exploitation can be seen in the site distribution pattern at Pearly Beach. A distinct occupation focus is present immediately adjacent to the maximal resource zone, viz. the intertidal zone. But inland resources were also exploited from this base. Inland caves form a base from which a different and more extensive part of the available resource spectrum could be exploited effectively; the implication here being that marine resources, although still utilized, played a lesser role in the subsistence of groups operating from bases, where the most accessible resources were located inland.

That the mobility of groups exploiting coastal resources extended beyond the coastal plain is demonstrated by the existence farther inland of isolated sites containing marine remains. With the inland boundary of the coastal plain rising steeply to as much as 200-250 m above sea-level the problem of easy access to the coast becomes apparent. Access to the Pearly Beach area via the coastal plain would have been relatively easy for groups travelling parallel to the coastline. Direct inland-coastal transhumance would have been possible along at least two routes

through the inland barrier in the form of valleys which lead on to the coastal plain. Seasonal mobility cannot be demonstrated yet. Red tides, which cause some shellfish species to become toxic, do not seem to occur with significant seasonal regularity as is the case along the west coast (Parkington 1972) and there may not have been a danger period restricting coastal exploitation during certain times of the year. Awareness of tidal movements could have initiated periodic mobility such as is reported for coastal Bantu, who are aware of the existence of spring tides and move down to the coast to collect shellfish at about these times of the month (Bigalke 1973). The examination of so-called 'transit' sites may provide some information on this question. It is notable that only *Haliotis* middens have been described as such. Other shellfish were removed inland however. Hunter (1936) and Bigalke (1973) suggest that Bantu coastal exploitation took place from up to 8-11 km inland.

Stone features

Stone features associated with open station shell middens have been noted in the past. Schönland (1903) describes what he interprets as a '... camping place of a Hottentot horde' which was found at the coast near Port Alfred (33°36'S, 26°53'E). 'There are still some heaps of stones on this ground which show plain signs that they were used as fireplaces and there are a few mounds of shell which prove that these people lived to a certain extent on shells.'

Goodwin (1946: 4) describes a locality near the Slang River mouth, (34°11'S, 24°03'E) Humansdorp district where '... the users ... had left their fire places and middens in perfect condition when they gave up the site. ... Near the mouth of the lagoon three shallow bowls of roughly built stone, each 3 feet in diameter and about the same distance apart, were used as fire places ... the abundance of ash and carbon shows that these were fire places, though at Slang River there is no local accumulation of midden, which would suggest that the cooked food was carried some 25 yards away for eating.'

