Science Budget: Growth Amid Red Ink

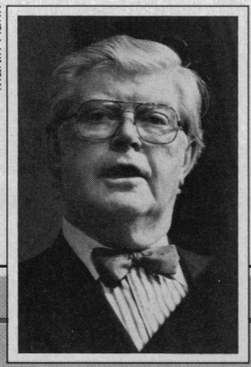
President Bush's proposals for R&D in fiscal year 1992 include healthy increases for many programs, but the prospects in Congress are cloudy

"I MUST HAVE THE EASIEST JOB IN WASHington today," declared a beaming Frederick M. Bernthal, acting director of the National Science Foundation, as he unveiled his agency's budget request on 4 February. He has good reason to gloat: President Bush's proposed budget for fiscal year 1992, which begins on 1 October, would provide NSF with an unheard of 18% increase.

Though Bernthal had more to crow about than most government officials, the heads of many other science agencies were also smiling this week. At a time when the federal budget is awash in red ink and many politically popular programs are under the knife, the Administration is requesting a 12% increase in government spending on R&D—well ahead of the expected 5% rate of inflation. That would bring the total to $72.8 billion, with a further $3.5 billion allocated to research facilities.

Within these totals, civilian R&D would climb from $26.3 billion to $28.8 billion, an increase of 10%. Defense R&D—virtually all of which is at the development end of the R&D spectrum—would climb even faster, from $37.8 billion to $43.2 billion (14%). Indeed, this budget would reverse the recent trend in which defense programs have claimed a declining portion of total federal R&D expenditures.

Of course, the smiles may be short-lived: The proposed increases for science and technology are embedded in a $1.45-trillion budget that will face a tough passage through Capitol Hill this year. Of particular concern to scientists will be the outcome of a zero-sum game forced on Congress by a budget agreement negotiated between Congress and the White House last fall (see box, p. 617). That agreement created tight caps on growth in so-called discretionary spending. That's the part of the federal budget that in theory can be changed each year. Programs such as Social Security, where payments are mandated by law, are nondiscretionary. So if Congress agrees to increase spending on science, it must also agree to cut other programs to stay within the overall spending limits.



Martin Kuhn

Tough sell. *Allan Bromley says it will be a major task to sustain the proposals in Congress.*

The Administration's budget offers some $18-billion worth of cuts to compensate for its proposed increases in areas such as R&D. But these sacrificial lambs include programs favored by powerful constituencies on Capitol Hill: housing support, student loans, urban mass transit, and low-income energy grants, to name a few. Though Congress has traditionally been supportive of science and technology programs, it has never before been forced to make such painful choices quite so explicitly.

D. Allan Bromley, President Bush's science adviser, acknowledged the problem last week: "The Administration and the scientific community have a major task ahead to support this investment in the future," he said at a briefing as the budget was officially being delivered to Capitol Hill.

Bromley may have a particularly hard time defending the Administration's backing of "big science." The budget for the National Aeronautics and Space Administration, for example, would grow by 13.6%. That includes a modest boost for the space station. Funding for the Superconducting Super Collider would more than double, from $243 million to $534 million (120%), and the Human Genome Project—biomedicine's own big science effort—would grow from $134 million to $169 million (26%). Last year, however, Congress targeted all these items for cuts (see "Big Science Scorecard"), and they could well be vulnerable again this year.

Bromley also will be going to bat for many areas of little science. Overall, the federal budget for basic research would climb from $12.3 billion to $13.3 billion, an 8% increase. Growth from agency to agency would be uneven, however: Support for basic research in the Departments of Defense and Energy would grow by a paltry 2%, while NSF and NASA would boost their basic research spending by 18%. The National Institutes of Health would come out in the middle, with an increase of around 7% in its basic research budget.

