and the full $36 million for a terascale computer. The conferees ratified both the Senate's $10 million boost to a $50 million plant genome program and its support for a $50 million biocomplexity initiative that the House had trimmed by $15 million. They also removed Senate language that would have shifted $25 million in logistical support for Arctic research—a boost of $3 million over the request—from NSF to the independent Arctic Research Commission (*Science*, 1 October, p. 24). "I guess it was a tempest in a teapot," says commission director Garrett Brass, "and we appreciate their continued support for Arctic logistics." **–ANDREW LAWLER**

With reporting by Jeffrey Mervis.

ARMS CONTROL

Scientific Groups Endorse Test Ban

Physicists took center stage in Washington, D.C., last week for a quick reprise of the military debates of the 1980s. President Clinton appeared with a group of scientists and military leaders on 6 October for a spirited defense of the Comprehensive Test Ban Treaty (CTBT), which would ban all nuclear testing. Opponents of the treaty, who regard it as a threat to national security, cited their own technical experts. They also mixed in the carefully worded testimony of the heads of the three U.S. weapons laboratories about the limitations of any treaty, which were also aired at a congressional hearing held 1 day after the White House event.

This Cold War–era rhetoric was the result of a surprise 30 September announcement by Senate Majority Leader Trent Lott (R–MS) that the treaty, which President Clinton sent to the Senate 2 years ago, would be brought up for a vote by mid-October after 2 days of debate. (A two-thirds majority is required for approval.) Recognizing that he lacks the votes to win, Clinton at press time was negotiating for an indefinite delay.

The eight pro-CTBT physicists who participated in the White House event represented a group of 32 Nobel laureates who signed a statement arguing that it is "imperative" that Congress approve the treaty to "halt the spread of nuclear weapons." Charles Townes, a University of California, Berkeley, physicist who co-invented the laser, noted that the United States began a unilateral moratorium on nuclear testing under President George Bush in 1992. "My colleagues and I ... have concluded that continued nuclear testing is simply not required to retain confidence in America's nuclear deterrent," he said. On the same day, two other scientific societies, the American Geophysical Union (AGU) and the Seismological Society of America (SSA), released an unprecedented joint statement expressing confidence in the treaty's verification scheme.

The CTBT forbids parties from conducting or helping others conduct "any nuclear weapon test explosion," and it establishes a complex administrative system to keep everyone honest. It would create an analytical center to collect data from a global network of sensors: 170 seismic stations (more than 70 of which are now functioning), 80 radionuclide sensors, 60 infrasound detectors of low-frequency blast waves, and 11 hydroacoustic ocean detectors. Under the CTBT, any nation that suspects another of conducting a test could demand, and presumably get, an on-site inspection. A challenger could also use evidence from its own "national technical means," such as spy satellites. Clinton agreed to these terms and signed the treaty in 1996, sending it to the Senate for ratification in 1997. Fifty-one other countries, including Britain and France, have now ratified it.

Lott opposes ratification, as do many Republican senators, including John Warner (R–VA), chair of the Armed Services Committee, and Jesse Helms (R–NC), chair of the Foreign Relations Committee. Warner, for example, has said he's concerned that the treaty would deprive scientists of the best means—actual nuclear explosions—of checking the safety and reliability of U.S. weapons. Other opponents doubt the monitoring network is good enough to prevent cheating.

Side by side. Charles Townes, left, and other Nobelists support President Clinton's defense of test ban treaty.

Treaty opponents trumpeted a 3 October story in *The Washington Post* in which unnamed "senior officials" said the Central Intelligence Agency has "concluded that it cannot monitor low-level nuclear tests by Russia precisely enough to ensure compliance" with the treaty. CIA spokesperson Bill Harlow says this is a simplification of the CIA's report but declines to clarify the CIA's view. The effect was "devastating," says one physicist lobbying for the treaty.

CREDIT: SAM KITTNER

ScienceScope

Gender shift It took 25 years for a woman to break into the upper echelon of the male-dominated National Science Foundation (NSF). And it was only last year that Rita Colwell became the first woman to head the $3.8 billion agency. But next year, as NSF marks its 50th anniversary, women will hold the balance of power.

