

# Fostering Academic Integrity

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*Report of the Committee on  
Academic Responsibility*

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*Report of the Committee on*

*Academic Responsibility*

*Appointed by the President and*

*Provost of MIT*

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## **Committee**

Richard C. Mulligan	<i>Professor of Molecular Biology</i>
Jerome I. Friedman	<i>Institute Professor, Professor of Physics</i>
Morris Halle	<i>Institute Professor, Professor of Linguistics</i>
Gerald N. Wogan	<i>Underwood-Prescott Professor of Toxicology and Director, Division of Toxicology</i>
Sheila E. Widnall-Chair	<i>Associate Provost and Abby Rockefeller Mauzé Professor of Aeronautics and Astronautics</i>

## **Committee Staff**

Charlene Placido	<i>Assistant to the Vice President for Research</i>
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*April 15, 1992*

Please note that since the original publication of this report, MIT's Academic Misconduct Policy has been revised. The new policy is available through the Office of the Vice President and Dean for Graduate Education and through the office home page on the world wide web (<http://web.mit.edu/vpr/www/acadmis.html>) as well as through MIT's Office of Sponsored Programs.

# Fostering Academic Integrity

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## *Report of the Committee on Academic Responsibility*

### Summary

The Committee on Academic Responsibility was charged to:

- a. review the current situation with respect to the community values in connection with the conduct of academic research;
- b. review our existing policies and procedures in connection with the conduct of research in view of the values held by the community;
- c. compare our existing policies and procedures with guidelines and regulations of federal and private research sponsors;
- d. suggest innovative education and mentoring programs directed towards raising the consciousness of our community concerning issues associated with the conduct of research and also propose mentoring programs related to faculty career development.

The committee found widespread recognition of our dual responsibility: that of educating the next generation of scientists and scholars for their professional responsibilities and of insuring that the research and scholarship done on our campus meet the highest standards of integrity. All of us need to have a clear appreciation of the basic values of science and scholarship and we must articulate these values clearly to our students.

We found that principles of ethical research conduct are not often explicitly discussed during the early phases of education of young scholars. Rather, individuals are left to develop their own personalized code of behavior, based in part on personal values and in part through specific examples set by their mentors. We believe that members of the faculty must develop an enhanced level of awareness of ethical issues that confront scholars at all levels of experience, and provide for a more explicit and systematic discussion of these issues with their students. The responsibility to insure systematic discussion of these issues rests with the departments and we make recommendations for educational programs based in departments.

We define three behaviors in the conduct of research that merit Institute attention. The first is research misconduct. We define research miscon-

duct as fabrication, falsification and plagiarism in proposing, conducting or reporting research or other scholarly activities. Other types of misconduct that can occur in a research setting but which are not unique to research activities are differentiated from research misconduct and defined as general misconduct. In addition, there is a range of questionable or improper research practices that we do not include in either research misconduct or general misconduct, but which can negatively affect the research enterprise, compromise the responsibilities of universities and violate ethical standards.

We present a set of generic research practices and urge discussions in departments and laboratories to establish field specific details and to determine at what thresholds deviations from these practices constitute improper or questionable research practices. We believe that discussing such research practices in research groups will contribute to our educational programs and that most disputes arising within groups about deviations from good practice should be resolved by informal discussions or mediation. We see an important role for informal mediation by faculty in departments and schools and have made recommendations to facilitate this. However, allegations of research misconduct cannot be informally resolved nor are they proper for a process of mediation.

We have made recommendations on institutional response to allegations of research misconduct, placing the responsibility for initial inquiry with the Department Head but providing central resources to insure proper procedures and institutional memory. We have discussed and made provisions to protect the rights of the accused to a fair, confidential and objective process and to insure that those who bring allegations of research misconduct responsibly and in good faith are protected from retaliation and damage to their careers.

Finally, we believe that a period of stability in federal regulations is appropriate to enable universities to gain experience in the application of procedures to insure the integrity of research done on their campuses.

## Charge and Committee Procedures

The Committee on Academic Responsibility was established jointly by the President and the Provost in May 1991 with the charge to:

- a. review the current situation with respect to the community values in connection with the conduct of academic research;
- b. review our existing policies and procedures in connection with the conduct of research in view of the values held by the community;
- c. compare our existing policies and procedures with guidelines and regulations of federal and private research sponsors;
- d. suggest innovative education and mentoring programs directed towards raising the consciousness of our community concerning issues associated with the conduct of research and also propose mentoring programs related to faculty career development.

In this report, we set out what we believe to be the consensus of the MIT community regarding the values that must be upheld in research conduct. We make specific recommendations for programs of education in research conduct. We discuss the regulatory environment in which scientific activity must now function. We propose a definition of research misconduct and make specific recommendations for procedures to deal with allegations of research misconduct.

This report is presented from a faculty committee to our faculty colleagues and to the MIT administration. We present our recommendations and intend that these will be translated into policies and serve as a basis for the development of procedures. We intend that our report will serve as a basis for further discussion among members of the community and for the development of educational and mentoring programs. We believe that these actions will allow MIT to respond effectively to the rapidly changing environment. We have not discussed all details of procedures that fall within our charge nor addressed all of the federal regulations by which MIT is bound but only those which relate to important issues involving the responsibility of the Institute for research integrity, the role of the faculty in this process and the rights of individuals caught in contentious situations. We expect that policies and procedures in this area will develop in an evolutionary manner as we gain experience.

We began our deliberations in May, 1991. We met with many members of the MIT administration, faculty, graduate students and postdoctoral fellows and associates and reviewed a substantial body of

literature dealing with the issues of responsibility in the conduct of scientific research and scholarly inquiry. We read transcripts of congressional hearings and media coverage of developing cases. Our report benefited specifically from the ongoing study of scientific responsibility by the National Academy of Science. We reviewed procedures used by other universities to address allegations of research misconduct. We commissioned a study of education in research ethics that gathered educational materials of general usefulness, surveyed other universities to determine what courses and programs are in place or planned, generated a number of scenarios illustrating difficult issues that arise in the application of principles of good research practice, and produced a document containing material that may be useful to departments for their educational programs. Copies of this document are available from the Committee.

Members of the community were most helpful to us, generously giving of their time and sharing openly with us their perceptions and experiences as they impinge on these issues. We benefited from descriptions of activities already underway in several departments and schools to deal with the issues raised herein, and from reports of relevant experiences elsewhere and lessons learned. In August we presented an interim report that was widely distributed throughout MIT. Many individuals came before us to discuss various aspects of these issues in the light of that report.

## Findings and Conclusions

The committee found widespread recognition of our dual responsibility: that of educating the next generation of scientists and scholars for their professional responsibilities and of insuring that the research and scholarship done on our campus meet the highest standards of integrity.

We found that principles of ethical research conduct are not often explicitly discussed during the early phases of education of young scholars. It is critical that members of the faculty, both senior and junior, develop an enhanced level of awareness of ethical issues that confront scholars at all levels of experience, and provide for a more explicit and systematic discussion of these issues with their students. Programs dealing with the ethical conduct of research are most effectively carried out in departments and research groups.

We defined three behaviors in the conduct of research that merit Institute attention: research misconduct, general misconduct and questionable or improper research practices. Each requires a unique institutional response.

Generic research practices provide a framework for discussions in research groups about research conduct; most disputes arising within groups about

deviations from good practice should be resolved by informal discussions or mediation. Faculty have an important role to play in informal mediation of disputes and in acting as advisors to individuals with concerns about research conduct. However, allegations of research misconduct cannot be informally resolved nor are they proper for a process of mediation.

Effective institutional response to allegations of research misconduct in research carried out at MIT places the responsibility for initial inquiry with the Department Head but provides central resources to insure proper procedures and institutional memory.

We must protect the rights of the accused to a fair, confidential and objective process and insure that those who bring allegations of research misconduct responsibly and in good faith are protected from retaliation and damage to their careers.

Finally, we believe that a period of stability in federal regulations is appropriate to enable universities to gain experience in the application of procedures for carrying through with their responsibility to insure the integrity of research done on their campuses.

## **Summary of Recommendations**

As a result of our deliberations and findings we make the following recommendations:

1. That the MIT faculty and administration make explicit their commitment to academic integrity and to the establishment and maintenance not only of proper research conduct but also of an environment in which both research and teaching can be carried out effectively.
2. That each department form a working group to reflect on current practices, the values they promote, and changes in practices that would improve education and research, particularly with respect to the specific research conducted by members of that department.
3. That MIT establish a series of workshops on research conduct; that these workshops be organized at the level of departments, laboratories, or research groups and be of a size to insure that individuals have an opportunity to speak; that these workshops be held periodically to provide new members with an opportunity to become familiar with the traditions and procedures of the group; and that attendance at these workshops be encouraged.

4. That MIT move to establish procedures for mediation as a part of its procedures for dispute resolution and that consideration be given as to application of the principles of mediation in the inquiry process when appropriate.

5. That each department designate individual faculty members to serve as advisors and informal mediators.

6. That MIT define research misconduct as fabrication, falsification and plagiarism in proposing, conducting or reporting research or other scholarly activities.

7. That a single set of internal procedures including standards of proof, and rights of complainants and accused among others be used for the investigation of all allegations of research misconduct involving faculty and staff.

8. That the responsibility for inquiring into allegations of research misconduct be vested in Heads of departments and interdepartmental laboratories or comparable administrative units; that this normally be done by setting up a fact-finding panel whose report provides the basis on which the Head decides what further steps are appropriate, including a recommendation to the Provost that a formal investigation is warranted.

9. That the Department Head submit all proposed plans and procedures for inquiries into allegations of research misconduct to the Office of the Provost for approval before the process is initiated; that the process to be followed in conducting inquiries and investigations be the responsibility of a specially designated individual(s) in the Office of the Provost; that the person(s) so designated be responsible for developing guidelines to be followed in carrying out inquiries and investigations.