While the general themes in the R&D budget may have a somewhat familiar ring, the document sent up to Congress this week contains some new departures: a slew of initiatives aimed at key areas that often span several agencies. A prime example is the High

BASIC RESEARCH

Department or Agency	BUDGET AUTHORITY (dollar amounts in millions) 1991 Enacted	1992 Proposed	Dollar change	Percent change
HEALTH AND HUMAN SERVICES	5,101	5,477	+376	+7
(NATIONAL INSTITUTES OF HEALTH)	(4,634)	(4,968)	(+334)	(+7)
NATIONAL SCIENCE FOUNDATION	1,719	1,987	+268	+16
ENERGY	1,726	1,759	+32	+2
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION	1,698	1,960	+262	+15
DEFENSE-MILITARY	992	1,010	+17	+2
AGRICULTURE	563	598	+36	+6
OTHER AGENCIES	521	529	+8	+2
TOTAL	12,320	13,320	+1,000	+8

SOURCE: OMB

SELECTED INITIATIVES

HIGH PERFORMANCE COMPUTING AND COMMUNICATIONS	$638 million
SCIENCE AND MATH EDUCATION	$1.94 billion
GLOBAL CHANGE RESEARCH	$1.19 billion
MATERIALS R&D (NSF)	$84 million
INSTRUMENTATION	$50 million

Performance Computing and Communications Initiative, a multiagency effort aimed at increasing the performance of the most advanced computers by three orders of magnitude. The program will also focus on the development of vastly improved communications networks. A total of $638 million (three and a half times the allocation to the genome project and more even than the sum designated to the SSC) is being sought for this effort next year.

Another huge sum (and a healthy increase) is being proposed for the global change research program that was launched last year. The effort, which involves nine agencies, would get a $1.2-billion budget in fiscal 1992, up from just under $1 billion this year and almost double the $660 million spent in fiscal 1990. A constellation of high-tech NASA satellites called the Earth Observing System would be the largest single component of the program, but the budget increase would also support a major new effort to model the world's climate and research on the economic consequences of global warming.

Programs designed to improve science and mathematics education—a politically popular topic and a perennial favorite of Congress—would get a 13% increase. A committee formed by the Office of Science and Technology Policy, chaired by Energy Secretary James Watkins, took an inventory of all the federal government's efforts in this area last year. The tally: $1.7 billion, including everything from improving precollege curricula to graduate fellowships. At the committee's urging, the Administration is proposing that the total be increased to $1.94 billion next year, with special emphasis on precollege education and teacher training.

Smaller, but still significant, sums would be allocated to brand new initiatives in materials science, including an $84-million NSF program for research into new semiconductors, advanced ceramics, and biomaterials. And the Administration is again trying to get Congress to support a major increase in funds for competitive grants in the Department of Agriculture. Last year, $100 million was proposed for a National Research Initiative in agriculture, but Congress trimmed it to $73 million and then added insult to injury by slapping a 14% cap on overheads that universities claim for research they conduct under the program. The Administration is trying again. It has requested $125 million and is urging Congress to remove the limit on overheads, saying it "threatens the viability of the program."

If the Administration is miffed by the treatment of the agricultural research initiative, it is downright annoyed by Congress's penchant for "earmarking" R&D funds—a practice less politely known as pork barrel politics. OSTP has identified a staggering $810 million that Congress earmarked for specific projects last year. The R&D budgets of the departments of Energy, Defense, and Agriculture were the most heavily laden with such pork, the OSTP study found, and some $332 million was earmarked in R&D accounts that were either cut or held constant by Congress—which means that the money had to be taken directly from other projects. Moreover, since many of the projects bankrolled by earmarked funds will require continued support, they will put a strain on the 1992 and future budgets.

The Administration's budget document politely asks Congress to cease and desist loading up research budgets with pork. But at the same time, it contains a proposal that could increase the pressure to earmark funds: The only major federal program that provides funds for university facilities—a $20-million NSF program launched last year at Congress's insistence—would be scrapped. "Special programs for facilities repair and renovation are not warranted," the budget document states. The reason: Universities are already charging the federal government about $1 billion a year in overheads for depreciation and maintenance of research buildings.

