Preserving and enhancing the research creativity of the nation’s young researchers is the single most important long-term strategy for ensuring national security in all of its forms in the next generation. By national security in all of its forms, I am referring to a broader definition developed as national policy nearly a decade ago (1). It included health security; economic security and prosperity through technical innovation; technical superiority fed by engineering innovation and by breadth and excellence in basic research; environmental security and responsibility; and personal security, as demonstrated through improved quality of life through culture, inspiration, and full participation in the democratic process.

It is impossible to overlook the importance of young researchers—postdocs, in particular—in every one of these areas of national security. The postdoctoral experience—which has become a 4–5 year commitment in most science and engineering (S&E) fields and is now considered a necessity to advance to a senior research position—is a critical step in future researchers’ preparation to make independent contributions at the frontiers of their disciplines. As a nation, we must ensure that pursuing advanced S&E degrees and postdoctoral research leads to rewarding positions in academe or elsewhere at the end of an intellectually challenging, if at times grueling, training gauntlet.

Startling changes in the postdoctoral experience have occurred over the past generation. When I received my Ph.D. thirty years ago, fewer than 35,000 Ph.D.s were conferred each year, the average postdoc lasted 1–2 years, and more often than not it ended in a tenure-track academic position. In 2001, the number of new Ph.D.s exceeded 40,000, the average postdoc lasted 4–5 years, and there simply were not enough tenure-track positions available to absorb all of the well-trained postdocs desiring them (2). On the other hand, researchers enjoy much more diverse and rewarding postdoctoral experiences today than they did in the past.

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Editor’s Column
Jerry A. Bell
American Chemical Society

Why should national security have such a prominent position in this issue of the ACS Graduate Education Newsletter? Dr. Greenwood’s feature article on page 1 offers a vision of national security that lifts us beyond terrorism to the challenges of securing health, economic well-being, the benefits of technology, and full participation in our society for all citizens. These are challenges for chemists because, in one way or another, all of them involve chemistry. Dr. Greenwood points out the importance of postdoctoral experience as preparation for careers that will help meet these challenges. In this issue, we focus on the postdoctoral experience that will be the next professional step for about half of you who are graduate students and we hope that the content will also serve postdocs.

Funding for the postdoctoral experience is important. On page 3 we provide a summary of a National Science Foundation sponsored workshop on the past, present, and future of postdoctoral appointments that included discussions of the definition and roles of postdoctoral appointees, working conditions, mentoring, and assessment of the experience. In his introduction to the workshop, Dr. Ellis reiterates the vision in Dr. Greenwood’s article with a thumbnail description of a new postdoctoral fellowship program involving projects that “would address national needs such as workforce development and job creation, and the strengthening of research capacity and infrastructure.”

The relatively recent increase in numbers of graduate students choosing to pursue postdoctoral appointments is mentioned several times in the Newsletter.

This first on-line Graduate Education Newsletter contains articles and features that we hope will be of use and interest. Let us hear about your responses to the articles in this issue, topics you would like included in future issues, and your reactions to and experiences with this on-line format.

The resulting larger number of postdocs, combined with an increase in the number of years spent in postdoctoral positions, made problems associated with the roles, rights, and responsibilities of postdocs more obvious. Some of the responses to these problems are outlined in the report on page 5 about the symposium on “The Status of Postdoctoral Education in the Chemical Sciences,” organized by the Office of Graduate Education. Further details on the recent Postdoc Network (FDN) and the National Postdoc Association (NPA) are found on pages 8 and 9, and an initiative by Sigma Xi to gather more data to inform decision-making is described on page 9. In the Points of View column, page 7, two postdocs relate their experiences and offer advice for graduate students planning to go on to postdoctoral positions.

If your career plans include the search for a faculty position, a new publication, And Gladly Teach: A Resource Book for Chemists Considering Academic Careers, from the Office of Graduate Education and the Department of Career Services, is described on page 10. We think this book and accompanying bibliography of further resources will be valuable tools as you pursue this career goal.

This first on-line Graduate Education Newsletter contains other articles and features that we also hope will be of use and interest. Let us hear about your responses to the articles in this issue, topics you would like included in future issues, and your reactions to and experiences with this on-line format. Remember to return your postcard or e-mail us at GradEd@acs.org with “Subscribe” as the subject line to receive future printed issues of the Newsletter as well as notices when the on-line issues are published.

Dr. Bell is Senior Scientist in the Education and International Activities Division of the ACS. ■
**Letters**

This letter is in response to the Points of View column on The Graduate Student Experience: Problems and Solutions in the spring 2003 issue of this Newsletter.

I thought that both points of view presented in The Graduate Student Experience touched on some really important issues, such as the lack of a clear “end point” and the positive aspects of inquisitiveness. However, I feel that my major concern with graduate education was not addressed. At some point in history, an unwritten rule was crafted that states graduate students must work 50–60 hours per week and are not entitled to vacation days such as Presidents’ Day and Martin Luther King, Jr., Day. As a result, students’ time out of work is riddled with guilt and second-guessing their own dedication. In the end, graduate students find themselves unable to let go and just relax. Students work all day, eat lunch at their desks (while reading articles), and read at home and on the bus during the commute. For the past several years the enrollment in Ph.D. programs in chemistry has declined each year. Maybe administrators should do something to dispel the unwritten rules.

