other fields—including marine biology, energy, and transportation—will also receive special treatment.

Huge increases in research spending during the 1980s under the former Socialist government pushed government funding for R&D to 0.9% of GDP in 1992. Since then, Spain's economy has faltered, and R&D funding has stagnated or slipped slightly each year. "We are quite behind other developed countries," says Jesús Avila, a researcher at the Center for Molecular Biology in Madrid. Researchers hope that the 1999 budget will reverse this trend and bring Spain nearer to the European Union average of 1.9% of GDP. "We must continue this trend," says Fernando Aldana, director of the Office of Science and Technology in Madrid, which oversees distribution of the government's science funds and authored the R&D request. "Spain can only achieve competitiveness through the sustainable growth of the investment in R&D."

The main concern among researchers is to find work for the large numbers of young scientists who were trained during the Socialist-led science boom in the 1980s and cannot now find permanent positions or get adequate funding (*Science*, 20 March, p. 1844). "The big groups have money, but the new ones—some of them very good—must be funded to avoid a disastrous situation in the future," says Avila.

–ALICIA RIVERA

Alicia Rivera is a science writer in Madrid.

U.S. R&D BUDGET

Three Spending Bills Bolster Research

Congress last week sent a mostly upbeat message to researchers that it is ready to give basic science a fresh infusion of cash for the 1999 fiscal year, which officially began on 1 October. It put the finishing touches on a trio of spending bills that would give the National Science Foundation (NSF) a 7% increase, science spending at the Department of Energy (DOE) a 10% boost, and basic research at the Department of Defense a 6% rise. "We're delighted," says DOE science chief Martha Krebs, echoing reaction from the research community to the new spending levels.

The numbers were hammered out by House-Senate conference committees that negotiated compromises between different versions of the bills passed by each chamber, and in some cases have already been approved by both bodies. Not all of the research agencies covered by the bills were lifted by the rising tide, however. NASA and the Environmental Protection Agency (EPA), for example, received essentially flat science budgets from House and Senate conferees. And as *Science* went to press, Congress had not yet decided what to do with three other key funding bills—including one that could give the National Institutes of Health a double-digit increase—that have become mired in election-year politicking.

White House officials say President Clinton is likely to sign the bills that emerged last week, once Congress has completed its work. Here are some highlights:

• **NSF:** Officials are very happy with the conferees' 7% solution to their $3.67 billion budget and the relatively free hand it gives them. The 8.8% increase in the research account, to $2.77 billion, is less than the Administration's 12% request, but it allows for healthy growth in programs ranging from human-computer interactions to life in extreme environments. Legislators agreed to drop proposed Senate earmarks for several research centers, although they directed NSF to spend $22 million more than it requested to support Arctic research and added $10 million to the $40 million plant genome initiative begun last year by congressional directive. They also added $10 million to a $38 million program to help 18 "have-not" states as part of a broader concern for schools outside the top 100 grant recipients.

Congress was more specific about how it would like NSF's $663 million education and training directorate to grow. It boosted the directorate's budget by $30 million, but told NSF to spend $13.5 million of the increase on two programs to increase minority participation in science and $10 million on informal science education. On major facilities, legislators once again ignored NSF's request for $21 million for a Polar Cap Observatory in Canada, although they tacked $17 million onto NSF's request for $22 million to nearly complete financing of its $145 million renovation of the South Pole station.

• **DOE:** Legislators not only gave DOE's science programs a $217 million boost, to $2.7 billion, but also moved fusion energy from its politically exposed position as a separate budget item into a new four-division Office of Science covering existing energy research programs. Krebs says the change, which also added $1.6 million to the Administration's request for fusion, reflects DOE's success in retooling the $223 million fusion program to emphasize university research rather than technology demonstration. The new office's $809 million Basic Energy Sciences account includes a $130 million boost to begin construction of the Spallation Neutron Source, a $1.3 billion facility scheduled to open in 2005 at Oak Ridge National Laboratory in

