strated (*19*). The potential source of infection has been more fully appreciated since the use of atmospheric sampling devices which show that such common and simple procedures as removing stoppers, expelling the last drop from a pipette, or removing plugs from a tube may produce aerosols near the laboratory bench (*20*). Filtration of infectious material may result in contamination of a vacuum line or pump unless adequate precautions are taken, and maceration of infected tissue by a variety of means may produce an infectious aerosol. Blenders for mechanical disruption of infected tissue have been designed to minimize the chance of leakage and to provide a means of drawing off fluid without removing the top (*21*). If, in addition, the operation is performed in a sterile chamber with a plastic cover over the apparatus, there should be little hazard. The opening of sealed glass ampules containing lyophilized active viral material constitutes a serious inhalation hazard in the laboratory. Special techniques have been recommended for opening such ampules.

Sources of laboratory-acquired arbovirus infections are shown in Table 3. In many instances, it was known only that the individuals had been working with the agent and that the source was probably aerosol inhalation. In addition to those classified as due to an aerosol, a number of infections under other headings were probably transmitted by aerosols. Known accidents resulting from situations that could have been avoided accounted for about 10 percent of the total.

The survey of laboratory-acquired infections has provided information concerning the number of cases and the identity of viruses that cause infections. Regular reporting of laboratory-acquired infections to the American Arbovirus Committee or American Public Health Association would stimulate the development of more effective measures to reduce the hazards in arbovirus laboratories. Regular testing of all members of the laboratory staff for antibodies to all viruses that they handle should be encouraged as a means of assessing the effectiveness of safety procedures. The greatest hope of preventing laboratory-acquired illness lies in the recognition of the sources of infection; the unrecognized sources constitute the greatest problem.

While there is no evidence that use of immunizing substances such as serum from convalescents or specific immunoglobulin is of any value after symptoms of arbovirus infection appear, a rationale based on studies in experimental animals has been developed for use of such substances for passive immunization immediately or soon after accidental exposure. Because of the numbers of laboratory workers required to handle an increasing number of arboviruses in diagnostic and research studies, efforts are being made by the National Communicable Disease Center and the World Health Organization to collect, pool, and accumulate serums of convalescents from specific arbovirus infections. These serums are being processed into specific immunoglobulins and will eventually be available on a restricted basis for use after certain types of laboratory accidents.

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NEWS AND COMMENT

Federal Research Funds: Science Gets Caught in a Budget Squeeze

As the first session of the 90th Congress draws to a close, it is clear that President Johnson's legislative program has been badly gutted. A number of factors—the rising economic and emotional costs of the Vietnam war, a general fiscal squeeze, poor Democratic congressional leadership, a stronger conservative coalition, and growing antipathy between the legislative and executive branches—combined to produce a Congress this year that ignored or drastically altered many of the President's legislative requests. The closing months in particular have been marked by an economy wave that engulfed virtually all non-war-related spending requests, from foreign aid to urban rejuvenation. In the scramble to save another nickel, few targets proved more tempting than federal support of research and development. As Representative Frank T. Bow (R–Ohio) expressed it: "R & D spending is a prime area for economy."

Such attitudes made it certain that the budget and appropriations process for fiscal year 1968 would provide no bonanza for science. Thus there are probably two main points to be made in any analysis of how science fared this year: One is that science received rougher-than-usual treatment at the hands of congressional appropriations committees—though things could have been worse; the other is that things are certain to get worse, thanks to the latest budget-cutting scheme announced

