Advancing Postdoc Women Guidebook

EDITED BY

Belinda Lee Huang, Ph.D.

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NATIONAL POSTDOCTORAL ASSOCIATION

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About the National Postdoctoral Association

The mission of the National Postdoctoral Association (NPA), a member-driven 501(c)3 nonprofit organization headquartered in Washington D.C., is to improve the postdoctoral experience by supporting enhanced research training and a culture of enhanced professional growth to benefit scholarship and innovation. Since its founding in 2003, the NPA has assumed a leadership role in addressing issues confronting the postdoctoral community that are national in scope and require action beyond the local level. The NPA has taken on the ambitious agenda to enhance the quality of the postdoctoral experience in the United States.

The NPA supports the postdoctoral community through resource development, advocacy, building community, and education of the public. Each spring, the NPA hosts its Annual Meeting, where many topics pertinent to the education and training of the U.S. research workforce are discussed and debated on a national level. One of the NPA's strategic priorities is to promote improvements in the training and professional environment for postdoctoral scholars, and the Elsevier Advancing Postdoc Women project is part of this effort.

The NPA membership includes some 3,100 individuals and 190 institutions, whose research is supported by more than 70,000-plus postdocs. Of the 108 research universities classified as "very high activity" research institutions by the Carnegie Foundation for the Advancement of Teaching, over two-thirds are members of the NPA. Of the 62 members of the Association of American Universities, 54 are NPA members. As a member-driven organization, the NPA's work is largely done by standing volunteer committees.

For more information on the NPA, visit **www.nationalpostdoc.org**

Acknowledgements

INTRODUCTION

Since 2009, the National Postdoctoral Association (NPA) has been working with institutions to foster the advancement of postdoc women in academic careers through the **NPA ADVANCE** project funded by the National Science Foundation **ADVANCE-PAID** program. In the ADVANCE project, we learned that key providers of professional development for postdoc women were mentors, institutions, and professional societies. Through the Elsevier Advancing Postdoc Women project, we focused our work to examine promising practices found in professional societies and associations.

In 2013, the NPA received a grant from the Elsevier Foundation to conduct a survey of multidisciplinary societies and associations, to assess their programs and resources for postdoc women, and to develop an online clearinghouse. Our goals included learning what professional development opportunities are offered by societies and associations, in various disciplines.

The first year of the program we launched an Elsevier focus group screening survey through SurveyMonkey to 59 participants. Survey participants included 37 individuals who worked at a research institution and were in postdoctoral affairs. Thirty-one percent were postdocs that answered the survey. Thirty-five percent stated that they were seeking a higher education tenure track position, 17.6 percent said they were interested in industry research related positions, and 17.6 percent were interested in industry non-research positions.

> **The three main challenges faced by postdoc women were cited as:**
> 1. Career-life balance
> 2. Lack of mentoring, and support (women scientists)
> 3. Lack of childcare/family obligations

Prior to the 2013 NPA Annual Meeting, a recruitment e-mail was sent to all meeting participants. This letter invited female postdocs, research administrators who oversaw postdocs or a staff member of a professional society or association that included postdocs in its membership to participate in two focus groups. One focus group focused on postdocs, while the other focus group was made up of largely postdoc offices.

These common themes emerged:

- Professional societies, being national, are in a better position to affect academic culture and influence policy at institutions. They can also provide accountability and monitoring of their membership and the applicable institutions.

- Professional societies could be better suited to offer women-only types of events which would encounter resistance at institutions. Postdoc women found value in having women-only programming, whereas the administrators were more resistant to this idea, with concerns about fairness and equity.

- Professional societies can serve as the seed of change in other respects, such as showing proof of concept of new programs or ideas that can then be disseminated to their stakeholders, as well as offering train-the-trainers types of programs that also share promising practices that can be taken back to the institutions.

- Institutions and professional societies can serve complementary roles in providing career development to postdocs. Professional societies meet so infrequently that they may be better suited to information provision and catalyzing a postdoc's development efforts (e.g. programs on how to write grants) whereas institutions can then follow-up on this (e.g. ongoing support to a postdoc in writing a particular grant).

- Postdocs felt that their professional societies knew little about them as a group and did little for them.

- Postdocs more often mentioned targeted professional societies (e.g. Association for Women in Science) as a provider of professional development for women than their disciplinary societies, but felt that all societies should have these concerns embedded in their activities and mission. This suggested that there was little career development offered to them by their disciplinary societies, whereas comments from the administrators suggested that these types of programs for early-career researchers were more common than this.

- Professional societies can play a dual role in changing the culture and the institutional environment, as well as educating and supporting the individual in their own career advancement.

- The types of programs that were suggested for professional societies were:
  - Mentor matching activities whereby postdocs could find suitable mentors in a database with varied search fields. This would have particular value for those looking for interdisciplinary collaborators. A follow-up suggestion was that these mentoring relationships could be structured to involve an activity like co-writing a grant, or could be targeted mentoring, focusing on just one area, e.g. grant writing, scientific technique, switching fields.
  - Reverse mentoring or managing up, which ensures that there is benefit for the mentors.
  - Include information on the needs of women in any mentor training.

- Fellowships for postdocs that tend to their long-term career with embedded professional development.
- Fellowships in career transition areas outside of academia, for example, science policy, science writing.
- Funding support for travel awards, transition funding for life transitions, professional development, childcare scholarships.
- Data collection and dissemination on topics such as: why researchers do and should take a postdoc position, various types of implicit gender bias, possibly on outcomes of professional and career development programs, salary disparities within their community.
- Policy statements or raising general awareness on: the importance of the postdoc as a training period, the varied career outcomes for postdocs, the need for early career planning by researchers well before the postdoc, awareness of implicit biases.
- In-person and online career seminars, particularly interactive venues.
- Childcare at meetings.
- Society committees dedicated to grad student and postdoc concerns.
- "Women's lunches" at conferences/meetings that foster networking and information sharing. There was however some concern, by both the postdocs and the administrators, that a panel of women talking about their "one-shot" experiences was perhaps not as valuable as someone who was an expert and could speak broadly about lessons learned and actionable, "how to" advice.
- Fostering networking, particularly regionally or internationally, and providing guidance on how to network.

Elsevier Advancing Postdoc Women Survey

We developed a survey with the guidance of our Advisory Board, and asked questions about what programs and services are provided by professional societies and associations to assist postdoc women make a successful transition to faculty or non-academic careers. Forty-six professional societies and associations responded with exciting information about mentoring, career development, professional development, and childcare resources.

Detailed information about their offerings can be found on the Elsevier Advancing Postdoc Women Clearinghouse which can be accessed at: **https://nationalpostdoc.org/page/elsevier/?**

Utilizing Professional Societies and Associations to Advance Your Career

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Professional societies and association have a wealth of resources and programs to share with postdoc women. In this chapter, you will find information about mentoring, career development, professional development, and childcare resources. While many of the professional societies and associations who have contributed to this chapter are in the STEM field, much of the information can be applied to social science and humanities postdocs. For instance, you can find excellent CV/resume advice and webinars that can be applied to any discipline. And if you find that your professional societies and association are lacking in resources, let them know! You may find they are willing to create it.

Mentoring

If you talk to a successful professional, chances are they have had great mentors or coaches throughout their career. You may wonder, "How do I find a good mentor?" And "What am I supposed to ask him or her?" As our focus groups told us, lack of mentoring is a major concern for postdoc women. Our professional societies and associations shared that many of the ways they approach mentoring is: 1) one-to-one, 2) at their annual meeting, and 3) through online mentoring.

One-to-one mentoring

Many of the professional societies and associations offer one-to-one mentoring. While this may be formal or informal, the benefit of this approach is the ability to match protégés to mentors. Some societies such as the **American Chemical Society (ACS),** have mentors to guide students and specific mentoring to people with disabilities, minority affairs and women in chemistry, and short term mentors for careers. The **American Anthropological Society** has a leadership fellows program, where a senior thought leader is matched with a protégé; they also have a first

come, first served mentor match based on the protégés interest. The **Association for Women in Science (AWIS)** provides one-to-one mentoring through their chapters and through seminars with access to coaching. Through a National Science Foundation (NSF) grant-funded program, the **American Sociological Society** has one-to-one matching of mentors.

The Federation of American Societies of Experimental Biology (FASEB) is comprised of 27 scientific societies. The **FASEB Maximizing Access to Research Careers (MARC) program** is a federally-funded program supported by two National Institute of General Medical Sciences (NIGMS)/National Institutes of Health (NIH) grants. It offers ancillary activities to support the training and development of underrepresented students, postdocs and faculty pursuing higher education and careers in life sciences research. The FASEB MARC program maintains its own database and does individualized matching.

At the **Midwest Political Science Association,** faculty are the mentors, and students pick their own mentors from faculty; **Sigma Delta Epsilon/Graduate Women in Science** offers mentoring between their chapters, so that new chapters are mentored by more seasoned chapters. The **American Physiological Society** and the **National Organization of Gay and Lesbian Scientists and Technical Professions (NOGLSTP),** offer one-to-one mentoring through MentorNet. Other societies and associations that offer one-to-one mentoring include: **American Association of Anatomists (AAA), American Astronomical Society,** and the **Association for Public Policy Analysis and Management (APPAM).**

Mentoring at the Annual Meeting
Since most professional societies and associations have the opportunity to see each other face to face at their annual meeting, providing mentoring at the annual meeting is a natural opportunity.

Some groups have mentor lunches, such as the **American Society of Human Genetics (ASHG),** which offers the *Trainee Mentor Luncheon* where grad students, postdoctoral fellows, and clinical fellows talk informally with senior members of the society about career options, goals, and professional opportunities. Trainees network with their mentors during the course of the meeting, and get career advice, and meet trainees with similar interests. The **International & American Associations for Dental Research (IADR/AADR)** offers a meet-a-mentor luncheon at their annual meeting, by topic area. This is open to all student members including postdocs and women. The **Society for Social Work and Research (SSWR)** offers group mentoring or committee-based mentoring though a meet the scientist lunch at their annual conference.

The **Entomological Society of America (ESA)** offers a "women in entomology" breakfast each year as part of the annual meeting. The goal is to encourage networking opportunities, particularly among women in the society, and all interested in supporting this goal are welcome to participate. ESA encourages all established members to find and sponsor one or more students or early professionals by buying their breakfast.

You can attend the **American Association of University Women's (AAUW)** annual meeting and find a session on how to mentor and opportunities to find mentors; in addition, the **American Astronomical Society** provides contact information of senior women who are willing to mentor younger women as does the **American Association of Anatomists**.

You may be wondering, how do I choose a mentor? Finding the right mentor who can guide you in your career track requires some investigating. Some associations such as the **Midwest Political Science Association (MPSA)** encourage their members to select a mentor based on whatever characteristic is important to them. One hundred and sixty-four people attended a mentoring reception at their conference, and the survey results were very positive; they plan to expand this next year. They also support an interest group for women only.

The **Society for Advancement of Chicanos and Native Americans in Science (SACNAS)** offers mentoring at its conference and this is open to all their constituents. Mentoring is also delivered through their summer leadership institute that is open to postdocs and others. SACNAS' ability to create a community where individuals are welcome and celebrated is a hallmark of their success. The **American Society of Nutrition** offers speed mentoring or a mentoring session at their annual meeting.

Conferences often lead to opportunities for informal networking with potential mentors within the society. You never know how a contact you meet may become a resource in the future. At the **Society for Applied Spectroscopy (SAS)** various opportunities are available, particularly at the SciX conference (which hosts the SAS' yearly meeting). A student event as well as a members social event are hosted each year at this conference, and governing and other senior members of the society also play an active role in these events. Similar activities and opportunities for networking are provided at the annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy (PITTCON) conference.

Online Mentoring

One of the advantages of professional societies and associations in addition to offering in-person mentoring at their annual meeting, is they offer it online. In fact some maintain databases such as the **American Medical Women's Association (AMWA);** AMWA offers a one-to-one mentoring, group mentoring, committee based mentoring and has a mentoring database. The association assigns mentors based on its website. In fact many of the regular physicians are willing to have a one-to-one relationship with residents and students. The **Society for Applied Spectroscopy (SAS)** has a membership database with contact information of members that is open and available to all members online. Members may choose to seek out a personal mentor by contacting them independently. Additionally, the Coblentz society, a technical affiliate/section of the SAS, is organizing a formal mentoring program, under the coordination of Anne Lemon. At the **Society of Toxicology,** which also utilizes an online database, any member can be either a mentee or mentor or both; during the mentor breakfast at the annual meeting - mentees meet with facilitators for

an informational session and then are matched with mentors. This activity is conducted by the women in toxicology special interest group (SIG); several regional chapters have mentoring activities ranging from informal to formal. The **Society of Systematic Biologists (SSB)** has an online program where mentors are assigned.

Other online options include eMentoring and webinar programs. The **American Society of Civil Engineers (ASCE)** offers two programs that postdocs and others may participate — an online eMentoring program (mentors volunteer and may be selected by mentees) and the ExCEEd Teaching workshop to better prepare university level teachers' skills. ASCE also offers one-to-one mentoring, group and a mentoring database. The programs are open to all. The **Association of Women in Science (AWIS)** has had at least 10 webinars on the topic of mentoring and have provided face-to-face workshops on the topic of mentoring at least 75 times during the past five years. These webinars and workshops are open to all. AWIS has a book and other material they utilize and information provided by the International Mentoring Association.

The **National Organization of Gay and Lesbian Scientists and Technical Professionals (NOGLSTP)** has an affiliated partner-plus program with MentorNet to provide mentoring to lesbian, gay, bisexual, transgender, and questioning students, postdoctoral fellows, and early career professionals. The organization is currently helping MentorNet modify their online program base to better serve the LGBTQ+ community. They also provide mentors for the Point Foundation scholars and alumni.

Social media is an important resource for mentoring. On LinkedIn, the **Society for Applied Spectroscopy (SAS)** has a member-run online forum established by a society member via a private group called "Women in Spectroscopy." Access to this group is given via a request to become part of the group, thus non-SAS members in the field of spectroscopy may also request to join. The forum to date has over a hundred members, and has many active topics of discussion on themes of women in science. Any group member may post in the group (pending moderator approval), and this has been a great resource for discussing general issues and asking for advice and mentoring on particular career issues. The **American Association of University Women's (AAUW)** fellowships and grants department has created a professional community for alumnae and current recipients through social media and personal connections. Alumnae and current recipients can join their fellowships and grants LinkedIn group, and follow **@AAUWFellowships** on Twitter for news in AAUW and higher education.

Career Development

Most postdocs enter their training without an idea of what their options are besides the academic track. Professional societies and associations are keenly aware that postdocs need information about their career options. Thus, many organizations offer workshops on career development

topics. The **American Anthropological Association** offers workshops on women in the academic and

non-academic workforce, career advancement, and work/life balance. And the **American Association of Medical Colleges (AAMC)** offers opportunities through many meetings and group offerings throughout the year. Some are targeted to women, and some have postdoc participation. The Group on Graduate Research, Education, and Training (GREAT Group) part of the AAMC, has several postdocs who serve as liaisons to the NPA. GREAT also provides workshops for undergraduates, graduate students and postdocs associated with their annual meeting, as well as in other national forums. See **https://www.aamc.org/students/research/** for online resources for students pursuing a career in medical research. The **American Educational Research Association (AERA)** has great interviewing, career development, negotiating, career planning/counseling, resources for career planning, and other careers outside academe workshops/seminars. AERA has collected and analyzed data and provide information about career planning and employment prospects. They also provide workshops or seminars on obtaining grant funding, communication skills, professional skills, and leadership skills. And the association offers awards that postdocs can use to fund research, and travel awards to present research or attend conferences. They also have workshops that cover issues of underrepresented minorities.

If you are looking for networking opportunities, the **American Association of University Women (AAUW)** has specific events that develop women. Every two years, hundreds of women leaders from across the country gather to discover new ways to empower themselves and other women and girls. AAUW's national convention is a unique opportunity to learn new skills, gain insight and inspiration, and connect with other women leaders. It offers sessions on learning how to mentor and opportunities to find mentors, as well as countless engaging opportunities for personal and professional growth, so that women leaders can maximize their impact. Members, as well as fellowships and grants recipients, are welcome to attend. If you need contacts, see the **American Peptide Association (APA)**. The association provides personal contacts, informal, particularly at its meetings. This is a spillover of the activities of the student affairs committee, and there is follow-up by e-mail. One-to-one mentoring is also provided. The **American Society for Nutrition (ASN)** is proud to host a variety of events specifically geared to postdocs at its annual meeting. The yearly networking event is one of the most well-attended events at the meeting. The young professional interest group also sponsors a variety of symposia and workshops that are designed by young professionals to focus on the hottest topics affecting early-career nutrition professionals today. The association has presented travel awards to present research or attend conferences within the last five years. The **American Sociological Association (ASA)** hosts a reception each year at the ASA annual meeting bringing together both cohorts of postdocs, ASA staff, the university principal investigators, and the NSF program officer.

