

# **Ethical Issues in Biomedical Publication**

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The Johns Hopkins

University Press

Baltimore & London

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Printed in the United States of America on acid-free paper  
9 8 7 6 5 4 3 2 1

The Johns Hopkins University Press  
2715 North Charles Street  
Baltimore, Maryland 21218-4363  
[www.press.jhu.edu](http://www.press.jhu.edu)

Library of Congress Cataloging-in-Publication Data will be found  
at the end of this book.

A catalog record for this book is available from the British Library.

ISBN 0-8018-6314-7  
ISBN 0-8018-6315-5 (pbk.)

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## Scientific Misconduct Policy Issues

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C. K. Gunsalus

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Questions of ethics almost invariably involve the publishing process, directly or indirectly.

Preface to *Ethics and Policy in Scientific Publication* (CBE 1990)

It is hard to find a scholar who has not experienced some violation at the hands of others with respect to publication, whether through outright plagiarism, unauthorized addition to or omission from a list of authors, omission of acknowledgment or attribution, or unfair treatment at the hands of anonymous peer reviewers. Given the importance of these issues to careers and reputations, feelings about these incidents run strong and deep. If unresolved, disputes can become acrimonious and divisive.

The tools to resolve these problems are disparate: minor breaches of professional etiquette may call for mediation or sensitive complaint handling, whereas major transgressions require strong procedures for responding to allegations of misconduct. In all of these situations, the fundamental value at stake is whether the information presented through the peer-reviewed literature accurately represents results from work performed and is correctly credited. Underlying this idea are some central issues, including the standards of conduct community members expect of themselves and each other. Are there any such standards, whether written or unwritten? Should there be? How should the academic community respond to breaches of commonly understood norms of behavior? What response should be given to actions that erode trust in the foundation of the research enterprise, the archival literature?

Despite their apparent prevalence, their centrality to the integrity of the scientific literature, and the strength of feelings they generate, the scientific community does not seem much inclined to address publication improprieties in an organized way. Proposed standards generate reactions ranging from distaste to outright rejection. Further, because there is no one

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place to find the policies that govern good practice or the rules that apply when an individual scientist has a question or problem, multiple sources must be consulted. These include the policies of each of the many institutional participants in the research system: the sponsors of research, scholarly journals, professional societies, and the universities and other institutions where research is conducted.

One of the most common publication problems involves collaborators who have differing ideas about authorship credit and priority. Problems of this nature often first come to attention within the institution where the work was performed and are voiced by a junior member of the research team.

Tim Prentice, a graduate student in the laboratory of Dr. Important, stops in to see the graduate studies advisor in his department, Dr. Wise, asking questions about authorship. Prentice is worried that Important is planning to take first authorship on a manuscript Prentice is developing from a chapter in his thesis. He has heard from other students in the laboratory that without consultation Important has been known to change the order of authors on manuscripts—and sometimes to add or delete names—between development of the final draft and publication. Because Prentice is on track to receive his doctorate at the end of the semester and has been interviewing for postdoctoral positions, he is anxious to get full credit for his work, which he plans to submit to the most prestigious journal in his field.

Wise should have a variety of materials at her disposal if the university and Wise have both done their jobs: the authorship statements put out by the major journals in the field, including those of the International Committee of Medical Journal Editors (ICMJE) (1997); the ethics statement from the primary disciplinary society of most members of Prentice's department (Friedman 1993); a statement on responsible authorship practices adopted or developed by the university; a statement on relationships between graduate students and advisors (including how students may seek mediation of disputes before lodging grievances); and a bibliography on the ethics of authorship and publication.

In pursuing this conversation, Wise knows that, aside from the questions of who can be an author and who makes this decision, there are other core issues here:

- How are priority and order of authorship established? By whom?
- When can a participant in a project be removed from or demoted in authorship credit (that is, dropped from the list of authors entirely or moved later in the list)? When may a name be added?

- How are the applicable rules in a given situation discerned and communicated?
- How are disciplinary standards developed and communicated? How much idiosyncrasy is or should be tolerated in deviations from such standards?
- Where can a participant go for guidance or redress when he or she is concerned that publication practices are unfair or improper?

Before examining how this case unfolds, consider the purpose of the various policies we hope Wise has collected to use as the basis for her response to Prentice's questions.

### **The Purpose of Policy: Consider the Source**

#### **The Sponsor of Research**

A government agency or private organization that sponsors research has one overriding interest when it issues a policy on scientific misconduct: assuring accountability. Recent debate over accountability for research mirrors in some important ways the historical development of regulations governing the use of human subjects in research in the United States. In 1968, congressional hearings were convened to decide whether to establish a national commission on human experimentation and medical ethics. The scientific community protested this governmental intrusion, one witness going so far as to predict that the proposed step would so impede research progress that the American biomedical research community would fall far behind its peers and "never catch up" (U.S. Senate 1968, 70).<sup>1</sup> Nevertheless, Congress persisted, and the resulting commissions—the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research (1974) and the President's Commission for the Study of Ethical Problems in Medicine (1978)—eventually led to federal regulation of human subjects in research. However, issues surrounding the use of human subjects in research have continued to attract public attention, and the National Bioethics Advisory Commission has been formed to examine the evolution of standards and concepts of patient autonomy. These developments suggest that the rules will probably never be static and that continual reexamination may be more the norm than the exception.

