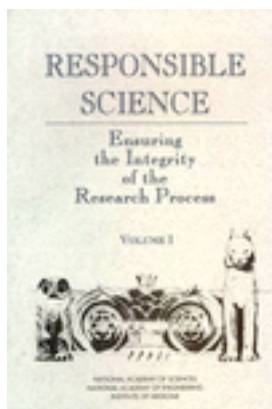


Free Executive Summary



Responsible Science, Volume I: Ensuring the Integrity of the Research Process

Panel on Scientific Responsibility and the Conduct of Research, National Academy of Sciences, National Academy of Engineering, Institute of Medicine

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Executive Summary

INTRODUCTION

The community of scientists is bound by a set of values, traditions, and standards that embody honesty, integrity, objectivity, and collegiality. These values are reflected in the particular principles and practices characteristic of specific scientific disciplines. The diversity, flexibility, and creativity of the research community—strengths that have contributed to decades of scientific achievement and progress in the United States—also derive from the decentralized character of the research enterprise.

For centuries scientists have relied on each other, on the self-correcting mechanisms intrinsic to the nature of science, and on the traditions of their community to safeguard the integrity of the research process. This approach has been successful largely because of the widespread acknowledgment that science cannot work otherwise, and also because high standards and reputation are important to scientists. Dishonest or untrustworthy individuals become known to their colleagues through various mechanisms, including word of mouth and the inability of other scientists to confirm the work in question. Such irreproducible work is recognized and discredited through the processes of peer review and evaluation that are critical to making professional appointments, accepting work for publication, and awarding research support.

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However, the ability of research scientists and their institutions to safeguard the integrity of the research process is now being questioned. Comparatively recent and dramatic increases in the size and influence of the U.S. research enterprise,¹ and in the amounts and patterns of funding, have led to changing social expectations about the accountability of scientists and their institutions for research supported by public funds. In addition, the changing nature of collaborative efforts, the quickening pace and increasing complexity of research endeavors, and the growing emphasis on commercialization of research results have combined to exacerbate stresses that have always been apparent to some extent in scientific research. During the last decade, reports of wrongdoing in science have been accompanied by government oversight and continued scrutiny of the conduct of scientific research. All of these developments have profound implications for the research enterprise's system of internal checks and balances, which evolved in a research environment far removed from the forces of the political process.

The Problem of Misconduct in Science

During the period from March 1989 to March 1991, more than 200 allegations of misconduct in science were recorded by U.S. government offices (NSF, 1990b; Wheeler, 1991).² From this number, about 30 cases have resulted so far in confirmed findings of misconduct in science (NSF, 1990b; DHHS, 1991b). Although the possibility of underreporting needs to be considered, these statistics indicate that the reported incidence of misconduct in science is low—compared, for example, to the 26,000 research awards supported annually by the National Institutes of Health (NIH, 1991).

However, any misconduct comes at a high price both for scientists and for the public. Cases of misconduct in science involving fabrication, falsification, and plagiarism breach the trust that allows scientists to build on others' work, as well as eroding the trust that allows policymakers and others to make decisions based on scientific evidence and judgment, especially in instances when definitive studies are not available. The inability or refusal of research institutions to address misconduct-in-science cases can undermine both the integrity of the research process and self-governance by the research community.

Acting to Ensure Integrity in Research

To respond to the need for more visible, explicit mechanisms to ensure integrity in the research process, and to handle allegations of

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misconduct in science, scientists and their research institutions face three major challenges. One challenge is to develop vigorous approaches to protect and enhance knowledge of scientific traditions and sound research practices and to penalize those who engage in misconduct. A second challenge is to foster responsible research conduct in a period of increasing diversification of funding sources, growing demands on limited research resources, and greater incentives for financial gain in the research environment. A third challenge is to ensure fairness and balance in efforts to establish individual and institutional accountability in scientific research activities, so that frivolous or malicious charges as well as counterproductive regulations are avoided.

PURPOSE AND SCOPE OF THIS STUDY

Charge to the Panel

To address concerns that affect the entire U.S. scientific community, the Committee on Science, Engineering, and Public Policy (COSEPUP) of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine convened the 22-member Panel on Scientific Responsibility and the Conduct of Research. The panel was asked to examine the following issues:

1. What is the state of current knowledge about modern research practices for a range of disciplines, including trends and practices that could affect the integrity of research?
2. What are the advantages and disadvantages of enhanced educational efforts and explicit guidelines for researchers and research institutions? Can the research community itself define and strengthen basic standards for scientists and their institutions?
3. What roles are appropriate for public and private institutions in promoting responsible research practices? What can be learned from institutional experiences with current procedures for handling allegations of misconduct in science?

