ing in Chicago. But the controversial nature of this year's election apparently led the board to announce the results early lest "leaks" of the results lead to further controversy. The board apparently also hoped to head off opposition at the annual meeting by disseminating the information as widely as possible beforehand.

As described in the 11 December issue of *Science*, the controversy over this year's election swirled around the question of whether Seaborg, the head of a much-criticized government agency, was an appropriate candidate to slate for president-elect. Some board members suggested that Seaborg would face difficult "conflicts of interest" between his roles at the AEC and at the AAAS; others saw no real conflict and argued that Seaborg's prestige would enhance the luster of AAAS. The behind-the-scences conflict over Seaborg's candidacy ultimately came to the attention of the press and received wide public notice. Subsequently. Seaborg indicated that even if elected, he might not agree to serve. He said that he would first consult with people on both sides of the controversy and that he would then make a decision based on what seemed best for AAAS. He also indicated that his decision might be based, in part, on the size of his electoral majority. Subsequent to his election, Seaborg told *Science* he had consulted with board members who had opposed him and found that none were "personally antagonistic" while one or two indicated they were now less concerned about the conflict of interest issue than they had originally been. "My intention is to serve—I see no particular problems," Seaborg said.

One of the conflicts that Seaborg's opponents said the AAAS would face during Seaborg's tenure involves the case of two dissident scientists, John Gofman and Arthur Tamplin, who are employed at the AEC-funded laboratory in Livermore, California. The AAAS has been asked, first by Sen. Edmund S. Muskie (D–Maine), and subsequently by Sen. Mike Gravel (D–Alaska), to adjudicate charges that the AEC and the Livermore laboratory have harassed Gofman and Tamplin. Those who opposed Seaborg's candidacy expressed doubt that the AAAS could appear as an impartial judge of that dispute if the head of the AEC were in a position of leadership at the AAAS. Some of Seaborg's supporters, on the other hand, suggested that perhaps the AAAS should turn down the Muskie-Gravel request to avoid any possible question of conflict of interest. As it turns out, the board seems to be steering a course aimed at satisfying both camps. It is establishing a Committee on Scientific Freedom and Responsibility to look into charges such as the alleged harassment of Gofman and Tamplin, but it is making efforts to insulate the committee from influence by AAAS officers.

The establishment of the committee was described by the board as follows: "At its meeting of December 12–13, the Board of Directors of the AAAS took the following three actions:

"(1) In view of the Association's concern with independent scientific inquiry and responsible scientific conduct, the Board hereby establishes a Committee on Scientific Freedom and Responsibility to (a) study and report on the general conditions required for scientific freedom and responsibility, (b) develop suitable criteria and procedures for the objective and impartial study of these problems, and (c) study and report on specific instances in which scientific freedom is alleged to have been abridged or otherwise endangered or responsible scientific conduct is alleged to have been violated.

"(2) The Committee on Scientific Freedom and Responsibility shall be composed of not more than five individuals who shall be selected by the Board for their integrity, independence, and relevant competence, and shall not include either current officers of AAAS or any parties at interest in cases under investigation by the committee.

"(3) In response to requests from Senators Muskie and Gravel that the AAAS investigate the allegation that the scientific freedom of Dr. John Gofman and Dr. Arthur Tamplin of the University of California Livermore Laboratory has been abridged, the Board requests the Committee on Scientific Freedom and Responsibility to take this allegation under consideration."

The salient points in these board actions are that the new committee will study both general problems and specific cases; and it will be substantially independent of the board, except that the board will appoint the members. There is no requirement that the members of the committee be AAAS members or even scientists. A prominent attorney or clergyman might serve, for example. The thinking of the board is said to be that members of the committee should be of such high competence and integrity that their judgment will be widely accepted. The independence of the committee is underlined, in the board's opinion, by the fact that there is no requirement that it report to the board, and no requirement that it accept cases assigned by the board. The board has merely "requested," for example, that the committee look into the Gofman-Tamplin allegations, and it is conceivable (though unlikely) that the committee could refuse to consider the case.

Establishment of the new committee stems not only from the Gofman-Tamplin controversy, but also from the fact that AAAS has received a number of requests for help from individuals who allege that their scientific freedom has been abridged. Thus the new committee may have a backlog of cases to investigate once it begins functioning.

—PHILIP M. BOFFEY

Life Sciences: Whistling in the Dark for Another $250 Million

"For several centuries, research in the life sciences has constituted one of the great human adventures." So begins the National Academy of Sciences report *The Life Sciences*,* which was released 3 December, and seldom in its 526 pages does it fail to represent past achievements as monumental or to consider future prospects as promising (provided that enough money is available). Concluding is the statement that "The life sciences are poised to explore the most arcane mysteries of life and . . . it is difficult to imagine more noble goals or more appropriate use of public funds."

Not surprisingly, more public funds are sought for these noble goals. The report begins with 31 pages of recommendations amounting to a request for an additional $250 million per year in

* Available for $10.50 from Printing and Publishing Office, National Academy of Sciences, 2101 Constitution Ave., NW, Washington, D.C. 20418

federal support for biological research.

