

Science Budget—More Than Peanuts

Neglect of basic research, the decrease in grants to individual investigators and funding “binges” for highly targeted programs such as cancer research “can be wasteful of the public’s funds and even harmful to the public’s health.” Such was the testimony of 10 scientists, including three Nobel laureates, at a Senate Appropriations Subcommittee hearing on biomedical research last week.

Though praising the general increase in funding for scientific research, they warned that basic research, and therefore meaningful advances, are suffering from an increased budgetary emphasis on applied research.

“Without a firm foundation in basic research, the advances prove to be shallow,” said W. Maxwell Cowan of Washington University’s School of Medicine. “They may harm people, destroy credibility, promise something they can’t deliver, damage science all over. We need courageous work such as questioning why a cell splits. Being discouraged from such research may cause ‘bootleg’ basic work that could be harmful.”

A classic example of the kind of “payoff” from basic research that may be jeopardized by over-emphasizing applied is the prevention of polio, said Gilbert S. Omenn of the Office of Science and Technology Policy. If applied rather than basic research had been stressed, polio now would be treated simply with more efficient iron lung machines rather than prevented by vaccine, he said.

To correct the imbalance between basic and applied research, the scientists asked for a return to the funding levels of the “golden years” of science — the levels reached by 1967, after which funding began the 19 percent slide to present levels.

As if in response to the scientists’ statements on the importance of basic research, President Carter in his State of the Union address later the same day said, “I am recommending a program of real growth of scientific research and other steps that will strengthen the nation’s research centers and encourage a new surge of technological innovation by American industry. The budget increase of 11 percent for basic research will lead to improved opportunities for young scientists and engineers, and upgrade scientific equipment in the nation’s research centers. I am determined to maintain our nation’s leadership role in science and technology.”

When the federal budget was released this week it was obvious that Carter’s determination was tempered by his view of economic reality. His federal R&D program for fiscal 1979 does support real

CHARACTER OF WORK	OBLIGATIONS		OUTLAYS	
	FY 1978 ESTIMATE	FY 1979 ESTIMATE	FY 1978 ESTIMATE	FY 1979 ESTIMATE
TOTAL	26.3	27.9	24.9	27.0
BASIC RESEARCH	3.3	3.6	3.1	3.5
APPLIED RESEARCH	6.2	6.7	5.8	6.3
DEVELOPMENT	16.8	17.5	15.9	17.2

Federal funding for R&D by character of work: The emphasis is on R rather than on D.

growth in basic research but does not indicate any sort of return to the golden years of science.

In the new budget, total obligations for the conduct of R&D are estimated at \$27.9 billion, an increase of 6.1 percent above 1978. Of this amount, obligations specifically designated for basic research are estimated at \$3.6 billion, 10.9 percent more

than the previous fiscal year. This amounts to a real dollar increase of almost 5 percent, explained Frank Press, director of the OSTP and the President’s Science and Technology Adviser. Press went on to list specific areas in which the new budget will support increased R&D. Among them are energy, climate, food and nutrition, environment, health and space. □

ERDA successor gets 23 percent increase

The Department of Energy — the Cabinet-level amalgam of federal energy agencies, including the former Energy Research and Development Administration — demonstrates the President’s commitment to attack the energy crisis in a request to Congress for a hefty budgetary increase. Funding for energy-producing technologies shows a marked movement away from the nuclear-dominated program of only a few years ago, and into development of clean and renewable fuels.

The nuclear portion of the budget is still large, roughly 43 percent of the total R&D component, but shows important shifts in emphasis. For example, although \$367 million is designated to maintain a nuclear-breeder-reactor technology base, only \$13 million is slated for the controversial Clinch River Breeder Reactor (SN: 11/12/77, p. 312) — clearly an effort to terminate the program. Within the nuclear research program there is a shift toward studying alternatives to the uranium-plutonium fuel cycle of conventional fission reactors. The nuclear-safeguards program also shows more attention to alternative fuel cycles (which are believed safer from a weapons-proliferation standpoint).

The single largest budgetary increase — \$660 million — goes to the Strategic Petroleum Reserve. Carter’s goal is the purchase and storage of 500 million barrels of oil by the end of 1980, one billion barrels by 1985.

Another large increase, \$318 million, would go into conservation programs. Some \$135 million alone is requested to help insulate the homes of some of “the

more vulnerable Americans,” such as the elderly and poor, for an estimated annual fuel saving equivalent to two billion barrels of oil.

