Nixon Budget: Science Funding Remains Tight

A continuing shortage of funds for science and a greater emphasis on using science to solve practical social problems are two of the main themes of President Nixon's proposed budget for the next fiscal year. The budget, which was submitted to Congress early this week, calls for total outlays of $200.8 billion in fiscal 1971, beginning 1 July. About 7.8 percent of the total—the lowest percentage since 1959—would finance research and development.

The Nixon administration describes its budget as "anti-inflationary" and as based on "prudent fiscal policy." The budget is designed to produce a small surplus of $1.3 billion, thus dramatizing the administration's determination to curb inflationary forces in the economy. Budget outlays would be slightly higher than in fiscal 1970 (the current year), but the increase is almost entirely due to outlays that are virtually mandatory under existing laws, such as Medicare and Medicaid. Federal spending that can be more readily controlled would actually be reduced below current levels.

In view of the "tightness" of this budget, research and development did not fare as badly as they might have. But this was clearly not a "good" year for science. Some categories of R & D spending are budgeted for decreases, others for increases that are so modest that they will almost certainly be wiped out by inflation.

Total federal obligations in support of R &D will continue to decline—from $16.4 billion in the current fiscal year to $15.8 billion in fiscal 1971. (Obligations are commitments to spend, although not necessarily within a single fiscal year.) Within the total figures, these are the major trends.

► Obligations for the conduct of basic and applied research would increase by $260 million, from $5.54 billion to $5.80 billion.

► Obligations for the conduct of development projects would decrease, from $10.1 billion to $9.4 billion, the decrease chiefly reflecting big drops in space and military spending programs.

► Obligations for R & D facilities would drop from $727 million to $585 million, the decrease chiefly reflecting a big drop in atomic energy spending.

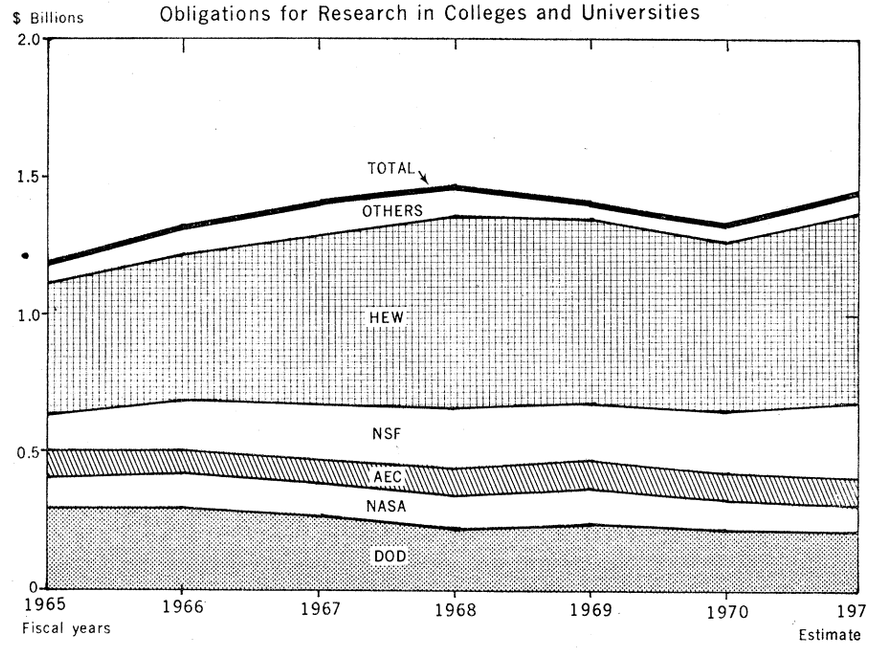
Lee A. DuBridge, Nixon's science adviser, professed himself pleased with the $260 million increase proposed for research funding. He called it a "heartening indication of the President's support of science," particularly since the President "reduced obligations in almost every other controllable item in the budget."