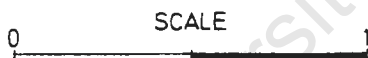
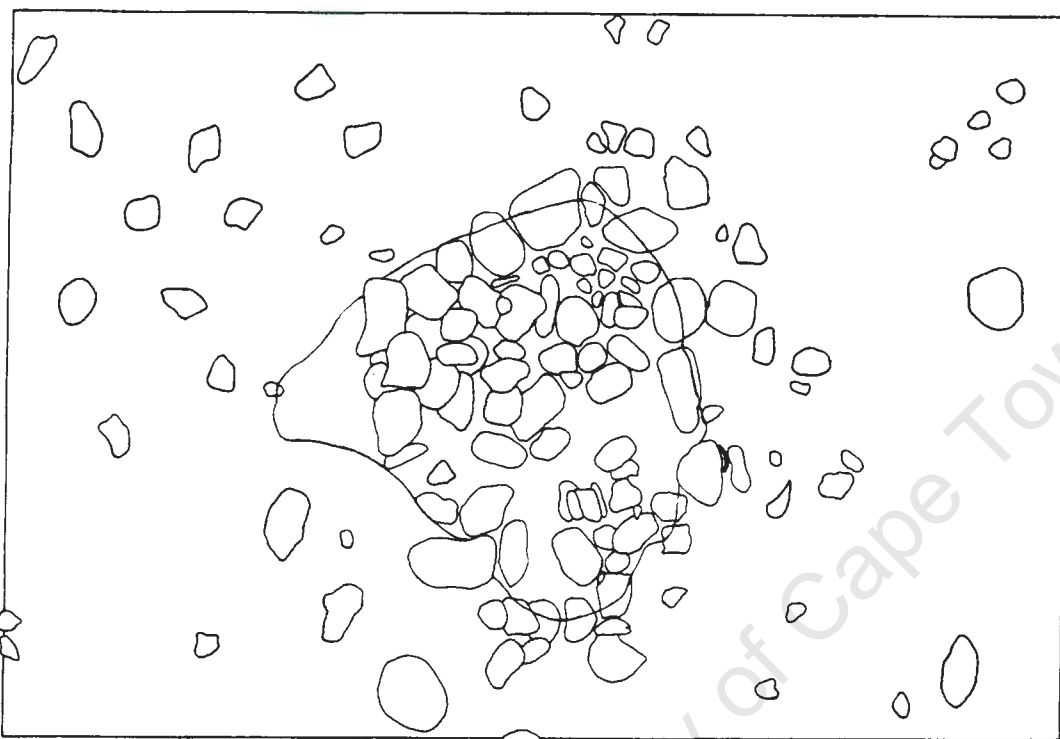
Mabbutt (1955) mentions the presence of 'stone hearths' and middens near Bokbaai (33°34'S, 18°21'E), Darling district.

Cairns (1973) excavated two stone features at Cape St Francis (34°13'S, 24°51'E), Humansdorp district. The first she describes as a roughly circular platform or possible windbreak base (1,21 × 1,30 m and 0,18 m thick) made of tightly packed beach cobbles. The stones truncated a midden, part of which had been removed in digging a foundation for the feature. The second, also made of cobbles, many of which were fractured, she describes as a hearth (1,09 × 0,92 m). Charcoal fragments and ash were found beneath the stones. The nearest midden was approximately 6 metres away.

The writer has located isolated stone hearth features cemented by charcoal and ash at Hawston (34°25'S, 19°08'E) and at Betty's Bay (34°22'S, 18°54'E) and has excavated stone features at Cape Point (34°21'S, 18°19'E) and Gansbaai (34°35'S, 19°21'E). The latter were covered by clean driftsand and no charcoal or ash was present. Shell middens were situated nearby in all cases. Stone features also occur with middens at

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Fig. 3. PB2/SI plan of hearth feature.

Melkbos (33°45'S, 17°26'E) (H. Deacon, pers. comm.) and Saldanha Bay (33°00'S, 17°57'E) (J. E. Parkington, pers. comm.).

Colson (1905) reported that shell middens and stone groups occurred along the Port Nolloth coast (29°15'S, 16°55'E). The stone groups consisted of 5-8 natural slabs, approximately 1 metre in length, which were buried to about half their length in two parallel lines about 45 cm apart. He described 15 such stone groups which occurred within a radius of 75 metres at a distance of about 200 metres from the middens. Several groups were excavated but no conclusion could be drawn as to the purpose of their erection. These groups are clearly different and as yet there seems to be no comparable feature farther south.

Stone features associated with middens therefore show a wide distribution although observations are few in number and mostly limited to perfunctory description.

#### Stone Features at Pearly Beach

As yet four different forms of stone feature have been recognized in the area under discussion. A fifth form, Tidal Fish Traps, is also described.

