RANDOM SAMPLES

edited by CONSTANCE HOLDEN

A Bigger, Better Bose-Einstein Condensate

Since a Colorado team announced the creation of the long-sought state of matter called the Bose-Einstein condensate (BEC) this spring, (*Science*, 14 July, pp. 152, 182, and 198), other researchers have continued their efforts to do the same. Now another group has made the condensate—and they've made it bigger and faster than anyone else's.

The latest success is reported by Wolfgang Ketterle of the Massachusetts Institute of Technology in a paper to be published in *Physical Review Letters*. Ketterle has spent 3 years in a quest to induce BECs, in which the atoms in a frigid dense gas are coaxed to renounce their individuality and enter a coherent quantum mechanical state, like photons in a laser beam. Ketterle reports that his team has cooled a gas of sodium atoms to a BEC in just 7 seconds, as opposed to over a minute for his competitors. And whereas the other groups only condensed a few thousand atoms at a time, Ketterle and company have managed to condense a half million. "We have exceeded the previous results by a factor of 1000," he says.

Ketterle first cools his sodium atoms by sapping their energy with a laser beam, then puts them into a magnetic trap where the hotter atoms evaporate and the colder atoms slip toward the center. Such a trap has a magnetic field hole, however, through which atoms can "leak" out. While the Colorado group solved this problem by adding another magnetic field to move the hole around, this decreased the density of the condensate. Ketterle found a different solution, aiming a laser beam at the hole to gently repel atoms that might slip through.

The result was a fast and dense BEC that has impressed even his competitors. "It's great," says the University of Colorado's Eric Cornell. "They have a very convincing signature, and lots more atoms. This is a big advantage because if BEC is going to live up to its advance press, we're going to need bigger samples of condensate."

Newton Goes to Cambridge

Cambridge University, U.K., has long exerted a gravitational pull on scholars interested in Isaac Newton, who was both student and professor there. But now another Cambridge—in Massachusetts—is becoming a new force in Newton scholarship.

A large collection of Newtoniana owned by Babson College in Wellesley, Massachusetts, has been permanently deposited in the Burndy Library at the Dibner Institute for the History of Science and Technology, an independent research institute based at the Massachusetts Institute of Technology. Combined with the library's existing Newton collection, it will be "the largest collection of Newton material outside the United Kingdom," says librarian Christine Ruggere.

Featuring first and subsequent editions of the *Principia*, the *Opticks*, and other landmark works—some bearing emendations in Newton's own hand—the collection will be a boon to Newton scholarship, says historian of science I. Bernard Cohen, the Burndy Library's first resident fellow. "The amalgamation of the two collections means that virtually all the important editions of all of Newton's writings are available for study in a single place," says he. "That's quite extraordinary."

The institute is planning a symposium next week that will be the largest gathering of Newton scholars in a decade, says Dibner Institute Director Jed Buchwald. Overseeing it will be one of the most unusual items in the Babson collection: a plaster death mask, once owned by Thomas Jefferson, one of eight made from Newton's corpse. While some scholars admit they're disturbed by the mask's sullen countenance, Cohen calls it "the nearest thing we have to being close to Newton himself."

GRAHAM G. RAMSAY

Peace in plaster. Death mask.

Nobelist Obliges

His theory of "rational expectations" won Robert E. Lucas of the University of Chicago the Nobel Prize in economics last month. Lucas's former wife, it now appears, took the theory to heart. When the couple were working out a divorce agreement in 1989, Rita Lucas thought it rational to expect that her husband might well be on the way to a Nobel. She was not alone in that view—"Lucas had become one of the most influential economists of the last 20 years," says Richard M. Cyert, president emeritus of Carnegie Mellon University. "I had certainly expected him to get it at some time."

The agreement stipulated that, should Lucas win the prize by October 1995, 50% of the money would go to her. She got in just under the wire—and half of the million-dollar prize will go to her. "A deal is a deal," her ex-husband was quoted as saying in the *Chicago Tribune*.

The Lucases follow a Nobel tradition established by Albert Einstein. According to Einstein's biographer, Abraham Pais of Rockefeller University, Einstein in 1919 in anticipation of winning the prize—which he did in 1921—promised the money (about $32,000) to his first wife, Mileva Maric, so he could marry his cousin, Elsa Einstein.

J.R. GLOVER/FRAN HEYL ASSOCIATES

Stronger than steel. Spider web draglines are the envy of science.

Bioengineered Spider Silk a Step Closer

Despite researchers' success at creating durable synthetic fibers, nothing they have come up with yet matches the strength and elasticity of spider silk. Now molecular biologist Randy Lewis of the University of Wyoming has spun the first strands of spider silk fibers with the aid of a genetically engineered silk protein factory: a bacterium.

Lewis reported last year that he had inserted a gene in bacteria that made them produce a huge protein similar to one spiders use to make silk (*Science*, 1 April 1994, p. 33). Now, in an unpublished paper, Lewis and his co-workers report making the leap from protein to fiber. After purifying the protein, drying it, and redissolving it, the scientists force it through a very fine needle. As the protein molecules pass through the narrow opening, friction causes them to elongate and connect, creating a fiber. The group has also dried the dissolved protein on a plate, forming films that Lewis says could potentially be used as wound coverings.

Cornell University biophysicist Lynn Jelinski says the step is a "breakthrough that the field's been waiting for." Lewis cautions, however, that the fibers his group has made are "nowhere near as strong as spider silk." The team is now trying to bioengineer bacteria to manufacture a second protein needed to replicate "dragline" silk, from which spiders make the scaffolding of their webs. That silk is five times as strong as steel, twice as elastic as nylon, waterproof, and able to

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stretch up to 30% beyond its length. Lewis says possible uses for a manufactured version range from artificial ligaments and tendons to material for parachute cords.