In addition to outlining approaches to encourage the responsible conduct of scientific research, the panel was also asked to determine whether existing unwritten practices should be expressed as principles to guide the responsible conduct of research. If the panel members judged it advisable, they were encouraged to prepare model guidelines and other materials.

Approach, Scope, and Audience

The panel (1) examined scientific principles and research practices; changes within the contemporary research environment; and the roles of individuals, educational programs, and research guidelines in fostering responsible research practices and (2) considered the incidence and significance of misconduct in science; examined how institutions have handled allegations of misconduct; and also analyzed the complex problems associated with responding to such allegations.

The panel's approach is not intended to diminish the importance of related problems such as conflict of interest and the allocation of indirect costs, but rather to reflect the panel's judgment that integrity in the research process itself and issues arising from misconduct in science deserve critical examination and consideration on their own merits.

Limited availability to date of evaluated data and the fact that the panel often had to rely on its own informed judgment require that this report be viewed as part of a comprehensive dialogue on and examination of integrity in the research process. The panel emphasizes that this report is addressed to *all* members of the scientific community, regardless of their institutional affiliation.

Defining Terms—Articulating a Framework for Fostering Responsible Research Conduct

The panel defined the term "integrity of the research process" as the adherence by scientists and their institutions to honest and verifiable methods in proposing, performing, evaluating, and reporting research activities.

To provide policy guidance for scientists, research institutions, and government research agencies concerned about ensuring the integrity of the research process as well as addressing misconduct in science, the panel developed a framework that delineates three categories of behaviors in the research environment that require attention. These categories are (1) misconduct in science, (2) questionable research practices, and (3) other misconduct.

Unethical actions of all types are intolerable, and appropriate actions by the research community to address such problems are essential. But the panel believes that there are risks inherent in developing institutional policies, procedures, and programs that treat all of these behaviors without distinction. Inappropriate actions by government and institutional officials can create an atmosphere that disturbs

effective methods of self-regulation and harms pioneering research activities.

In developing its framework of definitions, the panel adopted an approach that evaluates how seriously the various behaviors compromise the integrity of the research process.

Misconduct in Science

Misconduct in science is defined as fabrication, falsification, or plagiarism, in proposing, performing, or reporting research. Misconduct in science does not include errors of judgment; errors in the recording, selection, or analysis of data; differences in opinions involving the interpretation of data; or misconduct unrelated to the research process.

Fabrication is making up data or results, falsification is changing data or results, and plagiarism is using the ideas or words of another person without giving appropriate credit.

By proposing this precise definition of misconduct in science, the panel is in unanimous agreement that the core of the definition of misconduct in science should consist of fabrication, falsification, and plagiarism. The panel unanimously rejects ambiguous language such as the category "other serious deviations from accepted research practices" currently included in regulatory definitions adopted by the Public Health Service and the National Science Foundation (DHHS, 1989a; NSF, 1991b). In particular, the panel wishes to discourage the possibility that a misconduct complaint could be lodged against scientists based solely on their use of novel or unorthodox research methods. The use of ambiguous terms in regulatory definitions invites exactly such an overexpansive interpretation.

In rejecting the "other serious deviations" category, the panel considered whether a different measure of flexibility should be included in its proposed definition of misconduct in science, so as to allow the imposition of sanctions for conduct similar in character to fabrication, falsification, and plagiarism.

Some panel members believe that the definition should also encompass other actions that directly damage the integrity of the research process and that are undertaken with the intent to deceive.

Questionable Research Practices

Questionable research practices are actions that violate traditional values of the research enterprise and that may be detrimental to the research process. However, there is at present neither

broad agreement as to the seriousness of these actions nor any consensus on standards for behavior in such matters. Questionable research practices do not directly damage the integrity of the research process and thus do not meet the panel's criteria for inclusion in the definition of misconduct in science. However, they deserve attention because they can erode confidence in the integrity of the research process, violate traditions associated with science, affect scientific conclusions, waste time and resources, and weaken the education of new scientists.