Roni A. Kopelman  
University of Washington Graduate student in the Center for Nanotechnology, Supported by an Integrative Graduate Education and Research Traineeship

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**Postdoctoral Appointments: Roles and Opportunities**

An NSF Workshop, May 11–13, 2003

Many of the issues and challenges Dr. Greenwood outlined in her statement on our front page motivated the National Science Foundation’s (NSF’s) Division of Chemistry and Office of Multidisciplinary Activities to sponsor this workshop. Their purpose was to examine the past, present, and future of postdoctoral appointments.

In May, Dr. Arthur Ellis, Director, NSF Division of Chemistry, opened the workshop by sharing some background information about the NSF’s interest in postdoctoral appointments and expectations for the workshop. Here he introduces a summary of the workshop proceedings.

**Introduction**  
Dr. Arthur Ellis, aellis@nsf.gov  
National Science Foundation

The Division of Chemistry at the NSF recognizes the important contributions that postdoctoral scientists make to research in the chemical sciences. The impact of these scholars is evident in the creation of knowledge and in the development of the workforce that results from projects supported by the Division. Postdoctoral scientists often make major contributions to research projects and routinely appear as coauthors of scholarly publications. They frequently mentor younger graduate and undergraduate students, helping to develop future talent in the chemical sciences. Many postdoctoral associates assume an independent professional position after their tenure as postdoctoral scholars has ended, thereby becoming long-term contributors to and leaders of our chemical sciences workforce. Postdoctoral scholars deserve considerable credit for their contributions to integrating our research, education, and human resource enterprises. The Division’s recognition of the added value of the postdoctoral experience can also be measured by its financial commitment to these individuals. In fiscal year 2002, nearly half of the budgets for individual investigator awards made by the Division of Chemistry included postdoctoral support. These budgets show that the Division supported nearly 600 postdoctoral associates in fiscal year 2002 at a total cost of approximately $16 million, nearly 10% of the Division’s budget.

With such a substantial investment in postdoctoral training, the Division of Chemistry has been exploring mechanisms to enhance traditional postdoctoral appointments. The workshop, “Postdoctoral Appointments: Roles and Opportunities,” led by Robert Lichter, Willie Pearson, Jr., and Geraldine Richmond provided an opportunity to bring together a cross-section of the chemical sciences community to discuss postdoctoral training.

The structure of the workshop allowed the attendees to discuss ways to enhance traditional postdoctoral models and to explore some very different models. Dr. Rita Colwell, Director of the NSF, has recently commented on some of these issues (http://nextwave.sciencemag.org/cgi/content/full/2003/06/18/7). The Division of Chemistry is committed to working with our community to identify and support promising mechanisms for enhancing the quality of the postdoctoral experience.

The Division of Chemistry is developing Discovery Corps, a postdoctoral fellowship program that exemplifies a non-traditional model. Discovery Corps Fellowships would enable recent doctoral graduates and mid-career chemical scientists to develop projects that would address national needs by leveraging their research expertise with professional service. Such projects, which would be grounded in the chemical sciences, would advance the professional development of the Fellow and benefit institutions with which they would be affiliated. The projects would address national needs such as workforce development and job creation, and the strengthening of research capacity and infrastructure.

I would like to thank the workshop organizers, their steering committee, and the workshop participants for their hard work and contributions to an excellent and informative event. Their workshop report, which is available at http://www.merrimackllc.com/2003/postdoc-workshop.html, provides important guidance.

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from our community for investments in postdoctoral training. I appreciate your interest in these issues and welcome your comments.

Dr. Ellis is on leave from the Department of Chemistry, University of Wisconsin, Madison. The views expressed here are his and do not necessarily reflect the views of the NSF.

Workshop Summary

This report summarizes discussions that took place during the workshop convened to examine and discuss the current state and role of the postdoctorate, the period following completion of the doctorate and before the start of a full-time professional position. The workshop had two major goals. The first was to illuminate the processes, characteristics, and outcomes of the postdoctoral appointment. The second was to identify concepts, opportunities, and priorities for activities by the NSF uniquely at the postdoctoral level to strengthen science, mathematics, and engineering in the United States along with the human resources required to maintain scientific leadership.

The workshop envisioned larger outcomes for NSF-supported activities at the postdoctoral level as well. They include establishing a better prepared and more diverse United States workforce for the global chemical sciences environment; enhancing the numbers, capabilities and diversity of the chemical sciences’ workforce leadership; identifying opportunities other than research training that can be met at the postdoctoral level; and identifying additional research possibilities (including interdisciplinary research) to fill gaps and extend the understanding and knowledge of the postdoctorate. Workshop attendees represented a range of constituencies, largely but not exclusively in the chemical sciences, and included leading scientists and hosts of postdoctoral appointees; employers from academic, industrial, and governmental sectors; newly minted scientists, both with and without postdoctoral experience; current postdoctoral appointees (postdocs); public and private funders of postdoctoral positions; representatives of professional organizations; and representatives of organizations that direct their efforts toward communities underutilized in science, including women, minorities, and people with disabilities.

