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Promoting Scientific Standards

THE SCIENTIFIC ENTERPRISE IS BUILT ON A FOUNDATION OF TRUST. AS KENNETH SHINE AND I emphasized 15 years ago in this journal, if science is to flourish and attain its appropriate role in aiding human progress, “It is incumbent upon all of us in the scientific community to help provide a research environment that, through its adherence to high ethical standards and creative productivity, will attract and retain individuals of outstanding intellect and character to one of society’s most important professions.”*

Journals such as *Science* occupy a special place in the maintenance of scientific standards. As an influential gatekeeper to the peer-reviewed literature across the natural and social sciences, what *Science* decides to publish helps to define scientific excellence for scientists. And with remarkable frequency, the broader media uses our selections to decide which scientific advances to convey to the public, adding to our profound sense of responsibility. For these reasons, the chief editors of the journals *Science*, *Nature*, and the *Proceedings of the National Academy of Sciences* have been working together to consider how to improve our procedures, so as to help make science as productive as possible in serving both scientists and the greater society. As a start, we have focused on two critical authorship issues.

First, to discourage “honorary authorships,” we agreed that before acceptance, each author will be required to identify his or her contribution to the research (see www.sciencemag.org/about/authors). *Science*’s policy is specifically designed to support the authorship requirements presented in *On Being a Scientist: Third Edition*, published by the U.S. National Academy of Sciences.† That report emphasizes the importance of an intellectual contribution for authorship and states that “Just providing the laboratory space for a project or furnishing a sample used in the research is not sufficient to be included as an author.”

Second, *Science* will require that the senior author for each laboratory or group confirm that he or she has personally reviewed the original data generated by that unit, ascertaining that the data selected for publication in specific figures and tables have been appropriately presented. Thus, for example, a researcher who prepares a digitally processed figure displaying an assortment of electrophoretic gel separations will need to present all of the original gel data to a specified senior author, who must certify that this has been done when the manuscript is returned for revision.

In this way, *Science* aims to identify a few senior authors who collectively take responsibility for all of the data presented in each published paper. Traditionally, a single individual has been asked to accept this responsibility. But the former requirement has become increasingly unrealistic, considering that a large fraction of publications now contain contributions from groups with very different expertise—and that half of the papers published in 2009 by *Science* had authors from more than one nation.

One issue not yet resolved is what scientific journals might do to encourage good mentoring practices by experienced scientists. Many universities now require that their young faculty members choose one or more mentors among the senior faculty. These mentors then use the wisdom and connections developed from their decades of experience to help the younger scientist in whatever ways are requested, including decisions that involve ethical standards. Being a good mentor resembles being a good parent: It involves a great deal of listening and help with problem solving and requires mutual respect and trust. Should the acknowledgments section of a publication specifically list any mentoring that made a major contribution to the research? Could a special “mentor search” function on PubMed (and on other literature compilation Web sites) then help to reward mentors?

Effective mentoring is critical to the future success of science, and as scientists remain active to more advanced ages, it provides a meaningful way to end a career. Scientists everywhere can and should do more to promote it.

—Bruce Alberts

10.1126/science.1185983

*B. Alberts, K. Shine, *Science* **266**, 1660 (1994). †www.nap.edu/catalog/12192.html.

