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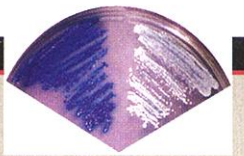
Tracking emeralds to their source



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Engineering yeast prions

2001 BUDGET

Clinton Seeks 'Major Lift' in U.S. Research Programs

Sometimes good news travels so fast that it gets there before its scheduled delivery date. Two weeks before the official roll-out of his proposed 2001 budget, President Bill Clinton unveiled his request to Congress for a hefty 7% increase in programs that account for the bulk of government spending on civilian science and technology. The proposed $2.8 billion hike, which would prove a windfall to researchers exploring everything from the sun to atomic-level machines on Earth, represents a strong commitment to academic research. It also challenges Congress to ease up on spending limits in favor of boosting science.

"Science and technology have become the engine of our economic growth," Clinton told students and faculty at the California Institute of Technology (Caltech) in Pasadena in a brief visit on 21 January. "We're going to give university-based research a major lift." That lift includes a proposed $675 million increase for the National Science Foundation (NSF)—double its previous largest boost and the biggest percentage request since former president George Bush sought 18% in 1992. It would also add $733 million to the National Institutes of Health (NIH), well under its most recent $2.3 billion increase, and jump-start research in the hot field of nanotechnology. The proposals, for the fiscal year that starts on 1 October, are winning cautiously positive reviews on Capitol Hill even among Clinton's Republican opponents.

Among the highlights:

• **NSF:** In recent years, NSF's modest increases have been overshadowed by the astonishing growth at NIH. But Science Adviser and former NSF chief Neal Lane argued successfully within the White House that the foundation should receive a larger slice of the R&D pie. Half of the $675 million increase in the agency's current $3.9 billion budget proposed by Clinton would be allocated to core programs in its six discipline-based directorates. NSF is also asking for $120 million more as the biggest single player in the nanotechnology initiative and $223 million more—including a second 5-teraflops (trillion operations per second) supercomputer—for its continued leadership of an information technology initiative begun last year. "It reflects their faith in NSF that we will address our objectives," said a happy NSF director Rita Colwell after the president's speech. "And it's necessary to achieve a balance [between biomedical and] nonbiomedical science."

• **NIH:** The Administration's 4.5% boost for NIH research likely will be bettered by lawmakers, but it's higher than last year's anemic 2% proposed increase. One Republican staffer speculates that the bigger request for the $17.9 billion agency was calculated to be "respectable enough so that the Parkinson's and cancer lobbies aren't screaming" but small enough not to interfere with the president's other priorities. Vice President and presidential candidate Al Gore also was behind the proposed increase, a politically popular stance. At the same time, some researchers complain about the Administration's touting of a $1 billion boost, without mentioning that $267 million would simply be passed along to other agencies, notably $182 million to the $200 million Agency for Healthcare Research and Quality for studies on the efficacy of various treatments and procedures.

• **Nanotechnology:** The Administration is touting a new National Nanotechnology Initiative that would boost spending for this area, in which researchers manipulate individual atoms and molecules, by 84% to $497 million. Although researchers say that nanotechnology is still in its infancy—and really should be called nanoscience—the promise of creating tiny computer chips or tiny biological machines has caught the attention of White House officials. NSF would get the most money, some $217 million, while the Defense Department, which is eager to exploit nanotechnology for military systems, would spend $110 million, a 57% increase. "This moves in the right direction," says George Whitesides, a Harvard biochemist. "We need to build a research base—and it's a big, big deal for the country," noting that Japan and Europe are likewise increasing their spending on the field.

• **Information Technology (IT):** The Internet's success continues to keep IT research and development on the Administration's front burner. For 2001, Clinton wants $2.27 billion—a $605 million boost over this year. Lead agency NSF's share would increase 43% to $740 million, with the Department of Energy (DOE) getting $667 million—a 29% boost. This year, however, Congress took away DOE's added portion of the IT pie while funding NSF's entire request.

• **Bioenergy:** The 2001 request would increase spending on technologies to convert biomass into fuels and products. Department of Agriculture spending on this initiative would increase 62%, to $115 million, while DOE's share would climb 39%, from $125 million to $174 million.

CLINTON'S BIG BOOST FOR R&D (IN BILLIONS OF DOLLARS)

Agency	2000 budget	2001 request	% increase
NIH	17.9	18.9	5.6
NSF	3.9	4.6	17.0
NASA	13.6	14.3	4.8
Cross-Agency Initiatives			
Nanotechnology	0.27	0.5	84
Information technology	1.66	2.27	36
Bioenergy	0.2	0.29	47
21st Century Research Fund*	39.9	42.7	7.0

*Total includes most civilian R&D programs.

Chief cheerleader. Clinton describes his science budget to Caltech president David Baltimore (right) and Intel founder Gordon Moore.

CREDITS: (TOP) SOURCE: WHITE HOUSE; (BOTTOM) AP PHOTO/PA

• **NASA:** The space agency's stagnant budget—which has hovered around $13.6 billion for the past few years—would finally rise if Clinton gets his way. "There are a lot of smiles here," says one NASA manager. Nearly half of the $650 million boost would be spent on science efforts, including a major new initiative to study the sun. The bulk of the remainder would go to a space launch effort designed to come up with a replacement for the 20-year-old space shuttle system.