The history of the regulations governing the protection of human subjects also suggests that the disinclination of a profession to regulate itself in the face of violations leads to external intervention. The debate on scientific misconduct echoes the earlier debate and shows a reluctance of the

scientific community to police itself. When concerns about scientific misconduct began to be aired in the media, scientists argued that only they knew enough to make decisions about the responsible conduct of research; lawmakers, however, disagreed. Thus, in 1985, Congress mandated that federal regulations be developed to address allegations of scientific misconduct. The research community is often still resistant to regulations concerning research misconduct, and arguments persist over federal jurisdiction, the definition of scientific misconduct, and investigative procedures.

The Commission on Research Integrity (CRI) was mandated by Congress in the annual process of reauthorizing National Institutes of Health (NIH) funding, in the NIH Revitalization Act of 1993. Known as the Ryan Commission, after its chair, Professor Kenneth J. Ryan of Harvard Medical School, it was directed to advise the secretary of the Department of Health and Human Services (DHHS) and the Congress about ways to improve the Public Health Service (PHS) response to misconduct in biomedical and behavioral research receiving PHS funding. The Ryan Commission (CRI 1995, sec. B.1.a.) described carefully what it saw as the government's interest in this area:

The Federal Government's interest in research misconduct stems from its funding of research and, in the biomedical sphere, its interest in the collective health of the citizenry. . . .

A federal research agency must refuse to fund researchers who have engaged in certain actions, or deny them participation as reviewers, or place conditions on their applying for or using its funds. A research misconduct regulation enables the Federal Government to take such actions when research-related misconduct occurs in connection with proposals and awards.

Almost four years later, the Office of Science and Technology Policy (OSTP) released a new proposed federal definition of research misconduct. It defined the scope of the federal interest much more restrictively as "the accuracy and reliability of the research record and the processes involved in its development" (OSTP 1999).

Just as no sponsor can assure that a grant or contract will yield discoveries or a specific desired outcome, but only that the effort is expended as promised, neither can a policy on misconduct prevent a problem from arising. What a well-conceived policy can do is to provide a framework for accountability by defining the misconduct it will take action against and stating how allegations are to be assessed and investigated and the results reported. In this way, the sponsor puts on notice all those who supply—and receive—its funding that it takes seriously its role in the creation and dis-

semination of new knowledge. Because a sponsor's interest is largely in accountability for its funding and the validity of work performed with its funding, few maintain policies on relatively minor transgressions. Those they leave to the other institutional participants, journals, professional societies, and universities.

Some research sponsors maintain their own investigative functions for responding to the most serious transgressions. For example, some of the science agencies of the U.S. government have such large budgets and scope that they maintain in-house staff to perform investigations. Although these agencies have the force of law behind them, they still cannot directly investigate every allegation of scientific wrongdoing they receive. They are usually distant from the site of the research and, even with their large budgets, do not have sufficient resources for that purpose. Thus, their policies must describe when they take direct responsibility for investigating allegations and when instead they refer problems to the home institutions of the researchers for investigation and response back to the agency. For those circumstances, the policy must define how the agency will assess those responses, the procedures it expects (and will follow itself), and the standard of proof against which evidence is to be assessed when cases are judged.

Outside the United States, the Danish Committee on Scientific Dishonesty (DCSD), established by the Danish Medical Research Council, has the most far-reaching statement (Riis and Anderson 1996). That committee focuses on scientific dishonesty, which it defines relatively broadly compared to the definitions in use in the United States (Andersen and Brydensholt 1996). It currently has few, if any, counterparts elsewhere in the world.

Prentice consults the "Instructions for Authors" of the journal to which he plans to submit his manuscript. The standards of the ICMJE have been adopted by the journal, and they require an author to have contributed substantially to the following phases of article development: "conception and design, or analysis and interpretation of data; drafting the article or revising it critically for important intellectual content; and final approval of the version to be published." When he reads this, Prentice feels that he is right to be uneasy. Important has not had much time for him; in fact, Prentice and Important have not met to discuss the results in some months. Most of Prentice's meetings have been with the senior postdoc in the laboratory.

### Journals

Journals work at the other end of the spectrum from sponsors of research, after at least some portion of the research project is complete. Be-

cause their concerns center on the importance and rigor of work submitted for publication, journals have little choice but to address—at least at some level—the less serious problems sponsors prefer to avoid.

A journal's policies must inform authors of its standards and expectations, set out what it seeks from reviewers, and inform readers about what they may expect from the journal and its editors. Thus, a sensible scientific journal adopts policies on authorship (defining which contributions merit authorship status); disclosure of potential conflicts of interest by reviewers and authors (so authors know what to expect from the review process and readers have a context in which to evaluate articles); rebuttals (defining under what conditions and with what evidence they are published); retractions (delineating whether they must be made by an original author or by all authors and what to do if the results of an institutional investigation discredit the research but the researcher persists in defending it); and how it responds to complaints about authorship and allegations of serious misconduct (whether it takes any action at all, declines to publish work by the author under some circumstances, or refers the matter to the home institution of the researcher). As a condition of submission of a manuscript, some journals also require authors to agree to make their data available for review if questions about them arise (Instructions for authors 1998).<sup>2</sup>

Journal editors are not well placed to resolve authorship disputes or to investigate allegations of scientific misconduct because reviewers and authors usually do not have an employment relationship with the journal, the contractual relationship that does exist may be quite limited in scope, and few if any journals have the resources to perform investigations at distant sites. Thus, journals and most sponsors of research are dependent upon the institutions where research is conducted to perform investigations. However, the journal may have significant leverage over the institution, which it should not hesitate to use. Further, the policies of journals in which scientists hope to publish their work—especially the most selective and prestigious journals—have enormous influence over ethical standards of conduct.

