supported at the expense of research.

The heart plan did not run around HEW's loops nearly as long as the cancer plan did, but it ran into trouble because it also contains dollar figures that the Administration will not stand behind. HEW officials wanted to release the plan with the future budgets deleted. Cooper and the council wanted them to stay and, after a struggle, they did. Pressured to get the heart plan through the bureaucracy and over to Congress with some dispatch, HEW released it within 3 months of its receipt. It is apparent HEW officials released it reluctantly.

On 24 July, deputy secretary Frank Carlucci, not Secretary Weinberger, sent the heart plan to Congress with a letter of transmittal that said in part: I believe it is important to note that the report has not been fully reviewed within the Executive Branch. As written, it does not reflect a consideration and development of priorities among all of our research objectives but is limited to those within the scope of the National Heart and Lung Institute. The potential danger of looking at only a single research area is illustrated by the fact that the plan's recommendations for heart and lung research, if implemented within the approved 1974 budget levels, would result in a reduction of $46 million in other important research fields. . . . In order to respond to the wishes of the Congress for prompt submission, I am transmitting the plan at this time with the above understanding.

The tone of the letter offended the people who wrote the plan, though Weinberger and Edwards insist that no offense was intended. (Carlucci, who reportedly put into his own words an assessment of the plan that came from Edwards' office, has been on vacation and was unavailable for comment.) The point of the letter, they say, was simply to emphasize to Congress the fact that the request for money comes from the heart institute and not the President.

Congress has let it be known that it is as interested in the wars on cancer and heart disease as it was to begin with and there is every reason to believe that when the appropriations bills are reported out within a few weeks, they will include sums far higher than the President has asked. No one knows what will happen then, or whether the wars to conquer disease will ever get started.—BARBARA J. CULLITON

Insect Viruses: A New Class of Pesticides

Saved countless lives in World War II; won Nobel prize for inventor; became household word throughout world; attacked by Rachel Carson; target of bumper sticker people; banned by the Environmental Protection Agency (EPA). The dramatic rise and fall of DDT is a paradigm of the vicissitudes that have beset the whole class of chemical pesticides. It may also prefigure the career of a radically new class of pesticides that is about to make its commercial debut. The use of viruses to kill off their natural insect hosts is conceptually elegant and, on the face of it, offers minimum interference with nature. Yet, unless viral insecticides are one of life's rare panaceas, they will probably be found in the course of use to have harmful consequences that are now unforeseen or held discountable.

Viral insecticides have the advantage over chemicals that they occur naturally and are apparently innocuous to all but their host species. But development of the viruses for field use has dragged out over more than a decade. Regulatory agencies, understandably enough, have not instantly embraced the idea of spraying viruses over crops intended for human consumption. And wariness of viruses has not been allayed by the emergence of their possible role in cancers or by the knowledge accruing from biological warfare programs. But virus enthusiasts persisted, regulatory officials eventually decided what safety tests they required, and a few months ago the EPA, in a little-noticed announcement in the *Federal Register*, declared for the first time that a particular viral pesticide was safe for use. If the virus is also deemed to be efficacious, a decision that may be taken in the next few weeks, it will be registered for commercial use, the first viral pesticide to attain this status.

The virus in question is the nuclear polyhedrosis virus of *Heliothis zea*, a noctuid moth known commonly as the cotton bollworm. By notice in the *Federal Register* of 30 May, the EPA exempted the virus from the requirement of leaving no more than a minimum residue on crops—a way of saying that the virus presents no hazard to human health.

This landmark decision has been reached with at least the appearance of some casualness. Virologists at the Center for Disease Control in Atlanta, Georgia, the federal agency charged with monitoring health hazards, were not involved in the decision (there is no statutory requirement that they should be) and were unaware that the virus was nearing registration. Nor, as might perhaps have been expected, did the EPA find it necessary to convene an outside review panel of specialists in molecular genetics and other pertinent disciplines.