According to John D. Young, the agency’s acting controller, the program priorities expressed in this budget proposal follow the President’s national energy plan, and “assumes enactment of the President’s energy legislation.” And there is a strong push to move near-commercial technologies — such as solar heating — into production by the private sector. □

	FISCAL YEAR		
	1977	1978	1979
Research Priorities (as percent of total federal R&D budget)			
Nonnuclear total	42	50	57
fossil	21	22	25
solar	11	13	12
conservation	7	10	14
geothermal	2	4	4
biomass	1	1	1
Nuclear total	58	50	43
breeder	28	17	12
alternative cycles ¹	7	7	9
fuel cycle ²	6	9	8
safety (light-water reactors)	1	1	1
fusion	12	11	11

¹ includes water-cooled and gas-cooled reactors, high-temperature gas reactors and non-conventional designs.
² includes such programs as uranium enrichment, fuel reprocessing and waste management.

NSF: More money, more basic research

Carter's support of science and engineering shows up in the National Science Foundation's budget proposal as a 9.1 percent overall increase for research and related programs. Basic research, which constitutes 91 percent of NSF's budget, totals about \$755 million, a 9.7 percent increase over 1978; the applied-research component increases 8.6 percent over last year to \$65.7 million.

One program NSF would publicize and try to expand under the new budget is support of cooperative university-industry research. Research proposals for this program would be evaluated like any others, says NSF director Richard Atkinson, but receive priority attention when they compete for applied- or basic-research funds.

Improving junior-high-school science education would be the focus of a new NSF thrust. Atkinson says data show there has been a sharp decline in science performance over the past five years that may later preclude many from science careers.

But qualifications alone may not determine who land science careers in the mid-80s, Atkinson stressed, because the job market is expected to be very tight. He said his agency will focus on ways to keep young people in basic research through this problem era and that he expects to

offer specific suggestions later this year.

Other major programs would aim at:

- Increasing participation of minorities, women and the handicapped in science.
- Broadening research on submicron structures — the miniaturization necessary, for example, to further develop integrated circuits and optical communication.
- Broadening research on nutrient cycling and its relation to atmospheric carbon dioxide levels.
- Supporting more equipment and facilities planning recombinant DNA research.
- Initiating an Integrated Basic Research program to accelerate work in "promising areas ... relevant to existing or emerging major problems."

For the National Oceanic and Atmospheric Administration, the proposed-budget message is simple: money down, program and manpower stable. Two major program reductions would save about \$113 million. The first, worth \$111 million, is made possible by a \$220 million surplus in the Coastal Energy Impact Fund, accumulated during the past two years. Closing 19 weather-service offices would save almost \$2 million more with only "minimal impact" on local observations and forecasts, NOAA says. □

The NASA budget: Still a low profile

As the United States begins its second 20 years in the Space Age, the Carter Administration's budget request for the space agency maintains a relatively level course, characterized as much by what it does not contain as by what it does. In dollars, the National Aeronautics and Space Administration's FY 1979 budget plan calls for spending some \$4.27 billion, an increase of about 7.3 percent over the previous year, but most of the difference is simply the effect of inflation.

Not surprisingly, most of the agency's spending will be on continuing existing programs — spacecraft in progress, aeronautics and other research, etc. It may be significant, however, that the "new starts" in the plan represent the tips of relatively small icebergs, rather than of large ones whose growing visibility could provoke controversies for several years "downstream."

Largest of the new starts — and the only one destined to operate beyond earth orbit — is the "solar polar" mission, in which a pair of spacecraft (one built and paid for by the European Space Agency) will use Jupiter's gravity to send them out of the ecliptic plane on paths that will then pass directly above and below the sun. Agency officials estimate that NASA's total cost for the program (which will not be launched until 1983, using the shuttle) will

be from \$220 million to \$270 million.

A proposed Earth Radiation Budget Satellite system would compare the total solar flux reaching the earth with the amount that is reflected back to space, providing data as part of the multi-agency national climate program. The only other spacecraft start is a Solar Mesosphere Explorer satellite, planned to measure the effects of solar ultraviolet radiation on the photochemistry of earth's mesosphere, the atmospheric region above the stratosphere. In addition, a proposed "halogen occultation experiment" known as HALO would be sent aboard the Spacelab research module on the shuttle to study pollutants, particularly halogens, as they relate to the ozone layer.