To determine whether specific conduct is ethical or has perhaps crossed a line, consultation with the ethical standards of the individual's discipline is essential. The most straightforward way to discern those standards is in a code of ethics from a disciplinary society or association.

When Prentice reads his professional society's code of ethics, he finds good news and bad news. His society is one of the majority (according to a 1994 study [Jorgensen

1995], 58% of scientific societies had adopted codes of ethics) that has developed an ethical code. But when he read the section on the ethics of authorship, he found it somewhat dissatisfying. It merely said that, to qualify for authorship, a researcher must have contributed "significantly and meaningfully" to the work in question. No further guidance is available. Prentice does not know whether providing the financial support for his work—his perception of Important's contribution—meets this standard or how he can find out whether it does.

#### Professional Societies

Academicians commonly belong to a community of scholars who study similar problems or use similar tools. Professional societies, if they have policies or a code of ethics for members, usually intend them to be aspirational statements of correct ethical conduct in that discipline, unless the field is one where professional licensure or certification is required. The vast majority of scientific disciplines do not require licensure, however, and enforcement of aspirational codes of ethics has proven problematic for a variety of reasons, including fear of legal liabilities and the absence of a contractual or employment relationship with members. As a result, professional societies rarely consider or take action on even the most serious charges against their members, let alone violations of professional etiquette or good practice (Gardner 1996).

Yet there is great value in the development and promulgation of codes of ethics by professional societies because they provide clear standards both for encouraging appropriate professional conduct and for judging deviations from accepted ethical standards. Their value is only amplified by the diversity of the research community and the absence of widely applicable standards. Broad ethical maxims apply across the range of scientific specialties, but particulars of ethical conduct vary (sometimes widely), depending upon the nature of the discipline. Thus, a statement of the parameters of responsible conduct within the professional community carries great weight.

Wise gives Prentice sensible advice about how to pursue a professional conflict from a position of relatively little power (Gunsalus 1998a). Wise sends Prentice to consult with Dr. Grand, the most senior person available who is approachable, known to keep confidences, and knowledgeable in Important's area of specialization. Grand points out that Prentice's concerns are premature; thus far, he doesn't know how—or even if—the authorship will be changed. He also talks with Prentice about Important's related lines of research, his designation of the problem, and his total funding of Prentice's work.

Prentice acknowledges these factors but insists that the ideas in the final research are largely his own and that he performed all of the work. Grand advises Prentice to assemble documentation as to the originality of his work and his sense that Important has not been much involved in it. Meanwhile, Grand promises to convene, with the assistance of the departmental librarian and a faculty member with expertise in publication and research ethics, a department-wide symposium on the discipline's authorship standards. He tells Prentice he had been meaning to do this anyway, and it may help in the present situation. After reflection, Grand decides to ask Important to make a few remarks at the event. Prentice accepts Grand's advice and adopts a wait-and-see attitude.

#### The Research Institution

A university or institution where research is performed (whether or not the research is externally sponsored) has broader interests than the sponsor, the publisher of research, or the professional society of the researcher. The university is the employer of professionals for whom it must set and enforce standards of conduct. This alone confers responsibility above and beyond that derived from financial support or publication of research. More importantly, the university is responsible for the education of its students, including ethical grounding for their future careers. Where students are participating in the research as part of their education, scientific misconduct can damage not only the institution's reputation and those depending on the results of research, but also those students. Thus, while a university must have a policy on responding to allegations of misconduct and must take disciplinary action for proven violations, even more fundamental are policies and educational programs that promote integrity in research.

These policies should set high standards for ethical conduct, higher than the bare minimum standard of avoiding charges of misconduct. They should include ways to respond when the conduct of individuals within the university's community does not meet those standards. Topics addressed should include guidelines for recording and retaining data, mentoring and authorship practices, compliance with research regulations (including the ethical treatment of human and animal subjects), and, most of all, the responsibilities conferred by and corollary to the rights of academic freedom.

Prentice soon learns from the departmental secretary (whom he dates) that the chapter from his thesis, now a single-authored publication by Important, has been submitted to the journal and has come back with reviewers' comments. Prentice

returns immediately to Grand, who, after a review of all the materials Prentice has assembled, agrees that sections of the manuscript are taken virtually verbatim from the thesis and that this raises serious questions about the proposed authorship. He suggests that he and Prentice meet jointly with Important to discuss the situation. Prentice, with some trepidation but driven by his concern for credit for his work, agrees.

For responding to the problems that will arise, the university should have a system for training those who receive complaints and questions about conduct (including advisers like Wise) (Gunsalus 1998b), well-crafted grievance procedures, and a carefully drawn policy for responding to allegations of misconduct. Those interested in the details of institutional procedures for responding to allegations of misconduct are referred to other sources, including the guidance documents issued by the Association of American Universities (1988), the Association of American Medical Colleges (1992), the American Association for the Advancement of Science (Gunsalus 1997), the Office of Research Integrity (ORI) (1995), and other reports of the U.S. government (Gunsalus 1993; ORI 1995). The most critical elements of such procedures are provisions for protecting the rights of both complainant and accused while assuring a rigorous analysis based upon relevant facts. With respect to the complainant, the procedure must include prohibitions against retaliation, and the institution must enforce these prohibitions. For the accused (often referred to as the respondent to avoid the overtones of criminal law), the provisions must ensure an opportunity to examine all evidence and an opportunity to respond to it. Other important features are protections against conflicts of interest that could bias the outcome and separation of the investigation from decision making so that different parties conduct the investigation and then act upon it after reaching a decision (Gunsalus 1993).