This is not to say, however, that the EPA has not done its homework. According to Reto Engler, a virologist in the EPA pesticides tolerance division, numerous outside experts have been consulted on an ad hoc basis over the last 5 years, and the safety issue has been reviewed by an international group that met last year under the auspices of the World Health Organization (WHO). (Chaired by C. E. Gordon Smith, former director of the British biological warfare establishment at Porton Down, the group consisted of entomologists active in the viral pesticide field rather than disinterested experts.)

The arguments for and against the safety of viral pesticides are not very evenly balanced. There is a mass of direct evidence for supposing the viruses to be quite safe. The reasons for supposing them to be hazardous to health, on the other hand, are for the most part far out theoretical possibilities for which no hard evidence exists.

Among the many attestations to the

safety of insect viruses, perhaps the most graphic is the coleslaw argument. When the cabbage looper caterpillar succumbs to a virus, its body dissolves and sheds onto the leaf large quantities of virus which are not killed by any of the preparative steps in the making of coleslaw. By mid-October, when mortality among the loopers is at its most grave, the average bowl of coleslaw includes about 4 billion live particles of cabbage looper nuclear polyhedrosis virus. The author of this dismal calculation, A. M. Heimpel of the USDA Insect Pathology Laboratory at Belts-

Do Oceanographers Have More Fun?

There was no tersely worded telegram from the Swedish Royal Academy of Sciences, no telephone call in the night from a breathless reporter wondering, "When, Dr. Revelle, did you first learn you had won The Prize? And how do you feed an albatross?"

You feed an albatross carefully if it is alive, as it can deliver a nasty nip. This particular specimen of *Diomedea immutabilis*, however, is dead, stuffed, and mounted in a cage to which is affixed a modest bronze plaque bearing the names of the world's 11 Laureates of the Albatross. As for the first question, Roger Revelle, the Harvard oceanographer cum population specialist, and president-elect of the AAAS, first learned the glad news when colleagues lured him up to a suite in Mexico City's Del Prado Hotel during the AAAS meeting in June. "All these guys were standing there with this damned bird," Revelle recalls, a trace of awe still in his voice. "I was really touched."

The bird, a bit scruffy about the tail feathers now, after 14 years of circulating around the globe as a kind of consolation prize for would-be Nobelists, is the chief sign that the American Miscellaneous Society—a mildly loony, invisible college of otherwise mature academicians—still lives. Last June, for the first time in 3 years, AMSOC arose cicada-like from its customary slumber just long enough to bestow the bird on Revelle. Having done so, AMSOC, probably to the general benefit of American science, scurried underground again.

AMSOC was founded in a fit of whimsy in 1952 by a small group of geoscientists at the Office of Naval Research who were seeking to "look at the lighter side of heavier problems," according to Arthur Maxwell, a founding member and now provost of Woods Hole. The society is fond of describing itself as exceedingly democratic, but harmlessly anarchic is probably closer to the truth. It has no officers or regular meetings, and any two members constitute a full quorum. Over the years the membership has grown to 50 or 100 scientists (no one seems sure of the precise number); at one point AMSOC established divisions of Etceterology, Generology, Triviology, and so on, as well as a committee to welcome visitors from other worlds. None arrived, however, or at least none made themselves known; but membership in AMSOC nevertheless acquired a certain reverse snob appeal in the early 1960's, with distinguished scientists dropping its cryptic name in their curricula vitae.

It was then that AMSOC first (and last) came to world attention—and ultimately to grief—with its suggestion that the government drill a hole clear through the sea floor to the earth's mantle. The rationale was, as Gordon Lill, another founding member, wrote at the time, that "the ocean's bottom is at least as important to us as the moon's behind." But the government took AMSOC seriously and so, eventually, did AMSOC. The society actually won a $15,000 grant from the National Science Foundation and achieved new stature as an official committee of the National Academy of Sciences. Thus was conceived the abortive and very expensive Project Mohole (since supplanted by the NSF's enormously successful deep-sea drilling project, which is still poking holes in the sea floor, but with no ambitions of puncturing the mantle).

