PERSONAL ADORNMENT with jewelry and body paint may have started far earlier than previously thought. Early indications of such symbol use—believed by many archaeologists to be a key component of modern human behavior—include 75,000-year-old shell beads (left) from Blombos Cave in South Africa.

The Morning of the Modern Mind

Controversial discoveries suggest that the roots of our vaunted intellect run far deeper than is commonly believed

BY KATE WONG
Christopher Henshilwood, an archaeologist at the University of Bergen in Norway, believes they were collected and perforated by Homo sapiens, potentially humanity’s crown jewels— the oldest adornment to date and proof that our ancestors were thinking like us far earlier than is widely accepted.

The shells, discovered in a cave called Blombos located 200 miles east of here, are perfectly matched in size, and each bears a hole in the same spot opposite the mouth, notes Henshilwood. If he is correct, these modest shells are humanity’s crown jewels—the oldest unequivocal evidence of personal adornment to date and proof that our ancestors were thinking like us far earlier than is widely accepted.

A Behavioral Big Bang

By most accounts, the origin of anatomically modern Homo sapiens was a singularly African affair. In 2003 the unveiling of fossils found in Herto, Ethiopia, revealed that this emergence had occurred by 160,000 years ago. And this past February researchers announced that they had redated H. sapiens remains from another Ethiopian site, Omo Kibish, potentially pushing the origin of our species back to 195,000 years ago.

Far less clear is when our kind became modern of mind. For the past two decades, the prevailing view has been that humanity underwent a behavioral revolution around 40,000 years ago. Scholars based this assessment primarily on the well-known cultural remains of Ice Age Europeans. In Europe, the relevant archaeological record is divided into the Middle Paleolithic (prior to around 40,000 years ago) and the Upper Paleolithic (from roughly 40,000 years ago onward), and the difference between the two could not be more striking. Middle Paleolithic people seem to have made mostly the same relatively simple stone tools humans had been producing for tens of thousands of years and not much else. The Upper Paleolithic, in contrast, ushered in a suite of sophisticated practices. Within a geologic blink of an eye, humans from the Rhône Valley to the Russian plain were producing advanced weaponry, forming long-distance trade networks, expressing themselves through art and music, and generally engaging in all manner of activities that archaeologists typically associate with modernity. It was, by all appearances, the ultimate Great Leap Forward.

Perhaps not coincidentally, it is during this Middle to Upper Paleolithic transition that humans of modern appearance had begun staking their claim on Europe, which until this point was strictly Neandertal territory. Although the identity of the makers of the earliest Upper Paleolithic artifacts is not known with certainty, because of a lack of human remains at the sites, they are traditionally assumed to have been anatomically modern H. sapiens rather than Neandertals. Some researchers have thus surmised that confrontation between the two populations awakened in the invaders a creative ability that had heretofore lain dormant.

Other specialists argue that the cultural explosion evident in Europe grew out of a shift that occurred somewhat earlier in Africa. Richard G. Klein of Stanford University, for one, contends that the abrupt change from the Middle to the Upper Paleolithic mirrors a transition that took place 5,000 to 10,000 years beforehand in Africa, where the comparative culture periods are termed the Middle and Later Stone Age. The impetus for this change, he theorizes, was not an encounter with another hominid type (for by this time in Africa, H. sapiens was free of competition with other human species) but rather a genetic mutation some 50,000 years ago that altered neural processes and thereby unleashed our forebears’ powers of innovation.
Archaeological discoveries in Africa have revealed that elements of modern human behavior can be traced back far beyond the 40,000-year mark (above), contrary to earlier claims based on the European record. But experts agree that many more people routinely engaged in these practices after that date than before it. A number of hypotheses for what set the stage for this tipping point—not all of which are mutually exclusive—have been put forth (below).