10. That MIT insure a supportive environment for individuals who come forward with concerns about research conduct; and that specific provisions to insure the protection of complainants who act in good faith be a part of the plan for conducting an inquiry into allegations of research misconduct and be submitted to the Office of the Provost before the inquiry is initiated.

In our report, we also make many suggestions and observations that we feel will improve the environment for research and education on our campus and improve the procedures for responding to allegations of research misconduct.

## I. Introduction

In our role as a teaching institution as well as a research institute, we have a dual responsibility: that of educating the next generation of scientists and scholars for their professional responsibilities and of insuring that the research and scholarship done on our campus meet the highest standards of integrity. In our discussion with members of the MIT community we have found widespread acceptance of these responsibilities. There is agreement that we must transmit the values of science and scholarship and the specifics of good engineering and research practice to the next generation both to the undergraduate and graduate students in our classes and to the post-doctoral fellows and junior faculty. It is widely understood that formal instruction is only a part of the educational process and that the core experience in the education of almost every scientist and scholar is to be found in the informal teaching — one-on-one — more often than not — that goes on outside the classroom and officially scheduled academic exercises. Since the atmosphere in the different research groups and the relationships among their members is central to this process, constant attention must be paid to the consequences that actions of individuals and their informal behavior may have on this informal learning process.

We believe that the establishment of our committee represents an opportunity for the MIT community to engage in discussions about the shared values it holds in the conduct of research and in the education of students and we recommend that the MIT faculty and administration make explicit their commitment to academic integrity and to the establishment and maintenance not only of proper research conduct but also of an environment in which both research and teaching can be carried out effectively.

We doubt that a direct cause and effect relationship between the environment for research and the occurrence of research misconduct can be established. Rather we assume that occasional allegations of research misconduct will occur in a large institution with an intense research focus such as MIT, and the Institute and its faculty must be prepared to deal effectively with these difficult issues. We make recommendations about education in research conduct because it is part of our educational responsibility to our students and will improve the climate for research and scholarship on our campus.

Although in our deliberations we concentrated primarily on research in science, broadly defined as the physical, biological and social sciences and engineering, we have also had discussions with members of the Schools of Humanities and Social

Science, and of Architecture and Planning and conclude that the issues of professional conduct encountered by these colleagues are not fundamentally different from those encountered by researchers and practitioners in science and engineering. In particular the values we discuss and the need for education in these values are not limited to individuals engaged in scientific research but are of crucial importance to the entire MIT community. We intend our discussions of research integrity to apply more broadly to scholarship and scholars throughout the Institute, including creative activities such as design in our definition of research. In some cases we must speak more specifically to science in responding to regulations governing the use of federal funds or in discussing research practices.

## II. The Changing Environment for University Research

The last half century has seen the creation of a uniquely American institution, the research university, of which in many respects MIT is the prototypical example. Like universities of past generations, the modern research university pursues twin objectives: transmitting to the next generation the knowledge and understanding that mankind has gained in the course of its history; and extending the frontiers of what is known and understood. The relative importance of the latter objective has dramatically increased. In the modern research university, and in MIT in particular, innovative research is the engine that drives the entire enterprise.

The spectacular successes that American science has achieved in the last half century were obtained largely through research conducted in universities. This work was performed predominantly with funds supplied by agencies of the US government. Although the US government had previously provided funds to universities — e.g., under the Morrill Act of 1862 and subsequent legislation — the level of government support for university research increased sharply after 1940 under a unique partnership between universities and government.

The changes that have taken place in the political and economic situation of the world in the last decade such as the collapse of the Soviet system, the emergence of Japan as the world's most dynamic economic power, the budget and banking crises and the worsened economic conditions in the United States have fundamentally altered the rationale that has justified the relationship between the US government and the major research universities. The universities — and science in general — are perceived by many as not as central to the national interest as they were during World

War II or after the launch of Sputnik, when science was seen by both the government and the public as essential to our national survival. Today, science is perceived by some as yet another interest group whose claims to public funds must be severely scrutinized. Headlines we have seen in the papers during the last few years exemplify this changed attitude. However, since science is essential to the solution of many of the problems faced by the world, it is vital that the public's esteem for and trust in science be maintained.

In addition to changes in the relationship between the research university and its chief sponsor, the US government, the last decade has also seen major changes in social relations — in particular, relations between individuals differing in race, sex and position in the hierarchy. Science places considerable value on the autonomy and the contributions of the individual; and therefore it is expected that individuals would continually challenge the system to insure recognition for their contributions and to insure the development of their future careers. Hierarchical, paternalistic structures in university research laboratories are less likely to escape challenge by today's graduate students and postdoctoral associates. Federal laws and regulations governing the treatment of personnel and the environment for career advancement affect the freedom of action of laboratory directors and individual investigators as do MIT's own policies with respect to our responsibilities to students, faculty colleagues and Institute staff. All of us need to understand better the changes in the environment for the conduct of research and we need to respond effectively to these changes.

The changes that have taken place during the last decade require that we modify and correct procedures and attitudes that do not respond to the new reality. All of us need to have a clear appreciation of the basic values of science and scholarship, of our responsibilities for transmitting them to the next generation, and of the many ways in which these can be compromised. We must not only articulate these values clearly but also internalize them as an essential part of our lives.

### **III. Values in Research**

Research is the attempt to reveal principles or laws that govern observed phenomena. The highest standards of conduct and practice are necessary to assure the integrity of the results. Values essential in research conform to those that ideally govern behavior and activities in the general society. Among these are honesty, performing one's craft with skill and thoroughness, respect and fairness in dealing with others, and responsibility to people and institutions.

Honesty is the foundation of scholarship. Deception in the proposing, conducting, and reporting of scientific and scholarly research subverts this enterprise. Skill and thoroughness, and other aspects of craftsmanship, are essential elements in conducting research and advancing a field. Good research requires good research practice; departure from this principle is often the cause of nonproductive scientific dispute. While it is clearly desirable to be first in reporting research results, this should not be done at the cost of "cutting corners." Scientists must take appropriate care to insure the integrity and accuracy of their work.

An important aspect of research practice is the proper reporting of the results of one's work. Data, procedures, and controls must be fully disclosed in publications to allow the experiment to be replicated and the results and conclusions to be evaluated. Criteria used to select the data presented should be explained and defended. Such disclosures are essential to insure the proper functioning of the system by which the priority, credit and support for research is decided.

Errata should be promptly submitted to correct errors discovered after the publication of results. While research is inherently a risky enterprise, every effort must be made to minimize error. One way to decrease the probability of error is to make the research data available to all collaborators for their review. As a minimal requirement, each co-author should be prepared to take responsibility in his or her area of expertise for the evaluation of data and procedures as well as for the conclusions of the paper. Ideally, all authors should be able to take responsibility for and to defend the conclusions of the paper as a whole. Research data should be retained for a reasonable time after publication to allow for examination by others.

Respect for and fairness to others requires that researchers be scrupulous in assigning proper credit for intellectual accomplishments. Significant research contributions by individuals in a group project must receive acknowledgment through authorship on publications, or other suitable means. While there are varied practices with regard to authorship, fairness requires that each author should have made a significant contribution to the work. Specialized contributions that do not merit authorship should be acknowledged. In addition, the published results of others used in research publications should be properly referenced.

Education is the primary function of a university and it must play a significant role in university research activities. The education and development of postdoctoral fellows and associates and graduate students in research is as important as obtaining



research results. Faculty have the responsibility to communicate to the next generation of scientists the values that govern research practices as well as knowledge and research expertise in their fields.

Although errors in science can be reduced by adherence to good research practice, their total elimination is probably not possible. Errors generally create scientific disputes and are ultimately rectified by the self-correcting mechanisms inherent in the scientific enterprise. While most fraudulent research can be expected to be corrected by these same mechanisms, research misconduct is so damaging to science and scholarship that the public record must be corrected whenever it is identified. This requires an appropriate institutional response when research misconduct is alleged.

Research misconduct is a violation of trust that society places in the scientist. In order to search for truth, the scientist is privileged to be granted resources in a compact with institutions, government, and society in general. Research misconduct is a betrayal of this compact. When trust erodes, so does support. In addition, research misconduct can have harmful practical consequences. It is wasteful of resources and time: not only the resources used by the offending scientist, but by other scientists who attempt to verify or extend fraudulent results. When fraudulent results influence medical, technical, and political decisions, they can have harmful consequences to society in general.

Secrecy is antithetical to the tradition of university research that basic knowledge obtained in research and scholarly endeavors should be available to all. Since the education of young scholars comes in part from participation in the debate that typically occurs in a collegial research environment as new ideas and results are described, proprietary and classified research in universities is detrimental to the objectives of education. Faculty engaging in such research are not able to divulge resulting ideas and knowledge to students and colleagues in general, eliminating this part of their efforts from the educational mission of the university, thus reducing their effectiveness as teachers and as mentors. In addition, students and postdoctoral associates participating in this type of research are not able to get appropriate credit and recognition for their work in open publications and meetings, which can be highly damaging to their careers.

While we recognize that a certain degree of confidentiality might be understandable before results are published, we were concerned by reports that competition among groups and individuals has sometimes resulted in the imposition of excessive restrictions on the free exchange of information,

even among faculty and students in the same department. Such informal "classification" of information in a research area cannot help but interfere materially with the effectiveness of teaching.

Conflicts of interest can be highly detrimental to the research environment. They can affect the researcher's objectivity and consequently distort research results. In the peer review process they can lead to unfair and wrong decisions based on personal interest or advantage. Conflict of interest must be avoided or fully disclosed. Such disclosure allows an institution, whether a journal, a professional society, a university or a federal agency, to conclude whether the conflict of interest as disclosed is acceptable under its rules and regulations.