Wracked by internal dissension, and properly chastened, AMSOC resumed its low and frivolous profile. "Mohole really did it in. It's almost as defunct as the bird," Revelle says, referring to the one now ensconced in his basement.

These days, the society exists mainly to give away the Albatross, an award devised in 1959 by Maxwell, Lill, and John Knauss of the University of Rhode Island as a mariner's substitute for the Nobel prize, which somehow always seems to evade deserving oceanographers. For this stroke of imagination they awarded themselves the first Albatross.

In spite of the award's frivolity, all but one of its recipients has been a distinguished researcher, although why the bird was visited upon Revelle at this particular time is anyone's guess. The sole exception to the rule was Sumner Pike, a Maine businessman and former member of the Atomic Energy Commission, who won the Albatross in 1968 for his "study of the oceans and other liquids after 5 p.m.," according to AMSOC archives. A consummate lobbyist for ocean research, Pike is warmly remembered by oceanography's elite for having once arranged (at the Navy's expense) to fly selected congressmen to his retreat at Lubec, Maine, for one of his famed lobster repasts.

When at last a reporter did call Revelle about his Albatross, he said he was adjusting well to his new status as Laureate.* "It hasn't changed my life-style at all," he insisted. "I'm really being quite modest about it."

Revelle will retain the bird until AMSOC decides to give it to someone else, which may be soon. His wife Ellen is said to be anxious to get "that damned dusty creature" out of the house as quickly as possible.

What all of this means is hard to say, unless it proves that oceanographers, like blondes, have more fun.—R.G.

* Other Laureates of the Albatross are Walter Munk, John Swallow, Harrison Brown, Victor Vacquier, Henry Stommel, and William von Arx. This award is not to be confused with the Albatross medal of the Swedish Royal Society of Science and Letters, whose honorees include, purely by coincidence, Roger Revelle.

ville, Maryland, considers that it would be apparent by now if the virus were harmful to man.

The coleslaw case illustrates the general point that the viruses occur naturally and man is habitually exposed to them. Even if insect viruses do in fact harm man, adding more to the environment will not make much difference. In nature the insect viruses often cause death late in the host's life cycle and after the insects have already caused damage. All that is done by applying a viral insecticide, argue the proponents, is simply to advance the time of the insects' exposure to the virus. (In the example of the cabbage loopers, says Heimpel, use of the virus would lead to fewer, not more, virions in the coleslaw because the loopers would be killed younger and the young caterpillars shed less virus than the older ones.)

An important consideration is the extent to which insect viruses can cross to forms of life other than insects. Some groups of insect viruses resemble viruses known to infect animals and plants, but the two groups which show the most promise as pesticides, the nuclear polyhedrosis viruses and the granulosis viruses, seem to be entirely restricted to insects. According to the report* issued by the WHO experts, there is little or no direct evidence that any of the insect viruses can replicate in vertebrates or in vertebrate cell cultures. One exception is a Japanese experiment—never confirmed—indicating that the DNA from the polyhedrosis virus of the silkworm can infect human amnion cells.

The virus now nearing registration, the cotton bollworm nuclear polyhedrosis virus, has passed a series of safety tests, including attempts to infect animals such as rhesus monkeys and tissue culture studies in human and other cells. The possibility that insect viruses may cause long term effects in man such as cancer or birth defects is very difficult to test. According to the WHO report, the importance of the problem is "greatly minimized" if it can be shown that the virus in question cannot multiply in human cells at normal body temperature and that the nucleic acid of the virus cannot infect human cells.