**Symbolism.** The invention of external storage of information—whether in jewelry, art, language or tools—was the watershed event in modern human behavioral evolution, according to Christopher Henshilwood of the University of Bergen in Norway. *Homo sapiens* probably had the hardware required for symbolic thought by the time the species arose, at least 195,000 years ago, hence the occasional early glimpses of it in the archaeological record. But only once symbolism became the basis for human behavioral organization—resulting in the formation of trade and alliance networks, for example—was its full potential realized.

**Ecological disaster.** Genetic data suggest that *H. sapiens* experienced a bottleneck some 70,000 years ago. Stanley H. Ambrose of the University of Illinois posits that it was the fallout from an eruption of Sumatra’s Mount Toba at around that time that the species arose, at least 195,000 years ago, hence the occasional early glimpses of it in the archaeological record. But only once symbolism became the basis for human behavioral organization—resulting in the formation of trade and alliance networks, for example—was its full potential realized.

**Population growth.** Modern ways bubbled up and disappeared at different times and in different places until the population size reached critical mass. At that point, confrontation between groups and competition for resources sparked symbolic behavior and spurred technological innovation, contend researchers, including Alison Brooks of Stony Brook University and Sally McBrearty of the University of Connecticut. And with more people to pass on these traditions, they began to stick, rather than dying out with the last member of a group.

**Brain mutation.** A genetic mutation roughly 50,000 years ago had the lucky effect of rewiring the human brain such that it was capable of symbolic thought—including language—argues Richard G. Klein of Stanford University. Humans carrying this mutation had a considerable advantage over those who did not and quickly outcompeted and replaced them.

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**Stone Age Sophistication**

<table>
<thead>
<tr>
<th>Symbolism</th>
<th>Projectile Technology</th>
<th>Ecological Disaster</th>
<th>Population Growth</th>
<th>Brain Mutation</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEADS</td>
<td>IMAGES</td>
<td>NOTATIONAL PIECES (INCISED)</td>
<td>MINING</td>
<td>MINING</td>
</tr>
<tr>
<td>BARBED POINTS</td>
<td>MICROLOTHS</td>
<td>FISHING</td>
<td>MINING</td>
<td>MINING</td>
</tr>
<tr>
<td>MINING</td>
<td>BONE TOOLS</td>
<td>LONG-DISTANCE EXCHANGE</td>
<td>BONE TOOLS</td>
<td>BONE TOOLS</td>
</tr>
<tr>
<td>NOTATIONAL PIECES (INCISED)</td>
<td>FISHING</td>
<td>SHELL FISHING</td>
<td>BONE TOOLS</td>
<td>BONE TOOLS</td>
</tr>
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<td>POINTS</td>
<td>BEADS</td>
<td>POWDERING</td>
<td>BONE TOOLS</td>
<td>BONE TOOLS</td>
</tr>
<tr>
<td>GRINDSTONES</td>
<td>BEADS</td>
<td>PROCESSING</td>
<td>BONE TOOLS</td>
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Age of Oldest Known Evidence (thousands of years)
Humans who looked like us had evolved by 195,000 years ago, as evidenced by Homo sapiens fossils from the site of Omo Kibish in Ethiopia. But received archaeological wisdom holds that humans did not begin behaving like us until nearly 150,000 years later. That notion stems largely from cultural remains uncovered in Europe, where art, ritual, technological advances and other indications of modern thinking flowered spectacularly and suddenly after about 40,000 years ago, around the time that anatomically modern humans started colonizing Europe. Recent finds, including those from Blombos Cave in South Africa, are revealing that many sophisticated practices emerged long before 40,000 years ago at sites outside of Europe, suggesting that humans were our cognitive equals by the time they attained anatomical modernity, if not earlier. Indeed, the fact that at least some Neandertals appear to have thought symbolically raises the possibility that such capacities were present in the last common ancestor of Neandertals and H. sapiens. The map below shows the locations of the sites mentioned in the article.

