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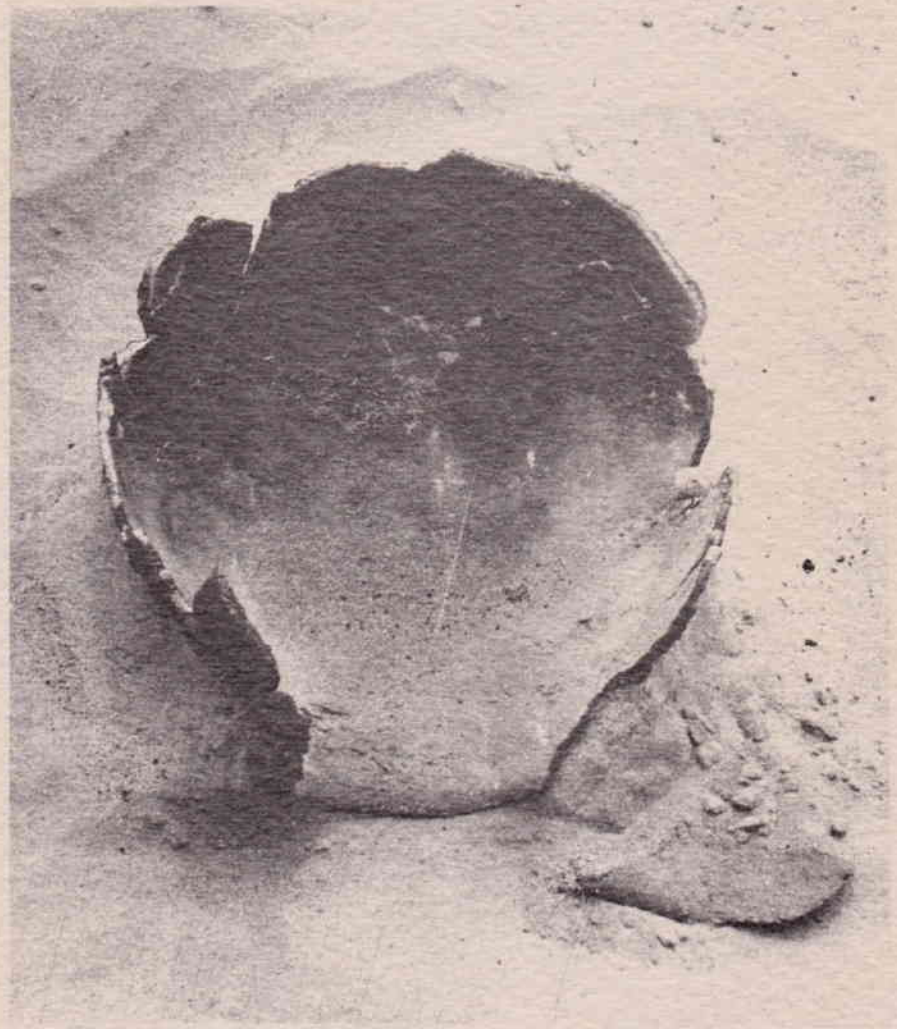
RECENT ARCHAEOLOGICAL RESEARCH BETWEEN THE ORANGE AND KAVANGO RIVERS IN SOUTHWESTERN AFRICA



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HOLOCENE SUBSISTENCE AND SETTLEMENT ON THE NAMIB COAST: THE EXAMPLE OF THE UGAB RIVER MOUTH

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ABSTRACT

Remains of a whalebone hut settlement and associated shell middens from the mouth of the Ugab River on the Namib Coast are described and dated to the last millenium. The taphonomy of the whalebones indicates that 16 baleen whales were selectively disarticulated and the bones used in the construction of residential structures. Evidence for subsequent use of the site is evaluated with attention to the exploitation of shellfish *Donax serra* as a dietary item. Problematic observations on the dating and interpretation of the site are discussed with reference to the regional prehistory.

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I. INTRODUCTION

The most arid region in the southern African subcontinent is the Central Namib Desert, lying along the Atlantic littoral between the 20th and 24th parallels. The inland limits of the desert coincide with the 100 mm isohyet and the foothills of a broken longitudinal escarpment. A number of episodic river systems drain from the savanna highlands to bisect the desert and enter the sea at widely separated points.

Small shell middens in the vicinity of river mouths are characteristic archaeological sites of the Namib coast. Most of the sites known so far are associated with Khoe ceramics (*cf.* Rudner 1968) dated to between 620±40 BP (Pta-902) and 70±45 BP (Pta-676) (Vogel & Visser 1981). There were, evidently, links between coastal settlements and those that lay farther inland: coastal materials have been described from a number of inland archaeological sites (Sandelowsky 1976; Wendt 1972) and copper beads of highlands origin have been dated to pre-contact times from a site at the mouth of the !Khuiseb (Kinahan & Vogel 1982).

There is little detailed knowledge of prehistoric settlement and subsistence patterns on the Namib coast, although the remains of stone hut circles have been reported from Cape Cross (Sydow 1971) and from Sylvia Hill, where skeletons with Khoisan affinities were also recovered (Shackley 1983). No detailed studies of subsistence remains from well-sampled sites are available but an examination of bird remains from Wortel showed that a variety of marine species was exploited without seasonal interruption (Avery in press). The nature of prehistoric use of other marine resources is unknown although the ethnohistoric literature (Budack 1977: 12 *passim*) provides some economic data for Khoe-speaking people on the coast at the time of European trading contact. These people relied heavily upon shellfish and marine species and also took advantage of beached whales to supplement their pastoral economy. Radiocarbon dates for sites with ceramic associations suggest that there was some continuity over the last 500 years of this subsistence pattern, although work in progress indicates changes both in assemblage composition and population distribution following contact with Europeans.

