

Budget Spotlights Engineering, Defense

In the closing hours of his presidency, Jimmy Carter offered up his last budgetary hurrah to Congress. Whatever else history may show, Carter demonstrated a strong and continuing commitment to the federal support of research.

Over his four-year term (which includes the budget proposed last week), funding for both basic research and research and development (R&D) rose 58 percent — 10.8 percent over inflation. And despite moves to rein in government spending, his newest budget—which proposes research obligations totaling \$44.2 billion—is an all-time high. Even after accounting for inflation, its purchasing power surpasses the previous high-water mark reached in 1968.

The National Science Foundation epitomizes a pattern of change evident in the new fiscal outline—a marked revitalization of engineering and physical studies. For instance, although the agency's planned support for fundamental research rose eight to 10 percent in the biological, behavioral and environmental sciences, it soared 15 to 23 percent for research in mathematics, physics, engineering and economics.

In response to a study reporting a decline in the nation's technical training and literacy (SN: 11/1/80, p. 276), NSF would initiate a \$25 million program to provide state-of-the-art instructional equipment in engineering and computer science. It would also establish \$3 million in traineeships to help reverse the growing faculty shortfall in these vital areas. In addition, funds to strengthen cooperative research between universities and private industry would increase substantially. Policy research and analysis in areas of international economics and technology assessment would also be expanded, as would programs supporting the commercialization of technical innovations developed by small R&D-oriented businesses.

But heading the list of NSF's key budget requests is a \$75 million program to upgrade research equipment and laboratories. Up to 120 awards—one per institution—will be made.

Elsewhere in the new budget:

Defense. Carter proposes several major spurts for the Defense Department, particularly in research. Basic research funding would climb 16.4 percent. And the boost scheduled for R&D would catapult spending 23.5 percent—12.5 percent over inflation—making it the largest R&D increase in Carter's budget.

Nearly one quarter of the R&D total would go for stepping up development of the mobile MX missile. Other large increases would speed development of Tri-

dent II submarine-launched ballistic missiles, research on a new lightweight tank and development of antiballistic-missile defenses.

Proposed funding for one of the agency's most important top secret projects—code named Stealth—is also classified. Reputed to be one of DoD's costliest ventures, it would develop aircraft fighters and bombers that cannot be picked up by Soviet radar.

Space. Even with years of development behind it and its first orbital flight as little as two months away, the space shuttle continues to dominate the National Aeronautics and Space Administration's expenses. In fiscal year 1981, the shuttle and its related activities accounted for 47.44 cents out of every dollar in the NASA budget plan. The Carter administration's NASA plan for FY 1982 gives shuttle matters a still larger chunk—48.66 cents—even though the overall plan is up more than 21 percent (about 9 percent after inflation) to \$6.726 billion.

The only "new start" in the plan's science portion is \$40 million to begin development of the long-sought Venus Orbiting Imaging Radar. Expected to be launched in 1986, it would provide high-resolution maps of the haze-blanketed planet's surface. No mention is made of a U.S. mission to comet Halley (the European Space Agency recently rejected major NASA participation in ESA's own Halley flyby), and proponents say that such a mission would have to get its start in the next few months to allow sufficient development time. (The plan does include limited funds for early work on the low-thrust Solar Electric Propulsion System, necessary for comet and asteroid rendezvous missions, outer-planet orbiters, etc.) Other new starts are all in earth-oriented applications such as oceanography, geology and upper-atmospheric studies.

Biomedicine. Biomedical research funding levels, as proposed, didn't keep up with inflation. The National Institutes of Health and the Alcohol, Drug Abuse and Mental Health Administration—agencies that finance more than two-thirds of U.S. biomedical research—were assigned budget increases of 7 and 8 percent. Proposed funds for 5,000 new and competing NIH research grants continue policy established last year of stabilizing the number of awards. Only four relatively small institutes received proposed increases of more than 10 percent. The largest increase (18 percent) went to the National Institute of Environmental Health Sciences, followed by the National Eye Institute (14 percent), the National Institute on Aging

(13 percent) and the National Institute of Neurological and Communicative Disorders and Stroke (11 percent).

Donald S. Fredrickson, director of NIH, points out that Congress generally increases funding for NIH beyond the budget requested. If it becomes necessary to reallocate resources, he says, emphasis will be placed on areas that are "hot," such as genetic mapping and neural control. Emphasis will also be placed on developing shortened tests of chemicals as part of the National Toxicology Program. In addition, the budget includes \$6 million to hire the support personnel necessary to open the new Ambulatory Care Research Facility to enable NIH scientists to conduct research using outpatients.