Earliest anatomically modern Homo sapiens physical remains
Known and presumed H. sapiens cultural remains
Neandertal cultural remains
Older human cultural remains
KYA = thousand years ago

Oldest evidence of painting in Africa from Apollo 11 Rock Shelter in Namibia: 28,000 years old
Neandertal-made pierced tooth from Arcy-sur-Cure, France: 33,000 years old
Oldest evidence of painting in Africa from Apollo 11 Rock Shelter in Namibia: 28,000 years old

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Key evidence for this model, Klein says, comes from a site in central Kenya called Enkapune Ya Muto, the “twilight cave,” that places the origin of the Later Stone Age at 45,000 to 50,000 years ago. There Stanley H. Ambrose of the University of Illinois and his team have uncovered obsidian knives, thumbnail-size scrapers and—most notably—tiny disk-shaped beads fashioned from ostrich eggshell in Later Stone Age levels dating back some 43,000 years. Strands of similar beads are still exchanged as gifts today among the !Kung San hunter-gatherers of Botswana. Ambrose posits that the ancient bead makers at Enkapune Ya Muto created them for the same reason: to foster good relationships with other groups as a hedge against hard times. If so, according to Klein, a genetically conferred ability to communicate through symbols—in concert with the cognitive prowess to conceive of better hunting technology and resource use—may have been what enabled our species finally, nearly 150,000 years after it originated, to set forth from its mother continent and conquer the world.

**Seeds of Change**

In recent years, however, a small but growing number of archaeologists have eschewed the big bang theories of the origin of culture in favor of a fundamentally different model. Proponents believe that there was no lag between body and brain. Rather, they contend, modern human behavior emerged over a long period in a process more aptly described as evolution than revolution. And some workers believe that cognitive modernity may have evolved in other species, such as the Neandertals, as well.

The notion that our species’ peerless creativity might have primeval roots is not new. For years, scientists have known of a handful of objects that, taken at face value, suggest that humans were engaging in modern practices long before H. sapiens first painted a cave wall in France. They include three 400,000-year-old wooden throwing spears from Schöningen, Germany; a 233,000-year-old putative figurine from the site of Berekhat Ram in Israel; a 60,000-year-old piece of flint incised with concentric arcs from Quneitra, Israel; two 100,000-year-old fragments of notched bone from South Africa’s Klasies River Mouth Cave; and a polished plate of mammoth tooth from Tata in Hungary, dated to between 50,000 and 100,000 years ago. Many archaeologists looked askance at these remains, however, noting that their age was uncertain or that their significance was unclear. Any sign of advanced intellect that did seem legitimately ancient was explained away as a one-off accomplishment, the work of a genius among average Joes.

That position has become harder to defend in the face of the growing body of evidence in Africa that our forebears’ mental metamorphosis began well before the start of the Later Stone Age. In a paper entitled “The Revolution That Wasn’t: A New Interpretation of the Origin of Modern Human Behavior,” published in the *Journal of Human Evolution* in 2000, Sally McBrearty of the University of Connecticut and Alison S. Brooks of George Washington University laid out their case.
Many of the components of modern human behavior said to emerge in lockstep between 40,000 and 50,000 years ago, they argued, are visible tens of thousands of years earlier at Middle Stone Age locales. Moreover, they appear not as a package but piecemeal, at sites far-flung in time and space.

At three sites in Katanda, Democratic Republic of the Congo, Brooks and John Yellen of the Smithsonian Institution have found elaborate barbed harpoons carved from bone that they say date to at least 80,000 years ago, which would place them firmly within the Middle Stone Age. These artifacts exhibit a level of sophistication comparable to that seen in 25,000-year-old harpoons from Europe, not only in terms of the complexity of the weapon design but the choice of raw material: the use of bone and ivory in tool manufacture was not thought to have occurred until the Later Stone Age.

The effort required to prepare the substrate and produce the markings suggests a premeditated act, rather than doodling.

Blombos ochre, engraved with a stone point, may reflect record keeping or a design aesthetic. The effort required to prepare the substrate and produce the markings suggests a premeditated act, rather than doodling.

