LBJ's Last Budget: R&D Follows a "Status Quo" Pattern

President Johnson last week unveiled what the outgoing and incoming secretaries of the Treasury agreed was a "very tight budget." For federally supported science, the fiscal 1970 budget can be said to promise little more than a "cost of living" increase.

Johnson is requesting a total of $17.1 billion in obligations for research and development next year compared to the estimated $16.8 billion which will have been spent by the time the current fiscal year ends on 30 June. In the research portion of the budget the requested increase would amount to about 5 percent over last year and would just about cover the rising costs of research and conform to the general pattern in what is essentially a "status quo" budget.

Academic scientists may be heartened by a shift in the proportions of funds in the R&D budget. Under the new budget, expenditures for research would increase by some $300 million and expenditures for development would decline about $100 million, with the shift largely accounted for by the fall off in development spending for the space program.

The context of the proposed budget has become a familiar one. Inflationary pressures caused by 8 years of economic expansion and, particularly, by the demands of Vietnam war financing, and worries over balance of payments problems, have moved the administration to opt for a restrictive budget for next year which even promises a small surplus. As a consequence, the outgoing administration has left its successor little room to maneuver in areas of "controllable spending" such as science.

A President's budget, especially a lame duck President's budget, of course, is simply a request for funds. Congress must appropriate the money and the new administration could well decide on chops or changes. And fresh in the mind of the scientific community, of course, must be the memory of last year when Congress pruned R & D budget requests and then compounded the cuts by requiring the administration to impose further restrictions on spending.

Whatever "give" is built into the 1970 budget depends on extension of the 10 percent income tax surtax. There have been indications that the Nixon Administration is inclined to extend the surtax and unless the surtax or some revenue-raising equivalent is applied, the science sector may well find that the help it hopes for amounts to a band-aid for a fracture. On the other hand, some encouragement may be taken from Presidential candidate Richard Nixon's emphasis on providing more funds for research.

If Congress does follow the recommendation of the Johnson budget, the effect should be cheering at least for the National Science Foundation (NSF), the current sick man of federal research supporting agencies. The budget calls for an increase in appropriations of about 20 percent over last year (see box) which would restore NSF's budget to a half billion dollars, approximately where it stood 2 years ago.

NSF's fate, of course, influences the general fortunes of academic science, which was the disaster area of the science budget last year. The new budget calls for a rise in spending for academic science from $1.4 billion in fiscal 1969 to $1.5 in the coming year (see Table 2), but the remedial effects of this boost are made somewhat dubious since new obligational authority (authority to obligate but not necessarily spend money) would rise only from $1.50 billion to $1.57 billion so that funds in the pipeline would hardly promise bigger spending in coming years. The prospects for academic science would have been brighter if the once-fat National Aeronautics and Space Administration's university program had not been cut again. The recommended reduction would be about 15 percent and the total requested to be obligated for academic research by NASA in fiscal 1970 would decrease to $101 million from $119 million in the

Table 1. Expenditures for research and development, 1954–70 (in millions of dollars)

Fiscal year	Department of Defense	NASA	AEC	HEW	NSF	Other	Total
1954	2,487	90	383	63	4	121	3,148
1955	2,630	74	385	70	9	140	3,308
1956	2,639	71	474	86	15	161	3,446
1957	3,371	76	657	144	31	183	4,462
1958	3,664	89	804	180	33	220	4,990
1959	4,183	145	877	253	51	293	5,803
1960	5,654	401	986	324	58	315	7,738
1961	6,618	744	1,111	374	77	356	9,278
1962	6,812	1,257	1,284	512	105	403	10,373
1963	6,849	2,552	1,335	632	142	478	11,988
1964	7,517	4,171	1,505	793	190	519	14,694
1965	6,728	5,093	1,520	738	192	604	14,875
1966	6,735	5,933	1,462	879	225	768	16,002
1967	7,680	5,426	1,467	1,075	277	917	16,842
1968	8,148	4,724	1,593	1,250	315	835	16,865
1969 estimate	8,036	4,250	1,668	1,181	336	954	16,425
1970 estimate	8,254	3,950	1,721	1,321	348	1,106	16,700

Table 2. Support of research in colleges and universities (in millions of dollars).

Department or agency	Obligations			Expenditures		
	1968 actual	1969 estimate	1970 estimate	1968 actual	1969 estimate	1970 estimate
Health, Education, and Welfare	700	713	705	653	592	666
Defense	219	247	274	235	252	275
National Science Foundation	221	210	255	207	224	243
National Aeronautics and Space Administration	130	119	101	151	130	109
Atomic Energy Commission	93	94	96	93	94	96
Agriculture	62	62	64	61	62	64
All other	60	63	76	56	60	66
Total	1,485	1,508	1,571	1,456	1,414	1,519

current year and $130 million in fiscal 1968.

