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JUST BEFORE VAN RIEBEECK: GLIMPSES INTO TERMINAL LSA LIFESTYLE AT CONNIES LIMPET BAR, WEST COAST OF SOUTH AFRICA

ANTONIETA JERARDINO^{1*}, LIORA KOLSKA HORWITZ², ARON MAZEL³ & RENE NAVARRO⁴

¹Department of Archaeology, University of Cape Town, Rondebosch, 7701, South Africa

*Corresponding author. E-mail: antonieta.jerardino@uct.ac.za

²Department of Evolution, Systematics and Ecology, The Hebrew University, Jerusalem, 91904, Israel
E-mail: lix1000@gmail.com

³International Centre for Cultural and Heritage Studies, Newcastle University, Newcastle upon Tyne NE1 7RU, United Kingdom
E-mail: a.d.mazel@newcastle.ac.uk

⁴Animal Demography Unit, Department of Zoology, University of Cape Town, Rondebosch, 7701, South Africa
E-mail: rene.navarro@uct.ac.za

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INTRODUCTION

The first encounters between European mariners and local people on the southern and western Cape coasts occurred in the late fifteenth and early sixteenth centuries, and in 1652 the Dutch East India Company established a refreshment station at Table Bay (Raven-Hart 1967). Soon after, Europeans ventured north and east to acquire more livestock and mineral resources, as well as to find the legendary *Vigiti Magna* river (Mossop 1931; Serton *et al.* 1971). Regrettably, their earliest journals provide only brief comments on local inhabitants. More detailed descriptions were recorded in 1685 by Simon van der Stel on his long journey north in search for copper (Serton *et al.* 1971). On his return, he explored the coastal margins of the Olifants River and Verlorenvlei mouths (Serton *et al.* 1971: 325–339, 353, 359–361), but recorded only a few descriptions of local Soaqua foragers. Twenty years later, the Landdrost of Stellenbosch, Johannes Starrenberg, set out for a journey to Namaqualand to barter and trade with Khoe pastoralists on behalf of the Dutch East India Company (Raidt 1973). He recorded Nama toponyms: *Quaecomma* referred to the Verlorenvlei and *Tythouw* was the Langvlei River. Stretches of the West Coast and Sandveld also were traversed by free burgers on sometimes illegal trading and hunting expeditions, and some reached as far north as Namaqualand (Raidt 1973: 21; Penn 1995). But they left no record of encounters with indigenous groups. Some of the most detailed accounts of the Cape Khoe people were recorded in the mid- to late eighteenth century by Robert Gordon (Raper & Boucher 1988; Cullinan 1992). He recognized that many of the shell heaps at Baboon Point, Elands Bay, were not the result of natural processes or that of animal activities, but that of “Strand Bosjemans” (Raper & Boucher 1988: 402). By then, the traditional way of life of foragers had already ceased.

The overall outcome of encounters between Europeans and indigenous groups is well known (Brink 2004). But, as with other culture contact situations, the pace and extent of this violent change depended on many factors, including cultural, social and economic resilience inherent to Khoesan groups at that time (Head & Fullagar 1997; Cusick 1998). There is a need to interrogate the history of southern Africa’s last 500 years, in order to re-cast the history and impact of colonialism within a framework that pays attention to local differences, rather than the grand narratives of established history (Swanepoel *et al.* 2008). Given the brevity and frequent bias of the early colonial written record, and the socio-economic diversity of southern

African foragers (Barnard 1992; Kusimba 2005), it is the archaeological record that must provide the details of indigenous life-ways immediately before European contact (Sampson & Plug 1993; Voigt *et al.* 1995; Plug & Sampson 1996). The late pre-colonial site of Connies Limpet Bar (CLB), a West Coast open shell midden situated in the Elands Bay area, provides such an opportunity.

LOCATION, STRATIGRAPHY AND DATING

CLB is a small shell midden, about 30 m from the present mouth of the Verlorenvlei coastal lake and about 80 m from the sea (32°19’S, 18°20’E). Although the immediate coastline is sandy, extensive rocky reefs are situated 200 m to the southwest (Fig. 1). The archaeological deposit was visible near the top of an exposed section in a sand dune vegetated with gum trees. CLB was excavated over two days on 15 and 16 December 1978 by Liora K. Horwitz, Aron Mazel and the late Pat Carter. Approximately 200 mm of sand overburden was removed before a thin (120–150 mm), limpet-dominated shell lens was uncovered. The shell lens sloped eastwards under the remaining dune, probably created in a single, short episode of occupation. Midden contents were well preserved with faunal remains that included fish bones, scales and the fragile exoskeleton of crustaceans.

A total of 193 buckets (2.97 m³) of deposit was excavated from 12 m² (Fig. 2, Table 1). Excavated material was sieved through a 3.3 mm mesh and all of this material was recorded as Spit 1. However, within Spit 1, the discovery of a cache of five ostrich eggshell flasks (Fig. 3) necessitated more detailed recording of context. Material surrounding this cache in squares C7 and C8 was named ‘Round Eggs’, and that excavated among the eggshell flasks from D7 and D8 was named ‘Further Round Eggs’ and ‘Still Further Round Eggs’. A sample of charcoal recovered from square C6 at 30–40 cm below the surface of the sand yielded an uncalibrated radiocarbon date of 390 ± 40 BP ($\delta^{13}\text{C} = 22.4$, Pta-4020). After calibration using OXCal 4.0 (Bronk Ramsey 1995, 2001) and the calibration curve ShCal 04 (McCormac *et al.* 2004), a 1 σ calibrated age range of AD 1476–1638 and a 2 σ calibrated age range of 1452–1651 was obtained (Table 2), making CLB one of the latest Stone Age sites in the Elands Bay area.

