MEETING AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Rich Blend of Research Served in Beantown

BOSTON—Featuring its usual breadth, the annual meeting of the American Association for the Advancement of Science (publisher of *Science*), held 14 to 19 February, included reviews of recent physics breakthroughs and new findings in anthropology. Other stories can be found in last week's issue (p. 1457) and at www.sciencenow.org.

New State of Matter Not So New?

The 2001 Nobel Prize in physics honored three researchers for coaxing hordes of atoms into a single quantum state. But the bizarre phenomenon known as Bose-Einstein condensation was actually spotted many years before the prize-winning work, says one of the new laureates. Other scientists disagree.

Bose-Einstein condensation occurs when certain types of particles are cooled to near absolute zero and suddenly collapse en masse into the single quantum state with the least energy and no momentum. Predicted in 1924, such condensation was achieved in 1995 by Eric Cornell and Carl Wieman of JILA, a laboratory run by the National Institute of Standards and Technology and the University of Colorado, Boulder, and independently by Wolfgang Ketterle of the Massachusetts Institute of Technology. The researchers used lasers and magnetic fields to cool gases of atoms such as rubidium and sodium, and last year, the three received the Nobel Prize for their efforts (*Science*, 19 October 2001, p. 503).

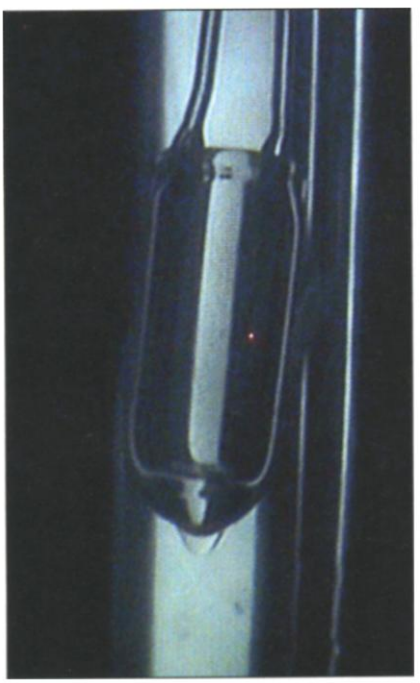
But Bose-Einstein condensation was seen decades ago in liquid helium, Ketterle mentioned during a presentation at the meeting, acknowledging a controversial claim by John Reppy of Cornell University in Ithaca, New York. Although helium-4 becomes a superfluid and flows without resistance at low temperatures, physicists generally agree that superfluid helium-4 is not a Bose-Einstein condensate (BEC) in the original sense of the term. That's because its atoms interact much more strongly than theory assumes BEC particles do.

Reppy studied an exception: tiny amounts of helium trapped in nanometer-sized pores of a spongelike glass called Vycor. Even though the pores keep its atoms too far apart to jostle one another much, the helium still behaves like a three-dimensional fluid. In 1983 Reppy and colleagues reported results that suggested that the helium was sloshing through the glass as a true BEC.

Ketterle says that Reppy brought this finding to his attention a couple of years ago and that the priority claim is fair. "I think the results appeared conclusive," Ketterle says. But co-laureate Wieman says that Reppy's claim is "really a stretch" and that Ketterle may have acknowledged the helium experiments to appease Reppy. "Ketterle is being gracious," Wieman says, "and Reppy makes a lot of noise."

Other experts are also divided. Jason Ho, a theorist at Ohio State University, Columbus, who has studied both liquid helium and atomic BECs, says Reppy certainly saw signals consistent with Bose-Einstein condensation, although he hesitates to call the observation conclusive. Guenter Ahlers, a helium physicist at the University of California, Santa Barbara, has no doubts. "Reppy had it before the atomic physicists," Ahlers says, "and he never got the credit he deserves."

On this much all agree: Ketterle, Cornell, and Wieman have opened a spectacular new field of physics. BECs in atomic gases have already been used to fashion rudimentary "atom lasers" and to stop light in its tracks. The BEC in helium in Vycor—if it's there—remains trapped within the glass.



Priority? Some claim that the newest state of matter was seen long ago in superfluid liquid helium.

–ADRIAN CHO

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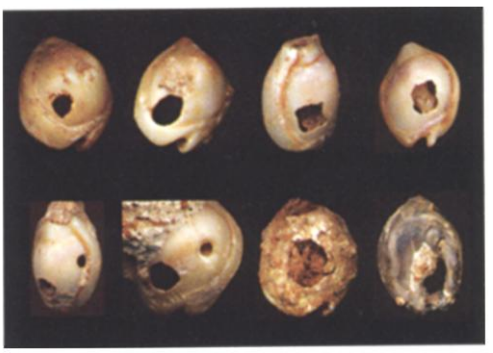

Conversation piece. A need to communicate may have led to more seashell ornaments.

Elbow Room and New Jewelry

Humans living in the eastern Mediterranean first began wearing beads just when their populations apparently began to expand. The finding, reported here 15 February, suggests that modern behaviors such as dolling up with jewelry may have originated from a need to communicate rather than a fundamental change in the human brain.

Humans started wearing beads about 42,000 years ago, according to work on archaeological sites in Bulgaria and Kenya. New excavations have now uncovered evidence of a third independent invention of ornamental beads. Pierced seashells started to appear in Turkey and Lebanon between 41,000 and 43,000 years ago, reported Mary Stiner of the University of Arizona in Tucson. At the same time, Stiner and her colleagues found, the locals started eating fewer tortoises and mollusks and more hares, as evidenced by the bones found at human settlements. To Stiner, the fact that hunters were forced to seek swifter quarry implies that the human population was growing. (The tortoise may have won one highly publicized contest, but the hare won the race to escape the hungry caveman.)