In this paper we describe the remains of a putatively pre-contact hut settlement constructed from the remains of baleen whales at the mouth of the Ugab River (21°11 S; 13°38 E). We interpret this apparently unique site as evidence for the prehistoric exploitation of beached whales and make use of its excellent preservation to reconstruct the layout of the settlement and the patterned use of whalebones in construction. We argue that the site is of pre-contact date because it lacks the ubiquitous and exotic trade goods of the contact period. It is, however, associated with Khoe ceramics and appears to have been used on more than one occasion. We analyse the shellfish remains and discuss the pattern of their exploitation. We conclude that the Ugab Mouth site exemplifies one part of a spatially discontinuous pattern of coastal exploitation. Necessary resources were concentrated at the mouths of rivers and access to these localities was probably gained via river courses that bisect the waterless Namib.

II. SITE DESCRIPTION

The Ugab River mouth is marked by a shallow lagoon surrounded by dense *Nicotiana* spp. and river grasses. One kilometre to the south of the lagoon, lying at an acute angle to the main riverbed, is an extinct channel of the Ugab, thinly scattered with clumps of *Psilicaulon salicornoides*. The site (Fig. 1) consisted of 16 whalebone and 5 stone features, associated with 19 shell middens, covering an area of 0,09 km² (9 ha) on two gravel terraces on the southern side of the channel. Most of the middens (14) and two stone hearth features with whalebones were on the lower terrace. Five middens and 11 whalebone features, including whalebone huts, were located on the upper terrace. Seven of these whalebone features, incorporating 90% of the total whalebone on the site, were concentrated in an area of 7 000 m² (0,7 ha).

With the exception of the dispersed Midden 15, the middens concentrated on the lower terrace were small, discrete, oval-shaped heaps of *Donax serra* shell compacted in windblown sand. The average size was 2,3 m x 1,5 m, with the slightly heaped profile giving an average depth of 0,1 m. Features 11 and 12, also on the lower terrace, consisted of whalebone associated with closely-packed stone cairns covering coarse, discoloured sand flecked with charcoal. Feature 11 included three vertebrae, while Feature 12 had two vertebrae, two ribs and one occipital.

The whalebone features and three stone cairns were located on the upper terrace with four dispersed middens. West of the main whalebone concentration were the very dispersed Middens 18, 19 and 20. Feature 9, located on Midden 19, was a small cairn of fist-sized cobbles. Features 10, 14, 15 and 16, on Midden 18, consisted of whale ribs; Feature 15 had in addition, a whale vertebra and a cranial bone.

Features 8 and 13, both consisting of groups of loosely packed cobbles, were situated east of the main concentration of whalebones. Beyond Feature 9 and Middens 19 and 20, 150 m to the south, were a number of thinly dispersed middens associated with three whale vertebrae and the temporal bone of an infant human.

The seven features of the main concentration of whalebone included five structures identifiable as huts. The remaining two features consisted of isolated whalebones: Feature 1 incorporated one mandible, one vertebra and one rib lying adjacent to the dispersed Midden 1, and Feature 2 incorporated one mandible, two ribs, one phalange and three non-diagnostic bones.

Features 3, 4 and 5 (huts) were roughly aligned and showed a consistent orientation away from the prevailing south-westerly wind, as did the huts (Features 6 and 7) opposite them. These orientations are indicated by arrows in Fig. 1. Between these two rows of structures were two occipitals, two occipital fragments (one of which fitted the occipital in Feature 3 opposite), one mandible and eight ribs. The structure of Features 3 and 4 was indicated by ribs and mandibles embedded vertically in the sand. Features 6 and 7 had low arcuate walls more than half a metre thick, incorporating a larger variety of skeletal parts. Burnt bone was found on Feature 3, and ashy sand on the open side of Feature 6.

