

A belt-tightening time for American science

A hold-the-line budget of \$17.4 billion is proposed for Federal R&D. Emphasis is on the practical. Many programs receive major cuts.



"I must say, Graff, you're not taking the budget cut very gracefully"

The tone of the section on research and development in the Administration's proposed budget for fiscal 1974, issued this week, is unmistakable. Science is to be oriented more and more toward solving important national problems. The quest for knowledge for its own sake has taken a rhetorical and monetary backseat to practical science. This trend has long been evident, but it seems more explicit this year than before.

The science budget also clearly reflects the Administration's fiscal belt-tightening. It requests \$390 million less for the conduct of research and development than it did a year ago. Total R&D obligations for fiscal 1974 would be \$17.4 billion. An additional \$0.9 billion would be added for R&D facilities.

The budget figures themselves are misleading this year; virtually all agencies, including those in science, have had a portion of their already appropriated funds for fiscal '73 impounded as part of the Administration's campaign to hold down current spending. These funds have been taken out of

the totals for '73 and included in those for '74. This makes comparisons between the two years difficult.

The 1974 R&D budget of \$17.4 billion compares with the estimated amount actually to be obligated in 1973 of \$17.1 billion. Last year the Administration requested \$17.8 billion for 1973.

A half dozen major areas of national concern are in for healthy increases in R&D funding: energy, up an estimated \$130 million; cancer and heart disease, up \$92 million; transportation, up \$83 million; natural disasters, up \$18 million; drug control and rehabilitation, up \$2 million; and crime prevention and control, up \$12 million.

The energy budget includes funds for development of the liquid metal fast breeder reactor, which the Government considers the top priority program for electrical energy in the 1980's and beyond. There is also more money for nuclear fusion, of promise for electrical power in the next century. Funds for solar and geothermal energy would double to \$16 million. Research will be expanded for obtaining more efficient use of coal, including coal-gasification, liquefaction and magnetohydrodynamics.

Major reductions in funding are proposed for the space program and biomedical research (see separate stories). Other examples of cuts are the Atomic Energy Commission's Plowshare program (no blasts are funded in 1974), space nuclear systems, and civilian reactor development, other than the fast breeder. AEC's funds for high-energy physics are being reduced slightly for all accelerators except the new 200-BeV National Accelerator Laboratory in Illinois, which will receive a \$10 million increase in operating funds. The Cambridge Electron Accelerator will be closed.

The Environmental Protection Agency's R&D programs are being slashed by

22 percent. The Government says an in-depth assessment of EPA's R&D activities has led to a major redirection and a decision to rely more on the private sector to meet antipollution technology requirements. Demonstrations of stack-gas treatment technology will be ended. Emphasis will shift to the long-term development of an advanced, clean-fuel automotive source.

R&D in colleges and universities is due to receive \$1.99 billion, compared with a request last year for fiscal '73 of \$2.25 billion and an estimated actual for fiscal '73 of \$1.91 billion. (The discrepancy between the two figures for '73 is due largely to impounded funds.)

The National Science Foundation, until recent years the bastion of basic research support and now increasingly involved in applied research, is slated for a budget of \$641.5 million. This is \$33 million less than NSF requested last year. It includes \$62.4 million of appropriated funds held out of the '73 budget by the Office of Management and Budget. It compares with \$615 million expected actually to be obligated by NSF in 1973.

NSF continues to phase out its institutional grants for science and it will complete a phaseout of graduate traineeships.

NSF will increase from \$3 million to \$10 million the funding for the Very Large Array radio astronomy facility to be constructed in New Mexico. Its funds for scientific research project support will go up \$14 million. Funds for scientific education improvement will go back up toward earlier levels after a major slash in the current fiscal year. The program is being restructured to emphasize interdisciplinary scientific careers.

At any rate NSF, despite its new role as appraiser of the effectiveness of all Federal R&D programs, seems a long way from its dream a few years ago of being a \$700 million agency. □

Department or agency	CONDUCT OF R&D (MILLIONS)	
	Obligations	
	1973 estimate	1974 estimate
Defense—Military functions	8,338	8,808
National Aeronautics and Space Administration	3,383	2,995
Health, Education, and Welfare	1,832	1,969
Atomic Energy Commission	1,359	1,411
National Science Foundation	461	516
Transportation	367	425
Agriculture	378	351
Interior	259	262
Commerce	214	211
Environmental Protection Agency	177	138
Veterans Administration	76	78
Housing and Urban Development	43	71
Justice	39	54
All other	184	141
Total, conduct of research and development	17,110	17,430

Agency R&D proposals for FY 1974. Impoundments depress '73 figures.