Probably the chief theoretical hazard presented by insect viruses is that, although they do seem to attack only insect cells, the molecular basis for this specificity is quite unknown. "Unless we have a grasp of the basic issues of why the viruses are specific, there will always be questions that are unanswerable," says one biologist who, because he has not made a thorough

Briefing

Congress Shifts RANN's Priorities

Congress has passed the authorization bill for fiscal 1974 for the National Science Foundation (NSF). In addition a final appropriation report has been agreed to in substance and will be passed when Congress reconvenes this month. The measures, together, dramatically alter priorities for that agency's most visible and politically sensitive program of Research Applied to National Needs (RANN). RANN, according to the appropriation report, will only be able to spend $72 million in fiscal 1974, which is only $2 million more than it had in fiscal 1973, and well below the $91 million authorized. Furthermore, the authorization report states that RANN must spend "no less than" $25 million on energy research and "no less than" $8 million on earthquake research. Thus, the result, according to RANN chief Joel A. Snow, who is now puzzling over how to meet these guidelines, will be to reduce other RANN work—in social systems, environment, advanced technology applications—by 25 percent from the 1973 level to $39 million. "We thought we had the most balanced program possible," he commented. "But obviously when Congress' actions reverse your priorities you look at it pretty hard." He also added that he thought that Congress put these new requirements on his program somewhat inadvertently. "It was the result of having four committees reviewing the budget at once."

Aside from RANN's meager increase, NSF as a whole has been appropriated less money for fiscal 1974 than it was given last year. Congress is scheduled to approve a $566.6 million appropriation with an added $3 million for the special foreign currency program, giving a total of $569.6 million. Last year, NSF was appropriated a total of $645.7 million, which included $7 million in special foreign currencies.

Nevertheless, NSF administrators are saying that although they've been appropriated less money, they may end up spending more in fiscal 1974 than in fiscal 1973. Last year, during its impoundment bonanza, the Office of Management and Budget (OMB) withheld $60.4 million of the sum Congress appropriated for NSF. If OMB permits these holdover funds to be spent during fiscal 1974, NSF could have at its disposal as much as $630.3 million. However, since no major anti-impoundment law has passed Congress, OMB might well go on withholding funds this year too.

NSF's authorization report inserted floors or "spending minima" on other programs beside RANN, to insure that whatever else happens, those programs will get some money. Among them is oceanographic ship construction and conversion money, including funds to enable the Antarctic research ship *Eltanin*, which was ordered mothballed last year before completing a circumpolar cruise (*Science*, 16 February), to complete its work. Institutional improvement, graduate student support, and science education improvement programs also received spending minima. The appropriations report specifies a maximum of $5 million for construction of the Very Large Array telescope. The $635.6 million authorization total includes up to $1.6 million for the Director of NSF and his staff to perform the new job of advising the government on science policy, a task NSF officially assumed last 1 July.

Last year, NSF's budget became altered by OMB through impoundment. One anti-impoundment device, called "proportional obligation," initiated by the House Committee on Science and Astronautics, was struck from the final NSF measure. Nonetheless, Congress is urged in the report to continue to study anti-impoundment measures.—D.S.

* "Considerations on the Use of Viruses for the Control of Insect Pests and Disease Vectors" (World Health Organization, 1972), described by WHO as "not a publication."

study of the matter, declines to be named. The viruses may, to be sure, occur naturally, but there is always the chance that in the course of preparation some change may occur in the viruses themselves. "Passage of a virus in any host by unnatural means, or infection of an unfamiliar host, may result in the selection of a mutant virus with different properties," warns the WHO report. Mutations may occur in the development or production of a virus and may cause a change in its virulence or host range. According to Heimpel, there are theoretical reasons, however, for supposing that not one but several mutations would be necessary before a nuclear polyhedrosis virus acquired the ability to infect vertebrate cells. If an insect virus capable of infecting vertebrate cells were to be disseminated, there is a remote possibility of recombination between the insect virus and a vertebrate virus.

Another kind of hazard is contamination of the virus culture. This has been a serious problem with vaccines—millions of people received polio shots contaminated with a monkey virus that causes tumors in lower animals. Any contaminant virus, however, even if it managed to propagate in insect cells, would be eaten or breathed by human beings, forms of exposure which are less dangerous than injection.