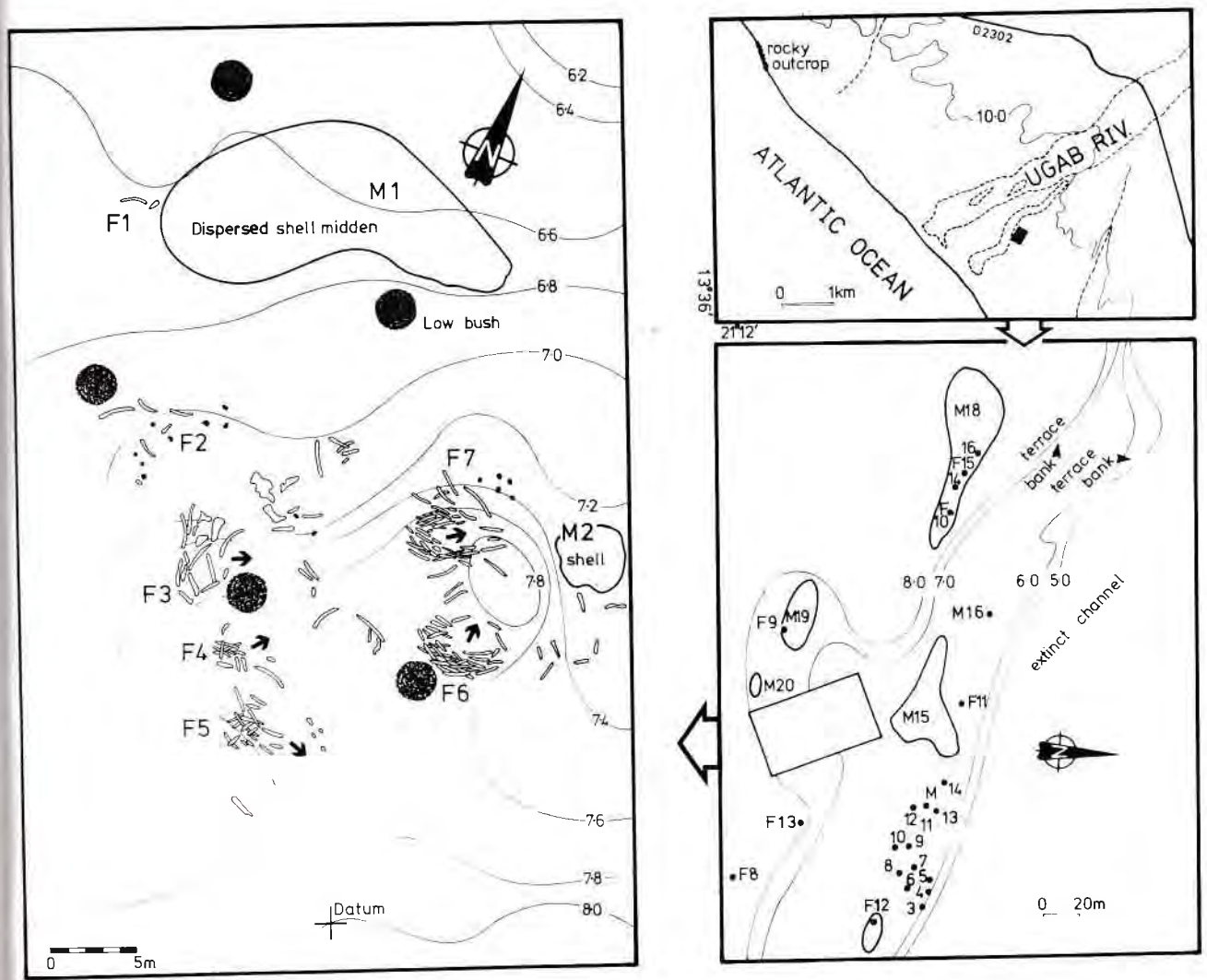

FIGURE 1. The Ugab Mouth site, local context and plan.

ASSOCIATIONS

Ceramic sherds from the site had been sandblasted wafer thin, exposing a coarse grit temper dominated by quartz and feldspar. Although a total of 41 sherds was noted, only two rim sherds were found. No complete vessels or vessel profiles could be reconstructed,

PLATE 1. Ugab Mouth whalebone huts viewed from the northeast. Feature 6 is in the foreground and Features 5 and 4 in the left background.

but both rims suggested necked Khoe-type vessels (*cf.* Rudner 1968); that from Feature 9 showed spaced fingernail impressions and a straighter neck profile than the slightly everted but undecorated rim from Feature 10. Five of the six occurrences of surface ceramics were associated with the middens and stone features (Fig. 1).

Most of the ostrich eggshell recovered from the site was associated with Midden 18, on the upper terrace, although fragments were present on Midden 15, on the lower terrace. A few of the pieces showed traces of drilling and shaping such as in bead manufacture, but most of the fragments were large sherds from broken eggs. No complete beads were found. From the total 830 g sample of ostrich eggshell, a minimum number of four eggs was calculated, using a mean dry egg weight of 233 g (n = 10) for comparative material.

Battered shale cobbles, casually flaked quartz and a large core that may have functioned as a scraper were also associated with Midden 18. Fist-sized cobbles, some of which had been crudely trimmed, were associated with Feature 2. One informal quartzite artefact was found on Midden 16, on the lower terrace. Very little evidence of butchery was found on the whalebone, but chopmarks, possibly produced by these stone tools, were visible on a radius from Feature 6, and on one of the occipitals between the two rows of whalebone huts.

Parts of two seabirds, corresponding to the gannet *Morus capensis* and the Cape cormorant *Phalacrocorax capensis* in size, were found on Middens 11, 14 and 15 and the humerus of a hare *Leporidae* was found on Midden 14. Four adult Cape fur seals *Arctocephalus pusillus* were represented by six femurs, a mandible and some rib fragments on Middens 14, 15 and 18. Several seal bones were scattered amongst the five whalebone hut features.

Although bones of bird, seal and hare present on the site could reasonably be assumed to represent part of the prehistoric diet, there is evidence of recent scavenging which casts doubt on the archaeological associations of this bone. A jackal kitchen was found close to one of the hut features, and a seal flipper, still covered in skin, had been dragged into one of the hut features by a jackal. G. Avery (pers. comm.) noted that he had observed wing bones of Cape cormorant in the extinct channel. These bones showed distinct signs of having been gnawed by a jackal but, while some bones were still linked by sinew and had a few feathers attached, others were already bleached and rapidly becoming indistinguishable from archaeological remains. These considerations decided

us to confine our analysis of food remains to the *Donax serra* shell middens.

III. ANALYSIS

SITE LOCATION

We believe that the position of the coastline has changed in relation to the site and that the present setting of the site does not resemble that at the time of its occupation. No indications of recent flow were apparent in the river channel below the site and it appears to be extinct. None of the grass species, *Juncellus laevigatus, Phragmites australis, Scirpus dioicus* and *Sporobolus consimilis* common at the present river mouth occur at the seaward end of the extinct channel, which supports only the species *Odyssea paucinervis* and *Sporobolus virginicus*. The extinct channel probably receives none of the periodic floodwater that sustains the plant growth at the present mouth.

