Final Verdict on Science Budget: Not Bad at All

After weeks of frenzied negotiations, Congress finally finished work on a budget; now agencies must decide what it all means

NOW THAT THE DUST IS SETTLING AFTER the titanic budget battles between Congress and the White House, celebration, not commiseration, is the order of the day for most scientists. Sure, some programs took hits—and big ticket projects like the Superconducting Super Collider and the space station are growing far more slowly than their proponents had hoped—but given the potential for fiscal disaster, science agencies made out very well.

Since most appropriations bills took their final shape only in the frantic days before the 101st Congress ended on last Sunday, it will be weeks—in some cases months—before agencies will know exactly how much money they have to spend and how they can spend it. For example, Congress has given the National Institutes of Health 30 days to come up with a way to award 6000 new and competing grants even though it is clear the agency's budget won't support that many. And the National Aeronautics and Space Administration has 90 days to come up with a redesign for the space station just to get the relatively modest 8.6% funding increase Congress gave the project. Then there are the pork projects that gobble up apparently healthy budget increases—the Department of Energy is all too familiar with those (see p. 618). And, to add to the government's fiscal nightmare, while federal agencies are sorting out their 1991 money, they are also up to their eyeballs in preparing their 1992 budgets. Welcome to Washington's fiscal follies.

The 1991 budget took its final shape last weekend when the House and Senate approved a package acceptable to President Bush that raises taxes and cuts spending to meet the Gramm-Rudman deficit reduction targets. Numbers kept changing right up until the last moment. Going into the home stretch, the National Science Foundation stood to get an 8.9% increase in its research budget under previously approved bills, only to find that an extra $40 million had to be trimmed after negotiators changed the rules on achieving spending targets. "That's just a cost overrun for NASA, but it's a significant hit for us," says NSF spokesman Alan Levitt. The final total for the research budget was $1.7 billion, 6.3% above 1990 levels, and agency officials are still working on how to divide up that money.

NIH also took a last-minute hit. In order to meet budget targets Public Health Service agencies were cut 2.4% across the board. But NIH still walked away with a 9.6% increase overall, as well as a much sought-after plum called the Senior Biomedical Research Service. The new service will allow the agency to offer candidates the salary and benefit incentives officials say they need to attract top biomedical researchers to NIH. Up to 350 of these new positions can be created, with salaries as high as $134,000 (the same pay as a Cabinet secretary). Researchers hired under the plan will be able to keep their private pensions. NIH's genome project also did well, rising to $89.7 million, 50% better than last year's total.

THE BOTTOM LINE: 1991 BUDGET ($M)

	1990 (estimate)	1991 (request)	1991 (appropriation)	'91 vs '90 (percent)
PUBLIC HEALTH SERVICE				
NIH	7576.4	7928.0	8306.6	+9.6
CDC	1121.3	1171.6	1318.2	+17.6
ADAMHA	2633.3	2824.2	2895.4	+10.0
NSF	2083.6	2383.0	2316.1	+11.1
RESEARCH	1592.4	1809.2	1694.2	+6.4
EDUCATION	220.5	273.3	322.4	+46.2
DEPARTMENT OF ENERGY				
GENERAL SCIENCE & RESEARCH	1093.3	1273.7	1148.7	+5.1
SSC*	217.0	317.9	242.9	+11.9
BIO & ENVIRONMENTAL RESEARCH	308.7	338.8	396.4	+28.4
BASIC ENERGY SCIENCES	582.5	648.7	716.3	+23.0
NASA	12221.6	15125.2	13868.3	+13.5
R&D	5227.8	7074.0	6023.6	+15.2
SPACE STATION†	1749.6	2451.0	1900.0	+8.6

* Part of General Science & Research account. † Part of R&D account.

But NIH must still do some fancy figuring to squeeze 6000 new grants out of its $8.3-billion budget, especially since Congress has asked the agency to abandon the "downward negotiations" process used in previous years in which funded grants took arbitrary cuts to save money. The House appropriations committee sketched out a 4-year plan for the agency that would create a stable pool of 24,000 grants with an average duration of 4 years. Many researchers are worried that to meet these targets, NIH will be forced to favor cheaper proposals and scientists at institutions with low indirect cost rates (see *Science*, 28 September, p. 1496). By the end of this month, NIH must give Congress an idea of how it plans to meet these long-range goals.

Possibly the biggest loser among science agencies this year is the Department of Energy. Although the numbers look rosy, Congress has instructed DOE to pay for a lot of pork. Add to that certain protected programs—like the genome project (the DOE contribution goes up to $46 million from $26 million last year) and global warming research ($65.9 million)—and suddenly the roses grow thorns. These gifts will require cutbacks in other DOE programs. The Superconducting Super Collider has already taken a beating, receiving only $242.9 million, compared with a requested $316.9 million, although SSC officials will be able to use $25 million from last year's budget to make up part of the loss (*Science*, 26 October, p. 501).

There was also consternation at NASA, primarily over funding for the space station. Congress is thoroughly fed up with the project's delays, redesigns, and ballooning costs. Using explicit language, the report accompanying NASA's $13.9-billion appropriation directs the agency "to immediately implement a revised space station design and assembly sequence which reflects an incremental approach." As concern grows over the shuttle's ability to provide the necessary number of launches to meet ambitious plans for the space station (*Science*, 26 October, p. 499), Congress clearly wants to move more cautiously. "The space station should be developed in useful phases—beginning with a man-tended capability—followed by a manned capacity and concluding with a permanently manned space station," the report said. NASA has 90 days to produce this new incremental design. Even if NASA's new plans are acceptable, Congress has decreed that the space station budget will only grow at 10% per year up to a maximum of $2.6 billion.