This population growth may have prodded an explosion of bead use as a means of more efficient communication, Stiner says. Although other scholars suggest that ornamentation and other "modern" use of symbols was prompted by a so-called cognitive revolution in brain wiring, decorations may be a response to more frequent

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social encounters and the need to convey more information about oneself to strangers. "Rather than saying it's a new brand of human being, we're saying it's a new rate of social contact," she says. Furthermore, a sudden biological change most likely would have occurred in only one place, Stiner says, whereas ornamentation arose independently in at least three.

The theory is plausible and intriguing, says Frank Hole, an archaeologist at Yale University, but he notes that the finding is only a correlation. "There are other cases where people are living close together and not doing anything like this," he says.

–BEN SHOUSE

Ben Shouse, a former *Science* intern, is an intern at *The Nation*.

Viral Threat to Newborns Under Radar

A common herpesvirus that infects healthy adults but rarely harms them—cytomegalovirus (CMV)—is now being recognized as a major threat to newborns. More than 40,000 children in the United States are infected with CMV at birth each year, and as many as 8000 of them suffer major consequences, including hearing loss and reduced IQ, says clinical researcher Richard Whitley of the University of Alabama, Birmingham.

Speaking here at the meeting, Whitley estimated the national economic loss due to CMV at more than $1 billion a year. Whitley says this makes it one of the greatest health risks for U.S. children—comparable to infectious agents such as *Haemophilus influenzae* that have received far more attention in the past.

CMV infection, which often coexists with HIV, attracted the attention of drug companies in the 1990s. When HIV infection rates were climbing, the pharmaceutical R&D investment in this area increased in parallel. But when more effective combination drug therapies began to reduce HIV incidence, CMV infections dropped in parallel; records show a sharp drop-off in opportunistic CMV infections of the eye (CMV retinitis) in adults starting in 1997. Since then, Whitley and other speakers said, drug companies have been cutting back on support for anti-CMV drugs because the potential market has declined.

The drugs now available for treating CMV, researchers noted, are far from ideal. They cause life-threatening side effects and must be injected intravenously (or in the case of CMV retinitis, directly into the eye). Whitley and several other speakers—including Leroy Townsend of the University of Michigan, Ann Arbor, and Karen Biron of GlaxoSmithKline—described new compounds they are helping develop that might eventually be used as oral medicines to combat CMV. None has yet been approved by the Food and Drug Administration.

–ELIOT MARSHALL

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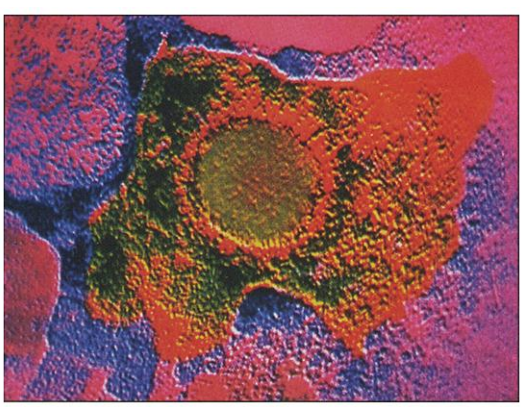

Dangerous. Although cytomegalovirus can harm children, industry research on it is declining.

GEOSCIENCES

'Earth Simulator' Puts Japan on the Cutting Edge

Researchers are eagerly awaiting the debut next month of the world's fastest computer for modeling Earth's climate and interior

YOKOHAMA, JAPAN—Will rising levels of greenhouse gases make northern Europe as cold as Alaska? Current climate models disagree sharply about how a slight rise in atmospheric temperatures could affect the North Atlantic currents that carry warm water from the Caribbean and keep Europe's winters relatively mild. That's because the models' picture of climate is too crude to make accurate predictions based on such fluctuations. But next month, Japanese scientists will start to operate a $310 million supercomputer that can digest a much more detailed model and, researchers hope, spit out a better answer.

Conceived around the time Japan was hosting the Earth Summit that produced the 1997 Kyoto Protocol on climate change, the Earth Simulator—billed as the world's most powerful computer—is designed to do more than help resolve such key questions about global warming. The supercomputer, housed at the Earth Simulator center here, will also add a new dimension to studies of Earth's interior by allowing the first global-scale simulations of the interaction between core and mantle, and between mantle and crust. And, although climate change and Earth's interior get priority, incoming director-general Tetsuya Sato, a computer simulation specialist, says he hopes to make the supercomputer available "for anything that promises to produce epochmaking results."

Scientists are already excited about its potential. "It's really a marvelous present the government has given to Japan's scientists," says Syukuro Manabe, a prominent climate modeler at Princeton University who is an adviser to the project. Geoff Jenkins, head of the climate prediction program at the U.K.'s Hadley Centre in Bracknell, says the computer's "more comprehensive climate models should contribute substantially" to the debate over the effects of climate change.

Groundbreaking work. Director Tetsuya Sato says the computer is available for "anything that promises to produce epochmaking results."

However, some researchers fear that bureaucratic and budgetary squabbles could handicap their work. The center's budget is split between several agencies that have different priorities. The country also has a dearth of senior-level environmental scientists capable of using the facility, and officials have not yet worked out a mechanism