The space agency expects to send men on a return trip to the moon surface during the coming fiscal year and thereby achieve the national goal which it began pursuing 8 years ago. But NASA's budgetary star continues to wane. The new budget requests $3.9 billion for NASA next year, about the same amount that is likely to be spent in the current year and drastically less than the $5 billion budget of fiscal 1967. The decline in the NASA budget reflects the completion of expensive construction projects and the disappearance from the budget of large sums for the purchase of costly Apollo program hardware, and also the absence of work on any major new post-Apollo manned programs. A larger share of NASA funds next year will be tagged for research than for development. NASA's space sciences budget would rise from $289 million this year to $351 million next year. And attention will be shifting to such events as the 1971 and 1973 Mars Mariner unmanned flights, the 1973 Venus-Mercury flight, and the proposed Planetary Explorer series later in the decade. NASA's bleak budgetary prospects in the early 1970's has troubled many space program partisans. Last week, for example, NASA's deputy administrator George Mueller said the budget as it stands "will put us out of business in 1971 and 1972." The question of NASA's future is likely to be a high priority one for President Nixon.

A conspicuous lacuna in the budget is the omission of funds for the supersonic transport (SST) project. The Boeing company recently submitted its SST proposal and the government will presumably decide this spring on what could be a nine-figure-line item in the budget.

Administration officials see increased spending on new military programs, for submarines and aircraft and, notably, for procurement of antiballistic missile hardware. But the Defense Department's spending on research is expected to rise only slightly and not to surpass the 1966 level. Funds for Defense's Themis program in the universities are supposed to remain level at about $27 million.

The Atomic Energy Commission's research programs would get some $16 million more under the proposed budget, raising the total to $437 million. The AEC continues to handle the finan-

NSF Budget: Binding Up the Wounds

President Johnson's proposed budget makes an obvious attempt to heal some of the wounds inflicted on the National Science Foundation during the recent spending squeeze. Much to the surprise of the Foundation's friends, the outgoing President, in a last-minute move, is said to have personally ordered a big boost in the NSF budget request. The President requested appropriations of $500 million* for NSF for fiscal 1970, compared with only $400 million granted NSF for fiscal 1969, the current year.

Foundation officials seem pleased with the size of the request, but there is no guarantee that Congress will look any more kindly on the NSF request this year than last. Pessimists might note that the fiscal 1969 budget also requested $500 million for NSF, but Congress reduced the figure by an amazing 20 percent. And even if the Foundation gets the full $500 million requested, which seems highly unlikely, the boost would only bring NSF back up to roughly the level of fiscal 1968.

The new appropriations requested, when combined with various recoveries and unobligated balances carried forward from previous years, would give NSF a total obligational authority (money available to commit) of $520.3 million* in fiscal 1970. This would be the highest total in the history of NSF, and would represent a substantial increase from the $435 million available in fiscal 1969.

Most of the increase would go to scientific research support and institutional support, thus providing some relief for the hard-pressed universities that seem to have borne the brunt of the current year's budget crunch. Support of research projects would be boosted to $195 million, up $17.7 million from the current year. Most of this boost, namely $10 million, is allocated for interdisciplinary research, both basic and applied, relevant to problems of our society and the modern environment. This is virtually the only significant new departure in a spending program that NSF officials characterize otherwise as "pretty much a standstill budget," designed to bind up wounds.

Other substantial increases are budgeted for the International Biological Program ($5 million requested, up from $0.5 million this year); the National Sea Grant program ($10 million, up from $6 million); the Ocean Sediment Coring Program ($6.5 million, up from $2.5 million); Computing Activities in Education and Research ($22 million, up from $17 million); and university science development ($30 million, up from $20 million). The increase programmed for university development will be applied mainly to renewal grants for existing programs and will permit only two, or possibly three, new grants. About $2 million has been allocated for a new oceanographic ship, and about $3 million for resurfacing the radio astronomy instrument at Arecibo, Puerto Rico. Support for science education is budgeted at approximately the same level. There would be a slight increase in fellowships and traineeships, from 7438 to 7610.

Though NSF suffered a sharp cut in appropriations (new money available to commit) in fiscal 1969, the factor which caused NSF the most grief was a ceiling imposed on expenditures (the amount of money that could actually be spent in fiscal 1969 no matter when it was committed). At this point it is not known whether there will be another expenditure ceiling in fiscal 1970, but NSF officials are predicting that Congress, which required the ceilings in fiscal 1969, will take similar action next year. If ceilings are not imposed, the budget request for NSF envisions expenditures of $500 million, up from $480 million this year.—P.M.B.

