

Cranial Trauma as Evidence of a Stressful Period among Southern African Foragers

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This paper documents and attempts to explain patterns of interpersonal violence that are evident in the human skeletal remains of South African hunter-gatherers dating to ca. 2400-3000 BP. The extrapolated behaviour of hunter-gatherers is important in the context of reconstructing the lives of our ancestors over the many millennia that precede the domestication of plants and animals. On the one hand, it is obvious that our ancestors were good at foraging because we are still here. On the other hand, there surely must have been some strategies that worked better than others, and the evidence for success or failure may be accessible to us through the skeletal remains.

Documentation of the health and behavior of living or historically documented hunter-gatherers from recent years offers useful information that can be applied to earlier populations, with caution (Binford 2001; Eaton and Eaton 1999; Jenike 2001; Kelly 1995; Truswell and Hanson 1976). However, study of recent peoples cannot provide a full picture of past peoples' behavioral options, because these recent populations did not have access to the rich environments that were exploited by their ancestors. To varying degrees, all recent populations represent groups whose activities and mobility are constrained or even dictated by dominant non-foraging groups like colonists or modern state governments. The skeletal remains of past foragers who lived their lives in a world populated solely by other foragers can form the basis for a more informed understanding of what it meant to be a forager throughout most of the human evolutionary story.

Regrettably, the low population density that characterizes much of this era is linked with reduced archaeological visibility and relatively few

discovered burials. The sample sizes in many studies of prehistoric foraging peoples tend to be small. This limits the value of the observations. The problem of small sample size has in some instances been solved by linking many small samples into regional overviews (Binford 2001; Kelly 1995; Larsen and Kelly 1995; Webb 1995). Studies of past foragers from Africa, where the foraging lifeway has its greatest antiquity, have been rare. Through both purposeful archaeological excavations and chance discoveries, numerous human skeletons have been discovered in southernmost Africa. An ambitious and highly successful program to generate individual radiocarbon dates and bone collagen stable isotope values (Sealy 1997; Sealy, et al. 1992; Sealy and van der Merwe 1988; Sealy, et al. 1987) formed the basis of what is now a substantial collection of skeletons that can be confidently identified as hunter-gatherers. Multiple lines of evidence mark these people as ancestral to Khoe-San¹ peoples of modern times, as summarized below. Continuity can be identified in both morphology and behavior. Using historic and ethnographic sources that come chiefly from the northern Khoe-San or Ju language family (such as the Ju/'hoansi or!Kung), the Holocene peoples of southern Africa are similarly small in stature (Sealy and Pfeiffer 2000), narrow framed (Kurki 2005) and lean,

¹ As contemporary authors attempt to be sensitive to the wishes of Khoe and San descendant groups, variations on nomenclature are proposed with some regularity. Sometimes proposals for new terms are accompanied by negative interpretations of prior terminology. This paper will follow Crawhall (2006), thus using terms that differ from the author's previous publications. Depending on the archaeological theory followed, the ancestors described herein may be more appropriately characterized simply as San. Whatever the nomenclature, the intent is to acknowledge the right of descendants to their voice in the matter.

habitually used a deep squatting posture (Dewar and Pfeiffer 2004), maintained a gender-based division of labor that was probably based on women's gathering and men's hunting (Stock and Pfeiffer 2004), relied on overland trekking rather than watercraft, even in coastal locales (Stock and Pfeiffer 2001). There are many aspects of stability in the foraging adaptation that was followed by these neighboring populations along the southern and western coasts of the continent.