What Congress appropriated (millions of dollars).*

Agency	FY 1967 appropriation or allocation	Administration budget request	FY 1968 appropriation or allocation
National Science Foundation	480.0	526.0	495.0
Atomic Energy Commission	2,199.0	2,646.1	2,509.1
Plant and capital equipment	276.0	476.2	369.1†
Operating expenses	1,923.0	2,169.9	2,140.0
Physical research	255.3	272.0	273.5
High-energy	108.1	116.5	118.0
Medium-energy	11.0	11.1	11.1
Low-energy	28.3	29.4	29.4
Math and computer	6.1	6.2	6.2
Chemistry	52.9	55.0	55.0
Metallurgy	26.3	27.6	27.6
Controlled thermonuclear	22.6	26.2	26.2
Biology and medicine	86.0	90.5	90.5
Training, education, information	16.2	17.9	16.4
Reactor development	467.7	521.1	507.5
Weapons	663.5	700.5	715.5
Plowshare	13.3	21.9	20.7
Health, Education & Welfare Department			
Public Health Service	2,618.1	2,907.9	2,817.4
National Institutes of Health	1,123.2	1,187.8	1,178.9
Cancer Institute	175.7	183.4	183.4
Heart Institute	164.8	168.0	168.0
Institute of Dental Research	28.3	30.3	30.3
Institute of Arthritis & Metabolic Diseeases	135.7	144.0	144.0
Institute of Neurological Diseases & Blindness	116.3	128.6	128.6
Institute of Allergy & Infectious Diseases	90.7	94.4	94.4
Institute of General Medical Sciences	145.1	160.3	160.3
Institute of Child Helath & Human Development	65.0	68.6	68.6
Regional medical programs	45.0	64.3	58.8
Environmental health sciences	24.3	20.6	17.3
General research and services	68.5	81.1	81.1
Construction, health research facilities	56.0	35.0‡	35.0‡
National Institute of Mental Health			
Mental health research and services	225.1	246.7	246.7
Community resource support	50.0	100.2	100.2
Construction, health education facilities	160.7	203.0	203.0
Health manpower education, utilization	149.7	170.4	164.7
Food & Drug Administration	64.8	67.9	67.2
Office of Education	3,924.8	4,004.7	3,903.2
Elementary and secondary education	1,464.6	1,692.0	1,677.9§
Teacher training institutes	37.3	42.8	37.3
Teacher Corps	11.3	33.0	13.5
Research and training	91.1	99.9	90.9
Higher education	1,179.4	1,173.2	1,158.2
Construction, 2-year facilities	99.7	89.7	100.0
Construction, 4-year facilities	353.3	300.3	300.0
Construction, graduate facilities	60.0	50.0	50.0
Elementary-secondary teacher fellowships	30.0	35.0	35.0
College teacher fellowships	80.8	96.6	86.6
Developing institutions	30.0	30.0	30.0
Undergraduate instructional equipment	14.5	14.5	14.5
College library resources	25.0	25.0	25.0
National Aeronautics & Space Administration	4,968.0	5,100.0	4,588.9
Research and development	4,235.1	4,352.0	3,925.0
Physics and astronomy	129.8	147.5	141.5
Bioscience	41.6	44.3	41.8
Basic research	21.5	23.5	21.5
Sustaining university program	31.0	20.0	10.0
Defense Department			
Research, developments test, evaluation	7,093.5	7,273.0	7,108.6
Basic research	404.0	399.3	361.5
Advanced Research Projects Agency ||	270.9	241.1	223.1
Commerce Department			
Environmental Science Services Administration	156.8	182.5	163.1
National Bureau of Standards	33.3	40.5	32.5
Patent Office	37.1	40.0	38.2
State technical services	5.5	11.0	6.5
Interior Department	1,579.6	1,710.3	1,624.0
Geological Survey	81.6	88.2	85.5
Federal Water Pollution Control Administration	234.7	306.0	295.8
Bureau of Mines	50.7¶	55.5¶	51.5¶
Office of Saline Water	29.9	23.3	9.8**
Office of Water Resources Research	6.9	12.7	11.1
Office of Coal Research	8.2	9.7	11.0
Agriculture Department			
Agricultural Research Service††	213.2	238.2	231.1
Soil Conservation Service	237.6	240.5	238.1
Office of Science & Technology	1.2	1.8	1.5
National Foundation on Arts & Humanities	9.0	16.4	12.2
Arts endowment	6.0	8.8	7.0
Humanities endowment	2.0	6.0	4.0

*The bewildering detail of the federal budget makes its presentation in tabular form an exercise in frustration. This table in no way pretends to be definitive. It is offered primarily as a guide to trends. Some figures have been adjusted for comparability. Comparisons in a horizontal direction—that is, from year to year for any particular line item—are believed to be valid. Figures listed in the appropriations columns represent, in some cases, a specific congressional appropriation for the particular item concerned; in other cases, the amount an agency plans to allocate to the particular item out of a larger congressional appropriation. † Most of the reduction from the budget request represents a financing conversion for two projects to an annual appropriations basis in lieu of the full funding requested. ‡ This is not the sharp decline it seems. Unobligated funds from last year's appropriation bring the amount available for obligation in 1968 up to $50 million. § Excludes $10.8 million requested for Indian and overseas dependents' schools pending enactment of authorizing legislation. || Includes some overlap with preceding figures for basic research. ¶ Excludes Appalachian-area restoration and helium fund. ** This also is not the sharp drop it seems. The additional appropriation requested was passed over without prejudice pending enactment of authorizing legislation. †† In addition to appropriations for ARS, Congress authorized a transfer of $15 million in Section 32 funds in 1968, down from $25 million in 1967.

last week by the Johnson administration. But how much worse is not clear at this writing.

The most dramatic evidence of the congressional economy mood came in the treatment accorded two agencies often regarded as sacrosanct—the National Aeronautics and Space Administration (NASA), and the Department of Defense (DOD). NASA suffered the deepest cuts of any science-oriented agency, ending up with an appropriation of $4.6 billion, more than half a billion less than President Johnson had requested and almost $400 million less than last year's appropriation (see Table, page 1287; see also *Science*, 24 November). It was the largest reduction Congress has ever made in the space program. NASA's sustaining university program was particularly hard hit, receiving less than a third of last year's appropriation.

