Misconduct: Judgment Called For

Frederick Grinnell, in his editorial "Ambiguity in the practice of science" (19 Apr., p. 333), argues that the usual practice of science contains "ambiguities," that is, departures from the ideal of total truthfulness and fairness. He tries to show that a definition of misconduct in science should not be based on the principle that scientists should be truthful and fair, or on any other fundamental principle. Instead, the definition should be based on "conceptually unambiguous examples" of misconduct, which will help in some unspecified way in the assessment of more ambiguous cases.

As it happens, misconduct cases generally are about truthfulness or fairness. The important thing is that scientists should not be held to a standard of perfection; rather, a misconduct case should be initiated only when a scientist's departure from truthfulness or fairness has been egregious.

Ambiguity haunts misconduct cases at least as much as it affects the normal practice of science. Even the relatively clear-cut examples Grinnell cites (data fabrication, plagiarism) raise questions such as intent and whether the action in the actual circumstances was serious enough to be misconduct in science. Simple rules do not resolve such questions. The ambiguity of actual cases calls for the application of judgment based on the standards of ethical practice of the relevant community of scientists. Any definition that does not recognize the need for that kind of judgment in individual cases will in the end subject the accused scientist to legal standards taken from some other source. One of the major issues in defining misconduct in science is whether scientists can continue to be judged according to the scientific community's own standards of practice.

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*These remarks should be attributed to the author, and not to his office or agency.

Response: Buzzelli concludes: "One of the major issues in defining misconduct in science is whether scientists can continue to be judged according to the scientific community's own standards of practice." I believe, however, that we have yet to adequately describe these standards. Instead of appealing to theoretical, fundamental principles, we need to articulate what doing science actually entails and to explain how the ethical practices of science fit into the context of everyday research. Identifying sources of ambiguity in science and analyzing unambiguous examples of misconduct will help accomplish these tasks.

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Gifted Public Servants

Henry Miller's ill-natured commentary (Letters, 12 Apr., p. 180) on the editorial by Gerald R. Fink ("Bureaucrats save lives," 1 Mar., p. 1213) requires a response. The National Institutes of Health and the National Science Foundation *do* "indeed have a legion of gifted public servants who possess invaluable knowledge and experience gained at the forefront of science." There is no "may" about it. Miller's aspersions on technical expertise at the regulatory agen-

cies must be seen against the background of his own approximately 15-year employment at the Food and Drug Administration and his occasional previous arguments in favor of ceding exclusive regulatory overview of human gene therapy to his own agency. He now sings for a supper paid by those who make derision of public service, especially in the federal government, a part of their political toolbox. Fink's editorial is an acknowledgment of the debt that the research community in this country owes to "a legion of gifted public servants." I was pleased to see it published and would add that the debt extends much more widely.

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The support for, and appreciation of, embattled federal science bureaucrats championed by Fink is likely to be enthusiastically echoed by all scientists in the United States. Fink writes that the action of Herman Lewis at the National Science Foundation permitted him and his students to perform an experiment that advanced the development of a hepatitis B vaccine by 2 years and saved millions of lives that would otherwise have been lost. This statement rests on their 1978 report of the first case of yeast transformation. For this work, Hinnen, Hicks, and Fink used a yeast-selectable marker on a bacterial plasmid (*1*). Did the work of Fink and his colleagues materially affect the timing of the development of a hepatitis B vaccine? I think not. A product derived from human placenta developed by Merck and by the Institute Pasteur was in use by 1982 (when expression of the surface antigen in yeast was published). Transformation of yeast by a 2-micrometer–based vector was reported in 1978 by Jean Beggs in the United Kingdom (*2*) very shortly after the Hinnen *et al.* publication. As the 2-micrometer plasmid is a multicopy endogenous plasmid, it is not surprising that more efficient high expression transformation can be obtained with vectors based on it. Consequently, it is 2-micrometer–based vectors that have been used for hepatitis antigen and human insulin production in yeast. In addition to those mentioned by Fink, the then SmithKline Beecham group in Belgium independently played a major role in the development and widespread application of the vaccine based on the antigen synthesized in yeast.

Fink writes that Lewis's sensible action caused the National Institutes of Health to bring forward the genetic engineering of yeast by 2 years. The National Institutes of Health was probably also influenced by the Ashby report in the United Kingdom (*3*) and the work of a European Molecular Biology Organization committee, for which another science administrator, J. Tooze, deserves substantial credit.

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References

1. A. Hinnen, J. Hicks, G. Fink, *Proc. Natl. Acad. Sci. U.S.A.* **75**, 1929 (1978).
2. J. D. Beggs, *Nature* **275**, 104 (1978).
3. *Report of the Working Party on the Experimental Manipulation of the Genetic Composition of Micro-organisms* (Cmnd. 5880, H.M. Stationary Office, London, UK, 1975).

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Biosystematics Database

I was pleased to see the Random Samples item about the Interagency Taxonomy Information System (ITIS) (5 Apr., p. 37). I would like to acknowledge the U.S. Environmental Protection Agency's partners on this vital project. The U.S. Departments of Agriculture, Interior, and Commerce's Na-