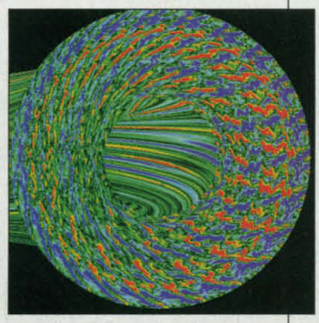
CREDIT: R. E. WALTZ AND G. D. KERBEL/NUMERICAL TOKAMAK PROJECT

ScienceScope

TURN OUT THE LIGHTS, THE ITER'S OVER

The U.S. Department of Energy is recalling its fusion scientists from their posts in Germany and Japan, where they have spent the last 3 years working on the moribund International Thermonuclear Experimental Reactor (ITER). Congress ended U.S. contributions to the $10 billion project last week (see p. 210), prompting DOE to order more than a dozen scientists back to their home institutions by 16 November. The recall completes a withdrawal begun in July, when it became clear that Congress wouldn't provide enough money to support the 36 U.S. researchers assigned to the project.

The retreat "has created a pretty depressed mood here," says physicist Ron Parker, who will be leaving his post at the ITER site in Garching, Germany, to return to the Massachusetts Institute of Technology. He calls Congress' decision to pull out "completely destructive. But at some point you have to put disappointment behind you and move on to new challenges."



ITER won't get the chance to test this simulation of tokamak turbulence.

CHEMIST TAPPED TO HEAD GENOMICS INSTITUTE

The Swiss life sciences giant Novartis is expected to name University of California, Berkeley, chemist Peter Schultz as the director of its new Novartis Institute for Functional Genomics. Last spring, the company announced that its philanthropic arm—the Novartis Research Foundation—would spend $250 million over 10 years to bankroll the San Diego–based institute. The center is expected to hire some 100 researchers to sort out the function of newly discovered genes as a basis for new drugs.

Schultz has pioneered the use of techniques such as combinatorial chemistry and DNA chips for drug development. His appointment is "a good hire for Novartis and a tough break for Berkeley," says Harvard University biologist Tim Mitchison. "He's not someone to let anything stand in his way."

Tennessee. "It's more than enough to get us off to a good start" but not enough to prevent delays, says project manager Bill Appleton about the funding, which fell $27 million short of the request.

Congress also ordered an end to DOE's once-grand plans for the $10 billion International Thermonuclear Experimental Reactor. It provided about $12 million to shut down the project, despite DOE efforts to explore scaled-down alternatives. The science office's two other research portfolios—the $696 million health and environment program and the $335 million high-energy and nuclear physics program—received a total of $9 million more than requested, but legislators earmarked $40 million for specific projects that were not in the request.

• **NASA:** Space scientists won't see much new funding in 1999. Legislators gave the agency's science programs $2.1 billion, $61 million more than the Administration's request but about the same as last year's budget. Lawmakers also met the Administration's request for $2.27 billion for the embattled international space station (see p. 206).

• **Defense:** For the first time since 1993, the Defense Department's spending on basic research will grow faster than the expected rate of inflation. The 6.1% increase, to $1.1 billion, still puts basic science spending 25% below the 1993 level, however. The defense bill also includes more than $200 million for several major biomedical programs, including $135 million for breast cancer research, $58 million for prostate cancer research, and $10 million for a new ovarian cancer program.

• **EPA:** The conferees agreed to fund the agency's science and technology account at $650 million, a 3% rise and 3% above the president's request. Within that amount, legislators boosted the agency's program on particulate matter research by $18 million, to $47 million. They also quelled a controversy over energy research related to global change policy in the wake of the Kyoto treaty. "The final language makes clear that we can proceed with commonsense actions to reduce greenhouse gases and to pursue other important environmental goals," says Todd Stern, the Administration's climate change coordinator.

Legislators were less generous to the Administration's $110 million a year Next Generation Internet project. For the second straight year, DOE, which had asked for $22 million, was blocked from spending any money. At the same time, plans by the two biggest partners, Defense and NSF, to spend $50 million and $25 million, respectively, remained on track. **–DAVID MALAKOFF**

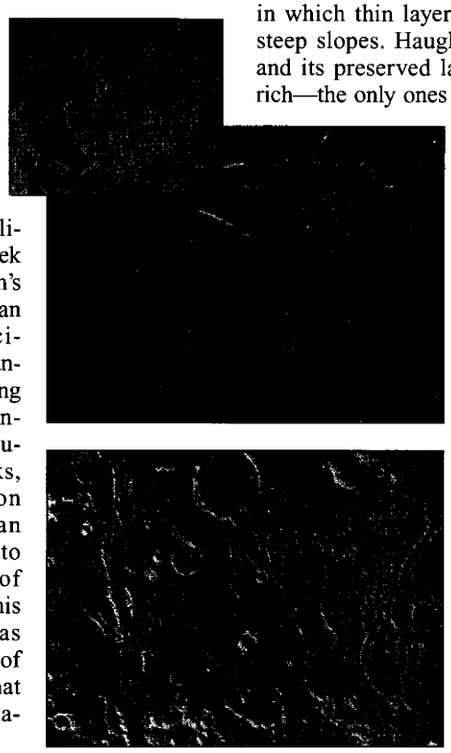
With reporting by Jeffrey Mervis and Jocelyn Kaiser.