The **American Chemical Society (ACS),** specifically the ACS Graduate & Postdoctoral Scholars Office, offers many resources on career development, career preparation workshops. The ACS

graduate & postdoctoral scholars reception is offered on the Monday evening of every ACS national meeting (held in the spring and fall of every year), and there are several career-preparation workshops: *Postdoc to Faculty workshop, Postdoc to Predominantly Undergraduate Institutions (PUI) Professor workshop, Academic Employment Initiative, Preparation for Life After Graduate School workshop.* See their career pathways section to find self-assessments, job search tools, networking advice. They divide career pathways into four pathways: Industry, Higher Education, Government, and Working for Yourself. Much of the information can be applied to STEM careers.

The *Trainee Networking Session* previously part of the **American Society of Human Genetics (ASHG)** trainee development program and networking session, is being offered as a stand-alone event this year. Trainees will mingle with potential employers and experienced members of the society representing a wide range of careers, both in traditional research and medicine-oriented fields, and in nontraditional fields such as intellectual property law, science policy, and science education. This event will be organized as a standing reception to encourage mingling and networking with as many people as possible.

The **Entomological Society of America (ESA)** branch (regional) and national meetings offer diverse opportunities for networking, including an onsite career center, new member receptions and various "lunch and learn" sessions. The student transition and early professionals committee also sponsors a professional development webinar during ESA's annual meeting. At the **Society for Applied Spectroscopy (SAS)** there is a networking event for SAS members at SciX, along with a SAS poster session, and a wine and cheese social event at SciX. There is also a special SAS symposia at Pittcon. In addition, there are women in science conference sessions and luncheons at SciX and Pittcon. Some societies such as the **Society of Systematic Biologists (SSB)** offer a networking mixer at its annual joint conference. Additionally, they held a satellite conference in May 2015, for SSB members only, where networking and career-development events were offered. In previous years, there was a lunch-time event at the joint conference (SSB/Society for the Study of Evolution/American Society of Naturalists) on the academic job market.

A women's network is developing at the **United States Society for Ecological Economics (USSEE).** At the 2013 meeting, the first ever women's lunch was held to begin a women's network (although not for formal mentoring, at least not yet), which was followed up in June 2014 with a women's retreat to discuss ways to develop mentoring programs and how the society can support women in academia. So far, these sessions were only open to women.

Online Resources

The **American Chemical Society (ACS)** offers a webinar on career development. In addition its ACS careers unit *www.acs.org/careers* has ACS webinar series and ACS professional development courses. If you are looking for free webinars on career and professional development topics than look no further than this site for resume/CV writing, networking, resources for managing the big transition to a first or new job, time management, and career development. Archived webinars are

available 24/7 for ACS members. The council offers resources for career planning (guidebooks, pamphlets, online resources), other careers outside academe, formal networking events/programs in the last few years (e.g. luncheons, receptions, distinguished lecture series, discussion groups) only for postdoctoral scholars.

If you would like to know how awards and recognition impact career success, the **Association for Women in Science (AWIS)** has collected this information with NSF funding. AWIS provides job search, placement or other "dual-career" assistance for partners, as well as workshops on balancing work with family or personal obligations.

The **Association for the Advancement of Science (AAAS)** website is a collection of resources freely accessible aimed at job seekers from undergrad to faculty, which include many articles about all these topics. The **American Society for Nutrition (ASN)** website which caters to postdoc members, has resources for locating postdoctoral fellowships, funding opportunities, and chances to apply for a variety of awards. You can find more web resources at the **United States Society for Ecological Economics (USSEE).** As a society, USSEE posts career opportunities related to the field of ecological economics on its website. In the past two years, they have been creating networks of practitioners and students to improve the diversity of their society, as well as stimulate new working partnerships. USSEE offers information about careers outside of academe, and formal networking events/programs in the last few years.

Other social media resources include the **Society for Applied Spectroscopy (SAS).** The society runs a LinkedIn group called "Women in Spectroscopy" that has over 100 members and hosts a "jobs board." SAS has a Twitter account (@AppliedSpec) and Facebook page where you can hear about the latest news and upcoming awards and grants applications.

Workshops

Chances are though you think you know what you want to do with your career, you don't know how to go about it. Though you might not have a career counselor sitting next to you, you can always access career planning workshops and seminars on academic jobs, and careers outside academe from professional societies and associations. In fact, many of them offer formal networking events/programs and "how to" workshops/seminars on networking, dual careers and balancing work with family or personal obligations. See these professional societies and associations' websites for information about these areas:

American Association of Anatomists (AAA)

Association for the Advancement of Science (AAAS)

American Association of Medical Colleges (AAMC)

American Educational Research Association (AERA)

American Medical Women's Association (AMWA)

American Philosophical Society (APS)

American Society of Human Genetics (ASHG)

Linguistics Society of America (LSA)

Society of Systematic Biologists (SSB)

Society of Toxicology (SOT)

In addition to career planning workshops, the **American Association of Medical Colleges (AAMC),** the **American Society for Nutrition (ASN),** and **Sigma Delta Epsilon/Graduate Women in Science (GWIS)** provide resources for career planning (guidebooks, pamphlets, online resources) as well as collect and analyze data to provide information about career planning and employment prospects. ASN's postdocs publish a quarterly newsletter that focuses on career development; they also have a symposium for early career investigators at their annual meeting.

The **Society for Advancement of Chicanos and Native Americans in Science (SACNAS)** offers workshops on balancing work with family, and the **American Philosophical Society (APS)** hosts publishing workshops for early career philosophers. APS also offers online resources related to academic and nonacademic careers and have begun analyzing data related to job advertisements and appointments.

You won't find these workshop topics at every annual meeting, but they are needed. At their 2015 annual meeting the **Entomological Society of America (ESA)** had workshops on *Women in Science: Breaking the Bias Habit and Data Handling* and *Analysis Tricks They Don't Teach You in Grad School.* Their workshop topics and content are member-driven. If you are looking for professional development content, consider the **Midwest Political Science Association (MPSA)**. MSPA added 29 professional development roundtables at the 2014 conference, one mentoring reception, and several networking sessions. Workshops also included balancing work with family or personal obligations and gender and underrepresented minorities issues.

The **National Council for Geographic Education (NCGE)** has been adding more programming that takes care of the whole professional not just the geography educator. In the last few years, the council has been offering interviewing, career development workshops/seminars and formal networking events/programs.

"Out to Innovate" offered by the **National Organization of Gay and Lesbian Scientists and Technical Professionals (NOGLSTP),** provides workshops on CV/resume writing, career development, networking, and mentoring. NOGLSTP has a brochure on companies friendly to LGBTQ+ STEM workforce and arranges networking receptions for LGBTQ+ students and professionals at various professional society meetings like AAAS, ACS, SWE, SACNAS, and ASEE to name a few. The organization also has caucuses within various professional societies for networking and advocating for LGBTQ+ in their fields and how to build your own networking

and mentoring potential. The **American Psychological Association (APA)** has a committee for early-career psychologists, which provides many resources for career preparation, but are not restricted to just postdocs.

American Association for the Advancement of Science's (AAAS), renowned Science and Technology Policy fellowship provides opportunities for scientists and engineers to learn first-hand about policymaking and implementation while contributing their knowledge and analytical skills in the federal policy realm.

Another career resource that AAAS is well known for is myIDP, an individual development plan (IDP) that helps postdocs explore career possibilities and set goals to follow the career path that fits you best.

If you go to myIDP (http://myidp.sciencecareers.org/) you will find:

- Exercises to help you examine your skills, interests, and values

- A list of 20 scientific career paths with a prediction of which ones best fit your skills and interests

- A tool for setting strategic goals for the coming year, with optional reminders to keep you on track

- Articles and resources to guide you through the process

Professional Development

Funding

There are some excellent funding opportunities for women postdocs that provide fellowships, travel awards to attend conferences and scholarships. The **American Association of University Women (AAUW)** Postdoctoral Research Leave fellowship, offers $30,000 and assists the candidate in obtaining tenure and further promotions by enabling her to spend a year pursuing independent research. **Sigma Delta Epsilon/Graduate Women in Science (GWIS)'s** legacy is providing fellowships for scientific research to women; every year they receive over 200 applications and choose 10-14 to receive up to $10,000 to do their research. In 2014 they awarded $65,000 to 13 women scientists doing research. Many were grad students, postdocs or faculty. In 2015, they awarded $75,000 to 10 young women scientists conducting scientific research. GWIS's membership is B.S. level through postdoc & professional level.

For the 2016 International Congress of Entomology, the **Entomological Society of America (ESA)** is offering a travel award program specifically focused on students and early career professionals located outside the United States. The applicant's contribution to the diversity of attendees at the congress is part of the evaluation criteria. **National Organization of Gay and Lesbian**

Scientists and Technical Professionals (NOGLSTP) provides travel awards to present research or attend conferences. They provide programming for other professional societies such as the Society for Advancement of Chicanos and Native Americans in Science, Society of Women Engineers, American Society for Engineering Education, and American Association for the Advancement of Science, for LGBTQ+ people for career development and networking. NOGLSTP offers scholarships to attend this summit and present research posters. See *www.outtoinnovate.org* for a video on this.

If you would like to join the Postdoctoral Fellows Program at the **American Association of Anatomists (AAA)** you could receive $20,000, plus travel support and registration fee (at early registration rate) to the next appropriate annual meeting. The Postdoctoral Fellows Program provides salary support to a member who is a postdoctoral fellow working in any aspect of biology relevant to the anatomical sciences.

Meeting/Conference

Professional societies and associations are actively involved in discussions on gender issues. The **American Anthropological Association** has a committee on gender equity in anthropology that has an active workshop program, as well as special annual meeting events to discuss professional development issues. The **American Association of University Women (AAUW)** through its national convention every two years, brings together hundreds of women leaders from across the country to discover new ways to empower themselves and other women and girls. At the AAUW's national convention, women leaders have a unique opportunity to learn new skills, gain insight and inspiration, and connect with other women leaders. Sessions on learning how to mentor, find mentors, engage in activities for personal and professional growth, enable women leaders to maximize their impact. Members, as well as fellowships and grants recipients, are welcome to attend. The **American Medical Women's Association's (AMWA)** professional development offerings include workshops or seminars on obtaining grant funding; workshops on communication skills, awards that postdocs can use to fund research, professional skills, leadership development, and women specific programs. The annual program includes many of these and they are well attended by residents and students. They have also provided workshops on gender bias, for internationals and underrepresented minorities.

At the **Society for Applied Spectroscopy (SAS)** there are sponsored "women in science" conference sessions yearly at both SciX and Pittcon international symposia since 2013. These sessions provide a broad range of career talks by women in the spectroscopy field from academia, industry and government research organizations, and a formal forum for the discussion of many different career issues. The target audience of these activities are women students and early career researchers/ postdocs, however these events are open to all conference attendees. The sponsorship of a Women in Science Luncheon at SciX—a women's lunch meeting is organized for networking and discussion of issues in a casual atmosphere. SAS has undergraduate travel awards, begun in

2012, to support undergraduates to present their work at the SciX conference. In 2013, the society also provided funding for early-career researchers to attend the SciX 2013 conference, and these were awarded to eight people (two women). Additionally the SAS has a Student Ambassador award to provide support for students to attend a conference other than SciX or Pittcon (the 2 main conferences that SAS attends) to present their work, and to serve as an ambassador for SAS. Sponsorship and organization of a poster session at SciX yearly. The contact person for SAS is Ingeborg Iping Petterson, ii209@exeter.ac.uk.

The importance of receiving awards cannot be underestimated in a woman's career success. The **Association for Public Policy Analysis and Management (APPAM)** has a professional award program that is presented at the annual conference, and they had a session on grant funding at their conference in 2013. Grant support is also valuable. The **American Sociological Society's (ASA)** grant from the NSF enabled postdocs (2010-2012 and 2012-2014) to attend two ASA annual meetings, the latter of which contained an opportunity to present the research from their time as postdocs.

If you are attending an annual meeting, you will need to eat, so why not eat and learn at the same time? The **Entomological Society of America (ESA)** offers an annual "women in entomology" breakfast, new member reception, and various "lunch and learn" sessions. During the 2014 meeting, a "women in entomology" symposium was organized by several ESA members and included a presentation of survey data gathered by ESA from women in all career stages.

A unique and clever way to deliver content, the **Genetics Society of America (GSA)** has started offering "GSA trainee boot camp" programs at each of its conferences, which are open to grads and postdocs registered for the conference. Sessions included finding funding, getting published, navigating academia, and careers outside of academia. GSA has only had one boot camp thus far, but it was very successful and well-received. They also have a society-wide women in genetics committee that is in early development stages. Other societies such as the **Society of Toxicology (SOT)** has multiple career and professional sessions at the annual meeting every year as well as webinars on career and professional topics, several hosted by the graduate student and the postdoc leadership groups. These groups provide a lot of leadership training and people who serve here very often move to another Society of Toxicology committee within a year or two. Many activities are of special interest to but not limited to women. They survey for the needs of their members, and provide programming that is responsive and that is a factor in their success. The **Linguistics Society of America (LSA)** provides a forum for a number of presentations, workshops, and resource sessions at both the annual meeting and the summer linguistic institute. Topics have included graduate school, research, the job market, toward tenure, jobs outside of academia, and women in the field.

The **Society for Advancement of Chicanos and Native Americans in Science (SACNAS)** also offers a professional development session at their annual conference; in addition grant funding, communication skills, professional skills, travel awards, and women specific programs are offered.

Workshops

Funding

You can also find funding resources at the **American Philosophical Society (APS):** The association holds a "funding for philosophy" session at each of its meetings featuring a different funder (NEH, Getty, etc.). They also offer graduate student travel stipends to attend its meetings. Another great resource is the **American Educational Research Association (AERA).** The AERA Professional Development Program provides dissertation funding and training to graduate students through the AERA Grants Program and the Minority Dissertation fellowship in education research. Small research grants are available to early career scholars who use large-scale, federally funded data sets in their studies. AERA collaborates with American Institutes for Research (AIR) and the Educational Testing Service (ETS) to provide postdoctoral fellowships in applied research.

At the **National Research Council of the National Academies** all professional development activities are provided at the individual laboratories and are not specific to any gender. If you are a foreign postdoc you might be interested in information on cultural acclimation. Primary professional development activities include local seminars and presentations. All postdocs in the program are provided a yearly travel budget for them to present their research at professional meetings and to network with their colleagues. The council offers workshops or seminars on obtaining grant funding, awards that postdocs can use to fund research, and travel awards to present research or attend conferences. They have workshops that cover issues of internationals and underrepresented minorities.

Many professional societies and associations offer workshops on communication skills, professional skills, international issues, women-specific programs, and a travel award to present research or attend conferences. See the website of these professional societies and associations for more information:

American Association for the Advancement of Science (AAAS)

Midwest Sociological Society (MSS)

National Council for Geographic Education (NCGE)

Society of Systematic Biologists (SSB)

Society of Toxicology (SOT)

At the **American Society of Human Genetics** career/professional development events are of-

fered at the annual meeting. Topics for the trainee development program change every year and have ranged from finding a job in science policy to communicating science to the public. See http://www.ashg.org/2015meeting/pages/Ticketed_Events.shtml

Leadership Development

In addition to workshops/seminars on grant funding communication skills, the **American Chemical Society (ACS), American Society of Civil Engineers (ASCE), American Anthropological Society, Entomological Society of America (ESA),** and **American Society of Civil Engineers (ASCE)** offer leadership development and balancing career and work workshops.

The **American Association of Medical Colleges (AAMC)** provides professional and leadership development opportunities through over 20 or more councils, groups, and forums. AAMC hosts an annual meeting each year and many of these councils, groups, and forums also host individual or collaborative meetings. They offer workshops on grant funding, communication skills, and leadership development. AAMC also has leadership development programs, including several for women and underrepresented minorities in academic medicine. The association has provided travel awards to aid in presenting research or attending conferences. The workshops provided cover implicit gender bias that affects hiring, promotion, resource allocation, and other peer reviewed processes, issues of internationals, and underrepresented minorities. Implicit bias negatively affects postdoc women through hiring, promotion, resource allocation, and other peer reviewed processes. These professional societies and associations also offer workshops in this area: the **American Association of Anatomists (AAA),** and the **Association for Women in Science (AWIS).**

The **Federation of American Societies for Experimental Biology (FASEB)** offers workshops or seminars on obtaining grant funding, communication and professional skills, a leadership development program, and travel awards to present research or attend conferences. The federation has workshops that cover issues of internationals and underrepresented minorities. Professional societies within FASEB that offer the workshops listed above include the **American Society of Nutrition (ASN), American Society of Human Genetics (ASHG),** and the **Genetics Society of America (GSA).** Postdocs will benefit from the FASEB career resource center at its annual meeting.