At the same time, temporal variability in adult body size suggests that there was at least on period of significant instability (Pfeiffer and Sealy 2006), with apparent lack of food security. Overlapping the period of smallest adult body size are a small number of skeletons that show death from cranial trauma (Pfeiffer and van der Merwe 2004; Pfeiffer, et al. 1999). The victims of this interpersonal violence are primarily children and date to 2400-3000 B.P. In this paper, possible links are suggested among the evidence of interpersonal violence, an insecure livelihood and consequent social disruption among prehistoric hunter-gatherers. It proposes that archaeologists must be prepared to deal with phenomena for which there is no ethnographic parallel. It concludes that in Holocene southern Africa, millennia of resource intensification paired with demographic pressure may have pressed immediate-return foragers to adopt a delayed-return model. Whatever their coping strategies, a return to stasis appears to have been underway prior to the introduction of pastoralism at ca. 2000 BP.

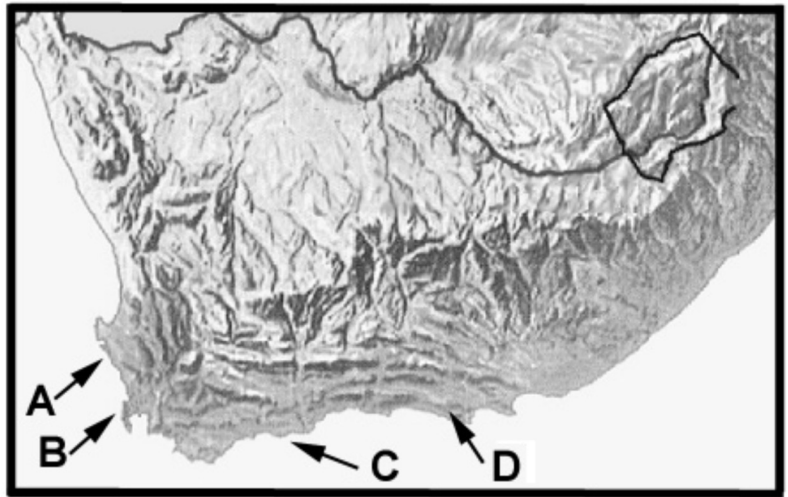
Holocene Foragers of the Cape

The skeletal remains that form the basis for this research come from archaeological sites within the Cape Fold mountains, the coastal platform and the rocky shorelines where southern and southwestern Africa meet the South Atlantic and Indian Oceans (Figure 1). This region, the Cape Ecozone (Deacon and Lancaster 1988), can be divided into western, southern and eastern parts. The western region of the Cape Ecozone consists of a wide, sandy coastal lowland with a Mediterranean climate of mild, wet winters and hot dry summers. The average annual rainfall

ranges from less than 200 to 600 mm per year (Anon. 2003). The coastal resources of the western Cape are linked to the productivity of the South Atlantic Ocean. The climate of the southern Cape is warm and temperate with year round rainfall ranging between 700 and 1200 mm per year (Anon. 2003). The coastal resources of the southern Cape are linked to the productivity of the Indian Ocean. These areas are in the winter rainfall zone, and are both characterized by fynbos vegetation, comprised of "fine leaf" shrubs and bushes (Meadows and Sugden 1993). The eastern Cape is a complex transitional zone, where the Cape Fold mountains diminish, meeting the interior grasslands and the eastern coastal plain. New plant communities join the fynbos, and rainfall is not seasonally patterned. Throughout the Cape Ecozone, the unique fynbos vegetation provides edible corms, fruits and seeds, and supports mainly small-to-medium sized mammals. Marine resources include shellfish, near-shore fisheries, bird nesting areas and seal rookeries. The region is well south of the malaria zone. Archaeological study has affirmed continuity from the Holocene foragers and pastoralists of the region and living peoples of Botswana, Namibia and South Africa who speak Khoe-San, or click, languages – the San (or Bushmen) and the Khoekhoe (or Nama). Evidence for continuity comes from the tools they made, the technological approaches they used, and the symbolism of their rock art (Deacon and Deacon 1999; Mitchell 2002).