In their meeting, Important tells Grand and Prentice that he feels his single authorship is justified. He feels that he did the work represented by the thesis chapter and just "let" Prentice use it in his thesis; that there are other chapters Prentice can use for his own publications; that this is an accepted practice in the field; and, besides that, Important feels that he needs a single-authored publication on this topic right now to shore up his prospects of winning an award for which he knows he is under consideration.

Questions about allocation of credit, especially those between senior and junior members of a research team, are questions most properly han-

dled in the work environment of the scientists, preferably at the lowest possible level. However, juniors are often reluctant to raise the questions for fear of the consequences they may suffer, and peers and colleagues may be disinclined to deal with problems when presented because of a combination of uncertainty as to the correct response and distaste for unpleasant confrontations.

The problems resulting from collaboration are many. Some common scenarios include the following:

- As in the case here, a student wonders whether his major professor can publish a chapter from the student's dissertation as a single-author publication by the professor.
- Two researchers collaborated on a research proposal to an agency that did not result in an award, and one now wonders about the rules governing his resubmission of sections of that proposal to a different agency, without the involvement of the other.
- A project was finished but never written up, and the researcher who did the work has left the institution and cannot be located; the remaining collaborators want to publish the results and wonder how the authorship should be assigned.
- Two collaborators have a falling out and will no longer work together; who has the right to publish what from their collaboration?
- A researcher receives a reprint with a nice note from a former postdoc saying, "Thank you for the wonderful experience." The researcher is listed as an author on the reprint but was never involved in any aspect of the published work.

Allocation of credit is especially problematic when there are significant imbalances of power among the participants, exemplified in collaborations between senior researchers and their subordinates. During the intense period of graduate study, students focused on their own assigned research projects are not always aware of the magnitude of the effort required to sustain a laboratory and its flow of projects. Further, in relationships with an uneven distribution of power and information, misunderstandings are sometimes slow to be addressed and resolved. This is particularly the case when expectations are high and competition is fierce. Current constraints in funding and the very tight job market may exacerbate such problems.

If practices for allocating authorship are not clearly understood, students may come to feel that their contributions are improperly subsumed

or inadequately credited. And although students may be slow to raise their concerns, especially if they feel the environment is inhospitable to such questions, the issues are so fundamental and the stakes so high that the problems tend to surface eventually, even if through no other mechanism than the departmental grapevine or rumor mill.

Ombudspersons, department heads, research integrity officers, and grievance deans see many such cases. One difficulty in resolving these cases is that students often do not have a sufficiently broad base of experience and knowledge to differentiate between an exploitative situation and the discomfort of being asked to achieve at a standard higher than their previous work. Tact, finesse, and open discussion are required ingredients for differentiating research misconduct from the many difficult questions that complicate daily interactions, causing friction and malaise.

After their meeting with Important, Prentice and Grand discuss the matter at length, including the costs to Prentice for pursuing the matter as opposed to letting it go. With permission from Prentice, Grand privately calls the editor of the journal, whom he knows well, for advice. The editor confirms that this is a very serious matter and adds that, not only should it be resolved before publication, but she cannot let publication proceed without assurances that the attribution of authorship conforms to the journal's policies. She is grateful to be alerted before publication that there might be a question, as she mostly receives such concerns after the fact. The editor, while stressing that an examination must occur, has little direct assistance to offer. Although she can (and will, if asked) use her position as leverage to get the institution to initiate a process of examination, she advises that Grand and Prentice may first wish to raise the issue inside the university. Grand and Prentice decide to seek further advice and possible assistance from the campus research integrity officer. There they discuss the most constructive way to proceed. The main choices seem to be making additional efforts to persuade Important to reexamine the authorship of the paper or to file formal charges of plagiarism. At this point, Prentice has not yet brought any charges. His concerns fall into one of the grayest areas of publication ethics: relations between students and their mentors.

Publications that grow out of dissertations represent a special category. Although the dissertation must always be singly authored, the mentor's role in the student's work may be sufficient to support co-authorship of excerpts that are published individually. This practice, however, can lead to serious misunderstandings (and allegations of misconduct) if the principles being applied to authorship decisions are not first sufficiently discussed and understood. Careful reflection upon the standard for these

were sanctionable only when the offender omitted the attribution on purpose, meaning to take credit for the work of another, or whether serious carelessness leading to the same result was sufficient cause for a penalty. The Danish Committee on Scientific Dishonesty stands essentially alone in endorsing a standard that equates "deliberate or grossly negligent" acts with intent (Andersen and Brydensholt 1996).

The Ryan Commission recommended that a unified definition for all U.S. government-supported research be embraced, that universities adopt higher standards than those of the government, and that the term *plagiarism* in the current U.S. federal definition of research misconduct be dropped in favor of the broader term *misappropriation*, with a clarifying internal definition, including breach of the confidentiality of the peer-review process. The 1999 OSTP proposal retrieved the use of the word *plagiarism* but provided a definition of it much like that in the Ryan Commission report, including the breach of the peer-review process.

In addition to providing a fuller internal definition of plagiarism, the commission's proposed definition explicitly addressed two issues upon which faculty review panels repeatedly stumble. First, it incorporated within its scope misconduct in reviewing manuscripts or grant applications. Second, it proposed that deviation from a defined standard of professional care in authorship should be sanctionable. Thus, in common with the approach of the DCSD, the proposed definition encompasses both intentional and reckless conduct in authorship to serve as a warning that the carelessness or sloppiness defense for a lack of attribution or citation is not acceptable.