The workshop consisted of plenary presentations and panel discussions, each followed by breakout group discussions that were summarized for the entire assembly. Candor and a willingness to articulate deep-seated concerns and possible ways to address them characterized the workshop. Participants discussed expansions of the “traditional” research-only postdoctorate, acknowledging the underlying importance of research at the postdoctoral level. Additionally, several attendees and presenters described valuable postdoctoral appointments that did not incorporate research. The workshop also clarified the need for more and better data to inform policy and program decisions.

Embedded throughout the entire workshop was the notion that scientific and scholarly excellence and leadership are intimately intertwined with diversity. Indeed, the workshop explicitly identified and addressed enhanced participation of women, African-Americans, Latinos, American Indians, and persons with disabilities in the scientific and technical workforce and its leadership.

The workshop did not seek to achieve consensus on programmatic recommendations, nor was it able to speak to all the underlying questions. Rather, its intent was to identify those aspects of the postdoctorate that are worthy of attention as new programs are considered or existing ones reviewed. Among these are:

- better guidance in choosing careers, beginning at the graduate-student level;
- the need for clear expectations of the postdoctoral appointment among postdoc, adviser, institution, and funder;
- better mentoring during the postdoctorate by the adviser, the institution, and professional associations;
- provision of adequate pay and benefits;
- more energetic and focused recruitment of underserved communities into postdoctoral appointments;
- creation of and participation in “hybrid” postdoctoral programs or ones that do not include research;
- documentation of previous mentoring and successes by postdocs in renewal proposals for funding; and
- broader assessment of the impact of the postdoctorate beyond research output, including tracking of the careers of younger scientists to gauge specific benefits of postdoctoral appointments.

Hybrid programs and ones that do not include research elicited attention, both for their potential to provide new postdoctoral venues and for their implications for career pathways, especially in research-intensive universities.

An auxiliary outcome of the workshop was the recognition that many of the themes presented there apply also at other career stages, including undergraduate and graduate study, and during full-time employment. Indeed, all the stages of “life-long learning” seamlessly overlap and share common elements. Addressing these elements at any stage benefits all levels of career development and progress and promotes the goal of achieving scientific excellence and leadership.
Currently, postdoctoral scholars play a dual role in science disciplines: as fellows (in advanced training under faculty mentorship), and as employees (contributing to university, government, and commercial research programs). There is growing recognition of the need to develop core policies that advance the postdoctoral experience—whether the postdoctoral scholar is funded as an employee or as a fellow. In addition to the core policies, there are crucial questions as to the objectives and outcomes of postdoctoral education. For example: What percentage of doctoral graduates seeks postdoctoral positions? Why? What is the expected duration of a postdoctoral appointment? What influences the duration of an appointment? What initiatives are there to enhance the postdoctoral scholar's experience? What are the employment statistics following this experience? How do former postdocs apportion among employment sectors (university, college, government, and industry)? The following short summaries of the presentations can’t capture all the details of their answers to these and other questions, but the ACS Office of Graduate Education website [www.chemistry.org/education/student/graduateducation.html] provides links to the slides from each presentation.

In her introduction to the symposium, Marjorie Caserio (University of California, San Diego) reflected on the difference between her experience from the past and the present situation. She recalled that for a Ph.D. graduate in the 1950s, a year or so of postdoctoral work was considered nice, but not a necessary step on the way to an industrial position or even an entry-level faculty position. Most Ph.Ds entered the job market upon graduation. Times have certainly changed. Postdoctoral experience has become necessary for graduates seeking faculty positions in most colleges and universities and for many research positions in industry and government. The number of postdoctoral appointees has increased dramatically, and by 1997 was estimated to be 52,000 in all science and engineering fields. For the individual, the postdoctoral experience has become an essential training period to add skills needed to advance a professional career. Collectively, postdoctoral scholars have become essential for the creative accomplishments and productivity of the research enterprise in the United States. Given their importance, it is surprising that most postdocs have uncertain status with no clear standards by which they are appointed, mentored, compensated, evaluated, or receive career guidance. This state of affairs was clearly laid out in *Enhancing the Postdoctoral Experience for Scientists and Engineers* (National Academy Press, 2000) [www.nap.edu], the results of a study by the Committee on Science, Engineering, and Public Policy (COSEPUP) of the National Academies. This excellent report has many constructive recommendations for postdocs, their advisers, institutions, funding agencies, and scientific societies to enhance the postdoctoral experience. This symposium responds to the call for scientific societies to play a larger role by bringing together some of the important stakeholders in the postdoctoral enterprise to exchange information and discuss the common goal—to enhance the postdoctoral experience.