(1) Groups of beach cobbles with ashy or burnt matrix (fig. 3). These features have been described as hearths. Johan Schreyer, who visited the Cape in 1668 (Raven-Hart 1971, 1: 130), describes the Hottentot methods of cooking meat. By the first method meat was placed in a pot and boiled on a fire. By the second '... They make a pit in the ground, throw a few stones therein, and make a fire on to these. When now the stones are hot enough, they take away the fire and lay the flesh thereon. On this again they throw stones and on these wood and fire and let it thus roast until the flesh is cooked to their taste.' The form of stone feature under discussion may well represent the remains of similar cooking activities. Excavation has revealed the presence of charcoal fragments underneath as well as among the stones, suggesting that they were placed on to an existing fire. No shell or bone remains have been found in association with the features. This may be an indication that flesh only was cooked on such hearths. *Haliotis* is a large animal and the meat may well have been removed from the shell for cooking on the stones, which would have provided direct heat and would have kept the meat out of the sand. Alternatively, if the animals were left in their

shells for cooking, moisture within the shells would have prevented their becoming dried out and charred, and therefore prevented the accumulation of any burnt residue. The cooked shellfish could then have been removed and the undamaged shells discarded to form a midden.

(2) Groups, similar to (1), but with a clean sand matrix which may represent blown-out hearths or platforms for some unknown use. Excavation under the dispersed feature within PB1/1 (fig. 4) revealed the localized presence of charcoal fragments, which suggests that the feature was a hearth. Erosion of exposed features progresses very rapidly and results in the removal of any charcoal or burnt matrix and in the dispersal of the stones to such a degree that the original concentration is not always identifiable. It is also possible that this type of feature was intended for use

as a platform or surface for some unknown purpose. Cairns makes this suggestion presumably on the basis of the absence of burning or charcoal in a well-preserved feature. At Pearly Beach at least one feature, by comparison with others, seems to be too large to have been a hearth. Interpretation is further complicated by the presence of animal and human bones amongst the stones.

(3) Groups of large cobbles or boulders which cover burials. The use of stones as burial coverings is well documented. Olfert Dapper, who visited the Cape in 1668 (Schapera 1933: 6), gives the following description: 'Dead Hottentots are placed in a sitting position . . . into a deep pit, which is then filled in with earth. On top of this is piled a great heap of stones, so that the corpse may not be dug out of the grave by wild beasts and devoured.'

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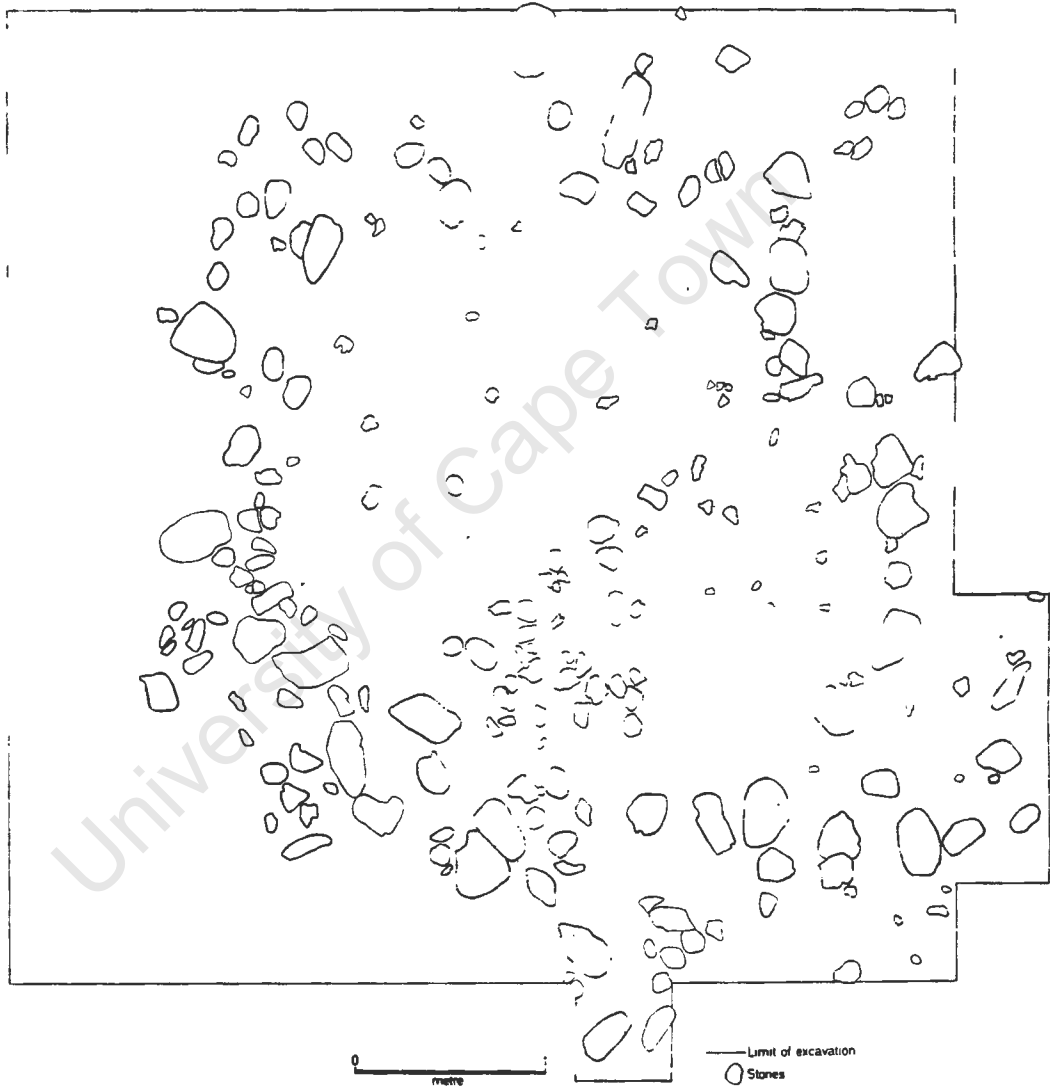