Biomedical research hit hard by cuts

Cancer and heart research are given healthy boosts in the 1974 budget, but other areas of biomedical research suffer. Cancer is getting an increase of \$74 million, 17 percent over 1973. Heart gets \$18 million more. Cancer and heart disease are the leading causes of death in the United States, which explains why the Administration is giving them preference. The bigger cancer funds also complement the refurbished National Cancer Institute, which had the President's blessing (SN: 5/13/72, p. 309).

Some other areas of research are also in—sickle cell anemia, for example, one of the most widespread and serious health problems for American blacks. Some \$16 million is earmarked for research, screening, diagnosis and treatment of the disease.

But most general areas of research funded by the National Institutes of Health stand to be drastically slashed—a total of \$42.897 million below the President's revised 1973 budget. General medical sciences are cut by \$13.0 million; research resources by \$10.4 million; arthritis, metabolic and digestive diseases by \$6.3 million; neurological diseases by \$4.3 million; child health and human development by \$2.9 million; allergy and infectious diseases by \$2.0 million; dental research by \$1.9 million; eye research by \$1.1 million; environmental health by \$626,000, and the John E. Fogarty International Center by \$340,000. As if biomedical research has not been walloped enough, the President is also impounding much of the research money that NIH has not yet spent in fiscal 1973.

To the dismay of biomedical Ph.D. candidates, young physicians doing research and the schools that train them, training grants for biomedical research are being ended. Commitments through

Impoundments tie up NSF science education funds

National Science Foundation Director H. Guyford Stever revealed in the budget briefings that the Administration has impounded \$62.4 million of NSF funds appropriated for the current fiscal year, ending June 30. This is money appropriated by Congress but, as the euphemistic phrase goes, "unapportioned" by the Office of Management and Budget, as part of the President's program to hold down spending. The figure amounts to about 10 percent of NSF's budget. Despite Congressional approval the money cannot be used in fiscal 1973. It has been put instead into the fiscal 1974 budget.

In the breakdown of the withheld money, science education suffers most. Stever said it was decided to take the biggest chunk out of NSF's Science Education Improvement program because "we are and have been in a serious re-orientation" of the program. "It's in a transition phase." This is the breakdown of NSF's impounded funds:

Scientific Research Project Support	\$ 0.1 million
National and Special Research Programs	8.6 million
National Research Centers	2.0 million
Computing Activities	1.7 million
Science Information	2.2 million
Institutional Improvement for Science	3.0 million
Congressional Add-on for Institutional Improvement	6.0 million
Graduate Student Support	6.0 million
Science Education Improvement	30.8 million
Foreign Currency Program	2.0 million
Total unapportioned funds	\$62.4 million

One effect of the impoundments is the calling back to port of NSF's research vessel *Eltanin*. The Antarctic research ship will be placed into "ready reserve" for the remainder of the fiscal year.

fiscal 1974, however, will be honored. The grants were worth \$186 million in 1972, and \$150 million in the revised 1973 budget. The Administration claims that a continued Federal thrust to train researchers may lead to an oversupply of scientists who will be unable to find appropriate employment. It also contends that doctoral-level scientists should bear the costs of their training themselves, and those trainees who need financial aid should look for assistance through the Office of Education or other scholarship sources.

In the area of health delivery, the

Administration is funding programs it considers effective and dropping others it believes have fulfilled their purposes or have been busts. There is \$15.6 million above the revised 1973 budget for family planning, \$3.5 million more for health planning at the local level. Emergency medical services get \$15 million (accidents are the third-leading cause of death in the United States). The Hill-Burton program, which has helped build hospitals since World War II, is being phased out, since 25 percent of the nation's hospital beds are empty. The seven-year-old Regional Medical

Military accounts for 55 percent of R&D budget

The war in Vietnam may have ended, but the upward spiral of military research and development funds continues. The new budget for fiscal 1974 requests \$8.99 billion for Department of Defense R&D. This is \$241 million higher than the amount requested a year ago and \$482 million higher than the estimate of actual obligations in the current year.