The periodic flooding that is a characteristic of Central Namib rivers is known to have a dynamic effect on topset beds and their drainage (Stengel 1966), leading to sudden changes in the direction of flow. This may account for the presence of the extinct channel, a feature that occurs at several other river mouths along the coast. There is some evidence for other changes, particularly seaward advances, in shorelines on the Namib coast. Kensley (1978) has remarked on the isolation processes affecting a tidal lagoon at Conception Bay, Kaiser (1926) noted shifts in the Hottentots Bay shoreline and Schultze-Jena (1907) noted rapid advances further north along the Namib coast. These processes are illustrated by the wreck of the *Evard Bohlin,* which grounded at Conception Bay in 1910 and now lies several hundred metres from the shoreline (C. Coetzee pers. comm.).

At the time of occupation, the site probably lay close to the spring tide high water mark, on the banks of an active channel of the Ugab mouth among fairly dense stands of bush and reeds. Under more favourable conditions, ample supplies of branches would have been available to supplement the whalebones used to build the huts and fresh water would have been available not far beneath the surface of the now-extinct channel.

WHALE TAPHONOMY

Although there are several first-hand accounts of the use of beached whales by aboriginal, Khoe-speaking people in the past (Thom 1952, vol.1:217; Raven-Hart 1970, vol.1:17), there is no reference, of which we are aware, to the skeletal disarticulation of stranded whales. The assemblage of whalebone from the Ugab Mouth site comprised a minimum of 16 individuals, most probably of the southern right whale *Eubalaena australis*. The representation of skeletal parts on the site is, however, highly disproportionate and suggests that disarticulation was selective and also that specific bones were chosen for use as building materials.

The distribution of skeletal parts mentioned in the description of the site is summarized in Table 1. Only the mandibles, comprising 11% of the total sample, could be sorted into left and right sides with any consistency and it is on these that the minimum number of 16 is based. Ribs outnumbered all other identifiable parts with a total of 221, representing 70% of the sample. No attempt was made to sort the ribs into left and right series for this would have entailed dismantling the features where most of the ribs were concentrated. The minimum number of six individuals represented by ribs is therefore based on a working total of 26 ribs per animal at death. Table 1 shows that ribs were the most generally distributed parts on the site and that only the vertebrae, of which there were 22 (7%), were comparably spread. All the vertebrae appeared to be of the thoracic region (owing to their compressed shape and transverse processes), giving a minimum number of only two individuals. None of the other parts produced counts of more than four individuals and it is of note that only one individual was represented by bones of the pectoral girdle and limbs. There were apparently no bones of the axial skeleton beyond the rib cage.

Complete excavation and matching of skeletal parts might show a consistency of treatment that would have lead to this disproportionate assemblage, but even without this, some conclusions can be reached from the relative survival of the bones. In the first instance, it is certain that the assemblage is a partial reflection of both the manner of disarticulation and selection for suitable building material. It is also likely that the character of the assemblages was secondarily determined by weathering processes and the treatment of the bones during the occupation of the site.

Table 1 shows that cranial bones were concentrated in the huts and between them; even if the entire whale skeleton were used on the site, the distribution of these parts is remarkably limited. Thirty-one of the 35 mandibles formed part of recognizable huts where they were used effectively to arch the roof. All (except one) of the 22 cranial bones were similarly located, planted upright in the sand to form the bases of the huts. Occipitals were included in two of the huts and the one example from the centre group between the huts may have formed part of another structure as it was associated with eight scattered ribs. The only two other body parts that were

significantly represented on the site, ribs and (thoracic) vertebrae, were concentrated in the structure of the huts but also occurred elsewhere on the site. This pattern of distribution shows a preference for the front parts of the skeleton, with the significantly low representation of the pectoral girdle and limbs relative to that for all other parts. If the preferential selection of cranial bones and ribs were primarily related to the building of huts, it would be reasonable to expect that the other, remaining parts, would be found elsewhere on the site. The absence of the other parts suggests a different explanation. It is more likely that the presence of the ribs and cranial bones is evidence of the anatomical emphasis of disarticulation on the head and thorax. The under-representation of the limbs would then be due to their rejection, along with the post-thoracic skeleton.

There is a possibility that the sparse distribution of bones outside the main residential focus of the site represents shifts in this focus during subsequent occupations. It is also possible that the emphasis of skeletal representation on cranial and thoracic parts is due to the durability of these bones. Vertebrae are composed mainly of cancellous bone with an outer layer of hard bone that is relatively thinner than that of long bones such as ribs or mandibles. Consequently, vertebrae would split and disintegrate with ex-

Table 1 Feature distribution of whale skeletal parts

		Cranial			Mandibles		Post-cranial						
Fea. no.	Descr.	Nasal	Occ.	l	r	Uns.	Vert.	Scap.	Rad.	Ulna	Phal.	Ribs	Non-D
1						1	1					1	
2					1						1	2	3
3	hut		1	3	2	1	1					20	
4	hut			1	2							14	
5	hut	2		2	1		1					30	1
6	hut	7	1	6	5		3	1	2	2		77	
7	hut	12		2	4	2	7					60	
10												1	
11	hearth						3						
12	hearth		1				2					2	
14												2	
15		1					1					2	
16												2	
Centre group			1	1								8	
Outlying bones					1		3						
Total		22	4	15	16	4	22	1	2	2	1	221	4

posure before other parts and occur with increasingly lower frequency with time. This explanation for the paucity of axial bones is partly discounted by the presence of thoracics on the site. Although their numbers were low and almost certainly decreased by weathering, the occurrence of only these vertebrae tends to support the argument for a frontal emphasis in disarticulation. The spatial distribution of the vertebrae on the site may also explain their lower frequency. Nearly half were found well outside the main concentration of bone, in association with hearth and midden accumulations. Portability of these bones and a tendency for their use on the periphery of the site may have reduced their numbers as effectively as weathering.

