

F. A. S. NEWSLETTER

Volume 20, Number 10

December, 1967

----- to provide information and to stimulate discussion. Not to be attributed as official FAS policy unless specifically so indicated.

FEDERAL RESEARCH FUNDS: A FURTHER SQUEEZE

Following—except for the omission of a detailed table—is the almost complete text of an article entitled, "Federal Research Funds: Science Gets Caught in a Budget Squeeze," by Philip M. Boffey in SCIENCE, 8 December 1967. A subsequent NEWSLETTER will attempt to survey the prospects for the coming fiscal year.

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 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. . . . 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,

(Continued on Page 2, Col. 1)

NEWS ITEMS

The several-times-postponed "Project Gasbuggy," the first experimental commercial thermonuclear explosion, finally occurred on December 11th. The 26-kiloton explosion was set off about 4,000 ft. underground in Northwestern New Mexico. The principal objective of the test is to "assess the extent of natural gas reservoir stimulation," essentially by forming a rough cylindrical cavity about 160 ft. in diameter and 350 ft. high and examining the gas which flows into the cavity. The \$4.7 million cost of this first commercial test in the Plowshare program was shared by the El Paso Natural Gas Company and the AEC. (*New York Times*; 11 December 1967)

President de Gaulle ordered a speed-up in France's nuclear energy program, and vetoed a suggestion that the state power system switch from a reactor design using natural uranium moderated by graphite and cooled by gas—an arrangement formerly preferred in France—to an enriched uranium design, for which most of the enriched uranium would have to be bought from the U.S. The French will begin construction next year of a 1480-megawatt plant north of Mulhouse on the Rhine. The French have dropped behind the nuclear energy goals envisaged in their present five-year plan which ends in 1970, chiefly because the first three big reactors using natural uranium have had many "bugs" and long shut-downs.

Coincidentally, the French Government announced its decision to build a fourth nuclear-powered submarine. The first French nuclear sub was launched last March, the second is due to enter service in 1970 or '71, the third by 1974, and the fourth a year or two later. Each will carry 16 ballistic missiles with nuclear warheads. (*New York Times*; 8 December 1967)

A space treaty on the rescue of astronauts has been approved by the 28-nation nation Committee on Outer Space of the United Nations, with vigorous backing from the U.S. and the Soviet Union. The new draft treaty implements a principle agreed to in the earlier space treaty (see previous NEWSLETTERS) whose primary emphasis was the prohibition of nuclear weapons in orbit. This earlier and broader treaty has now been signed by 90 nations.

Under the treaty, signatories would be bound to render "all possible assistance to astronauts in the event of accident, distress, or emergency landings." Other provisions cover assistance in search and rescue on the high seas, prompt notification of the launching authority and the U.N. in case of space mishaps, and reimbursement for expenses. It is believed that Soviet Union may have been particularly interested in speedy action on the treaty because its future manned space activities—possibly including a circumlunar flight—could increase the chance of unplanned landings. The treaty will be open to all states and will come into effect when ratified by the U.S., the Soviet Union, Britain, and two other states. A number of states objected that the treaty on astronaut rescue was being pushed ahead of a second draft treaty concerning liability for damages caused by accidents. But U.S. Ambassador Goldberg and U.N. Representative Fedorenko of the Soviet Union assured the

(Continued on Page 2, Col. 2)

FEDERAL FUNDS

(Continued from page 1)

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 relatively 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 . . . may cause hardship.

Unfortunately, Congress isn't the final hurdle between federal funds and the scientists 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."

NEWS ITEMS

(Continued from page 2)

Assembly that work on the second treaty covering damages would be pushed, and that a draft treaty should be ready for the 1968 session of the Assembly. (*New York Times*; 17 December 1967)

* * * * *

Congressman Daddario has again appealed to scientists to help out with national problems. Daddario, who is Chairman of the House Subcommittee on Science, Research, and Development, told members of the National Academy of Sciences at the NAS Autumn meeting that the scientific community and the government will share the blame in the future if the current generation doesn't extricate itself from its present bind—"the erosion of both our physical and social environment." Daddario suggested, in effect, that scientists should not wait upon Congress to take the initiative in areas where scientific expertise can make a valuable contribution, but should instead "get further into the act. You are citizens first, scientists second." (*News Report, National Academy of Sciences*; November 1967)

* * * * *

VITA and DATA have merged into a single 4500-member "Postal Peace Corps." The two private organizations working in international development took this major step toward

FAS NEWSLETTER

Published monthly except during July and August by the Federation of American Scientists, 2025 Eye St., N.W., Washington, D. C., 20006. Subscription price: \$2.00 per year.

