physicist Scott Tremaine of Princeton University. "It worked in 1846 with Neptune," he notes, when two mathematicians independently fingered the yet-to-be-discovered planet as the cause of unexplained squiggles in the orbital motion of Uranus. But "people have tried it since," he says, "without much success." For example, proposed tenth planets have failed to materialize, including "Planet X," which was supposed to graze the inner edge of the Oort Cloud and explain periodic impacts and extinctions on Earth (*Science*, 22 March 1984, p. 1451). A proposed stellar companion to the sun, dubbed Nemesis, has also failed to turn up so far.

Now two groups—including some veterans of Planet X and Nemesis—are again proposing a tenth major body orbiting the sun. This week at the Division for Planetary Sciences annual meeting in Padua, Italy, physicists John Matese and Daniel Whitmire of the University of Louisiana at Lafayette argued that a planet or even a brown dwarf—a massive gas ball still too small to ignite stellar fires within it—orbits through the outer Oort Cloud.

They base their assertion on the paths taken by a third of the 82 most closely studied comets observed to fall from the Oort Cloud into the inner solar system. Most comets that make it into the inner solar system are shaken loose by the galaxy's gravitational jiggling of the Oort Cloud, which Matese and his colleagues assume would send an even rain of comets falling from all parts of the sky. But the Louisiana group, which included the late Patrick Whitman, finds that about three times as many comets as expected approach in a band of the sky that circles Earth like the longest stripe on a croquet ball. And these comets, bunched in the sky, also tend to have atypically short orbits, which don't take them as far into the Oort Cloud or as close to the sun as other comets. The best explanation, the group will report in *Icarus*, is a body having 1.5 to 6 times the mass of Jupiter and orbiting the sun at a mean distance of about 25,000 times the Earth-sun distance—that is, in the heart of the outer Oort Cloud. "The [orbital] statistics are not compelling," says Matese, "but they're very, very suggestive."

Planetary scientist John Murray of The Open University in Milton Keynes, United Kingdom, also thought the bunching of comets in the sky was suggestive. In this week's *Monthly Notices of the Royal Astronomical Society*, he follows much the same trail as the Louisiana group and arrives at much the same conclusion. But he goes further, locating the putative comet perturber precisely near the constellation Aquila the Eagle.

Those familiar with the vagaries of cometary orbits remain skeptical. "There are some anomalies in the distribution" of comet orbits, says planetary dynamicist Julio Fernandez of the Institute of Astronomy in Montevideo, Uruguay, "but the statistical sample is not large enough to draw such conclusions." Tremaine agrees about the small sample size and adds that the Oort Cloud is not likely to be as uniform as Matese and Murray assume. Recent close encounters with passing stars may explain the comet clumping, he says. Levison agrees with both those criticisms and raises the possibility of observational bias, the tendency of comets to be found in a band near the plane of the solar system because that is where astronomers tend to search.

Matese, for one, rebuffs the criticisms but remains philosophical. The orbital anomalies "are not likely to be explained by chance, bad data, or selection effects," he says, but "nothing is going to be settled by most of these statistical arguments. The vast majority will remain skeptical, perhaps rightly so." Matese and Whitmire will be patient. They are still waiting for their mid-1980s proposal of Planet X to pan out; and Whitmire had his own version of Nemesis. The final resolution of their latest proposal, says Matese, may come with infrared telescopes capable of detecting the perturber's warmth, like the Space Infrared Telescope Facility, due for launch in 2001. **–RICHARD A. KERR**

BUDGET 2000

Congress Boosts NSF, Reverses NASA Cuts

The budgetary roller coaster ride for many U.S. scientists ended last week when President Bill Clinton said he would sign a bill that gives the National Science Foundation (NSF) a significant boost for 2000. The bill also grants NASA's science program more than either the Senate or the House had been willing to provide, although still less than the agency asked for. That victory, however, comes with a steep price tag for NASA: millions of dollars in pork-barrel spending.

House and Senate members who met on 7 October in a crowded chamber in the Capitol set aside $13.65 billion for NASA and $3.91 billion for NSF for the budget year that began 1 October. Both figures are close to the amount Clinton wanted. "I am delighted … it's a win for the economy and the nation," said NSF director Rita Colwell in a prepared statement.

Legislators apparently robbed housing programs and the space station to put some money back into space science. Last month, the House had approved $240 million less than the agency's $2.1 billion request, whereas the Senate had cut the request by $120 million. Both actions were loudly protested by White House and NASA space science officials (*Science*, 24 September, p. 2045). But last week lawmakers, led by Senator Barbara Mikulski (D–MD) and Rep. Alan Mollahan (D–WV), agreed to a complicated maneuver that reduces the space science request by a mere $46 million. An additional $75 million will be spread across science, aeronautics, and technology programs, although it remained unclear early this week which programs will benefit from that money. And the lawmakers retained some $70 million in earmarks—unrequested spending—that NASA must swallow, including $15 million for a solar terrestrial observatory to be built and operated by two Maryland institutions, Johns Hopkins University and the Applied Physics Laboratory. The bill also reduces NASA's Discovery program of cheaper and faster space probes by $24 million, which NASA officials say could delay announcement of the next two missions.

Nevertheless, there was relief among space scientists. "Despite the fact we got caught up in serious budgetary give-and-take, we came out in the end with real support," says Steven Squyres, a Cornell astronomer who chairs NASA's space science advisory panel.

Lawmakers compromised on the controversial Triana mission, a $75 million effort inspired by Vice President Al Gore that would beam back pictures of the whole Earth. Work on the spacecraft will be halted until the National Academy of Sciences conducts a study of its scientific goals. NASA had planned to launch the mission at the end of next year, but agency officials expressed relief: "This is not a termination," said one.

NASA life and microgravity sciences won a boost of $21 million above the $264 million requested, whereas earth science will receive only a $4 million cut to the $1.46 billion request—a far cry from the threatened $285 million House reduction. Much of that regained money will go to NASA's Goddard Space Flight Center in Greenbelt, Maryland. "The funding will save 2000 jobs cut by the House bill," Mikulski said after the conference.

For NSF, the conferees voted a 6.6% increase, to $3.91 billion. That amount overrides a flat budget approved by the House (*Science*, 6 August, p. 813) and falls only $9 million short of NSF's requested hike of $250 million. It also restores funds for a key administration computing initiative and several new projects.

NSF may have cemented its leading role in the proposed $366 million information technology initiative by receiving all but $5 million of its $110 million request for research

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

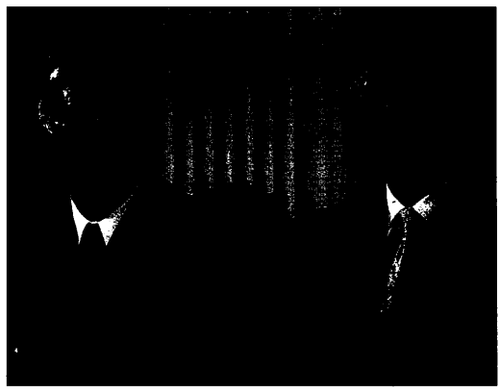
Physicists took center stage in Washington, D.C., last week for a quick reprise of the military debates of the 1980s. President Clinton appeared with a group of scientists and military leaders on 6 October for a spirited defense of the Comprehensive Test Ban Treaty (CTBT), which would ban all nuclear 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.

CREDIT: SAM KITTNER

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.

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).

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