Critics, however, have dismissed these finds on the basis of uncertainties surrounding, in some cases, the dating and, in others, the intent of the makers. Ochre, for one, may have been used as mastic for attaching blades to wooden handles or as an antimicrobial agent for treating animal hides, skeptics note.

Smart for Their Age
IT IS AGAINST this backdrop of long-standing controversy that the discoveries at Blombos have come to light. Henshilwood discovered the archaeological deposits at Blombos Cave in 1991 while looking for much younger coastal hunter-gatherer sites to excavate for his Ph.D. Located near the town of Still Bay in South Africa’s southern Cape, on a bluff overlooking the Indian Ocean, the cave contained few of the Holocene artifacts he was looking for but appeared rich in Middle Stone Age material. As such, it was beyond the scope of his research at the time. In 1997, however, he raised the money to return to Blombos to begin excavating in earnest. Since then, Henshilwood and his team have unearthed an astonishing assemblage of sophisticated tools and symbolic objects and in so doing have sketched a portrait of a long-ago people who thought like us.

From levels dated by several methods to 75,000 years ago and beyond, they have come an array of advanced implements, including 40 bone tools, several of which are finely worked awls, and hundreds of bifacial points made of silcrete and other difficult-to-shape stones, which the Blombos people could have used to hunt the antelopes and other game that roamed the area. Some of the points are just an inch long, suggesting that they may have been employed as projectiles. And the bones of various species of deep-sea fish—the oldest of which may be more than 130,000 years old—reveal that the Blombos people had the equipment required to harvest creatures in excess of 80 pounds from the ocean.

Hearths for cooking indicate that the cave was a living site, and teeth representing both adults and children reveal that a family group dwelled there. But there are so many of the stone points, and such a range in their quality, that Henshilwood wonders whether the occupants may have also had a workshop in the tiny cave, wherein masters taught youngsters how to make the tools.

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They may have passed along other traditions as well. The most spectacular material to emerge from Blombos is that which demonstrates that its occupants thought symbolically. To date, the team has recovered one piece of incised bone, nine slabs of potentially engraved red ochre and dozens of the tiny beads—all from the same 75,000-year-old layers that yielded the tools. In addition, sediments that may date back to more than 130,000 years ago contain vast quantities of processed ochre, some in crayon form.

Scientists may never know exactly what meaning the enigmatic etchings held for their makers. But it is clear that they were important to them. Painstaking analyses of two of the engraved ochres, led by Francesco d’Errico of the University of Bordeaux in France, reveal that the rust-colored rocks were hand-ground on one side to produce a facet that was then etched repeatedly with a stone point. On the largest ochre, bold lines frame and divide the crosshatched design.

Bead manufacture was likewise labor-intensive. Henshilwood believes the marine tick shells, which belong to the *Nassarius kraussianus* snail, were collected from either of two estuaries, located 12 miles from the cave, that still exist today. Writing in the January issue of the *Journal of Human Evolution*, Henshilwood, d’Errico and their colleagues report that experimental reconstruction of the process by which the shells were perforated indicates that the precocious jewelers used bone points to punch through the lip of the shell from the inside out—a technique that commonly broke the shells when attempted by team members. Once pierced, the beads appear to have been strung, as evidenced by the wear facets ringing the perforations, and traces of red ochre on the shells hint that they may have lain against skin painted with the pigment.

In the case for cognitive sophistication in the Middle Stone Age, “Blombos is the smoking gun,” McBrearty declares. But Henshilwood has not convinced everyone of his interpretation. Doubts have come from Randall White of New York University, an expert on Upper Paleolithic body ornaments. He suspects that the perforations and apparent wear facets on the *Nassarius* shells are the result of natural processes, not human handiwork.