Planned increases for projects like the National Aerospace Plane (NASP) and the Bush Administration's initiative to send

manned missions to the moon and Mars in the 21st century were also nixed by Congress. NASP was cut $24 million to $95 million, and $37 million for the manned exploration initiative was cut entirely, as was $15 million for using the Mars Explorer satellite for a mission to the moon. The good news for planetary missions was that only $3 million was cut from the $148 million requested for the CRAF/Cassini mission (see p. 628). The Senate had suggested a $50-million cut.

Defense-related research—an area many felt was vulnerable as legislators looked for ways to make the expected "peace dividend" a reality—did fairly well. Congress authorized $3.77 billion for the Pentagon's technology development accounts in fiscal 1991, $33.5 million more than the President's budget request. Programs in early design phase technology development, high performance computing, and manufacturing technology all received strong support. There is also $5 million for a Critical Technologies Institute to be established as part of the White House Office of Science and Technology Policy.

So once again the budget process has lurched to an end. What started with months of (mostly) rational debate over scientific and social priorities, ended in political expedience as politicians fought for their home districts and pet projects and avoided goring sacred oxes. For the time being, science funding appears to be mostly on the sacred side of the ledger. ■ JOSEPH PALCA

How Geography Boosted DOE's Budget

Despite the wailing and gnashing of teeth in many Department of Energy–funded programs (*Science*, 26 October, p. 501), a few R&D accounts were carefully sheltered from the budget-cutting storm. Why? Geography. Tucked away inside these accounts is $115 million earmarked by Congress for specific research facilities, most of which just happen to be in the home districts of powerful appropriations committee members. The following are the projects that Congress inserted into the budget and the relevant committee members.

Funds earmarked by the House: $4.8 million for the Advanced Technology Center at Indiana State University (John Myers, R–IN); $10 million for a Center for Energy Resources Management at the University of New Orleans (Lindy Boggs, D–LA); $10 million for the Energy Science Research Facility at Boston College; $5 million for the Advanced Technology Research Center at Oklahoma State University (Wes Watkins, D–OK); $5.7 million for the Nebraska Centers for Science and Technology at the University of Nebraska (Virginia Smith, R–NE); $3 million for the Midwest Superconductivity Consortium headquartered at Purdue University (John Myers, R–IN); $10 million for the Biomedical Research Facility at the University of Alabama at Birmingham; and $10 million for the Biomedical Research Facility at Case Western Reserve University (Louis Stokes, D–OH).

Funds earmarked by the Senate: $10 million for the Center for Nuclear Medicine Research in Alzheimer's Disease and Related Disorders at the Health Sciences Center at West Virginia University (Robert Byrd, D–WV); $6 million for the Gazes Cardiac Research Institute of the Medical University of South Carolina (Ernest Hollings, D–SC); $12.5 million for the Neurosensory Research Center at the Oregon Health Sciences University (Mark Hatfield, R–OR); $12.5 million for the Biomedical Research Institute at Louisiana State University Medical Center (Bennett Johnston, D–LA); $4 million for the Diagnostic Instrumentation and Analysis Laboratory at Mississippi State University (Thad Cochran, R–MS); $4 million for the Physical Sciences Center at Fort Hays State University in Kansas; and $4 million for the Center for Energy and Environmental Education Facility at the University of Northern Iowa (Tom Harkin, D–IA, and Charles Grassley, R–IA).

"Except for the most egregious cases, we don't even try to stop individual projects," says Association of American Universities president Robert Rosenzweig, who has long complained about scientific pork-barreling. "All you do is get someone angry at you."

■ DAVID P. HAMILTON

Slick Fix for Hubble Space Telescope?

By sacrificing one of the Hubble Space Telescope's six scientific instruments and replacing it with a set of corrective optics, NASA officials believe they can restore the remaining instruments to full scientific productivity despite the focusing flaws of the telescope's misshapen primary mirror. "Everyone who's looked at the idea feels very positive about it," says astronomer Robert Brown of the Space Telescope Science Institute in Baltimore. Along with the institute's Holland Ford, Brown cochaired a panel of astronomers, opticians, engineers, and astronauts who looked at a wide variety of proposals to fix the telescope before giving this one their unanimous endorsement.

"It would be a dream if it works," agrees NASA's Hubble program scientist Edward J. Weiler, who heard a formal report from the panel on 26 October. Weiler says the proposal should cost only a few million dollars, but cautions that a detailed study of its technical feasibility and cost will take about 6 to 8 weeks.

The proposal calls for the replacement to be made by space shuttle astronauts during their next visit to the telescope, now tentatively scheduled for June 1993. It would come in addition to a previously planned upgrade of the telescope's workhorse instrument, the Wide Field/Planetary Camera, which will contain corrective optics of its own. At the same time, the astronauts may also replace Hubble's two solar-power panels; extreme temperature changes as the telescope passes from night to day have caused the panels to "jitter," interfering with the most sensitive observations.

The key to the new proposal is a piece of equipment known as the STAR: the Space Telescope Axial Replacement unit. Currently sitting in storage at NASA's Goddard Space Flight Center, STAR looks from the outside like one of the telescope's four "axial" instruments, which together form a ring around the base of the spacecraft. These include the Faint Object Camera, the Faint Object Spectrograph, the High-Resolution Spectrograph, and an ultrasensitive light meter known as the High Speed Photometer. But on the inside, STAR is little more than a hollow box. It was built as a kind of insurance policy: if one of the axial instruments had not been ready as launch time approached, STAR would have been put in its place to keep the telescope in balance. Now, however, the panel has proposed to create a "smart" STAR by filling it with a set of subtly curved mirrors. The astronauts would insert it in place of one of the existing instruments—probably the High Speed Photometer, which is considered less essential than the others. And it would then intercept and correct the aberrated light from the primary mirror before reflecting it into the remaining three instruments.

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