Networking

The **International & American Associations for Dentistry (IADR/AADR)** offers a women in science network, which members can choose to join. This network works to promote issues of women in science. Many of the awards and fellowships of the associations are geared toward postdocs, to fund travel and research, and these are open to all genders. The IADR has also held a leadership workshop before the meeting to assist those going into an academic career. They also hold a grant writing workshop at the IADR and/or AADR annual meeting. These events

are open to its membership and/or meeting attendees. Workshops on obtaining grant funding, communication skills, professional skills; a leadership development program and women-specific programs are offered; and awards that postdocs can use to fund research, and travel awards to present research or attend conferences are available. Formal networking programs are offered as well as underrepresented minorities and women's issues programs.

Diversity

If you are looking for workshops that are geared to diverse populations, see the **Midwest Political Science Association (MPSA):** The society offers workshops or seminars on communication skills, leadership development and women specific programs. They also give travel awards to present research or attend conferences. The society has receptions for the specific demographic groups (women, black, Latino/a, LBGT), and they offer conference travel scholarships for members of these organized groups (or rather the society funds them so they can provide them). The society has many professional development sessions at their conference organized by various Women's Caucuses, but they are open to everyone. They organize an additional 29 roundtables on topics. The **National Organization of Gay and Lesbian Scientists and Technical Professionals (NOGLSTP)** offers workshops or seminars for the LGBTQ+ population on obtaining grant funding, leadership development and women-specific programs. Workshops cover implicit gender bias that affects hiring, promotion, resource allocation, other peer reviewed process, and issues of international and underrepresented populations.

Gender

The **Linguistics Society of America (LSA)** is active in addressing a range of issues affecting women, including those facing the linguistics workforce, and also those affecting users of language. The LSA has a committee on the status of women in linguistics (COSWL) that works on many of these issues. Other LSA resources related to gender issues include the LSA statement on sexual harassment, guidelines for nonsexist usage, and a survey of linguistic departments/programs (including data by gender). LSA offers workshops or seminars on obtaining grant funding. Empowering women was the main focus of the **United States Society for Ecological Economics's (USSEE)** June 2014 women's retreat, where there were approximately 25 women in attendance, about 12 percent of the total membership. USSEE also hosted a women's lunch in 2013 that was attended by 30-50 women during a national conference. Both LSA and USSEE offer workshops or seminars on professional skills (e.g. time management, lab management), travel awards to present research or attend conferences, and women-specific programs.

Childcare Support

Having access to childcare resources is critical for the women postdoc population. Given that many postdocs are in their thirties and having families, childcare is necessary to attend confer-

ences and meetings. For the Elsevier Advancing Postdoc Women Clearinghouse, professional societies and associations were asked what childcare support they provided. Did they provide childcare awards to cover dependent care or help with childcare costs that enabled women to attend conferences? Or did they provide subsidized childcare services? Did their association or society subsidize on-site childcare services at their meeting? On the whole, few organizations out of the 46 associations offered childcare support.

The **American Psychological Association (APA)** offers a "family room" which provides services to help family members who are traveling with someone to the meeting. Some paid half of the childcare costs or subsidized it; others reviewed this on a case by case basis **(American Educational Research Association).** The joint conference of the **Society of Systematic Biologists/Society for the Study of Evolution/American Society of Naturalists** provided childcare services. However, though childcare was requested, it was not used. The **Federation of American Societies for Experimental Biology (FASEB)** and others provided information for locating childcare providers and day care services and provided assistance to any attendees regarding child/family care issues or concerns.

Below are the professional associations and societies and types of childcare support they offer.

American Educational Research Association (AERA): Offers childcare for a fee at its annual meeting. They assist fellows with child/elder care to attend a meeting or professional development activity on a case by case basis. This is typically done in a case of hardship.

Association for Public Policy Analysis and Management (APPAM): In the past, had seminars on how to set up a childcare center.

Entomological Society of America (ESA): Offers small grants of up to $400 for attendees (one per family) who are bringing small children to the annual meeting or who incur extra expenses in leaving their children at home (e.g., extra daycare or babysitting services) in order to attend the annual meeting. Applications are evaluated by the child care grant selection committee.

These associations and societies offer childcare awards for dependent care that enable postdocs to attend their professional meeting:
1. American Association of Anatomists
2. American Educational Research Association
3. American Psychological Association
4. Entomological Society of America

5. Linguistic Society of America

6. National Postdoctoral Association

These associations and societies assist with subsidized/discounted on-site dependent care at the location of the professional meeting:

1. American Anthropological Association

2. American Astronomical Society

3. American Chemical Society

4. American Educational Research Association

5. Midwest Political Science Association

6. Society for Applied Spectroscopy

7. Society of Systematic Biologists

These associations and societies offer subsidized childcare costs (give reimbursement to parents using childcare) that enable parents to attend the professional meeting:

1. American Astronomical Society

2. American Chemical Society

3. American Educational Research Association

4. American Philosophical Society

5. Linguistic Society of America

6. Midwest Sociological Society

7. National Postdoctoral Association

8. Sigma Delta Epsilon/Graduate Women in Science

Summary

This chapter highlighted resources and programs offered by professional societies on mentoring, career development, professional development and childcare resources. Mentoring is offered though one-to-one matching, online, and at the annual meeting. Social events at the annual meeting such as mentor breakfasts and luncheons facilitate meeting your mentor. For career development, there are many offerings on career planning, interviewing, negotiating and employment prospects. Attending an annual meeting of a professional society and association is an excellent way to network, which can lead to a future job. Archived and online free webinars on career and professional development topics, include resume/CV writing, networking, resources for managing the big transition to a first or new job, time management, and career development, are easily accessible from professional societies and can be accessed anytime. Professional development programs offer workshops or seminars on grant funding, boot camps, communication skills, professional skills, and leadership development. Though childcare resources need more attention from professional societies and associations, there are some that are offering assistance through travel awards, subsidized on site care and dependent care.

Beyond "Finding Good Mentors" to "Building and Cultivating Your Mentoring Team"

Rick McGee, Ph.D., Northwestern University Feinberg School of Medicine
Steve Lee, Ph.D., University of California, Davis
Christine Pfund, Ph.D., University of Wisconsin – Madison
Janet Branchaw, Ph.D., University of Wisconsin – Madison

As a postdoc, it goes without saying that mentors are critical for your continued development as a professional, as well as your movement into a positon beyond training. But there is no such thing as the perfect mentor because everyone's needs and goals are highly variable. In fact, that is the first step in thinking about finding mentors — reflecting to specifically identify and assess what you hope to gain from your mentor(s); you can't go looking for something without a clear idea of your own needs and goals! Taking self-assessment tests and creating an Individual Development Plan (IDP), and then reviewing the results with current mentors and peers is a great first step.

With a deeper understanding of yourself, you will be much better positioned to seek new mentoring relationships and resolve mentoring relationship challenges.

Traditionally, much focus has been on how to make mentors better at meeting the needs of those whom they are mentoring. In a utopian world with perfect mentors, this is a great ideal to strive for, but in the real world it has to be about mutual benefit and mutual responsibility for making the mentoring relationship work.

This chapter has been created to help postdocs:
- Think and assess prospectively about what they are seeking from mentors
- Shift from thinking about good and bad mentors to the core attributes of effective mentoring relationships
- Recognize that effective mentoring is not just about mentors guiding mentees, but also

about mentees guiding mentors – *mentoring up*

- Learn more about recent theoretical, practical and research advances to guide their development of effective mentoring skills
- Become familiar with key resources to continue building their skills as mentees and mentors

Start at the Beginning: Self-Assessments

It can be tempting, and is common, for many to jump right into trying to solve problems with their mentors. Before you consider addressing problems or even identifying potential mentors, it is critical to start by assessing yourself and your goals. You have to begin by understanding yourself for numerous studies have shown that we often don't assess our strengths and weaknesses accurately. Thus, self-assessment is a critical first step to navigating any mentoring relationship. Self-assessment tools and professional development workshops are often available at universities, and your career center may be able to provide individual consultations.

It is critical to keep in mind that it will be less about what your mentor will 'give' to you and more about how the two of you can collaborate to meet your mutual needs.

A few examples include:

Myers-Briggs Type Indicators (MBTI)

The MBTI instrument assesses your preferences in four areas: how you relate to people, gather information, make decisions, and interact with the outside world. Free, unofficial versions are also available online.

http://www.myersbriggs.org/my-mbti-personality-type/mbti-basics/

StrengthsFinder

The Clifton StrengthsFinder 2.0 assessment identifies your strengths from among 34 themes within four domains. Purchasing the "Strengths Based Leadership" book will provide a background and an access code to take the online assessment.

http://www.strengthsfinder.com/home.aspx

myIDP

For postdocs in the STEM disciplines, the myIDP website provides an excellent, complete online resource to create your own IDP. The website is free and helps to assess your skills, interests, and values; explore possible careers and conduct informational interviews; set and achieve SMART goals; and implement your plans.

http://myidp.sciencecareers.org/

A short history of recent advances in developing mentoring skills: The Mentor

A big step forward in work to improve mentoring relationships took place in 2005 with the release of *Entering Mentoring: A Seminar to Train a New Generation of Scientists*. The series of workshops were developed by Jo Handelsman, Christine Pfund, Sarah Miller Lauffer, and Christine Maidl at the University of Wisconsin with support from Howard Hughes Medical Institute (HHMI). It was originally designed for postdocs and graduate students who were mentoring undergraduates doing summer research in the biological sciences. It quickly became the go-to standard for how to guide young scientists in training. *Entering Mentoring* was novel because it defined and provided effective workshop-based tools around what makes mentoring relationships effective – or not. Research mentoring in the sciences was broken down to its component parts. The second edition of this original curriculum was published by Christine Pfund, Janet Branchaw and Jo Handelsman in spring 2015 and is designed to be used across the STEM disciplines. It is available from W.H. Freeman publishers.

The Wisconsin team also adapted the *Entering Mentoring* curriculum for several specific disciplines. Although the core characteristics of effective mentoring are relevant for many fields, the cases used to display and talk about them are best if they fit the context of the person learning them. Currently, workshop manuals for many different disciplines can be downloaded from the Wisconsin website. Custom curricula may also be created on this website.

Overall mentoring tools and resources: **https://mentoringresources.ictr.wisc.edu/**

Workshop manuals can be found at **http://www.researchmentortraining.org/** and https://mentoringresources.ictr.wisc.edu/TrainingCurriculumChoices

Information on attending a training workshop on how to lead the workshops or request that a workshop be led by an experienced facilitator can be found at **https://mentoringresources.ictr. wisc.edu/TrainingMain**

One version of the adapted *Entering Mentoring* was specifically designed for faculty who are mentoring junior faculty or senior postdocs in a clinical and translation research setting. That version was field-tested at 16 medical centers holding NIH Clinical and Translational Science Awards (CTSA) in 2012-13. The field-testing was conducted as a true randomized controlled trial in which mentor and mentee pairs were randomly assigned to mentor being trained or not. The mentee did not know if their mentor had gone through the workshops or not. A whole series of publications have now documented this trial and the very promising results it produced. By several criteria, including perceptions of mentees of their mentors, the workshops had demonstrable positive benefits. Recent publications about mentoring and mentor training, including the publications that have resulted from this study can be accessed at **https://mentoringresources.ictr.wisc. edu/ResourcesBibliography**

Formal training in mentoring skills is not necessarily required for effective mentoring relationships!

Entering Mentoring makes visible and explicit how mentoring is all about *relationships* and what it takes for those relationships to be effective in order to achieve the mutual benefit of everyone involved. Even if you are unable to participate in the workshops, knowing those core attributes allows you to explicitly think about and continually improve your skills as a mentor. Knowing those attributes can help you actively guide your mentoring relationships. In fact, a whole array of resources you can use by yourself or with your mentor to guide development of your mentoring skills and mentored relationships as well as to a place to request training or connect to train-the-trainer workshops can be found here, **https://mentoringresources.ictr.wisc.edu/MentoringResources**

The seven "pillars" of effective mentoring relationships that are described, explained and practiced in the Entering Mentoring workshops are:

1. Maintaining Effective Communication
2. Aligning Expectations
3. Assessing Understanding
4. Addressing Equity and Inclusion
5. Fostering Independence
6. Promoting Professional Development
7. Ethics

Mentoring Up and Developing Skills for Empowerment – the foundation for taking responsibility for your own mentoring: The Mentee

It is equally important to prepare trainees and even junior faculty to "mentor up." Mentoring up involves mentees taking responsibility for guiding their mentors on what they need. With this in mind, the pillars of effective mentoring relationships are the same for mentees as for mentors and training to support mentoring relationships can be done for mentees as well as mentors. Janet Branchaw, Christine Pfund and Raelyn Rediske have published a curriculum for undergraduate STEM mentees called *Entering Research*. This curriculum parallels the *Entering Mentoring* curriculum and supports research mentees, who are engaging in research for the first time, to navigate their mentoring relationship. Along with the second edition of *Entering Mentoring, Entering Research* is available from W.H. Freeman.

> *Mentoring relationships are about two (or more) people, who share the responsibility of making the relationship work.*

As a postdoc, you can use all of the materials cited here to consider and develop skills for guiding your mentors – mentoring up. It is especially important for postdocs to learn to mentor up, because they will soon (if they haven't already) be mentoring others. As you gain skills in mentoring up, you will also be strengthening your own skills in mentoring others.

Assessing the current state of your various mentoring relationships as a mentee and as a mentor

If it seems like you are not getting what you were hoping for from your mentor(s), or you are not satisfied with how you are mentoring others, start by assessing those relationships. Good questions to ask yourself in both circumstances are:

- What exactly am I looking for (expecting) from this mentoring relationship?
- What do I expect from my mentors/mentees and what do they expect from me?
- How do they know what I am expecting or looking for?
- Have we explicitly discussed these questions? If not, why not?

If your answers are vague, or reflect little direct communication with your mentor/mentee, this could be a factor contributing to your dissatisfaction and a signal of where to start to make things better. Answers to these kinds of questions are often important elements of IDPs. If they are not in yours, add them. In addition to absence of clarity, you may identify other specific areas of concern and/or stylistic differences. If you objectively define them, this is a first important step in attempting to develop a strategy to address them.

Keep in mind that it is very valuable to have different mentors who assist you in different ways rather than expect one mentor to be the right person for everything. For example, you will need different mentors to address your research interests outside your primary research; career advancement if different path than a research mentor; personal/professional integration; needs that reflect your gender/racial/ethnic/sexual identity/socioeconomic status, etc.

Assessing the 'styles' of your various mentors, their openness to a shared responsibility and your "style" as a mentee

Often, difficulties in mentoring relationships come down to stylistic preferences or natural tendencies. Start by remembering that people typically tend to mentor in a manner that they would like to be mentored. Given this, it can be very valuable to find out about your own preferred styles and practices of mentoring *before* you sign up to be mentored. Don't be afraid to ask directly about things that are important to you and allow you to do your best work, such as:

"I have found from the past that I like to meet regularly, every week or two, with research mentors to make sure we are on the same page. Does that work for you?"

"Moving into this next step in my career I need to have a chance to come up with new ideas and would like to be able to run them by you to get feedback even if I don't intend to follow them all. Would this be ok with you?"

"I have realized that I am really not a morning person and work much better afternoons and into the night. Would this work ok with your typical schedule such that we have enough overlap time to converse as needed?"

Sometimes the best information on mentoring styles comes from open-ended and direct questions to others in a research team. This is not to say that it is impossible to work effectively with approaches that are not naturally aligned: just be sure you realize it ahead of time so you both can acknowledge it is something you will have to consciously address. If you like to check in frequently (like daily) and a potential mentor does not, think of it as something you both can adapt to as a compromise. If it is very important to you to write full drafts of papers by yourself, and your potential mentor is typically more involved in early writing stages, this is again something to discuss and adapt. It may not be easy for a senior mentor to define their style, or they may think they have one style but others perceive it as quite different. This is one area where asking others in the research group about mentoring style can be very revealing.

Working to improve mentoring skills (Up and Down) within a postdoc community – at institutions, NPA meetings, industry, organizations, etc.

As noted above, many of the newly developed mentoring skills materials can be quite useful for self-guided personal development. However, interactive workshops are generally more effective and more fun. Keep an eye out for wherever you may find them, and when you do, seriously consider participating. Yes, there is always pressure to do one more experiment, but really, will four hours make any difference in the long run in the lab versus developing a skill that can literally transform your relationships with mentors?