MIT has specific policies dealing with classified and proprietary research, and specific policies for outside professional activities including rules applicable to potential conflicts of interest in research conducted at MIT. In our discussions, we met with several individuals including junior members of our faculty who reported instances of poor mentorship or poor research environment that were driven by apparent conflicts of interest on the part of faculty members. Although we believe that MIT has established thoughtful and effective policies and procedures to monitor the outside professional activities of its faculty, we recommend that these policies be reviewed with special emphasis on how such activities impact on a faculty member's effectiveness as a teacher and as a mentor.

#### IV. Research Misconduct

It is important to define clearly various categories of departures from accepted values in scientific research in order to enable the Institute to respond appropriately to allegations of such behavior. The most serious of these is **research misconduct**. Research misconduct is a deliberate act to falsify research results.

A different term, **scientific misconduct**, is used in regulations that govern research supported by certain federal agencies. The definitions of scientific misconduct used by two federal agencies as a basis for their regulations are as follows:

##### *PHS Policies and Procedures*

"Misconduct or misconduct in science is defined as fabrication, falsification, plagiarism, or other practices that seriously deviate from those that are commonly accepted within the scientific community for proposing, conducting or reporting research. It does not include honest error or honest differences in interpretations or judgments of data."

## *NSF Policies and Procedures (revised May 15, 1991)*

"Misconduct means (1) fabrication, falsification, plagiarism, or other serious deviation from accepted practices in proposing, carrying out, or reporting results from activities funded by NSF; or (2) retaliation of any kind against a person who reported or provided information about suspected or alleged misconduct and who has not acted in bad faith."

Fabrication is presenting fictitious data or results; falsification is altering data or results including selective omission of data without scientific or scholarly justification; and plagiarism is using the words or ideas of others without acknowledgment. The definitions of **scientific misconduct** above also include "other practices that seriously deviate from those that are commonly accepted within the scientific community ." The federal government has looked to the scientific community to define such practices in reaching judgments about specific cases that occur on university campuses. The scientific community has strongly protested the vagueness of this language as being open to abuse.

Because of the severity of the sanctions for research misconduct, it is necessary to have a clear definition of what is to be sanctioned. In our review of scenarios of research misconduct and other examples of egregious acts which surely merit attention, action and possible sanction from the Institute, we found that all incidents that we would characterize as **research misconduct** can be encompassed by the categories of fabrication, falsification and plagiarism. By definition, therefore, research misconduct in research supported by NSF or NIH constitutes **scientific misconduct**. We have identified no "other practices which seriously deviate from those commonly accepted within the scientific community" that we believe should be characterized as research misconduct and therefore we recommend that **MIT define research misconduct as fabrication, falsification and plagiarism in proposing, conducting or reporting research or other scholarly activities.**

Research misconduct does not include errors in judgment or mistakes in the recording, selection, analysis or interpretation of data. A scientific disagreement about results that have been fully documented in a publication is not the basis for a charge of misconduct. Conversely, an allegation of misconduct cannot be countered by asserting that the science was correct if the data initially used to advance a scientific claim were fabricated. Between error and misconduct lies a range of attitudes and behaviors such as carelessness, negligence, reckless disregard and deliberate

disregard in the handling of research results that, while not falling within the scope of research misconduct, none-the-less are quite corrosive to the research environment.

There are other types of misconduct that can occur in a research setting, but which are not unique to research or scholarly activities and should thus be differentiated from research misconduct. We define these as **general misconduct** and include the misappropriation of funds or equipment, harassment, vandalism, unreported conflicts of interest, etc. These are offenses that violate legal statutes or Institute rules and can be addressed through established mechanisms. Many examples of misconduct that are unacceptable in the research environment would fall under this category; for example, deliberate interference with the research apparatus of others could be considered vandalism. Because existing complaint and disciplinary procedures can address these issues, we do not consider the issue of institutional responses to allegations of **general misconduct** to be a part of our charge nor do we include this category under **research misconduct**. However, because federal regulations quoted earlier define **scientific misconduct** to include behaviors we would consider **general misconduct**, such as retaliation against people who allege misconduct, a determination of which situations require the procedures and reports mandated by federal regulation must be made in each case. In these cases we would follow the procedures for handling allegations of research misconduct (outlined later) which are consistent with federal guidelines for handling allegations of scientific misconduct.

In addition to **research misconduct** and **general misconduct**, there is another broad range of practices that require institutional attention, viz, **questionable or improper research practices**. These are practices that we do not place under the classification of either research misconduct or general misconduct, but which negatively affect the research enterprise, compromise the mentoring and educational responsibilities of universities and in general violate ethical standards.

## **V. Research Practices**

Below is a set of generic research practices based on guidelines that have been collected from a variety of sources: research institutions, universities and professional societies with field-specific references removed or reworded to make them generally applicable. These are generally viewed as a framework for the proper performance of research and mentoring. Because of differences between fields, there should be discussions in departments and laboratories to establish the field specific details and to determine at what thresholds

*We present examples of scenarios involving the conduct of research that have been useful to stimulate discussions among students and faculty in educational programs; scenarios courtesy of the Whitehead Institute.*

## Late One Night

*Participants:* John Palant, graduate student  
Sandra Dunn, postdoc  
Barbara Steel, professor

*(After a group meeting on Tuesday afternoon)*

**Professor Steel:** Sandra, you were unusually quiet at group meeting today.

I thought you'd planned to discuss the results of your last fractionation. I wanted to go over the data with you this morning, but when I checked at your bench at eleven o'clock you hadn't come in. Is something wrong?

**Sandra:** No, nothing's wrong. I was reading the gels late last night and I overslept. I have a meeting now outside the building, but I'll knock on your door when I come in tomorrow.

**Professor Steel:** I'll be here, but try to catch me before lunch. I have appointments most of the afternoon.

*(Three days later, in the hallway)*

**Professor Steel:** John, have you seen Sandra? She said she'd stop by on Wednesday to go over her data with me, but I haven't seen her since group meeting.

**John:** She hasn't been around much during the day, but I know she's been working at night. You know, it's strange. Monday she said she had an idea that might help me find the co-activator for my DNA binding protein. I asked her about it at the meeting, but she said she'd been wrong and I should forget about it. I've been so frustrated the last few weeks that I haven't been coming back in after dinner.

**Professor Steel:** I know it's been hard, but I'm sure you're on the right track. You found the DNA binding protein; you just need to find the co-activator to make the whole thing work. The changes we discussed at group meeting might do the trick. I've got a committee meeting now. Will you leave a note on Sandra's desk asking her to call me?

**John:** Sure I'll let you know on Monday how things worked out.

*(Monday morning in Professor Steel's office. A knock at the door.)*

**Professor Steel:** Come in. Oh, Sandra, it's you. I've been trying to reach you for three days. Where've you been?

**Sandra:** Take a look at these *(she hands Professor Steel some papers)*.

**Professor Steel:** What are they?

**Sandra:** I've drafted two papers. One describes the work we planned to talk about last week. I realized when I read the gels last Monday that I'd accidentally found the answer to John's problem. Suddenly, it was clear that we had an entirely new class of DNA binding proteins and their partner-co-activators. I just needed one more experiment to confirm the results.

*(Professor Steel quickly reads through the two papers)*

**Professor Steel:** This is terrific. I can't believe we didn't see this before. But Sandra, what about John? Why didn't you tell him you'd found the answer to his problem? I mean, this is his thesis project. You could have done the last experiment together. He should be included in the final paper too.

**Sandra:** I don't think so. I've thought about it a lot. I put his name on the first paper because I started with his technique for isolating the DNA binding activity; but the second paper on the co-activator and its implications for all regulation is mine. I want it to stand out in the journal with just two authors.

**Professor Steel:** I can't force you to put John's name on the paper, but I think you should consider it again. I like to think we all work together in this lab. Have you shown these papers to him yet?

**Sandra:** No. I thought I'd present them at group meeting tomorrow. What do you think?

### Consider:

- A. If you were Professor Steel, would you insist that John Palant be included in the second paper?
- B. Should Sandra have done the experiment or should she have told John about her idea?

deviations from these practices constitute improper or questionable research practices. While we do not consider such deviations to constitute research misconduct, they interfere with the responsible practice of research and should be strongly discouraged. We believe that discussing such research practices in research groups will contribute to our educational programs and that most disputes arising within groups about deviations from good practice should be resolved by informal discussions or mediation.

