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## On Being a Scientist

How does a young person just entering a career in science learn the ethos and behavioral norms of the profession? For example, how does one know when it is okay to be secretive and when such behavior is unacceptable? At what point is one expected to share data and research materials with others, including competitors? What about sharing materials with those who have commercial interests? Whose name goes first on a publication? What are the “rules” for assigning credit, and how are the rules implemented?

Most of us learned answers to such questions through an informal process of on-the-job training or even at the school of hard knocks. For the majority of us, role models, especially our major professor, were a key factor. Of course, formal mechanisms also exist, including courses and scholarly books and papers. Moreover, professional organizations have made significant contributions, notable examples being the 1975 AAAS report *Scientific Freedom and Responsibility*, the 1984 Sigma Xi report *Honor in Science*, and the 1989 Institute of Medicine report *The Responsible Conduct of Research in the Health Sciences*. Unfortunately, most of these are unknown to the typical graduate student or postdoc.

Science today, like everything else, is undergoing rapid changes, some of which clearly affect the scientific ethos. Communication—the sine qua non of science—is rapidly evolving because of new technology. Moreover, the relation between science and society is increasingly one of interdependence, with society counting on science and technology for future competitiveness on the one hand, and science being heavily dependent on having the confidence and support of the public on the other. Both sides have a stake in nourishing and strengthening this relationship. Given these changes, it is fair to ask whether the informal mechanisms for preparing young scientists for their role in science and society will serve as well in the future as they have in the past.

In partial answer to this question, the National Academy of Sciences has just published a booklet entitled, *On Being a Scientist*. The booklet was prepared under the leadership of Academy President Frank Press and written by a very distinguished panel headed by Francisco Ayala.

*On Being a Scientist* covers topics such as the treatment of data (Is fabrication a more serious offense than “cooking” or “trimming” data?), values in science, the risk of self-deception, and the priority of discovery. It concludes with a discussion on “the scientist in society.” This 20-page booklet is a good read. With carefully selected examples, it brings life and meaning to the discussion of social and behavioral issues that will confront any young person embarking on a career in science.

In a section on human error in science, the authors note that the perceived pressure to have a large number of publications can create an atmosphere where quality is sacrificed. In that regard, the authors commend institutions that have adopted policies that make it clear that quality is more important than quantity in judging a scientist’s performance. This movement, which is long overdue, should be enhanced by the recent decision of the National Science Foundation to limit the number of publications that it will consider in grant applications. Future applicants to NSF will be limited to listing only five publications relevant to the proposed research, plus not more than five additional publications the applicant considers to be significant. If other funding agencies were to follow NSF’s lead, this movement would be accelerated appreciably.

How can publications such as *On Being a Scientist* be used most effectively? Many possibilities come to mind, but an obvious one is to use it as a basis for discussion and debate among graduate students and postdocs. Many major professors hold regular meetings with their research group to discuss progress on individual projects, new contributions in the literature, and the like. These meetings often play a key role in the socialization of young scientists, an effect that would be enhanced by having group members read and discuss the NAS booklet. The Academy deserves credit for taking the initiative in this area, but it will be the response of the scientific community as a whole that determines the impact.

—RICHARD S. NICHOLSON

\*F. Ayala et al., *On Being a Scientist* (National Academy Press, Washington, DC, 1989).