Some of the links included in this chapter will guide you to resources to invite experts to come to your campus to lead workshops and/or train individuals from your campus to lead them. There also are many groups that present mentoring skills and approaches on campuses and at meetings. All can be useful, but the bias of those of us behind this web content feel workshop models in which you get to identify how you tend to communicate, consider your current mentoring relationship, practice new approaches, etc. are more valuable than simply hearing others talk about mentoring.

More and more institutions and organizations are recognizing the importance of helping mentors and mentees develop effective mentoring skills and relationships.

Finding and choosing mentors – including primary research mentors and other mentors

The starting point for this one is very easy – you must figure out what you are looking for before you can try to find it! This is true for all facets of the mentoring relationships, including:

- Field of research, including how "hot" the field is and the type and intensity of competition

- Size of research group and degree of collaboration vs. independent work

- Hands on vs. hands off style of mentor(s)

- Mentoring relationships that encompass personal and professional domains vs. those strictly focused on the professional

- Professional reputation of mentor(s) and the degree to which they can/do assist others with establishing professional networks

- Location – don't underplay the importance of enjoying where you live to high quality work

- Utilizing mentors who are not at your home institution through intermittent phone and e-mail contacts, or at meetings you both attend

- More advice on identifying what you are looking for and your "fit" with various mentors can be found at **https://mentoringresources.ictr.wisc.edu/MenteesAssessingFit**

If you already have one or more primary research mentors and feel you would like something more, you must still start with explicitly identifying what it is you are looking for. That should quickly refine your search from amorphous goals to more concrete goals. With those concrete goals, you are then armed to approach others with specific, manageable requests. Your chances of getting a positive response skyrocket when you can clearly articulate concrete, realistic requests. A list of possible topics could be very long, but some might include:

- Research design if you are getting into areas outside the expertise of you and your mentors

- Statistical expertise

- Career strategies, especially if they are again outside what your mentors' personal experience

- Management of life issues, such as balance of family/relationship issues

- Balancing/integrating/maintaining multiple identities related to gender, race, ethnicity, religion, sexual identities, and others within the scientific community

- Networking

- Psychosocial support

New Mentoring Resources through the National Research Mentoring Network (NRMN)

In 2013, the NIH recognized the need to accelerate efforts to improve mentoring relationships and provide a nationwide infrastructure to link those who are seeking mentors with those willing

to mentor them. A major award was made in 2014 to a consortium of leaders of mentor training and professional development efforts – the National Research Mentoring Network (NRMN). NRMN was launched in the summer of 2015 and will be adding new resources at a rapid pace, available through: **www.nrmnet.net**.

Case Studies

As you consider how to apply the assessments and resources provided above into your specific situations, these case studies are provided to help you evaluate your own understanding and to practice applying your skills in realistic situations. These case studies are based upon real situations (with altered names and details to maintain confidentiality) for personal reflection and for group discussion. We encourage you to consider how you might respond to these situations, avoid similar problems, and move forward to resolve conflicts – in order to help you improve your skills in mentoring up.

Case Study #1: *Navigating between two mentors*

Heather is a new postdoc and has recently joined a research group with Professor Roman as her primary mentor. She was given multiple projects – including her first project, which was started by a visiting scholar in the group. She assumed that the visiting scholar would help her with the project, serving as an informal mentor.

Heather began working in the lab by following instructions that were written by the visiting scholar, but noticed problems with the results. When she asked the visiting scholar to confirm the instructions, he brushed her off with quick answers, and said that he didn't follow the written instructions exactly and that it contained errors. Heather was confused by his behavior, and began to suspect that the project was taken from him, and that he was resenting her work on the project.

To better understand her project and resolve problems with her results, she asked for a joint meeting with both of her mentors: Professor Roman and the visiting scholar. In the joint meeting, she made sure that the visiting scholar was given ample opportunity to speak openly and confirm that he approved handing over the project to Heather. However, even after the meeting, Heather still continued to have problems with the instructions, and the visiting scholar continued to brush her off with quick and cryptic responses that didn't help her. Heather still suspected that the visiting scholar only agreed to hand over the project to her because he was afraid to disagree with Professor Roman. Heather is frustrated, because her progress depends on the past work and experiments that were started by the visiting scholar, so she is unable to proceed at a sufficient pace. The visiting scholar has not been helpful, and seems to behave passive-aggressively towards her questions and requests for help.

Furthermore, the visiting scholar has asked that he be given first authorship if a paper were to be published, which Heather believes is acceptable since he started the project. But he has also started insisting that he be given first authorship on a second paper, even though Heather would have done most of the experimental work and writing of the paper. As Heather considered her various

options, she discussed her multiple projects with Professor Roman and began to shift her energy towards other projects.

Questions for personal reflection or group discussion:

1) Would you have behaved similarly to Heather in this situation?

2) How does Heather effectively "mentor up" in her situation? How does she assess the situation and her own goals, consider her options, and navigate through this sticky situation?

3) What could Heather have done differently to avoid problems or improve the situation?

Case Study #2: *Lack of independence*

Jennifer recently finished her doctoral degree and began working in her new lab as a postdoc with high hopes. She had initial great meetings with her research mentor, who seemed friendly and willing to listen to her ideas and plans for her work. She also heard from the grad students in the group that they were very happy with his mentorship style. He seems to have mostly grad students and undergrads in his research group, and Jen is his first postdoc in a while.

However, as she began working under her research mentor, she began to notice that he would brush off her ideas, and insist that she work on his ideas and plans. She brought up her ideas for what she had hoped to focus on multiple times, but he kept insisting that she first work on his initial project. Jennifer's initial project has started to grow and take longer than they both first anticipated, and he has started talking about it becoming her main project.

Jen began to notice that the grad students basically did what they were told to do, and were not given much independence in their research projects. She had been accustomed to having much more freedom from her graduate research mentor, so she is finding it difficult to follow her new research mentor.

Questions for personal reflection or group discussion:

1) What would you do in this situation?

2) What are some different options for Jen to consider?

3) How could Jen have avoided some of the difficulties?

Case Study #3: *Co-mentors*

Tom is thinking of collaborating with two professors for his postdoc. Both faculty members are leaders in their fields, so he's excited about the possibility of expanding his research expertise by these two leaders. One works primarily at the medical campus of the university, while the other works primarily at the main campus, which is about an hour's drive away.

Questions for personal reflection or group discussion:

1) What are some benefits of working with two mentors? What can he do to make sure to take advantage of these benefits?

2) What are some potential pitfalls of working with two mentors? What are some things he should do to avoid these pitfalls?

Case Study #4: *Different communication styles and aligning expectations*

Joseph has been having trouble understanding his research professor's expectations and goals for his research. This is particularly frustrating for Joseph, because he's very friendly and gets along with most people. He has weekly meetings with his professor, where he tells her all about his ups and downs from his research progress, along with complications and successes. Joseph is aware that he's communicative and talkative, so he believes that he's doing a good job with informing his professor about his research progress. But occasionally his professor will ask him a particular question that surprises him, because Joseph didn't realize that she had wanted something else. Joseph wishes that she would explain more clearly what she wants and expects, so that they can work better together. But she doesn't seem to say much during their meetings, and seems withdrawn from Joseph's perspective.

Questions for personal reflection or group discussion:

1) What do you think is occurring between Joseph and his research professor, in terms of miscommunication or misalignment of expectations?

2) Do you think that a possible source of difference is that Joseph is an extrovert, and his PI is an introvert? Refer to the Myers-Briggs Type Indicator (MBTI) for deeper explanations of the differences between introverts and extroverts.

3) How might Joseph adapt, to work better with his professor? How can he improve his understanding of her expectations for his research?

4) Have you or a friend experienced similar situations, where you had different communication styles with another member of a research group? How did the different communication preferences impact the relationship? How did you deal with the differences?

Summary

Begin by getting to know yourself. Take advantage of self-assessment tools, such as the Myers-Briggs Type Indicator, Strengths Finder and myIDP, to identify what you bring to the mentoring relationship and what you need from the relationship. This will help you develop positive, mutually beneficial professional relationships both as a mentee and as a mentor. Take advantage of available resources to help you on this journey. Use *Entering Mentoring* to learn about the effective characteristics of mentors and *Entering Research* to navigate the relationship from a mentee's perspective. As a mentee, be proactive. Use the principles of *Mentoring Up* to get what you need and to help you address challenges or find additional mentors when you are not getting what you need. In the end, open communication, aligned expectations and shared responsibility will help you build successful, mutually beneficial mentoring relationships.

Making the Most of Your Postdoc: Career Preparation and Planning

By Kim Petrie, Ph.D. and Ashley E. Brady, Ph.D.

As you think about your postdoctoral training period, consider the fact that your postdoctoral training period serves two purposes. First, it is your current job. You will design and execute an independent research project to generate new data, journal articles, and conference presentations that advance your field. Second, your postdoctoral work is a *training* period. By definition, it is temporary and it is explicitly intended as a time to develop the skills and expertise you need to advance to the next stage of your career.

Your dual role as worker and trainee exists simultaneously and must therefore be managed simultaneously. Tempting as it is to wait and see how your postdoctoral research turns out before worrying about what happens next – especially in the face of so many competing demands on your time – it is imperative to take charge of your career development and engage in thoughtful career planning from the start of your postdoctoral training. This way, you have time to develop skills, experiences, and relationships that form the foundation for your successful transition to satisfying employment. If you're reading this chapter as your postdoctoral training is winding down, the principles and advice still apply, but you may need to accelerate the pace of career planning activities if you haven't done them already.

Four Questions to Jumpstart Career Planning

You can jumpstart your career planning by thinking about your postdoctoral training period as preparation for a specific career in [fill-in-the-blank with the name of your favorite career]. You're not just here to do research and see what happens: you're here to prepare for a career in [fill-in-the-blank with the name of your favorite career].

Ready to start? Write down answers to these four questions:

1. What is my first choice career?

We're going to call this "Plan A." Don't let your constraints creep into your mind. This is the career you would pursue today if you could go anywhere and do anything, your readiness aside.

2. What skills and personal attributes/traits are required to be successful in a "Plan A" career?

Write down as many skills and attributes/traits as you can think of without regard to whether you possess them. The line between skills and attribute/traits is sometimes blurry, but we think of skills as something you can acquire, and attributes/traits as personality characteristics that are inherent; you may be able to shape and enhance attributes/traits, but trying to change them completely feels like swimming upstream. For example, success in a research-focused faculty career requires (among other things) solid written and oral communication skills, persistence (attribute/trait), and a keen desire to execute your own research ideas (attribute/trait). Success in management consulting requires good quantitative reasoning skills, teamwork (skill), strong drive and motivation (attribute/trait) and the ability to make decisions with incomplete data (skill).

3. What do I need to accomplish during my postdoctoral training period to be a competitive candidate for a "Plan A" job?

These should be high-level goals and not a detailed tactical strategy. For example, to be competitive for a faculty career at a liberal arts college, you will likely need teaching experience and a research plan that incorporates undergraduates, and is feasible for that type of institution; to be a journalist or a writer, you will likely need experience writing for a lay audience and a portfolio of writing samples.

4. What is the ideal timeline for me to move into my "Plan A" career?

Do you want to be in your post-training career in one year? Three years? Five years? This timeline should be both ideal *and* realistic. Remember that most institutions limit the postdoctoral training period to no more than five years, and many funding opportunities for postdoctoral training phase out after 3-5 years. If you are planning to move into your next career stage in one to three years, you will need to accelerate your efforts, while a five year goal may allow you more time to test potential career paths using the strategies outlined below. Knowing your timeline is important for setting goals for career development and visualizing how your career development goals can be accomplished alongside your research goals.

When you're finished writing the answers to these questions, go back and repeat the exercise for a "Plan B" career. The name "Plan B" implies it's a less desirable choice. However, "Plan B" may be an equally satisfying outcome to you as "Plan A," or it may be an option that takes your constraints — geographic preferences, your partner's career, etc. — into consideration. The point isn't to explicitly identify a second-tier option, but rather to ensure you spend time considering at least two different paths.

If it was easy for you to answer questions 1-4 for "Plan A" and "Plan B," great! Use an Individual Development Plan (IDP) to set goals for acquiring the necessary skills and experience to move you forward. Many institutions require postdocs to complete an IDP annually with their research mentors, or you can use the online myIDP career planning tool from *Science*Careers developed by Fuhrmann et. al. (2012). The free, confidential myIDP website (**http://myidp.sciencecareers.org/**) will walk you through the IDP process and it has many handy features like automatic reminders and fillable text boxes for you to make notes about your career development activities.

Regardless of which IDP you use, completing an IDP is beneficial because it helps you set goals for your career development and research, and there is evidence that setting specific, measurable, action-oriented, realistic, and time-bound goals (SMART goals) boosts achievement (Doran G.T., 1981; Locke & Latham, 2002). Furthermore, mapping out a plan for *when* you will get that teaching experience, or *when* you will take that science-writing course, helps you envision achieving your career development goals alongside your research goals. This can be especially important if your planned activities only happen at certain times of year or they have application deadlines. Finally, reviewing your IDP with your research advisor helps you understand her or his expectations of you, and helps your advisor understand the goals you have for yourself (Hobin et. al., 2014).

If you struggled to answer questions 1-4 for "Plan A" or "Plan B," don't despair. It isn't critical for you to have your future mapped out perfectly at this stage. In fact, if you talk to most successful professionals, they had no idea they would end up where they have, and they usually mention acts of serendipity that led them to where they are now. What is important, however, is to identify at least two plausible career paths you can pursue and to make strides toward those during your postdoctoral training. You will learn more as you go and keeping your options open and remaining flexible can be beneficial in the long run. It isn't important to find the "perfect job" right out of the gate, but you do want to find something you find interesting and exciting, utilizes your skills and talents, and allows you to continue to grow professionally. The following sections will help you figure out what your next steps should be.

Career Decision-Making

Career decision-making is often depicted as a cycle starting with self-assessment, followed by career exploration, goal-setting, and taking action to achieve your goals (Figure 3.1). The cyclical structure of the process underscores the fact that career development is iterative, happening continuously over your lifetime as you incorporate new experiences and new skills into your professional identity. While career decision-making is rarely this straightforward in practice, the career decision-making cycle nonetheless offers a useful framework for career planning.

Figure 3.1. Career decision-making cycle

Assess yourself → Explore options → Set goals → Act & learn (cycle)
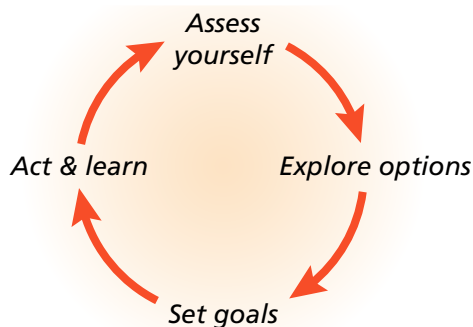
Self-assessment

Self-assessment is the process of reflecting on your past experiences to shed light on what makes you tick professionally. What are your skills and strengths? What tasks and activities do you enjoy doing? When do you feel most satisfied at work, and conversely, when are you unhappy with your job? Being aware of your work-related skills, interests, and values helps you identify possible careers that would be satisfying because they fit you well. A happy side effect of self-assessment is that you can articulate your strengths and interests more clearly with potential employers, and understanding your values helps you ask more targeted questions during informational interviews (more on informational interviews momentarily).

Your postdoctoral institution may offer career counseling services with career advisors who can administer structured self-assessment tools like the *Strong Interest Inventory or Knowdell Card Sorts* at low- or no-cost to you. We also recommend the *Clifton Strengths Finder* and *What Color Is Your Parachute? Job Hunter's Workbook,* both available from online booksellers, and the self-assessment contained within the free online myIDP tool from *Science*Careers.

Career development guru Richard Bolles, author of the famed *What Color is Your Parachute*, has proposed three categories of skills to help people reflect on what they are good at doing: knowledge skills, traits, and transferable skills (Bolles, R.N., 2015). "Knowledge skills" are work content skills that you need to know for certain jobs. Think microscopy or multivariate analysis. "Traits" are characteristics of personality that are required for success in certain types of work (e.g. persistence, autonomy, and attention to detail). Know any postdocs who have those in spades? "Transferable skills" are skills developed in one setting that can be applied in other settings (e.g. analyzing information or managing multiple ongoing projects).

As researchers who have mastered complex techniques and who have become deep experts in our field, we tend to focus on knowledge skills when we start taking stock of what we can do. This

can be discouraging for postdocs who want to transition *away* from the research they're currently doing. One benefit of a structured assessment of skills is that it pushes us to recognize the many traits and transferable skills that we hone in the course of doctoral and postdoctoral training. For example, as a postdoc you will likely become skilled at writing and editing grants, and this would be valued by a nonprofit seeking funding or a start-up seeking a small business innovation grant. Indeed, employers often value traits and transferable skills just as highly — if not more — than knowledge skills.

