a patent on the resulting tissue rather than the starting material, whether that is ES cells or stem cells derived from adults.

In the meantime, if an international panel gets its way, patents on DNA sequences could become harder to win. A day before EPO's ruling, the Nuffield Council on Bioethics issued a report recommending that patents on DNA sequences be "the exception rather than the norm." The report calls for patent offices to distinguish among different uses of a genetic sequence—for example, a specific genetic test, a method of gene therapy, or production of a therapeutic protein—and in general to grant patents on a specified use rather than on the DNA sequence itself. Making such distinctions could help clear up some of the ethical and legal debates over DNA patents, says biotechnology patent expert Mildred Cho of Stanford University. But implementing the Nuffield Council's recommendations, she says, "would require a major shift in thinking at the USPTO" and other patent offices. –GRETCHEN VOGEL

2003 U.S. BUDGET

NSF Gets Big Lift; Pluto Mission Backed

Senators Barbara Mikulski (D–MD) and Kit Bond (R–MO) have delivered on their promise to put the National Science Foundation (NSF) budget on a 5-year doubling track. But they also served notice that they are putting the agency on a tight leash.

Mikulski and Bond are chair and ranking member, respectively, of a Senate Appropriations Committee panel that has written a $91 billion bill covering the 2003 budgets of NSF, NASA, the Environmental Protection Agency (EPA) and dozens of other agencies. Last week, the full committee approved a 12% increase for NSF, to $5.35 billion, the largest percentage boost for any major agency in its jurisdiction. The legislators also overrode a White House plan to halt work on a Pluto mission and gave EPA science programs a slight increase.

The committee's vote is only the first step in a budget journey that might not conclude until after the November elections, but it's a big push for NSF's supporters, who have been urging Congress to match the explosive growth enjoyed by the National Institutes of Health in the past 4 years. "This is definitely a positive signal," says Samuel Rankin of the American Mathematical Society and the Coalition for National Science Funding, which is aiming for a 15% increase.

NSF's increase, for the fiscal year starting 1 October, is more than twice the 5% boost requested by the president. Research programs would jump by 15%, to $4.13 billion. Big winners within that account would include the physical sciences, graduate student stipends, a program to help have-not research states, cybersecurity, and research instrumentation.

At the same time, Mikulski and Bond would throttle back on a new program to improve math and science education (*Science*, 11 January, p. 265), expressing concern about NSF's ability to spend its $160 million allotment for this year. And they want to keep a closer eye on NSF's management of big projects. In addition to delaying the start of a proposed $12 million network of environmental

Promise kept. Senators Barbara Mikulski (*above*) and Kit Bond delivered for NSF.

monitoring stations, the bill would cut $15 million from a new $35 million earthquake detection and research network, called EarthScope, and freeze the money until NSF hires a permanent director to oversee big new research facilities (*Science*, 12 July, p. 183). The legislators also gave a whopping 28% boost to the agency's in-house watchdog, the inspector general, to carry out more audits of NSF programs.

EPA's science and technology account would receive a 1.7% boost (not counting $90 million in supplemental funding in 2002) to $710 million, more than reversing a 4% cut that the White House requested. The increase includes $10 million for the STAR graduate fellowship program, which the president had proposed transferring to NSF without providing funding—effectively killing it. The Senate bill restores the money and keeps the program at EPA. In a related move, the NSF portion of the bill deletes the proposed transfer of $76 million in programs from EPA and two other agencies (*Science*, 8 February, p. 954).

NASA's $15 billion request—just slightly more than the current budget—would increase by $200 million in the Senate bill. Legislators also set aside $105 million for a Pluto mission that the White House has put on hold, an amount that falls $50 million short of what mission planners say is needed to keep it on track for a 2006 launch.

Legislators also restored a $7 million cut proposed by the White House in the $17 million National Space Biomedical Research Institute in Houston, a move that had angered Texas lawmakers. But the NASA portion of the bill is chockablock with projects, such as $2 million for an aquarium in Maine, that benefit the districts of specific lawmakers but are not related to NASA's mission. The list of so-called earmarks is expected to grow this fall when the House marks up its version of the bill. –JEFFREY MERVIS

With additional reporting by Jocelyn Kaiser and Andrew Lawler.