SUBSISTENCE

In MNI counts, marine shells are the most abundant subsis-

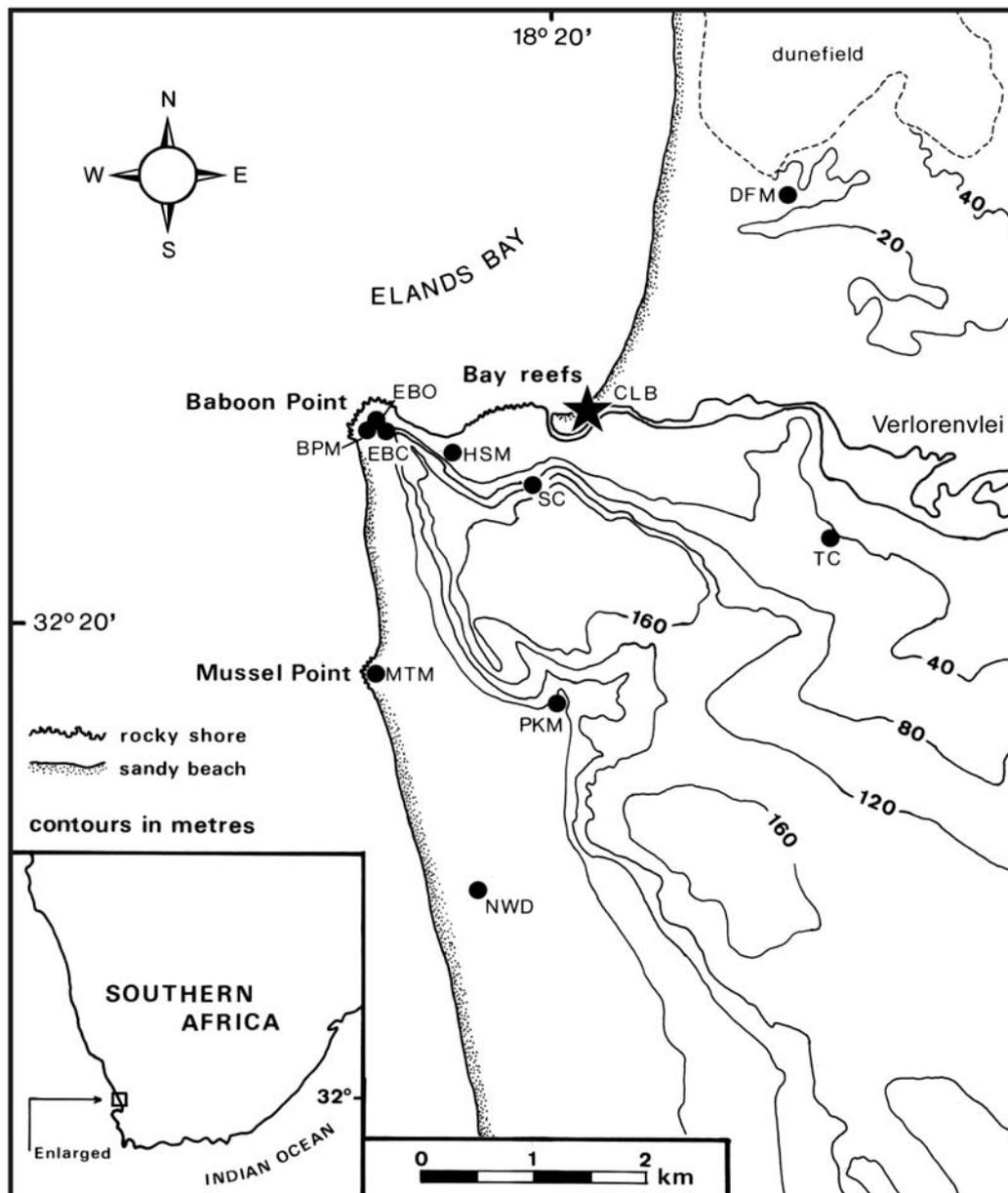


FIG. 1. Geographic location of Connie's Limpet Bar (CLB) and other sampled sites in the study area. Dunefield Midden, DFM; Elands Bay Cave, EBC; Elands Bay Open, EBO; Hailstone Midden, HSM; Mike Taylor's Midden, MTM; Newedam A site, NWD; Pancho's Kitchen Midden, PKM; Spring Cave, SC; Tortoise Cave, TC.

tence remains at CLB, followed by calcareous mandibles of the Cape rock lobster (*Jasus lalandii*) and lastly the remains of terrestrial vertebrates. At least nine species of molluscs were gathered almost exclusively from nearby rocky reefs, as shown by the shellfish species composition (Table 3). Limpets dominate the shellfish assemblage (86%), with *Cymbula granatina* and *Scutellastra granularis* comprising the majority of this category. The remainder consists of bivalves (8.3%), such as the rocky bottom black and ribbed mussels *Choromytilus meridionalis* and *Aulacomya ater*, and the sandy beach mussel *Donax serra*, followed by rocky shore whelks (5.6%) (*Burnupena* spp. and *Nucella* spp.). Not included with the main counts and frequency calculations is *Crepidula porcellana* (slipper shell). Because this small species seldom exceeds 25 mm in shell size (Kilburn & Rippey 1982), it was probably collected unintentionally and found its way to sites clinging on larger shells (Jerardino 1997).

Size observations were obtained for black mussel (*C. meridionalis*) shells by measuring the maximum prismatic band widths on the majority of right valves and by applying recon-

structive morphometric equations (Buchanan 1985) (Table 4). Whole and fragmented limpet shells (*C. granatina* and *S. granularis*) were also measured for the same purpose, and reconstructive morphometric equations (Jerardino & Navarro 2008) applied to fragmentary shells for the establishment of full shell lengths (Table 4). An MNI of 158 individuals was determined for Cape rock lobsters based on the majority of counts for right mandibles. Size observations in terms of carapace length (Table 4) were obtained by measuring the maximum length of the most numerous unbroken mandibles, in this case left mandibles, and applying the respective reconstructive morphometric equation (Jerardino *et al.* 2001).

Table 5 shows the NISP and MNI counts for vertebrate remains. Mammal and tortoise were recalculated by R.G. Klein (pers. comm., 2008), and differ slightly from those initially presented in 1987 by Klein and Cruz-Urbe (Table 3). The number of vertebrate specimens is relatively small representing a total MNI of only 44. Based on MNI counts, bird species dominate the vertebrate assemblage (MNI = 16; 36.3%). Among this

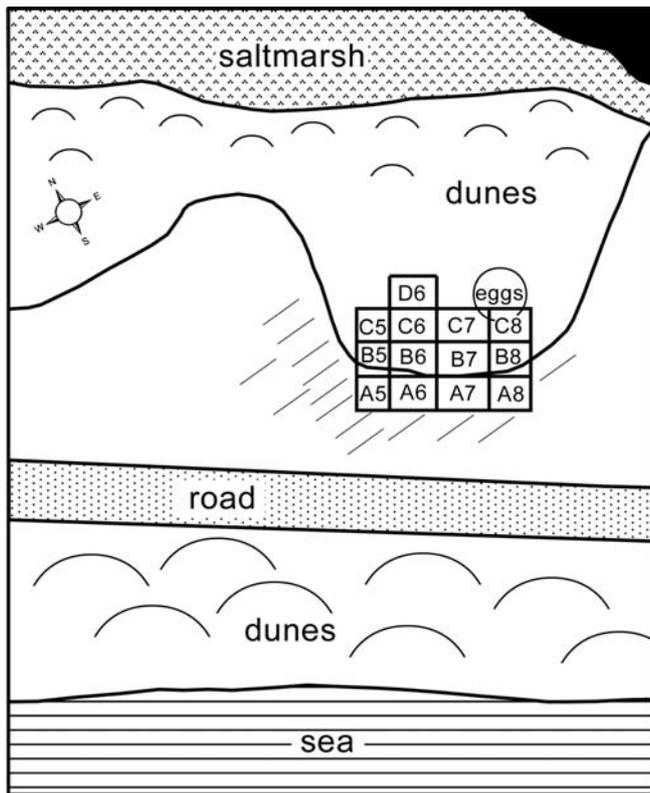


FIG. 2. Schematic plan view of excavations at Connies Limpet Bar.