## A. Data Management

1. *The results of research should be recorded and maintained in a form that allows access for analysis and review. Research data should*

*always be immediately available to scientific collaborators or supervisors for such examination.*

2. *Research data, including primary experimental results, should be retained for a sufficient period to allow examination and further analysis by others. After publication, the primary research data generally should be made available promptly and completely to other responsible scientists who seek further information.*

## B. Publication Practices

1. *Other than oral presentation in scientific meetings, publication in a professional journal should normally be the mechanism for the first public disclosure of new findings.*

2. *Timely publication of new and significant results is important for the progress of science. Similarly, it is the obligation of each scientist to provide prompt retractions or corrections of published work when necessary.*

3. *Multiple publication of the results of a scientific investigation or of the same or similar data is inappropriate. Each publication should make a unique and substantial contribution to its field.*

4. *Each publication should contain sufficient information to enable the informed reader to assess the validity of the publication's conclusions. Ideally, each scientific paper should contain all the information necessary for the scientific peers of the authors to repeat the experiment. Brief communications should be followed by publications containing this information.*

### C. Authorship

1. *"Honorary authorship" is never acceptable. Authorship should be limited to those who have made a significant contribution to the conceptualization, design, execution, and/or interpretation of the research study. All those who have made such contributions should be offered the opportunity to be listed as authors.*

2. *Each coauthor should take responsibility for the full evaluation of data and procedures and for the conclusion of the paper in his or her area of expertise. Ideally, all authors should take responsibility for the conclusions of the paper as a whole. Other individuals who have contributed to the study should be acknowledged, but should not be identified as authors.*

3. *The submitting author should make every effort to insure that each author has reviewed the manuscript and authorized its submission. The submitting author has the responsibility to coordinate the responses of the group of authors to inquiries and challenges and must assure that the manuscript as published has been approved by all authors.*

### D. Peer Review

1. *Peer review can serve its intended function only if the members of the scientific community provide thorough, fair and objective evaluations. Although peer review is a difficult and time-consuming activity, scientists have an obligation to participate in the peer review process and, in doing so, they make an important contribution to science.*

2. *Scientists should not make any unauthorized use of information or ideas that are obtained*

*through peer review. Any information contained in the material subject to review should be held as confidential.*

3. *Peer review requires that the reviewer be expert in the subject under review. The reviewer, however, should avoid any real or perceived conflict of interest. Normally, such a conflict of interest would require a decision not to participate in the review process and to return any material unread. In any event, the reviewer should disclose any potential sources of bias.*

### E. Training and Education

1. *Each student engaged in research should have a designated primary research mentor. It is the responsibility of this mentor to provide a training environment in which the student has the opportunity to acquire both the conceptual and technical skills of the field.*

2. *The supervised research experience should extend beyond the performance of tasks assigned by the supervisor; the student should be provided, over time, with an increasingly independent role in the choice and performance of research projects.*

3. *Mentors should not negatively impact the careers of students or postdoctoral associates to benefit the mentor's research program.*

4. *The research experience must impart to the student appropriate standards of scientific conduct. The mentor must convey these standards both by instruction and by example.*

5. *Research supervisors should discuss the authorship policies and other intellectual property issues currently used in their research group with potential new members of the group.*

6. *Mentors have a responsibility to provide students and postdocs with a realistic appraisal of their performance and with advice about career development and opportunities. Discussion should take place about continuation of the line of research after the student or postdoctoral associate leaves the laboratory.*

### VI. Education in Research Conduct

Ethical behavior in the conduct of scholarly research is of central importance in the educational programs of all academic institutions, but is of special significance in those with a major research emphasis, such as MIT. From our discussions with a variety of faculty, postdocs, and graduate students, we found that principles of ethical research conduct are not often explicitly discussed during the early phases of education of young

scholars. Rather, individuals are left to develop their own personalized code of behavior, based in part on personal values and in part through specific examples set by their mentors. A number of postdoctoral associates indicated that this mechanism for developing principles of ethical conduct can lead to considerable confusion and uncertainty regarding their responsibilities and prerogatives within their research groups. Issues of authorship, publishing in general, and intellectual property were most often cited by the postdocs as issues needing a more forthright, explicit discussion by their mentors.

We met with a large group of postdocs following the issue of our interim report. They stated that our interim report had been useful in promoting discussion in their research group about research conduct. In most cases these discussions were welcomed by the faculty who participated along with their students. The graduate students with whom we met were unanimous in their desire for more explicit discussion of these issues at the departmental level. Both graduate students and postdocs agreed that an initial discussion of these issues with potential research supervisors should have occurred but all were uncertain about how to initiate such a discussion.

Complex issues of authorship and intellectual property arise quite naturally in the context of academic research. Students coming into a group, for example, are not always sure "who owns the data." Collaborative research often involves agreements about the time of publication, sometimes across several university groups. When is a student free to publish the results of the experiment? When is it appropriate to publish a specific set of experiments? Other issues arise when a student leaves the laboratory for a new research position at another institution. The student may be involved in the preparation of grant proposals both to continue the research in the new position and to provide for the continued work of the laboratory at MIT. Questions can arise as to "who owns the problem." What material and equipment will the student be allowed to take on to the new position?

In our meetings with graduate students and postdoctoral associates we were told of authorship policies that seemed to us to deviate from good practice. Several individuals reported to us that in certain groups the group's leader treats research conducted by the students as part of his or her own property. It would be difficult to exaggerate the damage that such conduct inflicts on the atmosphere of trust that is required for science and scholarship to flourish.

Where there exists confusion today about issues of research practice among students, there will exist uncertainty when they must lead their own research

groups and provide guidance to the next generation. Problematic behavior in research conduct can result from lack of awareness of what constitutes appropriate behavior, from insufficient emphasis being placed on the importance of appropriate behavior, or from significant flaws in the character of particular individuals.

While we believe that this report represents a first step towards increasing the awareness of all members of the MIT Community regarding the many issues of academic responsibility and research conduct that face us in the 1990's, we also believe that in order to sustain this awareness and further improve the community's understanding of these issues, the report should be followed by the establishment of specific educational programs. Because of the importance of mentorship in the establishment of values of ethical research conduct, we think it is critical that members of the faculty, both senior and junior, develop an enhanced level of awareness of ethical issues that confront scholars at all levels of experience, and provide for a more explicit and systematic discussion of these issues with their students.

Towards this end, several activities are underway and others should follow. First, an Institute-wide seminar series that deals with the changing relationship between research universities and the federal government was initiated by the Program in Science, Technology and Society and has been well attended by faculty from throughout MIT. Such a discussion helps faculty to focus upon their broader responsibilities set in a historical and national context. We suggest that a seminar series of this type be continued every year, perhaps sponsored by the Office of the President or Provost, in order to emphasize the strong support by the highest levels of the MIT administration for such faculty involvement. In addition we note the establishment of a School-wide committee by the Dean of Science. The charge of this committee has been to define further appropriate standards of academic behavior, to define and contrast differences in practices that may exist from field to field, to increase the awareness of the faculty regarding issues of academic responsibility, to facilitate the creation of novel educational programs for postdoctoral and graduate students, and to coordinate education programs initiated by departments within the School. Other schools may wish to establish such a committee.

Since the fundamental responsibility for educational programs in research conduct rests with the department we recommend that each department form a working group to reflect on current practices, the values they promote, and changes in practices that would improve education and research, particularly with

respect to the specific research conducted by members of that department. An important role of departmental working groups would be to develop specific educational programs as well as to discuss some of the less well-defined roots of interpersonal conflict that lead to general problems within research laboratories. Results of the deliberations of these working groups could periodically be reported to the department as a whole to encourage further discussion among the faculty, students and research staff. Based on these discussions, individual faculty members would be strongly encouraged to have similar discussions with members of their own research groups.

In addition to stimulating individual discussion between faculty members and their research groups, individual departments should institute (perhaps on an annual basis) explicit discussions of research practices, in which a variety of faculty members and research groups participate. The involvement of several faculty members in these discussions would provide students with a broader exposure to these issues than they would receive as members of a single research group. Individual faculty members will also benefit and will be aided in dealing with the issues that arise with their own students. In addition, such discussions, if formalized and continued on an annual basis, would be one way to fulfill new federal requirements for training in the ethical conduct of research.

What would be the content of such discussions? Many interesting discussions would be in the gray areas, where no single principle guides action and yet the issues involved are important and contentious. One can begin to lay out what seems to be reasonable principles of research behavior, which, when applied to specific cases, will evoke very different reactions. The use of scenarios to engage a discussion group in the specifics of a case is a particularly valuable approach to the discussion of responsible research conduct. Although there will be a few areas in which all will readily agree, individual, field and group-specific differences in research practices will quickly emerge. These discussions can reveal that such issues are invariably complex, that reasonable individuals can differ in their point of view, that a common framework exists within which these issues can be debated, that such issues are proper to discuss and debate in a research environment, and that individual faculty are open to discussions with students about their concerns. Recently, during a retreat, the Whitehead Institute organized a discussion session that involved the use of such scenarios. This discussion was led by an experienced "facilitator," and included the entire faculty and research staff of the Institute. Feedback from the participants has been extremely positive.

We recommend that MIT establish a series of workshops on research conduct; that these workshops be organized at the level of departments, laboratories, or research groups and be of a size to insure that individuals have an opportunity to speak; that these workshops be held periodically to provide new members with an opportunity to become familiar with the traditions and procedures of the group; and that attendance at these workshops be encouraged. We encourage senior members of the administration to participate in such workshops.

## VII. Government Regulations and MIT Policies and Procedures

### VII.1 Overview

Universities have been subject to an increasing set of regulations affecting the conduct of federally supported research. Since the university is the official recipient of the funds, the primary responsibility for fulfilling these requirements falls upon it. Since the faculty are the principal investigators and the supervisors of the research, they must accept the ultimate responsibility for fulfilling the university's obligations. Federal regulations govern the conduct of research and the treatment of students, faculty, research staff and research subjects in areas such as safety, protection of human subjects, animal care, equal opportunity, harassment, and in financial affairs such as overhead and auditing practices.

As a result of several highly visible cases of alleged scientific misconduct, additional federal regulations have been established governing institutional response to charges of scientific misconduct. The regulations governing investigations of allegations of scientific misconduct in research supported by NSF or NIH require notification of the research sponsor at an early stage in the process, at the point when formal investigation of an allegation of scientific misconduct begins. The name of the accused scientist must be reported to the agency and may be placed in a data bank available to agency personnel. Certain restrictions may be placed on this individual while the investigation is in progress such as not being able to serve on an agency review panel. The conduct of the university investigation, its timing, its findings and its outcome is overseen by the agency which receives a copy of the investigatory report. In some cases, the agency has disagreed with the findings of the university, and conducted its own investigation.