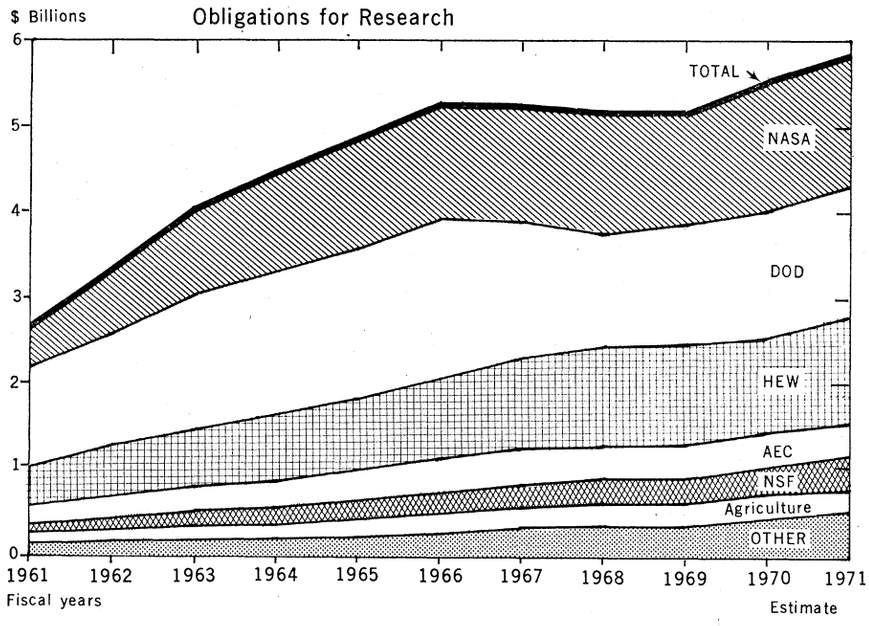
Yet the increase will probably be more apparent than real, for at least two reasons. First, the budget is merely a "proposal" or a "request" for funds. Congress almost always makes cuts in the budget, and it is more than likely that some of those cuts will affect research spending. Second, the proposed increase of $260 million, even if it were approved intact, represents only a 4.7 percent increase, which might not be enough to keep pace with the rising cost of inflation. Inflation, as measured by the consumer price index, reached almost 6 percent in the last calendar year.

The budget tries to reverse the downtrend in support for research and development at the nation's colleges and universities, but here, too, inflation may wipe out the increase. Obligations for academic R & D increased steadily until fiscal 1968, but declined in fiscal 1969 and 1970. The budget proposes boosting the amount to $1.5 billion in fiscal 1971, an increase of $114 million over the current year. But that would still leave the total below the 1968 dollar level. Moreover, if inflation is figured in, as DuBridge noted at a press conference, then the amount of scientific work that could be carried out with the funds budgeted for fiscal 1971 is probably at least 15 percent less than the amount carried out in 1968.

There would be significant shifts in the sources of funds for academic R & D. Both the National Science Foundation (NSF) and the Department of Health, Education, and Welfare would increase their academic support substantially, while the Defense Department, the Atomic Energy Commission, and the National Aeronautics and Space Administration are budgeted for cuts in university support. The NSF share of total federal support for R & D in the universities would rise from 14 percent in 1969 to 18 percent in 1971.

The amount of money budgeted for student aid would increase somewhat under Nixon's new budget, but there are indications that support for students





engaged in scientific research may be increasingly difficult to find. Outlays for research training in the biomedical fields, for example, would drop from $218 million to $214 million. And NSF graduate traineeships would drop a precipitous $9.4 million (from $27.1 million to $17.7 million). NSF's graduate fellowship programs would increase by $1.6 million, but there would still be a sizable net decrease in NSF support for graduate students. About 5800 individuals would receive fellowships and traineeships, down from 7300 this year.

William D. McElroy, the NSF director, said the sharp drop in traineeships reflected "a general administration decision this year to look very hard at the mechanism of support of graduate students." He also said the traineeships were sacrificed as "one way to fight the inflationary problem." But McElroy expressed the belief that scientists are "very ingenious" at devising ways to support their graduate students, and he noted that scientists are "not prohibited" from asking for funds to support a research assistant when they submit a proposal for a project grant.

The Nixon administration states that it made a "concerted effort" to identify programs that could be reduced, terminated, or fundamentally restructured in order to save money. Some of these programs, as it turned out, were in the area of R & D. The Atomic Energy Commission, for example, will end its support of the Princeton-Pennsylvania high-energy physics accelerator and of several other research projects, notably in the reactor development program. However, the AEC will continue construction of the 200-Gev proton accelerator at Batavia, Illinois, and of the Meson Physics Facility in Los Alamos, New Mexico. The Plowshares program, which seeks to develop peaceful applications of nuclear explosives, will be reduced from $14 million to $8 million and will shift its emphasis from excavation experiments to the exploitation of marginal deposits of natural resources.