group, two species of cormorants and penguins are most numerous. Small bovids and *Raphicerus* spp. make up the remaining bone material in NISP counts, but their MNI contribution is relatively modest (MNI = 4; 8.8%). Tortoises, rock hyrax (*Procapia capensis*), small carnivores (mostly immature or young adults), a large and a large–medium sized bovid, a hare (*Lepus* sp.), and a baboon (*Papio ursinus*) comprise the remaining vertebrate assemblage. No sheep remains, nor those of any

TABLE 1. Volume of material by stratigraphic unit and square at Connies Limpet Bar (65 full buckets make up a total of 1 m³).

Square	No. buckets	Cubic metres
B5	10	0.15
B6	12	0.18
B7	13	0.20
B8 Spit 1	3.75	0.06
C6 Spit 1	19.75	0.30
D6 Spit 1	16	0.25
C5 Spit 1	24.5	0.38
B5 Spit 1	6.75	0.10
D5 Spit 1	24	0.37
B6 Spit 1	3.25	0.05
C7 Spit 1	15	0.23
D7 Spit 1	9	0.14
C8 Spit 1	6	0.09
D8 Spit 1	5	0.08
Round eggs	10	0.15
Further round eggs	10	0.15
Still f. round eggs	5	0.08
Total buckets	193	2.97

other domesticated fauna, were identified.

Age was assessed using the state of epiphyseal fusion and dental eruption. Bones and teeth of the wild cat and genet belong to adult animals. Examination of dental eruption for rock hyrax specimens indicates that the three lower jaws represent juvenile animals between 14–20 months of age (deciduous PM2–PM4 present, as well as permanent M1 and M2, with M3 present but no permanent). For *Raphicerus*, two of the left mandibles also appear to represent juveniles. One jaw contains deciduous premolars (PM2 to PM4) as well as permanent molars M1–M2. A second jaw contains deciduous premolars PM2 to PM4 as well as permanent molar M1; while a third older animal, possibly an adult, is represented by a permanent M2



FIG. 3. View of the cache of five ostrich eggshell flasks. Note insert showing example of aperture facing down and lighter shading around it left by sealing material.

TABLE 2. Radiocarbon dates from sites discussed in the text. All dates were obtained from charcoal samples, with the exception of Tortoise Cave which was established from a sample of reeds and that of Newedam obtained from marine shell samples. Calibration for atmospheric variation in ^{14}C follows ShCal04 for the Southern Hemisphere (McCormac et al. 2004). For marine shell dates, calibration for atmospheric variation in ^{14}C follows Marine 04.14c (Hughen et al. 2004).

Laboratory no.	Site	Provenance	Uncal. ^{14}C date (yr BP)	$\delta^{13}\text{C}$ ‰	Calibrated date (1 σ AD)	Calibrated date (2 σ AD)
Pta-4020	Connies Limpet Bar	Spit 1	390 ± 40	-22.4	1476–1638	1452–1651
Pta-4023	Borrow Pit Midden	MH	640 ± 40	-23.4	1305–1411	1291–1427
Pta-7499	Dunefield Midden (North)	KIR	710 ± 45	-18.6	1287–1314	1273–1402
Pta-5061	Dunefield Midden (South)	FRA	580 ± 50	-23.5	1399–1430	1376–1447
Pta-1815	Elands Bay Cave	NKOM	320 ± 50	-21.8	1632–1663	1485–1677
Pta-5813	Elands Bay Cave	MRSB	500 ± 45	-20.1	1425–1459	1411–1497
Pta-2460	Elands Bay Open	Spit 1	590 ± 50	-23.8	1396–1427	1305–1444
Pta-4070	Grootrif G	PATCAP	690 ± 40	-19.0	1338–1392	1283–1405
Pta-4262	Hailstone Midden	GBS/PS	910 ± 40	-21.9	1163–1227	1041–1259
Pta-4478	Newedam A	Spit 1	990 ± 50	-0.1	940–1070	890–1150
Pta-5605	Pancho's Kitchen Midden	LAT	570 ± 20	-24.2	1411–1424	1405–1430
Pta-5921	Pancho's Kitchen Midden	MIST	880 ± 50	-23.8	1174–1259	1113–1280
Pta-4062	Spring Cave	ASH IV	460 ± 40	-18.3	1440–1485	1427–1519
Pta-4042	Spring Cave	DBM	840 ± 50	-16.6	1213–1276	1168–1291
Pta-3600	Tortoise Cave	FUB	760 ± 50	-23.4	1269–1299	1235–1317

and M3. Based on bone fusion, the single specimen of Cape fur seal (*Arctocephallus pusillus*) represents a large adult.

With the exception of the small bovids and hyrax, the terrestrial vertebrate samples were too small for a meaningful examination of skeletal element (Table 6). For rock hyrax, the postcranial remains are markedly under-represented relative to the cranial elements. Likewise, for *Raphicerus* spp., even if combined with the small bovid category, it is clear that although the full range of skeletal elements is present, postcranials are under-represented for the MNI estimate of three individuals. It is possible given the small excavation, that the remainder of the skeletal elements lay in unexcavated parts of the site. Bone density mediated attrition could have played only a minor role in biasing the assemblage, as shown by the presence of so many ribs (Table 6: 2/3 of the small bovid category), although some are in a fragmentary state. Table 7 lists the skeletal element representation for birds. Notably absent are the more fragile bones such as those of the skull and jaw, vertebrae, ribs, phalanges and pelvis, suggesting some bone density mediated attrition resulting from site formation processes and/or a portion of the birds having been recovered as wash-ups.

Although 127 fish bones (as well as over 46 fish scales) were recovered from CLB, species identification was carried out only on teeth and jaws. As such, only one bone was identified to

species representing a Hottentot (*Pachymetopon blochii*), a species with an average size of 45 cm that prefers rocky habitats.

A small number of ostrich eggshell (OES) fragments ($n = 6$), which have clearly not derived from the OES water containers, were also recovered. It is possible that these OES fragments were not related to subsistence needs but rather to the manufacture of artefacts such as beads and pendants.