* Includes $3 million in excess foreign currencies; NSF had no separate foreign currency appropriation in fiscal 1969.

cing of the 200-Gev accelerator at Batavia, Illinois, in a gingerly way, but this year has taken the plunge of seeking authority to obligate $102 million for construction. Expenditures on the project, however, would amount to $20 million in fiscal 1970.

In the medical and health research sector no dramatic movement is called for in the budget. For the National Institutes of Health, Congress is asked to appropriate $1.49 billion in fiscal 1970 as compared with $1.40 billion this year. The budget request for the National Institute of Mental Health is $367 million compared with $350 million this year. For medical research this will be, in a double sense, a transition year, since not only is a new administration moving in but NIH's old friend and patron Senator Lister Hill is leaving the Senate and his strategic chairmanships on the Labor and Public Welfare and Appropriations committees.

The new budget is virtually bare of requests for big increases. There are some incremental raises asked in the mass of new education, social, consumer protection, and environmental programs passed in the Johnson years. But the outgoing administration seems to have resisted whatever temptation there may have been to bloat its farewell budget and thus leave its successor with the difficulty of reducing requests.

Last week was a time of arrivals and departures in Washington. The swan songs heard at agency budget briefings were tinged with regret that time and money had run out, but the mood was more of leave-taking than stocktaking.

One interesting obiter dictum came from Ivan L. Bennett, deputy director of the Office of Science and Technology (OST), who handled the OST briefing. Bennett was asked, in effect, what he thought accounted for the hold down in growth of federal science in recent years. (Bennett, who is taking over as director of New York University Medical Center and an NYU vice president, came to Washington from Johns Hopkins where he was head of the Department of Pathology.) Making clear it was one man's opinion and not an agency view, Bennett said he did not think the malaise in federal science funding could be attributed primarily to the impact of the Vietnam war. Bennett said that in the 1960's rapidly increasing federal science spending had acquired political "visibility." The science budget now represented about a third of controllable expenditures in the federal budget and had reached a size where it would continue to be "examined very closely." Bennett found the pathology of the federal science funding not all gloomy, however. He said he felt the science budget would begin to grow again, probably at a rate close to the rate of increase of the gross national product, and that the new surge forward would perhaps begin in "two or three years."—JOHN WALSH

Steam Cars: Jet Tycoon, Others, Espouse the Cause

Reno, Nevada. While the auto industry and the federal government continue to study the feasibility of alternative forms of automotive power that will not emit harmful pollutants into the air, William P. Lear is putting his business experience and his money into the production of such systems right now. At a former Air Force Base 10 miles north of here, Lear is developing steam engines, and he plans to be producing 1000 engines a day by the end of 1970. Developments here and at Newport Beach, California, where Donald Johnson of Thermodynamic Systems, Inc., has developed a small and highly efficient steam engine for automotive use, indicate that relief from contaminated air may be not too far away. Lear promises to have steam cars on the market by the middle of 1970—both a moderate- and a high-priced model.

The multimillionaire's arrival on the steam scene came just at the right time, as far as advocates of steam are concerned. Last spring, when the Senate Commerce Committee and Air and Water Pollution Subcommittee of the Public Works Committee held joint hearings on steam-powered automobiles, the steam people said lack of available money was delaying development of their engine systems (*Science*, 5 July 1968).* They were primarily seeking government support at that time, but mainly they were interested in money—anybody's money. They explained how they had solved all the historical problems associated with steam automobiles—slow start-up time, problems of freezing, heavy and complex engine systems. They felt that they had a feasible solution to the problem of automotive air pollution, and that their engine was competitive, in both cost and performance, with the internal-combustion engine. Calvin Williams and Charles Williams showed the senators their steam car, which had been tested for emissions after 25,000 miles and found to have released about 1 percent of the pollutants that an uncontrolled internal-combustion engine emits. But the Williams brothers—and the other steam experimenters who testified—were almost broke (the Williamses have since gone out of business), and no money was in sight.

"I looked around," Lear told *Science* in a recent interview, "and saw that if somebody didn't do something, the auto industry would bury steam just like it had done before." So he decided to do something.

Lear had already decided to bring industry to Reno, in the hope of providing some diversification for the gambling-dominated economy. Besides the steam project, Lear has set up Titanium West, which will produce titanium ingots; he also plans to produce power alternators and automatic airplane pilots, and to start a charter jet service and a precious-metal refinery. He sees his enterprise as providing the industrial base for a future technical community here that would also include the nearby Desert Research Institute and the University of Nevada (*Science*, 23 August 1968).

All of this would probably sound fantastic were it not for the fact that

*A Senate Commerce committee study report based on the hearings is expected to be released in late February or March. Sources in the committee indicate that the report will carry a recommendation for possible legislation backing research to aid in the development and marketing of a viable steam car engine.