Carter Kimsey (National Science Foundation) provided information about postdoctoral scholars in all the sciences. NSF supports postdoctoral scholars directly on fellowships and indirectly through research grants, cooperative agreements, center awards, and education projects. Individual fellowship programs were described. Efforts to assess the status of postdoctoral scholars supported via other mechanisms were presented as well as efforts to improve the status of postdoctoral appointees.

Statistical information related to postdoctoral scholars in chemistry comes from the ACS annual surveys of salaries and of new graduates, as well as the 2000 ChemCensus, an every-five-year census of working ACS members. Jerry Bell (American Chemical Society) reviewed these data, beginning with a breakdown of working Ph.D. chemists by employer: 52%
are employed in industry and another 36% in academia. Within these categories, a little over half of industrial Ph.D. chemists and almost three-quarters of the academics have had postdoctoral experience. Broken down by subdiscipline, 83% of biochemists have done postdoctoral work as compared to less than 50% of polymer and analytical chemists. These differences probably reflect the choice of the latter groups to find industrial employment where postdoctoral experience is not as important. Among native and non-U.S. native chemists, a larger percentage of nonnative chemists have done postdoctoral work and they have held more postdoctoral positions. These differences are probably attributable to the reasons for coming to United States and visa–naturalization status. As we could infer from Marjorie Caserio’s introductory remarks, the number of chemists who have had postdoctoral experience decreases with the age of the chemists. Two-thirds of those in the under-40 cohort have done postdoctoral work, compared to 54% of those over 60. A little over half of industrial Ph.D. chemists and almost three-quarters of the academics have had postdoctoral experience.

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Important messages for others who wish to follow in these footsteps without reinventing wheels are the “best practices” that have been learned over the six-year lifetime of the office. These include recognition that you have to work with and support these constituencies: the postdoctoral appointees, their faculty mentors, and the staff engaged in research and research training. You must have a standard definition of a “postdoctoral appointee,” clearly defined postdoctoral policies (such as an adequate and consistent salary schedule, maximum time of appointment, periodic review, benefits, and so on), and a consistent appointment process across the administrative unit. The responsibility for training (an essential component of the postdoctoral experience defined in the policies) is borne by the institution, the department, and the mentor, with the former two taking the lead in developing training programs that complement and extend the research experience. Human resource experience is a necessary component for staffing these programs as well as providing for career guidance services, since the ultimate objective is preparation for and acquisition of a permanent career position.

Although offices and programs like those just described are becoming more common, they are still the exception, not the rule. Alternative ways for postdoctoral appointees to get information and advice are still needed. Two avenues that have recently become available, both with funding from the Alfred P. Sloan Foundation, are the Postdoc Network (PDN) at Science’s Next Wave (http://nextwave.sciencemag.org/pdn) and the National Postdoc Association (NPA, www.nationalpostdoc.org) hosted by the American Association for the Advancement of Science (AAAS). James Austin (AAAS, Science’s Next Wave) provided a description of the PDN. For an overview of the rationale for the PDN, see the article by Austin on page 8. Also, see the article by Carol Manahan on page 9 for an introduction to the NPA. The PDN was launched in 2000 with the mission “to facilitate communication and interactions between postdoctoral researchers and their associations, societies, and offices across the country via a free, online, postdoctoral community.” Today there are articles available online for these constituencies in a variety of areas of concern: practical solutions for quality of life issues—status, salary, benefits, childcare, and more; tools to help your organization meet postdoctoral appointees’ professional development needs; and advice about how to create and maintain a postdoctoral association, office, or program. In addition, there are links to resources including policy documents, salary–benefits information, surveys, resources for women and international scholars, professional development programs, and more.

Whatever their situations, most postdoctoral scholars are seeking permanent careers and at least half of those in chemistry will probably find them in industrial laboratories. James Heck (Merck Research Laboratories) gave some advice about choosing a postdoctoral position, getting the most out of it, and positioning yourself for industrial employment. His suggestions for choosing a position included knowing your career goals, knowing your preferred work environment, using your graduate mentor to aid in the search, aiming as high as possible, and, if at all feasible, visiting the laboratories of prospective postdoctoral mentors to get a sense of your fit with the group. To get the most from your postdoctoral experience, ensure that your project goals are realistic and well-defined and then accomplish them, learn from your colleagues, connect with other faculty and researchers in your field, and find out where recent alumni of your research group are employed because these provide initial leads to your possible future employment. If you are interested in an industrial position, consider what industrial employers find important in a Ph.D. chemist: creative problem solving with a record of accomplishment, technical excellence in the field, a team player, and excellent communication skills, especially if you aspire to project management. More detailed suggestions about how to conduct an industrial job search are included in the online slides from this presentation.

To be sure that postdoctoral reality was part of the symposium, two current postdoctoral scholars, Lee Friedman and Luke H. Bradley (Princeton University), described their academic backgrounds, search for postdoctoral positions, and experiences since accepting their postdoctoral positions. See the “Points of View” column, page 7, for statements by Dr. Friedman and Dr. Bradley.
Points of View

Choosing a Postdoc
Lee A. Friedman
Princeton University

Before I begin discussing my postdoctoral search, I wish to make clear that I am only referring to my own experience and opinion(s), which may not apply to everyone. In fact, they probably don't. Each person has a unique time in graduate school, and what he or she does afterward stems from a combination of that and individual career goals. I can only hope to share what I have learned along the way.