Chairman Jay Orear

The FAS Newsletter is prepared in Washington.
Editor: Harriette L. Phelps.

Approx. closing date for this issue: 10 Jan. 1968.

The FAS, founded in 1946, is a national organization of scientists and engineers concerned with the impact of science on national and world affairs.

Sources of information (given in the articles in parentheses) are for further reference. Items reprinted directly from other publications are designated as such in an introductory paragraph.

SEMANTICS AND POLITICS: A Comment from SCIENCE NEWS

The following item, noted as "From The Editor's Desk," and entitled "Science and the Salesmen's Art," from the 30 December 1967 issue of SCIENCE NEWS should be of interest to FAS members.

Between "life in the test tube" and "the first successful synthesis of viable DNA" there may be only a semantic difference. They are both phrases employed by the National Institutes of Health, justifiably proud of having supported a significant piece of research—the synthesis of replicating DNA by Dr. Arthur Kornberg and others at Stanford University.

Dr. Kornberg himself said, in answer to a question about what he had done, "You can call it a simple form of life if you want to."

He obviously didn't want to; most journalists did and the public Dec. 14 and 15 was greeted by headlines reading, "Life Created in Lab Test Tube," and "Scientists Create 'Molecule of Life'."

Dr. Kornberg's work is indeed significant. He refined an enzyme that could create from off-the-shelf chemicals a functioning, viable replica of natural DNA. It was a natural, if not inevitable step, in the chain of related steps that have always characterized science.

But there are few single developments, in the logical progress of basic research, that are hailed as "awesome" by the President of the United States, and a "landmark achievement" by Dr. James A. Shannon, the director of NIH.

What is awesome, in fact, is the acclaim with which Dr. Kornberg's work was greeted. Its publication in the PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES was accompanied by press releases by Stanford University and the Academy itself, and statements issued by the White House and Dr. Shannon's office.

This acclaim may not be unjustified; in fact it has been said, it is only when a society builds massive public monuments to its scientists and scholars, rather than its soldiers and statesmen, that it can be said to have become truly civilized.

But we suspect that it does not diminish the significance of Dr. Kornberg's contribution to understanding of the life sciences to suggest that the massive outpouring of publicity that accompanied this particular development might not have been wholly ingenuous.

Are the accolades in fact a reward for the meticulous effort that went into this one achievement?

Or do they represent a more cynical juncture of science and public policy? They come at a time when Dr. Shannon has just emerged from a scathing session of Congressional controversy over his fiscal 1968 budget, and is trying to save what he can from Federal planners drawing up next year's budget and more concerned with the costs of Vietnam than with scientific research.

Science itself is a complicated process. So is the public administration and support of science. When the two mix, as they apparently have in the present case, public awareness of science may be enhanced by the salesmen's art, but balanced public understanding of either process, in perspective, is bound to suffer.

NEWS ITEMS

"greater efficiency and increased effectiveness." Both groups will now operate under VITA's name, with headquarters in Schenectady (Volunteers for International Assistance, Inc., College Campus, Schenectady, N.Y. 12308. Phone: [518] (372-5696). DATA has been located in Palo Alto, California. Since the late 1950's, VITA and DATA have been assisting Peace Corps volunteers, missionaries, and

others with technical problems in developing countries by putting them in contact with technically skilled volunteers in the U.S. VITA and DATA had been organized independently of each other, but with very similar aims. The expanded VITA has an inquiry service, a research and development program, and a publication program. Future plans include setting up counterpart organizations in other countries, starting "village technology centers" to familiarize development workers with basic technology, and publishing a quarterly which will cover technology useful in rural community development (VITA News Release; 21 September 1967)

* * * * *

The Bulletin of the Atomic Scientists has moved the hands of its famous clock forward to seven minutes to midnight. The position of the clock's hands follow the Bulletin editors' views on how close mankind is to "nuclear Armageddon." The January issue of the Bulletin moved the hands forward from twelve minutes to seven minutes to midnight. Since the Bulletin was founded after World War II, the hands of its famous clock have moved as follows: beginning at seven minutes to midnight; forward to three minutes in 1949, at the time of the first Soviet nuclear test; then to two minutes in 1953 when both the U.S. and the Soviets opted to develop hydrogen weapons; back to eight minutes in 1960, when the international atmosphere improved; back to twelve minutes in 1963 when the limited test ban treaty was signed; and now forward to seven minutes because of the spread of atomic weapons to France and China, the Indo-Pakistani and Arab-Israeli Wars, the U.S.-Soviet arms race, the U.S. ABM deployment decision, and the escalation of the war in Vietnam. (Bulletin of the Atomic Scientists, January 1968; also noted in the Washington Post, 8 January 1968)

