SCIENCE

EDITORIAL

Integrity of the Research Process

To scientists steeped in traditions of integrity and the search for truth, current emphasis on misconduct is painful. They believe, and rightly, that the structure and tremendous value of scientific knowledge have not been eroded. They point to mechanisms that ensure that significant error will be detected and expunged. However, their opinions have little weight on public opinion or federal policies that have been influenced by no less than 1100 articles on misconduct. Many, perhaps most, items have dealt with only a few egregious examples. However, a substantial number of new allegations have been made recently.

In the current climate, the research enterprise must be concerned about two possible hazards—a curtailment of federal support and an increase in bureaucratic involvement. To minimize the likelihood of further regulations, a number of actions should be taken. The rationale for them has been discussed in a document recently issued by the National Academy Press.* The report, a product of an intensive 2-year effort, indicates that some constructive steps are being taken to deal with and minimize misconduct, but further actions are desirable.

The report advocates a precise definition of scientific misconduct, namely: "Misconduct in science is defined as fabrication, falsification, or plagiarism, in proposing, performing, or reporting research...." It avoids the fuzzy category "other serious deviations from accepted research practices" that is included in the regulatory definitions of the Public Health Service and the National Science Foundation. That kind of language can be interpreted to mean many things and can lead to an inflation of numbers of alleged cases of misconduct.

Humans respond to the pressures, intellectual climate, and rewards systems to which they are exposed. The pressures at universities have tended to emphasize mere numbers of publications and the amounts of grant money brought in. Skilled lectures to undergraduates have counted for little. The poor performance of a few universities in dealing with serious cases of fabricated data and delays in addressing allegations of misconduct have tarnished the images of all universities. The report points out: "As the recipients of federal funds and the institutional sponsors of research activities, administrative officers must comply with regulatory and legal requirements that accompany public support. They are required, for example, 'to foster a research environment that discourages misconduct in all research and that deals forthrightly with possible misconduct.'"

The report emphasizes the role of research directors and principal investigators in minimizing misconduct in research. They are important in maintaining the intellectual climate in which others work. If they are diligent they can detect questionable data. They can serve as mentors or see to it that others function to instill in graduate students appropriate standards. A source of confusion and enmity in research groups is authorship of articles. Frank discussion of this matter and decisions about authorship before a project is initiated can avoid trouble.

The roles of editors of journals and of staff at the granting agencies received only minimal attention. Actually, they can have substantial effects on the integrity of scientific research. They cannot be counted on to detect all misconduct, but they and their peer reviewers can discover some of it. Well-chosen peer reviewers can be highly knowledgeable about the subject matter and the characters of the authors involved. Most of the time they offer excellent advice. However, for a variety of reasons, including self-interest, sometimes they don't. Safeguarding against such events is the responsibility of editors and their associate editors. It is also the responsibility of staffs of granting agencies. Their duty is to review the reviewers and to maintain records on their backgrounds and performance. With modern computer systems, this is quite feasible.

One of the major puzzles that the report was able to deal with only partially is the extent and types of misconduct. At present needed information is not in the public domain. However, when it becomes available, analysis may suggest further steps to decrease misconduct. The present report represents a good summary of the existing situation.

Philip H. Abelson

*National Academy of Sciences, *Responsible Sciences: Ensuring the Integrity of the Research Process* (National Academy Press, Washington, DC, 1992), vol. 1.