Fig. 4. PB1/SI plan of hut feature.

It is unfortunate that the only burial found *in situ* at Pearly Beach so far was dug up by a group of curious holiday-makers. The result is that the only information we have concerning the burial is that the skeleton was found under a group of large stones, and that the body had been buried in a sitting position facing east.

(4) Roughly circular or semicircular features of various-sized cobbles or boulders which may represent the base anchorages of huts or windbreaks. In some cases a group of smaller cobbles, perhaps representing a hearth, is found within the feature (fig. 4) (see comment above under (2)). An illustration of this method of construction is perhaps provided by the Ova Tjimba in the northern Kaokoveld of South West Africa. (MacCalman & Grobbelaar 1965: 8): 'Mopane branches are planted in the ground in a circle, some four foot to four foot six inches in diameter, in which a section is left open for the entrance, and stones are placed around the circumference to hold the branches in place. The branches are then bent over, the tops are tied together and the whole structure is roughly thatched with smaller branches, leaves and grass. . . . In front, at the entrance is a fire place. . . .'

A similar method could have been utilized to anchor shelters made of branches, or portable huts of the type generally used by the *Khoi*, which might well have been necessary under certain conditions in exposed situations such as the coastal area under discussion.

(5) Tidal Fish-traps. These man-made structures are not directly associated with shell middens but are included in this paper as they are examples of stone features associated with coastal exploitation (see above).

Tidal fish-traps consist of low boulder walls constructed across gullies or other suitable localities for the purpose of catching fish. Situated within the intertidal zone, the walls are built to the height of the surrounding bedrock or form complete artificial enclosures. The traps operate on the principle that fish can swim over the walls at spring tides in order to feed, and that as the water recedes the fish do not attempt to swim back until it is too late and they are trapped within the confines of the enclosure. It is then an easy matter to remove the fish from the almost dry trap at low tide.