It is difficult to gauge the extent to which bones were moved around the site during occupation. The fall-off in density away from the huts may be due to the distribution of activities not necessarily related to the use of whalebone. However, the marked differences in the amount of bone used in the five recognizable huts may evidence robbing of unoccupied huts during re-use of the site. More than half the mandibles and ribs used in the hut features were concentrated in Features 6 and 7, and these were considerably larger than the others. If these huts represent the most recent use of the site, they may well relate to the accumulation of *Donax* shell on the lower terrace, although their contemporaneity cannot be established.

The assemblage of whalebones does appear to have undergone some modification; the whales were dismembered in an apparently selective fashion to produce an assemblage that emphasized the frontal skeleton. This is inferred from the skeletal parts represented on the site which, although they seem to have been further depleted by use and weathering, cannot be explained by these agencies alone. There was some evidence for the dispersal of parts to the periphery of the site, where they were associated with the preparation of shellfish and probably relate to an occupation subsequent to the use of the meat from the stranded whales.

DONAX MIDDEN ANALYSIS

Three of the 13 discrete shell middens on the lower terrace were sampled for the analysis of *Donax serra* remains. These archaeological samples were used to isolate three size classes based on shell length and to obtain minimum numbers of individual mussels per midden volume. A sample of 100 *Donax serra*, collected from the Ugab Mouth beach and preserved in alcohol, was used to establish a relationship between shell length and meat weight, and to obtain an energy value of the meat. These analyses, detailed below, represent the necessary analytical steps for testing Voigt's (1975: 93) contention that molluscs, as dietary remains, should be directly related to group size and period of occupation.

Archaeological samples of 0,05 m^3; 0,07 m^3 and 0,05 m^3, excavated in 1 m^2 units to sterile sand, were taken from Middens 5, 7 and 13 respectively and passed through a 10 mm mesh sieve. The samples retained by the sieve consisted of intact and fragmented shell of the species *Donax serra*. Intact shells were separated into two groups, according to left or right umbo, and counted. The group with the highest count was taken to represent the minimum number of individual mussels in the archaeological sample. Three size classes, based on the maximum length of the shell, were established: A <46 mm, B 46 - 59 mm and C >59 mm. These size classes correspond to age classes of less than 2 years, from 2 - 3 years and greater than 3 years (*cf.* De Villiers, 1975: 12). The mean distribution of size classes for the 3 intact shell samples was found to be 82%: 17%: 1% for size classes A, B and C respectively (SD = 4,7%; 4,4% and 0,0% respectively). The intact shells in each size class were weighed and these weights were divided by the numbers of shell in the size classes to obtain the median weight for one shell.

On the assumption that the proportions of intact shells in each size class were the same for fragmented shell in each sample, the weight of fragmented shell was divided proportionally among the three size classes. By dividing the weight of fragmented shell by the weight for one shell in a given class, the numbers of shells in that size class could be calculated. These numbers were then halved to obtain the minimum number of mussels and added to the number of mussels calculated by means of intact shells. Table 2 presents these results. On the basis of the excavated samples from Middens 5, 7 and 13, a mean number of 47 355 mussels/m^3 was calculated (SD = 17 585 mussels).

Fig. 2 shows the exponential regression $y = 0{,}37e^{0{,}06x}$ ($r^2 = 0{,}96$) for the relation between shell length and meat weight. This relationship was derived from the 1983 Ugab Mouth beach sample. Meat weight for each size class was calculated from the appropriate median value on the exponential regression. A 500 g sample of the *Donax serra* meat preserved in alcohol was analysed to establish an energy value of 231 kJ / 100 g wet meat (A. Wehmeyer pers. comm.), or 18.48 kJ / g ash free dry mass. Table 3 presents the following results for the three Ugab Mouth midden samples: numbers of *Donax serra* in the size classes, with the estimated meat weights and kilojoule values for each size class. Table 3 also presents the equivalent information from two comparative archaeological samples, B2736 and B2740, from coastal sites near the

Table 2 *Donax* midden samples: size class analyses and comparative 1983 sample

Donax size class	MNI (intact shell)	%	Median wt of 1 intact shell (g)	Wt of fragmented sample (g)	MNI (frag. shell)	Total MNI
SAMPLE: MIDDEN 5						
A	976	77	0,998	2008(E)	1006(E)	1982
B	276	22	1,007	574(E)	285(E)	561
C	9	1	1,410	26(E)	9(E)	18
Total	1261	100	1,138	2608	1300(E)	2561
SAMPLE: MIDDEN 7						
A	1795	86	1,010	3956(E)	1959(E)	3754
B	292	14	1,010	644(E)	319(E)	611
C	11	1	1,920	46(E)	12(E)	23
Total	2098	100	1,310	4600	2290(E)	4388
SAMPLE: MIDDEN 13						
A	594	84	1,005	1176(E)	585(E)	1179
B	109	15	0,979	210(E)	108(E)	217
C	6	1	1,180	14(E)	6(E)	12
Total	709	100	1,055	1400	699(E)	1408
SAMPLE: B2736						
A	-	-	-	-	-	-
B	1	7	1,000	459(E)	230(E)	231
C	14	93	1,500	6091(E)	2030(E)	2044
Total	15	100	1,250	6550	2260(E)	2275
SAMPLE: B2740						
A	-	-	-	-	-	-
B	4	11	1,000	42(E)	21(E)	25
C	34	89	1,500	308(E)	103(E)	137
Total	38	100	1,250	350	124(E)	162
SAMPLE: 1983 UGAB BEACH						
A	12	12	n/a	n/a	n/a	12
B	51	51	n/a	n/a	n/a	51
C	37	37	n/a	n/a	n/a	37
Total	100	100				100

MNI = minimum number of individual mussels
(E) = estimate

!Khuiseb delta, and the results of the analysis of the sample collected live from Ugab Mouth beach. From the mean of 47 355 mussels/m³, (Table 2) an average energy value of 377 403 kJ/m³ was derived. This energy value is comparable with that of 350 000 kJ/m³ obtained by Buchanan *et al.* (1984) for Western Cape shell middens.