Archaeological evidence of Later Stone Age foragers in the Cape is extensive, with good preservation, especially in contexts of shell middens, dry rock shelters and sand dune deposits. The initial Holocene stone tool assemblage known as Oakhurst (or a variant known as Albany), was replaced by the Wilton assemblage in the first half of the Holocene. While all Later Stone Age assemblages include more bone, shell and ostrich eggshell artifacts than the earlier Middle Stone Age complexes, Wilton is distinguished by a relatively high proportion of standardized, retouched formal stone artifacts. Variation in the proportions of small scrapers, bladelets and adzes are some of the regional distinctions upon which archaeologists base reconstruc-

Figure 1. A Map of southern Africa, with the four sites discussed in this chapter marked. A = Modder River Mouth, B = Melkbosstrand, C = Snuifklop, D = Andrieskraal.



tions of foraging adaptations during this time period (Mitchell 2002). It is around the end of the Pleistocene that evidence of light-draw bows (and presumably poison-tipped arrows) is first found (Parkington 1998; Wadley 1998). Evidence from upper arm strength and arm asymmetries indicates the establishment of a gender-based division of labor in which women's activities probably focused on work with digging sticks and grinding, while men hunted. While elements of the tool kit show homogeneity through the region, men in the southern (forest) and western (fynbos) regions appear to have favored spears, and light-draw bows, respectively (Pfeiffer and Stock 2002; Stock and Pfeiffer 2004). There are relatively few instances of healed fractures among the adults, compared to patterns reported for other hunter-gatherers groups. Of 152 Later Stone Age skeletons, 12 show evidence of a healed long bone fracture; among 1353 major long bones, 13 show healed fractures. All of the long bone fractures are consistent with accidents, like falls (Pfeiffer 2007).

Patterns of foraging during the Holocene show both temporal and geographic variability. While it has been argued that geographically extensive exchange networks analogous to the *hxaro* gift-exchange practiced by Ju/'hoansi (San) of the modern era were operative by ca. 12,000 years ago (Wadley 1987), by mid-Holocene times the ranges of at least some Later Stone Age groups were firmly delimited and each community's food procurement

was adapted to local conditions (Sealy and Pfeiffer 2000). Approximately two thousand years ago, bones of caprines and pottery are first seen at some archaeological sites, signaling the introduction of pastoralism among some communities. It is not established whether these innovations were "traded in," or came with a southward movement of Khoe peoples from the northwest. For the next millennium, the occupants of the Cape showed variability with regard to subsistence. There is debate regarding whether communities of foragers and pastoralists can be distinguished. The term "hunters-with-sheep" has been suggested (Sadr 2003). Groups may have shifted their reliance on hunted versus herded animals readily, depending on environmental conditions. There are intriguing questions to be addressed, pending the confident identification of archaeological remains as representing foragers or pastoralists.

At about the same time, farmers (ancestors of today's Black African peoples, sometimes referred to as Bantu speaking groups) moved southward on the east side of the continent, bringing with them metallurgy, domesticated sheep and cattle and sorghum and millet cultivation (Huffman 1993). These early farmers have been characterized archeologically as "Iron Age," a term that is rejected by some as Eurocentric (Mitchell 2002). Ancestors of today's Black African peoples, they were reliant on rainfall patterns that would support sorghum and millet cultivation and grasslands for

their stock, found in the Karoo and eastern coastal plain. The San in these regions appear to have been absorbed or eliminated, but San populations of the fynbos and coastal locales survived. Where there was little or no conflict, in the south and the west, some San survived – although relations with herders remain little understood.

A few hundred years after the arrival of the first foreigners (the Black farmers) the second wave of foreigners arrived: from Europe and from across the Indian Ocean, landing on western and eastern coasts. From that point (the early 15th century), the story of the San becomes a chapter in the history of Africa. High rates of San mortality were associated with disease, disruption and overt conflict among groups, principally domination by Whites. Today, most descendants of the Holocene foragers are integrated into urban and rural regions of southern Africa, while a small number attempt to pursue a foraging lifestyle in the Kalahari region – a habitat that differs greatly from the cooler, wetter habitats favored by their ancestors. “Whether invoked as archetypal conservationists, original ‘owners of the land,’ or the first resistance fighters to colonial rule, it is their past that is the enduring heritage of all southern Africans, as well as a matter of vital concern to Khoisan-speaking groups or those who claim particular descent from them” (Mitchell 2005).