#### Open station shell middens

Goodwin (1946: 4) gives an interesting but brief insight into the problem of the variability of the food components of separate middens within site localities near the Slang River mouth. 'About the edge of the lagoon are to be seen midden heaps, quite fresh and untrampled, and still standing in the natural conical heaps, 9 or 10 feet in diameter and 3 or 4 feet high, where the shells were originally thrown . . . each separate shell heap is composed of a single type of shell, almost exclusively. Quite certainly this neat arrangement is fortuitous and merely reflects the way in which the midden makers consumed the available supplies of a particular shellfish from one source and then turned to another, alternating between rock mussels, periwinkles, sand-mussels and back again. The eating sites in the lagoon were shifted at the same time, so one heap yields sand-mussels, a second rock-mussels, a third periwinkles, a fourth *Donax* and so

on.' He also quotes from a letter sent to him by a Mr E. Pike of Great Brak River near Mossel Bay: ' . . . The shells also seem sorted out, at one place you will find a heap of Venus' Ear shells (*Haliotis*) of the large variety (about 5 inches or so) partly buried in the sand, but very worn, perhaps due to the actions of sand and wind. Then another heap will be of ordinary mussel and so on.'

Goodwin's statement poses a number of questions. To what degree was this arrangement really fortuitous? Does it merely represent casual species by species collection of available shellfish populations or was this done with careful intention? Why did the collectors bother to exploit one species at a time when many species occur? What period of occupation do they represent?

There seems to be little doubt that, like their modern counterparts, prehistoric herders and hunters possessed an intimate knowledge of the available resources and conditions which affected them and, furthermore, that they utilized this knowledge in the organization of deliberate subsistence strategies which were aimed at the maximum exploitation of the resource potential. Shellfish species which would have been available to prehistoric collectors occur within the intertidal zone. Individual species are fairly rigidly distributed vertically and geographically within this zone according to the habitats to which they are adapted. It follows that the tidal cycle has a marked influence on the accessibility of particular species. It seems likely, therefore, that intra-site variability of middens represents the expression of a deliberate collecting strategy developed for maximal exploitation under differing tidal conditions or gross habitat divisions (rocky or sandy shores), together with selective (or activity) variation in collection and preparation.

In discussing methods employed by modern Bantu people in the disposal of empty shells after meals, Bigalke (1973: 164) mentions that in some places 'the remains of each shellfish-collecting expedition are thrown in a separate small heap, sometimes in the same area, so that there is a series of small heaps in a midden area'.

#### Open Station Shell Middens at Pearly Beach

A situation similar to those described by Goodwin and Bigalke is present at Pearly Beach site localities where at least three distinct midden varieties are found. These distinctions are based on the predominant species found within shell concentrations and are as follows: *Haliotis* (Perlemoen); *Turbo* (alikeukel); *Oxystele*, *Patella*, *Turbo* (periwinkle, limpet, alikeukel). Such concentrations with one or more dominant species suggest that some selective process was in action during or after the collection of shellfish. Several possibilities exist as explanations of these differences.

#### *Haliotis*

(a) Collection at low spring tides when *Haliotis* could be reached and may have represented the optimum resource because of its size. Other available species would then have been disregarded almost completely. This would have been possible at two short periods only per month.

(b) Specialized preparation activity. Removal of the animal prior to dealing with it at the living-area (cooking) or dumping of discarded shells after cooking (see above under (1)). *Haliois* middens seem to be situated on the outskirts of site localities and although ash and burning marks are absent in some middens, others contain charcoal and ash and some shells are burnt.

(c) 'Transit' sites where the animals were removed from their shells to facilitate transport elsewhere, e.g. inland. This situation does not seem to exist at Pearly Beach. It is included as a possibility, however, as there are indications that this might be the case elsewhere in the research area.

#### *Turbo*

(a) Tidal. *Turbo* are found over a greater range within the intertidal zone than *Haliois*, which is only obtainable at low spring tides. *Turbo* can be collected at normal low tides and perhaps formed the optimum resource for this period in the tidal cycle.