Although the entire Ryan Commission report was controversial, one of its most contentious aspects was the commission's proposed new definition for research misconduct. The National Academy of Sciences (NAS) Council was specifically disapproving of the commission's "expansion of the concept of plagiarism into 'misappropriation'" (Alberts et al. 1996, 3). The Council reendorsed a previous report by the Committee on Science, Engineering, and Public Policy (COSEPUP), based on virtually the same standard. The 1999 OSTP proposal adopted the broader standard, in keeping with the Ryan Commission and COSEPUP reports: "Plagiarism is the appropriation of another person's ideas, processes, results, or words without giving appropriate credit, including those obtained through confidential review of others' research proposals and manuscripts."

Within universities, the situation is equally disparate. In the United States, *student* codes of conduct are often explicit about standards for quo-

tation, attribution, and paraphrasing.<sup>4</sup> *Faculty* codes of conduct (following current definitions of research misconduct) are much less clear. In common with the U.S. governmental agency regulations, they often contain no explanation of plagiarism at all. This lack of clarity leads to constant reconceptualization, as each misconduct committee thus develops its own definition of plagiarism, sometimes citing dictionary definitions or the personal experiences of each panel member. The definitions some committees develop are quite expansive; others are very narrow.

### **Institutional Responses to Questions of Publication Impropriety**

Grand and Prentice's meeting with the university's research integrity officer, Dr. Perry, has some bumpy moments. Perry's first response is one of shock and dismay: "There must be a mistake: I'm sure Dr. Important would never do such a thing!" Prentice asks Perry to examine the documentation, and Perry reluctantly concedes that either Important has improperly approved the chapter of Prentice's thesis (by permitting the inclusion within it of work not done by Prentice) or that he has improperly appropriated sole authorship of the article accepted for publication. Grand explains that the journal editor is prepared to insist that the university examine the question of authorship. Perry agrees that an internal examination is better than official involvement by the journal and offers to talk to Important and then get back to Grand and Prentice.

Perry has a very candid discussion with Important, in which she points out the obvious similarities in the documents and the very serious ramifications of the situation. Emphasizing that Prentice has chosen the most professional way of raising his concerns and that he has not filed formal charges (but could), Perry persuades Important to restore Prentice as a co-author on the article. Perry spends a considerable portion of her interview with Important talking through Important's anger with Prentice and cautioning Important against actions that might be viewed as retaliation against Prentice. When Important retorts that Prentice has not been a very satisfactory student, Perry asks him to explain his own writings extolling Prentice's achievements, including several commendations Important wrote for Prentice, from recommendations for prestigious fellowships to nominations for student accomplishment awards. Important has no reply and instead tells Perry how very busy, overwhelmed, and stressed he has been in recent months.

Perry's job is made significantly easier than it might otherwise be by several factors: involvement by Grand, a respected senior faculty member, which has moderated Prentice's reactions and lent weight to the questions

Prentice is raising; the explicit definition of authorship provided by the journal to which the manuscript was submitted; Perry's own homework into Prentice's file revealing Important's unequivocal statements about the quality of Prentice's work on multiple occasions; and the university's own very clear guidelines about attribution of authorship and about how mentors and their students should interact. This may represent an idealized situation, as there remain many journals and universities that either have no written policies for how to respond to such a situation or do not consider it their problem. As problems accumulate and the value of these tools reveals itself, however, the number of institutions moving in this direction increases.

#### **Preventing or Solving Problems of Publication Impropriety**

The old saying has it that an ounce of prevention is worth a pound of cure. Its enduring wisdom is demonstrated in situations of research misconduct, especially in cases of proper conduct in publication. Experience suggests that many authorship or attribution disputes arise from misunderstandings, which emphasizes that early and frequent communication about the basic issues is good practice. Raising questions of credit and attributions before conflicting assumptions have an opportunity to collide represents the colloquial ounce of prevention.

Contrary to some advice, it is not necessarily useful to devise in advance a written contract among collaborators to delineate the nature of contributions and resulting authorship priority. Aside from the difficulties of predicting how the research will proceed and thus who may make the seminal contributions, circumstances over the life of a project may dictate changes that could not be anticipated at the outset. What is more useful is to develop a shared understanding of the applicable principles for the collaboration, particularly among those who have not worked together before. As with many awkward topics, addressing this issue before participants are too deeply committed can forestall many hard feelings later. At the end, another open and candid discussion should be held to allocate contributor credit. Rennie, Yank, and Emanuel (1997, 584) responded to the concern that this process will be too complex by observing that "with practice researchers should become more used to openly discussing and resolving what their contributions have been. The benefits of a better system will outweigh the effort required for such discussions."

### Individual Action and Responsibility

When a researcher seeks to assure that his or her conduct in publication is proper, the concept of the *compact with the reader* is key. In scholarly publication, there is a well-understood set of agreements between the reader and the author, with the journal editor in a mediating and reinforcing role. Correct conduct in most, if not all, matters concerning publication can be discerned by consulting the compact with the reader and honoring it.

The core set of understandings forming the compact with the reader in a scientific journal (whatever further disciplinary idiosyncrasies may arise) are that the material presented is original to the authors, it represents work actually performed by the authors, and it was performed as described. The rule is that, wherever the specific publication at issue will deviate from this implicit compact, the reader should be signaled. A short note suffices, however presented.