Here Today, Gone Tomorrow

If read correctly, however, the remarkable discoveries at Blombos offer weighty evidence that at least one group of humans possessed a modern mind-set long before 50,000 years ago, which may in some ways make previous claims for early behavioral modernity easier to swallow. So, too, may recent finds from sites such as Diepkloof in South Africa’s Western Cape, which has produced pieces of incised ostrich eggshell dated to around 60,000 years ago, and Loiyangalani in Tanzania, where workers have found ostrich eggshell beads estimated to be on the order of 70,000 years old.

Yet it remains the case that most Middle Stone Age sites show few or none of the traits researchers use to identify fully developed cognition in the archaeological record. Several other locales in South Africa, for example, have yielded the sophisticated bifacial points but no evidence of symbolic behavior. Of course, absence of evidence is not evidence of absence, as prehistorians are fond of saying. It is possible the people who lived at these sites did make art and decorate their bodies, but only their stone implements have survived.

Perhaps the pattern evident thus far in the African record—that of ephemeral glimpses of cognitive modernity before the start of the Later Stone Age and ubiquitous indications of it after that—is just an artifact of preservational bias or the relatively small number of African sites excavated so far. Then again, maybe these fits and starts are exactly what archaeologists should expect to see if anatomically modern *H. sapiens* possessed the capacity for modern human behavior from the
get-go but tapped that potential only when it provided an advantage, as many gradualists believe.

The circumstances most likely to elicit advanced cultural behaviors, McBrearty and others hypothesize, were those related to increased population size. The presence of more people put more pressure on resources, forcing our ancestors to devise cleverer ways to obtain food and materials for toolmaking, she submits. More people also raised the chances of encounters among groups. Beads, body paint and even stylized tool manufacture may have functioned as indicators of an individual’s membership and status in a clan, which would have been especially important when laying claim to resources in short supply. Symbolic objects may have also served as a social lubricant during stressful times, as has been argued for the beads from Enkapune Ya Muto.

“You have to make good with groups around you because that’s how you’re going to get partners,” Henshilwood observes. “If a gift exchange system is going on, that’s how you’re maintaining good relations.” Indeed, gift giving may explain why some of the tools at Blombos are so aesthetically refined. A beautiful tool is not going to be a better weapon, he remarks, it is going to function as a symbolic artifact, a keeper of the peace.

Conversely, when the population dwindled, these advanced practices subsided—perhaps because the people who engaged in them died out or because in the absence of competition they simply did not pay off and were therefore forgotten. The Tasmanians provide a recent example of this relationship: when Europeans arrived in the region in the 17th century, they encountered a people whose material culture was simpler than even those of the Middle Paleolithic, consisting of little more than basic stone flake tools. Indeed, from an archaeological standpoint, these remains would have failed nearly all tests of modernity that are commonly applied to prehistoric sites. Yet the record shows that several thousand years ago, the Tasmanians possessed a much more complex tool kit, one that included bone tools, fishing nets, and bows and arrows. It seems that early Tasmanians had all the latest gadgetry before rising sea levels cut the island off from the mainland 10,000 years ago but lost the technology over the course of their small group’s separation from the much larger Aboriginal Australian population.

This might be why South African sites between 60,000 and 30,000 years old so rarely seem to bear the modern signature: demographic reconstructions suggest that the human population in Africa crashed around 60,000 years ago because of a precipitous drop in temperature. Inferring capacity from what people produced is inherently problematic, White observes. Medieval folks doubtless had the brainpower to go to the moon, he notes. Just because they did not does not mean they were not our cognitive equals. “At any given moment,” White reflects, “people don’t fulfill their entire potential.”

Symbol-Minded

The debate over when, where and how our ancestors became cognitively modern is complicated by the fact that experts disagree over what constitutes modern human behavior in the first place. In the strictest sense, the term encompasses every facet of culture evident today—from agriculture to the iPod. To winnow the definition into something more useful to archaeologists, many workers employ the list of behavioral traits that distinguish the Middle and Upper Paleolithic in Europe. Others use the material cultures of modern and recent hunter-gatherers as a guide. Ultimately, whether or not a set of remains is deemed evidence of modernity can hinge on the preferred definition of the evaluator.

