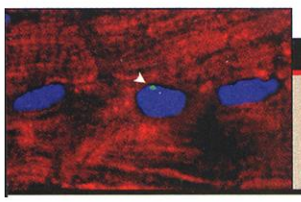

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plementing them will be expensive. "There's no doubt that institutions are going to need more resources and more bureaucracy," says Danforth. Adds Martin, "Nobody out here has proposed how to pay for this increased scrutiny."

The association plans to issue a second report this year on institutional conflicts. The next few months may also see guidelines from the HHS Office for Human Research Protections, whose chief, Greg Koski, says that AAMC's recommendations are "by and large very consistent" with what HHS is contemplating.

–JOCELYN KAISER

HIGH-ENERGY PHYSICS

Repairs Weakened Neutrino Detector

TOKYO—A single cracked photomultiplier tube apparently triggered the devastating accident on 12 November 2001 that has closed Japan's Super-Kamiokande neutrino detector for at least a year. An investigation into the accident has confirmed early suspicions about the sequence of events that destroyed about 7000 of the observatory's 11,000 light-detecting sensors (*Science*, 23 November 2001, p. 1630).

The $100 million detector has produced convincing evidence that neutrinos have mass, contrary to decades of theoretical predictions. The wispy particles cannot be observed directly, however, so the 39-meter-diameter, 41-meter-high observation tank is filled with water and lined with photomultiplier tubes that can catch a distinctive glow, known as Cerenkov radiation, produced when neutrinos smash into atomic particles in the water. Last summer, for the first time since the facility was completed in 1996, the water was drained so some 100 burned-out tubes could be replaced. The tank was being refilled when one of the tubes imploded and started a chain reaction that destroyed almost all of the submerged tubes.

By analyzing the sequence in which the sensors stopped sending signals, the investigators narrowed down the initial break to one of two tubes—one original, one a replacement—on the floor of the tank. To make the repairs, technicians stood on thick Styrofoam pads placed directly atop the tubes, after determining that the tubes were capable of withstanding the stress. Examining that assumption, investigators applied eight times the load calculated to have been imposed during the repair operation on an array of 12 tubes. One of these tubes subsequently broke at its neck when subjected to a water-pressure test. This result "hints" that the neck of the original tube could have been weakened by the repair work, the report concludes, although the replacement tube might also have been damaged during handling or installation.

To test the theory that a single imploding tube could destroy thousands of others, the investigating team three times submerged an array of nine tubes and deliberately punctured the central tube. Each time, the shock wave resulting from the implosion broke all the surrounding tubes. Yoji Totsuka, a professor at the University of Tokyo's Institute for Cosmic Ray Research and director of the observatory, says the team plans to test whether acrylic housings for the tubes will contain the shock wave and prevent a chain reaction. They are also working with the manufacturer to develop more shock-resistant tubes.

The Japanese and U.S. project scientists running the experiment must now convince a University of Tokyo committee that they understand the causes of the accident well enough to prevent it from recurring. If they do, scientists hope to resume some observations within a year using a limited number of photomultiplier tubes. But bringing the facility back to full strength could take 5 years and cost between $15 million and $25 million.

–DENNIS NORMILE

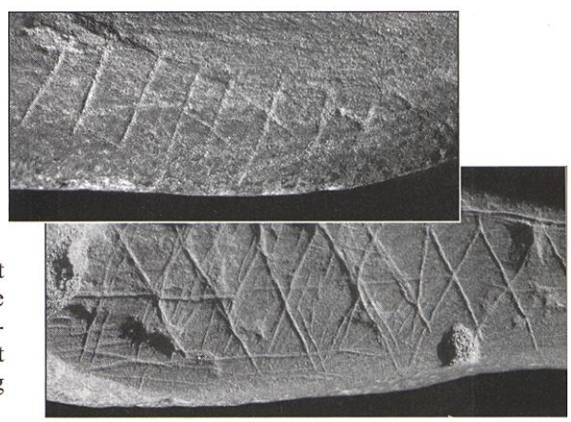
Fix-it fiasco. Repairs to the photomultiplier tubes triggered a costly accident when the tank was refilled.