"Balancing" these additions, however, are a number of cutbacks and non-starts. The five space shuttle orbiters that were to have been purchased have been cut back to four. The Lunar Polar Orbiter, designed to provide global data about the moon to tie together the widely spaced Apollo samples and sought by scientists in the last three NASA budgets, is absent again, and a gamma-ray astronomy satellite failed to make the administration's cut. In addition, there is again no mention of any sort of return Mars mission to follow in Viking's footsteps, and concerned researchers feel that such plans may thus be

deferred well into the late 1980s, though there is proposed funding to operate the Viking spacecraft until March 1, 1979. Finally, as expected, there is no provision for the much-discussed rendezvous with Halley's Comet, due in 1986 but requiring a low-thrust propulsion system that would necessitate a launching in 1982. There have been hopes that NASA may consider a less-costly and later-launched ballistic mission (a "shot across the bow") to Halley, followed by a rendezvous with some lesser comet, but NASA Administrator Robert A. Frosch said last week that even the ballistic shot "looks difficult and expensive and probably not worth the amount of data we could get." The other alternative for visiting the solar system's best-known comet would be when it comes around one orbit later — in the year 2062. □

EPA: Reversal of inadequate funds

The Environmental Protection Agency's 1979 budget request sports a 33 percent increase over Carter's 1978 supplemental budget, 40 percent over the Ford Administration's budget proposal. This is "a dramatic reversal of the last six years' inadequate support for the protection of our environment," says EPA Administrator Douglas M. Costle. It also marks "a deliberate shift" in program emphasis "to keeping harmful substances out of our air, water and soil, rather than concentrating solely on cleaning them up after the damage has been done," he says.

The toxic-substances program enters an action phase with a near doubling of its budget, to \$573 million. The increase will support developing regulations, assessing hazards, inspecting sites and enforcing the toxic-substances act.

A 64 percent increase in the drinking-water program will go primarily for program control in states that have not assumed primary program responsibility; the increase would also beef up programs for groundwater protection, for emergency action when there is "imminent danger to public health" and for setting organic-pollutant standards.

The solid-waste budget proposal also shows a large increase — 28 percent — primarily for developing and enforcing regulations. Throughout the agency, EPA responsibilities show a more aggressive stance on defining health hazards and prosecuting polluters. Costle said that in the past EPA's mounting responsibilities have not been matched by resources to carry them out; this budget, however, starts to provide "the necessary muscle," he said.

In what has turned out to be a controversial move by the Office of Management and Budget, EPA and the Energy Department will swap about \$14 million in re-

search. OMB wants the Department of Energy to be able to assess the environmental impacts as well as the energy-producing capability of a technology, particularly when attempting to compare conventional fossil technologies with the so-called "clean" technologies, such as fluidized-bed combustion.

Until now, EPA was responsible for developing pollution-control technologies — such as stack-gas scrubbers and electrostatic precipitators — for conventional fossil power systems. DOE will pick up these programs in the swap; in return EPA should get research on biological effects

of energy-related pollution and perhaps even human dose-response studies, says Steve Reznick in EPA's office of research and development. But while it is rather clear which EPA programs will go to DOE, the Energy Department has been "enormously uncooperative" in deciding which programs it will give up, so the swap is progressing slowly, Reznick says.

Environmentalists outside either agency are already concerned about the move. Chief among their worries is that DOE will be so concerned about producing energy that conflicting environmental problems will get short shrift. □

Behavioral Science: Positive reinforcement

Mental health advocates are not sure exactly how much it helps to have the president's wife on their side, but in light of Jimmy Carter's budget proposals most of those advocates would tell you it doesn't hurt. Rosalynn Carter was honorary chairperson of the President's Commission on Mental Health, which early last fall called for substantial appropriations increases in mental health, alcohol and drug research (SN: 9/24/77, p. 198).

Carter's 1979 budget follows the commission's recommendations to the letter in most cases. In addition to meeting the requested increases, Carter also complied with the commission's wishes to continue funding community mental health centers through at least 1979 and to maintain clinical mental health training funds at the 1978 level.

In addition, the proposed National Science Foundation budget calls for boosts in behavioral, neural and social sciences which NSF Director Richard C. Atkinson characterized as a "whopping big increase."

And in a move that could have indirect but long-term effects on future agency funding, Carter formally announced he will press for a new cabinet-level department of education.