Evidence of Interpersonal Violence, 3000-2400 BP

Descriptions of the four burial sites from which the seven affected individuals come have all been previously published, although a radiocarbon date from one of the locales is newly available. The described individuals comprise all the instances of cranial trauma, unhealed and healed, from among over 200 adult and almost 100 juvenile skeletons from the prehistoric Later Stone Age that have been surveyed at five curatorial institutions in South Africa as of 2005. In addition, one instance has been published of an adult woman with a projectile point embedded in a vertebra, which was the apparent cause of death, who was buried with an infant (Morris and Parkington 1982). While there

is no date for this skeleton, the inclusion of pottery with the burial indicates a date more recent than 2000 years.

Mouth of the Modder River (Pfeiffer and van der Merwe 2004)

Three juvenile skeletons, dated to ca. 2600 BP, were discovered in 1980 in coastal dunes near the mouth of the Modder River, Malmesbury District, Western Cape (Figure 1, Table 1). Skeletal ages at death for the three juveniles are approximately 1 to 1.5 years, 6 to 7 years, and 12 to 13 years, based on dental and skeletal development. The discoverers’ verbal account and their snapshot of the site record that the two older children were positioned flexed, back to back, with their heads up-slope. The infant was at their feet, position unknown. There were no burial inclusions found. All three crania show indications of trauma that occurred while the bone was fresh. The size and shape of the perforations and indentations are consistent with the same type of object being used to inflict all injuries, with that object having an approximately circular diameter of no more than 15 mm diameter and tapering to a point at its end. The eldest of the children shows at least seven round-edged lesions; the middle child shows at least five (three holes and two indentations); the infant shows one obliquely delivered indentation. A diagram of the positions of the holes and indentations relative to the burial positions demonstrates that this damage could not have been delivered after the skeletons were buried. Isotopic values from bone collagen indicate a marine-based diet, with a suggestion of a trophic shift in the infant that is consistent with being breastfed (Clayton et al. 2006).

Melkbosstrand (Balm 2003; Pfeiffer et al. 1999)

Two skeletons were found by construction workers in 1996 within dune sand sediment in Melkbosstrand, a northern suburb of Cape Town (Figure 1, Table 1). Salvage excavation documented what appeared to be a purposeful double burial, capped by a large intrusive stone. Body positions appeared irregularly flexed within a narrow hole, sprawled, more lying than seated. No grave goods were found. The adult is clearly female, with parturition scarring and damage to the pubic face, aged from late 20s to early 40s. She shows

Table 1. Radiocarbon dates and isotopic values for the skeletons with cranial trauma discussed in the text.

Site	Catalogue	^{14}C Date (BP)	Lab No. for date	Age (yr)	Sex	$\delta^{13}\text{C}$ (‰)	$\delta^{15}\text{N}$ (‰)	Citation
Melkbosstrand	SAM-AP	2460±50	GX-23455	25-40	F	-14.2	10.8	Pfeiffer et al. 1999
Melkbosstrand		2490±50	GX-23871	13-16	F?	-12.7	N.A.	
Modder River	SAM-AP 6054A	2780±45	Pta-4211	12-13		-11.7	15.6	Pfeiffer & van der Merwe 2004
Modder River	SAM-AP 6054B	2530±60	Pta-4151	6-7		-14.8	14.8	
Modder River	SAM-AP 6054C			1-1.5		-15.2	15.7	
Snuijklip	UCT 372	2390±60 2360±60	Pta-4001 Pta-4003	>50	M	-14.0		Morris et al. 1987
Andrieskraal*	A2787	3028±32	OxA-V-2161-55	>50	M	-13.1	12.3	This study