Adding to the DoD's figure the \$625 million requested by the Atomic Energy Commission for military-related R&D gives a total of \$9.62 billion for military R&D in the new budget. This represents 55 percent of the amount requested by the Administration for all research and development (\$17.43 billion).

The bulk of the DoD's R&D request is for conduct of development (\$6.8 billion) as opposed to research (\$1.9 billion). The other \$189 million is for R&D facilities.

The main objective of the Defense R&D, according to the budget documents, is "to develop strategic and tactical systems that will allow us to maintain our force effectiveness. At a time when military force strength has been reduced, we must ensure that new and improved equipment is available for force modernization."

The Trident submarine ballistic missile system and the B-1 advanced bomber are two major strategic systems continuing development in 1974. R&D will increase on defense of Minuteman missile sites. There are major increases in Army tank, helicopter and ground-based air defense systems; Navy surface-effect ships and antisubmarine warfare programs, and in Air Force close air-support aircraft and electronic-warfare-support aircraft. Basic research and other studies will explore new systems concepts "such as laser weaponry and advanced surveillance radars."

Program, designed to bring medical advances to more Americans, is ending. The Administration considers it a failure, a duplication of other public and private efforts. However, \$60 million is earmarked, under proposed legislation, for Health Maintenance Organizations. These are prepaid group medical practices, a form of health delivery that promises better and cheaper health care to more Americans.

The Administration is upgrading its consumer protection efforts. The Food and Drug Administration is getting \$22 million more, a 15 percent increase over fiscal 1973 and a 42 percent increase over 1972. □

Space program cut to lowest level in a decade

The "moth-ball mode" and "bare bones budget" of three years ago look good to NASA now. Those were the terms used to characterize the 1971 fiscal year budget. At the time, the agency's funds had plummeted from the \$3.7 billion of 1970 to \$3.3 billion. This year NASA finds itself asking for \$3.0 billion.

The request of \$3.0 billion is the lowest since 1962. Research and development is down over \$300 million. Space science is down \$95 million;

space applications, \$36 million; technology utilization, \$222 million. The High-Energy Astronomy Observatory has been suspended; the Pioneer Venus studies, stretched out yet another year (these have already been going on for three years). Orbiting Solar Observatories (OSO) J and K are nowhere to be seen. The second Earth Resources Technology Satellite (ERTS B) will be delayed two years to 1976. Tiros N, the prototype of a new series of operational meteorological satellites for the National Weather Service, will be delayed a year to 1977. Applications Technology Satellite (ATS) G is canceled. And 1,800 more NASA employees

Revamping science: Critics attack, Administration defends

Criticism from several fronts has greeted the Administration's decision to abolish the White House Office of Science and Technology and to transfer its functions to the National Science Foundation (SN: 1/27/73, p. 52). The White House finally announced the already reported move late last week.

The Federation of American Scientists deplored what it called the moving of scientists into "a lesser and more subordinate role" in the Government, and Rep. John W. Davis (D-Ga.) called the plan "disastrous for the nation's economy and for our country as a whole." Davis is chairman of the House Subcommittee on Science, Research and Development.

FAS, a public-interest lobby of 4,500 scientists, including at least 21 Nobel laureates, said: "We view with dismay and alarm this further decline in the role of scientists in Government. . . . As the issues of national science policy become more complicated, the voice of science becomes more necessary. We believe that disinterested expertise should be sought rather than suppressed. The policies being followed by the Administration, in downgrading science, are leaving the scientific community with an ever greater feeling of frustration."

Davis, in elaborating on his earlier reported comments, called the actions "a bad mistake" and "a downgrading of science and engineering in national policy." He said he intends to try to "beef up" the executive science function, adding that it would be a part of the "big struggle that is shaping up between the executive and legislative branches of government."

The White House announcement answered few of the critics' major questions about the effects of the action. NSF's main new duty is to "appraise the over-all effectiveness of ongoing Federal and national [civilian] R&D efforts to advance national goals through science and technology" and to "make recommendations on policy and program actions" necessary to achieve those goals.

A briefing by NSF Director H. Guyford Stever did bring some facts to light:

- Stever's new title of "Science Adviser" means he is science adviser to the Government as a whole, not to the President.

- The first detailed discussions in which Stever was involved began just two weeks earlier. He had "a very few words" with President Nixon in person about the changes.

- The National Science Board, NSF's policy-making body, was not consulted as a group before the decision was made.

