



CULTURAL ROOTS

A South African archaeologist digs into his own past to seek connections between climate change and human development.

BY JEFF TOLLEFSON

Metal scrapes on hard sand as archaeologist Chris Henshilwood shaves away the top layer of sediment in Blombos Cave. After just a few moments, the tip of his trowel unearths the humerus of a pint-sized tortoise that walked the Southern Cape of South Africa many millennia ago. Next come shells from local mussels and snails amid blackened soil and bits of charred wood, all remnants of an ancient feast. It was one of many enjoyed by a distinct group of early humans who visited Blombos Cave over the course of thousands of years.

The Still Bay culture was one of the most advanced Middle Stone Age groups in Africa when it emerged some 78,000 years ago in a startlingly early flourishing of the human mind. Henshilwood's excavations at Blombos Cave have revealed distinctive tools, including carefully worked stone points that probably served as knives and spear tips, and bits of rock inscribed with apparently symbolic designs. But evidence of the technology disappears abruptly in sediment about 71,000 years old, along with all proof of human habitation in southern Africa. It would be 7,000 years

Chris Henshilwood inspects a cave on the South African coast near Blombos.

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before a new culture appeared, with a markedly different toolkit, including crescent-shaped blades probably used as arrowheads.

What drove the coming and going of these early cultures? At about the time the Still Bay culture disappeared, the globe — already in the middle of a glacial period — began to cool even further, causing sea levels to fall (see ‘Crucible of culture’). “Humans are very adaptable,” says Henshilwood, “but I think climate must have played some role in the demise of the Still Bay.”

If there is a link, it may hold broader implications. Genetic data suggest that the entire population of modern humans contracted at around the same time, then rebounded and expanded in Africa and onto other continents.

Multiple teams are now racing to determine the part climate might have played in driving human evolution during this period. Blombos Cave, with its detailed archaeological record of the Middle Stone Age, could become a key testing ground. With Francesco d’Errico, an anthropologist at the French National Centre for Scientific Research (CNRS) in Bordeaux, Henshilwood has assembled a team of archaeologists, climate modellers and palaeoclimatologists for a five-year, €2.5-million (US\$3.3-million) project to look at correlations between climate and culture during the eventful span of prehistory that includes Still Bay, and the beginnings of modern human behaviour.

“These are very daunting questions indeed, but I think they are answerable,” says Henshilwood, a native of Cape Town who now works at the University of Bergen in Norway. “If we can get some good climatic data, we can at least hazard some guesses.”

PERSONAL HISTORY

Outside the cave, a cool November breeze scours the steep slope to the shore, which Henshilwood has known since he was a child. His grandfather bought this land on the Southern Cape as a fishing retreat in 1961 and Henshilwood spent his holidays searching the hills and caves for ancient artefacts.

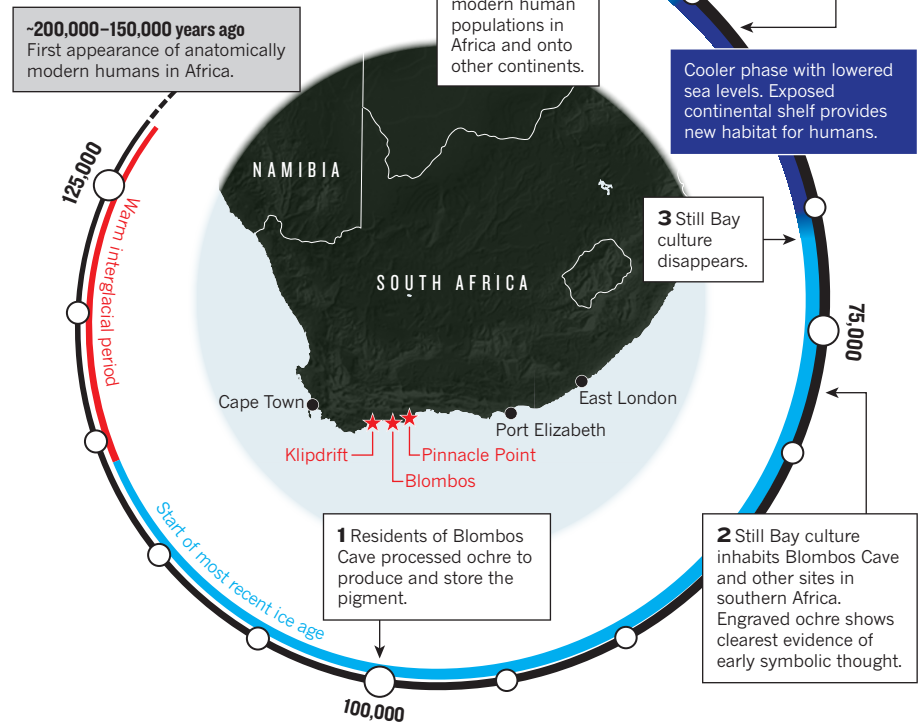
Those experiences served him well in 1985, when, out of sheer boredom in his mid-thirties, he decided to leave the family department-store business and enrol in an archaeology course at the University of Cape Town. In 1991, as a PhD student on a scholarship at the University of Cambridge, UK, he returned to Blombos in search of the same kind of artefacts that he had found as a child. What he discovered was much more significant and far older: a series of bone tools and double-sided stone points that were clearly tied to the enigmatic Still Bay period.