Oddly enough, the National Science Foundation, which is usually a tabby cat when it comes to budgetary infighting, won itself a fairly good increase this year. The budget requests new obligational authority of $513 million for NSF in fiscal 1971, up from an effective total of $463 million this year. Director McElroy called it "a significant increase" and said it would enable NSF to maintain "a vigorous although austere program." NSF plans to boost its support of research but will cut its support of educational activities. Whether Congress will treat NSF more kindly this year than it has in the recent past is the big unanswered question, but with NSF now presenting itself as a potential solver of critical national problems, the agency's political fortunes may improve.

President Nixon emphasizes that his budget reflects "a significantly different set of priorities" from the last Johnson budget. "For the first time in two full decades," he said, "the Federal Government will spend more money on human resource programs than on national defense." About 41 percent of the proposed outlays would pay for such human resource programs as education, manpower, health, income security, and veterans benefits, while another 23 percent would support a variety of civilian programs, including pollution control, crime reduction, transportation, and housing. Only 37 percent would go for national defense. In past years defense had accounted for as much as 60 percent of the budget. One result of the shift in priorities is that various agencies are supporting more research on problems related to education, crime, housing, transportation, pollution, and other social issues. Some highlights of the budget follow.

Environment

Following up on his pledge to carry out a major new effort against environmental degradation during the 1970's, the President is proposing substantial increases in spending for control of air and water pollution and for purchases of open space, parklands, and recreation areas. Spending for these purposes would be greater by $330 million in fiscal 1971 than during the current year, rising from $785 million to $1115 million. "Despite current budget stringency, we must find a way to move aggressively on these [environmental] problems *now*," the President said.

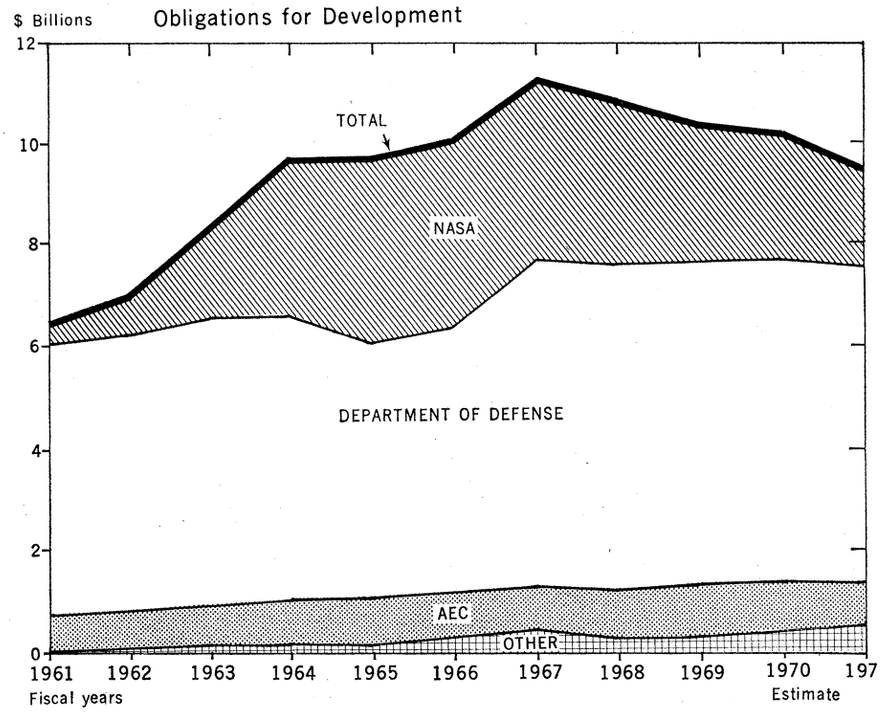
The administration has decided, moreover, to go along with congressional demands for a sharp increase in the funds to be made available in sewage treatment works grants. It plans to allocate $800 million a year for such grants over the next 5 years, for a total of $4 billion. While only $40 million is to be spent next year under this program, the explanation given is that payments on projects will be spread over 5 years and that those required initially will be modest. The $4 billion in federal funds is expected to stimulate $10 billion in construction, with the states and localities putting up the $6 billion difference. A new federal environmental financing authority, now being proposed by the administration, would offer to buy state and local bonds, which otherwise would have to be sold on the commercial market, where interest rates are already high. Altogether, $465 million will be spent on water pollution programs in 1971, including grant funds to be awarded under past appropriations.