CREDITS: (TOP) C. HENSHILWOOD *ET AL.*; (BOTTOM) ICRR

OLDEST ART

From a Modern Human's Brow—or Doodling?

Archaeologists in South Africa have found what may be the oldest known art, dated at least 40,000 years before the earliest cave paintings in Europe. The artifacts, two chunks of red ochre engraved with geometric crosshatches, were recovered from 77,000-year-old cave deposits. It's unclear what the ancient artist meant the marks to represent. Nevertheless, some researchers argue that the find in Blombos Cave, published online by *Science* on 10 January (www.sciencexpress.org), strengthens the case that modern human behavior arose much earlier than previously thought and that it took root in Africa long before spreading to Europe. Others caution against drawing sweeping conclusions from what may be a relatively rare find.



Ochre oeuvre? Researchers claim these engravings are evidence of symbolic representation.

Most experts believe that *Homo sapiens* arose about 130,000 years ago in Africa, when anatomically modern humans debut in the fossil record. But scientists have been puzzled by the seemingly long gap between when humans began looking modern and when they started acting modern. Until recently, there was little evidence of modern behavior—such as the use of advanced hunting and fishing techniques and the creation of elaborate tools and art or other symbolic expression—earlier than about 40,000 years ago, the start of Africa's Later Stone Age and Europe's Upper Paleolithic, when stunning cave paintings in France and Spain appeared.

Since 1993, however, a team led by ar-

chaeologist Christopher Henshilwood of the South African Museum in Cape Town has been unearthing at Blombos Cave what it believes is proof of modern behavior during the Middle Stone Age period, 250,000 to 40,000 years ago. In the December 2001 issue of the *Journal of Human Evolution*, for example, the team described a cache of elaborately worked bone points—which many researchers consider evidence of the ability to visualize a complex form—found in layers older than 70,000 years. But the ochre engravings, unearthed in 1999 and 2000, could be the best evidence yet that humans were capable of symbolic representation that long ago. The smaller piece, 53 millimeters long, has a series of X-like crosshatches, some struck through by a horizontal line. The larger chunk, about 76 mm long, features many X's traversed by three horizontal lines.

"This is clearly an intentionally incised, abstract geometric design," argues anthropologist Stanley Ambrose of the University of Illinois, Urbana-Champaign. "It is art." French cave art expert Jean Clottes is more circumspect. Although "the geometric design is fully deliberate … and shows a desire to achieve symmetry," Clottes says he is "far from sure" that "it is an incontrovertible instance of symbolic behavior … it could also be a kind of doodling." What's not seriously in dispute is the 77,000-year date, pegged to charred stone tools in the same soil layer and sand grains in an overlying dune.

Although many researchers are willing to grant the Henshilwood team's claim that the artist intended to symbolize something, few are ready to embrace a radical new chronology for the spread of modern behavior. "I have a bit of trouble with the argument that this is now *the* evidence to displace all claims for the earliest modern behavior elsewhere," says anthropologist Meg Conkey of the University of California, Berkeley. Even if symbolic representation did arise in Blombos Cave, it may have been a fluke: a flicker of insight that died with the artist. "There are at least 30 Middle Stone Age sites scattered across the continent that could be expected to show the kinds of things reported … [in] Blombos Cave," says archaeologist Richard Klein of Stanford University. But they don't, he says, with the possible exception of a site in the Congo. Ambrose agrees: "[Blombos] remains unique in its abundance of evidence for modern behavior."

Henshilwood counters that more Blombos-type discoveries may well turn up at other digs in Africa. "This is just the tip of the iceberg," he predicts. As for the 30 sites Klein refers to, he says, "most were dug in the 1920s, '30s, and '40s and were not dated properly," and most were not well excavated.