From the results obtained in Tables 2 and 3 meat weights and energy contents were estimated for the 13 other middens on the lower terrace. The volume of each midden was estimated by using the midden dimensions of length, breadth and depth and the formula for the volume of half an ellipsoid, the closest geometrical equivalent to the shape of the middens (personal observations).

Table 4 shows the average midden to have a volume of 0,21 m³, (range = 0,02 m³ - 0,4 m³) containing approximately 9 835 mussels (range = 7 540 -150 949 mussels) with a total meat weight of 34 kg (range = 3,3 kg - 65,3 kg). In energy content, the average midden represents 78 397 kilojoules, and all 13 middens together represent approximately one million kilojoules.

Comparable Australian data (Meehan 1982: 152 - 155) suggest a 9 000 kilojoule per capita daily energy budget. Applying this figure to the Ugab Mouth data of one million kilojoules gave an estimate of 111,1 kilojoule man-days. Individually, the middens represent 8,7 kilojoule man-days (range = 0,84 - 16,7 kilojoule man-days).

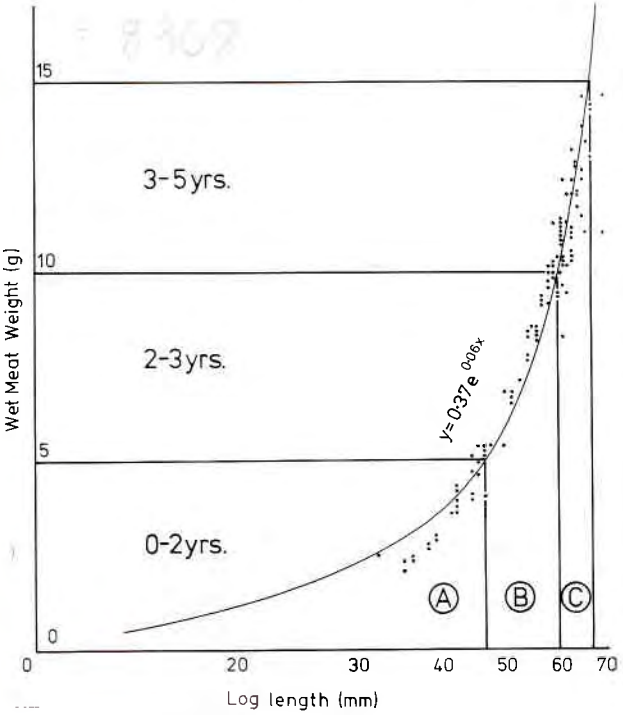

FIGURE 2. *Donax serra*, relationship of shell length and meat weight.

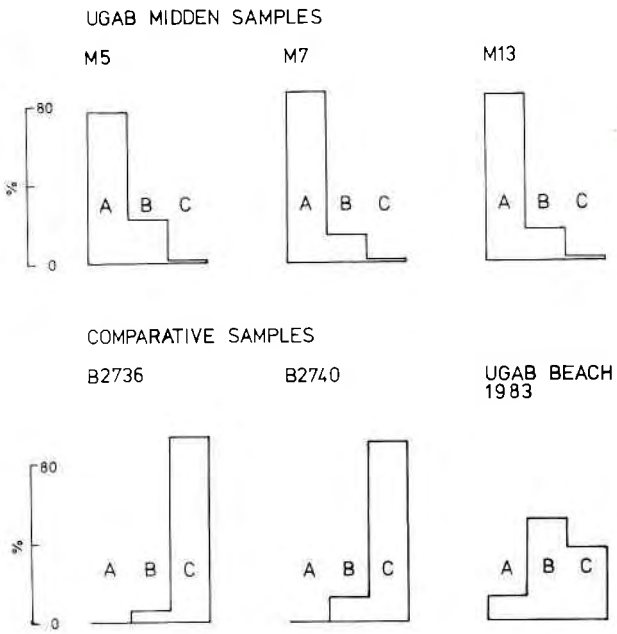

FIGURE 3. Histograms of *Donax serra* size class frequencies, Ugab Mouth and comparative samples from the !Khuiseb Delta area.

Although the Ugab Mouth site is unusual in that it consists of discrete shell middens of uniform composition and comparable size, rather than continuous scatters or the large, varied accumulations most characteristic of the western Cape (*cf.* Buchanan *et al.* 1984), and has apparently associated residential features, the testing of Voigt's hypothesis remains problematic. A direct relationship between the huts and the middens cannot be established; we argue that the number of huts varied with subsequent occupations of the site, and we have no method of calculating group size or of establishing duration of the occupations. Beyond establishing analytical procedures, we are unable to explore further the implications of Voigt's hypothesis.