CREDIT: (TOP) RICK KOZAK

WOMEN'S HEALTH

U.K. Hormone Trial to Pause for Review

For at least 3 months, no new patients will be enrolled in a large trial of hormone replacement therapy (HRT) taking place in the U.K., Australia, and New Zealand. The U.K. Medical Research Council (MRC), the trial's main sponsor, ordered the pause last week and decided to ask an international panel to recommend whether to continue the trial in the face of evidence that prompted termination of a similar U.S. study 3 weeks ago. However, women already enrolled will be asked to keep taking their pills.

Safety reviewers halted the U.S. study, designed to test the long-term benefits and risks of HRT, after an interim analysis found that taking a combination of estrogen and progestin was too risky. The reviewers concluded that an increased risk of breast cancer, stroke, and heart disease outweighed benefits related to colorectal cancer and bone fractures (*Science*, 19 July, p. 325).

Despite the findings of excess risk, U.K. leaders of the Women's International Study of long Duration Oestrogen after Menopause (WISDOM) saw no compelling reason to halt their own trial. Both WISDOM's steering committee and an independent safety panel unanimously concluded that the U.S. study, part of the Women's Health Initiative (WHI), had not conclusively demonstrated the increased risk of heart disease. That meant the balance of risk and harm from HRT was still uncertain, they said, and it was ethical to keep enrolling women, provided they were fully informed about the risks (*Science*, 26 July, p. 492).

But the MRC Council, meeting 26 July, decided that an international group of experts should study the matter and issue a recommendation by October. "The MRC has a duty to safeguard the well-being of the women who have volunteered for the WISDOM study," MRC chief George Radda said in a statement. "We must be absolutely satisfied that it is right to press ahead ... with the study."

"It sounds like a very reasonable approach to me," says Stanford University's Marcia Stefanick, principal investigator of WHI. Unlike the WISDOM leaders, Stefanick says she has no doubts about the WHI results, although she notes that researchers differ in what they regard as convincing. But WISDOM steering committee chair Rory Collins worries that recruitment in the trial, already behind schedule, will suffer, even if it resumes after October: "Once you stop a tanker, it's quite difficult to get it going again." —**MARTIN ENSERINK**

HIGH-ENERGY PHYSICS

Tevatron Sees Light at End of Tunnel?

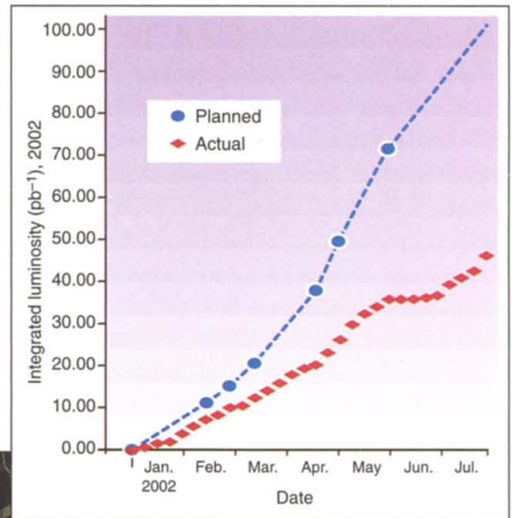
Six months ago, the Tevatron accelerator was in trouble, plagued by technical woes that threatened to cripple the device's research program. Now scientists working on the project say things are looking up—mostly. Scientific results from the accelerator are beginning to trickle out, and a 2-week shutdown in June might have marked a turning point in the battle against the machine's problems. But the accelerator's particle beams still fall far short of their target brightness levels, and scientists still await the Tevatron's reemergence as a flagship accelerator.