* * * * *

On December 30th, the White House announced the names of the twelve men selected as the 1967 recipients of the National Medal of Science. These medals have been given annually since 1959 to persons who, in the President's judgment, are "deserving of special recognition by reason of their outstanding contributions to knowledge in the physical, biological, mathematical, or engineering sciences." The 1967 medal winners, with fields and affiliations, are: Kenneth F. Cole, biophysics, NIH; Harry F. Harlow, psychology, University of Wisconsin; Igor I. Sikorsky, engineering, United Aircraft Corporation; Paul J. Cohen, mathematics, Stanford University; Jesse W. Beams, physics, University of Virginia; Francis Birch, geology, Harvard; Gregory Breit, physics, Yale; Louis P. Hammett, chemistry, Columbia; Fred H. Sturdevant, biology, Caltech; Michael Heidelberger, bio-chemistry, New York University; Edwin H. Land, physics, Polaroid Corporation; George B. Kistiakowsky, chemistry, Harvard. (New York Times; 31 December 1967)

* * * * *

The impact of science and technology on regional development in the U.S. will be studied by a special committee of the National Academy of Sciences and the National Academy of Engineering. The 14-member committee is chaired by Daniel Alpert, Dean of the Graduate College and Professor of Physics at the University of Illinois. Among questions the group will try to examine are the following: public expectations and actual dimensions of R&D in the national economy; the social, political, and economic factors involved in economic development, including the matching of R&D with regional problems and resources; the manner in which local and federal decision-making attempts to relate R&D to the problems of a region; the locational impact of R&D institutions, including the role of universities, not-for-profit laboratories, industrial, and government laboratories; and R&D activities directed specifically toward the solution of regional economic problems. Later on, the committee will try to consider policy implications and various questions

(Continued on page 4, col. 1)

NEWS ITEMS

(Continued from page 3)

relating to whether and how geographical considerations should influence federal R&D funding. Plans call for the study to be completed by July 1968. (*News Report, National Academy of Sciences*; December 1967)

Computer and telecommunication technology can help shape "a new world for behavioral and social scientists," a committee of the National Research Council suggests. Specifically, the group asked for steps toward the establishment of a decentralized national network of data banks with basic statistical information on domestic and foreign populations, a Federal Data Service Center (with stringent safeguards to protect individual privacy), and a time-shared communication and information system that would link scholars around the country through consoles in their offices or departments. Such a system, the NRC committee says, would bring about major changes in the work patterns of behavioral scientists, reducing barriers of time and space in the scientific communication process, and giving the scholar more opportunity for doing creative work. The NAC committee suggestions were put forth in the belief that the "information explosion" of the natural sciences has not yet come to the social sciences, so that there is still time to cope very advantageously with information and communication problems in the social sciences. (*News Report, National Academy of Sciences*; January 1968)

During this fiscal year and the last fiscal year the U.S. used herbicides in Vietnam with a total cost of almost \$100 million. This contrasts with an expenditure of \$12.5 million in fiscal year 1966. These figures were made public by Charles E. Minarik, Director of the Plant Science Laboratory at Ft. Detrick, Md., and an advisor to the Pentagon on defoliation practices. Minarik argued that the killing of foliage that could conceal Viet Cong snipers and ambushes leads to no long-term effects. Minarik's statement contrasted with charges made by Barry Commoner, Director of the Center for the Biology of Natural Systems at Washington University in St. Louis, speaking at the annual meeting of the AAAS. Commoner said the AAAS has tried in vain to obtain from the Department of Defense data supporting the Pentagon's contention that the defoliation program would not have long-term ill effects on Vietnam and its population.