Not all federally funded scientists will be overjoyed by the budget:

■ **Biomedical research.** One group of researchers that will probably manage no more than a strained smile is the biomedical research community. This budget would provide a little relief, but not much, from the pressures that have forced the number of new grants funded by NIH to dip to an all-time low. The Administration is proposing an increase of around 6% in NIH's overall budget and an 8.8% increase in the money going to

BIG SCIENCE SCORECARD

	1991 Proposed	1991 Approved	1992 Proposed
SPACE STATION	2,627	2,044	2,214
SUPERCONDUCTING SUPER COLLIDER	318	243	534
HUMAN GENOME PROJECT	154	135	169
STRATEGIC DEFENSE INITIATIVE	4,663	3,025	4,720

SOURCE: OMB

Science Increases Will Test New Regime

For the past 5 years, scientists who depend on federal funds have been living under the shadow of a blunt fiscal ax, an infamous piece of legislation commonly known as Gramm-Rudman-Hollings. In theory, Gramm-Rudman was supposed to reduce red ink in the budget by automatically cutting government spending whenever the federal deficit rose above a certain level. It never quite worked out: The deficit has ballooned to more than $300 billion. So last year, Congress and the Administration essentially scrapped the Gramm-Rudman formula and agreed on a new approach, one focused on restraining spending directly. The budget the Administration sent to Congress last week is the first to test this new regime.

In essence, Congress and the Administration set tight limits on total government spending on "discretionary" programs—those subject to annual appropriations. These include all government R&D programs. The agreement also separates discretionary spending into three categories: domestic, defense, and foreign assistance programs, and it forbids shifting funds from one category to another. This means that cuts in defense programs, for example, cannot be used to fund domestic programs. The immediate effect is to force choices: large increases in one area—science, say—must be offset by cuts in other areas. That's the prospect facing members of Congress as they consider the Bush Administration's budget increases for R&D.

The most powerful players in sorting out these choices will be the appropriations subcommittees. The budgets for the National Science Foundation, the National Aeronautics and Space Administration, and the R&D programs of the Environmental Protection Agency will be considered by subcommittees that also have housing and veterans' programs under their purview. The National Institutes of Health is considered alongside health and welfare programs. And Department of Energy programs end up in subcommittees that also review water and public works programs.

Appropriations bills should, in theory, be passed before the fiscal year begins on 1 October. If the totals approved for, say, domestic discretionary programs exceed the spending limits set for that category, then all domestic discretionary programs would be trimmed to bring the total into compliance. ■ **C.N.**

research project grants (see table below). This would allow the agency to fund a total of 21,818 project grants next year, including 5,785 competing grants—the same number as this year. Though that is almost 1,000 more competing grants than were funded last year, it's still well below the level of a few years ago, when NIH was funding more than 6,000 new grants a year.

It's a similar story in the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA). The agency's research budget is set to increase by nearly 8%, to $1.065 billion. That would be enough to support a total of 2473 research project grants, an increase of just 33 over this year.

The Administration is also proposing only a modest 5% increase in research on AIDS, which would bring the total to $1.185 billion. The reason for the slowdown after several years of rapid growth, said Health Secretary Louis W. Sullivan, is that "our research scientists tell us that there is no area of [AIDS] research that is going unfunded."

Biomedical research lobbyists lost no time in attacking the Administration's proposals. Within hours of the budget's release, The Ad Hoc Group for Medical Research Funding, a coalition of 150 organizations, put out a statement contending that the proposed biomedical research budget would "fall substantially below the levels required to exploit the scientific opportunities that are currently apparent."

■ **Department of Energy.** Some researchers who rely on DOE for funds may also feel less than enthusiastic. Though DOE's basic research budget is slated to grow from $2.31 billion to $2.67 billion, increases proposed for the SSC and other high-energy physics programs account for the lion's share of this increase. Support for basic energy sciences and biological and environmental research, in contrast, would hold steady or decline.

The $533 million proposed for the SSC next year would enable construction of the first segment of the tunnel to begin by the end of 1992. According to Energy Secretary Watkins, DOE is estimating the total cost of the project at $8.25 billion, which is at the low end of four cost estimates the department received last summer. The target date for completing the project is 1999.

