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PRESIDENT'S Column

On Better Serving Our Graduate Students

In a previous column to ASCB members, entitled "The real 'Science for Society'" (April 2007 *ASCB Newsletter*), I argued that—if we are to be successful in spreading the values and judgments of science throughout the world—we will need talented individuals who have been well-trained as scientists to enter a broad range of career paths. To this end, I asked how we might "begin to build a new type of scientific enterprise, one in which universities focus on seeding large numbers of highly skilled scientists throughout society—as future leaders in education research, pre-college teaching, journalism, business, science policy, law, and politics." I now return to this important issue to propose some possible strategies.

Bruce Alberts

Our graduate school system successfully supports the preparation of large numbers of young people as skilled research scientists, producing about 6,300 Ph.D.s per year in the biological sciences in the U.S. alone (National Science Foundation, 2006). However, the accumulation of more and more Ph.D.s in postdoctoral "holding positions" in our field reflects the shortage of traditional research positions compared with the supply of young talent, an imbalance that is not sustainable. For science to continue to be a favored career choice for young people, essentially all of those who complete graduate school must be able to find fulfilling careers that make use of their training and abilities. Proposals to stop the formation of new graduate school programs and to reduce the intake of the existing ones (National Research Council, 1998) have been largely ignored. Yet, if nothing is done, the situation could become self-correcting in a disastrous way—with a vast demoralization of underemployed Ph.D.s sending a clear message to most young people that science careers are too risky to contemplate.

Career Options for Biological Scientists

The future health of the scientific enterprise requires that we cast the widest possible net for talent; not only to develop the next generation of independent researchers and scientific leaders, but also to produce those who will make use of their scientific training and abilities in a variety of non-research careers. We can probably never have too many well-trained scientists. I say this because of the great benefit to society of having people with both science skills and "science in their soul" spread widely throughout the professions. From my contacts with large numbers of young cell biologists, I find a surprising percentage who would be pleased (in fact, eager) to use their science training in any one of a variety of ways. But this requires that we both support their career choices and continue to maintain contacts after they leave. Thus, we need to treat them as an important part of the broader "scientific community," inviting them back to talk to our students and faculty as we currently do for those who pursue standard research paths.

Last, but not least, we need to do much more to provide pathways from our graduate schools into the wide variety of non-research professions that are of interest to students. About 10 years ago, the National Academies produced three important booklets to help enlarge the discussion around this issue. The first, entitled *Careers in Science and Engineering: A Student Planning Guide to Grad School and Beyond* (National Research Council, 1996), was intended to help students broaden the range of careers that they were considering in thinking about their future. A second, entitled *Adviser, Teacher, Role Model, Friend: On Being a Mentor to Students in Science and Engineering* (National Research Council, 1997), was produced in response to many students' fear of discrediting themselves with

faculty if they even hinted that they might not be aiming at a career as a professor. And finally, there was a very important report on enhancing the postdoctoral experience (National Research Council, 2000). As with all publications produced by the National Academies, these booklets are available for reading (or purchase) at www.nationalacademies.org.

When I returned to the University of California, San Francisco (UCSF), in 2005 after 12 years in Washington, I was surprised and pleased to discover the many programs that had been developed to serve graduate students and postdoctoral fellows by a new UCSF Office of Career and Professional Development. These include frequent workshops and courses on teaching, writing, networking, leadership, goal setting, career path assessment, business, and a wide range of career options (see www.ucsf.edu/career/lifesci.options.shtml). Many other academic institutions now offer similar types of help to their young scientists.

Broadening the Available Experiences

There are certainly other steps that we can take to help optimize the career paths of our young trainees at UCSF (600 graduate students and more than 1,000 postdoctoral fellows) and elsewhere. At the National Academies, inspired by the year-long American Association for the Advancement of Science fellowships that have brought scientists and engineers to work in government for more than 30 years, we established 10-week fellowships to bring graduate students and postdoctoral fellows to work on science and technology policy at the Academies (see www7.nationalacademies.org/policyfellows). The response has been amazing, with about 150 applicants for the 20 or so places available three times a year. The 450 alumni now pursue a wide variety of science-rich careers. Many are research scientists with broader interests and a much wider view of their responsibilities in society than they might otherwise have. Many others have entered careers in science policy; in the federal government alone, alumni work in seven different Departments of the Executive Branch and as staff in the House of Representatives and the Senate. Others work in science education, environmental protection, as journalists, or in international organizations such as the World Bank.

At the ASCB Council Retreat in May, we discussed the possibility that the ASCB could catalyze the development of a national program to place cell biology graduate students and postdoctoral fellows in a wide variety of apprenticeship-type positions for periods of one to four months. This would enable them to sample careers not only in science policy, but also in state governments, K–12 education settings, community colleges, the media, nongovernmental organizations, industry, and the law. It would take a substantial amount of new resources to pull this off, and we would appreciate feedback from members with ideas about how we might begin.

A New Type of Graduate Degree?

The most ambitious plans for the future would include the development of a new type of graduate program for scientists, with a branching set of options after the first year. After this year, those who are motivated to become research scientists would continue for the traditional five-year Ph.D. degree. Those with other aims might enter a three-year degree program, with a new name analogous to the law school J.D. This new program would specifically prepare students for one of a set of other careers. The preparation would presumably include short fellowship experiences such as those just described, as well as training specifically designed to equip the student to be a professional science-oriented journalist, science curriculum specialist, policy analyst, museum educator, and so on. Although there are good stand-alone programs leading to some of these careers, they are unconnected to standard science PhD programs, and they are of limited capacity.

For science to continue to be a favored career choice for young people in our society, essentially all of those who complete graduate school must be able to find fulfilling careers that make use of their training and abilities.

Obviously, creating such options for students who enter our standard graduate programs would require a set of partnerships with other organizations to bring in the needed expertise. At least some of these partnerships would need to be organized regionally and involve students from different universities. Starting such a program would require major resources, and it will probably need to await the appearance of a far-sighted donor with the appropriate vision. ■

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Comments are welcome and should be sent to president@ascb.org.