When you complete your self-assessment, consider not only the skills you developed formally during your postdoc or doctoral training, but also the skills you develop participating in other activities outside of research. Also, don't be discouraged if your self-assessment reveals an interest in certain work functions or careers, but you have little or no experience in those areas. It's possible to acquire relevant experience and develop skills related to those interests. That's why skills and interests are assessed separately!

An understanding of your values will help you make better career choices by helping you focus on careers that will be satisfying to you. Making career choices without taking your values into account can lead to a career mismatch and deep dissatisfaction.

Pay close attention to the outcome of your values assessment. Values are things that are important to you personally and professionally. In the context of career, values are what make your job enjoyable and worth doing. Examples of values include helping others, fast pace, work-life balance, high earning potential, location, or intellectual status. An understanding of your values will help you make better career choices by helping you focus on careers that will be satisfying to you. Making career choices without taking your values into account can lead to a career mismatch and deep dissatisfaction.

Overall, self-assessment is intended to prepare you for the next step of the career-decision making process: career exploration.

Career exploration

The goal of career exploration is not simply to become aware of possible careers, but to weigh those options against your skills, values, and interests, and gauge whether those careers are a good fit for you. For example, a career in management consulting may capitalize on your interest and skill in problem solving, but if you value working alone with little input from others, you probably won't be content as a management consultant.

Reading about careers is a great way to start exploring options. It is a relatively low investment of time that helps you focus future, more time-intensive exploration activities on careers that hold high potential for you. For a good overview of options, browse the "Career Exploration" section of

*Science*Careers myIDP. It has a list of 20 different of career paths for STEM doctoral recipients along with links to online articles, book titles, and pertinent professional organizations. The "PhD CareerFinder" section of Versatile PhD (**www.versatilephd.com**) has a similar list for both STEM and humanities/social sciences doctoral recipients.

> *"What skills and personal attributes/traits are required to be successful in this career?" and, "What do I need to accomplish during my postdoctoral training period to be a competitive candidate for this career path?"*

Other low-effort ways to explore career options include attending career panels or presentations sponsored by your postdoctoral institution or professional society. If your postdoctoral institution doesn't offer career programs for postdocs, lead the charge to create them! You will develop valuable leadership experience through researching what other institutions are doing in this arena and lobbying the administration at your institution to offer similar programs. (See the "Events" section of our website, **https://medschool.vanderbilt.edu/career-development/events** for examples of programs we host regularly at Vanderbilt, and see **http://www.nihbest.org/** for programs being developed by the NIH Broadening Experiences in Scientific Training (BEST) consortium institutions). Many professional societies hold career panels in conjunction with their annual scientific meetings. These sessions are sometimes publicized apart from the regular scientific sessions, and you may need to explore the conference website to find them.

The Alumni Tool of LinkedIn can help you learn the career outcomes of doctoral recipient graduates from your university, and you can search career websites or job aggregators like Indeed.com or SimplyHired.com with simple keywords like "PhD." You never know what you might find! If you identify a job description that looks really interesting to you, use it as a springboard to explore that career path.

As you learn about careers, strive to answer questions two and three from the first section: "What skills and personal attributes/traits are required to be successful in this career?" and, "What do I need to accomplish during my postdoctoral training period to be a competitive candidate for this career path?" Knowing the answers to these two questions will help you determine what skills you are missing that you could add to your repertoire over the coming years to make you a stronger candidate for a similar position. You'll use this information in the next stages of career decision-making: goal setting and taking action.

Set goals and take action

Armed with basic knowledge about careers that interest you, the next steps are to set goals and take action to move forward in the career-decision making process. As noted earlier, we recommend setting explicit career development goals as part of your Individual Development Plan

(IDP). myIDP, the free online planning tool from *Science* Careers, can help you set SMART goals, and it includes a built-in e-mail reminder system to help keep you accountable.

The specific actions you take next will depend on your needs. Generally, people fall into one of three categories at this stage:

1. You still don't feel very confident about your career interests, even after reading about them and attending career talks. This isn't unusual, especially for careers that are a big departure from academic research. To increase your confidence in your career choices, you may benefit from conducting informational interviews and testing your interest in a particular field. See the sections, **Informational Interviewing** and **Testing Your Interest,** below.

2. You're reasonably confident about your career interests, but in the course of doing your career research, you discovered gaps in your skills or experience that you need to fill before applying for jobs. Seek out opportunities to develop these skills so you are well-prepared to go on the job market. You should also be building and nurturing your network. See the sections, **Skill Building** and **Networking,** below.

3. You're reasonably confident about your career interests and you're on track to be a competitive candidate for a job in that field. Wonderful! Your time is probably best spent building and nurturing your network. See the section, **Networking,** below.

Informational Interviewing

To increase your confidence, you can conduct informational interviews with people in those careers to confirm your interest or eliminate those careers from consideration.

The term "informational interview" was coined by author Richard Bolles and refers to an informal, but professional, meeting with someone in a career area of interest to you. This is a highly effective means to learn more about a particular career. Nevertheless, many people have either never heard of informational interviews or are not taking full advantage of their potential as part of their career exploration. The intention of an informational interview should never be about getting a job offer or responding to an open position. Rather, as the name implies, it is strictly about gaining information.

Informational interviews can be done at any point in your career, but there is no better time than when you are still in a "training" position such as your postdoctoral fellowship. Many professionals are more than willing to help someone who is just getting started. They remember when they were in your shoes, and they are eager to give the next generation a hand up.

What can you achieve from conducting an informational interview?
The benefits are wide-ranging and include both immediate and longer-term impact:
• You have the opportunity to meet someone new and learn about their current position, the company they work for and their career path.

- Meeting individuals in this context helps you grow your network exponentially, as often they will suggest others whom you should meet.

- You can learn about resources available to you to gain important skills or expertise.

- This is a great low-stress environment in which you can build your confidence and practice talking to people.

- Exposure to a specific career path or company may make you a more impressive job candidate at a later date because you will have greater knowledge of the industry or career.

- You may find that from these conversations you gain insight into what is referred to as the "hidden job market": the 50 percent (or more!) of open or newly created jobs that are never advertised. Insiders in a particular field will know about job opportunities before they are advertised, such as knowing that a particular department is planning to expand, or that someone in a particular company is planning to leave. You may be made aware of these potential market/industry changes in advance and be able to begin conversations with the appropriate stakeholder before a job description is even written.

How do you find people to interview?

This is actually much easier than you might think. A good place to start is with your own personal network. Friends, family, colleagues, mentors, your PI — ask all of these individuals if they know of anyone who would be good for you to talk to in order to gain more information about various career areas. Seek out alumni contacts from your college or university who may be in a particular industry or field. Look for professional societies or local meet-ups where you might be able to identify people in career areas of interest. Review meeting agendas before you go to professional conferences to identify key individuals who may also be in attendance. Try to introduce yourself to these individuals at the conference and get their business card to write to them and ask for an informational interview later. The professional societies you belong to may have formal mentoring programs or host career development networking receptions at annual conferences. Scour industry websites and LinkedIn for people doing things that interest you. If you find yourself visiting a city for personal or professional reasons, seek out individuals who you might meet while you are there.

Once you have identified someone to interview, how do you ask for a meeting? You could certainly call them to ask, but usually e-mail is an effective and unobtrusive way to reach out to someone with a meeting request, especially when it is someone you don't know. In an e-mail, make sure that you have a descriptive subject line so that your e-mail won't be discarded without being opened. Make your message succinct and easy to read, keeping in mind that most professionals are very busy and may be receiving your request on a mobile device. Tell them who you are and why you are contacting them, and importantly, any connection or common background you may have. For example, let them know if you are both alumni of a particular university or program, or if you have a mutual acquaintance who has referred you. State your request clearly, whether asking for a

face-to-face meeting or phone call, and then offer a time and a date. This can be specific, if you are only in town on a certain day, or more general (i.e. next month), if your timing is flexible. State the intended meeting duration (usually not more than 30 minutes), and stick to that time limit when you meet. Always remember to include your contact information in your signature.

Example e-mail correspondence

Below is an example e-mail request for an informational interview and an example follow-up e-mail confirming the meeting time. Don't get discouraged if you don't hear back immediately. Sometimes busy people take a few days to respond, and sometimes e-mails just get lost or deleted. After a week, it is usually worth sending one more very brief request e-mail by forwarding the initial e-mail you send. If you never hear from the person, don't take it personally, just move on to another person and try again. Most often, you will be surprised at how responsive people are, and the more you do this, the more you will refine your message and the better you will get at asking. If you do get a favorable response, you can confirm details and include your CV/résumé if you choose, once the meeting is set. The day before your scheduled informational interview, it is always a good idea to send a final confirmation e-mail with the meeting details and your cell phone number.

Example e-mail request for informational interview

Re: Meeting request from [your university] postdoctoral fellow

Dear Dr. Who,

I'm a postdoctoral fellow in cancer biology at [your university]. I am in the process of exploring my next career steps and am particularly interested in applying my background in cell proliferation and tumor initiation to develop precision chemotherapy for cancer patients. My advisor, [your advisor's name], suggested that you would have a very good perspective on the current field.

I would appreciate the opportunity to meet with you for 20 minutes to learn more about your career path and current role at [company name]. I'm especially interested in any advice you may have for someone who is interested in transitioning from academia to industry.

Would you have time to meet for a coffee or talk by phone at some point in the next month?

My best,

Jane
615.123.1234
janepostdoc@gmail.com

Follow up confirmation e-mail

Re: Meeting request from [your university] postdoctoral fellow

Dear Dr. Who,

Thank you so much for agreeing to meet with me at 11:00 a.m. on Tuesday, March 14th at Starbucks on Grand Ave. I'm attaching a copy of my résumé to give you a little more information about my background.

Looking forward to seeing you,
Best,

Jane
615.123.1234
janepostdoc@gmail.com

What do you do to prepare for an informational interview?

It is very important to do your homework before you show up to your meeting. Remember that this person is giving you their valuable time, and you want to make a good impression so that they will want to continue to help you. You should prepare a short 30-60 second "elevator pitch" to tell them who you are and what you are trying to learn. Research the person you are meeting with, as well as their company/department and industry. Use LinkedIn and Google to help you find websites, annual reports, press releases and news articles that will help you develop questions to ask. This will also ensure you are up to date on any important trends or developments in this individual's industry. For example, if their small start-up was just acquired by a larger company, you would want to know this before you sit down to talk with them. Avoid asking information that you can readily find online. You should also prepare approximately 10-12 focused questions. For example:

- Tell me about your career path – how did you get here?

- What does your typical day look like? How do you spend your time?

- What is the work culture in your company, or this industry in general?

- What sort of education, training, or experience is needed to work in this field?

- What are some of the skills that you find most valuable to you in your job?

- What are you are looking for when you hire new people for a position like…x,y,z…?

- Do you know of any places where I might be able to build my skills in "X"?

- I'm interested in "X" type of position. Do you know of other places where this type of job might exist, or other positions that might use similar skills?

- Do you know of any other people doing something like this who might be good for me to talk to?

Etiquette for the informational interview

While this is generally an informal meeting, and should feel more relaxed than a job interview, you never want to make a bad first impression.

- Dress professionally, as you would dress for a job in this person's industry, but perhaps not as formally as you might for an interview.

- Be on time, which is to say, **be early.** You never want someone who is doing you a favor to have to wait on you.

- **Turn off your cell phone. We cannot emphasize this enough.** It is disrespectful to be looking at your phone during the meeting. If you typically use your phone instead of a watch to know the time, set your phone's timer to vibrate discreetly near the end of the meeting.

- Bring a paper and a pen to take notes.

- Buy their coffee or lunch, or at least offer.

- Emphasize that you are there to learn and gather advice, and don't inquire about job openings.

- Share something about yourself, but don't dominate the conversation — employ an informal dialogue.

- Be enthusiastic and show interest.

- Be a good listener and ask thoughtful, relevant questions.

- Be direct and concise.

- Have good eye contact and posture.

- Always be mindful of their time; keep an eye on the clock and make it easy for them to exit the conversation by or before the agreed upon time.

- At the end of the interview ask if they can recommend a few people you can speak to.

- Thank them for their time.

How do you follow-up after the informational interview?

It is absolutely imperative that you send a thank you e-mail within 24 hours of your meeting. A hand-written note is not required but often makes a nice impression. Use this e-mail follow up as an opportunity to let them know that you would like to connect to them via LinkedIn if you have not already. To personalize your note, include a reference to something you learned from them or something you enjoyed hearing about. Also include any specific follow-up items that you offered to send them or vice-versa, such as contacts, websites, or other information.

Example "Thank you" e-mail

Re: Meeting request from [your university] postdoctoral fellow

Dear Dr. Who,

It was great to have the opportunity to meet you yesterday. Thank you for taking the time to share your experience with me. It is very encouraging to hear about the exciting opportunities you foresee in the area of precision cancer therapeutics and I hope to be able to contribute to this area as my career develops.

Thank you also for suggesting I reach out to our local biotechnology industry organization. I will let you know how that goes. Please continue to keep me in mind if you learn of any other opportunities or resources that might be helpful to me.

I would also like to connect via LinkedIn so that we can stay in touch that way.

My best,

Jane
615.123.1234
janepostdoc@gmail.com

In addition to the immediate thank you e-mail, it is also wise to periodically check in with this person. Remember, he or she has invested time in you and they will want to know if their investment paid off. If you have followed up on any of their advice, let them know that their suggestions were helpful or you enjoyed meeting with someone they suggested you reach out to. Let them know if you have a meaningful success, such as you obtain an internship position, take on a leadership role, or land a new job. If you come across something that would be of interest to them such as a news article, a book, or a speaker who will be on campus, let them know. Congratulate them on a recognition, promotion, or publication. These "touches" help to reinforce the relationship and let them know you are thinking of them.

Testing Your Interest

In *Working Identity* (2003), business professor Herminia Ibarra, Ph.D. presents a model for career change based on her study of 39 successful professionals who changed careers at mid-life. Despite the diverse careers and industries of the professionals she studied, Ibarra found a common thread among them. Before they switched careers, they had all tested their interest in some (often small) way before making the leap. Through these "experiments," as Ibarra called them, the career changers learned new things about themselves and made new connections that helped them take steps toward assuming their new professional identity.

Although Ibarra focused on mid-life career change, we think the observation that Ibarra discovered is critical for all career decision-makers: you gain confidence in your career choices by testing your interest in those careers in small ways. Ideally, you would start with activities that are a lower investment of time so that you can explore different careers expeditiously and focus more time-intensive activities on the most promising options for you.

- **Volunteering:** Lending a hand can help you get a feel for a particular industry or organization, while also building your experiences and growing your network.

- **Job shadowing:** You can arrange to spend one to three days with an individual who is in a career that interests you. This gives you the opportunity to see what a day in their life looks like, the kinds of tasks they spend their time doing, and what the work environment is like.

- **Company visits:** Depending on the company or organization, you may be able to participate in a tour and meet with individuals who are employed there.

- **Meet-ups (www.meetup.com):** A variety of meet-ups may be available in your community where you can meet others who share your interests in a particular career area or industry that you would like to explore further.

- **Webinars:** Increasingly, professional societies are offering free or low cost webinars to their members. For example, the American Association for the Advancement of Science, **www.aaas.org**, offers numerous webinars on a variety of technology and career-related topics. Test your interest from the comfort of your computer!

- **MOOCs:** Massive Open Online Courses are available for you to take for free from top universities and educational organizations (e.g. Coursera, **www.coursera.org**, Udacity, **www.udacity.com**). These classes can enhance your knowledge and understanding of a subject or career area, such as project management, finance or programming, among thousands of other topics.

Skill Building

As you narrow your focus to a few viable career paths, you can start to invest more time and energy in the activities you choose and make a concerted effort to develop skills that will make you a stronger candidate for the position you will seek. The line between activities that qualify as "testing you interest" and "skill building" blurs a bit as you invest more time. Thus, while a Massive Open Online Course (MOOC) may help you explore a career area to determine if you like data science, for example, you will no doubt also gain valuable skills and experience which will strengthen your resume. Other possibilities for skill building include:

- Audit a course at your institution. Similar to participating in a MOOC, you can learn more about a subject area that interests you.

- Take a short course offered by a professional organization or industry group. For example, the **American Chemical Society** (**http://www.acs.org/content/acs/en/careers.html**) offers short courses on a range of topics from drug design and lab management to intellectual property management and project management. Seek out the professional organizations and industry groups in your career area of interest and see what they have to offer.