MATERIAL CULTURE

The CLB stone artefact assemblage is extremely small ($n = 31$) and dominated by stone debitage (80.6%). This assemblage derives entirely from locally available raw materials, namely quartz and quartzite. No formal tools are present, although two utilized or edge-damaged stone artefacts made from quartz were identified (Table 8). Other categories of artefacts consist of one bone point and one bone awl recovered from square D6 and ten undiagnostic ceramic sherds weighing a total of 34.8 g. No early colonial European artefacts were found.

A cache of five OES flasks was excavated on the western end of the site and over squares C7, C8, D7 and D8 (Fig. 3). No evidence for a pit was identified. All five ostrich eggs were intact, and none was decorated. Each egg had a single, intentionally made round aperture. Interestingly, the location of the apertures differed between eggs; two had holes at the tips and three eggs had holes on their sides. Metrical attributes of the

TABLE 3. MNI and percentage frequencies of marine mollusc species from Connies Limpet Bar.

Species	MNI	%MNI
<i>C. meridionalis</i>	170	7.7
<i>A. ater</i>	12	0.6
<i>D. serra</i>	1	<0.1
<i>C. granatina</i>	1201	54.7
<i>S. granularis</i>	427	19.5
<i>S. barbara</i>	8	0.4
<i>S. argenvillei</i>	12	0.6
<i>S. cochlear</i>	2	0.1
Unidentified limpets	238	10.8
Whelk	124	5.6
TOTALS	2195	100.0
<i>Crepidula porcellana</i>	5	2.7

TABLE 4. Mollusc species and Cape rock lobster measurements for Connies Limpet Bar and contemporaneous levels from Elands Bay Cave ($V =$ coefficient of variation).

	<i>C. meridionalis</i>	<i>C. granatina</i>	<i>S. granularis</i>	<i>J. lalandii</i>
CLB				
n	141	615	309	83
Mean	79.4	55.6	37.9	77.5
S.D.	18.5	10.1	4.5	12.8
Range	45.9–119.1	30.1–82.0	26.3–55.8	59.5–110.6
V	23.3%	18.2%	11.9%	16.5%
EBC				
n	805	308	176	71
Mean	87.2	59.1	38.3	73.5
S.D.	16.9	9.8	4.1	11.5
Range	44.9–142.8	34.5–86.4	28.1–48.0	58.9–116.6
V	19.4%	16.6%	10.7%	15.6%

TABLE 5. Number of identified specimens/minimum number of individuals (NISP/MNI) of vertebrate species at Connies Limpet Bar. Identifications of birds were made by G. Avery & L.K.H.; rodents by B. Hendey & L.K.H.; ungulates & carnivores by R.G. Klein; seal by J.E. Parkinson & L.K.H.; fish by C. Pöeggenpoel.

Species	Vernacular name	NISP	MNI
<i>Spheniscus demersus</i>	African penguin	10	2
<i>Phoeniconaias minor</i>	Lesser flamingo	2	1
<i>Phoenicopterus roseus</i>	Greater flamingo	1	1
<i>Phalacrocorax capensis</i>	Cape cormorant	42	8
<i>Phalacrocorax carbo</i>	white breasted cormorant	12	1
<i>Diomedea</i> sp.	Albatross	2	1
<i>Procellaria aequinoctialis</i>	White chinned petrel	2	1
<i>Puffinus</i> sp.	Shearwater	2	1
<i>Lepus</i> sp.	Hare	1	1
<i>Papio ursinus</i>	Baboon	2	1
<i>Genetta</i> sp.	Genet	4	1
<i>Felis libyca</i>	Wildcat	5	1
<i>Arctocephallus pusillus</i>	Cape fur seal	1	1
<i>Procavia capensis</i>	Rock hyrax	18	3
<i>Bathyerigus suillus</i>	Cape dune-mole rat	1	1
<i>Otomys unisulcatus</i>	Bush karoo rat	18	1
<i>Rhabdomys pumilio</i>	Striped mouse	5	1
Rodentia sp.		1	1
<i>Taurotragus oryx</i>	Eland	2	1
<i>Raphicerus</i> spp.	Steenbok/grysbok	8	3
	Small bovid	50	3
	Large medium bovids	4	1
	Large bovids	12	1
<i>Chersina angulata</i>	Angulate tortoise	X	5
	Snake/lizard	Present	1
<i>Pachymetopon blochii</i>	Hottentot	1	1
Pisces sp.		127	–
TOTAL MNI			44

eggs and their modifications are presented in Table 9. Sealing material was found around the apertures of each egg, and each hole was covered by a *C. granatina* limpet shell. The sealing material around the apertures was analysed by staff of the

Department of Organic Chemistry at the University of Cape Town in 1979 for the purpose of identifying the main constituents, which was thought initially to be some type of plant resin or mastic. The results of this analysis showed an absence of carbohydrates or insoluble protein, discarding any possibility of plant resin, but instead the presence of clay and sand particles suggesting that clods of clay were applied to plug the holes and to keep the limpet covers in place.

DISCUSSION

SETTLEMENT

CLB is on a narrow sandy bar at the mouth of Verlorenvlei which offers little protection from enemies or elements. This and the lack of features associated with stock keeping suggest the site was occupied by foragers. A number of other small sites were also occupied relatively briefly in and around the Elands Bay area over the last 1000 years (Table 2), suggesting a high degree of group mobility (Jerardino 1996, 2007; Jerardino *et al.* 2009). Most of these sites were visited during the climatological period known as the Little Ice Age (Grove 1990). CLB falls within a 500-year period (roughly between 500–1000 BP) which in the study area has the second-highest number of dates for the last 6000 years (Jerardino 1996: fig. 6.1). Favourable environmental conditions for human settlement and subsistence characterized by higher rainfall and colder sea-surface temperatures were dominant at this time (Grove 1990; Cohen *et al.* 1992; Jerardino 1995). Higher productivity at both terrestrial and marine environments would have been dominant during these five centuries, translating into greater densities of shellfish beds along rocky reefs, denser and higher plant cover (grass and bush), and an abundant supply of fresh water from Verlorenvlei. The latter would have also attracted and supported many species of animals including fish and waterfowl.

Competition for resources between herders and foragers at this time would probably have been minimal, as resources must be limited for competition to happen (Molles 2005; Jerardino *et al.* 2009). This was probably also the case between indigenous groups and European settlers in the Cape soon

TABLE 6. Numbers of skeletal elements per mammalian taxon from excavated sample at Connies Limpet Bar. P = proximal; D = distal; C = complete.