During my graduate career, I figured out that I really enjoy teaching. The teaching motif drove my decision to take a postdoc, which would eventually lead to a career as a professor. I decided to eschew the traditional research postdoc in lieu of a teaching postdoc. Truth be told, I have the attention span of patio furniture, and I get really antsy standing at a lab bench all day long. Since I had done synthetic organometallic/inorganic chemistry with an emphasis on mechanistic studies for my Ph.D. thesis, I wanted to do postdoctoral research in the area of physical organic chemistry. I felt (and still feel) that this combination would make me an attractive faculty candidate. Fortunately, things turned out very well for me and I found a teaching postdoc that was compatible with both my research and teaching goals. I pretty much hopped on it about a week after I got the offer, and am very glad that I did. Below are some factors I recommend considering and some things to do when nearing the end of your graduate career.

Decide why you want to do a postdoc. Many people do postdoctoral research to gain experience and to get publications, which are completely admirable goals. I wanted to teach and to do research in an area I wasn't completely familiar with in order to expand my capabilities. Finding an adviser willing to take on an inorganic chemist for organic research was something I thought might be difficult, but I did luckily find such an adviser. Whatever your reason, make sure you are clear about what you want from a postdoc.

Apply for fellowships. I wish someone had told me this early on. Applying for postdoctoral fellowships (NIH or NSF, among others) will allow you to pretty much have your pick of advisers. Indeed, the most famous people at the top schools have oodles of postdoctoral applicants who are externally funded. From a financial standpoint, these professors can't be faulted for taking people who bring money with them. To compete, you almost have to apply for externally funded fellowships. Nonfunded postdoctoral fellows cost more than graduate students.

Ask your thesis adviser to recommend postdoctoral advisers. I happened upon my current postdoctoral appointment through a connection via my thesis adviser. Yours can use his or her connections to put you in touch with potential advisers, give you insights into their personalities, and tell you who might be a good choice or a not-so-good one.

Send out feelers to establish contact(s) before you apply. I think this becomes especially important if you need to write a proposal for an externally funded fellowship, because you may get a suggestion for a proposal. But I think it's always a good idea to let prospective advisers know you're interested in their research—people are always flattered when you mention that. If there are only a certain number of "slots" for postdoctoral researchers, you may end up cementing the one you want by contacting the professor beforehand. Of course, remember to include your expected graduation date—be sure to talk to your thesis adviser about it and be realistic.

Talk to people in the group you are thinking about joining. This is the same recommendation I always give to students regarding picking groups in graduate school. Doing so will give you a good idea of what being in the group is like, and how the group dynamic works. It will also give you a chance to find out how much you will see your potential postdoctoral adviser, and how he or she chooses to run the group.

Start to think about your postgraduate plans about a year before graduation. You don't want to get stuck with a defense date and no future prospects. Getting a jump on your plans will make your transition out of graduate school less stressful and give you plenty of time to think carefully about your ideal postdoctoral plans.

Postdoctoral Experience
Luke Bradley
Princeton University

So far, I have found my postdoctoral experience to be an exciting, challenging and important part of my overall science education. "Postdoc" means something different to each individual. My own experience can best be summed up as "a job with many hats."

My main postdoctoral "hat" centers on research. Like most postdocs, I have chosen to learn a different specialty after graduate school. After settling into my new lab, I began a new research project. In the beginning, this aspect of my postdoc provoked anxiety in addition to challenging me, especially since it came so soon after leaving my familiar graduate work. However, I remained relatively calm by realizing that any new project will have unforeseen pitfalls(!). My background also gave me confidence, leading me to hope that my learning curve would be relatively short. My research has since progressed to the point where I think the results of this new project will be published soon.

Another important postdoctoral "hat" has involved funding. I was relatively naïve about how a laboratory is funded (and what exactly is being funded). When I began my position, the laboratory had enough money to fund me for only a year—not much time to begin a large research project. Soon I was looking into postdoctoral funding opportunities—and submitting applications and proposals. Fortunately I was awarded a three-year postdoctoral fellowship that will allow me to continue developing my project, which has also received external funding. Obtaining (and maintaining) funding is a crucial aspect of running a laboratory and an essential skill to learn.
The Postdoc Network at Science's Next Wave

James Austin
American Association for the Advancement of Science

Though most people place the birth of the postdoctoral position in the era of scientific expansion following World War II, postdoctoral holding patterns have existed since at least the 1930s and probably for far longer. At least as early as the 1930s, young scientists often pieced together a living from a few available fellowships and short-term teaching jobs, or by any other means they could find, until they could obtain a suitable faculty position. Meanwhile, they spent all their "free" hours practicing their science. This willingness to sacrifice a bit of personal comfort for the privilege of pursuing science has long marked the postdoctoral experience, and many scientific institutions have proved willing to accept these sacrifices. By offering the best deal in town, struggling young scientists have played a key role in the scientific enterprise for the better part of a century.