Before the advent of these regulations, MIT had established internal procedures (contained in *Policies and Procedures 1990*) to investigate

charges of research misconduct (referred to as **academic fraud**; we will not further use the word **fraud** since its legal definition involves matters that may not be present in all cases of misconduct). These procedures were recently revised to accommodate the new regulations regarding misconduct in research supported by NSF or NIH which required a two stage process that responds to allegations of scientific misconduct.

This remains an active area for legislation and regulation. The few, highly publicized cases that have occurred test the university's abilities to oversee the research done on its campus and to warrant continued public trust. While we know of no evidence that the scientific knowledge base has been seriously affected by these cases, the universities and the scientific community have been damaged in the eyes of the public and the Congress, not so much because they occurred but because a number were not well handled.

At MIT, our collective understanding of these issues and our ability to respond have shifted dramatically over the past few years. Although some important things can be learned from the few past cases that have occurred at MIT, our goal must be a robust set of policies and community attitudes that will allow us to respond to new challenges, the details of which we cannot possibly anticipate, while retaining the strengths of our institution.

**We recommend that a single set of internal procedures including standards of proof, and rights of complainants and accused among others be used for the investigation of all allegations of research misconduct involving faculty and staff.** If not otherwise subject to federal regulations, allegations of research misconduct by undergraduate and graduate students are covered under MIT policy on "Academic Honesty ... Departmental Guidelines for Students."

## **VII.2 Resolving Disputes and Allegations About Research Conduct**

Disputes are normal, inevitable and often welcome elements of academic research. Disagreements about experimental design, research procedures, data selection, retention, presentation and their interpretation can play a constructive, self-correcting role in the research process. Disputes in science can act to make science itself error correcting even though individual scientists are fallible.

We found that the limited number of allegations of research misconduct that have occurred at MIT arose as one element of a complex situation which also included disagreements about authorship or publication of research results or charges of inadequate mentoring or harassment. Individuals who have concerns about research or other

misconduct, problematic research practices, failure of mentorship or other unprofessional behavior have access to advice through multiple channels. Depending on specific circumstances, consultation can be sought from a research supervisor, another faculty member, department or laboratory head, Dean or other senior administrator, an Institute ombudsperson, or a faculty member within a department designated to act as an advisor or informal mediator for the department. Efforts are made to insure confidentiality in the earliest stages of this consultation and throughout any consultation with an ombudsperson. If a more formal case is contemplated, the individual will be advised as to the degree of confidentiality that can be assured.

This multiplicity of channels is designed to maximize access to institutional resources for individuals who have concerns about research conduct. However, their full utilization by members of the MIT community is impeded by lack of awareness of their availability, and also by the hierarchical structure of the research community, in which the faculty occupy a dominant position. The perception that when allegations of research misconduct are made, the faculty within a department or laboratory will react in a unified manner to protect its members is widely shared by junior members of the community, especially graduate students and postdoctoral associates. Means need to be found to change this perception, and to create an environment in which all members of the community can be assured that voicing concerns in a responsible manner can be done without risk of damage to reputation or career.

Experience to date indicates that in many cases, vague and complex concerns may be brought forward by an individual, who may be under stress. Under such circumstances, an important role for the individual from whom advice is sought is to assist in the articulation of specific elements of concern, and in particular to identify allegations of research misconduct and differentiate them from other types of disputes or accusations.

## **VII.3 Informal Resolution and Mediation**

Since MIT is required to formally inquire into all allegations of scientific misconduct in research funded by NSF and NIH, allegations of research misconduct cannot be informally resolved nor are they proper for a process of mediation. However, many disputes such as those arising over proper research practices, can be resolved at the initial stage through informal means or through mediation.

Members of the faculty play an essential role in the resolution of disputes related to research conduct and education within the MIT community. However, an even more critical role for the faculty

## Home Runs

*Participants:* Jim Farber, postdoc  
Daniel Stern, assistant professor  
Dick Winston, professor  
Anna Wong, graduate student  
Paolo Donato, graduate student

*(Between the fifth and sixth innings at a faculty-student softball game, post-doc Jim Farber stops to talk for a minute with Daniel Stern. Stern is an assistant professor; he and Farber had the same advisor in graduate school.)*

**Jim:** Hi Dan, I haven't seen you at beer hour lately. What have you been up to besides hitting home runs?

**Dan:** Things have been very busy in the lab, and I've received ten papers to review in the past five weeks.

**Jim:** I don't know how you manage it all; anything exciting in the papers?

**Dan:** Well, as a matter of fact, Peter Van Norman's group in Sweden has discovered the *pbj* gene has a third exon. It's top secret. I wouldn't tell you, but I know you stopped working on the gene last year.

**Jim:** Actually, we're working on a related gene, *pbh*; we suspect that the product of *pbh* might form heterodimers with the *pbj* protein. Oh look, you're up at bat and I better move into the outfield.

*(One day later, Jim Farber is reporting his conversation with Dan Stern to his lab director Dick Winston and others in his research group.)*

**Dick:** Jim, are you sure that Dan said *pbj* has a third exon? That would explain why we had so much trouble cloning it. It might also explain the problems we've been having with *pbh*.

**Jim:** I'm sure that's what he said. In fact, last night I came back to the lab after the game and reanalyzed our data on *pbh*. It all fits. I don't

know why we didn't see it. We just need two experiments to confirm the results, and then we can write a paper that describes *pbh* and explores the relationship between the *pbh* and *pbj* products.

**Paolo:** Wait a minute, Jim. You can't use the information you got from Dan. He had no business telling you in the first place. You remember how secretive Van Norman's group was at the meeting in Madrid last month. You really should call them and tell them we've heard about their results.

**Jim:** I disagree. I didn't go looking for this information. Their paper most likely will be published before ours anyway.

**Paolo:** I can't believe you really feel that way. This information probably saved us two months work on *pbh* and it will help us confirm our theories about the relationship between *pbj* and *pbh*. We've got to call Van Norman's group.

**Anne:** I think you're being overly dramatic, Paolo. If we give them full credit for their contributions in our article, that should be enough. After all, if we call Van Norman's group now we'll probably get Dan in trouble. I'm sure he didn't realize the intensity of the competition between Van Norman's group and ours, and Van Norman will get the credit for cloning *pbj*. What do you think, Dick?

### Consider:

- Is Jim Farber at fault in the first conversation (for asking Dan Stern if he's noticed anything interesting in the papers)?
- How would you answer if you were Dick Winston?

*Research scenario courtesy of the Whitehead Institute*

is to create an environment in which research values and practices are discussed by all members of the research community in a free and open manner. Such an open environment within individual research groups as well as departments and laboratories should be effective in minimizing the occurrence of disputes, and in facilitating early resolution of those that do arise.

Faculty members often participate in efforts to resolve disputes. Senior members of the faculty have an especially important role, lending the benefit of their experience in acting as mentors for junior faculty, creating an atmosphere of approachability for graduate students and postdocs, and in serving as role models for all junior colleagues. When called upon to participate in inquiries into allegations of misconduct, members of the faculty must balance the values of objectivity, fairness and collegiality, and at the same time remain sensitive to the vulnerability of the accused. Junior faculty may feel particularly isolated and fear that mere questions about their behavior create doubt concerning their scientific capabilities or their abilities as research supervisors and mentors.

Several departments have established a committee or designated individual faculty to act as confidants, informal mediators and advisors for individuals who wish to bring concerns in an informal way. We believe that this will improve the academic and research environment before difficult situations develop and therefore recommend that each department designate individual faculty to serve as advisors and informal mediators. Consideration should also be given to making the list of such individuals available at a School-wide level. Such individuals should receive a common charge and specific guidance about their role in dealing with issues such as the degree of confidentiality that is due a complainant and all others attached to a case, their responsibilities to their department and to MIT, and the degree to which their actions will influence future events should a case of research misconduct develop. These individuals will need to be aware of Institute resources for referral of more serious cases that cannot be handled at the departmental level to individuals at the School or Institute level.



Many of the disputes that arise in an academic setting are appropriate for a process of mediation. Whether formal or informal, a mediation process has several elements. It must be seen as fair and objective by all participants; it must be freely entered into by all parties; it begins with a phase of sharing facts and opinions; at any point in the process one of the parties may exit, thus effectively ending attempts at mediation. In many of the disputes that arise, there will be three parties who have interests: two principals and MIT itself.

There are many paths to mediation. A process of mediation can be initiated by an Institute ombudsperson upon receiving a complaint. It can be initiated by a faculty member who has been designated to serve as an informal mediator upon receiving a request for resolution of a dispute. It can be suggested to parties in a dispute by a Department Head who would call on an individual within the community to act as an informal mediator, for example the faculty member in the department or School who has agreed to play such a role.

Upon receiving an allegation, complaint or request for resolution of a dispute in which all parties ask for mediation, the mediator has several options. The mediator might enter into a fact-finding process or in some cases set up a fact-finding panel. If a fact-finding panel is set up, all parties to the dispute should have an input into the selection of the panel. After the fact-finding process, the next step involves a mediator negotiating with the parties on the basis of the factual report. If mediation breaks down, the report is referred to an adjudicator, possibly the Department Head, who would render a decision.

In the area of research conduct, disputes are apt to have several issues combined. A dispute over authorship may lead to charges of poor mentorship, conflict of interest, poor research practices, and many also lead to charges of research or other misconduct, such as fabrication or misappropriation of funds. In these latter cases, if the fact-finding panel determines that charges of misconduct have substance, this portion of the dispute must be reported to the Department Head as discussed below.

MIT is beginning to use mediation as a mechanism to resolve disputes. We believe that there is much to be gained by incorporating the possibility of mediation into the process of inquiry (see below) in certain types of cases. If the inquiry committee is appropriately charged, then depending on their findings, their report can serve either as a basis for a Department Head's decision with respect to possible research misconduct or as a basis for a mediated settlement.