“It was right over there,” he says, motioning to the back of the cave. “Nobody believed us, because nobody had found a Still Bay site for 40 years.”

The Middle Stone Age was not part of his thesis, so Henshilwood covered the site up and moved on. Only in 1997 did he secure funding

CRUCIBLE OF CULTURE

During the latest ice age, human populations in southern Africa went through profound changes that sometimes coincided with major environmental shifts.



for a full excavation from the US National Science Foundation. In 2002, Henshilwood published a study¹ in *Science* documenting pieces of red, iron-rich rock called ochre, which were engraved with cross-hatched patterns. He argued that the 77,000-year-old etchings were examples of symbolic behaviour and represented the earliest known evidence of abstract thought. These and other findings have challenged the once-dominant idea that human culture — as exemplified by art such as carvings and jewellery — appeared in an explosive transformation during the Late Stone Age, some 40,000–50,000 years ago, in north Africa

and Europe. Blombos and other sites suggest a more gradual cultural and technological development, beginning far earlier, during the Middle Stone Age throughout Africa.

Now a postdoctoral researcher at the University of Bergen, van Niekerk has been work-

ing with Henshilwood since the early days at Blombos. It's a good life, she says, “and a lot of work”. On this day she finishes early and heads to Henshilwood's beach house and scientific base to help a master's student, Cornelia Albrektsen, to conduct an experiment using home-made stone and bone tools. They struggle for the better part of an hour trying to replicate the way ancient people might have opened shellfish. Then Henshilwood shows up.

“Give me one,” he says, grabbing a shell.

DID CLIMATE WIPE OUT THE STILL BAY CULTURE? OR DID THE PEOPLE MOVE AWAY OR PERHAPS JUST ADAPT OVER TIME?

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On a visit to Blombos in November, the cave looks like a war bunker, complete with a generator, lights and sandbags. The team has excavated just enough earth to create a workspace for a crew of five. Hundreds of steel tabs mark strata on vertical walls of sediment. While Henshilwood works on the cave's top layer, from

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Within minutes, Henshilwood pops open several snails and determines which tools work best. He then departs to clean up for dinner, leaving the stunned crew to finish the experiment. "It was really impressive," Albrektsen says later. "He was getting all caveman-like."

During a break in the excavations, Henshilwood stares out to sea and wonders aloud whether the Indian Ocean holds answers. Palaeoclimate records from marine sediment and ice cores suggest³ that around the time the Still Bay culture disappeared, global temperatures dropped and the polar ice sheets grew. Ocean levels fell, and the Still Bay people may have followed the sea onto the continental shelf, which would have become a productive plain.

If this idea is accurate, most of the evidence would have been submerged as the ocean returned over the past 15,000 years. Henshilwood has hiked along more than 240 kilometres of coastline in search of caves that might hold clues to the fate of the Still Bay. He hasn't found any yet, but he is beginning excavations on a site called Klipdrift Shelter, west of Blombos, that could allow him to look at the rise of Still Bay's successor: the Howiesons Poort culture, which appeared 65,000 years ago and persisted for about 5,000 years.