In recent decades the postdoctoral phase has come to be seen not merely as a holding pattern but as an additional training phase beyond the Ph.D. Some postdoctoral training programs have emerged that are highly structured and effective, but many are neither; the nature of the experience depends completely on the lab a particular postdoc is working in.

Although postdoctoral experiences vary among disciplines, institutions, laboratories, and personal situations, all postdocs share common needs as scientists, professionals, and regular people. Among these needs are a living wage—indeed, a salary commensurate with their productivity, achievement, and potential—health insurance, decent working conditions, substantive career-development and career-advancement opportunities, and various individual needs. Researcher-led postdoctoral associations and university-sponsored postdoctoral offices have sprung up at some institutions to meet such needs, but until recently these organizations were relatively few, and often worked in isolation. A national effort was required. Enter the Postdoc Network.

The mission of the Postdoc Network has been to connect postdocs, postdoc associations, and institutional offices, allowing these groups to share information and ideas. The Postdoc Network publishes articles about the establishment of postdoc offices and organizations and provides resources to guide the formation of new ones. The first annual meeting of the Postdoc Network occurred two years ago, and, in what will surely prove to be an important milestone, the 2003 Postdoc Network meeting saw the birth of the National Postdoc Association.

Progress has been rapid, and though postdocs themselves and their host institutions deserve much of the credit for this progress, the Postdoc Network has played, and will continue to play, an important role in the evolution of postdoctoral organizations and experiences.

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As a postdoc, I wear an additional "hat" as a mentor. Our lab is fortunate enough to have several graduate and undergraduate students. Several have worked directly on my project. In this role, I initially have to teach project background and theory as well as laboratory and experimental techniques. Once the students become more independent, I answer questions (sometimes too many!) and direct their research efforts. Leading a "research team" has been a rewarding aspect of my postdoctoral experience that I didn't anticipate. In addition, I also advise other students in the lab about their research and, as a result, become knowledgeable about other research projects as well as my own.

My final "hat" is that of an instructor. My postdoctoral fellowship has given me the chance to help teach an undergraduate course. I thought this experience wouldn't differ much from my teaching as a graduate student; however, it turned out to be considerably more involved. Classroom and course responsibilities (grading, etc.) were very similar to those of a graduate student, and personally I found them a very positive experience. The biggest difference in postdoc teaching is accommodating the time demand. Research, running a project, mentoring students, and writing occupy me much more as a postdoc. Teaching responsibilities posed another claim, and initially it was difficult to balance everything. I had to become more efficient, learning to prioritize my activities and remain vigilant to meet my responsibilities.

I have approached this postdoctoral time in my career as part of my education. I feel that "wearing many hats" in addition to research—gaining new experiences, handling new responsibilities, and interacting with others—is a valuable part of my overall postdoctoral experience. I believe that it will make me a better researcher, whether in academia, government, or industry. My advice for others is to determine which "hats" they would like to wear during their postdocs, and then find the best setting for accomplishing their goals.
Postdocs Create National Association
Carol L. Manahan
Johns Hopkins University

Taking their futures into their own hands, a group of postdocs from various institutions have banded together to establish The National Postdoctoral Association (NPA, www.nationalpostdoc.org). This group of postdocs received a large grant from the Alfred P. Sloan Foundation in December 2002 and is sponsored by the American Association for the Advancement of Science (AAAS). The NPA aspires to provide a national voice for postdocs. It will serve by democratic mandate from its membership, which comprises not only postdocs, but also others interested in improving the postdoctoral experience. The organization’s goals include assisting with formation of new postdoctoral associations at individual institutions, identifying “best practices” regarding postdocs, creating educational materials, assisting with the Sigma Xi National Postdoctoral Survey (see the article on this page), and engaging in advocacy on behalf of postdocs. In addition to providing information for postdocs on its website, the NPA plans to create a section geared toward graduate students that will contain information to help them find postdoctoral positions. The NPA is engaged in establishing collaborations with government agencies, professional organizations, educational institutions, and postdoctoral offices and associations. At a meeting with individuals from the National Institutes of Health (NIH), former Acting Director Ruth Kirschstein requested that the NPA submit a white paper outlining ideas for improving the postdoctoral experience. In May, the NPA presented this document to Dr. Kirschstein. It contains the NPA’s initial policy recommendations, which the NIH will consider when it formulates policies affecting postdocs. The white paper addresses issues that include status and classification, compensation, and a proposal for a new, portable, extramural career transition grant to be awarded to individual postdocs. In addition, the NIH’s extramural Training Advisory Committee, chaired by Walter Schaffer, has formed a subcommittee specifically to act as a liaison to the NPA (TAC-NPA). It will provide a direct conduit to the individuals at the NIH who make policy decisions affecting postdocs.