	<i>Genetta</i> sp.	<i>Felis libyca</i>	<i>Procavia capensis</i>	<i>Raphicerus</i> spp.	Small bovid	Medium-large bovid	Large bovid
Cranium				1			
Maxilla		1	5	3			
Mandible	3	1	6	6			
Atlas			1				
Vertebrae					1		
Ribs					30	4	
Scapula		1P	1P	1D	2P		
Humerus				2D			
Radius				1D+1P	3P		
Ulna		1D			1P		
Metacarpal		1C					
Pelvis			3	1			
Femur					1D		
Tibia	1D		2C		1D		
Astragalus					1C		
Metatarsal				2P	3P		
Phalanx 1					3P		1D+5P
Phalanx 2					1C		3P+1C
Phalanx 3					1C		2C
Metapodial					2C		
TOTAL	4	5	18	18	50	4	12

TABLE 7. Skeletal element breakdown by bird species: Prox, proximal; Dist, distal; L, left side; R, right side.

Species	Bone	Portion	No./side	Total
<i>Phalacrocorax carbo</i>	Humerus	Prox	1L	1
	Humerus	Dist	1R	1
	Radius	Shaft frags	2	2
	Ulna	Dist	1L + 2R	3
	Carpometacarpus	Dist	1L	1
	Fibula		1L + 1R	2
	Tarsometatarsus	Shaft	1	1
	Coracoid	Prox	1	1
	TOTAL			12
<i>Phalacrocorax capensis</i>	Scapula		5L	5
	Humerus	Prox	2R	2
	Radius	Prox	1R	1
	Ulna	Prox	1L + 1R	2
	Carpometacarpus	Shaft frags	6	6
	Femur	Prox	2L	2
	Fibula		2L	2
	Sternum		6	6
	Tibiotarsus		8	8
	Coracoid	Whole	8	8
TOTAL			37	
<i>Spheniscus demersus</i>	Scapula		2L	2
	Humerus	Shaft frags	1L + 1R	2
	Radius	Dist	1R	1
	Ulna	Whole	2L	2
	Femur	Dist	1R	1
	Fibula		1	1
	Tibiotarsus	Dist	1R	1
TOTAL			10	
Albatross	Femur	Shaft	1	1
	Tarsometatarsus	Dist	1L	1
TOTAL			2	
Greater flamingo	Scapula		1	1
TOTAL			1	
Lesser flamingo	Tibiotarsus	Dist	1R	1
	Coracoid		1	1
TOTAL			2	
Shearwater	Scapula		1	1
Shearwater	Coracoid	Dist	1R	1
TOTAL			2	
White chinned petrel	Scapula		1	1
	Coracoid	Dist	1L	1
TOTAL			2	

after AD 1652. Nevertheless, this relationship changed rapidly for the worse as the numbers of technologically superior and aggressive agro-pastoral invaders increased steadily towards the end of the seventeenth century, bringing large-scale environmental degradation among other negative impacts (Schrire 1990; Baxter & Meadows 1994).

SUBSISTENCE

Early field surveys along Elands Bay rocky shores showed that the bay reefs, Baboon Point and Mussel Point (Fig. 1) are very different in terms of total biomass and species composition of mollusc beds (Rebelo 1982). This pattern was later described for similar shore types along much of the West Coast (Bustamante *et al.* 1995; Bustamante & Branch 1996). The exposed reefs of Mussel Point today support a very high biomass of filter feeders, mainly black mussels and substantial patches of the invasive European mussel *Mytilus galloprovincialis*. In contrast, the reefs located inside the bay are sheltered and dominated by limpets, with a total biomass one order of magni-

tude smaller than that observed for Mussel Point. Black mussel and limpet are equally common on the rocky shore of Baboon Point, but it is steep, more exposed to wave action, and therefore less accessible than Mussel Point. It has the lowest biomass of all three rocky shores.

Inter-reef differences in species composition and biomass probably have been present since the recovery and relative stabilization of sea level around 8000 years ago, although absolute numbers and biomass may well have shifted due to environmental changes affecting recruitment and growth rates (Bustamante *et al.* 1995; Bustamante & Branch 1996a). Inter-reef differences in average size of shellfish also would have characterized past shorelines, but maximum and average sizes would have been affected by sea-surface temperatures and productivity.

CLB shellfish composition is dominated by rocky shore fauna and is similar to that from contemporary sites with close access to the reefs within the protected bay (Fig. 1). For instance, Hailstone Midden (Horwitz 1979; Noli 1988) and

TABLE 8. Inventory of flaked stone artefacts from *Connies Limpet Bar*.

	Quartz	Quartzite
Chips/chunks	19	6
Utilized	2	0
Grindstone	0	2
Manuport	2	0
Total	23	8

Dunefield Midden (Tonner 2005) show a dominance of limpet species between 50 and 78%. In contrast, sites closer to more exposed shorelines at Baboon Point and Mussel Point such as Elands Bay Cave (Parkington *et al.* 1988), Elands Bay Open (Horwitz 1979), Pancho's Kitchen Midden (Jerardino 1997), Newedam A (Jerardino 2003), and the uppermost horizons at Mike Taylor's Midden (Jerardino & Yates 1997) show instead a dominance of black mussels around 70–75%, followed by barnacles (10–15%) and overall lowest frequencies of whelks and limpets around 2–8%. It thus appears that the relative frequencies of shellfish species from sites dating to the last thousand years broadly correspond to their relative abundance today on nearby reefs. Consequently, it seems that when foragers occupied CLB and other sites between about 1000 and 1700 AD, they harvested molluscs from the adjacent shoreline without preference for one species over another (Buchanan 1988; Parkington *et al.* 1988). This pattern can also be seen in coastal sites of the first millennium AD (A. Jerardino personal observations). However, it is not present in older sites where shorelines have not changed. Black mussels dominate (96–99% by weight) in sites both within and outside the bay reefs between 3000 and 2000 years ago, at a time when shellfish exploitation reached its highest levels ever in the pre-colonial history of the western Cape (Jerardino 1996, 1997; Jerardino & Yates 1997; Yates 1989; Jerardino *et al.* 2008). Studies have shown that at this time there was a marked increase in population, relatively longer site visits, more circumscribed mobility, a heavier reliance on marine resources and a re-formulation of subsistence strategies around terrestrial resources (Jerardino & Yates 1996; Sealy & van der Merwe 1988; Lee-Thorp *et al.* 1989; Jerardino *et al.* 2008). Clearly, very different subsistence and settlement strategies characterized the last 1000 years compared to those between 3000 and 2000 years ago (Parkington *et al.* 1988).

Comparisons of CLB mollusc sizes with those from contemporary sites in the Elands Bay area are illuminating. Two occupation horizons at Elands Bay Cave (EBC) are contemporary with CLB and similar marine palaeo-productivity can be assumed (Table 2). The marine shell samples from these EBC horizons were pooled and analysed according to the same standards used for CLB marine shell assemblage. Shell sizes for *C. meridionalis*, *S. granularis* and *J. lalandii* carapace size (Table 4) were compared statistically with those established for CLB by means of a *t* test. Figure 4 shows box plots for these four species.