Information Dirt-Track

The information gap between rich and poor nations is increasing as the Internet spreads, according to a report issued last month by the Panos Institute, a London-based group that specializes in development issues. "So far the information revolution has only reached a few universities, companies, journalists, researchers, and governments in developing countries," writes Mike Holderness, author of the report *The Internet & the South: Superhighway or Dirt-Track?* He notes that most of the world's population is scarcely qualified to join the revolution. The Internet is overwhelmingly the tool of English-speaking nations; 70% of the almost 7 million computers connected to the system are in the United States. As for connectivity, one must have access to a stable power supply, reliable telephone service, and resources to buy the necessary hardware. Yet, reports Panos, 49 countries have fewer than one telephone per 100 people—and 35 of those countries are in Africa. India has 8 million telephone lines for 900 million people.

There are many schemes afoot to help bring poor countries online—AT&T, for example, is soliciting investors for a project to crisscross Africa with fiber-optic cable, and Motorola plans to launch 66 satellites to extend mobile phone coverage over the whole planet. But, says Panos, "in the short term, the North-South information gap looks set to increase."

INTERNET HOSTS
as of August 1995

North America	4,541,470
Western Europe	1,463,870
Pacific	251,320
(Australia 207,426)	
Asia	229,854
Eastern Europe	66,998
Africa	41,416
(S. Africa 41,329)	
Latin America	27,069
Middle East	19,548

SOURCE: INTERNET SOCIETY

Scientists as Managers

Despite the need for technologically sophisticated people in a modern economy, few top managers in Fortune 1000 companies have scientific training, and only half are "technologically literate," according to a poll commissioned by Cornell University's Johnson Graduate School of Management last month. But the school has an MBA program that aims to fix that—by turning scientists into managers.

The poll of 500 senior managers revealed that many perceive a "cultural divide" between employees with and without technical training, and technical types are also perceived as "not understanding a market-driven culture."

But the respondents agreed that science and management know-how are going to have to come together "for the next generation of successful managers." The Johnson school, in anticipation of this development, has started an MBA program designed just for scientists, which takes 12 months instead of 2 academic years. "We believe people who have advanced scientific training can absorb the stuff faster," says the school's dean, Alan Merton. Basic courses in accounting, marketing, finance, operations, microeconomics, and quantitative methods—ordinarily spread out over an academic year—are jammed into 3 months, leaving the rest of the year for advanced elective courses. The first class, which entered last spring, contains 30 scientists from around the world. Says Merton: "I think this program is going to boom because there are so many scientists out there who would like an MBA but won't come in for a 2-year program." Northwestern University biochemist Richard Morimoto agrees. "Sounds like the folks at Cornell have been clever to create a timely program," he says. For more information, e-mail merton@johnson.cornell.edu.

Seized Agent Orange Research Released

An international team of biologists whose documents and samples were seized by Vietnamese customs agents this summer have learned their materials have been released, clearing a hurdle to joint U.S.–Vietnamese research on health effects of Agent Orange.

The nine scientists, sponsored by the National Institutes of Health (NIH) and the World Health Organization, visited Vietnamese colleagues for 10 days in June at the request of Congress to discuss possible joint research on Agent Orange, a dioxin-containing herbicide used by the U.S. Army during the Vietnam War. The visit ended on a low note when airport customs officials confiscated all the team's documents and notes "remotely related to dioxin," says team member Arnold Schecter, professor of preventive medicine at the State University of New York's Health Science Center. Officials also seized food and blood samples collected for dioxin analysis, including 40 vials of blood from Laotians exposed to Agent Orange (*Science*, 21 July, p. 298).

On 16 October, however, after many diplomatic entreaties, Schecter got a fax from Vietnamese colleague Hoang Dinh Cau saying that the papers and samples had been released. His group expects to receive the documents by mail soon. The fate of the blood samples is less certain. The scientists hope to make another trip to retrieve the samples, which, says Schecter, "may or may not be salvageable" depending on whether they have been kept frozen.

The release lifts a hurdle to getting money from NIH and other agencies for further research, Schecter says. Until now, "instead of being able to recommend moving forward, we could only say we had a really bad trip." He now hopes Congress will target funds for workshops and more scientific exchanges.

Swords to Prairies

FRAN HARTY

Fit for roaming. 60 kilometers of chain-link fence and 2430 hectares of pasture allow for reintroducing bison at the Joliet Arsenal.

The Joliet Arsenal, 64 kilometers southwest of Chicago, spent 50 years turning out ammunition for the U.S. Army. Now, with the end of the Cold War, plans are to turn the clock back to the last century by turning most of the site into the nation's first federally designated tallgrass prairie preserve.

In late October, U.S. congressional conferees agreed on legislation creating the Midewin National Tallgrass Prairie. The reinvigorated ecosystem is expected to draw greater numbers of birds such as the bobolink, the loggerhead shrike, and the endangered upland sandpiper. Bison may also be reintroduced. Financing for the project remains to be decided, but plans are moving ahead to reseed the prairie with big blue stem, Indian grass, liatris, and other species once common to the Illinois plains. In its original form, "a man on horseback could barely see over it," says ecologist Francis Harty of the Illinois Department of Natural Resources. The seeding job won't be easy. In 1830, 80% of Illinois was covered with prairie, but now the figure is well under 1%, and seed supplies of many native grasses are in short supply. Volunteers are currently collecting seeds in the field which will then be handsown. Ecologists are enthusiastic about the project. "It's wonderful," says ecologist Paul Risser, president of Miami University of Ohio. Combining 7700 hectares from the arsenal with adjacent conservation areas will create a domain of prairies, wetlands, and rivers covering more than 16,000 hectares. That, says Risser, promises to be "a powerful experimental area" for ecological and species preservation studies.