

to the Hessian fly. Of all methods of pest control, crop resistance is the cheapest and least troublesome, when it works. Cox says scientists know that the resistance takes one of three forms: antibiosis (something in the plant's system kills the insect); tolerance (the plant is able to grow despite the presence of the insect); or nonpreference (the insect is not attracted to the plant or is repelled by it). "But we don't know why resistance works," he admits. "It's empirical; in most cases we don't know the chemistry. If we did, we might be able to make it a universal solution to crop pests. If we could just isolate the genetic factors, we could breed resistant crops without so much trial and error."

The kind of fundamental knowledge that Cox admits his agency lacks is developed for most sciences in university basic sciences departments. But university research in biological controls is meager, with one exception—the University of California at Riverside, which has a full department of about 40 people studying biological control and scoring several successes. D. A. Chant—formerly chairman at Riverside, now at the

University of Toronto, and one of the leading experts in the field—told *Science* that outside of Riverside, "there are individuals here and there, but they are working in a wilderness." Chant sharply criticized the government for not devoting funds to increasing university involvement in the field. (According to the department's figures, 95 percent of the ARS research budget is for in-house research at agricultural research stations around the country.) He said that university research must be stepped up, first, because the universities would train badly needed new scientific personnel and, second, because Chant doesn't think the USDA is doing a good job. "To be frank, the USDA does not have top-flight people and is going about the work in a superficial way. [Despite their expenditures] I don't think they really have much of a commitment to biological control."

Whether or not Chant's view is valid, the USDA quantitatively dominates the biological control field. Unless there is a sudden upsurge of interest at universities, the burden of developing the field to the point where it can dent the virtual monopoly of chemical pesti-

cides rests with the federal government. Industry, the only other source of significant funding, has expressed little enthusiasm for biological control. A spokesman for the Shell Chemical Company, a subsidiary of Shell Oil and one of the largest pesticide manufacturers in the country, told *Science*: "We looked for chemosterilants and other hormones for several years, but found this unrewarding and very costly. Quite frankly, no one but the federal government can afford this research."

Research costs may not be the only consideration. If biological controls reach a level of sophistication that permits them to substantially replace chemical methods, firms will have to undergo a major retooling—to begin breeding millions of sterile insects, for example—or get out of the pesticide business altogether. As a spokesman for the National Agricultural Chemicals Association commented, "There really is not much in industry in this area [biological control research]; they would research themselves right out of a market."—

JOEL R. KRAMER

## Pentagon Promises To Observe Congressional Curbs on Research

Senate leaders and the Pentagon appear to have reached an understanding on enforcement of a congressional ban interpreted as being aimed primarily at ending Defense Department support of basic research in the universities.

Last Saturday Senate Majority Leader Mike Mansfield (D-Mont.) read into the *Congressional Record* his exchange of correspondence with Defense Department Deputy Secretary David Packard in which Packard assured Mansfield that the Defense Department would fund only research which has "a direct, apparent and clearly documented relationship to one or more specifically identified military functions or operations."

In his letter Packard also said the Defense Department had contacted the National Academy of Sciences and "invited them to consider carrying out a complete examination of all projects

and studies which might be regarded as marginal under provisions of Section 203." [This refers to Section 203 of the military authorization bill passed by the Senate (*Science*, 14 Nov.) which prohibits use of funds for a project unless it has "a direct and apparent relationship to a specific military function."]

National Academy of Science officials said Monday that they had received no formal request from the Defense Department to perform the services Packard described. Since Packard's proposal would involve an essentially new sort of activity for the Academy, its response presumably will entail a significant policy decision.

Mansfield has been the prime mover behind the effort to curb DOD support of basic research. The latest outburst by the usually mild-mannered Mansfield occurred when Senator J. W. Fulbright (D-Ark.) received a letter on the

subject from the office of John S. Foster, director of Defense Research and Engineering which included the observation "I do not expect that the implementation of these sections will entail any new type of review or selection."

After seeing the letter, Mansfield reportedly indicated he would block passage of the pending defense appropriations bill until the Pentagon provided a "clear accounting" on its research budget.