Statistically significant differences were detected in all species with the exception of *S. granularis* ($t = -0.8537$, d.f. = 389.012, $P = 0.3938$). EBC mean sizes of *C. meridionalis* ($t = -4.659$, d.f. = 182.624, $P < 0.0001$), and *C. granatina* ($t = -5.0479$, d.f. = 626.321, $P < 0.0001$) are significantly larger than those calculated for CLB, while EBC *J. lalandii* mean carapace size ($t = 2.0256$, d.f. = 151.562, $P < 0.05$) is significantly smaller than that from CLB.

Wave action has been demonstrated to have a profound effect on the body size of shellfish. Movements of most limpets are inhibited by wave action, and they achieve smaller sizes on wave-exposed than sheltered shores (Branch & Odendaal 2003). This is particularly true of both *S. granularis* and *C. granatina*, the two species found with highest frequencies in West Coast middens. Conversely, mussels, which favour wave-exposed shores because wave action suspends and replenishes greater concentrations of particulate food (Bustamante & Branch 1996a, 1996b), attain greater sizes and growth rates on exposed shores than in sheltered areas (Steffani & Branch 2003; Branch & Steffani 2004). Consequently, wave exposure may explain some of the observed size differences, as reefs in close proximity to EBC are steep and exposed while those in immediate proximity to CLB are sheltered and slope gently. Based on modern ecological studies (Branch & Odendaal 2003; Steffani & Branch 2003) larger mussels and smaller limpets would be expected for EBC assemblages while the inverse would apply to CLB. Since Cape rock lobsters could have been captured by wading or by luring individuals with bait, and given that smaller rock lobsters often frequent shallower waters to escape predation by large adults (Pollock 1989), foraging in the less accessible Baboon Point reefs would have resulted in the procurement of overall smaller individuals closest to this shore than when foraging in the bay reefs. The above predictions on mean body sizes are confirmed for *C. meridionalis* and *J. lalandii* but not for the two limpet species. Perhaps, as we suggest below, additional behavioural factors relating to shellfish collection and the relatively greater susceptibility of limpets to harvesting (Lasiak 1991) may explain these unexpected results.

Because of their distribution in the high and mid intertidal zones and relative ease of gathering, *C. granatina* and *S. granularis* are more vulnerable to harvesting pressure than *C. meridionalis* mussels (Lasiak 1991; Jerardino *et al.* 2008). The latter species occurs in the intertidal zone and down into subtidal depths, with smaller and easier to collect individuals higher up this gradient (Kilburn & Rippey 1982). Assuming and considering that: a) people collected larger molluscs first, as is observed with modern foragers (Siegfried *et al.* 1985; Durán *et al.* 1987; Hockey *et al.* 1988); b) that CLB and EBC occupations involved comparable lengths of visits and numbers of shellfish foragers; and c) that shellfish collection from CLB focused largely on limpets (Table 3: at least 54% *C. granatina*) while harvests from EBC focused on *C. meridionalis* mussels (24–61% MNI) and less so on *C. granatina* (14–40%) and *S. granularis* (5–20%), it is to be expected that smaller limpets would have been added to the collections towards the end of

TABLE 9. Observations on *Connies Limpet Bar* ostrich eggshell flasks. The sealing material observed constitutes only remnants of what was originally applied around the openings (measurements in mm).

Egg no.	Egg length	Egg width	Position of aperture	Aperture diameter	Sealing material (length)	Sealing material (width)
1	145	120	Tip	17	42	50
2	140	114	Tip	13	45	45
3	140	115	Side	13	62	59
4	135	104	Side	10	–	–
5	130	105	Side	10	61	63

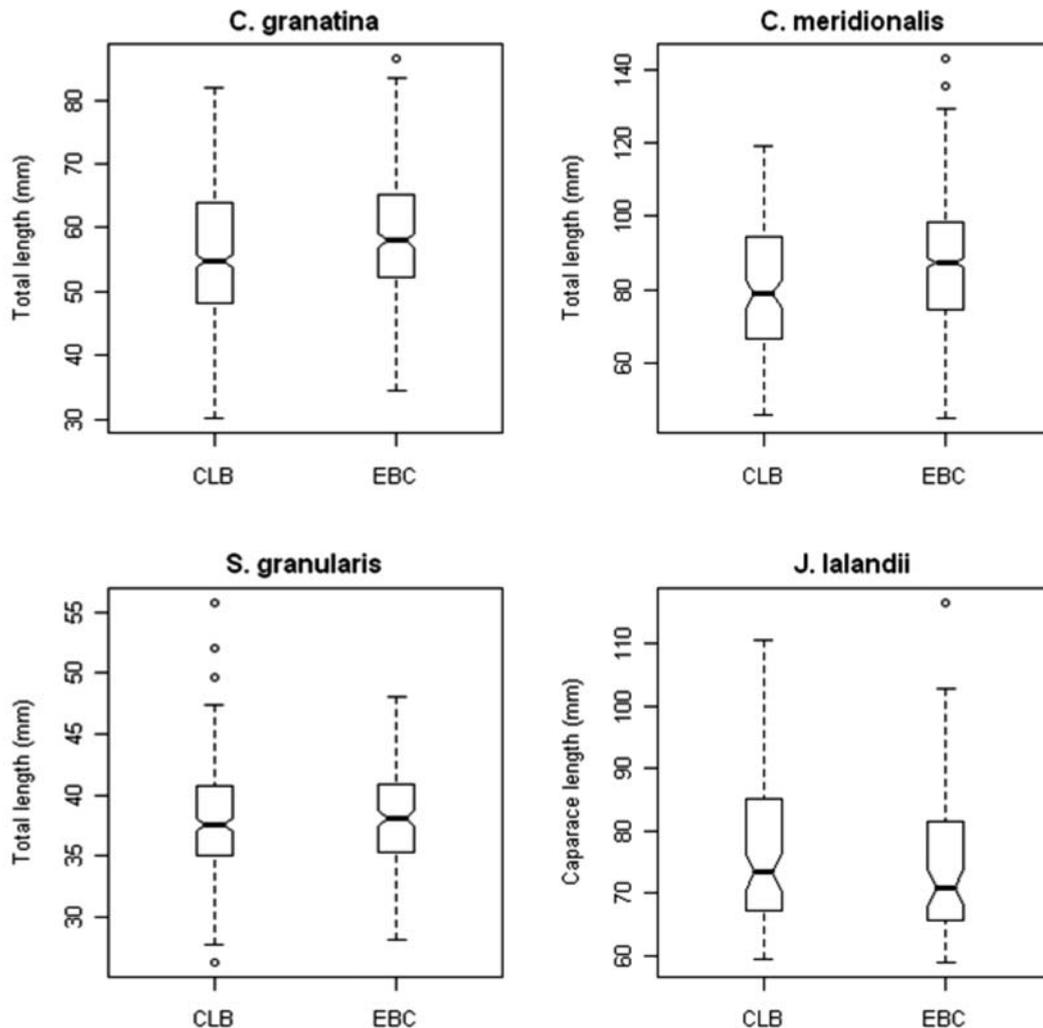


FIG. 4. Box-and-whisker plot of total shell length of *C. granatina*, *S. granularis*, *C. meridionalis* and *J. lalandii* for CLB and contemporaneous occupation at EBC. Illustrated are lower and upper quartiles (box), the median (line across the box), the range (whiskers) which is 1.57 times the inter-quartile range (Q75–Q25), and extreme values are shown separately (circles).