TIME AND TIDE

Taking a break from Blombos, Henshilwood visits the new site with Simon Armitage, a mineral-dating specialist at Royal Holloway University of London. Armitage uses a technique called optically stimulated luminescence to determine the last time a sample of dirt saw sunlight before being buried. The method requires Henshilwood and others to cover Armitage with a thick black tarpaulin and sit on its edge to prevent any light from fouling the measurements. While waiting, Henshilwood talks about the significance of the site, which has already yielded a human tooth and some artefacts with markings that could be engravings. He says the findings may turn out to be more fascinating than the decorated ochre pieces that made Blombos famous.

Once the site has been dated, the researchers will add it to environmental and cultural records from southern Africa and Europe. To construct a climate record, Henshilwood's team is sampling cave deposits, in search of clues to ancient rainfall and temperatures. They are also testing ocean sediment cores for pollen and traces of charcoal that hint at vegetation, rainfall and the frequency of fires.

The palaeoclimate data will allow a team at the CNRS to build a high-resolution model of climate in Europe and southern Africa,

beginning with the time spanning the Still Bay and Howiesons Poort cultures. The last step is to overlay the climate and cultural data onto an ecological model to analyse the environmental space occupied by specific cultures throughout time. The team can then look for links. Was one industry, for example, always associated with a particular environment? Do similar cultures occupy similar landscapes or respond to climatic shifts in similar ways?

"We can start to test our hypotheses about the role of ecology and the environment," says William Banks, who runs the modelling at the CNRS in Bordeaux.

Henshilwood and his colleagues have some friendly competition. Curtis Marean, an archaeologist at Arizona State University in Tempe, came to the cape shortly after Henshilwood, inspired by the genetic evidence of a population crash in the Middle Stone Age and thinking that the cape would have been a good place for humans to ride out hard times. He partnered with Henshilwood on a paper⁴ examining bone tools from Blombos in 2001 and went on to document the use of pigments⁵ and heat-treatment of stone tools⁶ 164,000 years ago at Pinnacle Point, less than 100 kilometres east of Blombos.

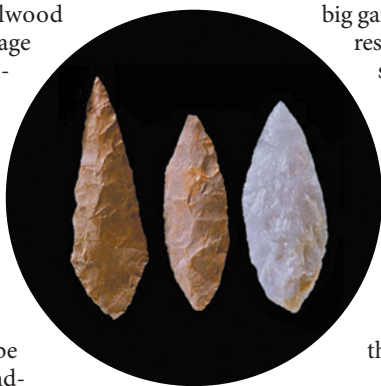
He is also looking to the sea for answers. Marean and a team of researchers have already produced an assessment³ of historical sea levels around Pinnacle Point, and now they have received money from the National Geographic Society in Washington DC and the US National Science Foundation to build a detailed geophysical map of the continental shelf. Marean thinks that the exposed shelf would have been a diverse shrubland ecosystem with edible roots, big game for hunting and marine resources.

His goal is to reconstruct the vegetation, and then use models to analyse how people might have exploited those resources.

"We need to develop a thick empirical record and put that into a really tight timescale," says Marean. "Once we have that, we can start debating the whys."

Alison Brooks, director of the Center for the Advanced Study of Hominid Paleo-

biology at the George Washington University in Washington DC, says that Henshilwood and others are producing much-needed data and hypotheses, but she warns against the dangers of oversimplification. Brooks is co-authoring a forthcoming publication that aligns palaeoclimate data with archaeological data throughout Africa, and she says that each region of the continent seems to have its own story. "There's a lot of complexity here," she says.



Stone tools from Blombos Cave.



Archaeological excavations at Blombos Cave have yielded early evidence of abstract thought.

Henshilwood acknowledges that comparing environmental and cultural data may not yield concrete answers. The disappearance of the Still Bay, he says, could have resulted from climatic change, migration, the arrival of new people or simply cultural evolution over the course of thousands of years.

Back in the cave, Henshilwood settles down into a familiar routine: digging carefully through the sediments and thinking about the past. He uncovers the remains of a clam that lives along sandy beaches and a mussel that prefers rocky shores, evidence that the Still Bay people had access to a varied coastline much like the one he has been exploring all his life. Just behind Henshilwood is another hole, carefully filled with sandbags. He dug that in 2007 as a test plot and found that the sediments inside Blombos date back at least 130,000 years, with artefacts dispersed throughout. "But that's for another day," he says, glancing at the wall of dirt in front of him. "Or another year, another decade." ■

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