The Life Sciences, produced by a 29-member committee under the chairmanship of Academy president Philip Handler,† would appear to be an unfortunate waste of effort. Four years in the making, it is the last of a series of reports commissioned by the Academy's Committee on Science and Public Policy (COSPUP) to establish needs and priorities in various areas of science. All of the previous COSPUP studies in this line—each resulting in a lengthy argument for additional federal funds —were virtually ignored by government policy makers, and the same fate almost certainly awaits *The Life Sciences.*

Time Lag in Preparation

Basing its recommendations primarily on lengthy questionnaires returned by some 12,000 doctoral level research workers and 1300 department chairmen, the report suffers because of the time required for its preparation. The questionnaires were returned in 1967 —a period when scientists had considerably less cause to complain about financial conditions. The conclusions and recommendations, however, have been updated to a 1970 description of calamity in science for lack of funds.

According to the report, appropriations for research in the life sciences are now 20 percent less than required "to ensure that the nation's truly qualified academic scientists are fully and usefully engaged." Once this 20 percent deficiency is eradicated, life scientists would require only a 12 to 15 percent per year increment in research support. Computer time and new instrumentation would consume most of the additional funds, followed by block grants to universities for faculty salaries and additional support for graduate students and postdoctoral fellows.

1 January Issue Omitted

The first issue of Science, for 1971 will be published Friday, 8 January.

The need for continued support to graduate education prompted the committee to state "that were it absolutely essential that some *small* decrease be made in the appropriations for the research and graduate-research training endeavors for the next year or two, we would consider it wise to delete these funds from research support rather than from training programs." This admission, albeit mild, is the only mention of an ordering of priorities in the entire report, except for continual warnings against basic research giving ground to mission-oriented research.

The life sciences, unlike chemistry or astronomy whose committees suggested some priorities in their reports, cannot be clearly defined and analyzed, and this, Handler said at a press conference, accounts for the committee's failure to consider priorities. To study the life sciences, the committee appointed 22 panels, each for a separate area of biology such as "the origins of life," "function of tissues and organs," and "human development and changes with time."

The combined reports of these panels were edited into a highly successful book *Biology and the Future of Man,* published for the Academy by Oxford University Press early this year (reviewed in *Science*, 21 August). Chapters one and two of *The Life Sciences* summarize *Biology and the Future of Man*, while the concluding chapters of the two volumes are identical. These summary chapters in *The Life Sciences* provide a short description of the scope of biological research that would be of interest to high school students or college freshmen considering the study of life sciences.

More likely to interest those who enjoy almanacs, the three chapters detailing the results from thousands of questionnaires returned by life scientists includes a multitude of charts, tables, and graphs. One can learn, for example, that, while 92 out of 1208 physiologists study parasitic worms, only one behavioral biologist of the 169 surveyed finds the worms worthy of his attention. Or, genetics departments have on the average 2100 square feet of laboratory space per faculty member, but anatomy departments must make do with an average of only 757. Two thirds of the respondents to the questionnaires were employed by colleges or universities, 14 percent by the federal government, and 10 percent by industry.

Industry, however, provided 30 percent of the $2.264 billion spent for biology in 1967 with 60 percent coming from the federal treasury and 4 percent from private funds. Biochemistry and molecular biology consumed the lion's share of the funds (25 percent), followed by physiology (17 percent) and disease mechanisms (14 percent). Ecology received 4 percent.

Basic Research Emphasized

Although many of biology's great past accomplishments listed by the report resulted from "applied" research, *The Life Sciences* defends basic research as the most worthy recipient of funds and basic molecular biology research in particular. Regarding the above distribution of funds, the report states that it is "a reasonably fair indication of the fraction of national support that these areas command." One of the premises established by the committee before embarking on this study declares molecular biology to be "not merely one of the gigantic intellectual accomplishments of man; it is the unique basis for hope that, in the future, we shall be able to cope with the major diseases to which man is subject, thereby lengthening the span of useful, enjoyable human life."

Molecular biology, however, does not promise to clean up the environment. The report concludes a lengthy discussion of that area with the statement that "whether our concern be with drugs, food or the physical environment, the hard question is what the American public is willing to pay for." The reader might infer that such questions are not to be raised for basic research. In the comment on the need to finance ecology, the report notes that "it would be tragic indeed if its further development were limited by the lack of the relatively modest funds required to insure its growth."

Murmurs of educational reform often accompany requests for additional funds to support academic research.