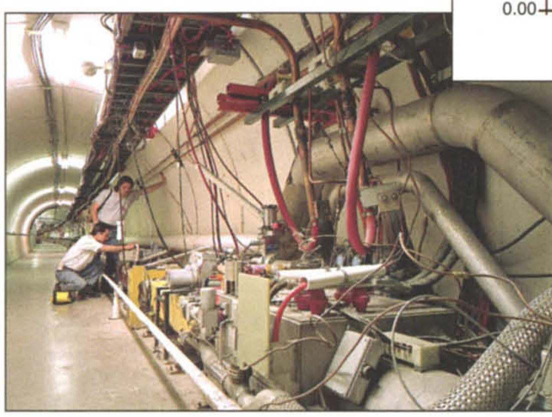
A year and a half ago, the Tevatron, which smashes protons and antiprotons together at enormous energies, began operating again after a $260 million refit. Despite months of tinkering, however, scientists and engineers couldn't boost the beam's luminosity—its "brightness"—high enough to begin the bulk of the accelerator's research program. By January, Tevatron scientists had devised a plan for attacking the accelerator's problems and had set performance benchmarks for the rest of the year (*Science*, 8 February, p. 942). Six months later, the accelerator has missed every single luminosity benchmark. "We're still a factor of 2 short," says Stephen Holmes, head of the beams division at Fermi National Accelerator Laboratory (Fermilab) in Batavia, Illinois.

A major problem with the accelerator lies in the system that accumulates, accelerates, and stores antiprotons—which, unlike protons, are hard to produce. Fully 80% of the antiprotons were supposed to survive the trip from the accumulator system to the collider, but in January, a mere 30% made the journey intact. "Really, until April, we had no idea what the physical cause" of this problem was, says Holmes. So, despite Fermilab's best efforts, "we topped out at about 40%. We were pretty much stuck."

In April, however, scientists at Fermilab figured out that the antiproton problem was caused by intrabeam scattering. "When the antiprotons are going around and around in the antiproton accumulator, they are confined to a very small space, and they are bouncing off each other," says Holmes. "This tends to heat the beam, making it get bigger. It wants to blow up." Scientists had anticipated problems, but this effect was worse than expected.

Now a 2-week shutdown in June might have solved the antiproton problem, Holmes says. While the accelerator was turned off, engineers improved the beam cooling system and refocused the magnetic optics that keeps the beam tight. Now about 50% to 60% of the antiprotons survive the trip to the accelerator, and the number is rising. With that roadblock removed, last week the Tevatron's luminosity surged to a record-setting 2.64×10^{31} inverse square centimeters per second—still far short of the benchmarks but a vast improvement. "The problem seems like it's moving downstream, out of the antiproton facility," says Holmes.





Hard climb. Fermilab's Tevatron accelerator (*above*) is still struggling to hit its luminosity targets.

Physicists now have enough data to start doing real science with the Tevatron, says John Womersley, spokesperson for the D0 experiment on the Tevatron. "There are a lot of interesting things we can do with a small data set," he says. Teams have already used Tevatron data to measure properties of the W and Z bosons, carriers of the weak nuclear force, at an energy at which these properties had not been measured before. The amount of data already collected should roughly double the number of top-quark sightings, Womersley says. "We're beginning to do physics," he says, "but this doesn't mean we're happy to run like this for years."

Tevatron engineers still have several other problems to solve. One particularly sticky one arises from the unwanted mutual influence of the proton and antiproton beams, which travel close to each other in the accelerator. This beam-beam interaction is more severe than expected at low energies, and engineers are going to tear out a bottleneck in the accelerator where the beams get too close together.

That makes physicists at CERN, the European laboratory for particle physics near Geneva, nervous, as their next big machine, the Large Hadron Collider (LHC), also has two high-luminosity beams in close proximity. "For the LHC, we are pretty confident that [beam-beam interactions] are not going to be a problem, but anything can happen," says Steve Myers, Holmes's counterpart at CERN. Partly for that reason, CERN is flying a handful of its scientists to Fermilab to assist their American colleagues. "The main effort is to help them out, and in so doing, we get hands-on experience dealing with problems that might affect us," says Myers. "In repayment, when we start running the LHC, they will help us. This is the deal of the collaboration."

According to Mike Harrison, head of the superconducting magnets division at Brookhaven National Laboratory in Upton, New York, the Tevatron's fundamentals are sound: The performance at top energy is good, and the antiproton production system works—it's just a matter of getting all the parts to work together, usually a struggle when getting an accelerator up and running.

If Tevatron scientists manage to bring their accelerator's performance up to its design expectations, they will be ready for the next big challenge: adding a system to recycle used antiprotons. With luck, the Tevatron's greatest difficulties lie behind it rather than ahead of it. —**CHARLES SEIFE**

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