Women will hold five of the nine top slots at NSF in January, when University of Rhode Island oceanographer Margaret Leinen will succeed Robert Corell as head of geosciences, one of NSF's seven research directorates. Indeed, all three of Colwell's assistant director picks have been women—starting last fall with Ruzena Bajcsy to lead computer sciences and continuing with the appointment in August of Judith Sunley as acting head of education and human resources. They join Mary Clutter, who has headed the biology directorate since 1991.

"I'm delighted that NSF is appointing a significant number of women to high positions," says Betsy Clark, a biologist at Bowling Green State University in Ohio, who in 1975 became the first female assistant NSF director and who, perhaps not coincidentally, recruited Clutter. "Good women have been available for a long time, but many haven't gotten the chance to be leaders."

Less taxing A major cut in Australia's capital gains tax could spur investment in biotech and other fields. The new rates are intended to open the door to outside sources of venture capital and encourage Australians to keep their funds in-country. The tax break "will remove a major barrier," predicts John Mattick, director of Queensland's Institute of Molecular Bioscience.

The new rates are part of a top-to-bottom government overhaul. The current 48% capital gains tax would be cut in half for individual Australians and erased for overseas pension funds that commit cash to Australian projects for at least 1 year. Skeptics note that the breaks don't apply to Australian investment funds. Still, some research centers are taking advantage of the change: Sydney's Garvan Institute, for example, has already spun off investor-ready mental health and diabetes research firms. Legislators still must approve the changes, which a recent review deemed critical to raising Australian's international science standing (*Science*, 21 May, p. 1248).

Contributors: Richard Stone, Dennis Normile, Jeffrey Mervis, Elizabeth Finkel

The chiefs of the Department of Energy (DOE) weapons labs, called to testify before the Senate Armed Services Committee on 7 October, didn't provide their political bosses with much ammunition, either. Bruce Tarter, director of the Lawrence Livermore National Laboratory, said that simulated weapons testing under DOE's $4.5 billion-per-year Stockpile Stewardship Program "has an excellent chance of ensuring that this nation can maintain the safety, security, and reliability of the stockpile without nuclear testing" but that "it is not a sure thing." C. Paul Robinson, director of the Sandia National Laboratory, said the best guarantee of security is to continue testing weapons. "To forego that validation ... [is] to live with uncertainty," Robinson warned. Los Alamos National Laboratory chief John Browne said the reliability of nuclear weapons requires a "national commitment"—in other words, generous funding of the stewardship program and less criticism of lab management.

The CTBT did receive a technical vote of confidence last week from a joint AGU-SSA review panel, which had examined the plan for detecting low-yield nuclear tests. The CTBT allows for on-site inspections covering no more than 1000 square kilometers of any alleged test site. This is the area within which current technology can pinpoint the location of a magnitude 4 seismic event (equivalent to a 1-kiloton blast). The AGU-SSA panel, chaired by seismologist Terry Wallace of the University of Arizona in Tucson, concluded that the CTBT verification network, when complete, "can be relied upon" to detect and locate 1-kiloton tests. Members of the panel—including Gregory van der Vink of the Incorporated Research Institutions for Seismology in Washington, D.C., and Jeffrey Park of Yale University—said they didn't think it would be difficult to spot a weapons development program, even if the tests were very small.

The AGU-SSA group acknowledged a major uncertainty, however: No one has reliable data on a blast deliberately "decoupled" from the environment. Some research suggests the seismic signal would be nearly cut in half by decoupling, a process in which a damping substance (or air) is introduced between a bomb and the surrounding structure to reduce the transmission of blast waves. But doing this would require "extraordinary technical expertise," according to the AGU-SSA statement, and in any case, "the likelihood of detection is high." Van der Vink said that decoupling a bomb might increase the risk of radionuclide release, which would be picked up by an independent set of sensors. "No nation could rely upon successfully concealing a program of nuclear testing, even at low yields," the panel concluded.