(b) Specialized collecting or preparation activity. *Turbo* may well have been collected together with *Haliois* etc., but kept separate for preparation.

#### *Oxysteles, Patella, Turbo*

(a) Tidal. Collection at normal or neap tides when the larger-bodied species were not available or not numerous enough to be collected in significant quantities.

(b) Specialized (or non specialized) preparation activities, perhaps reflecting the collective treatment of these species. These middens appear to be more closely associated with the living-area; the matrix is ashy and general cultural activity, as evidenced by artefacts and pottery, seems to be clustered around them.

#### Dating

Only one date is available as yet.

Pta-1069 Pearly Beach. PB2/S1 (Charcoal from hearth) 1680 ± 50 B.P. A.D. 270. This date is perhaps earlier than might have been expected for this kind of site. Charcoal samples from other excavated hearths have been submitted for dating. Only one suitable charcoal sample has been collected from an excavated midden so far. More samples are being sought. Sheep remains and pottery occur in the Pearly Beach localities and it is hoped that it will prove possible to date these associations more definitely in the future.

#### Discussion

Shell middens were originally considered to represent the occupation remains of a people called *Strandloopers* who populated the coast and whose subsistence base was almost entirely marine. The term was first used by early Dutch callers at the Cape, synonymously for the *Watermen*, a small group of coastal-dwellers living in Table Bay. Thereafter it took on ethnic identity and, although no parallel group seems to have been found, was applied indiscriminately to any cattleless person or persons observed on the coast. The name and usage have persisted to the present in spite of a later report that members of the original watermen/strandlooper group were in fact not a distinct people but exiled and cattleless *Hottentots*

who were living on the coast (Maingard 1931: 492), and that later, when the opportunity presented itself, they acquired cattle at the Dutch East India Company's expense and reverted to a herding way of life (Moodie 1960: 94).

As early as 1926 (Schapera 1926), in discussing the relationship between the *Hottentots*, *Bushmen* and *Strandloopers*, Schapera suggested that there was not enough evidence to support ethnic distinction for any of the groups, and that the term *Strandloopers*, as implying a distinct people, was not justified; the *Strandloopers* were nothing more than *Bushmen* who lived along the coasts and that the name 'Coast *Bushmen*' was quite adequate if a term was necessary. Although it showed a considerable advance in thinking, this view is perhaps too simplistic. There may well have been groups of *Bushmen* or hunter-gatherers subsisting at the coast, but he does not consider the existence of a dynamic system involving regular transhumance between the coast and the interior as discussed by Parkington (1972), or the fact that herders are known to have exploited marine resources when their annual movements brought them to the coast.

In studying recent coastal living patterns in the south-western Cape the presence of two socio-economic groups (herders and hunters) for at least 1500 years before the contact period is postulated in this paper. The presence of herding groups in the south-western Cape is indicated by radiocarbon dates of around 1500 B.P. for the occurrence of sheep remains at Die Kelders (Schweitzer & Scott 1973). Other data, as yet unpublished, suggests that this date can be extended back to at least 2000 B.P. Members of these groups may have competed directly or indirectly for marine resources. This would be determined by the annual movements of people, i.e. a prerequisite of coastal exploitation for people not living permanently on the coast would be that at least part of the area covered by their annual beat should include the coast or bring the coast within economic range. Herders or hunters may then have utilized the coast as part of their subsistence strategies on a permanent or periodic basis. Some groups would never approach the vicinity of the sea and would therefore not exploit marine resources.