PLANETARY SCIENCE

Geologists See Mars in The Canadian Arctic

Mars aficionados of all stripes long to walk upon the Red Planet, but a trip there is a dim and distant possibility. So some planetary geologists have opted to learn about Mars by studying similar regions on its sister planet, Earth. Now a band of NASA scientists has found what may be the most Mars-like setting yet: the Haughton meteorite crater in the hostile Canadian Arctic.

This 20-kilometer-wide basin may offer clues to the early evolution of the martian landscape, says planetary scientist Pascal Lee of the NASA Ames Research Center in Mountain View, California, who next week will present his team's work at the American Astronomical Society's Division for Planetary Sciences meeting in Madison, Wisconsin. Landslides, sinuous valley networks, and other Haughton landforms bear an eerie resemblance to terrain on parts of Mars, says Lee: "This little microcosm has an amazing variety of geologic features that may have direct analogs on Mars."



Good match. A plateau near Canada's Haughton crater *(inset)* is sliced by branching "valley networks" *(top)* that resemble those seen on Mars by the Viking orbiter *(above)*.

Scientists who have accompanied Lee to Haughton share his hopes for the 23-million-year-old crater, located on Devon Island, an uninhabited slab of rock west of Greenland and far north of the Arctic Circle. "It's an impact crater in a cold polar desert, so it may be an excellent analog for the climate and geologic processes on early Mars," says planetary geologist Aaron Zent of NASA Ames. By studying the crater's ice-sculpted terrain, the team may be able to deduce whether similar martian features arose during icy conditions, rather than during a warm and wet period postulated for early Mars. Although NASA has not yet promised more funds to study it, the crater already has captured the imagination of enthusiasts at the private Mars Society, who plan to build a prototype Mars base there.

Other martian stand-ins on Earth range from ice-covered lakes in Antarctica to wind dunes among volcanic debris in Iceland and Death Valley. But Lee's team says that images from the Viking and Mars Global Surveyor orbiters, plus air and ground surveys of Haughton, show that the crater looks startlingly like parts of Mars in several unique ways.

The similarities may stem in part from how ice and subsurface permafrost interact with the crater's shattered terrain, says Lee. For example, old ice exposed within crater walls might trigger the small landslides seen at Haughton and some martian craters, in which thin layers of rock detach from steep slopes. Haughton once held a lake, and its preserved lake sediments are ice-rich—the only ones known that may match the icy lake sediments in some martian craters. And ice locked within jumbled impact deposits at Haughton has melted to form odd cup-shaped basins at the heads of long valleys, a process proposed for similar valleys on Mars. Finally, Lee's team suspects that fans of narrow channels seen in a plateau next to the crater were carved by meltwater beneath a stationary glacial cap. The channels are the only ones on Earth sharing the strange branching patterns of some martian valley networks. "The wasting away of an ice cover might explain many of these features without requiring rainfall," Lee says. "Mars might not need to have been that warm in the past."

Planetary scientist Steven Squyres of Cornell University in Ithaca, New York, cautions that such similarities could be deceptive. "We don't know what early Mars was like," he says. "We need to apply what we see at all terrestrial Mars analog sites with a great deal of caution and humility." Lee agrees but says that studies of the crater's geologic evolution and glacial action at the crater will help.

More study is just what the private Mars Society, founded this year by aerospace engineer Robert Zubrin of Indian Hills, Colorado, is planning. The society has ambitious plans to put a "Mars Arctic Research

CREDITS: (CRATER INSET) GEOLOGICAL SURVEY OF CANADA; (TOP PANEL) CANADA DEPARTMENT OF ENERGY, MINES, AND RESOURCES/NASA HAUGHTON-MARS PROJECT; (BOTTOM PANEL) NASA