We therefore recommend that MIT move to establish procedures for mediation as a part of its procedures for dispute resolution and that consideration be given as to application of the principles of mediation in the inquiry process when appropriate.

## VIII. Procedures for Responding to Allegations of Research Misconduct

### VIII.1 Inquiries

Federal regulations require an inquiry as the first element of institutional response to charges of scientific misconduct in research supported by NSF or NIH. We view the setting up and conducting of inquiries as one of the most difficult phases of institutional response to charges of research misconduct. In no case is an inquiry sufficient to produce definitive evidence of research misconduct. This finding can be made only after a more formal process of investigation. The inquiry does not establish a presumption that research or other misconduct has occurred. Although faculty may be reluctant to see an inquiry proceed to an investigation unless the inquiry produces convincing evidence that research misconduct **has occurred**, inquiries are designed only to determine whether allegations of research misconduct **have substance**: that is, they are not frivolous, unfounded or unsubstantiated. A finding that the allegations **do not have substance** will effectively end the institutional response to a charge of research misconduct.

MIT uses inquiries to deal with a wide range of issues and MIT policies are silent, and therefore flexible, on the question of who conducts an inquiry and the nature of the complaint that will bring an inquiry into being. Federal regulations are silent on the specific requirements of who initiates and who conducts inquiries and how inquiries should be conducted beyond requiring that they be thorough, fair, prompt, confidential, and objective.

NIH regulations define inquiry as "information gathering and initial fact-finding to determine whether an allegation or apparent instance of scientific misconduct **warrants an investigation.**" These regulations require an inquiry into all non-trivial allegations or other evidence of possible misconduct that relate to funding from NIH. A written report must be prepared that states what evidence was reviewed, summarizes relevant interviews and includes the conclusions of the inquiry. The accused individual must be given a copy of the report and may append comments as part of the record. The inquiry must be docu-

mented in sufficient detail to permit later assessment of the basis for a finding that an investigation was not warranted; these documents are retained for three years.

NSF defines an inquiry as "preliminary information gathering and preliminary fact-finding to determine whether an allegation or apparent instance of scientific misconduct in the conduct of research funded by NSF has substance." NSF requires an investigation if the allegations have substance.

Consistent with our recommendation that MIT use a single procedure to deal with allegations of research misconduct, in cases not covered by federal regulations, we think that MIT should proceed to an investigation using the same standard, namely that the allegations have substance.

Inquiries should begin only after a formal allegation has been made or other substantial evidence has been produced suggesting possible misconduct or other violations of MIT policies. Allegations involving faculty or students should be brought to the attention of the Department Head; allegations involving research staff to the Laboratory Director. In some cases, the allegations should go directly to the Dean of the School. In our report we use the term Department Head to refer to the senior officer in this role, including Laboratory Directors and Deans as appropriate in this use. Allegations should normally be presented in written form and be as specific and detailed as possible. Specific evidence should also accompany the allegations whenever possible. After reviewing a number of cases and examining the procedures used by a substantial number of universities, we make the following recommendations concerning the initiation of an inquiry:

**That the responsibility for inquiring into allegations of research misconduct be vested in Heads of departments and interdepartmental laboratories or comparable administrative units; that this normally be done by setting up a fact-finding panel whose report provides the basis on which the Head decides what further steps are appropriate, including a recommendation to the Provost that a formal investigation is warranted;**  
and further that the Department Head submit all proposed plans and procedures for inquiries into allegations of research misconduct to the Office of the Provost for approval before the process is initiated; that the process to be followed in conducting inquiries and investigations be the responsibility of a specially designated individual(s) in the Office of the Provost; that the person(s) so designated be responsible for

**developing guidelines to be followed in carrying out inquiries and investigations.**

Upon receiving an allegation of research misconduct, a Department Head may conduct an inquiry or may set up a committee to conduct the inquiry. Members of such a committee must be impartial and be perceived to be disinterested. In many publicly controversial cases of scientific misconduct, charges of conflict of interest among members of inquiry committees abound. Friends, coworkers or antagonists are not appropriate members of such a committee. Department Heads may despair at choosing an inquiry committee from inside a department because of its effects on the department. In some departments it may be impossible to select a committee without perceived bias. For such reasons, nondepartmental committees bringing the necessary expertise may be the best choice. The accused and complainant should have an opportunity to challenge the composition of the inquiry committee.

The charge to the inquiry committee should be in writing and should be as specific as possible given the allegations or other evidence. We believe that, whenever possible, the charge to the committee should be limited to determining the facts and the substance of the allegations and should not charge the committee to recommend whether a further investigation should be carried out. That is, we are suggesting a separation in the role of fact finder and adjudicator. If no evidence of research misconduct is found by the fact-finding committee, then their report can serve as a basis for mediation of the dispute should the parties involved decide to enter into such a process. If the committee find that the allegations of research misconduct have substance, the report of the fact-finding committee provides the basis upon which the Department Head makes a recommendation to the Provost as to whether an investigation should be carried out.

There are several reasons for this separation in roles. First, it limits the scope and responsibility of the inquiry committee, charging them to focus on the key elements of their task: evaluation of evidence and finding of fact. It places the judgmental role with the Department Head, and the Provost. It does not burden the committee with recommending a particular administrative outcome. It should reduce the potential for tension between committee members and other departmental members who may not agree with the final outcome based on the limited information available to them.

The committee should be briefed concerning the Institute guidelines for inquiries including evaluation of evidence, burden and standards of proof and the level of certainty of committee findings to be achieved. The committee is not asked for a finding

of facts that misconduct occurred since the Institute must proceed to an investigation whenever allegations are found to have substance, that is "if there is reason to believe."

The committee would gather, hold, and examine all evidence including original data as appropriate, and would allow the accused to present evidence in writing and to meet with the committee. The evidence that such a committee would be expected to gather and evaluate includes all forms of data that faculty members have competence to evaluate: research data in its various forms, direct testimony from witnesses, publications and drafts, financial records, correspondence, logs and other laboratory records.

Inquiry into the possibility of research misconduct should not be conducted as an adversarial process between an accused and a complainant. The accused has the right to contest all of the assertions brought against him/her but not to challenge the particular individual who brought them. In some cases the committee might not elect to meet with the complainant. However, in some cases, because of eyewitness testimony, dispute about the interpretation of physical evidence, or other issues, the participation of the complainant would be required.

We expect that in most cases the committee would take testimony from both the complainant and the accused in separate closed sessions. The accused should receive a copy of the charge to the committee and the evidence against him/her and be allowed to present evidence on every key point.

We believe that given the preliminary nature of inquiries, and the many uses that MIT makes of inquiries, that attorneys should not be present at inquiries. Since the only definitive outcome of an inquiry is a finding that no misconduct has occurred, there is no finding of misconduct by the accused. We have also suggested procedures to insulate any subsequent investigation from the inquiry process to protect the rights of the accused.

The role of the complainant during the inquiry and later investigation, if any, deserves careful consideration. One possibility is to have a two branch process. In one branch, the individual who brings evidence to the Department Head may wish to have no further involvement with the case. If substantial evidence of misconduct is presented in the allegation on which a determination can be made without the involvement of the individual bringing an allegation, then that individual's participation is not required. In many cases, because of career pressures and fear of retaliation, this would be the preferred course. For example, a graduate student could take evidence of plagiarism to a Department Head who would then act on behalf of the Institute. In this case the Institute acts as the complainant and there is no requirement that

the initial complainant be made known to the accused. This individual plays no further role in the process: would not be called as a witness, would not continually furnish information, and would not be informed about the progress of the case.

In the second branch the complainant becomes a principal in the case, putting forward the initial allegation, providing documentary evidence and testimony to the inquiry and investigation committees and receiving and responding to sections of committee reports that deal with issues raised by the complainant. If the case proceeds to a formal investigation, the identity of this person would become known to the accused.

The latitude of the inquiry is an issue. It should be neither a freewheeling inquiry into every possible issue involving the accused nor need it be constrained to deal only with the issues originally raised in the initial allegation. If in the course of a careful examination of the evidence directly related to the initial allegation, the inquiry committee discovers evidence of possible misconduct not known by the complainant, then this becomes part of the inquiry and the evidence and the findings of facts should be reported to the Department Head as part of the committee report. The accused should be kept informed of the issues being considered by the committee.

The nature of inquiry into charges of research misconduct deserves careful thought. The issue is not, "Is the science correct?" at this point. Error is not misconduct; conversely, assertions that are true but made on the basis of fabricated data do constitute research misconduct. The inquiry committee is not charged with initiating repetition of the research in question, but rather with determining whether a factual basis existed at the time of submittal for the claims made in a publication.

The product of the inquiry process is a written report from the committee in response to their charge accompanied by the decision of the Department Head to recommend to the Provost whether a formal investigation of a charge of research misconduct is warranted, using the standards prescribed by law and by MIT policy. The Department Head may decide that although there is no evidence of research misconduct, other violations of Institute policies may have occurred and may recommend to the Provost that an internal investigation be initiated to deal with allegations and possible sanctions by internal procedures. If the nature of the dispute or the possible violations of Institute policies are such that mediation is an option for resolution of the dispute, then the inquiry report can serve as the basis for a mediated settlement at the request of all of the parties. In any case, the Provost must be notified about the outcome and receive a copy of the report.