"There have been objections to the use of viral insecticides, some of a philosophical nature, some based on the whims of individuals," says an EPA official. "But none are well founded scientifically. The farther away from the field a man is, the more generalized are the kind of objections he may raise." The preponderance of evidence certainly seems to support the EPA's belief that the viruses are essentially safe. But confidence in the EPA's action would probably not have been diminished by a more formal treatment of such theoretical hazards as may exist.—NICHOLAS WADE

OTA Funds Are Up Against the (West Front) Wall

The Office of Technology Assessment (OTA) will probably get only half or less of the $5 million originally envisioned for its first year of operation, and the delays in funding are pushing the starting date for the office back so far that it is unlikely to complete any substantive work before late 1974. After 7 years of discussion, Congress last year decided to establish the OTA, which, although it has a governing board, still has no director, staff, or funds.

Part of the reason seems to be genuine parliamentary foot-dragging by a Congress which over the summer has been absorbed in Watergate and other national business; but another possible cause is the fear that Senator Edward M. Kennedy (D–Mass.) who is serving as chairman of the board of OTA through January 1975, will, in the words of one liberal Democrat, "use the OTA for his own political purposes."

When Congress reconvenes this month, a joint House-Senate conference committee will meet to resolve the different versions of their respective fiscal 1974 legislative appropriations bills. Among the differences is a $3.9-million item for OTA in the Senate bill, but there is no money for OTA in the House version. Usually when this occurs, the conference will award the project an intermediate amount, and one House staffer who follows OTA said, "There's no question but that we won't get the full amount. We might get $2 million or $1.5 million."

Why have funds for OTA been so long in coming? Why are they turning out to be so meager? For the last year and a half, Kennedy's staff has been doing much of the legwork in the Senate to get OTA set up. Recently, this display of energy has been criticized on the Hill and in the press. The *Wall Street Journal*, for example, called Kennedy's prominence in OTA matters an attempt to build a "shadow government" for a future presidential bid. By now, the rumor has spread so widely that it appears to be inhibiting some of the aggressive efforts on OTA's behalf.

Kennedy's staff man for OTA, Ellis Mottur, has repeatedly denied that Kennedy's interest is politically motivated, but the feeling persists. When a last-minute bid for $289,000 for fiscal 1973 start-up funds—which would have enabled a director to be appointed—came up before another House-Senate conference committee last June, they were knocked out of the bill. Ostensibly this was done because at the time only 3 weeks remained in fiscal 1973—not time enough to spend the money wisely. But one of the House conferees reportedly growled during the discussion that OTA was Ted Kennedy's "bag," and there was no point giving any money to *him*. And, a few weeks ago, a Democratic member of the House Science and Astronautics Committee remarked that he had no doubt whatever that the funding had been delayed because some people believe Kennedy might "use" OTA for his own political aims. OTA, for the time being anyway, has become the victim of that particular kind of resentment which members of Congress sometimes reserve for those of their number with alleged presidential hopes.

As if its present troubles were not enough, there is one further obstacle to OTA's getting any money now, for reasons that have nothing to do with Kennedy, or OTA itself, but which relate—of all things—to the West Front of the Capitol building.

Both the OTA budget items and money for repairing the crumbling West Front of the Capitol are in legislative appropriations bills that could total $650 million. Some congressional leaders favor extending the West Front to create more offices, and they have plenty of representatives on the conference committee. Opposed to this is a group that is led in committee by Senator Ernest F. Hollings (D–S.C.) and favors restoration of the existing West Front walls. Hollings is also a member of the OTA board, is friendly to Kennedy, and is the chief conference committee champion of the Senate $3.9-million appropriation for OTA. Sources close to the situation say that this fight over the West Front will be the main issue confronting the committee when it meets. In the inevitable bargaining process, little OTA may get traded away. What with the Kennedy rumors and a lot of congressional passion over architecture, OTA seems up against the wall.—D.S.