There are nuances to the compact. For example, the reader brings a different set of expectations to the methods section of a paper than to the presentation of findings and discussion. Thus can be discerned the answer to the self-plagiarism dilemma raised so plaintively: "But I always use the same methods. Must I write the methods section each time from scratch for fear of being accused of self-plagiarism?" The expectation of the reader that the methods section is novel is usually quite low, especially when it is clear from context that the research presented is part of a continuing series of explorations using the same or similar methods. However, in a situation in which there are no other signals to the reader, adding such a signal costs little in words or space and puts the author on solid ground with editors and readers.

Similarly, the compact with the reader can resolve the dilemma of the missing primary author who cannot be located, has become disabled, or has developed personal differences leading to a refusal to communicate or collaborate. This situation can be addressed through a short note (negotiated as appropriate among the funding officer, other authors, and the editor) indicating that the publication is based upon work performed by Dr. John Doe, who was unavailable to participate in preparing or reviewing the manuscript. Alternatively, in some circumstances where primary authorship is warranted and seems desirable despite an inability to secure the individual's permission (e.g., death of the primary author), such authorship can still be awarded, so long as a clarifying note explains the situation. In this case, the footnote reveals that the manuscript was completed post-

humously by the named individuals and that the publication occurs with the permission of the heirs.

The compact with the reader can also cut through issues of multidisciplinary collaboration. As a rule, the key to authorship responsibility is the ICMJE statement that "each author should have participated sufficiently in the work to take public responsibility for the content" (ICMJE 1997, 38). For those who protest that they are collaborating with others and that taking responsibility for the entire work is impractical, what is probably indicated is taking note of the compact with the reader and adding a signal to that effect in the publication. In some journals, specifying contributions provides this signal.

#### Recommendations for Institutions and Journals

The report of the Ryan Commission explored many of the policy issues surrounding publication questions in scientific research. The controversy over those recommendations is one indication that there is little or no consensus in the research community about these issues. The fact is that external standards of accountability are changing. As with medical practice and human-subjects regulations, these standards are moving in a direction that reduces the autonomy of the affected professional community. The transition is painful.

The main question is whether the research community will respond by developing meaningful self-regulation to give external observers confidence that the community is accountable to the public that funds research and to those who rely upon its results. Whether greater consensus will lead to such self-regulation is yet to be seen. Seven specific areas in which leaders of the scientific community, academic institutions, and journal editors might act are education, the formulation of guidelines for responsible conduct, the definition of misconduct, institutional and individual responses to problems, institutional incentives for responsible conduct in publication, confidentiality and university research, and journal policies.

#### *Education*

As scientists move through their careers, they develop from being consumers of knowledge as undergraduate students to being producers of knowledge as graduate students and professional researchers. It is the rare student who arrives at college knowing the standards of professional conduct, much less how they apply in an array of circumstances. Unless these standards are addressed explicitly in the course of students' education, how

will they acquire that information? The cultural traditions of science have it that students receive this guidance from their mentors in the process of graduate education. The need for increased formality of such training is rooted in the explosive growth of the graduate education system across the United States over the last several decades and is emphasized by recurring questions about the quality of the education students receive on the structure and conduct of research (see chap. 10).

The requirement introduced by NIH in 1992 that institutions holding training grants offer programs in research integrity has spawned a tremendous diversity of materials to support such training efforts. The Ryan Commission recommended that this training requirement be extended to all individuals supported by PHS research funding. Educational efforts are discussed in chapter 10.

#### *Guidelines for Responsible Conduct*

A key element of creating a positive environment for research integrity is providing information to the well-intentioned on how to resolve dilemmas relating to professional conduct. Biomedical researchers in corporate settings are subject to many requirements within their research practices, starting with those imposed by lawyers wanting to protect corporate intellectual property. Those involved in businesses that submit data to government agencies for drug or product approval must conform to federal Good Laboratory Practice regulations. Although a similarly elaborate set of regulations for academic research is not advisable or desirable, simple guidelines that provide information about responsible professional practices can be helpful for educational purposes, for establishing a climate of research integrity, and for resolving questions when they arise.

Guidelines might include such topics as the recording and retention of data, authorship and publication practices, and other professional conduct. Whether such guidelines are established institutionally or by professional societies, it makes a great deal of sense to have in place standards to which all conscientious professionals should aspire and to provide positive guidance to researchers who seek such information.

#### *The Definition of Misconduct*

A workable definition of research misconduct is required for both the federal government and research institutions. Components of a workable definition include sufficient clarity that peer researchers can apply the definition in institutionally conducted misconduct proceedings and suffi-

cient legal validity that well-based misconduct findings will hold up when challenged in court. Despite the intense controversy and effort expended within the research community since the late 1980s, the evidence suggests that we have not yet arrived at a definition of research misconduct that meets these two standards and the needs of the community.

#### *Institutional and Individual Responses to Problems*

Much has been written about institutional responses to allegations of misconduct. The continuing legalization of these processes (as with our society as a whole) is having a profound effect upon institutional regulation of and responses to allegations of scientific misconduct, and this trend is likely to continue. Where it is taking us is not yet clear.

**Improved Institutional Responses to Problems.** The goal is not to eradicate allegations of misconduct (not a feasible goal in any event), but to assure sufficient expertise and competence in response that public confidence in the conduct of research can be maintained. That is, if the response to an incident of alleged research misconduct is prompt and effective—and if the end result is disclosed when misconduct is found—the public is remarkably accepting. For example, in the unfortunate 1996 incident in the laboratories of Dr. Francis Collins, where a promising junior researcher fabricated results, most of the publicity praised the response of Collins and the University of Michigan for taking the situation seriously, for expeditiously alerting the research community, and for investigating the entire matter thoroughly. Very little of the publicity condemned the laboratory or the university, although questions were raised about why a reviewer would catch an error not caught by supervisors and collaborators. Most of the publicity instead focused upon the betrayal of trust by one from within. In fact, there was significant sympathy for the position in which Collins found himself and regard for his response to the situation.