## Interviews

### Participants:

Melanie Chang, postdoc  
Larry Johnston, professor  
Tom Plough, postdoc  
Richard Estaben, postdoc

*(Melanie Chang is a new postdoc in Professor Johnston's laboratory. Larry and Melanie have decided that she will work on a project begun four years earlier by Tom Plough. Tom published one paper in a relatively obscure journal and then picked up an entirely different project based on his thesis work. His subsequent research was very successful and he is now in the process of interviewing for a junior faculty position. The first scene takes place on Monday afternoon in Professor Johnston's office.)*

**Larry:** Melanie, I think you have to try the experiment again. I don't understand why it's not working. Tom describes the procedure very clearly in his paper. Have you asked him for help?

**Melanie:** No, he's been away on interview for the past two weeks. When I discussed the project with him before he left, he just said I should be very careful during the extraction process.

**Larry:** Well, talk to him as soon as he gets back. I'm sure he'll be able to help you. You can't really move forward until you repeat his experiment.

**Melanie:** Larry, I know I've asked you this before, but I'm still not clear on the answer. Do you know why Tom dropped this *idk* project after he published the paper? Why didn't he follow up on the results himself?

**Larry:** Well, you know how imaginative he is. He came to me and said he had a new idea based on some problem he'd encountered in his thesis project. He asked if he could spend a little time working on it before he continued on the *idk* gene. I told him to go ahead, and then the results were so exciting that he never looked back. In January, when I told him I was thinking of having you continue the *idk* work, he said he thought it was a good idea. He did say, though, that several aspects of the project had been very difficult technically, and that you might have some problems at first.

**Melanie:** Well, he was certainly right about that. I'll catch him as soon as he gets back. Maybe he can spend an hour or two with me in the lab.

*(Late in the afternoon on Wednesday...)*

**Melanie:** Hi, Tom. I've been trying to call you. Do you have a few minutes to talk? You know I've decided to look for the cofactors that might explain your results with the *idk* gene in chickens. The problem is, I can't repeat your experiment. I'd like to go over the procedure with you; maybe you can tell me what I'm doing wrong.

**Tom:** I'd be happy to talk about it Melanie, but right now I have an appointment with Peter Yales across the street. Why don't you call me at home tomorrow.

**Melanie:** OK, I'll call you. I really need to meet with you as soon as possible.

*(10 a.m. on Thursday...Melanie dials the telephone in her lab.)*

**Melanie:** Hi, Janet. May I speak with Tom, please? *(She pauses a minute.)* That's strange, he told me yesterday that I should call him this morning. Did this trip to Michigan come up suddenly? *(She pauses again.)* Well, I guess he must have forgotten. Will you ask him to call me as soon as he gets home?

*(Five days later, Melanie is standing in the lab shaking her head when her friend Richard Estaben walk by.)*

**Melanie:** Richard, do you have time for a cup of coffee? I need your advice.

**Richard:** Sure, just let me return these samples to the cold room.

*(Ten minutes later at a table in the cafeteria.)*

**Melanie:** Richard, what would you do if you suspected that someone had faked the data on a paper?

**Richard:** I guess it would depend on the situation. Why?

**Melanie:** Well, as you know, I've been trying to repeat Tom Plough's work on the *idk* gene so I can start looking for a co-factor. I just can't make it work. I've tried asking Tom for help, but he keeps avoiding me.

**Richard:** You know how busy he is with interviews. Maybe it's just your imagination.

**Melanie:** I thought so too at first, but when he got back from Michigan and I still didn't see him in the lab I began to wonder. I called him at home and he said he'd had a bad cold. I tried to make a joke about his avoiding me and he got very defensive. He suggested that the *idk* project might be too difficult for me.

**Richard:** Strange. I've never heard Tom say a negative word to anyone.

**Melanie:** I know it's not like him—he was one of the first people I met when I came here and he was extremely helpful about showing me around the lab. The only explanation I can think of is that he's hiding something. I know I'm repeating his procedures exactly. The results just aren't there. I've begun to wonder if he fudged the data.

**Richard:** I can't believe that's true. Why don't I come by the lab tonight and we'll go through your notebooks.

*(Sometime after midnight, Melanie and Richard are hunched over the lab bench in Melanie's lab.)*

**Richard:** I don't know what to say, Melanie. Tom's procedure makes perfect sense when I read it, but your results are clearly different.

**Melanie:** Thanks for going through it with me. Now I have to decide what to do. I guess I'll try to talk to Tom once more. I still hope I'm wrong. I know that everything he has done since the *idk* project has been above reproach. It's been repeated in at least four labs by people who've used his ideas as a starting point for new projects. I heard today he has three job offers. If I go to Larry with this and I'm right, it could mean the end of his career.

**Richard:** Tom's been my friend for three years. I don't know what to advise you. I suppose you could tell Larry that you'd rather work on something else and just drop the whole thing. Maybe it is a technical problem and we're just missing something obvious.

### Consider:

A. Would you advise Melanie to confront Tom or proceed directly to Professor Johnston?

B. Does Richard Estaben (friend of both Melanie and Tom) have any responsibility to act on the information he has?

*Research scenario courtesy of the Whitehead Institute*

## VIII.2 Research Misconduct Investigations

Federal regulations require investigation into all allegations of scientific misconduct (in research funded by NSF and NIH) that have substance. MIT uses investigative panels for a variety of purposes. It can be the final fact-finding or appeal panel in a grievance; it can be a committee set up to consider a recommendation to remove tenure; it can be a committee investigating a charge of research misconduct. MIT has policies and procedures in place to deal with these issues. The charge to our committee is to review these policies and procedures as they apply to allegations of research misconduct and to review the regulatory requirements when the research in question involves the expenditure of government funds, most specifically funds provided by either NSF or NIH. In these latter cases, federal regulations govern aspects of the procedures that MIT must follow, and impose downstream consequences for individuals found guilty of research misconduct that can include criminal prosecution. Implications of these consequences necessarily affect MIT's handling of such investigations.

Based upon our review of cases and procedures from other universities, we endorse MIT's current policy that the responsibility for the conduct of a formal investigation into allegations of research misconduct is vested in the Provost; that normally the Provost establishes a fact-finding panel whose report provides the basis upon which the Provost adjudicates the charges and determines what further steps, if any, are needed.

Such a formal investigation of charges of research misconduct will be initiated by the Provost typically upon recommendation of the Department Head, generally following an inquiry. The Institute must at this stage notify NSF or NIH if they are involved in funding the research in question; the regulations also require notification at the allegation stage under certain circumstances.

We support the separation in roles for the committee as fact finder and the Provost as adjudicator. The charge to the committee should be specific as to the finding of facts and to the level of certainty to be established concerning the facts that will enable the adjudicator to decide whether research misconduct has occurred. At the stage of investigation, the standard of proof increases beyond "a charge having substance," which was appropriate for the inquiry stage. Because of the implications for the career and reputation of the accused, we suggest that an appropriate standard for a determination that research misconduct has occurred is a finding of fact by "clear and convincing evidence" (this lies between the criminal standard of "beyond a reasonable doubt" and the civil standard "by a preponderance of the evidence").

The charge to the investigation committee may contain a mixture of allegations of research misconduct and other violations of Institute policies. It is important that the charge separate these issues to aid the committee in hearing testimony and in finding fact on which the Institute must determine the truth of each allegation. Since the implications for a finding of research misconduct differ from those for violation of internal policies, the committee must keep these issues distinct.

The Committee would be given all of the physical evidence (lab notebooks, manuscripts, etc.) that the inquiry committee had gathered and would also collect additional data as appropriate. The evidence that the committee would be expected to gather and evaluate is data that faculty members have competence to evaluate: research data in its various forms, publications and drafts, direct testimony from witnesses, financial records, correspondence, logs and other laboratory records. We believe that the committee should not gather forensic evidence that requires for its evaluation expert testimony beyond that related to the science in question, such as handwriting analysis, fingerprints, and paper or ink analysis, nor use data such as surreptitious audio or video tape recordings or other data that violate Massachusetts law, and institutional policies such as the policy on privacy.

We suggest two mechanisms to insulate the investigation process from the informal inquiry: first, that no individual serve on both committees; second, that the investigation committee not be given a copy of the report of the inquiry committee. They should not interview or discuss the case with members of the inquiry committee. This insulation of the investigation should insure that the committee focuses on their charge and the evidence. Procedural error or findings from the less formal inquiry should not influence the fact-finding of the investigation.

Confidentiality is essential in the conducting of inquiries and investigations. This is obvious with respect to the testimony of both the accused and the complainant. It should, but may not, be obvious with respect to all participants in the process including particularly the members of the committee. They must be formally bound by a directive and an agreement of confidentiality. They cannot break confidentiality to respond when the principals in the case criticize their activities, impugn motive to questions asked during closed meetings, charge favoritism, or when colleagues take sides in the case.

To the extent possible, members of the investigation committee should be chosen from outside the department of the person charged utilizing individuals from outside MIT as well as

from contiguous departments to provide the necessary expertise. The accused should have an opportunity to challenge the makeup of the committee but should not have a veto. The committee should have adequate staff and budget to carry out their task. They should be briefed by a designated individual in the Office of the Provost about their charge, about rules of evidence, issues of due process and about the standard of proof and level of certainty to be used in reaching their findings.

The latitude of the investigation is an issue. It must not be constrained to deal only with the issues originally raised in the initial allegation or outlined in their charge. If, in the course of a careful examination of the evidence directly related to the initial charge, the investigation committee comes across serious evidence of possible misconduct that was not known by the complainant or uncovered during the inquiry, then this becomes part of the investigation. The accused must be kept informed of the issues being considered by the committee.

The accused will receive a copy of the charge to the committee and must be given the opportunity to respond in writing, in meetings with the committee, and by presentation of evidence. If the accused wishes the committee to call witnesses, their names and the nature of their testimony should be given to the committee in writing. The committee would attempt to interview the witnesses suggested by the accused consistent with the developing lines of investigation.