The Defense Department, though it received essentially the same appropriation as last year for its overall research and development effort, was told to cut back its support of basic research—alarming news for those accustomed to view DOD as a convenient vehicle for slipping research funds past congressional budget cutters (it's somehow harder to vote against defense than to vote against science). The House appropriations committee told DOD its basic research program could "safely be reduced" without "endangering national security" or disrupting graduate education. Partly in response to such sentiments, DOD has cut its allocation for "research" (a budget category that includes all the department's basic research plus some applied) by more than 10 percent—from about $404 million in fiscal 1967 to about $362 million this year. DOD officials say most of the drop represents a cutback in advanced funding of contracts, particularly contracts funded through the Advanced Research Projects Agency, but there has also been some drop in the level of this year's research program and a "striking reduction" in new starts. The cutback in advanced funding means that universities will be less able to make long-term commitments to personnel.

Considering the intense economy pressures at work, the other major science-oriented agencies didn't suffer too badly at the hands of Congress. The National Institutes of Health (NIH) got less than requested—a relitively rare occurrence in recent years—but the overall NIH appropriation increased by more than $55 million and each of the eight institutes got precisely the amount requested. The only cuts Congress imposed affected two relatively new programs (regional medical programs and environmental health services) that Congress thought unready for efficient expansion. The Atomic Energy Commission (AEC) got less than requested (the cut largely reflecting a bookkeeping change) but still enjoyed a 14-percent increase over last year's appropriation. And the National Science Foundation (NSF) received a modest boost over last year, though some $31 million less than requested. NSF told Congress it plans to put greater emphasis on four fields of science this year—chemistry, social sciences, atmospheric sciences, and ocean sciences.

What does it all add up to? Final figures aren't available yet, but the congressional cuts are believed to have dropped aggregate federal support of research and development below last year's level of roughly $16.5 billion, primarily because of the huge NASA reduction. The drop occurred in the development component of R & D. A science specialist at the Budget Bureau estimates that Congress increased the research component of R & D above last year's level, and that it also boosted federal support of academic science. Basic research clearly suffered a tight year in appropriations, but the tightness apparently resulted in a slowed rate of growth rather than a traumatic decline of federal support. Of course, a slowing of expansion is bound to cause problems in institutions gearing up for new programs, and cuts in the physical sciences and in the availability of fellowships (*Science*, 3 November) may cause hardship.

Unfortunately, Congress isn't the final hurdle between federal funds and the scientist at the bench. As things stand now, most federal agencies will not be allowed to dispense the entire appropriations granted by Congress. The Johnson administration's latest budget-cutting scheme, announced last week, will require major federal agencies to reduce their obligations (commitments to spend) and expenditures below the amounts envisioned in the President's budget proposals, in accordance with a percentage formula. The plan was offered as a sweetener to coax Congress into passing the tax increase sought by President Johnson, but Charles L. Schultze, Budget Bureau director, said the cuts will be required even if Congress fails to act on a tax boost.

Some of the cuts demanded by the formula have already been made by Congress, but most agencies will have to cut back even further. NASA will be spared further goring, but the AEC is faced with "a pretty Goddamned big cut," according to one of its financial experts, who estimates that the agency will have to cut its obligations by some $86 million beyond the $114 million already cut by Congress. The Department of Health, Education, and Welfare estimates it will have to cut its obligations by $500 to $600 million beyond the $100 to $200 million already imposed by Congress. And NSF, according to the budget bureau, faces a formula cut of $53 million in obligations and $24 million in expenditures—amounts considerably larger than the cuts imposed so far by Congress. Even after all the additional cuts are made, however, aggregate federal support of research and of academic science is expected to show some increase over last year, according to informed Budget Bureau "guestimates." Unfortunately, inflation may increase even faster.

The basic thrust of the new formula is to impose an across-the-board reduction on all agencies without worrying about the question of priorities, or considering which programs are more beneficial than others. The precise programs that will be affected in various agencies are not known at this writing, for each agency is still trying to come up with a "mix" of program cuts that will produce the dollar reductions demanded by the formula. Some budget officials hope to meet the requirements primarily by deferring new construction rather than by interfering with ongoing programs.

The budget squeeze could become even tighter in the near future. Congress has indicated it wants an even bigger reduction before it will consider a tax increase, and it is also seeking assurances that spending will not soar next fiscal year if a tax increase is granted. Moreover, the advent of next fall's elections may bring the economy crusaders out in force. Perhaps ominously, the Senate Appropriations Committee asked NSF to submit a report surveying all significant private and public efforts in pure science "in view of the proliferation of basic research."

—PHILIP M. BOFFEY