Minarik reported that the Midwest Research Institute in St. Louis has completed for the Pentagon a study of the effects of large-scale use of herbicides on the life of a region like Vietnam, but that the results have not yet been made public. According to Minarik, the report of the Midwest Research Institute is to be reviewed by the National Academy of Sciences in the light of extensive protests from the scientific community against the use of chemicals to kill vegetation and crops in Vietnam. (*New York Times*; 4 January, 1968)

Twenty-one government agencies have pledged to abandon the controversial practice of providing secret funding for academic research on foreign countries. The pledge came in an announcement by an interagency committee of the State Department of a code of procedures aimed at dispelling one of a number of long-standing uncertainties in the relations between the academic community and the Federal Government. The new rules will apply to—and presumably affect some small fraction of—about \$35 million a year in government contracts with universities and private research institutions. One of the guidelines requires that "the fact of Government support should always be acknowledged by sponsor, university, and researcher." The principles—accepted by the CIA as well as other Government agencies—apply to the support of academic research in the social and behavioral sciences. Projects involving the natural sciences are not covered by the guidelines, nor is research

in this country that does not involve any foreign society or area. (*New York Times*; 20 December 1967)

In a separate development, secret funding operations by U.S. Government agencies for educational and private organizations were terminated by December 30th, the State Department said. Lump sums of unspecified amounts have been given to some organizations to help tide them over the period of transition from Government to private financing, it was reported. The new Government policy stems from, among other developments, disclosures that the National Student Association and other private groups had for many years received money from the CIA to support their overseas activities. It also came to light in the last year that an intricate web of interlocking foundations and other sources of funds had been partially supported by the CIA. The termination of covert funding programs was one of the recommendations of a Presidential committee headed by Under Secretary of State Katzenbach. (*New York Times*; 30 December 1967)

A committee of Cornell University's Board of Trustees has recommended separating the University from the Cornell Aeronautical Laboratory in Buffalo, which laboratory has a number of classified defense contracts. The Aeronautical Laboratory, a wholly owned and self-supported Cornell subsidiary, is one of the nation's larger applied research laboratories. More than two-thirds of its \$30 million a year research effort is done for the Defense Department, and about half of this work is classified. If the committee's recommendations are implemented, it appears that the Laboratory will continue its work—now also including research in electronics, automobile traffic safety, and other areas—but will be separated from Cornell University in a so-far unspecified manner. (*New York Times*; 5 January 1968)

On December 2nd—the 25th anniversary of the first controlled nuclear chain reaction—the U.S. offered to place all but certain defense-related nuclear facilities under international inspection. The offer by President Johnson was presumably aimed at helping the cause of the non-proliferation treaty (NPT). At ceremonies in Chicago, in which President Saragat of Italy also participated, Johnson paid particular respect to the work of Enrico Fermi, and proposed that the Weston, Illinois, accelerator be dedicated to Fermi's memory. (*New York Times*; 3 December 1967)

The State Department has reversed itself and given warm endorsement to a Republican initiative calling for an ambitious international program that would use nuclear energy to provide water for the Middle East. At the same time, the department, in belated testimony before the Senate Foreign Relations Committee, continued to maintain that the Republican plan, advanced by former President Dwight D. Eisenhower, was politically impractical until there was some settlement of the basic controversies between Israel and the Arab states. The Eisenhower plan, worked out by Lewis L. Strauss, a former chairman of the Atomic Energy Commission, calls for establishment of an international corporation, patterned after the Communications Satellite Corporation, that would construct three large nuclear desalting plants in the Middle East. The dual-purpose plants would be operated by the International Atomic Energy Agency and their water and electricity would be provided on a regional basis to such countries as Israel, Jordan, and the United Arab Republic. (John W. Finney in the *New York Times*; 26 Nov. 1967)

President Johnson plans an independent non-profit research institute, along the lines of the Rand Corporation, to tackle the problems of the nation's cities. To be established outside the Government in some attractive setting, the

Institute for Urban Development would be expected to attract from 60 to 100 professionals in all social, economic, and construction fields. It would undertake contract research first for the Federal Government and later for State and local agencies as well. Apparently, the new institute will have the same sort of relationship with the Department of Housing and Urban Development that the Rand Corporation has long had with the Air Force. HUD has a research budget of about \$10 million this year, a sharp increase over last year. (*New York Times*; 7 December 1967)