† Other members of the committee: Nyle C. Brady, Cornell University; James F. Crow, University of Wisconsin; Horace Davenport, University of Michigan Medical School; Harry Eagle, Albert Einstein College of Medicine; James D. Ebert, Carnegie Institution of Washington; Don W. Fawcett, Harvard Medical School; H. Orin Halvorson, University of Minnesota; Arthur D. Hasler, University of Wisconsin; Sterling B. Hendricks, U.S. Department of Agriculture; John B. Hickam (deceased), Indiana University, Indianapolis; Norman H. Horowitz, California Institute of Technology; Donald Kennedy, Stanford University; Stephen Kuffler, Harvard Medical School; Albert I. Lansing, University of Pittsburgh School of Medicine; Daniel S. Lehrman, Rutgers University; Clement L. Markert, Yale University; Ernst Mayr, Harvard University; Norton Nelson, New York University School of Medicine; Hans Neurath, University of Washington School of Medicine; Allen Newell, Carnegie-Mellon University; David Pimentel, Cornell University; David M. Prescott, University of Colorado; Howard Schneiderman, University of California, Irvine; Sol Spiegelman, Columbia University College of Physicians and Surgeons; Curt Stern, University of California, Berkeley; Lewis Thomas, Yale University School of Medicine; Ernest H. Volwiler, Abbott Laboratories; and Maxwell M. Wintrobe, University of Utah College of Medicine.

Although *The Life Sciences* lists among its conclusions that "the quality of teaching and education in these institutions [colleges and universities] is at an all-time high. . . . And this is made no less true by student complaints about 'relevance' or about insufficient contact with distinguished professors," it does suggest some educational reforms including the following:

► Implementation of a single core curriculum for undergraduates in biology.

► Instruction in "humanistic" biology for students in other fields of science.

► Standardization of Ph.D. programs.

► Upgrading of teaching laboratories to include modern instruments.

Noting that curricula of colleges and universities are often structured to meet the needs only of future college teachers, research biologists, and physicians, the report suggests that a special undergraduate program in biology be taught for future high school and junior college teachers in order to upgrade the quality of biology instruction in high schools.

A chapter of the report titled "Communications in the Life Sciences" offers few specific recommendations, but it does survey the phenomenon "from the standpoint of the working biologist" and offers some guiding philosophy. "Investigators in all fields of biology," according to the report, "face the critical challenge of coping with waves of information that threaten to swamp them. . . . Yet only 15 years ago the situation was within bounds." Of some 26,000 distinct scientific and technical journals, more than half are concerned with the life sciences. But the report notes that more than 90 percent of the "truly significant original work" appears in about 1000 journals, and an individual biologist needs to read only 50 to 100 periodicals to keep up in his field.

Taking the position that the editorial judgment of declining to publish "incompetent, incorrect, or totally pedestrian" papers forms the backbone of the scientific information system, the report suggests a rigorous look at editorial standards and improvement of the quality of journals with the reader in mind. In every field, the report states, there is a hierarchy of journals, and "occasionally a paper is consecutively submitted to journals of diminishing quality until it finds acceptance." It implies that many scientific papers serve little purpose besides clogging the information system.

Perhaps if petitioners for government support would examine the origins of the "incompetent, incorrect, or totally pedestrian" work in their fields, their requests would be more attractive to government policy makers. Demands for "more of the same," such as *The Life Sciences*, seem destined to fall on deaf ears.

—ROBERT J. BAZELL

Health Care: AMA White Paper Offers Traditional Solutions

Boston.—In response to increasing demands for better health care in the United States, the American Medical Association still offers its time-tested solution: the well-paid private practioner, free from government constraints. At its semiannual meeting held here 30 November to 2 December, the AMA's ruling body—the House of Delegates—adopted as official policy a report already submitted to the Nixon Administration by the AMA's board of trustees. The report, titled "Considerations in Devising an Overall Health Plan," is intended as a "white paper," spelling out the AMA's expectations for federal action in the health field. It lists in order the following four priorities for meeting the medical service needs of the nation:

► Effectively using those practicing physicians we now have.

► Increasing the productivity of physicians.

► Augmenting the number of physicians.

► Using the physician effectively in his role as conservator of his patients' expenditures.

While the first three priorities are hardly controvesial, the suggestions offered for their implementation will appease few critics of the American health care system because they amount to little more than a defense of medical private enterprise. In expounding on the first priority, the report states that physicians, particularly general practitioners, have been fleeing from practice and that young doctors have not been motivated "to enter into direct patient care."

No solutions for this dilemma are offered; however, the report mentions several factors which could increase the exodus of doctors from patient care. For example: "In the existing climate of the United States, efforts to regiment, conscript, or apply economic sanctions to the medical profession are destined to make matters worse rather than better. They have the effect of driving even more physicians from active practice into research, teaching, administrative medicine, more narrow specialization, or premature retirement." Or, "measures which would freeze the income levels of physicians, eliminating their ability to adjust to the economic environment, are discriminatory and lead to still further departures from active practice."

Another factor threatening to reduce the number of practicing physicians, according to the report, is the establishment of prepaid group practices such as the Kaiser Health Plan in California. While the report concedes that such plans should be given a chance to prove themselves as competitive mechanisms, it warns that "to attempt to force all physicians into a rigid pattern of salaried group practice could be the most destructive move made by the government."

The president of the AMA, Walter C. Bornemeier, proposed at the Boston meeting of the House of Delegates that the AMA allow doctors to seek and accept financial assistance from the federal government to help them set up practices in the nation's ghettoes. The report of the board of trustees, however, rejects such a program, claiming that "highly trained physicians probably cannot be attracted into practice in rural areas or in many slum areas,