sees the additional assignments as having "forced NBS leadership into defensive management, whereby long-range programs are sacrificed to salvage short-term objectives." The predominant source of information for the members of the visiting committee is NBS management itself. It therefore appears that the pessimistic view of the present state of NBS conveyed by Kolata's article is more in accord with reality than the optimistic picture one might derive from the letter of Willenbrock and Davis.

In truth, those areas of NBS which are best known to the community of science have suffered considerable damage over the past several years. [The thoughtful letter from Michael N. Alexander (7 Oct., p. 8) rightly emphasizes that this has happened in other government (and industrial) laboratories.] Recent events, including the proposal of a radical reorganization of NBS, offer hope that an opportunity is at hand to reverse or at least mitigate some of the more devastating trends of the last decade. My sense of the institution is that this comes none too soon but not yet too late. There remains at NBS a cadre of scientific workers who have an appreciable culture in their disciplines, residual commitment to the institution, and even a measure of hope for its future.

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Recombinant DNA Guidelines: Scientific and Political Questions

An article in the News and Comment section of the 22 July issue of *Science* (p. 348) includes a summary of the spring meetings of the National Institutes of Health Recombinant DNA Advisory Committee. An observer is quoted as writing that the committee members "often mocked their own restrictions," and three statements by committee members are cited in support of this interpretation: "These high levels are political, not scientific"; "P4 was designed to prevent research"; and "P1 is a laboratory plus a bureaucrat." As a member of the committee, I would like to comment.

While perhaps mocking in tone, these are profound statements about some of the problems faced by the committee. In the proper sense of the word "political," meaning the setting of policy, the guidelines are indeed political, and not scientific. This is a most crucial point. The scientific question is, What is the estimated

probability that various types of recombinant DNA research could produce a dangerous or undesirable microorganism? The political (policy) question is, What measures, if any, should be taken in response to this estimate? In contrast to the scientific question, the latter question is answered by considering the political climate, sociological factors, and one's own value judgments.

The committee's answer to the scientific question was in essence:

1) The only experiments for which there was clearly a finite probability of harm were among those cited in the original warnings about possible dangers of recombinant DNA research and which were placed under voluntary moratorium.

2) For the rest of the experiments the possibility that there could be a real danger could only be assessed on an intuitive basis until there were more data and broader scientific input.

In the view of the committee, the appropriate response, that is, the policy decision, was to ban the experiments in the first category above and to place a graded series of restrictions on the other experiments sufficient to allay the most serious of the intuitive concerns. It should be noted that these restrictions in effect *instituted* a partial moratorium on much recombinant DNA research and in no way represented *ending* a moratorium. Thus, the decision to specify containment levels for particular experiments was primarily one of policy, being based on value judgments as to how to respond to a problem for which there was an inadequate data base, and not based on a rational estimate of the probability of risk.

The failure of the guidelines to be clearly perceived as being a policy statement rather than a scientific document has been responsible for much of the excessive concern about possible public health problems from recombinant DNA research. Particularly, classification of an experiment as a "P4 experiment" is seen by many as prima facie evidence of serious biohazard, rather than as a supercautious recommendation on dealing with an unknown area of research.

The committee quite consciously recognized that its recommendation that P4 facilities be used for certain experiments served a twofold purpose—to ensure maximum containment and to severely limit the number of experiments in those categories that at the time were considered to be the most conjectural of the permitted experiments. In that sense, the statement "P4 was designed to prevent research" is quite true. The fact that, as of this writing, there is still no certified P4 facility in this country bears this out.

The third comment, "P1 is a laboratory plus a bureaucrat," also carries an extremely important message. This statement was made during discussion of what administrative procedures to recommend for laboratory work involving physical and chemical characterization of recombinant molecules free of host or vector microorganisms. The committee agreed that this type of work was free of any conceivable risk, and the suggestion was made, "Why not put it in P1?" The reply was, "No, because P1 is a laboratory plus a bureaucrat," expressing the idea that laboratories doing unquestionably safe research must be assiduously protected from encumbrances such as the multiple levels of administrative review inherent in being under the guidelines.

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Medical School Transfers

In discussing Philip H. Abelson's editorial "Coercion of medical schools" (16 Sept., p. 1137) Theron A. Ebel states (Letters, 21 Oct., p. 250) that 69 percent [actually, the figure should be 64 percent, from the quoted data (*1*)] of the U.S. citizens seeking to transfer from foreign medical schools through COTRANS (the Association of American Medical Colleges' Coordinated Transfer Application System) were from three states. While not taking any position on the desirability of such transfers, one might point out that the three states in question (New York, New Jersey, and California) represent more than 22 percent of the country's population, a figure perhaps more pertinent than the 6 percent of the states they constitute. There is still a discrepancy, but one not quite so shocking as that quoted by Ebel.

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References

1. W. F. Dube, *Characteristics of U.S. Citizens Seeking Transfer from Foreign to U.S. Medical Schools in 1975 via COTRANS* (Association of American Medical Colleges, Washington, D.C., 1977), p. xi; available from ERIC Reproduction Service, Arlington, Va.