* * * * *

A symposium on the question of whether in the long run technology will enhance or destroy our independence, creativity, and environment produced some contradictory answers. Speakers at the meeting marking the 150th anniversary of the founding of the New York Academy of Sciences included AEC Chairman Seaborg; René Dubos of Rockefeller University; Simon Ramo, an aerospace industry pioneer; and Margaret Mead, the well-known anthropologist. Seaborg envisioned abundant nuclear energy as ultimately bringing about a golden age. But Dubos suggested that "energy, as presently used, adds to the devastation and makes the environment increasingly unfit for human life." Ramo foresaw the possibility of a "robot" society in which all initiative was delegated to machines, but he believed that this could be avoided. Margaret Mead coupled youth's discontent to the rapidly increasing pace of development. (*New York Times*; 7 December 1967)

* * * * *

Opinion is divided on whether graduate students in the natural sciences should have draft deferments. On December 4th an interagency advisory committee recommended to the National Security Council that broad draft deferments be given to graduate students in the natural sciences, mathematics, engineering, and the health fields. There are now some 144,000 first-year graduate students, of which about half are in these fields. (*New York Times*; 5 December 1967)

But the proposal for deferment of graduate students by academic field met opposition from leaders of the academic community. The American Association of Universities and the American Council on Education presented arguments against selective deferments, and pointed out that such deferments could cause bitterness and disruption in graduate schools by making a false distinction of national interest between the natural scientific fields and the social sciences and humanities. It was also noted that there would be long-term detrimental effects stemming from the inevitable pressures on graduate students to select fields in which they would have draft deferments. One question asked was, "What would this do to teaching and research in the humanities ten years from now?" (*New York Times*; 9 December 1967)

* * * * *

Large public universities are moving into a still more dominant role in graduate education, according to a new report from the National Academy of Sciences. In the years 1958-1966 the leading producers of doctorates were, in order: Illinois, Wisconsin, California at Berkeley, Harvard, and Columbia. By contrast, forty years ago four out of the top five universities were private institutions. Among other facts from the NAS report: Berkeley leads in most of the natural sciences and mathematics, although Illinois leads in chemistry and Wisconsin in earth sciences. MIT is first in engineering. The private universities are still the leading doctorate producers in the humanities. The annual output of doctoral degrees in engineering has almost quadrupled since 1958. The median time required for Ph.D. in the natural sciences, after a Bachelor's degree, is 6.3 years. The place of first employment for new doctorates in the physical sciences shows a trend toward universities (up from 39 to 48% since 1958) and away from industry (down from 44 to 30% in the same period). Sixty-six percent of new doctorates (including the social sciences and humanities) take

academic jobs first and this percentage is also rising. The percentage of women among doctorate recipients has remained constant at about 11% since 1960; women now receive 40% of baccalaureate degrees. (*National Academy of Sciences News Release*; 13 December 1967)

* * * * *

Alan T. Waterman died on November 30th at the age of 75. Waterman was the first director of the National Science Foundation and a former president of the AAAS. He headed NSF from its founding in 1951 until 1963. In pre-World War II years he was a physics professor at Yale. During the war he was with the Office of Scientific Research and Development. In 1946 he became chief scientist of the then newly established Office of Naval Research, and went from there to the NSF. (*Science*; 8 December 1967)

* * * * *

The first worldwide computerized exchange of nuclear data is the aim of a cooperative venture by the U.S., Russia, and the six members of the European Atomic Energy community. The International Atomic Energy Agency (IAEA) will undertake a \$100,000 pilot program in the coming months. The U.S., Russia, and EURATOM will supply indexes of new literature, patents, university theses, and conference papers. These will go to IAEA headquarters in Vienna and will be abstracted in a form suitable for computer storage. The stored data would be available to researchers and institutions in any of the 98 member nations of the IAEA. (*New York Times*; 11 December 1967)

* * * * *

Communist China conducted its seventh nuclear test on December 24th. An AEC statement said the atmospheric test was in the low yield—meaning less than 20 kilotons—range. In contrast to earlier Chinese tests, the U.S. failed this time to predict the approximate date of the test. China's first test was on 16 October 1964. Since then, the Chinese tests have included both a missile-borne device and a bomb dropped from a plane. Last June 17th was the first Chinese hydrogen bomb test, with by far the largest yield of all, estimated at 3 megatons. (*New York Times*; 25 December 1967)

A preliminary analysis of this latest Chinese nuclear test suggests that it was a failure. On January 3rd the AEC coupled two pieces of admittedly circumstantial evidence: the presence of thermonuclear material in the Chinese device, and the small explosive force, which suggests that the thermonuclear material probably had not ignited. This apparent failure would help explain Peking's unusual silence about the latest test. A preliminary analysis of the debris from the Chinese device showed uranium 235, lithium 6, and natural uranium 238, indicating that the Chinese were trying for a triple stage or fission-fusion-fission explosion. (*New York Times*; 4 January 1968)