- The Federal Council of Science and Technology, an interdepartmental coordinating group, will be abolished.

In its place will be created a Science Policy Council, of which Stever will be chairman. It will perform much the same functions but "probably . . . in a different way."

- No money and no personnel slots are being transferred from OST to NSF. About 20 new positions made available originally to NSF for other purposes will be used to man its new Office of Science Policy, to be set up to carry out some of OST's former functions. Several of the positions may be filled by persons now at OST.

- The actions will become effective July 1, unless Congress acts to the contrary within 60 days.

Left in never-never land by the announcements is the status of the President's Science Advisory Committee. No mention of PSAC was made in the White House statements. Whether it will be excised or merely ignored to death was not immediately clear. Said Stever: "PSAC's role is not mine to judge." But he added, "I believe the need for advice from the scientific community is intensely strong," and he said NSF will have to set up some structure in an advisory capacity. "I'll have to think about it some more."

President Nixon's message to Congress on the subject called the actions a streamlining of the Federal science establishment. His message and a White House fact sheet indicated that the White House felt OST was no longer necessary. "OST has performed with distinction since its creation in 1962, during the post-Sputnik period when major evaluation and coordination of science and technology programs was vital," said the White House. "Increasingly, the research and development capabilities in line departments and agencies have been upgraded and our R&D programs have been stabilized. With a growing range of capability in the NSF, the President will now look to its director as a principal adviser in science and technology matters."

Stever is obviously in the difficult position now of having to satisfy two at-least-partially opposing constituencies: the White House, with its effort to hold down spending, reduce the number of persons reporting to the President, and redirect science toward practical ends; and the scientific community, with its desire to continue strong efforts in basic science and maintain a strong visible voice for their interests in the Government. Stever acknowledged the difficulty of this position, noting that he will have to work to keep his two roles distinct. He maintained the intent of the elimination of OST and the transfer of its role to NSF is not to downgrade science. Whether that ultimately may be its effect, he said, will be a matter of interpretation that will have to be seen. But he concluded, "I have the feeling we may be able to be very effective."

will be dropped (1,500 were dropped this fiscal year).

"We have curtailed several NASA activities which were important to the nation's space and aeronautics program," NASA Administrator James C. Fletcher said this week. "But despite these cuts, [we] have maintained a surprisingly strong program." NASA saved the 1975 Viking landers, the 1977 Jupiter-Saturn fly-bys and *OSO 1*. The second probe to Jupiter and a Mariner Venus-Mercury fly-by will be launched this calendar year. Skylab will be flown as well as the U.S./U.S.S.R. docking mission in 1975. Work on the space shuttle will continue, but at a slower pace.

Fletcher proudly announced two new starts for fiscal year 1974—*Nimbus G*, an experimental earth-oriented satellite directed at environmental pollution and oceanographic measurements, and *LAGEOS*, a new geodetic satellite for accurate measurements of movements of the earth's surface. *Nimbus* will fly in 1977; *LAGEOS*, 1976.

There was one hopeful note for NASA: Administration budget projections for fiscal year 1975 indicate NASA may be back "up" to \$3.2 billion. □

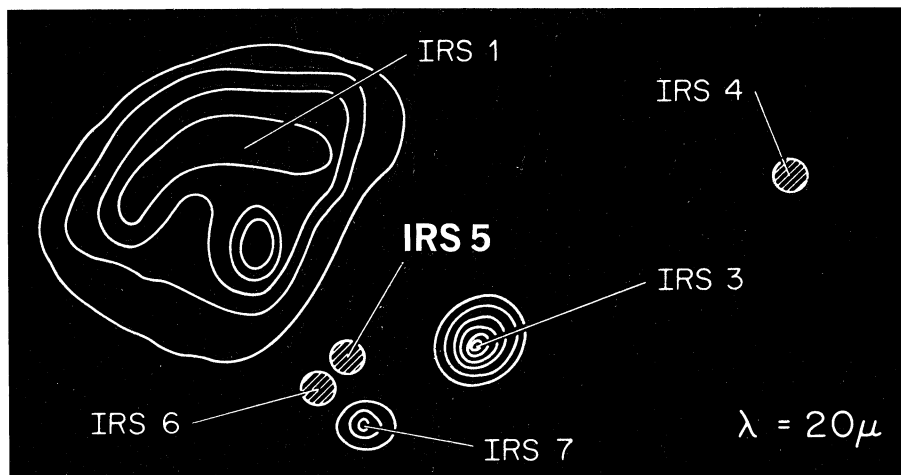
Slayton chosen for Apollo/Soyuz mission

One of the original seven Mercury astronauts, Donald Kent (Deke) Slayton, was selected this week for the crew of the Apollo/Soyuz Joint Docking Mission. The U.S.-Soviet joint flight will be launched July 15, 1975. Thomas P. Stafford, veteran of Gemini 6 and 9 and Apollo 10 was named commander of the mission. Vance Brand is the third crew member. Brand is one of the few pilots from group five who has not flown in space.