For the validity and credibility of findings on allegations of scientific misconduct, substantive decisions must be made by scientists of high repute and standing. However, just as scientists must serve in this capacity because they are the experts on scientific matters, they should at all times have access to and support from those with legal and procedural expertise when involved in one of these cases. The training of academic research scientists, however rigorous, cannot fully prepare them for such service. Several national associations and societies have collaborated in developing materials to support procedural rigor, and they should be consulted for

assistance in approaching allegations of research misconduct. Too much of the history in this field involves one university after another making the same understandable, but serious, mistakes in administering a misconduct investigation.

**Public Disclosure of Findings of Misconduct.** Just as we seek expressions of remorse and pledges to do better from rule-breakers in other sectors of our society, so do we want our institutions to behave in a straightforward and forthright manner. In the 1970s and 1980s, universities, often out of fear of legal liability, were known to accept a resignation quietly and allow an individual found to have committed research misconduct to move on. Mallon (1989, 144–93) and Broad and Wade (1982, 38–59) described how recidivist plagiarists moved from institution to institution with impunity, with scant interruption in their prodigious (stolen) output. Dan Greenberg (1988, 4–5), a Washington science journalist and experienced observer of science, observed in commenting upon the harshness of the penalty suffered by one researcher in a celebrated case at Harvard that, “in similar circumstances in past years, violators of scholarly propriety were tolerated or were permitted to go quietly. . . . The misfortune of Harvard’s [researcher] was that his derelictions were revealed at a time when the issue of scientific fraud has become politically volatile. It is a safe assumption that in quieter times, the episode would have remained a little secret within the Harvard family.”

Whatever the disciplinary disposition within an institution, there is an obligation to correct the archival literature when misconduct in publication has been established. There should be a similar obligation to sister hiring institutions.

*Institutional Incentives for Responsible Conduct  
in Publication*

Universities must pay attention to how their own practices affect the conduct of those who perform research under their auspices. This should include the climate created for students and the messages they are receiving about how to succeed as professionals. If the institution provides education about the responsible conduct of research but is conspicuously uninterested in reports of concerns—or, worse, is perceived to punish whistleblowers—perhaps more damage has been done than if the topics were not addressed at all.

Institutions should also attend to the messages that they send through

their personnel practices. Is quantity in publication and research rewarded over quality? Do internal mechanisms for quality control function well? Are standards of behavior consistent across the institution? Or are exceptions made for powerful (and well-funded) researchers? Students and other junior researchers will be acutely sensitive to these issues and aware of institutional realities.

#### *Confidentiality and University Research*

One of the missions of universities is to create and disseminate knowledge. It follows that the practices adopted by technology transfer offices may have broad ramifications. For example, if implementation of the university's intellectual property policies emphasizes the generation of income through research support or royalties to the detriment of other values (such as peer review or collegial interaction), then the long-term effects may be damaging. If scientific discoveries are announced through press conferences rather than the peer-reviewed literature or if a university routinely accepts prohibitions on publication as a condition of access to materials, then the values of the university are undermined. In the most egregious cases, attempts were made to suppress research results not to the liking of a corporate sponsor (Rennie 1997; Dong et al. 1997). The research community will need to confront these issues directly and take a group stand restricting individual actions that will, in the long run, undermine our system of basic research.

#### *Journal Policies*

Good policy in one sector is often similarly good policy in another. Just as it is a positive development for institutions and disciplines to articulate responsible conduct guidelines, so is it for journals. Although some journals have followed the lead of the ICMJE and developed written guidelines for authorship and publication practices, not all have done so. (Of course, even among those that have, not all authors read or comply with the requirements. It is not uncommon, for example, for researchers to acknowledge cheerfully that they forged the signature of collaborators to expedite submission.)

To resolve problems that do arise, journals must have guidelines by which they will respond to allegations and to proven misconduct. The Council of Biology Editors has taken a leadership role in this regard, but further training and consciousness raising seems to be required. Perhaps groups of editors can establish procedures by which journals establish a

standard framework for responding to allegations of misconduct, much as universities in the United States have already done. Elements of such procedures might include information on and steps to

- review the facts when they are available to the editors. An example would be to compare manuscripts when plagiarism is alleged to determine at least whether there is an obvious problem on the face of the matter.
- establish a protocol in which the editor's role is clarified. Minimal steps might include a standard practice for referring questions to the home institution of the author, requesting feedback from the institution within a stipulated period, and following up if it is not received.
- ensure that the problems are not compounded by proceeding with publication while questions are unresolved.
- understand differences between plagiarism and copyright.
- be proactive about obligations, having ethical guidelines, codes of conduct, guidelines for authorship, and so forth.
- be prepared to deal with problems through established mechanisms and networks for referral and advice.

One serious policy issue requiring attention from journal editors is running (and indexing) retractions. For example, if an institutional investigation establishes that data do not exist or have been fabricated, the author (especially if advised by an attorney) may refuse to participate in the retraction. Regrettably, authors and institutional officers continue to report that some journals are reluctant to run retractions when submitted by only a subset of authors, by the institution itself, or even at all.