the CLB occupation. This prediction appears to be confirmed by the size frequency histograms of *C. granatina* from CLB and EBC (Fig. 5), where individuals in the 40–50 mm size range are represented in substantially larger numbers at CLB than at EBC. Although a diachronic view which would inform us of the likelihood of resource pressure is not available for CLB, it is possible to suggest that a heavy reliance on shellfish during a relatively short visit to the bay area may have resulted in the temporary and localized thinning out of limpets.

It is perhaps also of note that despite the existence of extensive sandy beaches near CLB, only a single individual of *D. serra*, a sandy shore dwelling species was identified. Other sites located less than a kilometre away from sandy beaches also show scant numbers of this species, and the few observed are often modified shell scrapers (Horwitz 1979; Parkington & Poggenpoel 1987; Robey 1987; Orton 2006). It is very likely that the coastal geomorphology north of Elands Bay has remained much the same since the build up of dunes during the late Holocene (Miller *et al.* 1993, 1995). Hence, it is unlikely that environmental change could explain the near absence of *D. serra* and other species found in sandy beaches. *D. serra* burrows in sandy substrate and is found in variable concentrations along exposed sandy beaches in the west and south coasts of South Africa (McLachlan & Hanekom 1979; Kilburn & Rippey 1982). Along the south coast, this species occupies the mid-intertidal zone, while along the west coast it is found

deeper within the lower intertidal and shallow subtidal zone (McLachlan & Hanekom 1979; McLachlan *et al.* 1979; Donn & Els 1990). Smaller individuals (30–45 mm in shell length) are found at sand depths of 0–7 cm while larger individuals (45–60 mm shell length) are located between 7 and 15 cm into the sand (McLachlan & Hanekom, 1979). Easier access to this resource along the south coast seems to be reflected by their consistently higher frequencies in local mid and late-Holocene shell middens (Klein 1972; Döckel 1998; Binneman 2004/2005). More effort is needed to reach west coast *D. serra* colonies, which might explain its rarity on sites along this coastline. A known exception for the last 500 years (pre-contact) along the Namibian coast could well be explained by foraging on the upper limits of this species' tidal distribution as reflected by the dominance of small individuals (Kinahan & Kinahan 1984). A similar explanation may also account for the noticeable numbers of *D. serra* at Ysterfontein 1 MSA site (Avery *et al.* 2008).

As for bird remains, cormorants seem to have been easy to access around Baboon Point (Jerardino *et al.* 2009). EBC over the last 1000 years, Borrow Pit Midden around 640 BP and Hailstone Midden occupied around 900 BP (Fig. 1) show the highest frequencies of bird bones (particularly cormorants) in the Elands Bay and Lamberts Bay areas during the late Holocene (Avery 1987; Noli 1988; Jerardino *et al.* 2009). According to historical records, cormorants were obtained by collecting washed-up animals, chasing and clubbing, and also with bows

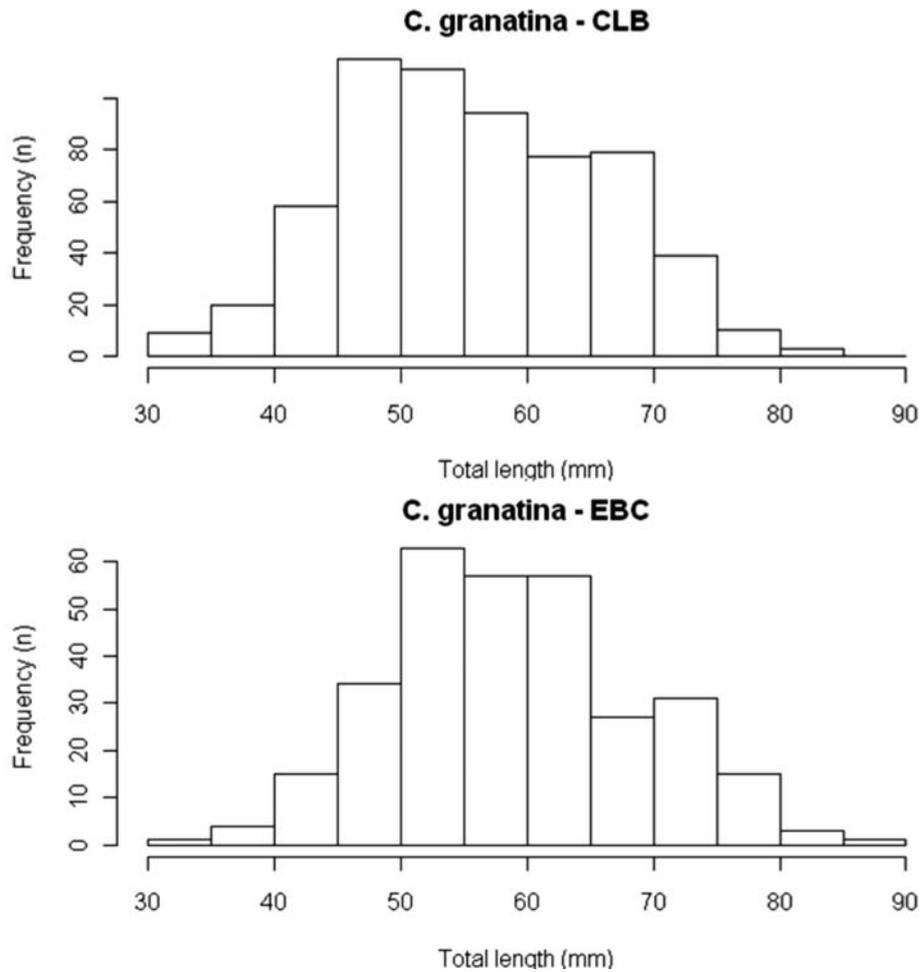


FIG. 5. Frequency (n) histograms of *C. granatina* limpet shell sizes from Connies Limpet Bar and contemporaneous assemblage from Elands Bay Cave.

and arrows (Avery 1987:169). Nonetheless, the relatively high numbers of birds represented at CLB and locally elsewhere over the last 1000 years is unlikely to have resulted from beach collections alone, given their low numbers currently observed during beach surveys (<1–3 birds per km; Avery 1987). Hence, it is possible that an extinct local breeding colony or regular conglomerations of flocks near or at Baboon Point may explain this marked geographic emphasis on bird catching around Baboon Point over the last 1000 years. The systematic use of nets as part of the available hunting technology of coastal foragers during the late Holocene may also be relevant (Jerardino *et al.* 2009). However, the presence of albatross and white-chinned petrel, two pelagic species that do not establish permanent or temporary colonies along Africa’s shores, is unlikely to be due to net-hunting. Rather, they may have washed up, as previously suggested by Avery (1987).