The analysis of the *Donax* samples into size classes (Table 2) showed comparable distributions in the Ugab Mouth archaeological samples, but different distributions of size classes in the Ugab Mouth 1983 (live) sample and in the !Khuiseb archaeological samples. In the samples from the three middens at Ugab Mouth, the smallest size class (A) represented the greatest proportion of the samples (77%, 85% and 83% respectively). The medium size class (B)

Table 3 Ugab Mouth midden samples: estimated meat weights and energy contents

Donax size class	MNI	Median meat wt of 1 mussel (g)	Total meat wt (g)	Energy ★ content of meat (kJ)
SAMPLE: MIDDEN 5				
A	1 982	2,5	4 955,0	11 446,1
B	561	7,5	4 207,5	9 719,3
C	18	12,5	225,0	519,8
Total	2 561	7,5	9 387,5	21 685,2
SAMPLE: MIDDEN 7				
A	3 754	2,5	9 385,0	21 679,4
B	611	7,5	4 582,5	10 585,6
C	23	12,5	287,5	664,1
Total	4 388	7,5	14 255,0	32 929,1
SAMPLE: MIDDEN 13				
A	1 179	2,5	2 947,5	6 808,7
B	217	7,5	1 627,5	3 759,5
C	12	12,5	150,0	346,5
Total	1 408	7,5	4 725,0	10 914,7

★ Based on a value of 231 kJ/100 g wet meat

represented 22%, 14% and 15% respectively, while the largest size class (C) was minimally represented. In the 1983 (live) sample from Ugab Mouth beach, size class B constituted the largest proportion of the sample (51%), with the smallest sized mussels constituting the smallest proportion of the sample (12%). In the two comparative samples, B2736 and B2740, from the !Khuiseb delta area, class A was not represented at all, while mussels from the largest size class C made up the bulk of the samples (93% and 89% respectively). These differences are presented graphically in the histograms in Fig. 3.

Assuming that the archaeological samples reflect the available *Donax* specimens, then the high proportion of small mussels in the Ugab Mouth midden samples indicates that the population of mussels was largely juvenile and expanding, following Odum (1971: 176). The comparative 1983 (live) sample, then, shows that the modern population structure is different and implies that the character of *Donax* populations fluctuates with time. This agrees with the findings of De Villiers (1975) who showed that populations of *Donax* may expand steadily after catastrophic decline. The high proportion of large mussels in the !Khuiseb comparative samples would indicate a mature population of *Donax*. The differences in distributions of size classes in the Ugab Mouth and !Khuiseb Delta archaeological samples imply that the structure of *Donax* populations varies along the

Table 4 ***Donax serra* midden volumes** and estimated contents

Midden	Vol (m^3)	MNI	Wet meat wt (kg)	Energy content (kJ)
3	0,24	11 365	39,2	90 582
4	0,30	14 207	49,0	113 220
5	0,25	11 839	43,8	101 185
6	0,02	947	3,3	7 540
7	0,35	16 574	54,7	126 346
8	0,27	12 786	44,1	101 885
9	0,40	18 942	65,3	150 949
10	0,21	9 945	34,3	79 254
11	0,34	16 101	55,5	128 318
12	0,02	947	3,3	7 540
13	0,08	3 788	12,7	29 314
14	0,02	947	3,3	7 540
16	0,20	9 471	32,7	75 486
Total	2,70	127 859	441,2	1 019 159
$\bar{x}$	0,21	9 835	33,9	78 397
SD	0,13	6 295	21,6	49 973

Vol = (1/3 π RAB) 1/2 where R = depth, A = length, B = breadth
MNI = minimum number of individual mussels

coast. De Villiers *(ibid.)* also showed that mussels are arranged on beaches according to size (the smaller mussels usually occurring near the high-water mark, and the larger specimens usually closer to or even below the low-water mark). These biological characteristics may allow spurious exploitation strategies to be inferred from archaeological samples, and we would caution against interpreting a high proportion of any particular size class as representing a selective exploitation strategy.

IV. DISCUSSION

The Ugab Mouth site is an apparently unique archaeological example of large-scale whale exploitation by aboriginal people. This singularity is partly related to problems of preservation and to the in-

complete archaeological exploration of the Namib coast. In the wider context of prehistoric settlement along the western seaboard of southern Africa, the site is unusual but not inexplicable; regular exploitation of whales is known from the ethno-historic record (Budack 1977) and the documented prehistory of the coastline indicates a responsiveness to resource concentrations that would not preclude the stranded cetacean (Smith & Kinahan 1984).

In the case discussed here, 16 stranded whales were disarticulated and their remains used to construct dwellings in a fashion that suggests an informed response to such windfalls. The process of bone accumulation may well have been discontinuous; although right whales visit these latitudes in considerable numbers during winter (Best 1970), they are not usually sociable (G. Avery pers. comm.) and the simultaneous beaching of 16 or more would be most unusual. It is therefore probable that more than one stranding episode is represented on this site although these cannot be distinguished. Similarly, the process of bone distribution might have covered several occupations and the observed distribution may be quite different from that of earlier occupations; bones outlying the main concentration would then be vestiges of a more extensive settlement and the extreme concentration in Features 6 and 7 would then indicate a smaller-scale and more recent use of the site. Historical observations of whalebone hut settlements were made by Paterson (1790) and Gordon (1779) and in the illustration of one site (provided by the latter and reproduced in Smith & Kinahan 1984), the use of ribs in the hut framework and of vertebrae as seats is similar to the use of whalebones in the Ugab Mouth site described in this paper. The similarities in the differential use of skeletal parts in these cases may have a more general validity. Preliminary survey of a number of coastal sites in the !Khuiseb delta vicinity (Kinahan in prep.), reveals that vertebrae are the most common whale skeletal parts and often occur without any other whalebones in association. Such observations await further confirmation but provide circumstantial support for the depletion of the Ugab Mouth assemblage by transport of bones.