### Conclusions

The challenge for those responsible for settings in which research is conducted is to create and maintain an environment that supports ethical choices and makes researchers comfortable with asking questions about those choices. If the well-intentioned have ways to raise their questions and do not feel they will be attacked as ignorant (or worse) for having them, miscommunications will be reduced and goodwill (usually) generated. If permission to explore ethical issues is granted, either implicitly through the culture of the research group or explicitly through direct statements, the myriad disputes that arise in daily life will be more easily resolved and will less frequently grow into larger disputes. Even where conflict over an issue

is unavoidable because the participants have irreconcilable views, it is more likely in such settings that the dispute will be resolved without undue damage and hardship.

An open environment—however competitive—in which professional differences can be aired and explored without being made or taken personally is more likely to produce rigorous results. Although it is probably not possible to eradicate disputes when working in heterogeneous settings with multiple participants, it is certainly possible to provide an environment in which differences can be addressed with a minimum of venom and procedural intervention. Further, the skill, compassion, and common sense with which such concerns are met will reverberate in many quarters, underscoring the importance of good procedures and training for the many individuals who may be asked to handle complaints about ethical issues.

### Notes

1. "If I am in competition with my colleagues of this country, which I am not . . . then I would welcome such a commission, because it would put the doctors [in the United States] . . . so far behind me, and hamper the group of doctors so much that I will go so far ahead that they will never catch up with me" (U.S. Senate 1968, 70).

2. "All persons listed as authors must meet *all* the following criteria for authorship.

—I certify that I have participated sufficiently in the work to take public responsibility for the content.

—I certify that (1) I have made substantial contributions to the conception and design or analysis and interpretation of data; and (2) I have made substantial contributions to drafting the article or revising it critically for important intellectual content; and (3) I have given final approval of the version of the article to be published.

—I certify that the manuscript represents valid work and that neither this manuscript nor one with substantially similar content under my authorship has been published or is being considered for publication elsewhere, except as described in an attachment.

—I attest that, if requested by the editors, I will provide the data or will cooperate fully in obtaining and providing the data on which the manuscript is based for examination by the editors or their assignees." (Instructions for Authors 1998, 19)

3. For one discipline-specific example, see Fine and Kurdek (1993).

4. I am indebted to Walter Stewart of NIH for this observation. For example, the University of Illinois at Urbana-Champaign's *Code of Policies and Regulations Applying to All Students* (1998, sec. 33.I.D.) defines *plagiarism* as follows (reprinted with permission):

**Plagiarism**

Representing the words or ideas of another as one's own in any academic endeavor.

**Comments:**

1. Direct Quotation: Every direct quotation must be identified by quotation marks or by appropriate indentation and must be promptly cited in a citation. Proper citation style for many academic departments is outlined in such manuals as the *MLA Handbook* or K. L. Turabian's *A Manual for Writers of Term Papers, Theses and Dissertations*. These and similar publications are available in the University bookstore or library.

*Example:* The following is an example of an uncited direct quotation from a case in which the student in question was found guilty of plagiarism.

Original Source: To push the comparison with popular tale and popular romance a bit further, we may note that the measure of artistic triviality of works such as "Sir Degare" or even "Havelok the Dean" is their casualness, their indifference to all but the simplest elements of literary substance. The point is that high genre does not certify art and low genre does not preclude it. (From Robert M. Jordan, *Chaucer and the Shape of Creation*, Howard University Press, 1967, page 187.)

Student Paper: To push the comparison with popular tale and popular romance a bit further, you can note that the measure of artistic triviality in some works of Chaucer's time period is their casualness. Their indifference to all but the simplest elements of literary substance. The point is that high genre does not certify art and low genre does not preclude it.

2. Paraphrase: Prompt acknowledgment is required when material from another source is paraphrased or summarized in whole or in part. This is true even if the student's words differ substantially from those of the source. To acknowledge a paraphrase properly, one might introduce it with a statement such as "To paraphrase Locke's comment . . ." and conclude it with a citation identifying the exact reference. Or the concluding citation might say, "The last paragraph (two paragraphs, etc.) paraphrases statements by . . ." and then give the exact reference. A citation acknowledging only a directly quoted statement does not suffice as an acknowledgment of any preceding or succeeding paraphrased material.

*Example:* The following is an example of unacknowledged paraphrase that could warrant a charge of plagiarism.

Original Source: The era in question included three formally declared wars. The decision to enter the War of 1812 was made by Congress after extended debate. Madison made no recommendation in favor of hostilities, though he did marshal a "telling case against England" in his message to Congress of June 1, 1812. The primary impetus to battle, however, seems to have come from a group of "War Hawks" in the legislature. (From W. Taylor Reveley III, "Presidential War-Making: Constitutional Prerogative or Usurpation?" *University of Virginia Law Review*, November 1969, footnotes omitted.)

Student Paper: During this period three wars were actually declared by Congress. For instance, in 1812 a vehemently pro-war group of legislators persuaded Congress, after much discussion, to make such a declaration, despite the fact that Madison had not asked for it, though, to be sure, he had openly condemned England in his message to Congress of June 1, 1812.

3. Borrowed Facts or Information: Information obtained in one's reading or research that is not common knowledge should be acknowledged. Examples of common knowledge might include the names of leaders of prominent nations, basic scientific laws, etc. Materials that contribute only to one's general understanding of the subject may be acknowledged in the bibliography and need not be immediately cited. One citation is usually sufficient to acknowledge indebtedness when a number of connected sentences in the paper draw their special information from one source.

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