The principal disease prevention organizations, the Centers for Disease Control and the Food and Drug Administration, received less than 1 percent increases in the 1982 budget. Within that slim amount is included \$39 million to build new laboratory facilities and \$2 million to accelerate use of one technique—monoclonal hybridomas that produce pure and specific antibodies—for clinical screening and vaccines.

Energy. Carter would boost energy spending 37 percent, to \$12 billion in fiscal year 1982. Fossil-fuel R&D would climb 47 percent—to \$1.44 billion—largely to support several synthetic-fuels test facilities. Energy conservation programs would also rise, increasing 37 percent to \$1 billion. But the largest budgetary increase—a near tripling of the \$1.2 billion FY 1981 figure—would go for efforts to continue stockpiling oil in the Strategic Petroleum Reserve.

Although there was no money earmarked for the Clinch River Breeder Reactor again this year, fission funding would have kept pace with inflation through a 10 percent increase. Magnetic fusion would fare considerably better—up 27 percent to \$563 million. While solar and renewable energy projects received only marginal gains, tax credits and related benefits would have escalated solar support by 20 percent.

Environment. The most significant increases for the Environmental Protection Agency would be a more than doubling—to \$250 million—of funds to clean up hazardous-waste dumps under the superfund law enacted last month. Elsewhere throughout the agency, although budget allocations would rise, purchasing power would fall. (Measured in constant 1972 dollars, the FY 1982 budget is worth 13 percent less—the equivalent of \$92 million—than the \$706 million authorized in FY 1979.)

Other increases demonstrating Carter's emphasis on hazardous wastes include \$10.3 million more for research and coordination of groundwater protection, \$8.3 million more for investigation and enforcement of regulations—particularly

hazardous-waste laws, and funds to consolidate state and federal toxic-substances management.

In some ways the Carter budget was merely an exercise in fiscal planning. President Ronald Reagan has vowed to overhaul and tighten the budget within his first month in office. In another sense, however, the Carter budget represents a taunting challenge from the departing administration to the incoming one. Scientific and technological development play a major role in maintaining economic productivity and national security — high-priority issues with Reagan. If the new President attempts major excisions in the research budget, he risks charges of jeopardizing those vital interests. □

Staving off future gloom and doom

Last July a three-year federal study known as Global 2000 (SN: 8/2/79, p. 70) painted a grim and detailed portrait of a world whose resources had become impoverished and seriously degraded. The vision is a forecast of the gross ecological havoc likely to occur if drastic changes aren't made in the world's social and environmental practices. Last week a follow-up study identified steps the United States could take toward preventing that nightmarish vision from becoming reality.

Called Global Future, this 255-page report was developed under the joint aegis of the State Department and President's Council on Environmental Quality. In response to a request by former President Jimmy Carter, it recommends ways to improve federal programs already tackling some of the problems that Global 2000 identified as most urgent and serious.

For instance, the report claims, "A sustained commitment to development assistance by the richer nations... is critical to breaking [the] cycle of hunger, misery, and resource degradation in the Third World." Yet the United States ranks 15th of 17 major industrial nations in the share of gross national product it contributes as foreign aid. The study singles out programs and changes that are "strategically well planned, where the U.S. contribution is meshed with those of other countries and international organizations, and where recipient countries both need the assistance and are able to use it effectively." By way of example, it suggests investing in the World Bank's five-year fuelwood program to double the rate of tree plantings in lesser developed countries.

There are over 165 recommendations, from initiation of programs to increase fertilizer-use efficiency to development of hazardous wastes export regulations. Probably most vital, the report says, is a need to change policies inhibiting U.S. agencies from efficiently providing foreign nations aid, advice or data. □

Smoking: Dangerous to your spouse

Passive smoking — involuntary exposure to cigarette smoke — increases a person's risk of getting lung cancer, says a report in the Jan. 17 *BRITISH MEDICAL JOURNAL* by Takeshi Hirayama, chief epidemiologist of the National Cancer Center Research Institute in Tokyo.