The problem of identifying these postulated situations in the archaeological record is by no means a simple one largely because of the nature of the material preserved in coastal sites. In open station contexts especially, preserved material is limited to the remains of those aspects of herder and hunter living patterns which appear to show similar expression—technology and hunting and gathering activities. The presence of sheep and cattle remains in sites does not necessarily indicate that the occupants were herders. The fact that hunters stole cattle and sheep from herding communities is well documented (Schapera 1933: 33) and it is therefore to be expected that such remains will occur on sites occupied by hunting groups as well. On the basis of ethnographic sources it seems safe enough to assume that cave occupations were restricted to the smaller hunter-gatherer units. Herders tended to move around in much larger numbers together with large herds of sheep and cattle

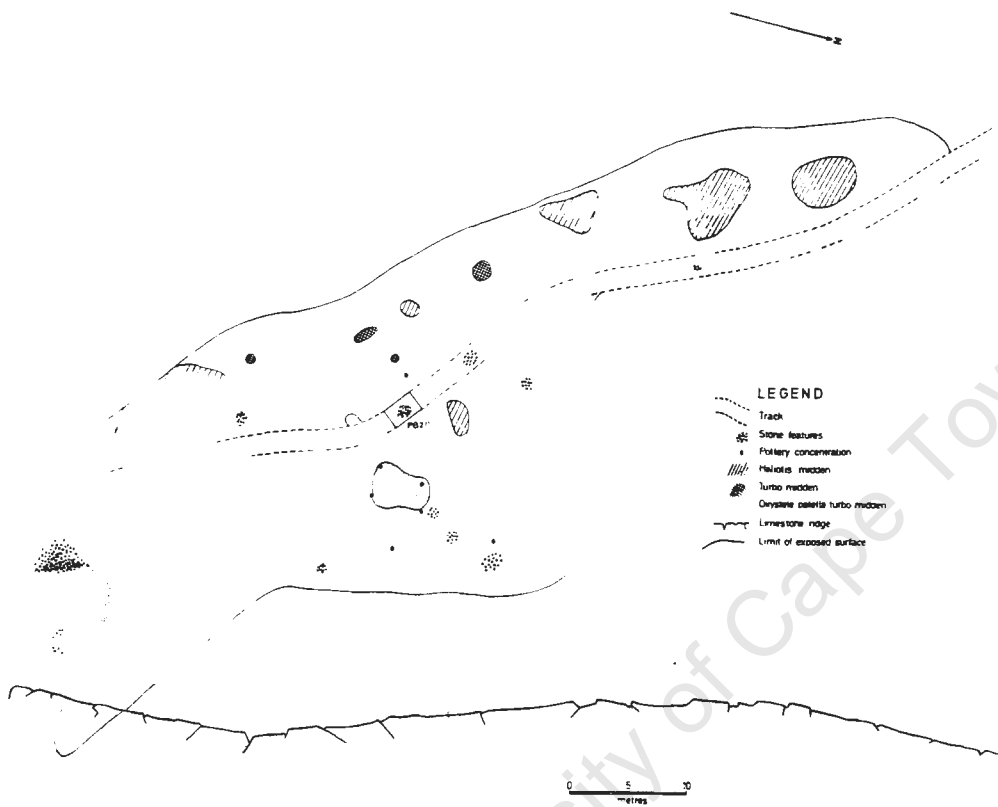


Fig. 5. PB2 plan of middens and stone features.

d housed themselves in portable huts. Their campments were laid out in such a way that the tents formed a protective perimeter within which the stock was kept at night (Schapera 1933: 23, 119). It may be possible to identify herder occupations by the size of their presumed larger size and unique layout.

How much of this will actually be achieved remains to be seen. The plan of the site locality PB2 (fig. 5) gives an indication of the kind of areal distribution of middens and stone features to be found in the Pearly Beach area.

On the basis of excavation and observation of the stone features the writer believes that all stone features in this locality, except perhaps the largest (? platform), represent hearths. It has not been possible to establish what proportion, if any, of the hearths might represent hut features which have otherwise not been preserved. The completion of work in several other sample localities should provide a platform from which it might be possible to establish the presence or absence of patterning.

These preliminary observations serve to provide an outline of the aims and problems being considered in a study dealing with past coastal living patterns. The indications are that information extracted from open excavations will underline suggestions made by other research workers such as Parkington.

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