In the absence of an absolute radiocarbon date for this site, we propose that the presence of Khoe-type ceramics (*cf.* Rudner 1968) and the lack of European trade goods places this site within the range of dates for ceramic associations elsewhere on the Namib coast (Vogel & Visser 1981) and outside the usual limits for European contact material on the Namib coast. Work in progress elsewhere in the Central Namib and in the !Khuiseb delta supports the contention that introduced trade goods moved rapidly through the area during the last two centuries and that their absence from any large residential site indicates pre-contact occupation. European items from coastal archaeological sites usually date to within the last two centuries, when regular trade is visible in the archaeological record (Kinahan in prep.). Initial European contact predates these occurrences by about two centuries (Axelson 1973) so that the discovery of a Spanish 2 reales coin dating to between 1556 and 1598 A.D. in the reign of Felipe II (L. Meltzer pers. comm.) on another Ugab Mouth site is exceptional for it seems that the volume of European goods introduced via the Namib coast was exceedingly low until the late 17th century. Maximum dating of Khoe ceramics on the Namib coast may be extended as sampling progresses but the consistent range of dates so far allows some relative dating and makes it highly probable that the Ugab Mouth site described in this paper falls within the range of 600 B.P. to 200 B.P.

There may be no causal relationship between the stranding of the whales and the presence of the river mouth, although a direct relationship between the human exploitation of these whales and the Ugab Mouth locality is a certain consequence of Namib environmental conditions. Access to the coast was constrained by available water as the prime limiting resource; there are practically no sources of water in the Central Namib that are not situated in river drainages and fresh water at the coast is only available near the river mouths. Thus, exploitation of coastal resources was limited to the river mouths and their environs and no settlement was possible on the long stretches of beach between them.

A highly predictable distribution of sites, consistently related to river mouths and their waterholes along the whole Namib coast would confirm this hypothesis. Little regional data is available, although few of the known Namib coastal sites offer contradiction. A recent survey of the Uniab delta (Kinahan, unpublished internal report) that revealed high site densities within a limited area lends some support to this view. However, the corollory, that river mouths would show an intensity of settlement (large, or very numerous sites) consistent with this environmental constraint, is not convincingly evidenced at the mouth of the Ugab. Our consideration of the site location offers a partial explanation that may be of general validity for site distribution at other river mouths. We show that the site occupies a relict landscape and it is possible that evidence of sites on the northern riverbank has been erased by shifts in the position of the river mouth. Beach sites at river mouths would be particularly vulnerable to shifts in drainage, and depending on the pattern of settlement in such localities, there would be an unusually high attrition of the archaeological distribution.

We have argued that site formation processes, including the effect of scavenging jackal on the representation of subsistence activities on the site,

allow little precision in the analysis of food remains. Without some control of these processes and of the sequence of occupation on the site, no reliable estimate of the importance of shellfish can be made. The analytical procedures for shellfish remains outlined in this paper clarify some of the related problems but the data allow no conclusive test for Voigt's proposition. In spite of the unusual association of residential features with discrete shellmiddens, we suggest that the proposition cannot be tested without the demographic and chronological evidence that is seldom available for such sites. In the case of the Namib coast, general archaeological knowledge of demography and subsistence strategies is very poor and it is difficult to relate occupation of the Ugab mouth to any pattern of movement between seasonally abundant resources. There is, nevertheless, some recent evidence of *Donax* as an important resource in the area; an aboriginal family that lived some distance from the coast on the Hoanib River (200 km north of the Ugab) during the 1950's repaired to the mouth of the Hoanib and the Uniab delta for several months each year expressly to collect and eat *Donax* (E. Karlowa pers. comm.). The timing of this movement is uncertain but it appeared to coincide with inland shortages of sustaining plant foods and could thus have covered the lean months before summer rains.

Indeed, no such seasonal pattern may exist for Namib prehistory: the semi-historical case outlined above and the paucity of evidence for repeated occupation at the Ugab should be considered in light of Avery's (in press) case for year-round settlement at Wortel and the salient characteristics of the Namib environment. With an annual rainfall of less than 100 mm the general conditions of the Namib are inimical to human settlement. Almost all known Holocene sites in the Namib are situated within or close to regional resource anomalies. The coastal sites are no exception; access to them is afforded by valleys that are often flanked by riparian forest as a result of abundant groundwater, and the littoral itself is arguably the most productive resource base within reach of the desert. Inland, seasonal droughts are a regular occurrence and several years may pass without rain. The severe depletion of resources that accompanies these events obviously reduces the carrying capacity of the desert and would have placed some demographic stress on its residents in the past.

Under such circumstances, river mouth localities may have provided viable alternatives, with the Ugab Mouth site as an example of this temporary residence. Equally, windfall whale strandings would allow larger and more sustained social aggregations than at many inland sites and would present an attractive alternative even under favourable inland conditions.

Finer control of the Namib coastal sequence is necessary before the effect of European landings and their demand for sheep and oxen can be gauged. It is conceivable that this demand and the ensuing exchange influenced the timing and direction of aboriginal movement to the coast and that the changes would be archaeologically visible. A programme of research to test this hypothesis in the !Khuiseb delta, an important European entrepôt during the last two centuries, is currently in progress. Comparative data from sites such as the Ugab Mouth provide a valuable baseline for the archaeological interpretation of contact on the Namib coast.

V. CONCLUSIONS

The Ugab Mouth site exemplifies the prehistoric exploitation of beached whales. This example is apparently unique and we have described it in some detail, considering alternative interpretations of the remains of 16 whales and their associated shellfish middens. We infer that the site was used on several occasions during which the whalebone was redistributed and the shellfish middens were accumulated. The interpretation of the site raised several problems of relevance for the regional archaeology. We have dealt with these issues from the limited perspective of the site, outlined some analytical procedures and suggested parameters for a regional model of prehistoric settlement on the Namib coast.

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