- Internships: Some organizations and industries are open to hosting interns, so it is always worth inquiring about this possibility. This may be through a formalized internship program that the company offers for 10 weeks during the summer, or it may be something that you set up on your own through a contact you have. These opportunities can take many forms (part-time, full-time, paid and unpaid, etc…) but internships are among the best ways to gain valuable experience.

Networking

The term "networking" often gets a bad rap, and some people wilt into a sweaty mess just thinking about it. Other individuals perceive networking as an inauthentic, exhausting and time-consuming activity that people do only when they need something from someone. However, networking is really just about relationship building. Two important ways to making networking more enjoyable are to build your network before you need it and to try to find ways to give first.

Build your network before you need it.
Relationships take time and repeated positive interactions to develop. Your networking efforts should be an ongoing, normal part of your everyday activities, not just something you start doing when you need something from someone.

Every week you have multiple opportunities to build and strengthen your network. Attending your departmental seminar, having lunch with the other postdocs in your lab, offering to help teach a new trainee how to use a piece of equipment, chatting with your neighbor while walking your dog, volunteering to help with a committee, and playing on an intramural softball team are all opportunities to strengthen relationships and meet new people. If you start keeping track of how many "networking" activities you do in a week, even the biggest introverts might be surprised at how many things you are already doing that build your network. You might also consider taking a look at how many opportunities you may have missed and see if you can be more effective in the future.

Determine how you can help someone else and give first.
When you first meet someone, focus on **what you can offer them,** not on how they can help you. Think about who you know that they might like to meet or what resources you may know of that could be helpful to them. If you offer something of value to someone, they are most likely going

to be eager and willing to help you later — whenever that may be. You never know how someone you meet during one season of your life may play in to your life at a later point.

Who is already in your network and how can you grow your network?

Your network is made up of all of the relationships you currently have. This includes family members, friends, colleagues, alumni from your education and training institutions, parents of children in your child's school, colleagues you meet at professional conferences, and many other individuals you have met and interacted with over the years.

It is important to nurture the existing relationships you have through a series of positive interactions. Some of this can be deliberate or strategic and some can be more organic, but all should be authentic and genuinely motivated.

To grow your network, take advantage of opportunities to meet new people. Prepare a brief "elevator pitch" so you can smoothly and succinctly explain to others what you do, why you do it, and how it might relate to them. It is always good to have several versions of this quick 30-60 second summary designed for a variety of audiences.

Also, be a good listener and ask engaging questions to find out what motivates and excites others, what they need help with, as well as their hobbies and passions. Think about what you have to offer and be generous with your time and ideas. You may have more than you realize, including access to your current network, your knowledge, expertise, and experiences, as well as access to your *future* network. Make sure you follow up with new acquaintances after meeting them, and keep them in mind in the future. For example, send an e-mail note when you see an opportunity that might be of interest to them (e.g. a news article, visiting speaker, or upcoming conference). Invite them for lunch or coffee to catch up, congratulate them on a recent publication, recognition, promotion or new job.

Unique opportunities as a postdoc

As a trainee, you have unique opportunities to grow your network. Your postdoc period is a great time to meet new people, ask for information, and seek out mentors because most people are excited to help others coming along behind them; they can relate to when they were "in your shoes" and they are eager to pay it forward.

Moreover, at this point you aren't expected to have as much to offer "in trade," and it is completely acceptable to simply seek someone out for advice or their opinion. This makes others feel valued and is a great way to build your network.

Informational interviews

Informational interviews may very well be one of the most powerful networking tools at your disposal, especially at this stage in your career. As described earlier, these are meetings you set up with someone who is doing something that interests you so that you can learn more about their work. The benefits are numerous and

since you aren't asking for a job, all the pressure is off. If you make a good impression, they may try to help you by connecting you to resources and other people who can help you.

Invite someone to speak at an event

This is a fantastic time to take advantage of campus groups like clubs, departments, trainee organizations and career offices who may have budgets to bring people in to speak. Take advantage of this as an opportunity to identify someone you would like to meet. Often, you will have the opportunity to invite them, participate in coordinating their visit, and share a meal with them, among other activities.

Get involved in your community

There are a variety of clubs, committees, professional organizations and volunteer opportunities available to you as a postdoctoral fellow. Participating in these organizations and activities, especially in a leadership role, is a great way to gain transferrable skills and to network with your peers who will eventually be in important positions in academia, government, industry and Nonprofits.

Professional meetings

Attending professional meetings isn't just about presenting your research. Conferences are also a wonderful opportunity to meet new people who may become collaborators, mentors, and advocates for you and your work later in your career. Be sure to take full advantage of these opportunities by going prepared and setting up meetings with individuals of interest ahead of time. When you are attending meetings in other cities, this is also a great time to set up informational interviews with professionals in various local industries.

Getting Stuck in the Career-Decision Making Cycle

Some people embark on the process of self-assessment and career exploration expecting it to reveal the "perfect job." If it is not revealed, they dive back into the solitary activities of self-assessment and passive career exploration. In reality, the "perfect job" is more elusive than the Tooth Fairy and no job will be 100 percent satisfying, 100 percent of the time. Instead of getting stuck in the "think" phase of the career-decision making, it's important that you *do* something to test your interest in promising career paths (Ibarra, 2003). Only through action can you have new experiences that will reveal new information about yourself or the career paths available to you.

Related to the idea that action is required to move forward in your career decision-making, a big limitation of self-assessment is that it relies entirely upon our past experience. How do we know if we are skilled at something before we try it? It's easy to overlook interest in a career that we don't

know exists. And we often don't realize we value something in our work until we don't have it, or until we have too much of it! Again, taking action and having different experiences can help us discover new things about ourselves (Ibarra, 2003).

Finally, a word of caution about values, which are a critical piece of the career satisfaction puzzle. Often we are compelled to embark upon career change because our work is not satisfying a particular thing we value. For example, an oft-cited reason people leave research is lack of work-life balance. If you find yourself compelled to change directions for one or two discreet reasons, proceed with caution so you don't focus singularly on those values at the expense of other things that are important to you. At worst, it could lead you to make a hasty choice that turns out poorly. More likely, though, it could cause you to discount promising opportunities prematurely. When assessing the potential work-life balance of other career paths, for example, make sure you know how the people you're talking to define work-life balance. For them, a strict 8-hour day with no evening or weekend work may constitute "balance," whereas you would be content with a 9-hour day and the occasional evening or Saturday work.

Summary

Your postdoctoral training period is an ideal time to develop skills, experiences, and relationships that will help you transition to the next stage of your career. Early in your postdoctoral training, it is important for you to focus on getting your research project rolling and learning new skills and techniques that will ensure your success in this position. At the same time, it is important that, as a trainee, you begin to prepare yourself for the future. Career exploration and preparation can be thought of as a continuum in which you can engage in less time-intensive and involved activities earlier in the process, and as you identify a few key career paths of interest, you can move to participating in activities that are a greater investment in your time and energy (Figure 3.2).

Figure 3.2. Continuum of career planning and preparation activities
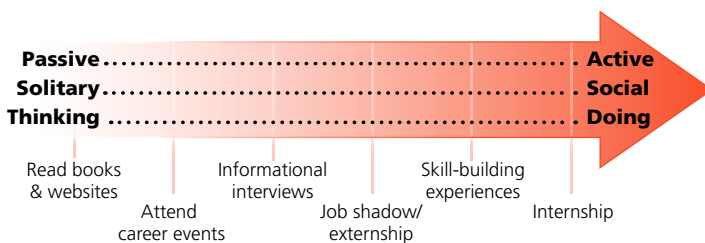
Source: Petrie, K. Vanderbilt University School of Medicine Office of Biomedical Research Education and Training, ASPIRE to Plan module, Fall 2014. https://medschool.vanderbilt.edu/aspire/aspire-plan

At the left hand of the spectrum are activities that are more passive, solitary and thinking-focused, such as reading books or websites and attending career events at your institution or at conferences. Arranging informational interviews is a great way to learn about various careers while also building your network. As you being to pinpoint specific career path(s) you would like to pursue, you move rightward on the continuum toward activities that are more active, social, and doing-focused. At this stage, career exploration transitions to career preparation and you can seek out more experiential opportunities such as job-shadowing and internships, as well as identify skill-building opportunities that will help you to be more knowledgeable and competitive once you embark on the job search.

Regardless of your long term career objectives, it is imperative that you be successful in your post-doctoral research and take advantage of the many opportunities that are available to you during this time. The diverse skills you develop and experiences you encounter during your postdoc will help prepare you for your next position – whatever it may be!

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CHAPTER FOUR

Beyond Graduate School

Joe Sostaric, Ph.D.

This chapter is geared toward providing advice on the approach that you can take as a woman postdoctoral scholar in preparing for your career, with an emphasis on how that can be achieved by interacting with your professional society. The focus in this chapter is slanted significantly toward advice on how to prepare for and succeed in academic jobs, industry and government careers, and in relation to the resources available through the American Chemical Society (ACS) (**www.acs.org/**). Even so, this advice should be just as applicable to other STEM fields. A group of interest to women postdocs at ACS is the Women Chemists' Committee (WCC) (**http://www.womenchemists.sites.acs.org/**), which serves the membership of ACS. Even if you are not an ACS member, or a researcher in the chemical sciences or chemical engineering, I would urge you to take the time to learn about what the ACS WCC is doing to help promote women chemists in education and in the workplace. This may help spawn ideas for how you can interact with your scientific society, and with the professionals in your specific field of interest.

Ultimately, your career success depends on your willingness and ability to carve out the time from your busy schedule to improve your understanding of the career opportunities that exist, and your non-technical knowledge and skills. This includes gaining an understanding and appreciation for how your **knowledge, skills,** and **values** fit with the expectations of future employers and future career roles, which are almost exclusively different to those expected of you as a postdoctoral scholar. Here you will find advice developed from the experiences and knowledge of

If you have not already started to do so, you should be actively building a valuable professional network.

one manager working in the ACS Graduate & Postdoctoral Scholars Office (**www.acs.org/grad**). In that sense, the advice is limited in scope, especially when compared to the incredible breadth, wealth, and years of knowledge and experiences available through the 158,000+ members (as of December 2014) of ACS. If ACS is not your scientific society, consider how many members make

up your scientific society, and the wealth of knowledge that may be available to you as a member of your scientific society.

This chapter represents only a snippet of the information that would otherwise be available to you through a robust professional network, and a thorough knowledge of resources available to you, and it should by no means be considered a comprehensive career-preparation guide. If you have not already started to do so, you should be actively building a valuable professional network. I hope that you find the current chapter a useful addition to the multitude of reputable sources on career advice for early-career scientists, and in expanding your ideas on how to approach your career planning effort – something that I consider a career-long process. Please keep in mind that, just like any advice that you may receive on any endeavor, you will have to decide on its value, accuracy, and relevance to your situation.

Examining Careers for Ph.D. Chemists (and other scientists)

Jobs in Academia, Industry, Government and Nonprofit Organizations

You may be aware of the general notion that jobs differ significantly from industry, academia, and government. You may also be aware of the larger number of scientific societies and other associations that exist (see the list of societies and association listed in this guidebook), and which may offer good opportunities for postdoctoral scholars looking to transition into a program management or management role. For example, see the American Society for Association Executives website (**http://www.asaecenter.org/**) to get an idea of the number of associations operating in the United States and internationally. It is true that there are, in general, significant differences between industry, academic, and government jobs, but there can also be some similarities. This section attempts to outline some of the different types of jobs that exist in each sector, but does not make any attempt to describe the types of differences between the different sectors of which you need to be aware, in order to successfully apply for and succeed in the variety of positions available. This shall be tackled in the following section. The ACS College to Career website (**http://www.acs.org/content/acs/en/careers/college-to-career.html**) provides information on jobs of relevance to students in the field of chemistry. Some of the information contained there will be of relevance to some postdoctoral scholars. If you are not working in the chemical sciences, you may want to see what your scientific society has to offer.

According to the "NSF (NCSES) Survey of Doctorate Recipients, 2013" (Table 12), (**http://ncsesdata.nsf.gov/doctoratework/2013/**) published September, 2014, 49 percent in academia, 27 percent of doctoral scientists were employed in business/industry 10 percent in federal/state/local government, respectively, while 14 percent were either self-employed, working for nonprofit organizations, or were employed in some other area. Clearly, the vast majority of jobs for scientists (76 percent) are found in industry and academia. However, considering that the majority of the 49 percent jobs available in academia includes postdoctoral positions, adjunct faculty, and

other, non-tenure track research positions, there is an extremely high level of competition for the relatively small number of tenure-track faculty positions in the United States. The values described here are specific to science jobs in general. The same table breaks down these job statistics by scientific field. For example, in the general field of chemistry, the majority of chemists are employed in industry (51 percent), with those employed in academia making up only 34 percent (again, this 34 percent includes all non-tenure track positions available to Ph.D. chemists, including postdoctoral positions). Therefore, in the field of chemistry the vast majority of jobs that could be considered a full time, permanent position, rather than a postdoctoral position are overwhelmingly greater than the number of tenure-track faculty positions available to doctoral chemists. You may wish to review the data in Table 12 to get an idea of the distribution of positions occupied in your field in 2013.

Academic Jobs

From a purely statistical perspective, opportunities for tenure-track faculty positions in the field of chemistry are significantly lower than opportunities for chemistry jobs in industry. This statement is not meant to discourage anyone from following their career aspirations, which I would strongly encourage anyone to do, but rather to encourage you to be prepared for the possibility that you may not be able to land the academic job of your dreams, purely from the statistical reality that there are not enough tenure-track positions available to accommodate the majority of postdoctoral scholars in your field. Early in your postdoctoral training it would be valuable to consider what other types of opportunities exist that could fit with your career aspirations. Whether or not your focus shifts to jobs outside of academe, the experience and knowledge you gain by going through the process of considering careers outside of academia will undoubtedly serve your future graduate students and postdoctoral scholars well, when one day you become a tenure-track, and eventually tenured faculty.

To be competitive for tenure-track academic positions means more than having a polished application package. You also need to have a strong understanding of the different types of higher education institutions, the history and culture of the institution, and the expectations of the position and the department where you are applying for the job. This is not as obvious as it seems, and every year we meet postdoctoral scholars who attend the ACS Postdoc to Faculty workshop (**www.acs. org/p2f**) who have surprisingly scant knowledge of the items mentioned above.

From Postdoc to Faculty

The Postdoc to Faculty workshop is managed by ACS and supported by volunteer faculty from a variety of institutions, including two-year colleges, primarily undergraduate institutions, and research intensive graduate degree granting institutions. Volunteer representatives from funding agencies, include NIH, NSF, Research Corporation for Science Advancement, and the ACS Petroleum Research Fund also support the workshop. Workshop attendees are exposed to a variety of interactive teaching pedagogies; they learn about the variety of higher education institutions in the

United States, along with the expectations of faculty at those institutions. Additionally, participants learn about expectations when applying for funding for their research, and gain invaluable advice on academic job applications and on the interview process. The workshop is also a great networking opportunity, and postdocs, faculty, funding agency representatives and ACS staff all gain a great deal from the experience.

Although the Postdoc to Faculty workshop may not be available to you, there may be other ways in which you can gain similar information. Consider developing a stronger relationship with your advisor and/or other faculty in your department, and even with those faculty in your field of research, to gain insights on expectations at their institutions, and to expand your network beyond the faculty who you know directly. You have access to a wealth of information, and finding a way to access it is critically important. It is also of critical importance that you find good career advice. Check with your institution's career center to learn about seminars and other resources that may be available to help you prepare a competitive application package and to polish up your interview skills. I'm surprised at the number of early-career scientists that I meet who simply refuse to return to their institution's career center because they consider it too focused on non-STEM careers. I would argue that the fundamental knowledge and skills related to preparing good job application materials, and preparing for academic and non-academic job interviews are readily transferable across fields (STEM fields or otherwise). With the knowledge and skills in hand, it is significantly easier to tailor your application package and interview plans to your particular field.

Researching Your Career Options

Tapping into the resources available to you through your scientific organization is another great way to improve your job search skills. For example, the ACS Graduate & Postdoctoral Scholars Office regularly publishes articles providing career advice in the *ACS Graduate & Postdoctoral Chemist* e-magazine (www.acs.org/grad). Examples of relevant articles include, "Writing the Research Plan for your Academic Job Application" by Prof. Jason G. Gillmore of Hope College (http://www.gpchemist.org/graduateandpostdoctoralchemist/september_2013?pg=10&search_term=research%20statement&doc_id=-1&search_term=research%20statement#pg10), and "Six tips towards writing an effective teaching statement," by Prof. Melanie Cooper of Michigan State University. The ACS Careers website (www.acs.org/careers) likewise offers academic career advice to ACS members through our "ACS Career Pathways" series, along with one-on-one career mentoring with volunteer career consultants, some of whom are in academia.