Highlighting the behavior-related budget proposals for 1979 are:

- \$135.4 million — a 20 percent increase over 1978—for National Institute of Mental Health research. The total NIMH budget proposal of \$545.2 million represents an 8.4 percent agency increase.
- \$21.2 million — a 30 percent increase — for National Institute on Alcohol Abuse and Alcoholism research. The total agency proposal of \$174.3 million is a 3.4 percent increase.
- \$45.9 million — a 35 percent increase — for National Institute on Drug Abuse research. The overall NIDA budget proposal of \$275.3 million is a 5 percent jump over 1978.
- Increases of 17 percent (to \$33.1 million) in behavioral and neural sciences and 22.5 percent (to \$29.4 million) in social science research in the NSF budget plan. Much of

that money will go toward expanding studies of behavioral development in humans and key aspects of behavioral and neural functions, as well as assessing the impact of government programs and population redistribution, according to Atkinson.

- \$284.1 million for community mental health centers, a \$15 million increase.

- \$83 million for mental health, drug and alcoholism clinical training — the same as for 1978 — plus a \$2.5 million increase in mental health research training.

The proposed education department promises to become more controversial, primarily because HEW Secretary Joseph A. Califano Jr. has opposed its creation. "If Congress okays it, there will be a big thing about [who gets] federal training supports," one federal source told SCIENCE NEWS. "And I don't think Califano wants to lose [from the present HEW setup] the health training bag." □

NIH budget: Not much change

A National Institutes of Health status quo budget is in the offing, as was the case for fiscal 1978. Specifically, the 1978 budget decreased slightly after accounting for inflation. In contrast, the 1979 budget of \$2.8 billion, or an increase of \$173 million over last year, translates to 6.5 percent, or about the current rate of inflation. Thus, the actual level of support will stay about constant in real dollars at best, or perhaps even decline a little.

All areas of research are up somewhat over the 1978 fiscal budget. Cancer would receive the lion's share, followed by environmental health, cardiovascular, neurological and visual, metabolic diseases and arthritis, infectious diseases, mental health, child health; health services research and development, population and family planning, pulmonary, nutrition, dental and aging. Funding for research facilities, however, is down. □

Freshmen: On making the 'inflated' grade

It has been obvious for some time now that U.S. college campuses no longer are the frenzied incubators of desperate political and social movements. Some observers have speculated that with a change of wardrobe and hairstyle, the class of 1980 might be mistaken for its 1960 counterpart. This swing back toward conservatism is among a number of trends — some of them disturbing — reflected in a nationwide survey of 1977 college freshmen conducted by the University of California at Los Angeles and the American Council on Education.

The survey, conducted annually for the past 12 years, also indicates that many students may be entering college with "inflated" high school grades and academic preparation inferior to that of past years. More than four of every 10 students in the 200,000-student sample say that an important reason for deciding to go to college is "to improve my reading and study skills," according to UCLA's Alexander W. Astin, director of the survey.

Paradoxically, A students now outnumber C students in high school, whereas in the late 1960s C students outnumbered A students two to one. Sixty-one percent of those surveyed concede that "grading in high schools has become too easy."

Other indicators that today's college freshman is less knowledgeable than the 1967 freshman include: Less than one in three, compared with nearly one-half 10 years ago, can describe the personal freedoms guaranteed in the Bill of Rights; just one in five (two in five in 1967) knows the difference between stocks and bonds; the percentage that can use a slide rule declined from 34 percent in 1967 to 19.3 percent. "This latter trend suggests that the ready availability of low cost hand calculators has reduced the need for students to learn how to use a slide rule," Astin says.

Other findings among the students, sampled from 374 institutions, include:

- Fifty-seven percent describe themselves as "middle of the road," politically. The percentage of liberals has declined to 27 percent, from 37 percent in 1970. At the same time, however, more than half of the freshmen favor the legalization of marijuana, and increasing numbers advocate equal rights for women and more student power and autonomy.
- A steady rise in plans for a business career (18 percent, up from 16 percent in 1976) contrasts to a declining interest in school teaching (6.9 percent, down from 8 percent a year ago). In the first survey in 1966, teaching was nearly twice as popular (21.7 percent) as business (11.6 percent).
- The "increasingly materialistic" attitude is further reflected in the percentage of students that wants to be "very well off financially" — 58.2 percent, up 3 per-