*Values for Andrieskraal are previously unpublished. Carbon and nitrogen isotopic values for Andrieskraal were provided by J.C. Sealy, University of Cape Town.

developmental asymmetry of the cranial base and of the upper torso, plus activity-based prior trauma to the lower lumbar region. The juvenile has a skeletal and dental age between 13 and 16 years, with a female skeletal morphology. Of these complete skeletons, only the crania show perimortem damage. That damage is consistent with gashes caused by a linear instrument as well as focal blunt-force trauma to both crania. Damage to the woman's head is consistent with a powerful blow delivered to the right side while the left side was resting on a firm surface. Isotopic values from bone collagen suggest a diet comprised either of terrestrial foods from an interior region with C_4 vegetation some distance away, or a marine-based diet that focused on low trophic level protein (shell fish). The latter seems more probable, given the coastal burial locale.

Snuijklip (Morris et al. 1987)

Skeletal remains found eroding out of a sand dune led to a salvage excavation in 1986 of a single, adult male (Figure 1, Table 1). The skeleton was tightly flexed, and was accompanied by a variety of stone artifacts and faunal objects. Age at death is estimated to be well above 50 years, based on information from the cranial sutures, dentition, rib ends, and joints. Osteoarthritic changes are particularly extensive in the lumbar region, and the toe bones, the latter being extensive enough to undoubtedly affect gait. Two lesions on the frontal bone anterior to the coronal suture show crushing of the diploe, with one also including depression of the inner table. Both appear oval in outline, 15 mm to 35 mm in their greater axis. The authors note that "healing is quite evident" and suggest by

clinical analogy that the wounds might have occurred about six months before death. The only stable isotope value available for this skeleton was generated with the radiocarbon date. It is consistent with prehistoric diets of people who lived along the southern Cape Coast.

Andrieskraal I (de Villiers 1965; Deacon 1965)

Skeletal remains were salvaged from a rock shelter, without benefit of archaeological expertise, during construction of a dam on the Kougha River in the Gamtoos Valley in 1961/62 (Figure 1, Table 1). The site is located within the Baviaanskloof Wilderness Area. While this site is only about 40 linear kilometers from the south coast, the terrain is very mountainous, so the functional distance from the coast would have been much greater. Isotopic values from bone collagen, newly available thanks to the lab of J.C. Sealy (Table 1), indicate a diet that was comparable to that of many other southern Cape foragers (Sealy 1997). The isotope values cannot be used to distinguish the extent to which this man had access to coastal resources.

The adult male skull that was noted to show partially healed trauma can be associated with a partial mandible and an atlas vertebra, but nothing more (Figure 2). Advanced dental wear and tooth loss are associated with extensive arthritic changes to the temporal-mandibular joint. The original report places age in the fourth decade because of the "rather robust cranial vault bones" (de Villiers 1965:201), but subsequent independent assessment suggests an older age, based on tooth wear, suture obliteration and joint deterioration. The blunt force trauma has a depressed

triangular focus on the anterior-superior right parietal, with cracks extending across both parietals and the frontal bone. The damaged bone shows rounded edges, the cracks show some closed sections, and the focus of the blow shows a granular, hyper-vascularized surface that indicates considerable healing prior to death (Figure 3).

Evidence of Reduced Adult Stature between 4000 and 2000 B.P.