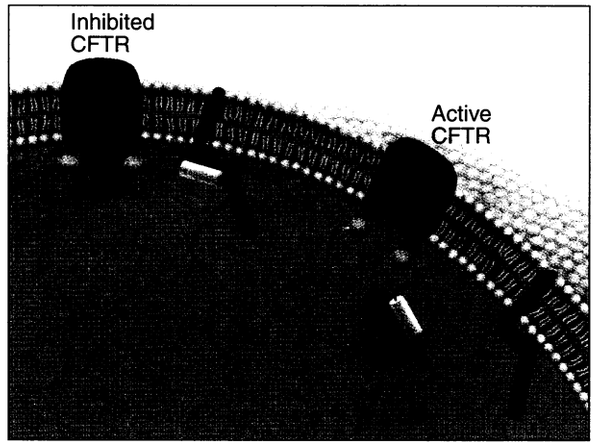
Whatever the Senate does, the test ban is likely to be discussed at election time. And that may mean an encore for the scientists who appeared in last week's drama.

–ELIOT MARSHALL

CELL BIOLOGY

New Insights Into Cystic Fibrosis Ion Channel

For commuters all over the world, a broken traffic light can be a nuisance. But when the proteins that regulate the traffic of molecules into and out of cells malfunction, it can spell disaster. Take the protein encoded by the gene at fault in cystic fibrosis, which strikes about one in 3000 newborns every year in the United States alone. Known as the cystic fibrosis transmembrane conductance regulator (CFTR), this protein channels chloride ions through the cell membrane, thereby regulating the water and salt balance in cells that line organs such as the lungs and intestines. Mutations that prevent the CFTR from doing its job disrupt this chloride transport, which in turn causes the lungs and certain other organs of affected individuals to fill up with thick, sticky secretions, setting the stage for life-threatening lung infections.



Unplugged. By interacting with the R domain, the CFTR tail may help keep open one of the cell's chloride channel.

New insights into how the CFTR works may now help researchers design drugs that regulate the operation of this vital cellular channel. On page 544, physiologist Kevin Kirk of the University of Alabama, Birmingham, and his colleagues report that they've identified an interaction between two parts of the CFTR molecule that seems to help keep the channel open. Drugs directed at the CFTR regions involved in that interaction might therefore serve to either enhance or inhibit chloride transport through the channel.

Although few cystic fibrosis patients are expected to benefit from any channel-activating drugs—most CFTR mutations prevent the protein from even getting to the membrane—channel inhibitors may have a wide application. Various forms of watery diarrhea, including those caused by the cholera bacterium and pathogenic *Escherichia coli*, are due to toxins that kick the CFTR into overdrive. Such infections kill far more people than cystic fibrosis, mainly children in developing countries. "This is a solid step forward, one of the more important insights into CFTR regulation in recent years," says biochemist and CFTR co-discoverer Jack Riordan of the Mayo Clinic in Scottsdale, Arizona.

The new findings stem from a discovery Kirk, Anjaparavanda Naren, and their colleagues made about 2 years ago. They found that a membrane protein called syntaxin 1A shuts down the CFTR channel by holding on to one of the channel protein's "tail" regions, which protrude into the cell interior. This suggested that the tail somehow controls CFTR function. To find out more about what it does, the team performed a series of experiments in which they either mutated specific amino acids in the tail region that binds syntaxin 1A or deleted the tail altogether.

The researchers introduced the mutant genes separately into frog eggs, where the protein products were made and inserted into the cell membranes. Because chloride transport affects the cell's electrical properties, the team assessed CFTR function by measuring the overall current across the membrane in response to signals known to activate CFTR. The researchers found that the tail had to be present for normal channel opening to occur. And they identified four negatively charged amino acids, all clustering on the same side of a predicted helical region of the tail, as crucial to that operation. "This suggested that the tail probably interacts with some other part of the CFTR," Kirk says. Fishing for the partner region, the researchers came up with "the most obvious candidate," as Kirk puts it. This is the so-called R domain.

Previous work has shown that the R domain keeps the CFTR channel closed until it is decorated with chemical tags called phosphate groups in response to CFTR activation signals. At that point it seemingly "swings out" of the way and sets the stage for a second incoming signal, the binding and subsequent cleavage of a small molecule called ATP, which provides the energy necessary to pop the channel open. Kirk now proposes that the tail binding to the R domain helps keep the channel unlocked. He and his team

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