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Building a professional career. Ethics—doing the right things

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Ethical conduct is something we increasingly hear of in the news with reference to science. It is used in reports on discoveries based on fraudulent data, on the utilization of genetic understanding and engineering, on potential repercussions of chemicals in the environment and to human health, and other areas.

Over the past few years there have been a few highly publicized examples of fraudulent scientific research. In some cases this has been by deliberately falsifying data to report a desired result. In other examples, the interpretation of results has been biased towards obtaining a particularly desired result. Neither type of behavior is acceptable.

Two of the most publicized examples of research based on fraudulent data were submitted by groups of scientists: the claims of superconductance in organic molecules, and the synthesis of several new artificial elements. In both cases, later investigation implied that the principle investigator committed the fraud. The other workers on the projects had little real involvement or oversight. They abrogated their responsibilities as colleagues and co-authors, allowing the fraud to go unnoticed. This is taking a passive role in being a collaborator and not verifying the results. This is especially heinous when the research is groundbreaking, because the results cannot be accepted only by glancing through a manuscript. Every author listed on a manuscript must remember that the presence of his or her name on the manuscript means something. Any future accolades or denigration are to be shared.

In a reflection of the growing need for more inclusion of ethical behavior in research, the American Chemical Society has recently formed a committee on ethics. Its responsibilities include reminding society members of the expected ethics through mails and

articles in the Society's publications, and to provide education on the topic. It joins a variety of ethics-oriented groups that already operate within the ACS that deal with employment, hiring, proprietary rights, and other issues.

The journals published by the American Chemical Society now contain a guideline on ethical behavior. It touches on many aspects of research and the ethical standards that are expected by editors, authors, and reviewers. Its definition and origins are given. "An essential feature of a profession is an acceptance by its members of a code that outlines desirable behavior and specifies obligations of members to each other and the public. Such a code derives from a desire to maximize perceived benefits to society and to the profession as a whole and to limit actions that might serve the narrow self-interests of individuals." It goes on to say that the sharing of knowledge in advanced science must be done at the sacrifice of some personal gains.

There are several specific obligations described for scientists in the three roles, researchers submitting manuscripts and other scientists acting as reviewers and editors. The main concepts are in confidentiality and impartiality. The publication process must be a closed process with those involved maintaining secrecy of the manuscripts until they are published. Any possible conflicts of interests or biases, positive or negative, must be recognized and dealt with appropriately.

Discussions with colleagues about research prior to its publication are confidential. The free exchange of ideas can lead to some very innovative thinking. As an example, an experimenter might perform some novel experiments. The fruitful results might not be explainable. These could be gained by discussions before publication. The new theories would support the new experimental results that the experimenter might not think of.

These exchanges, however, are not in the public domain. The information is not published yet. The manuscript could become caught up in a long, drawn-out review process or rejected. Anyone who was made

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privity to it and passed that information to others would risk the due credit to the original authors of the discovery. Unknowingly, this can happen. These other researchers may refer to the first work as “unpublished results” in their manuscripts, but theirs becomes the first in print. The recognition for the initial published work becomes theirs, not the real discoverers. Other later researchers forget the circumstances or are not aware of them and cite the first published report. Credit for the discovery then is attached to the authors of the first published report and not to those who first did the research.

Editors and reviewers are included in this sort of confidentiality. They are made aware of this new research as part of the publication process. They bear the responsibility of keeping the work private until it is accepted for publication. Even then the ACS guideline state that only the title and authors should be published and only as in the context of future articles to appear in the journal. All other references to the work and its details should only be done with the author's express permission. Many journals require written confirmation of this prior to allowing any mention of such private knowledge. That this is unpublished information or that it is in press should also be noted along with the list of authors in any manuscripts that an editor, a reviewer, or a fellow scientist with this preprint or personally-discussed knowledge has.

Conflicts of interest or biases must not be hidden. With the rise in academic research funding coming from industry, either directly from companies or through trade groups, the appearance of a bias can be detrimental. For example, work on environmental air samples from a researcher who receives funding from the coal industry would seem to be slanted in one direction. If the funding was from a solar-power group, the slant would appear to be the opposite. In both cases, when accepting such funding and disclosing it within the manuscript, a researcher must understand these perceptions.

Conflicts of interest must also be avoided when reviewing manuscripts or research grants. In a very active field, this can be difficult. A reviewer may know the authors and their work. They may be considered friends or competitors. In either case, a reviewer should try to set aside that personal knowledge in assessing the manuscript. If that cannot be done then the offer to review the manuscript should be denied and it should be returned quickly to the editor.

An even-handed appraisal of the research described in a manuscript is even more difficult at times. Reviewers are chosen for their expertise in an area.

They often know everyone else doing the higher quality work in that area personally. One must be on-guard for biases for or against the others based on personality, friendship, enmity, and other personal aspects. The review process relies on this integrity and it should never be compromised because of personal issues. Poor research should not be published even if it is done by a friend. In fact, it is somewhat of a dis-service to do that. An even better approach would be to honestly review the manuscript and help the friend achieve the good work needed through detailed comments. Contrarily, good work should not be rejected because of enmity.

A more subtle form of a conflict of interest is a bias against a manuscript because of the origin of the work. The nation, institution, and other affiliation of the authors should not be an issue that weighs negatively or positively on the treatment of the manuscript. This origin might be reflected in a less-than-acceptable level of technology, reagent purity, equipment, and other technical issues or in the quality of the writing and grammar. These aspects can be criteria for acceptance or rejection.

Due credit must be given for significant contributions to a project. The magnitude of the contribution determines whether this is a co-authorship or an acknowledgement. Conversely, co-authorships should not be taken lightly so as to include any person who is even slightly involved in the work. I must admit to being overly generous at times with co-authorships. But it seems to me that if the decision is debatable, then it is better to err on the inclusive side. With that, the author listing may grow longer, but the chances of bruised egos are less. A rule of thumb reiterated by several scientists is to think of yourself as the other person. How would I feel if I were or were not acknowledged? If I were or were not cited as a coauthor?

Quoting from another research paper is legitimate if it is cited. If it is not, it is plagiarism. The introductory sections of manuscripts or review articles sometimes contain bits of this. It seems that authors think the writing someone else does is good and that they cannot do better. I once reviewed a manuscript that had a very characteristic opening paragraph. It said that occurrences the larger polycyclic aromatic hydrocarbons “are reported from literally the bottoms of the oceans to the dust clouds of interstellar space.” It contained certain phrases and words that sounded very familiar. It was copied from one of my papers, but without citation. If I had not been one of the reviewers this writing would have been usurped by the authors of the later manuscript.



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