Taking that into consideration, some experts instead advocate focusing on the origin and evolution of arguably the most important characteristic of modern human societies: symbolically organized behavior, including language. “The ability to store symbols externally, outside of the human brain, is the key to everything we do today,” Henshilwood asserts. A symbol-based system of communication might not be a perfect proxy for behavioral modernity in the archaeological record, as the Tasmanian example illustrates, but at least researchers seem to accept it as a defining aspect of the human mind as we know it, if not the defining aspect.

It remains to be seen just how far back in time symbolic culture arose. And discoveries outside of Africa and Europe are helping to flesh out the story. Controversial evidence from the rock shelters of Malakunanja II and Nauwalabila I in Australia’s Northern Territory, for instance, suggests that people had arrived there by 60,000 years ago. To reach the island continent, emigrants traveling from southeastern Asia would have had to have built sturdy watercraft and navigated a minimum of 50 miles of open water, depending on the sea level. Scholars mostly agree that any human capable of managing this feat must have been fully modern. And in Israel’s Qafzeh Cave, Erella Hovers of the Hebrew University of Jerusalem and her team have recovered dozens of pieces of red ochre near 92,000-year-old graves of H. sapiens. They believe the lumps of pig-
matter were heated in hearths to achieve a specific hue of scarlet and then used in funerary rituals.

Other finds raise the question of whether symbolism is unique to anatomically modern humans. Neandertal sites commonly contain evidence of systematic ochre processing, and toward the end of their reign in Europe, in the early Upper Paleolithic, Neandertals apparently developed their own cultural tradition of manufacturing body ornaments, as evidenced by the discovery of pierced teeth and other objects at sites such as Quinçay and the Grotte du Renne at Arcy-sur-Cure in France [see “Who Were the Neandertals?” by Kate Wong; SCIENTIFIC AMERICAN, April 2000]. They also interred their dead. The symbolic nature of this behavior in their case is debated because the burials lack grave goods. But this past April at the annual meeting of the Paleanthropology Society, Jill Cook of the British Museum reported that digital microscopy of remains from Krapina Rock Shelter in Croatia bolstered the hypothesis that Neandertals were cleaning the bones of the deceased, possibly in a kind of mortuary ritual, as opposed to defleshing them for food.

Perhaps the ability to think symbolically evolved independently in Neandertals and anatomically modern H. sapiens. Or maybe it arose before the two groups set off on separate evolutionary trajectories, in a primeval common ancestor. “I can't prove it, but I bet [Homo] heidelbergensis [a hominid that lived as much as 400,000 years ago] was capable of this,” White speculates.

For his part, Henshilwood is betting that the dawn of symbol-driven thinking lies in the Middle Stone Age. As this article was going to press, he and his team were undertaking their ninth field season at Blombos. By the end of that period they will have sifted through a third of the cave’s 75,000-year-old deposits, leaving the rest to future archaeologists with as yet unforeseen advances in excavation and dating techniques. “We don't really need to go further in these levels at Blombos,” Henshilwood says. “We need to find other sites now that date to this time period.” He is confident that they will succeed in that endeavor, having already identified a number of very promising locales in the coastal De Hoop Nature Reserve, about 30 miles west of Blombos.

Sitting in the courtyard of the African Heritage Research Institute pondering the dainty snail shells in my hand, I consider what they might have represented to the Blombos people. In some ways, it is difficult to imagine our ancient ancestors setting aside basic concerns of food, water, predators and shelter to make such baubles. But later, perusing a Cape Town jeweler’s offerings—from cross pendants cast in gold to diamond engagement rings—it is harder still to conceive of Homo sapiens behaving any other way. The trinkets may have changed somewhat since 75,000 years ago, but the all-important messages they encode are probably still the same.