The Pentagon position in the dispute has generally been that defense spokesmen are simply reiterating a long-standing Defense Department policy and that Congress misunderstands the Pentagon definition of basic research. In a memorandum to key defense officials also published in the *Record* Packard touched on this point when he wrote, "Insufficient attention has been given to making clear to Congress the basis for deciding to support work in a particular field, and particularly the connections between relatively basic research and long-range Defense problems and missions which require such research."

Mansfield, in a statement accompanying the letters in the *Record*, adopted a somewhat more flexible position on

implementation of the ban than he has before, but made clear that he would not stand for a simple shifting of location of research projects. With the matter of definitions still in doubt, the dialogue may well continue.

Because of the light it throws on congressional attitudes and Pentagon reactions most of Mansfield's statement and the two letters from the *Congressional Record* are printed below.—J.W.

MR. MANSFIELD.

Mr. President, it will be noted . . . that the Office of the Secretary of Defense passed the word throughout the Defense Department that any project which does not comply with section 203 must be terminated in an orderly way as soon as possible. In addition, the Department is reviewing all current studies and projects as well as the selection criteria used to evaluate proposed work to assure that the criterion will be applied explicitly in every case. Furthermore, in addition to the internal review now begun, the National Academy of Sciences has been asked by the Defense Department to carry out a complete examination of all projects and studies in the gray area—those projects and studies that do not have a readily apparent military application—and to adjudge independently which do not meet the criteria of section 203.

The gray area, in my judgment, would certainly be larger than those projects presently sponsored under the heading of basic research. In other words, some applied research certainly would fall within the possible challenge of section 203.

Dr. Packard's response is positive and constructive, and is to be commended. I am well aware of the magnitude of the change required by section 203, but I am encouraged by his attitude that its implementation can go forward in an orderly, thoughtful way. With such a positive attitude, precipitate, last-minute action that might seriously disrupt research projects can be averted. Our joint emphasis will be the orderly transfer to other agencies of projects that do not meet the criteria of section 203.

Several points bear repeating. Section 203 is not intended to cause needless disruption of high quality research; nor is Secretary Packard's attitude indicative of an intended overresponse.

Section 203 has the positive aim of reducing the dependence of basic, scientific research upon military appropriations. Let us be specific on this

point. It affects military support of those scientists who pursue the uncovering of new knowledge in whatever direction and way they find most interesting. This is the basic research of which Dr. Vannevar Bush wrote so eloquently in his report to President Truman about scientific research after World War II. Section 203 contemplates that scientists whose interests and way of work focus upon solving problems may continue to receive military funds provided their research has a direct and visible relationship to military needs.

Section 203 does not ban the Defense Department from sponsoring research in universities, or in not-for-profit research institutions. The Defense Department retains ample authority to fund research by university scientists who wish to apply their talents to solving problems of national defense.

Section 203 is not intended to disrupt the work of any scientist simply because his work now funded by defense appropriations does not meet the new criteria. The cooperative attitude apparent in Secretary Packard's letter encourages me to expect that the Defense Department, the civil departments and agencies, the Bureau of the Budget and Congress can arrange for the orderly transfer of quality research projects that should be continued by other agencies, and for appropriate funding arrangements.

Section 203 makes it abundantly clear to students, to scientists, to officers of universities and not-for-profit institutions and to industrial contractors that money received from defense appropriations for research is needed to carry out a specific military need or function and is directly related to the defense needs of this country. No need is of higher importance. The work that will be sponsored by the Defense Department will be able to stand on its own feet and meet the true and open test of a valid need of the Department. The National Science Foundation and other civil agencies will be charged with the responsibility for continuing the investigations that expand our existing base of knowledge in the various scientific disciplines.

As I said on November 6, the performing of research to meet the needs of defense is honorable work. Scientists and universities who receive defense funds for a valid defense need should be proud, never ashamed. It is only when the sponsorship of a project is questionable or the subject matter of

## NEWS IN BRIEF

### ● SENATE KILLS FOUNDATION

**CURBS:** The Senate last week killed a section of the tax reform bill that would have limited the tax exemption of foundations to 40 years. The amendment to delete, sponsored by Senator Walter F. Mondale (D-Minn.), was carried 69 to 18. The House version did not contain such a restriction (*Science*, 5 December), so it seems unlikely that the longevity limit will be revived.