Questionable research practices include activities such as the following:

- Failing to retain significant research data for a reasonable period;
- Maintaining inadequate research records, especially for results that are published or are relied on by others;
- Conferring or requesting authorship on the basis of a specialized service or contribution that is not significantly related to the research reported in the paper;³
- Refusing to give peers reasonable access to unique research materials or data that support published papers;
- Using inappropriate statistical or other methods of measurement to enhance the significance of research findings;⁴
- Inadequately supervising research subordinates or exploiting them; and
- Misrepresenting speculations as fact or releasing preliminary research results, especially in the public media, without providing sufficient data to allow peers to judge the validity of the results or to reproduce the experiments.

The panel wishes to make a clear demarcation between misconduct in science and questionable research practices—the two categories are not equivalent, and they require distinct types of responses by the research community and research institutions.

Other Misconduct

Certain forms of unacceptable behavior are clearly not unique to the conduct of science, although they may occur in a laboratory or research environment. Such behaviors, which are subject to generally applicable legal and social penalties, include actions such as sexual and other forms of harassment of individuals; misuse of funds; gross negligence by persons in their professional activities; vandalism, including tampering with research experiments or instrumentation; and violations of government research regulations, such as those dealing

with radioactive materials, recombinant DNA research, and the use of human or animal subjects. Industry-university relationships, and the resultant possibility of conflicts of interest, also raise issues that require special attention.

Recognized legal and institutional procedures should be in place to address complaints and to discourage behavior involving forms of misconduct that are not unique to the research process. The panel concluded that such behaviors require serious attention but lie outside the scope of the charge for this study.

On some occasions, however, certain forms of "other misconduct" are directly associated with misconduct in science. Among these are cover-ups of misconduct in science, reprisals against whistle-blowers, malicious allegations of misconduct in science, and violations of due process protections in handling complaints of misconduct in science. These forms of other misconduct may require action and special administrative procedures.

FINDINGS AND CONCLUSIONS

Scientists and Research Institutions

Because scientists and the achievements of science have earned the respect of society at large, the behavior of scientists must accord not only with the expectations of scientific colleagues, but also with those of a larger community. As science becomes more closely linked to economic and political objectives, the processes by which scientists formulate and adhere to responsible research practices will be subject to increasing public scrutiny. This is one reason for scientists and research institutions to clarify and strengthen the methods by which they foster responsible research practices.

Accordingly, the panel emphasizes the following conclusions:

- The panel believes that the existing self-regulatory system in science is sound. But modifications are necessary to foster integrity in a changing research environment, to handle cases of misconduct in science, and to discourage questionable research practices.
- Individual scientists have a fundamental responsibility to ensure that their results are reproducible, that their research is reported thoroughly enough so that results are reproducible, and that significant errors are corrected when they are recognized. Editors of scientific journals share these last two responsibilities.
- Research mentors, laboratory directors, department heads, and senior faculty are responsible for defining, explaining, exemplifying, and requiring adherence to the value systems of their institutions.

- Administrative officials within the research institution also bear responsibility for ensuring that good scientific practices are observed in units of appropriate jurisdiction and that balanced reward systems appropriately recognize research quality, integrity, teaching, and mentorship.

The Changing Research Enterprise

The academic research community, governed by traditions derived from an earlier model of a community of independent scholars who participated equally in academic governance, is challenged by the complexity of today's issues and of the environment in which research is conducted. Still, basic research continues to flourish, and faculty, postdoctoral fellows, and graduate students continue to contribute extraordinary research capability to science.

In reviewing changes within the scientific research enterprise, the panel reached the following conclusions:

- Scientific research is part of a larger and more complicated enterprise today, creating a greater need for individual and institutional attention to matters that affect the integrity of the research process. Scientists themselves and research institutions will be expected to play a more active role in ensuring that the activities performed by researchers are within the governance mechanisms of their institutions.
- The growth and diversity of modern research call for institutions to accept explicit responsibility for fostering the integrity of the research process and for handling allegations of misconduct. In recognizing that their faculty and research staff are responsible for maintaining the integrity of the research process, institutions should retain and accept certain explicit obligations. Principal among these is providing a research environment that fosters honesty, integrity, and a sense of community. Research institutions should also recognize the risks that are inherent in self-regulation and strive to involve outside parties, when appropriate, in investigating or evaluating the conduct of their own members.
- The increased size, specialization, and diversity of research groups, and other changes in the social relationships of their members, have stimulated personal conflicts and misunderstandings, including disputes about fairness and allocation of credit. These disputes may be prevented by positive efforts to foster responsible research practices and by taking preemptive actions to promote a harmonious and productive workplace. Frank discussions, both formal and informal,

possibly aided by outside mediators, are additional tools to use in addressing these disputes.