A study of femoral lengths from 127 dated adult skeletons from the western and southern Cape regions demonstrates that while Khoe-San ancestors were always petite, there was a period when some individuals were even smaller (Pfeiffer and Sealy 2006). Estimated statures are comparable to historic Khoe and San samples, but show lower

values and greater variance during the fifth/fourth millennium before present, in both sexes and both biomes (Figure 4). Variation in femoral length does not correlate with dietary sources of protein, as reflected in stable isotope ($\delta^{13}\text{C}$ and $\delta^{15}\text{N}$) values taken from bone collagen. There are some positive correlations between femoral head diameter and isotopic indicators of reliance on marine protein. While the nature of dietary protein does not explain the variance in stature, some type of nutritional explanation is most likely. The authors conclude that there must have been challenges of food sufficiency, among at least some communities. When femur lengths are plotted by ^{14}C date, it appears that the foraging populations “pulled out” of the stressful period during the third millennium, prior to the introduction of pastoralism. Femora are available from two of the adults affected by interpersonal violence. The reported



Figure 2. *Facial view of Andrieskraal cranium and partial mandible. The general morphology is consistent with males of this population. Extensive dental wear is consistent with an age at death in mid- to late-adulthood. Photo is courtesy of C. Steininger.*



Figure 3. Lateral view of right side Andrieskraal cranium. Frontal is to the right. Major sutures are obliterated, consistent with advanced age. The focus of the blow is marked by an arrow. Curved fracture lines can be seen inferior to the arrow, and above the arrow the edges of the broken vault are smooth, consistent with bone healing but not knitting across the fracture. Photo provided by C. Steining.

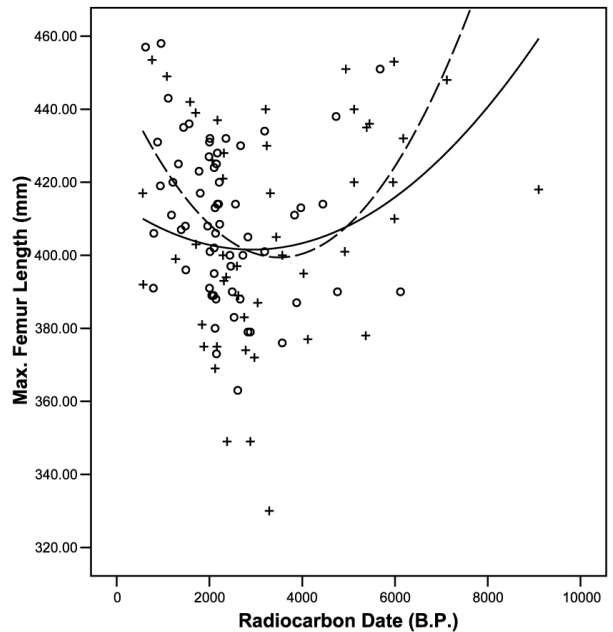


Figure 4. Maximum femur lengths among Holocene foragers of southern (plus signs) and western (open circles) regions of the Cape, plotted by uncalibrated radio-carbon dates; curves represent quadratic regression model, solid line for southern region, dashed line for western region. The arrows along the x-axis identify the approximate time range represented by the four examples of cranial trauma that are discussed in the text (modified from Pfeiffer and Sealy 2006).

maximum femoral length of the woman from Melkbosstrand is 395 (left) and 399 (right), and from the man from Snuifklip is 398 mm. This places both of them in the middle of the range for adults from that time period (Figure 4). When the linear long bone dimensions of the three children from the Modder River are compared to similarly aged children from other Later Stone Age sites, the growth of the Modder River children is unremarkable. They were small children, growing to become small adults.

There is an intriguing juxtaposition of the period of apparent dietary stress and the time period from which instances of interpersonal violence are found (Figure 4). Including the dates' error terms, the examples of cranial trauma date from ca. 2300 to 3050 B.P., centering around 2400-2600 B.P.

Discussion

It may be argued that all the people with cranial injuries may have been marginal to the economically central members of the community. They were either very young or very old, or skeletally abnormal (the woman from Melkbosstrand). This argument is a weak one, however, since all of the people represented within the four sites (except the infant) could have been productive contributors to their groups, in their various roles. The one factor that ties the sites together is their dating. All coincide with a period in which some men and women from across the western and southern Cape regions were experiencing growth stunting.