Consider searching for career advice through other, reputable sources, such as the career departments of other universities. You'd be surprised how much information is freely available.

*Science*Careers (**http://sciencecareers.sciencemag.org/career_magazine**) offers a series of career preparation articles and resources, and I would urge you to spend some time reviewing their website. Other online sources of career and education information include Academic Keys (**http://AcademicKeys.com**) and *The Chronicle of Higher Education,* (**http://Chronicle.com**). As you can imagine, reviewing the websites provided in this chapter would itself require quite a time investment. Consider the time investment required to properly prepare for your career.

Institution types and your fit

As you embark on your academic job search, you will have to assess your knowledge and skills and determine how well they fit with typical academic job requirements, such as research, teaching, mentoring, applying for external funding, general administration, and service to your institution and society. Likewise, you will have to assess whether or not the culture that exists at a particular institution is a good match with what you value (more on culture in a later section of this chapter). When assessing institutions for higher education in the United States, it is critical that you be aware that there is a spectrum of different institution types, generally classified on their size, the amount of scientific research being done, and the teaching and/or service work load. One such classification system is **The Carnegie Classification of Institutions of Higher Education** (**http://carnegieclassifications.iu.edu/**). I would urge anybody interested in applying for an academic position in the United States to have a thorough understanding of the incredible diversity of higher education institutions here, and "The Carnegie Classification" is a good starting point. This should be followed by a thorough review of your preferred institutions' websites, and informational interviews with any faculty member, postdoc, student, or administrator that would be willing to talk with you.

At the very least, it is important to have an understanding that large-, mid-, and small-sized research intensive institutions offer graduate degrees; primarily undergraduate institutions (PUIs) which may or may not have research programs; liberal arts colleges and two-year colleges. It is important to understand, for example, that PUIs with research programs generally have fewer resources (such as lab space, administrative support, and funding) compared with research intensive, graduate-degree granting schools. In addition, research programs at PUIs generally require scientific research support in the laboratory from undergraduate students, and rarely is there money

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ACS Academic Employment Initiative

The Academic Employment Initiative (AEI) is the American Chemical Society's signature event for postdoctoral scholars in the chemical sciences and chemical engineering who are seeking to network with faculty whose departments are currently searching for new faculty candidates. Held at every fall ACS national meeting, participants gain advice on how to network with recruiting faculty prior to a networking poster session, while recruiting faculty learn about participants by reviewing biographical sketches that are posted online prior to the event.

For more information visit www.acs.org/aei

available to hire a postdoc. None of this is a "bad" thing. However, it would not be good if you were not able to assess your level of satisfaction as a tenure-track faculty at a large research intensive institution, with a PUI where you could run a successful research program – showing a lack of understanding in a job application, or during an academic job interview would go over well. Smaller liberal arts colleges, and two-year colleges also offer great career opportunities, especially if your focus is leaning towards teaching and service to the community.

Clearly, an application for a tenure-track or other faculty position at any one of these schools is going to look different, but so will an application submitted to similarly classified institutions in different locations, with their own unique histories, and specific cultures, both institutional and within the specific department. You can only determine this information by doing your research on the institution online, and by talking to as many people with knowledge of the institution and department as possible

Industry Jobs

As described above, the majority (51 percent) of doctoral chemists in the United States in 2013 were employed in for-profit companies. As a doctoral chemist or STEM postdoc, there is a good probability that you may end up in an industry role. Consider reviewing the "NSF (NCSES) Survey of Doctorate Recipients, 2013" data mentioned earlier to see how this compares to your general field of research. Even if it is not your primary aim to gain a position outside of academia, the data suggests that it would be in your best interests to learn about the types of jobs available outside of academia, that best match your knowledge, skills, values and interests. Going through this process may also broaden your understanding of jobs outside of academia and introduce you to jobs and career pathways that may be a very good match with what you currently envision as your ideal career path.

The diversity of jobs available to you in private, for-profit companies is broad. In the field of chemistry, industry jobs for postdoctoral scholars may start off at the bench as a senior scientist or similar role, from where your career path can progress along a scientific research role, or through a scientific management role, within your field of research. However, depending on the size, type, and needs of the company, there may be opportunities to transition out of your specific field of research, and into other job functions. If you think that you might be interested in transferring your skills to other job functions sometime in the future, you may wish to ask whether such opportunities exist during your job interview. Specific job functions where your scientific knowledge may be of value include marketing and sales, strategic planning functions (including acquisitions and mergers), managerial accounting, supply chain and/or operations management, product manufacturing roles including quality control and regulatory roles, HR functions such as recruiting, and IT-related roles.

Preparing for life after graduate school

The Preparing for Life After Graduate School workshop (**www.acs.org/gradworkshop**) offers information on finding, applying for, and succeeding in your first job in academia, government, and industry, with a focus on industry jobs. The workshop is geared towards graduate students and postdoctoral scholars in the chemical sciences and chemical engineering, however much of the information provided is transferable to other STEM fields. ACS Careers (**www.acs.org/careers**) also has a variety of information on industry jobs available online to both members and non-members of the society.

The **Preparing for Life After Graduate School workshop** (www.acs.org/gradworkshop) offers information on finding, applying for, and succeeding in your first job in academia, government, and industry, with a focus on industry jobs.

Finding industry jobs

Another good source of information on industry jobs are large company websites. These generally have a FAQ section, and a way of contacting the company with specific questions. Both of these avenues, along with regularly looking at the posted jobs and descriptions are good ways to gain preliminary information on the types of jobs available. As you may be aware, larger companies conduct recruiting events at educational institutions and at scientific meetings. These offer excellent opportunities for you to meet and hopefully connect with company representatives who might be your best source of information on the types of positions available to postdocs in their companies. Also consider reaching out to members of your network, especially faculty you know who may already be connected with industry professionals in your field. A good approach would be to ask if you could conduct a brief, 30 minute informational interview to learn more about the types of opportunities available to postdoctoral scholars, and the type of culture that exists in the organization. Searching the web for "informational interviews" will lead you to a variety of resources online, from where you can choose those of most relevance to you.

Other exercises that can be useful in discovering the types of jobs available in industry have included subscribing to an industry specific professional magazine (for chemists, ACS *Chemical & Engineering News*), learning about the types of industries classified by the Bureau of Labor Statistics (**www.bls.gov/iag/tgs/iag_index_alpha.htm**), and other reputable business databases which may be available to you free of charge through your university library. A search of industry sectors at http://biz.yahoo.com can provide a large list of companies which may be relevant to your job search, quickly exposing financial data that can allow you to assess the company's financial status – this should also be an important consideration in your job search, and assessed against your short and longer term goals.

Expectations for applying for industry jobs can be significantly different from those of academic jobs. You may have heard that for industry jobs, you would typically submit a cover letter and a résumé, rather than the cover letter, CV, and research and teaching statements typically required

for academic positions. The reasons for this stem from the broad differences in culture between the two sectors (see the latter section of this chapter). To make a few generalizations regarding job applications in industry vs academia, for industry jobs, you will find that there is less emphasis on your individual scientific and academic achievements, relationship with your advisor, and number of scientific publications in your name. Instead there is a greater emphasis on your understanding of the job description and how that fits with our knowledge and skills, evidence of strong interpersonal skills, and evidence of your time management and organizational skills. Indeed, there may or may not be an expectation that you provide references with your job application (it's generally not required), and it is more typical to provide phone numbers of your references after a promising round or two of interviews. Your references can (but need not) include your advisor, and just as importantly can include fellow postdoctoral scholars who can talk to your interpersonal skills; graduate and undergraduate students who may be able to talk about certain leadership traits, and scientific collaborators who can talk to your research skills and ability to work in an expanded team. Ensure that you are clear on the expectations for that job to which you are applying before you apply, since providing a CV with a long list of publications and conference presentations may show a lack of understanding about these expectations, and may be a non-starter.

There are a multitude of websites providing advice on how to prepare a cover letter and résumé. Sticking to reputable resources including ACS Careers (**www.acs.org/careers**), AAAS Careers (**www.aaas.org/careers**), any reputable career center at a U.S. higher education institution, including your own institution's career services office, will ensure that you can create a compelling case for your industry job application. Resources for improving your interview skills can also be found at the above internet sites. ACS national meetings (**www.acs.org/meetings**) offer attendees free one-on-one résumé reviews and practice interviews by highly experienced career consultants and it is worth attending such meetings just for this benefit alone.

Government Jobs

Government jobs provide a real mix of opportunities, and include basic scientific research jobs that have many similarities to tenure-track faculty positions (minus the teaching and applying for grants), and offer a variety of administrative positions that would be of relevance to STEM postdocs. Visit www.science.gov to identify the multitude of government agencies where scientific jobs may exist. Also search **www.USAjobs.gov** for relevant positions. Be creative with your search terms at this website. For example, searching for your field of research is one strategy, however you may also want to conduct a search for the types of skills that you have to offer. For example, do you think that you would be interested in a "program management" role? Although these types of positions usually require a "Program Management Professional" or other certification, most postdoctoral scholars with excellent organizational and time management skills, and a good understanding of MS Excel (and eventually relevant project management tools, such as MS Project), would excel in such a role. Consider also doing an extensive search for jobs at the GS-13 pay scale level (at a minimum for your level of experience), in your preferred geographical location. Such a

search may return a large number of positions, but taking the time to review such a list, and read job descriptions that look relevant to you can be a very valuable exercise.

You can also obtain a complete list of U.S. federal government agencies at **www.usa.gov/federal-agencies/a**. Although it would take a while to do so, consider investing some time to learn about the federal agencies, and the types of jobs that may be available. For example, did you know that the FBI has a need for doctoral chemists and other scientists to work on quite complex problems? Or that the Food and Drug Administration has regulatory positions for postdocs from a variety of STEM fields. Note that the vast majority of U.S. government jobs are available only to U.S. citizens. When you identify the type of agency that may be of interest to you, you can always go back to the **www.USAjobs.gov** website and search for agency specific jobs.

The vast majority, if not all, federal U.S. government job applications are administered through the www.USAjobs.gov website. Expectations for individual applications vary, and should be thoroughly reviewed before attempting to submit an application. Occasionally, the job description offers the contact information for the person who is coordinating the process for the given job, and it can be a good idea to contact this person with any questions or guidance that you may need, prior to submitting your application. Although the direct contact person may not know the answer to your question, they will forward your request to the hiring manager and you are more than likely to receive a response. However, it is important to get an early start. As you view the **www.USAjobs.gov** website, you will come across certain positions that seem to have a relatively short open period. Although I have never been able to confirm the reason for this, I have heard that this could mean that there is already a candidate, or candidates of interest for the position. This does not mean that your application will not be considered, however it may be a guarantee of strong competition for the position (if you find out the reasoning for these short open periods, please let me know!)

A final tidbit that I would like to share regarding any federal or state government position, is that you should be able to readily understand what salary you can expect when being hired. Salary scale information for federal government jobs is openly available on the **www.OPM.gov** website (search for "2014 General Schedule (GS) Locality Pay Tables"), and you should take the time to familiarize yourself with these scales, if you have not already done so, along with "locality adjustments," and the "step-wise" increase in salaries that occurs with years of experience or in-grade promotions. If you know of people who work for a federal government agency, you can readily review their salary information online, and this can give you a great idea of the type of salary on offer, especially if you understand the number of years of experience that the employee has, and any promotions that they may have received during this time. This information can be found at **www.fedsdatacenter.com**. If you have trouble finding 2014 information, try reviewing 2013 information.

There are varying views on whether or not such data should be available to the public. I'm providing the information here because I feel that every jobseeker should be aware that such information

exists (and not just a select few), and I will reserve my opinion on whether or not one should access and use this information. I will add that such data is also available for state government agencies (take the time to do a web search of this if you are interested). Additionally, scientific societies may provide additional guidance on salaries in general, and not just for government jobs. The ACS salary calculator (**www.acs.org/salary**) is a great tool that regularly reminds me of my worth! Available only to ACS members, use this tool to get an idea of how your salary should compare to your peers for a given set of circumstances in typical chemistry jobs. As a woman postdoc, you may be aware that the average salary of women in the workforce is generally lower than that of men in similar positions. Using these and other tools can help put you in a better salary negotiation position, and help mitigate this trend.

Networking can be one of the best ways to gain a deep understanding of job types and availability in industry. It can also be of value to carefully review and understand job descriptions available on job sites. The ACS posts advertised jobs through its Chemical and Engineering News magazine, and these jobs are accessible through **www.acs.org/jobs**. Industry job postings can also be found at your target company's website, and through other scientific associations. As you learn about the types of jobs and job-levels appropriate to your years of experience, and how the job description matches what you have to offer to a certain role, you may wish to venture off onto more general job sites to see if you can find jobs and job descriptions that fit your knowledge, skills, values and interests, but may lie outside of your specific field of research. Doing this can be long, but very rewarding and eye-opening experience. You can gain more advice on how to go about doing this from the professional career experts at your institutions career services office.

Association Management Jobs

This chapter would not be complete without mentioning association management jobs. As a post-doctoral scholar, you have developed skills and knowledge that is readily transferable to roles within association management. Below I share the types of positions that are regularly advertised at ACS (**www.acs.org/about**), consider similar roles at associations that are involved in similar product and service offerings. Within the ACS Publications Division, you can see jobs advertised for "managing editor" positions. These positions are an appropriate entry point in publications for postdoctoral scholars. The role involves managing the journal editing process, which includes tasks such as managing the manuscript review process, organizing meetings between the editor and the editorial board, varying levels of budget responsibility, and occasionally supervising support personnel. Keep an eye out on the ACS internal job section at www.acs.org/about for this type of job.

Other jobs that are of relevance fall in the "program management" and "management" areas. Program management jobs (non-IT) are related to managing complicated processes that ensure the delivery of a specific service to the customer(s). For example, picture an event such as a workshop that needs to be developed, promoted, requires an application process, communication with a significant number of consultants, volunteers, applicants, hotel management and catering staff, and

add to this the responsibility of having to manage a program budget, and another such program! This should give you an idea of the complexity of the program management role. These types of jobs may or may not require certification as a Program Management Professional (PMP), and this will be clearly mentioned in the job advertisement. Most postdoctoral scholars during their training have developed the skills necessary to excel in such a role. You will also see "Management" roles advertised at ACS, and these roles may have some similarities to the program management role, but will invariably require a higher level of responsibility, including the management of staff, an office-level budget (rather than a program budget, for individual programs), strategic planning responsibilities, and occasionally the management of an ACS Committee. On a final note, the Chemical Abstracts Service (a division of ACS) is the world's leading authority on chemical information and also has a variety of positions available that would be appropriate at the postdoctoral level. Such positions include roles that require a knowledge of two or more languages, in addition to a science background. Visit **http://www.cas.org/about-cas/careers** regularly to seek for relevant positions.

Understanding Critical Non-Technical Skills

The broad differences between jobs that exist in the different sectors mentioned above depend on an innumerable combination of factors. Since they are not only sector-specific, they also depend on the size and type of organization within any one of the specific sectors, and are even dependent on the people leading, and working for the particular organization, or unit within an organization in that sector. Taking industry jobs as an example, being a senior scientist at a small chemical start-up firm trying to bring a new technology to market, where long hours, a focus on creative scientific discovery, direct customer interaction, and being a jack of all trades might be welcome, will be very different to a senior scientist at a large, multi-national firm trying to create incremental improvements to the formulation and marketing of its signature skin care product, where implementation of leadership plans and communication of product value across company departments would be of greater importance. It is critical to have this level of understanding before even attempting to construct a coherent application for either job, since this will dictate the level of non-technical skills required to succeed in each role.

Understanding organizational differences

To try to gain a handle on the expectations at different organizations within a specific sector, it can be of value to categorize the differences, and then embark on a mission of filling these categories with information that you can find from your own research into the organization. This is true whether the specific organization is a company, an academic institution, a federal, state, or local government agency, or an association. I have found the following two categories to be very useful in researching specific jobs within the different sectors: 1) The goal of the organization, and the objective of the role within the organization. 2) The culture of the organization, and even the micro-culture that is formed within the specific unit or division in which the role resides. Using

these two categories, it should be intuitive why certain differences exist between jobs in industry, academia, government, and associations. However, the exercise is a little more nuanced when comparing organizations within a sector, and even similar organizations within a sector.