- The issues associated with conflict of interest in the academic research environment are sufficiently problematic that they deserve thorough study and analysis by major academic and scientific organizations, including the National Academy of Sciences.
- The research environment is stressful and yet conducive to the remarkable productivity of researchers. The rewards for successful research are greater now than in the past, but today's rapid pace of development may undermine critical internal checks and balances and may increase opportunities for misrepresentation or distortion of research results.

Misconduct in Science—Incidence and Significance

The panel found that existing data are inadequate to draw accurate conclusions about the incidence of misconduct in science or of questionable research practices. **The panel points out that the number of confirmed cases of misconduct in science is low compared to the level of research activity in the United States. However, as with all forms of misconduct, underreporting may be significant; federal agencies have only recently imposed procedural and reporting requirements that may yield larger numbers of reported cases. Any misconduct comes at a price to scientists, their research institutions, and society. Thus every case of misconduct in science is serious and requires attention.**

Handling Allegations of Misconduct in Science—Institutional Responses and Experience

University-Government Approaches

Government agencies, congressional oversight committees, and academic institutions generally agree that *the primary responsibility for handling complaints of misconduct in science rests with the research organization*. However, the development and implementation of policies and procedures for handling misconduct in science have been problematic. Some universities, particularly small research institutions, are not prepared to accept responsibility for pursuing allegations of misconduct in science.⁵ It is difficult for any institution to investigate members of its own community, especially individuals who hold positions of high esteem. In addition, some research institutions and

government agencies have made mistakes in investigations of complex cases, such as appointing to investigatory panels members who have personal or professional ties to the individuals who have been accused of misconduct in science. All these factors foster a perception that research institutions are not dealing effectively with misconduct in science,⁶ prompting criticism of the speed, rigor, honesty, fairness, and openness of their response mechanisms.

Many universities have now established policies and procedures for handling allegations of misconduct in science, and some research institutions have acquired valuable experience in implementing these procedures to deal with cases of misconduct. However, the legal and procedural issues associated with misconduct-in-science investigations are extraordinarily complex, and there is little case law in the public record to guide and inform analysis of these issues.

The panel believes that, in general, the current and evolving system of government and institutional relationships requires more experience and adjustments before specific policy or procedural changes can be recommended. Research institutions need to clarify their own approaches and judgments on these issues before any general consensus can be reached on procedural matters.

Part of the difficulty in developing vigorous and effective institutional responses to incidents or allegations of misconduct in science arises from variation in and disagreement about essential elements of fairness, completeness, and objectivity that should characterize investigations. Effective responses are impeded also by recurring patterns of denial by some institutional officials and faculty members who believe that misconduct in science is not a serious matter. The pressures of conducting an objective investigation of complaints involving respected or prestigious scientists cannot be underestimated. Strong and informed leadership is needed to clarify procedural matters and to ensure that allegations or apparent incidents of misconduct in science are not ignored or covered up.

Need for Explicit Procedural Elements

Institutional policies and procedures should include a common entry point for handling complaints from the outset; clear procedures are necessary for determining which type of alleged offenses will be reviewed by administrative staff or faculty. A sequence of steps to achieve resolution of significant disputes is required. All of these steps require clear separations between each of the following groups: the affected parties, those who are judging the seriousness of the complaint and formulating the evidentiary base to substantiate charges,

and those who must adjudicate penalties based on charges of misconduct in science.

The panel believes that institutional procedures should define explicit and clear criteria that are to be used in determining when a misconduct inquiry should proceed to a more formal investigation. The panel concludes that administrative officials and faculty have a responsibility to inform all members of their institution, especially junior personnel, of existing channels for handling complaints about misconduct in science or other misconduct.

Current Situation

The panel is aware of the inherent difficulty posed by asking research institutions to investigate allegations of misconduct in science that involve their own members. Internal investigations must demonstrate a fundamental commitment to independence and objectivity to ensure their credibility and success, and may be enhanced by the participation of members from outside the affected organization. The objectivity of misconduct-in-science investigations also relies heavily on the credibility of the process used to arrive at findings and recommendations. To maintain the privilege of self-regulation, research institutions must exercise vigilance and diligence in examining the conduct of their own members.