In March 2003, the NPA convened its first annual meeting in Berkeley, CA, in conjunction with Science’s Nextwave Postdoctoral Network. At this meeting, postdocs and administrators from many institutions discussed issues important to postdocs and shared ideas. The attendees enjoyed networking opportunities and ratified the new organization’s Constitution and By-Laws. Additional information can be found on the NPA website (www.nationalpostdoc.org). It discusses the benefits of membership, how to become a member, how to get involved, current activities, and tips for finding a postdoctoral position. (You do not have to be a postdoc to become an NPA member.) The NPA is an organization that represents all postdocs; chemists in postdoctoral positions are encouraged to participate and provide their perspectives. If you are interested, please check out the website or send an email to info@nationalpostdoc.org.

Carol L. Manahan, Ph.D., is a postdoc at Johns Hopkins School of Medicine and current Chair of the National Postdoctoral Association.

The Sigma Xi Postdoctoral Survey Project

Where do new scientific discoveries come from? The answer, increasingly, is from the nearly 50,000 postdocs working in the United States. Sigma Xi, The Scientific Research Society, working in cooperation with the National Postdoctoral Association, Science’s Next Wave, and the National Bureau of Economic Research, is coordinating a national set of postdoc surveys to take place during the 2003–4 academic year. The surveys are designed to help universities and national laboratories enhance the postdoctoral experience. Sigma Xi is working with Research Triangle Institute (RTI) International to create a survey kit consisting of a core set of professionally designed questions and methodological guidelines, Web software for administering surveys, and professional survey analysis. Participating administrators and postdoctoral associations and offices will receive reports about their postdocs’ research activities, career choices and goals, compensation and benefits, interactions with advisers, and perceptions of the policies and practices at their institutions. For benchmarking purposes, the reports will include comparative data from peer organizations. In addition, Sigma Xi will pool results across institutions to provide data about the national population of postdocs. A pilot study of five institutions will take place in the fall of 2003, and the full-scale study will launch in the spring of 2004. Registration is under way for the full-scale study. To learn more, visit the survey web site, http://postdoc.sigmaxi.org/ or contact postdoc@sigmaxi.org.
And Gladly Teach: A Resource Book for Chemists Considering Academic Careers

A. Truman Schwartz
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The ACS Office of Graduate Education and the Department of Career Services have recently published a 66-page booklet entitled And Gladly Teach: A Resource Book for Chemists Considering Academic Careers. This publication, an outgrowth of the Preparing Future Faculty (PFF) project, has been partially funded by it. In 1998 ACS received a grant from the National Science Foundation, which led to the creation of PFF programs centered at five research universities. During this project’s implementation, it became apparent that despite the large amount of printed and electronic material available about academic careers, no single volume collects information that chemists in graduate school or on postdoctoral appointments might find particularly useful. Hence, Jerry Bell and Marta Gmurczyk of the ACS staff initiated the preparation of a resource book. The principal author is A. Truman Schwartz, Macalester College, Saint Paul, MN, with contributions from an editorial board consisting of Ronald Archer, University of Massachusetts, Amherst, MA; Amina K. El-Ashmawy, Collin County Community College, Plano, TX; and David Lavallee, State University of New York, New Paltz, NY.

The Preface of the book summarizes its goal:
“Every chemist knows that quantum mechanics has significantly aided our understanding of atomic and molecular structure. It is considerably less well known that quantum mechanics provides an insightful metaphor for the well-lived life. The secret of a richly rewarding career is simply to maximize the overlap integral between the wave function that represents what you must do and the wave function for what you want to do. If those two expressions are identical, you should achieve much and enjoy yourself while doing so. But if those wave functions are orthogonal, with no overlap whatsoever, your life will be drudgery. The aim of this little book is to help you make your job and your joy the same.”

There are over 4,000 post-secondary educational institutions in the United States, and their diversity is so great that generalizations are difficult and dangerous. In order to address this issue, the editorial board includes individuals with considerable professional experience in the four major types of American academic institutions: two-year colleges, four-year colleges, comprehensive universities at which the highest degree awarded is usually the M.A. or M.S., and Ph.D.-granting research universities. The board members prepared position papers that described personnel practices in their own and similar institutions. These observations were incorporated into the manuscript, which was carefully reviewed by the contributors.

Experimental data were gathered via a questionnaire that was sent to approximately 2000 chemistry departments in a wide variety of colleges and universities. About 400 responses were received, read, digested, and incorporated into the full report. Respondents were asked to indicate the importance of various factors and attributes associated with applicants for academic positions. Examples would be quality and quantity of papers and publications, teaching experience, campus interview, prestige of postdoctoral and Ph.D.-granting institutions and research mentors, academic record, and ability to diversify the department. Moreover, the questionnaire solicited information about the relative weight attached to teaching, research, and service in the granting of tenure and promotion. This information is presented in the form of a three-component phase diagram.