The budget would provide $104 million for control of air pollution, 30

percent more than will be spent during the current year. A major objective is to help the states establish air quality standards and enforcement plans. By the end of 1971, more than half of the U.S. population will be living within the air quality control regions being set up under the Clean Air Act. The National Air Pollution Control Administration (NAPCA) also will intensify its research effort to develop, in cooperation with industry, techniques for the control of sulfur oxides, nitrogen oxides, and motor vehicle emissions. For new answers to the problems of pollution from sources such as power plants, NAPCA will coordinate research on processes for achieving a more complete combustion of coal and oil. Meanwhile, the Department of the Interior will be intensifying research on magnetohydrodynamics (MHD), which the administration regards as a "promising" technology for converting coal directly to electricity with minimal air and water pollution.

The Food and Drug Administration, which has been under mounting pressures to set lower tolerances for pesticide residues, will undertake a $2.2 million program of contract research next year in which the effects of 22 pesticides will be tested in 2-year animal feeding studies. Such studies were recommended last year by the Secretary of Health, Education, and Welfare's commission on pesticides and health. Certain pesticides, such as DDT, are known to cause cancer or birth defects in test animals when administered in large doses.

Even the NSF, whose primary mission is to support undirected research, is getting into environmental problems in a sizable way. NSF hopes to expand its program of support for interdisciplinary research on problems of society from the current level of $7 million to $13 million. The money would be used to support teams of specialists—engineers, social scientists, and others—who would combine their talents in an effort to help solve critical problems. McElroy said he could conceive of supporting teams as large as 150 men with grants as large as $1 million. NSF is also expanding and redirecting some of its other programs to encourage work on societal problems. All told, McElroy estimates that $55 to $60 million in the proposed NSF budget would be spent for this purpose. Some of the NSF programs which have a bearing on the environmental question include research on the use of seas and of coastal zones and a new Arctic research program directed primarily to ecological studies of Alaska's North Slope.



Health

Outlays for medical research, manpower training, construction of health facilities, and improved organization of the health delivery system would, under the new budget, be increased from $2142 million in 1970 to $2235 million in 1971. The administration points out that, during the 1960's, the government assumed large responsibilities under the new Medicare and Medicaid programs to pay the hospital and medical bills of the aged and the poor. But, it adds, the failure of the health system to expand and improve enough to meet the demands generated by these programs and by population growth has resulted in an upward spiral in the cost of medical care, in imbalances in the availability of health resources, and in a growing public awareness of inefficiencies in the health system. The new budget is supposed to represent a strong push toward reform.

To allow greater enrollments in institutions for educating health professionals, the budget would provide $535 million next year (a $68 million increase) for construction of facilities, scholarships and loans to low-income students, and institutional grants. Grants for direct institutional support are projected at $148 million, up 15 percent from the figure for the current year, and are expected to reduce the medical schools' dependence on biomedical research and research training grants as means of supporting their educational roles. Total enrollment in medical schools and schools of osteopathy is expected to rise from 38,130 in 1970 to 40,520 in 1971.

With respect to construction of health care facilities, the new budget reflects a marked shift in strategy from the past emphasis under the Hill-Burton program on providing additional hospital beds. The $50 million allocated for construction grants would go primarily for outpatient facilities and care centers for ambulatory patients. Hospitals will be expected to rely primarily on loans, rather than on grants, for capital improvements; their loan obligations are to be met from revenues now available from Medicare, Medicaid, and private insurance plans.

The budget would provide increased support for planning, developing, and evaluating new health care programs. For instance, a $6.8 million increase in grants for the Regional Medical Programs will allow funding for all 55 such programs thus far established. And, with the funds available to the National Center for Health Services and Research increased from $42.5 million to $57 million, a series of new experiments in designing improved sys-

tems of health care delivery will be started.

Support for biomedical research would increase in fiscal 1971 to $1035.5 million, up $50.1 million over the current level. The National Institutes of Health would support over 9900 traditional research project grants, or about 100 more than is estimated for 1970. Of the new total, some 2800 will be either new awards or renewals of grants previously awarded. Four areas of research have been singled out for substantial increases in support: funds for virus-cancer research would be doubled, increasing from $30 million to $60 million; funds for research on arteriosclerosis and lung disorders would be increased from $15 million to $35 million; support for research on prevention of dental cavities would rise from $1.7 million to $6.7 million; and funds for "family planning" and child health research would be increased from $15.5 million to $28.5 million, allowing a greater effort on development of "safe, effective, and acceptable" contraceptive methods.