Balancing Accountability and the Need for Intellectual Freedom

In the wake of procedural and policy reforms in response to incidents of misconduct in science, representatives from the academic and scientific community have raised concerns about the long-term or unintended effects that might result from institutional or governmental intrusions into the research environment.⁷ Aggressive efforts to control research practices, if carried to an extreme, can damage the research enterprise. Balance is required. Inflexible rules or requirements can increase the time and effort necessary to conduct research, can discourage creative individuals from pursuing research careers, can decrease innovation, and can in some instances make the research process impossible. Governmental or regulatory efforts to define "correct" research conduct or analytical practices can do fundamental harm to research activities if such efforts encourage orthodoxy and rigidity and inhibit novel or creative research practices.

However, the panel concludes that allegations and incidents of misconduct in science require a vigorous institutional response and

that the methods used by research institutions and government to address allegations of misconduct in science need improvement. Research institutions sometimes require advice or assistance in addressing allegations of misconduct in science because of the complexities of these cases or because their faculty or administrators are reluctant to address in a systematic manner complaints or suspicions about possible misconduct in science. Research institutions have not developed mechanisms for broad exchange of information and experience in resolving difficult cases and consequently lack opportunities for learning from each other.

Steps to Encourage Responsible Research Practices

In considering different approaches to dealing with questionable research practices, the panel concluded that questionable practices are best discouraged through peer review and the system of appointments, evaluations, and other rewards in the research environment as well as educational programs that emphasize responsible behavior in the research environment. Such approaches build on the strengths of self-regulation, rely on those who are most knowledgeable about the intricacies of the scientific process to maintain the quality of the research environment, and preserve the diverse disciplinary traditions that are essential to responsible scientific conduct. By encouraging the development of educational programs that emphasize responsible research behavior, the panel seeks to foster more deliberate and informed communication, discussion, criticism, and reflection of the basic values that guide scientific practices and judgments.

In considering the advantages and disadvantages of guidelines for research conduct, the panel concluded that although the process of formulating guidelines may be extremely valuable for those who participate, guidelines that are relevant and appropriate to research may vary considerably depending on the research field, the nature of the work, and other factors. To be effective, guidelines must be incorporated into the process of research and education and become an operational part of day-to-day activities. If faculty desire to develop guidelines for the conduct of research, such policies should be formulated by those who will be directly affected and should be adapted to specific research fields and protocols.

Institutional guidelines are likely to be less effective than ones formulated at the group or laboratory level. However, research institutions may wish to adopt an overarching set of general principles for their members to provide a common frame of reference. The panel recognizes that the formulation of written guidelines is an exacting task that requires substantial time and effort.

The panel concluded that subjects such as data management, publication practices, authorship, peer review, and training and supervision should be considered in any efforts aimed at developing educational discussions or guidelines for the responsible conduct of scientific research. This set of subjects suggests particular topics and examples of "best scientific practice" that should be considered in formulating statements on research conduct.

RECOMMENDATIONS

Ensuring the integrity of the research process requires that scientists and research institutions give systematic attention to the fundamental values, principles, and traditions that foster responsible research conduct. In considering factors that may affect integrity and misconduct in science, the panel formulated twelve recommendations to strengthen the research enterprise and to clarify the nature of the responsibilities of scientists, research institutions, and government agencies in this area.

Acting to Define and Strengthen Basic Principles and Practices

Recommendation One

Individual scientists in cooperation with officials of research institutions should accept formal responsibility for ensuring the integrity of the research process. They should foster an environment, a reward system, and a training process that encourage responsible research practices.

Recommendation Two

Scientists and research institutions should integrate into their curricula educational programs that foster faculty and student awareness of concerns related to the integrity of the research process.

Recommendation Three

Adoption of formal guidelines for the conduct of research can provide a valuable opportunity for faculty and research institutions to clarify the nature of responsible practices, but adopting guidelines should be an option, not a requirement, for research institutions.

Dealing with Misconduct—Institutional Roles

Recommendation Four

Research institutions and government agencies should adopt a common framework of definitions, distinguishing among misconduct in science, questionable research practices, and other forms of misconduct. They should adopt a single consistent definition of misconduct in science that is based on fabrication, falsification, and plagiarism. Accordingly, federal agencies should review their definitions of misconduct in science to remove ambiguous categories such as "other serious deviations from accepted research practices."

Recommendation Five

Government agencies should adopt common policies and procedures for handling allegations of misconduct in science. The Office of Science and Technology Policy (OSTP) should lead the effort to establish government-wide definitions and procedures. OSTP should consider adopting the definition of misconduct in science proposed in this report and use this definition in formulating government-wide model policies.