The book consists of four chapters: I. Deciding on an Academic Career, II. Preparing for an Academic Career, III. Searching for an Academic Position, and IV. Keeping an Academic Job. Specific topics covered include the nature of an academic position in various types of institutions; choosing between a postdoctoral position and a temporary teaching job; preparing a curriculum vitae, research proposal, and statement of teaching philosophy; campus visits; weighing competing job offers; and balancing time demands while working toward tenure. Differences among institutions are addressed where appropriate. The booklet ends with an extensive bibliography of printed and electronic sources that was prepared by Rebecca Eickey of the University of California at Los Angeles.

Interspersed within the chapters are statements from eight recent Ph.D.s describing their trajectories toward academic careers. Most of them had participated in PFF programs. Graduate students and postdocs will be able to identify with these authors and relate to their experiences.

The authors very much hope that this publication will prove a useful guide for chemists as they contemplate options and opportunities in academic employment. Copies are being sent to all chemistry departments with programs approved by the Committee on Professional Training, where the books can be consulted by interested individuals. Anyone desiring his or her own copy can request one by contacting the ACS Office of Graduate Education at graded@acs.org. Requests will be met as long as supplies last. The publication is also available as a pdf file on the ACS Graduate Education website at www.chemistry.org/education/pff.html. Dr. Schwartz is Professor Emeritus at Macalester College, St. Paul, MN.
CEPA to Present Three Symposia at New York Meeting

A Presidential Event, “Opportunities in the Bio and Pharma Areas,” is among three career-related symposia of interest to the graduate community that will be presented by the Committee on Economic and Professional Affairs (CEPA) at the upcoming New York national ACS meeting.

Biotechnology and pharmaceutical research are hot areas today in terms of drug discovery, fundamental research, and new business opportunities. These fields are projected to produce a large proportion of the employment for chemists and chemical engineers in the future.

After ACS President-Elect Charles Casey delivers introductory remarks, a group of well-known experts will provide an overview of the many opportunities available in biotechnology and pharmaceutical research. Among the topics of discussion will be new technology, innovation, and opportunities for growth. The symposium, to be held 8:30 a.m. to 12 noon on Monday, Sept. 8, is cosponsored by the Division of Biological Chemistry (BIOL), Division of Professional Relations (PROP), the Women Chemists Committee (WCC), and the Younger Chemists Committee (YCC).

A second symposium, “Face-to-Face with Intellectual Property Protection and Commercialization Issues,” will explore a variety of vital topics surrounding the protection and transfer of intellectual property. Speakers will discuss topics ranging from patents to venture capital to establishing new businesses. The symposium will be held 1:00-4:00 p.m. on Monday, Sept. 8. The symposium is sponsored by the Division of Chemistry and the Law (CHAL) and cosponsored by the Division of Small Chemical Businesses (SchB), CEPA, the Committee on Professional Training (CPT), and the Society Committee on Education (SOCEC). The ACS Office of Graduate Education (OGE) and Department of Career Services (DCS) are co-organizing this symposium.

“The Need for ENDA, the Employment Non-Discrimination Act, in the Chemical Process Industries,” to be held 1:30–4:10 p.m. on Tuesday, Sept. 9, fills out CEPA’s lineup of symposia. This presentation will cover the current state of the workplace for lesbian, gay, bisexual, and transgender workers. The current legal environment at the federal, state, and local levels will be discussed, as well as efforts to change the laws now in place. The event is sponsored by the Division of Professional Relations and cosponsored by CEPA, YCC, WCC, and CHAL.

For more information about the symposia, call DCS at 1-800-227-5558, ext. 6208.

ACS Career Center to Roll Out New Workshops in New York

“Negotiating a Career Transition During Tough Economic Times” is one of three new workshops the Career Resource Center (CRC), part of the ACS Department of Career Services, will present at the upcoming ACS national meeting in New York. This workshop, scheduled from 1:00–3:30 p.m. on Sunday, Sept. 7, is designed to help chemical professionals and their families anticipate and cope with such unwanted situations as pay cuts and layoffs as well as to steer them toward alternative career opportunities.

The other workshops new this fall are:

- “Foreign-National Scientists: Obtaining a Job in the U.S.,” which surveys topics of importance both to foreign nationals seeking employment in the United States and to their potential employers (9:00-10:00 a.m. on Monday, Sept. 8).
- “Navigating the Federal Employment Process,” in which participants will learn how to work effectively with this invaluable source of job opportunities. (10:30 a.m. to 12:00 noon on Tuesday, Sept. 9).

At each national meeting, the CRC hosts a wealth of professional development programs and services to enhance your career potential, including a library, resume reviews, mock interview sessions, and a variety of workshops ranging from “Interviewing 101” to “Career Strategies: Critical Steps for Success.” All these workshops and programs are of interest to and open to the graduate community.

The CRC will be located at the Jacob Javits Convention Center and will be open from 10:00 a.m. to 7:00 p.m. on Sunday, Sept. 7, and 8:00 a.m. to 5:00 p.m. on Monday, Sept. 8 through Wednesday, Sept. 10. These programs and services are open to ACS members and national and student affiliates.

Workshop times and/or locations are subject to change. Please consult the Web version at http://chemistry.org/careers/newyork2003 for the final schedule.