Defense

In spite of substantial political pressures against defense research and the sizable drop in overall defense spending, Pentagon research and development obligations will decline by only $148 million, to $7.763 billion. Indeed, in percentage terms, the present administration appears to put a higher priority on R & D than the last one did. Total defense spending will drop from $77 billion to $71.8 billion, but R & D has been spared heavy cuts. Funds proposed for research and exploratory development, as distinct from major weapons development projects, show a slight increase, although not enough to offset inflation.

The change in defense dollar priorities reflects, in part, the declining level of Vietnam war activity. But it also reflects the President's determination to pursue a "low profile" defense posture, particularly in the Pacific. This posture deemphasizes land forces and places greater reliance on sea power and strategic weapons to deter and contain Communist China. In this respect it somewhat resembles the "massive retaliation" doctrine of the Eisenhower era, at least regarding China.

In connection with this strategy, the administration has decided to go ahead with "phase II" of the Safeguard antiballistic missile (ABM) system. This is designed eventually to provide nationwide "area" defense against Chinese missiles, presumably to strengthen the President's hand in a showdown over Taiwan or some other bone of contention. President Nixon is asking $1.5 billion for ABM deployment, including R & D, as compared to $900 million in the current fiscal year. But by returning to the previous administration's rationale for the ABM, at which he scoffed during the 1968 campaign, the President may have given additional ammunition to ABM foes on Capitol Hill. Scientists who were so passionately involved in the ABM opposition last year can be expected to leap on Nixon's press conference statement, of 30 January, that area defense would be "virtually infallible" against Chinese missiles. Last year's Senate battle, which ended in a 50-50 tie defeat for ABM opponents, may now be renewed with vigor.

The Pentagon's decision not to cut back on research and exploratory development reflects a different concern. According to defense officials, the administration has been impressed with continued heavy Soviet investment in military research and technology, and wants to keep up with Ivan. There will be a reduction, however, in defense support of academic research and development, largely as a result of congressional action on this year's appropriation bill. Thus, in fiscal 1969, defense obligations for academic R & D were $247 million, but in the current year this support drops to $223 million, and the new budget proposes $220 million for next year, a figure which Congress will almost certainly cut.

Defense research, according to the President's budget, will place particular stress on "efforts offering high promise for military application, such as electronics, sensor physics, aerodynamics, propulsion, . . . high-strength materials" and oceanography. Less money will be available for social science research and for astrophysics and astronomy than in the past. As a result of the Mansfield amendment to last year's military research authorization bill (*Science*, 14 November 1969), the Pentagon is at present reviewing about $1.3 billion in research and exploratory development projects to determine whether they conform to the new criterion of "direct and apparent relationship to a specific military function or operation." Again this year, there will be no new starts for Project Themis. That is the Pentagon program for spreading research funds to universities that previously got little or no federal support (*Science*, 21 November 1969). Like other defense research projects, existing Themis contracts are getting a close reexamination prompted by the Mansfield amendment. Officials expect the review to produce some shifts in defense research over the next year or so. Some of the projects dropped by the Pentagon may be picked up by the National Science Foundation, however.

Space

The Administration proposes a $3.4 billion spending budget for NASA in fiscal 1971. This compares with $3.9 billion in the current year and $4.25 billion in fiscal 1969. The Apollo moon program takes the biggest cut, about $600 million, partly offset by proposed increases for the Apollo applications project (aimed at putting a Saturn V workshop into earth orbit in late 1972) and for design of a reusable space shuttle and a permanent, earth-orbiting space station. A slight increase is proposed for the NERVA nuclear rocket engine project.

As noted in *Science* (23 January), the dominant feature of the new NASA budget is the proposal to stretch out the seven remaining Apollo moon shots and terminate production this year of the Saturn V rocket. Decision on a post-Apollo manned space program has been deferred to a later year, but design of the space shuttle and space station permits some progress toward this goal. NASA's unmanned space programs are to be curtailed to make extra money available for the new earth resources satellites.

NASA support of academic research will decline from $110 million this year to $88 million next, and the small program of sustaining grants to universities will be terminated after current obligations are met. The program was designed to stimulate academic research and training in aerospace sciences. Last year it was allowed $7 million for new obligations. NASA will close the Cambridge Electronics Research Center and the Mississippi Test Facility for Saturn rockets; the rocket assembly plant at Michaud, Louisiana will virtually cease operations. Nearly 50,000 contractor jobs will be terminated. But federal employment at other NASA centers is not expected to decline appreciably.

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