The fusion program continues to limp along. The proposed budget of $337 million looks like a big increase from this year's funding, but in fact it would do little more than restore a $50-million cut that Congress made last year. Research and development will be continued on the next big machine, the Burning Plasma Experiment, but as yet DOE has made no firm commitment to build it. Watkins confirmed that DOE is now seeking international contributions to the machine. DOE is also now firmly committed to taking part with Japan, the Soviet Union, and the European Community in the next stage of the International Thermonuclear Experimental Reactor Project, Watkins said.

■ **Defense R&D.** Engineers who depend on Pentagon funds should be happy. In spite of all the talk last year of a "peace dividend" from the collapse of the Warsaw Pact and the diminished military threat from the Soviet Union, the Administration is proposing a hefty increase in funds for defense R&D.

Leading the way is the Strategic Defense Initiative. Though Congress slashed SDI's budget last year to about $3 billion, $800 million below the amount spent in 1990, the Administration has come right back with a request for some $4.7 billion for 1992 (including $140 million in SDI-related programs funded by the Department of Energy). But this expanded defense R&D budget belies a dramatically shrunken mission for the program. SDI is being redirected away from President Reagan's vision of an astrodome defense against a massive nuclear attack to a system capable of knocking down only a handful of missiles, such as might be launched by accident, in a limited strike, or by a Third World country.

Other big winners in the military R&D budget are the development and testing of specific weapons systems such as the Advanced Tactical Fighter. In contrast, the Pentagon's basic and applied research programs would not even keep pace with inflation.

■ **Space program.** In spite of a series of hydrogen leaks in the shuttle fleet and the embarrassing flaws in the mirror of the Hubble Space Telescope, NASA hasn't fallen from favor with the Administration. Its proposed budget of $15.7 billion is 13.6% higher than Congress appropriated for this year.

The space agency's most prominent project, the space station, would get only a modest increase, however, reflecting the fact that Congress cut its budget last year and asked NASA to scale down the design. The redesign should be completed in about 1 month's time, says NASA Administrator Richard Truly. But space science would get a hefty 21% increase, to $2.1 billion. Says Leonard Fisk, associate administrator for space science and applications, however, "This is basically a run-out of what was proposed and approved last year."

■ **National Science Foundation.** NSF's proposed $2.72-billion budget includes a 16% increase for research and related activities and a 21% increase for science education programs. Every directorate would get a percentage increase in double figures.

The foundation is also asking for $50 million to launch a new program to provide funds to universities on a matching basis to purchase instruments in the $100,000 to $2 million range. And it is again requesting money ($23.5 million) to begin construction of the Laser Interferometry Gravitational Wave Observatory, a project that Congress turned down last year.

In 1988, the Reagan Administration backed a plan to double NSF's budget by fiscal 1992. The goal receded when Congress cut the foundation's budget requests in the late 1980s. Bernthal optimistically notes, however, that if this request were fully funded, doubling could be achieved by 1994.

Now, as this budget makes its way through Capitol Hill, the question for the scientific community is: By the time it finally emerges next fall, will the grin remain or only a wry smile? ■ COLIN NORMAN

With reporting by David P. Hamilton, Eliot Marshall, and Joseph Palca

NIH Budget

	BUDGET AUTHORITY (dollar amounts in millions)			
	1990	1991	1992 Proposed	Change
RESEARCH PROJECT - GRANTS	4,180	4,498	4,893	+395
(NUMBER)	(20,281)	(21,186)	(21,818)	(+632)
INTRAMURAL RESEARCH	860	925	988	+63
RESEARCH TRAINING	286	306	315	+9
CENTERS	633	713	746	+33
R&D CONTRACTS	568	615	646	+31
RESEARCH MANAGEMENT AND SUPPORT	343	371	427	+56
OFFICE OF THE DIRECTOR	90	98	95	-3
BUILDINGS & FACILITIES	61	169	104	-65
ALL OTHER	555	582	561	-21
TOTAL	13,507	14,269	14,632	+363

SOURCE: Department of Health and Human Services