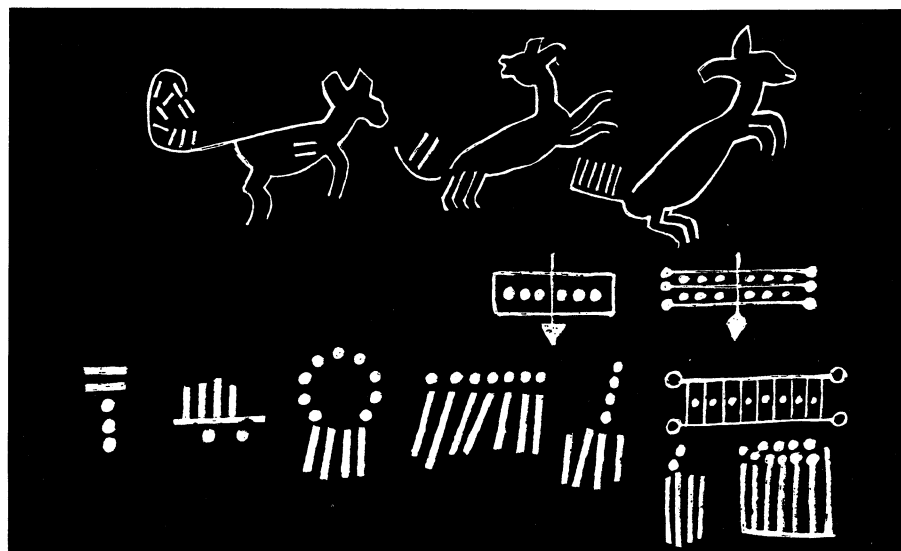
Between 1965 and 1979 Hirayama studied several hundred thousand men and women 40 years of age and older (many of them husbands and wives) in 29 of Japan's 800 health center districts. He now reports that the susceptibility of nonsmoking wives to lung cancer is linked statistically to the smoking habits of their husbands. There was up to a twofold increase in the death rate from lung cancer for nonsmoking women who were continually exposed to their husbands' smoke. Nonsmoking women whose husbands smoked more than 20 cigarettes a day were found to have a risk of lung cancer 2.08 times higher than nonsmoking women whose husbands did not smoke. If the husbands smoked fewer than 20 cigarettes a day, the risk was 1.61 times higher than for nonsmoking wives of nonsmokers. The relative risk of developing lung cancer was even higher in certain subgroups of nonsmoking women with husbands who smoke — notably those in agricultural settings — further strengthening the evidence that the lung cancers of nonsmoking women were due to their husbands' smoking, not to air pollution.

This study adds to the evidence that passive smoking is harmful. In 1974, scientists found that parents' smoking can make children more susceptible to pneumonia and bronchitis (SN: 12/14/74, p. 376). In 1976, psychologists found that a smoke-filled room makes nonsmokers feel anxious and tired (SN: 9/16/78, p. 197). Last year, a study suggested that passive smoking can damage the small airways in the lungs (SN: 4/5/80, p. 221). These and other studies that document the dangers of smoking should, eventually, have an effect on smoking habits. And there are indications that this is now happening.

Lloyd Johnston, Jerald Bachman and Patrick O'Malley of the University of Michigan's Institute for Social Research in Ann Arbor conducted nationwide annual surveys of thousands of U.S. high school seniors between 1975 and 1980. Since 1977, the surveys show that smoking among high school seniors of both sexes has been dropping. In 1977, 29 percent said they smoked daily, but by 1980 only 21 percent said the same, with about half of that decrease occurring between 1979 and 1980.

The reason teen smoking is dropping off, the surveys suggest, is that teens are increasingly concerned about the health risks of smoking. For instance, nearly two-thirds of both male and female seniors surveyed in 1980 thought that there was "a great risk" in smoking a pack or more a day. Three-quarters of seniors of both sexes surveyed in 1980 also believed that their friends would disapprove of their smoking, whereas only about half of seniors of both sexes surveyed in 1975 thought so. □

Reading the rocks in Amazonia



The petroglyphs, or rock carvings, found in the Upper Amazon have generally been passed over as unfathomable art. But Guyanese archaeologist Denis Williams (recently at the Smithsonian Institution's Museum of Natural History) has surveyed hundreds of them and concludes — based on the punctate marks and furrows typically found with representations of fish, plants and game — that they were an important tally system rather than an art form. If Williams is right, the petroglyphs may help trace the dates and movements of hunter-gatherers who lived in the Amazon region as early as 7,000 years ago.