Contrary to the impression given by some ethnographic accounts (Marshall 1958; Marshall 1959), ethnographic information on interpersonal violence among San groups in historic times indicates that violent acts were not particularly rare. Instances most commonly have their basis in sexual jealousy, and occur among men. 'Executions' have been described in which men who have slain other men have been killed (with arrows) by the group or with the collusion of the group (Lee 1993). The archaeological evidence from the prehistoric Cape is not consistent with

this model. None of the affected skeletons are of young or middle-aged adult males.

The time period from which the cases of violence arise is one of subsistence intensification and possible territoriality in the Cape. Territoriality is unexpected among direct-return foragers (Woodburn 1980). In the western Cape, these cases correspond with the "megamidden period," when coastal dwellers created large shell middens in the course of their intensive shellfish collecting (Jerardino 1998; Jerardino Wiesenborn 1996; Parkington et al. 1988). Along the southern coast, differences in dietary protein sources provide evidence that groups were exploiting clearly demarcated, mutually exclusive territories (Sealy 2006). There are at least two multiple burial sites in which adults show isotopic signatures indicative of terrestrial diet and relatively small stature. They are Farooskop in the western Cape (30 km inland (Sealy et al. 1992), femoral length 400 mm, s.d.=21.5, N=5) and Whichers Cave in the southern Cape (14 km inland (Sealy and Pfeiffer 2000), femoral length 406 mm, s.d.=17.7, N=4). Farooskop dates from ca. 2100 B.P. (six very similar dates), while Whichers Cave has yielded four disparate dates, from ca. 6000 to 2700 B.P. Their relevance here is the illustration that sometimes groups chose to avoid, or were prohibited from access to, relatively rich coastal resources, despite a possible negative impact on health.

In the eastern Cape, research based on lines of evidence including tool types, raw material usage, food remains and burial placement suggest an increasingly sedentary settlement pattern, in which family groupings may have been signaling a sensitivity to some definition of delimited identity (Binneman 1995; Hall 1990). There is accumulating evidence that the landscape was becoming more crowded in the mid-Holocene. Direct return foraging strategies appear to have been giving way to delayed return strategies. Limitations on the availability of food, systems that facilitated the storage and hence the control over food, and a sense of a crowded landscape are factors that could have acted as triggers, leading to interpersonal violence.

Conclusions

The information presented here serves to illustrate the challenges inherent in moving from the ethnographic present to the archaeological past. There is no direct analogy within San ethnography for the behaviors that led to the skeletons with peri-mortem cranial injuries that appear at around 2600 B.P. While there is documentation within San ethnography for interpersonal violence, it is derived from observations of the northern Khoe-San language family (Ju), rather than the southern Khoe-San language family (!Ui-Taa). Crawhall has suggested that these two language groups, plus Khoe, are major language families, and hence they represent relatively isolated histories (2006). If this conclusion is correct, then the amount to be learned about Cape foraging from ethnographic analogy with the Kalahari will be limited to fundamental characteristics. The Cape foragers may have been ancestral to !Ui-Taa speakers, for whom there is little ethnographic information, since !Ui-Taa speakers were dramatically affected by conflict in colonial times.

There are various lines of evidence that could be used to further explore the possibility of a period of social disruption. We can, for example, explore evidence of chronic stress indicators on juvenile skeletons, to test whether they are more common during the period around 2600 B.P. Progress in testing a hypothesis of social disruption will require working across the western, southern and eastern regions of the Cape. It will need to incorporate evidence from archaeology, biological anthropology and archaeological science. It will need to closely examine evidence for climatic patterns during the later Holocene. On the one hand, it seems improbable that such a generously resourced ecozone could have been a limiting environment for skilled foragers who had lived there for millennia. On the other hand, there is evidence that something was going wrong. There needs to be further exploration regarding the nature of the problem.

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