Among the terrestrial fauna, MNI counts of *Raphicerus* spp. at CLB are identical to those for indeterminate small bovids, suggesting that the latter may be the undiagnostic skeletal elements of *Raphicerus*. The same may apply to the one eland and an indeterminate large bovid. These indicate hunting success during the short occupation. Snared animals include small bovids and other small mammals, such as rock hyraxes, at least one hare and a few small carnivores. The latter group of species feature regularly in excavated faunal assemblages from the Elands Bay and Lamberts Bay areas (Klein & Cruz-Urbe 1987; Noli 1988; Cruz-Urbe & Klein 1994; Jerardino 1998, 2007). They were probably caught for their furs rather than their meat. Subsistence rounds also included the collection of tortoise, which at CLB are few compared to other nearby Late Holocene

assemblages (Jerardino 2007; Jerardino *et al.* 2009). The apparent absence of domesticated fauna at CLB lends support to the suggestion that the occupants were foragers.

THE CACHE OF OSTRICH EGGSHELL FLASKS

The use of ostrich eggshell flasks by southern African foragers has been recorded since the early days of archaeological research (Péringuey 1911). Caches of such flasks are a rare but conspicuous feature in LSA archaeological contexts, particularly in the Northern Cape region and Namibia (I. Rudner 1953; J. Rudner 1971; Sandelowsky 1971; Morris 1994; Morris & Von Bezing 1996; Henderson 2002). Ethnographic and ethno-historical observations have clearly shown their use as water containers (Morris 1994; Henderson 2002), but their use as receptacles for pigments and other material has also been established (J. Rudner 1971; Sandelowsky 1971; Humphreys 1974). The use of flasks is also evidenced by OES fragments containing an arc of the aperture, and these are widespread in southern Africa since MSA times (Wendt 1972; Deacon 1976; Schweitzer 1979; Schweitzer & Wilson 1982; Humphreys & Thackeray 1983; Wadley 1993; Parkington *et al.* 2005; Dewar 2008).

The ostrich eggshell flasks were packed tightly and buried with their apertures down or sideways. Although the apertures were sealed with clay and a shell, each OES flask was full of sand. This has also been observed in caches in the Northern Cape (I. Rudner 1953; Morris 1994; Henderson 2002). Filled with sand, the ostrich eggshells may have been more resistant to breakage while stored temporarily underground, as argued by Morris (1994). The position of the apertures in the CLB flasks

is similar to those of the Northern Cape, as well as to ethnographic collections (Nteta 1975; Jacobson 2006). The diameters of the CLB flask apertures (Table 9) overlap with the range from Vaalbos National Park (Morris 1994: 13–17 mm), Gordonia District (J. Rudner 1971: 10–13 mm) and the South African Museum examples (Maggs 1966). The absence of any decoration on the five flasks conforms to a temporal pattern already identified for the last 2000 years for the Western Cape (Yates *et al.* 1994).

The CLB flask openings are mostly rounded, probably the result of careful chipping followed by gentle abrasion with the use of an implement akin to that reported by Maggs (1966). Morris (2002) suggests that discolouration and adhesions around the flask opening reported by Henderson (2002) could serve as an indicator for the erstwhile presence of mastic spouts. A similar discoloration is present in all five CLB OES flasks, although analysis of the sealing material failed to identify organic constituents in 1979, and the presence of a limpet shell as lids argues against spouts in this particular case. The use of marine limpet shells as lids is unique so far, but probably relates to the coastal setting of the finds. Spouted flasks appear to be restricted to the confluence of the Orange, the Vaal and the Riet rivers (Humphreys 2006).

Given the site's location near the mouth of Verlorenvlei, the cache of flasks at CLB may indicate that the vlei served as a source of fresh water and that the containers were buried to be refilled when needed in future visits. Alternatively, due to seasonally higher salinity of water at the vlei mouth, these flasks could have been used to bring fresh water from further upstream, and were then left at the site for later use.

CONCLUSIONS

CLB appears to represent a short visit by a small group of foragers to the mouth of Verlorenvlei in the last years of the pre-colonial period. Subsistence resources were abundant thanks to a productive marine and terrestrial environment sustained through the Little Ice Age. Overall, foraging appears to have been broad-based and opportunistic, taking advantage of resources in close proximity to the camp, a pattern that is evident also at other nearby sites dating to the last 1000 years (Jerardino *et al.* 2009).

Despite the relatively short occupation, and the high marine productivity as inferred from low sea-surface temperatures (Cohen *et al.* 1992), shellfish collection might have temporarily impacted on the more vulnerable and most heavily harvested of mollusc species, namely *C. granatina* limpets. However, further comparative work is necessary in order to establish more conclusive evidence in this regard. Large numbers of Cape rock lobsters formed part of the foragers' diet which would have been relatively easy to procure from the sheltered and low-lying reefs adjacent to CLB. The gentle reef topography would have given greater access to deeper waters where larger adults hide. This is reflected by the larger average size of Cape rock lobsters at CLB compared to those from contemporary EBC occupations. On the other hand, and despite their expected abundance along the long nearby sandy beaches, *D. serra* white mussels were ignored. Access to this species may have been restricted by their distribution low in the tidal gradient along the West Coast.

CLB occupants had also great success in procuring a relatively large number of marine birds and other small prey, such as small bovids, rock hyrax and tortoises. During their short visit, they also hunted an eland and an unidentified small–medium bovid. The expedient character of the stone artefacts suggests simple processing technology. However, the

procurement of at least ten birds capable of flying suggests the use of nets. Washed up birds were collected to a much lesser extent.

The five ostrich eggshell flasks confirm that these water-carrying devices were used throughout prehistory until European contact, as similar finds in the Northern Cape have also indicated. CLB occupants may have intended to come back and reuse the flasks, but the fact that the flasks were still there when archaeologists arrived about 400 years later suggests that the possibility for revisiting was curtailed rapidly. The broad-based diet, flexible subsistence strategy, and high degree of mobility may have allowed foragers to react quickly and effectively to the presence of newcomers in their landscape. Nevertheless, the rapidly expanding settler frontier quickly put an end to their traditional way of life (Swanepoel *et al.* 2008).

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