### ● BRITAIN CURBS ANTIBIOTIC

**FEED:** Britain has placed a strict control on the use of antibiotics in animal feed. A committee, appointed by the government and chaired by Michael M. Swann, University of Edinburgh, reported that some antibiotics could lead to the emergence in humans of bacterial strains resistant to antibiotics. The committee recommended that "feed" antibiotics, given to promote growth and with little or no medicinal value to humans, continue to be available without prescription. On the other hand, "therapeutic" antibiotics such as penicillin, chloramphenicol, and tetracyclines, given to cure and possibly to prevent disease, will be available on prescription only.

### ● HOPE FOR HURRICANE SEED-

**ING:** Scientists in the Commerce Department and the Navy announced last week that, for the first time, they have probably successfully weakened a hurricane by seeding it. Several hours after hurricane Debbie was seeded with silver iodide on 18 August, the storm's maximum speed fell from 98 to 68 knots, a 31 percent drop. On 19 August, there was no seeding and the storm intensified. On 20 August, Debbie was seeded again and diminished 15 percent in intensity. Scientists said they could not be absolutely sure that the seeding had caused the change. But only 1 in 11 hurricanes changes speed on its own by 31 percent in a day, and about one in two has a 15 percent change, so the odds are at least 22 to 1 that the results were not a matter of pure chance. Scientists are encouraged about the prospects of substantially reducing hurricane coastal damage, since the force of a hurricane varies with the square of its speed. In seeding experiments, the scientists work only on hurricanes expected to remain at least 50 miles offshore for 24 hours after seeding.

the mission is questionable does an element of doubt enter the relationship.

Section 203 reminds all of us that scientists who are interested in problem-solving are just as much a part of the scientific community as are those who pursue knowledge for its own sake. Both outlooks are necessary not only for defense, but also for resolving the many urgent civil problems of our Nation.

In carrying out section 203, we can now expect the Defense Department to identify its needs for research to further defense science and technology, and to publish these needs so that well-qualified, problem-oriented scientists can match their interests and abilities with the defense needs. Some of the requisite research in the future will be suitable for universities and nonprofit institutions. And I would expect it to be carried on in a close, collaborative relation with the Department's research administrator and its own laboratories.

Naturally, I expect that the total of defense-funded research will decrease as section 203 takes effect. I would point out, however, that section 203 is not intended to stimulate a transfer of funds to in-house defense laboratories. The thrust of section 203 is to confine the type of research sponsored by the Department of Defense—not simply to change the identity of the Defense contractors. The latter would be senseless subterfuge.

To expedite the working out of arrangements for orderly transfer of research concerned to other agencies, I have written to the Director of the Budget Bureau and to the Comptroller General. Today I have written to the President of the National Academy of Sciences and to the heads of the National Science Foundation, the Department of Health, Education, and Welfare and other civil agencies to urge their cooperation with the Defense Department and with the Congress in working out final arrangements for the orderly transfer of projects and funds.

The working out of section 203 will be difficult. Nevertheless, whatever the temporary difficulties may be in the long term both the Defense Department and the Nation will benefit from the assertion of the principle in section 203.

And, in conclusion, I would again congratulate the Defense Department for its positive and cooperative response to section 203. I am confident that together the Congress and the Department of Defense will be able to imple-

ment the prescription of section 203 and accomplish what is truly in the best interests of the Department and contribute significantly to a healthier attitude in our society toward those who perform research and those who sponsor it.

NOVEMBER 20, 1969.