Named to the backup crew are Alan L. Bean, Ronald E. Evans and Jack R. Lousma.

This summer the Soviet cosmonauts will go to Houston for a joint training session with the astronauts. In the fall the astronauts will train in the Soviet Union. The astronauts have been studying Russian.

Slayton is the only one of the seven original astronauts who has not flown in space. He was taken off flight status because of a heart irregularity just before his scheduled Mercury flight. The ailment disappeared in 1969, and he was subsequently placed back on flight status. He has been Director of Flight Crew Operations at the Manned Spacecraft Center in Houston and in charge of naming all space crews. The new crew, however, was recommended by Christopher Kraft, director of MSC. The flight is the last manned mission before manned shuttle tests. □



Hale Observatories

A star is born, IRS-5, in one part of a large gas cloud in the galaxy.

An embryo star larger than the solar system

Clouds of dust and gas in the universe are the birth places of stars. These clouds contain vast quantities of hydrogen from which stars are formed. Ten years ago Eric Becklin found an object in such a cloud he thought to be a star being born. This embryo star or "protostar" is in the Orion nebula.

Now he, Gareth Wynn-Williams and Gerry Neugebauer, all of the Hale Observatories in California, report the discovery of an object emitting 10 to 20 times as much energy as the Orion protostar. The new object, called IRS-5 (Infrared Source 5), is emitting 30,000 times more energy than the sun and is larger than the entire solar system.

But its temperature is extremely low—only 170 degrees F. Normal stars have temperatures of about 5,000 degrees F. The new object is not associated with any visible source. It does coincide with a radio source emitting energy in the microwave region of the spectrum.

Becklin thinks the cold giant is in the process of collapsing under its own gravitational forces. It will become, in a thousand years or so, a much hotter, more compact and exceptionally bright star.

IRS-5 was found in a dense cloud of gas called W3, located about 10,000 light-years away in the Perseus spiral arm of the Milky Way galaxy. Wynn-Williams had been studying the hot hydrogen gas in the cloud for years. There was indirect evidence the cloud contained several fairly young stars (about 10,000 years old), but the dust in the cloud obscured the stars in the visible light. By using infrared detectors attached to telescopes, the researchers have now confirmed the presence of the young hot stars. In fact, one of them is only a few light-years away from the new object discovered. The bright star is hidden at the center of

the cloud, W3, behind the dust.

The astronomers have also used the infrared detectors to measure temperatures and thicknesses of the dust in the cloud W3. Eventually, they say, the radiation in the cloud will cause the dust to disperse, allowing the new stars to be seen from earth. □

Baboons too use tools

Since 1960, Jane van Lawick-Goodall, a protégé of the late Louis S. B. Leakey, has been studying the behaviors of chimpanzees in their natural habitat. Working in the Gombe National Park in Tanzania, East Africa, van Lawick-Goodall and her husband, photographer Hugo van Lawick, have received wide attention for their descriptive studies of animal behaviors—especially tool-making and tool-use among wild chimpanzees. But the tool-use studies are not confined to chimpanzees. In the Jan. 19 *NATURE* she, her husband and C. Parker describe two incidents of tool-use by free-living baboons in Gombe National Park.

To feed on the seeds of a certain fruit, baboons must break open a pod in which the seeds are surrounded by a white glutinous juice that dries to a consistency of rubber cement. When this food is in season the hair around the baboons' lips frequently becomes matted by the juice. Usually they attempt to remove the juice by rubbing their mouths against a tree or large rock. One three-year-old female, however, was observed picking up a stone and repeatedly and forcibly rubbing it across her muzzle in an attempt to remove the dried juice.

In a separate incident, an adult male of a different troop cut his lip during a fight. Blood and saliva ran down his