If Blombos Cave is an aberration, the task is to try to explain why modern behavior did not appear simultaneously across Africa. Henshilwood suggests that the cave's location overlooking the Indian Ocean—where seafood might have provided a rich diet—provides a clue. "Did those anatomically modern people who ended up in a coastal environment do better?" he asks. "This does seem to be the pattern." The search for such patterns, some experts say, might be more important than pinpointing the precise origin of modern behavior. "These authors don't need to make big, bold claims to convince us that what they have is important," says Conkey. "The interesting question is not so much, 'Is this the earliest?' but 'Why did it happen here?' "

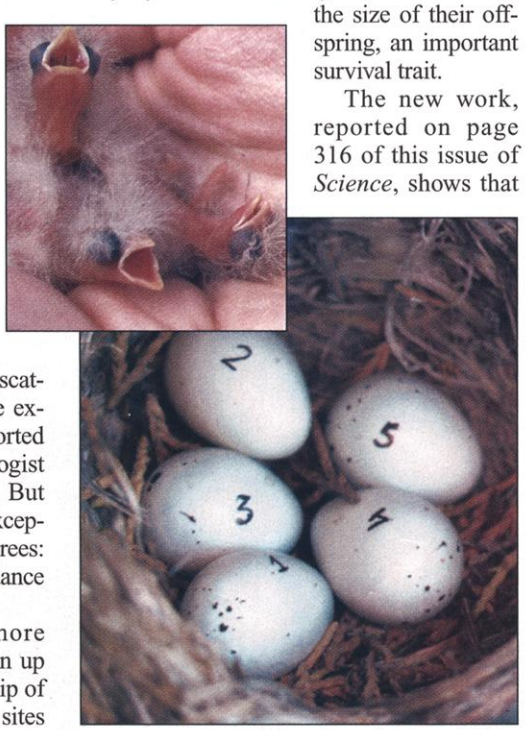
–MICHAEL BALTER

EVOLUTIONARY BIOLOGY

Finches Adapt Rapidly To New Homes

Birds of a feather don't necessarily stick together. A study of house finches has demonstrated that in just 30 years, finches newly settled in Montana and Alabama begin to look and act quite different from each other, despite being close kin. Alexander Badyaev, an evolutionary ecologist at Auburn University in Alabama, and his colleagues have also shown that these flourishing avian pioneers improve their chances of success in part by controlling the sex of their eggs as they lay them. In this way, mothers influence the size of their offspring, an important survival trait.

The new work, reported on page 316 of this issue of *Science*, shows that



Urban invader. Labeling eggs by birth order helped explain the house finches' (*above*) widespread success.

CREDITS: A. BADYAEV *ET AL.*

ScienceScope

Take It Back White House budget officials have backed off from a proposal to transfer some $35 million in research funds from the Smithsonian Institution to the National Science Foundation (NSF) after hearing strong protests from Congress and the scientific community.

The Office of Management and Budget had planned to shift the money as part of the president's 2003 budget request that will be released on 4 February (*Science*, 7 December 2001, p. 2066). Budget officials had argued that the funds, for the museum's astrophysical observatory, tropical research institute, and environmental center, could be better managed by NSF, which would then hold a competition open to all scientists. But shortly before Christmas, Smithsonian officials were told that the plan had been withdrawn.

"The change is as definite as it can be [without a formal budget]," says a Smithsonian official. But the White House may still order up a study on how best to support science at the Smithsonian.

Human Genome, Take 2 ScienceScope's recent item about an informal vote on the future of the Human Genome Project painted a darker picture than was intended (21 December 2001, p. 2451). National Human Genome Research Institute director Francis Collins invited dozens of researchers attending a December meeting on the sequencing project's future to vote on one of two propositions: "A. We declare victory for the Human Genome Project at the essential completion of the human sequence [in 2003] ... and we will then identify what happens next with some other term, such as 'genome research,' " or "B. We consider the Human Genome Project to be a continually evolving entity, adding new goals and opportunities as the science and its medical applications move forward." Participants voted roughly 3:1 for proposition A.

Prior to the tally, Collins noted in a jovial—not dictatorial—tone that the poll wouldn't be the final word. Afterward, he cracked that some members of his staff probably wouldn't be happy that he'd put the choice to a vote—drawing laughs from the crowd. To see the entire event for yourself, check out www.nhgri.nih.gov/CONF/beyond01.htm.