We believe that the accused should be allowed to attend all of the evidentiary hearings of the investigation committee that deal with the issue of research misconduct. One reason is that the scientific chain of reasoning that leads the committee to understand the allegations and eventually to render a finding can be long and tortuous. Fairness is served if the accused is present to understand in detail the reasoning that is being used to charge and assess culpability. The accused would not respond at that point in the proceedings unless asked by the committee, nor question witnesses, but will be able to specifically respond to the charges in writing and by testimony at a later date. The committee will thus be aided in more specifically and accurately carrying out their charge.

Accurate record keeping of evidentiary hearings for the purpose of fairness to the accused, puts an administrative burden on the committee. If the accused is present, the burden on the committee shifts to record keeping for the purpose of reaching and justifying their findings and in some cases communicating these to the sponsoring agency. For those portions of the investigation that deal with aspects of the case other than research

misconduct, the accused need not be present but should receive an accurate summary of the testimony presented. The committee is of course free to deliberate in executive session. It is the responsibility of the Chair to structure the hearings to protect the rights of both the accused and the other witnesses.

The role of attorneys at this stage in the process deserves some consideration. An individual is of course always free to consult an attorney at any point in life for any reason. The issue is their participation in institutional processes. Various universities deal with this issue in various ways. Some allow attorneys to be present, but do not allow them to speak. Others do not permit their attendance at any phase of university proceedings. By custom and tradition, MIT has not permitted attorneys to participate in Institute proceedings for either students, faculty or employees.

However, special circumstances apply when the investigation concerns research funded by the federal government. In this case, a finding of scientific misconduct may give rise to criminal charges being filed against the accused. In this case, there is an issue of "self-incrimination" during the Institute procedures. In cases involving students, MIT has decided to hold in abeyance a student discipline case when the student was also under possible indictment by a court for the same incident. In the case of scientific misconduct, we are not free to do this because of the time limits set by the agencies and our responsibilities to carry through the federally mandated process. Thus, we may be asking the accused to participate in an Institute procedure where there exists some possibility of self-incrimination. Therefore, we suggest provisions be made for the accused to bring an attorney for counsel when testifying, if desired. In this case, the role of the attorney is restricted to that of a confidential advisor to the accused. The attorney would not be present during the testimony of other witnesses, nor raise questions or objections with the committee.

At any time in the proceedings, the Chair may rule that the presence of the attorney is interfering with the committee procedure and may refuse permission of the accused's attorney to attend the hearing. In this case provisions should be made for the accused to have access to the attorney outside of the hearing room or by telephone as the hearing progresses.

We believe that members of the community have an obligation that is inherent in their positions as MIT faculty, staff or students to participate in Institute administrative processes such as those discussed herein. If the accused refuses to participate, the committee will proceed as best they

can and base their findings on the evidence presented. In the case of research funded by NIH and NSF, if the committee cannot make a finding because of the refusal of the accused to participate, MIT may have no choice but to refer the case to the agency for investigation.

The outcome of the investigation is a written report containing a summary of the evidence and a finding of fact to the standard of certainty outlined in their charge. The accused receives a copy of this report and may append a response. The complainant receives a copy of those portions relevant to the complainant's allegations and may append a response. The Provost receives the report plus the appended responses, adjudicates the case and decides on an appropriate action within the framework of MIT policy and procedures. In all subsequent Institute proceedings including appeals and hearings to remove tenure, we recommend that, in the absence of new and significant evidence, the facts not be refound but used as the basis for further procedures. If the sponsoring agency is NIH or NSF, the outcome of the investigation and the actions taken must be reported; the agency may take additional action.

## **IX. Protection of Complainants**

MIT must insure that individuals who raise allegations in good faith do not experience retaliation by any supervisor. We suggest that this concern be dealt with early in the process by appropriate means, such as by making alternative arrangements to have the individual's work supervised and evaluated, and by insuring fair and objective letters of recommendation. Part of the setting up of an inquiry should include a plan to insure the protection of the complainant. Alternatively, individuals who raise allegations maliciously may be guilty of general misconduct.

**We recommend that MIT insure a supportive environment for individuals who come forward with concerns about research conduct; and that specific provisions to insure the protection of complainants who act in good faith be a part of the plan for conducting an inquiry into allegations of research misconduct and be submitted to the Office of the Provost before the inquiry is initiated.**

## **X. Rights of the Accused**

Great sensitivity is required towards protecting the rights of the accused, who is after all a colleague and member of our scholarly community and who is presumed innocent of the allegations until the investigation is complete. There is a natural imbalance between the Institution and the individual. In this process their interests will collide.

The Institute will have legal resources and will carry through the required processes to fulfill its responsibilities. The individual will feel isolated and may lack resources to fully protect his or her rights.

The rights of the accused during the proceedings described above are: adequate notice of the charges, and an opportunity to respond in an impartial, fair, timely and objective process. We have outlined procedures to provide **adequate notice**: receiving the charge; attendance at evidentiary hearings during the investigation; and the opportunity to receive the committee reports. We have outlined procedures to provide the **opportunity to respond** including having an impartial committee; an opportunity to present witnesses; and an opportunity to respond to the committee report. The accused has a right to avoid self-incrimination related to a potential criminal proceeding, and we have recommended the option of the accused, if he or she testifies, having the right to consult an attorney — but not otherwise having lawyers participate. The accused has the right to a confidential proceeding; individuals who disclose facts concerning the case to individuals without a need to know may violate MIT policy and may risk civil suits. Current MIT policy also grants the right to be accompanied to MIT proceedings by an MIT advisor.

Procedures to insure these rights differ between inquiry and investigation. Since only an investigation can result in a finding of misconduct and lead to sanctions as well as public disclosure, the procedures are necessarily more formal.

Our suggestions for procedures to safeguard the rights of the accused, in this and in previous sections, are based in part on our perceptions of the unwritten covenant between faculty and administration about the values inherent in our relationship. The suggestions we have made are directed towards providing protections for faculty, students and staff who are accused of what in scholarship is a capital crime.

## **XI. Institutional Memory**

Because the process of inquiry and investigation into allegations of research misconduct is carried out with a high degree of confidentiality, there is little opportunity for the MIT community to learn about how to respond effectively to new cases as they arise. And yet, because of the importance of these issues to the Institute and its faculty, staff and students, we must effectively deal with such cases. The thrust of our procedural recommendations is to insure that possibly serious cases immediately come to the attention of senior officials who can

insure that proper procedures are followed. We also believe that there is a need to establish a formal mechanism to insure institutional memory for these issues.

Some of the important functions requiring such institutional memory are: to provide assistance and advice to a Department Head concerning the selection of and the charge to a committee of inquiry; to foster consistency of procedures and standards across departments; to brief committees of inquiry and investigation as to their charge, to evaluation of evidence, standards of proof and fair process requirements; to insure that plans are made to protect complainants who act in good faith; and to make available knowledgeable advisers in the event that the inquiry or investigation takes an unexpected turn. Some universities have established a standing faculty committee to provide these functions and to insure that past experiences are used to guide future actions. We believe that this function can be more effectively provided by centralizing the activity within the Office of the Provost.

The Provost will be the adjudicator after the investigation (if any) is completed, and should not be involved at this stage in the process of developing evidence. Rather, the Provost should identify individuals within MIT who can insure that proper processes are initiated in response to allegations and who can advise committees on procedural issues and charge such individuals with carrying out these functions. Therefore, we have recommended earlier that MIT establish a function within the Office of the Provost to guide the processes of responding to allegations of research misconduct.

The earlier section of our report on responding to allegations can be interpreted as setting up procedures for these processes. However, such procedures must be continually updated to respond to changing regulations and legislation. Part of the responsibilities of this individual would be the development of procedures for inquiries and investigations and the continual review and update of these, both to respond to changes in federal regulation and to improve their effectiveness.

## **XII. Interactions with the Federal Government**

For research supported by NIH and NSF (currently), the end of the Institute's investigation begins the response of these federal agencies. MIT is required to furnish to these sponsoring agencies the evidence, the findings and the conclusions of its investigation, and the actions taken in sufficient detail to permit a thorough evaluation of the outcome and basis for the Institute's findings and to allow the agency to repeat the investigation if it

wishes. At this point, actions of the accused, the Institute and the individuals who participated in the process, as complainant, as members of faculty committees or as Institute officials, may be subject to further scrutiny. The accused may be censured or debarred from future federal funding. The Institute may be criticized for its handling of a case. Individuals involved may be accused of conflict of interest, of making false accusations or of negligence for their roles in carrying out an inquiry or investigation. It is thus imperative that the Institute give full attention to these matters.

The scientific community has expressed its concern about the vagueness and the inconsistencies between agencies in the definition of scientific misconduct as well as concerns about failures of due process and confidentiality on the part of federal agencies. A dialogue is ongoing that it is hoped will resolve some of these issues enabling universities and the federal agencies to fulfill their responsibilities while protecting the rights and reputations of the individuals involved and insuring the productivity and creativity of the scientific enterprise. We endorse MIT's efforts to join with other universities, professional societies and individual members of the scientific community in working cooperatively with federal agencies to improve procedures for the federal response to allegations of scientific misconduct.

The past few years have seen considerable turmoil surrounding the issue of institutional response to allegations of scientific misconduct. During these past few years, universities have put in place federally-mandated procedures to deal with such allegations that occur on their campuses. The National Academy of Science has established a Committee on Scientific Responsibility and the Conduct of Research; they will report soon. We urge a period of stability with respect to new federal regulations to give universities and the scientific community an opportunity to gain experience with these procedures.



**Note:** Scenarios are the work of Eve Nichols, Whitehead Institute for Biomedical Research, with assistance from Professors Gerald R. Fink, Lawrence E. Susskind and Robert A. Weinberg.