* * * * *

The Soviet Union is aiming for more cooperative space agreements, an area in which it lags far behind the United States. Russia recently announced that it will launch French and Czechoslovakian satellites, and include Cuba in a communist-bloc communication satellite system. The Soviets are also known to be establishing new tracking stations in the United Arab Republic, Mali, and "in other countries of Asia and Africa." The U.S. Space Agency now has bilateral agreements with more than 70 nations, covering activities ranging from student exchanges to satellite launchings. One of the apparent reasons why Russia has had more difficulty in obtaining bilateral space agreements is the relative Russian reluctance—compared with the U.S.—to grant free access to the station in the host country and also help train host country technicians to help operate the stations. It is clear that the Russians need more tracking capability in the southern hemisphere for their widely anticipated manned circumlunar flights. (*New York Times*; 14 December 1967)

INTERESTING READING

"Documents on Disarmament, 1966," 900-page volume prepared by the U.S. Arms Control and Disarmament Agency (ACDA), dated September 1967. (Texts of the principal documents in the disarmament and arms control area for 1966, drawn from all countries and sources. Available for \$2.50 from the U.S. Government Printing Office, Washington, D.C. 20402.)

"The Sociology of Nobel Prizes," article by Harriet Zuckerman, in the *Scientific American*, November 1967. (A fascinating article in which the many and various impacts of Nobel awards on the individual recipients, their institutions, and even national prestige are examined.)

"British Science Policy: The Case for Growth," article by John Walsh, in *Science*, 24 November 1967. (Some observations drawn from a recent report of Britain's Science Policy Council, noting that "what Vietnam has meant to science in the United States, a limping economy means to British science." The report takes as a major theme the economic justification for a continued adequate growth rate and expenditure on science.)

"Arms Control and Disarmament," a quarterly bibliography with abstracts and annotations, Winter 1967-68. (Ninety-seven page report from the Library of Congress. Available from the Government Printing Office for 75¢—yearly subscription is \$2.50. About 400 abstracts, mostly of articles, indexed by author and subject.)

International Peace Research Newsletter," November 1967. (Available for \$2.00 a year from the International Peace Research Association. Published in the Netherlands but the U.S. editorial office, which handles U.S. subscriptions, is at the Institute of Behavioral Science, Building 3, University of Colorado, Boulder, Colorado 80302. Issued three times a year. Lists organizations and essential facts about organizations doing research on peace and disarmament. Useful information for anyone interested in keeping up with

the activities of the very large number—now definitely in the hundreds—of organizations involved with peace related subjects.)

"The Process Values of University Research," article by James D. Carroll, in *Science*, 24 November 1967. (The point is made that the Federal Government and other supporters of university research should allow for the "process values" of university research—the contributions of research to the teaching and training of students, the general strengthening of universities and colleges, local economic advantages, and cultural and community development. These values are distinct from the "product values"—new knowledge, contributions to technology, etc.—which are usually identified as the reasons for supporting research.)

"The Nuclear Time Bomb: Report to U.N. Secretary General U Thant by the Task Force on Nuclear Arms Escalation," article in the *Saturday Review*, 9 December 1967. (Excerpts from a study prepared for the Secretary General pursuant to a General Assembly resolution. "... a report on the effects of possible use of nuclear weapons and on security and economic implications of wider acquisition and further development of these weapons.")

"Research in Japan: U.S. Army Grants Cause Controversy," article by Philip M. Bossey, in *Science*, 10 November 1967.

"AIP Corporate Associates Study Physics and Society," article by Edward Creutz in *Physics Today*, November 1967. (Notes on the theme of the annual meeting of the American Institute of Physics Corporate Associates held last October. Topics discussed included: how physicists appear to their colleagues, what their job attitudes are, and how the public looks at physics and the latest physics advances. Very brief highlights of the views of some individual physicists.)

"Smale: NSF's Records Do Not Support the Charges," article by D. S. Greenberg, in *Science*, 3 November 1967. (A relatively recent summary of the Smale case. The title speaks for itself.)

FAS NEWSLETTER

Federation of American Scientists
Suite 313
2025 Eye Street, N. W.
Washington, D. C. 20006

Volume 20, Number 10 December, 1967

Second Class Postage
Paid at
Washington, D. C.

Return Postage
Guaranteed

Master