Recommendation Six

Research institutions and government research agencies should have policies and procedures that ensure appropriate and prompt responses to allegations of misconduct in science. Research institutions should foster effective and appropriate methods for detecting and handling incidents of misconduct in science and should strengthen the implementation of misconduct-in-science policies and procedures that incorporate fundamental elements of due process.

Recommendation Seven

Scientists and their institutions should act to discourage questionable research practices through a broad range of formal and informal methods in the research environment. They should also accept responsibility for determining which questionable research practices are serious enough to warrant institutional penalties. But the methods used by individual scientists and research institutions to address questionable research practices should be distinct from those for handling misconduct in science or other misconduct.

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Recommendation Eight

Research institutions should have policies and procedures to address other misconduct—such as theft, harassment, or vandalism—that may occur in the research environment. Where procedures for handling complaints about other misconduct do not exist, allegations should be examined according to the same administrative mechanisms as those designed to address misconduct in science, although the procedural pathways for responding to other misconduct and misconduct in science may differ.

Recommendation Nine

Government research agencies should clarify their roles in addressing misconduct in science, questionable research practices, and other misconduct. Although government agencies have specific regulatory responsibilities in handling the categories of misconduct in science and other misconduct, their role in addressing questionable research practices should be designed to support the efforts of scientists and research institutions to discourage such practices through the processes of education and peer review.

Taking Additional Steps

Recommendation Ten

An independent Scientific Integrity Advisory Board should be created by the scientific community and research institutions to exercise leadership in addressing ethical issues in research conduct; in framing model policies and procedures to address misconduct in science and other misconduct; to collect and analyze data on episodes of misconduct in the research environment; to provide periodic assessments of the adequacy of public and private systems that have been developed to handle misconduct in science cases; and to facilitate the exchange of information about and experience with policies and procedures governing the handling of allegations of misconduct in science.

Recommendation Eleven

The important role that individual scientists can play in disclosing incidents of misconduct in science should be acknowledged. Individuals who, in good conscience, report suspected misconduct in science deserve support and protection. Their efforts, as well as

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the efforts of those who participate in misconduct proceedings, can be invaluable in preserving the integrity of the research process. When necessary, serious and considered whistle-blowing is an act of courage that should be supported by the entire research community.

Recommendation Twelve

Scientific societies and scientific journals should continue to provide and expand resources and forums to foster responsible research practices and to address misconduct in science and questionable research practices.

NOTES

1. Government funding for U.S. basic research increased in current dollars from \$5.4 billion in FY 1982 to an estimated \$12.5 billion in FY 1991. See p. 53 in American Association for the Advancement of Science (1991a). Academic research investigators are also increasingly supported by nonfederal funds provided by a diverse mix of industrial sponsors, state, and local funds, foundations, and intramural support. For example, the industrial share of academic R&D funding grew from 3.9 percent in 1980 to an estimated 6.6 percent in 1989. Some specialized academic research centers now receive over 20 percent of their funding from industry. See p. 106 in National Science Board (1989).
2. The term "allegation" here refers to complaints of misconduct in science that have resulted in a government case file. An analysis of these allegations is provided in Chapter 4. As of December 1991, about half of these allegations had been resolved.
3. It is possible that some extreme cases of noncontributing authorship may be regarded as misconduct in science because they constitute a form of falsification. These would include only cases in which an individual who has made *no* identifiable contribution to a research paper is named, or seeks to be named, as a co-author.
4. See Bailar (1986).
5. See, for example, the discussion in the DHHS's OIG report (DHHS, 1989d), which notes that although all "large grantee institutions considered [misconduct] investigations their responsibility, ... only 54 percent of the small institutions shared this view, and most of these institutions would support a more active NIH role in investigating allegations" (p. 11).
6. See the statement by Rep. John Dingell in U.S. Congress (1989b): "The apparent unwillingness on the part of the scientific community to deal promptly and effectively with allegations of misconduct is unfair to both the accuser and to the accused" (p. 1). See also Weiss (1991b) and the commentary in Dong (1991).
7. See, for example, testimony by academic officials and scientists in hearings convened by the House Committee on Science, Space, and Technology (U.S. Congress, 1990b).

RESPONSIBLE SCIENCE

Ensuring the Integrity
of the Research Process

VOLUME I

Panel on Scientific Responsibility and the Conduct of Research

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