HON. MELVIN R. LAIRD,  
*Secretary of Defense, Department of  
Defense, Washington, D.C.*

DEAR SECRETARY LAIRD: The consideration of the military procurement authorization bill—entailing many weeks of consideration by the entire Senate and the House—reflected a growing interest on the part of Congress in the specifics of the recommendations contained in military expenditure bills. One provision of this year's bill—which is now law—is Section 203 which, as you know, was added by the Senate and retained by the House. The intention of this section is rather clear. The language really needs no explanation since it specifies a restrictive policy with respect to the sponsorship of research by Defense. [It] was added by the Senate with the specific intent to reduce the sponsorship by the Department of Defense of non-mission oriented research—research that did not have a direct and apparent relationship to a specific mission of the Department of Defense.

Over the past two decades, the Department of Defense has sponsored far-reaching and significant research throughout the full spectrum of science. The contributions that have been made to the health and vitality of the Nation's scientific structure by the Defense Department is not disputed. However, the language of Section 203 expresses a clear policy of Congress to reduce this dependency by the scientific community on the Department of Defense. The National Science Foundation was established in 1950 to contribute the Government's share to maintain a proper level of scientific inquiry—investigations for the pursuit of knowledge per se.

I was greatly dismayed upon being informed of Dr. John Foster's attitude with respect to Section 203. In answering a letter from Senator Fulbright concerning the Defense Department sponsorship of a study of birds, he expressed the belief that Section 203 would have no effect on that study or on the operations of his office and the research that was being sponsored. The Congress of the United States does not attempt to enact futile gestures; it should be most resentful when an Executive agency decides to ignore its clear expression of intent.

I am writing today to Mr. Staats, the Comptroller General, and requesting him to establish appropriate guidelines and machinery to determine the effectiveness of Section 203 and to return a preliminary finding prior to the consideration of the appropriations bill this year.

I think an appropriate test of these guidelines would be to determine what impact they would have had on last year's expenditures if it had been enacted last year.

With warm regards, I am

Sincerely yours, MIKE MANSFIELD

THE SECRETARY OF DEFENSE  
*Washington, D.C., December 2, 1969.*  
HON. MIKE MANSFIELD,  
*U.S. Senate,  
Washington, D.C.*

DEAR SENATOR MANSFIELD: I thank you for your letter of November 20 inquiring about the Department's views regarding Section 203 of the Military Procurement Authorization Act. We appreciate your concerns and would like to explain our position.

There is absolutely no question that the Department will comply fully with the law. I have directed all components to review critically all current and proposed research and development projects and studies to ensure that they have a direct, apparent, and clearly documented relationship to one or more specifically identified military functions or operations. Any project or study which does not fulfill the criterion of Section 203 will be terminated. For your information, a copy of my memorandum on this matter is enclosed.

In addition to this comprehensive review within the Department, we have contacted the National Academy of Sciences and invited them to consider carrying out a complete examination of all projects and studies which might be regarded as marginal under the provisions of Section 203.

With respect to Dr. Foster's recent letter to Senator Fulbright concerning the impact of Section 203, I have discussed the issue in detail with Dr. Foster. He shares without reservation my firm intent to comply completely with the law.

I intend to follow this issue closely and personally in the future, and to cooperate fully with Comptroller General Staats in his review of this matter. Please be assured that in our FY 1971 budget requests and program plans, we will reflect detailed consideration of the intent of Section 203 in relation to Defense needs for research and development.

Sincerely, DAVID PACKARD, *Deputy*

## RECENT DEATHS

**John B. Brown, 75;** emeritus professor and former chairman of physiological chemistry, Ohio State University; 22 November.

**Jasper E. Crane, 88;** retired vice president, E. I. du Pont de Nemours & Co.; 1 December.

**E. John Dolan, 68;** past president, Bronx Medical Association, and head, Association of Private Hospitals, Inc.; 27 November.

*Erratum:* On page 850 of the 14 November issue, an article on Project Sanguine reported that Hazleton Laboratories of Falls Church, Virginia, had completed a study of the project's biological effects. The laboratories have instead just begun the study.

*Erratum:* On page 983 of the 21 November issue, in the "Appointments" column, Jerold Roschwalb is cited as executive director of the American Association of State Colleges and Universities (AASCU). Allan W. Ostar is executive director of the AASCU, and Jerold Roschwalb has been appointed director of the Office of Federal Programs at the AASCU.