Administration insiders credit Clinton's chief of staff, John Podesta, for raising the visibility of science and technology spending within the White House. "This will be viewed as an age of great investment in science and great investment in NIH, and I think we're doing it all within the fiscally prudent policies the president brought to town," Podesta told reporters on 16 January. And they credit Lane with keeping the pressure on. "In his quiet way, Neal Lane made it his mission" to win across-the-board increases for basic science rather than just for NIH, says one White House staffer. Both Lane and Colwell have been pushing hard for such a balance, and they were joined by Office of Management and Budget officials. Gore and his staff focused on a boost for NIH, Administration officials add.

The reaction on Capitol Hill was markedly different from the scathing reviews of Clinton's previous budget requests. "I am confident that together we can make fundamental research and development a real priority," declared Representative James Sensenbrenner (R–WI), chair of the House Science Committee, although he added that science priorities should not be wrapped in "a larger government spending spree." Representative Nick Smith (R–MI), who chairs the House basic research subcommittee, says he supports the proposed increases as long as they are compatible "with other priorities like strengthening Social Security, paying down the debt, and providing tax relief for working families."

Substantial increases may be easier to win this year, because Republican and Democratic leaders have tacitly agreed that a booming economy will allow them to bury the 1997 balanced budget agreement, which set strict spending caps. And a similarly bipartisan agreement that the rosy economy is due in large part to research appears to be emerging. "If you can afford it," Lane told reporters before Clinton's speech, "you want to increase the federal investment in R&D, because the payoff to the whole country is so high."

In his Caltech speech, Clinton foresaw "an era of unparalleled promise—fueled by curiosity, powered by technology, driven by science." R&D advocates hope to turn those lofty words into hard cash in the months ahead. **–ANDREW LAWLER**

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PATENTS

Company Gets Rights to Cloned Human Embryos

A U.S. company has received two British patents that appear to grant it commercial rights to human embryos created by cloning. The precedent-setting patents, issued last week on the cloning method that produced Dolly the sheep, have sparked protests from groups concerned about the ethics of biotechnology patents, especially those covering human genes or cells.

The British government is "the first government in the world that has issued patent protection on a human being at any stage in development," claims author-activist Jeremy Rifkin of the Foundation on Economic Trends in Washington, D.C. He said he will challenge the patent, arguing that British law forbids giving someone property rights to a human even at the blastocyst stage. The patent, he says, is "breathtaking and profoundly unsettling."

Protected. New patents cover the techniques that produced Dolly and other clones.

The patent gives California-based Geron Corp. exclusive rights to "a reconstituted animal embryo prepared by transferring the nucleus of a quiescent diploid donor cell into a suitable recipient cell" up to and including the blastocyst stage. That claim includes human embryos, says David Earp, Geron's vice president of intellectual property. Last summer, Geron bought Roslin Bio-med, the commercial arm of the government-funded Roslin Institute outside Edinburgh, Scotland, where Dolly was born in 1996.

The application process was fairly smooth, says attorney Nick Bassil of the London firm Kilburn and Strode, which represented Roslin and Geron. He says the patent office allowed the claim because it is consistent with recommendations from the U.K. Human Fertilisation and Embryology Authority and the Human Genetics Advisory Commission that cloning technology be permitted on human embryos for the development of treatments for disease. The government has imposed a moratorium on any such experiments, however, while an expert advisory group reviews that recommendation. U.K. patent office spokesperson Brian Caswell says European Union directives forbid patents on human cloning, but he suggests that the patent was allowed because it only covers embryos in "the very early stages of development" that would not result in a live birth. "The exercise of any invention would have to be in accordance with the law," he adds.

Geron, a biotechnology company which has also supported much of the work on human embryonic stem cells, hopes to develop so-called "therapeutic cloning" to treat human diseases. The process would involve transferring the nucleus of a patient's skin, muscle, or other cell that has been made "quiescent," or nondividing, to an egg cell to create an embryo. The embryo would be allowed to develop for a few days and then harvested for its stem cells, which would be used to treat the patient.

The patent surprised others in the cloning field, including commercial competitors. Michael West, president and CEO of the Massachusetts-based Advanced Cell Technology, says the claim is "extremely broad." "If Geron is right and its claim is to a human embryo, then to my knowledge it's the first time that anyone has claimed ownership of a human embryo," West says. Advanced Cell Technology received a U.S. patent on nuclear transfer from nonquiescent cells last year, but the patent covers only nonhuman mammalian species.

Earp says Geron has received word from the U.S. patent office that its claims have been allowed, and he expects the patent in the next few months. However, the U.S. patent office has been reluctant in the past to issue patents covering human material, and the company's U.S. application only covers cloning of nonhuman mammals. Although Earp says Geron also plans to pursue therapeutic cloning in the United States, he says the company "is pursuing a different strategy" to protect its commercial claims.

–GRETCHEN VOGEL