Organizational vision, mission, and goals

The information that you will need to fill the two categories noted above can best be obtained by reviewing the company's website, reviewing the company's annual report, tapping into your professional network, seeking information from your institution's career office, and your scientific society. The process of filling the two categories above with information can start with a simple question. For example, asking the specific question, "What is the goal of the organization?" should set you on the path to researching the organization's vision, mission, and the strategic goals to attain its mission. This is extremely important. For example, it should be intuitive that it would not be an effective approach to interview for a laboratory management role for a large for-profit organization, and talk exclusively about your great research and teaching accomplishments – this would be more appropriate (but by no means sufficient) for an academic job interview. A better approach for the for-profit company will be to focus on the specific for-profit needs of the company, and show a strong understanding for how your knowledge and skills will fulfill the specific role requirements, which will invariably include strong evidence for experience and understanding of working in and leading teams, managing a budget and business unit, and ensuring continual alignment between your unit and the organization's goals. The interview may be more focused on your ability to run an effective research team that is working in alignment with the goals set for the marketing and sales teams, to ensure that the right product is developed and effectively marketed and sold. Essentially, you will have to show that you understand how to communicate and work with people up, down, and across the leadership structure.

> *A better approach for the for-profit company will be to focus on the specific for-profit needs of the company, and show a strong understanding for how your knowledge and skills will fulfill the specific role requirements, which will invariably include strong evidence for experience and understanding of working in and leading teams, managing a budget and business unit, and ensuring continual alignment between your unit and the organization's goals.*

The goals of the organization and indeed the specific unit in which the role exists, along with the people leading the organization and unit help shape the culture that exists within the organization and unit. It is critical to have an understanding of the culture in the organization/business unit, and to try to ensure that the culture which you are entering will be

conducive to the cultural environment in which you are more likely to succeed. A more in depth description of the broad cultural differences between industry jobs and academic jobs is described in, "Behavior in an industrial culture: Not everything, but maybe the main thing," and I urge you to read this article (**http://www.acs.org/content/acs/en/education/students/graduate/newsletter/ behavior-in-an-industrial-culture-not-everything-but-maybe-the-main-thing.html**).

However, it is also important to recognize that cultural differences will also exist between organizations in the same specific sector. In the industry example provided above, for the small start-up company compared to the large multinational firm, *what cultural differences might exist?* Even similar companies within an industry may have significant cultural differences, and you would need to be aware of these to ensure that the culture at the particular organization and within the unit is a good fit with your values. A more in depth look at organizational culture is beyond the scope of this chapter, however you may wish to search for reputable sources of information on this subject on the web. You may also wish to learn about "organization climate," which measures how employees experience the culture in their organization, as this leads to the importance of making an effort to ensuring that the organizational culture is a good fit with your values.

Summary

This chapter, by no means represents a comprehensive or exhaustive set of career preparation ideas. It is hoped that it has helped spawn ideas on how to approach and fulfill your career preparation needs and goals. The best way to get career advice is to depend on a strong professional network, have a willingness to invest time in the process, start now and never stop – it really is a career-long process. To receive help and advice, the first step is to recognize that you have a need, and the second step is to ask. Ironically, what seems to be the worst that can happen when you seek help and advice (i.e., an answer of, "I can't help you with that"), is also one of the best answers that you can get since it can help you define the make-up of your professional network. Career preparation requires time and effort, but making this investment can have both financial and personal benefits beyond what hard work at the bench alone will deliver. Good luck on your career path!

* Please note that the American Chemical Society does not endorse any products or services. The views expressed in this chapter are those of the author and do not necessarily reflect the views or policies of the American Chemical Society.

Work-Life and Childcare Resources for Postdoc Women

Janet Bandows Koster, CAE, MBA, and Cynthia L. Simpson, CAE, M.Ed.

The demands between the workplace and workers' private lives often results in a tug-of-war as individuals struggle to find satisfaction in both areas. A vast amount of research exists regarding work-life issues and there are numerous lists of best practices and recommendations which cover such issues as flexible workplace structures, onsite child care centers, and the importance of travel awards/grants. The demands between the workplace and workers' private lives often results in a tug-of-war as individuals struggle to find satisfaction in both areas. There is much debate among employers across all STEM sectors around the world related to the level of acceptable accommodations to enable postdoctoral women to be successful in their chosen field.[1]

Indeed, one could make the claim that significant progress has been made in improving the status of women who are in the scientific workforce, particularly within the past three decades. Although this is true to some extent, there is still a significant drop-off of women from their postdoctoral training to their first full-time position to higher level positions within academia.[2] Issues revolve around the inability to establish satisfaction between work and life and/or relating to the desire to start a family are often cited as to why women leave.[3] For women who are in academia, there is also the added challenge of trying to start a family while concentrating on the advancement of their career; in STEM, this impact on women is particularly pronounced.

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Importance of Work-Life Programs to Retain the STEM Workforce

The results of a world-wide study, conducted in the fall of 2011 by the Association for Women in Science (AWIS) and in collaboration with Elsevier's research arm, underscored the importance of finding satisfaction between one's working and personal life, particularly for women.[4]

Figure 5.1. Percentage of survey respondents who indicated that they were happy with their work-life balance
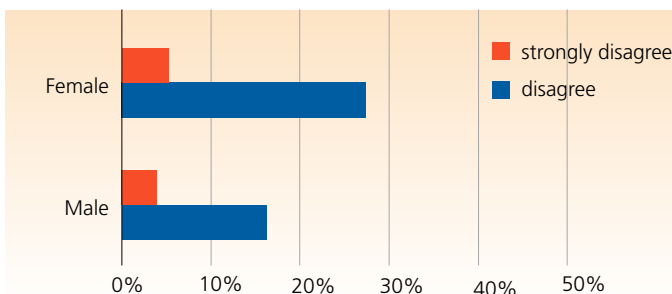
When asked their views on the statement "I am happy with my work-life balance, e.g. time spent working versus time spent on my personal life," 32.5 percent of female researchers, compared with 20.3 percent of male researchers responded that they either disagreed or strongly disagreed with the statement (Figure 5.1). Given the fact that so many female researchers indicate their inability to integrate work-life issues successfully, there is a need for systemic change that would allow these women to thrive within the STEM workforce.

Fortunately, there are numerous resources that have been developed to address the work-life integration issue. One program, in particular, has been developed by the Association for Women in Science. This extremely interactive program, titled "Improving Work-Life Satisfaction," focuses on addressing those issues which impact women and includes both a participants' workbook and resource guide for further information. The program has been offered in a number of different settings including academic institutions, professional scientific society conferences, and corporate offices. To date, the program has been presented over 50 times to a combined audience of more than 3,000 people. In addition, the program has been presented to 14 AWIS chapters located across the United States. To further sustain the program, AWIS chapter leaders from around the country were brought in for a "Train the Trainer" workshop. The benefits the chapter leaders received were as great as those of the participants:

> *The Work–Life Satisfaction seminar experience has enriched me professionally and personally at least as much as it has enriched the seminar attendees'. The Train the Trainer workshop was amazing and provided a wonderful forum for learning the materials, developing training skills*

to apply to the seminar, and engaging and networking with some incredible women. Since then, I have led the workshop twice, once for a graduate student and postdoc group and once for the Society of Postdoctoral Scholars at UCLA. Both experiences were positive and the discussions were lively with all participants engaged. The feedback I received was very positive and I look forward to my next presentation. Not only am I learning more about work-life satisfaction from a personal and professional aspect, but I am also able to improve my presentation skills and am learning to adapt my skills to meet the needs of my audience.

— President of the AWIS Los-Angeles/Ventura County chapter

Modifications, based upon continuous assessment and evaluation by the participants, continues to take place so that the program remains relevant to the participants.

Evaluation of the AWIS work-life program indicates that the primary benefit revolves around participants' ability to interact and to hear from other participants regarding the challenges and solutions they encountered. Being able to interact with others face-to-face alleviated the sense of isolation and many participants noted that they came away with a better understanding that they were not alone and, in fact, were now able to tap into a network of other women who they could reach out to in the future. As the nature of science can often be extremely stressful and very competitive, it is important for women in STEM to remain in contact with each other and to find ways to continue to network. For women who are contemplating leaving science, face-to-face meetings can serve as a way to exchange information and may help in the retention of women in academia.

...the networking component of attending professional meetings cannot be stressed enough as this provides postdoctoral researchers with both the ability to expand their community, as well as serves as a source of support, particularly for those scientists who are in smaller, isolated environments.

But attendance at those meetings can oftentimes only take place by offering childcare and/or dependent care.

Childcare and Dependent Care in Professional Contexts

Face-to-face meetings and attendance at professional scientific conferences can provide postdoctoral researchers in STEM with the opportunity to interact with individuals within their own specific discipline. Indeed, attending professional meetings provides both recognition of professional achievement within the discipline as well as the opportunity to interact and network with peers; networking with individuals who are also considered subject matter experts within the same field of study is critical to one's professional success. Scientists will be judged by their peers for their scholarly work and although they are more than likely to move to various institutions throughout their career, participation at professional scientific conferences should be a career-long endeavor. Again, the networking component of attending professional meetings cannot be stressed enough as this provides postdoctoral researchers with both the ability to

expand their community, as well as serves as a source of support, particularly for those scientists who are in smaller, isolated environments.[5]

For those postdoctoral researchers who have families, attending a scientific conference is challenging, yet necessary, in their early career stage. Attending important meetings, although critical for career success, takes one away from their traditional family-support network. As well, for scientists who are may also be responsible for taking care of parents or other dependents, the need for high-quality, reliable care is important when they are away on travel.

To alleviate this challenge, professional scientific societies can provide opportunities to scientists with families or dependents by offering various childcare and dependent care options. On-site childcare, for example, can allow postdoctoral researchers to bring their children with them while they attend the conference. The downside, however, is that often times these on-site childcare facilities are not available in the evening which prevents scientists from participating in sessions or networking events which is a major benefit in attending the conference. Another drawback is that societies who have offered this option have indicated that the participation rate is rather low and, based upon the cost involved, is not a sustainable activity. On-site childcare also does not address the needs of those scientists who are responsible for aging parents or who oversee the care of other adults, as on-site childcare often has an age limit and will not accept older children or adults.
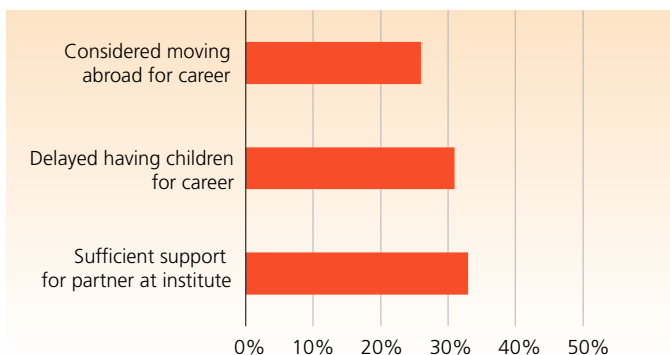
Other professional scientific societies have offered childcare/dependent care grants or awards which provide scientists with the opportunity to attend various conferences. Widespread advertising that these grants or awards are available is critical to the success of these offerings and provides scientific societies with the ability to increase awareness of the importance of childcare/dependent care assistance. Implementing this program and having a process of applying childcare and dependent care funds must be clear and easy for postdoctoral researchers to understand. It is imperative that the application processes outlines exactly what will be covered to avoid any type of misunderstanding by either party. In addition, the application should not be perceived as a barrier with any requests for unnecessary data eliminated from the final application.

Continued funding of childcare/dependent care programs is often a source of concern for professional scientific societies. To the extent that data can be collected to reflect the ongoing importance and need to continue to fund these programs is critical for future success and sustainability.

Promoting Family Friendly Policies

The importance of offering family friendly policies at institutions around the world was underscored in the earlier-referenced study that was conducted by the Association for Women in Science and in collaboration with Elsevier's research arm.[6]

Figure 5.2. Attitudes towards importance and impact of family-friendly policies at institutions expressed by survey respondents.

Implementation of family friendly policies at institutions could have a positive impact on retention. Twenty-six percent of young researchers responded positively to the statement "I am considering moving to another country to further my career in research." The reasons most cited as to why they would move related to greater opportunities provided to them or the opportunity to obtain a permanent position in another location (Figure 5.2).

When asked the statement "I have delayed having children in order to pursue my career in research," 39 percent of the females, in comparison to 27 percent of males, agreed. The decision to wait having children oftentimes reflected upon the researcher's need to obtain a permanent position or an increase in salary, as they could not afford to start a family based upon current earnings. This choice may become less of a factor for institutions that have effective family-friendly policies in place, including very good childcare options as well as generous maternity and paternity leaves[7] (Figure 5.2).

Thirty-three percent of all researchers strongly agreed that "there is sufficient support for my partner/spouse at my institute" as a result of family friendly policies. Spousal hiring policies, flexible working arrangements, or strong benefit plans to support their spouse were cited as exemplary practices as to what was offered by their institution. Academic institutions can take the lead in helping researchers by addressing their needs through the adoption of family-friendly policies which can, in turn, assist researchers

> **Suggested recommendations which focus on creating a family-friendly environment would include:** offering caregiving travel grants, creating sufficient lactation rooms across campus as well as developing a comprehensive lactation program, and implementation of dual-career policies that can be utilized during the recruitment process.

by providing them with the programs, services, and benefits that are necessary for career success. Suggested recommendations which focus on creating a family-friendly environment would include: offering caregiving travel grants, creating sufficient lactation rooms across campus as well as developing a comprehensive lactation program, and implementation of dual-career policies that can be utilized during the recruitment process. Institutions that offer assistance to researchers are taking responsibility for meeting the challenges of today's workforce, particularly for those scientists who are parents, caregivers, or part of a dual-career household (Figure 5.2).

However, unfortunately, an equal number of respondents disagreed with this statement (also 33 percent) indicating that funding cuts greatly reduced or eliminated these types of policies or other types of support.

To improve recruitment and retention of women in STEM, it is important for institutions to become more family-friendly. Appropriate funding needs to be set aside to sustain initiatives that would assist female postdoctoral researchers and faculty to remain successful on their career trajectory. By establishing sustainable policy-driven solutions for female postdoctoral researchers and faculty with responsibilities for family and/or caregiving, institutions would be able to eliminate those barriers which prevent women from being fully productive and rising to higher level positions.

Summary

The importance of developing and sustaining the community of female postdoctoral researchers cannot be overstated. It is critical to enact policies and procedures that will support full inclusion of women for continuation of a robust STEM workforce. The adoption of family friendly policies, the creation and implementation of procedures related to cost-effective childcare and dependent care programs, as well as an understanding of the importance of eliminating barriers that prevent women from fully contributing to the overall STEM workforce, represent suggestions that would address the workplace challenges faced by female postdoctoral researchers. However, long-term systemic change revolving around how science is actually conducted, including changes in society's view on working women, require continued discussions and recommendations for the creation and establishment of best practices that must be implemented in the STEM workforce.

[1] Dean, D.J., & Koster, J.B. 2014. *Equitable Solutions for Retaining a Robust STEM Workforce.* Massachusetts: Academic Press.

[2] Committee on Maximizing the Potential of Women in Academic Science and Engineering, National Academy of Sciences, National Academy of Engineering, and Institute of Medicine. 2007. *Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering.* Washington, DC: The National Academies Press.

[3] Monosson, E. 2008. *Motherhood: The Elephant in the Laboratory: Women Scientists Speak Out.* New York: Cornell University Press.

[4] Dean et al. 2014.

[5] Ibid.

[6] Ibid.

[7] http://www.businessinsider.com/why-delaying-parenthood-and-having-kids-later-is-a-big-deal-2015-6 (accessed July 24, 2015).

AWIS is committed to serving the life-long leadership and professional talent development of women in all STEM work sectors and career stages to ensure they will achieve their full potential as leaders. AWIS has a variety of mechanisms to deliver outstanding leadership and talent development programs related to work-life integration, mentoring and coaching, achieving recognition, and life transitions. These mechanisms include face-to-face workshops delivered directly to groups of members and partners, internet based webinars, on-demand playback of webinars, and a variety of electronic social media platforms. Additional information may be found on the AWIS website at www.awis.org

APPENDIX

Professional Societies and Associations

American Anthropological Association

American Association for the Advancement of Science

American Association of Anatomists

American Association of University Women

American Astronomical Society

American Chemical Society

American Educational Research Association

The American Medical Women's Association

American Peptide Society

American Philosophical Association

American Psychological Association

American Society for Biochemistry and Molecular Biology

American Society for Nutrition

The American Society of Civil Engineers

American Society of Human Genetics

American Sociological Association

Association for Public Policy Analysis and Management

Association for Women in Science

Association of American Medical Colleges

Entomological Society of America

Federation of American Societies for Experimental Biology

Genetics Society of America

International & American Associations for Dental Research

Linguistic Society of America

Marine Engineering Laboratory

Midwest Political Science Association

Midwest Sociological Society

National Council for Geographic Education

National Organization of Gay and Lesbian Scientists and Technical Professionals

National Research Council of the National Academies

Sigma Delta Epsilon/Graduate Women in Science

Society for Advancement of Chicanos/Hispanics and Native Americans in Science

Society for Applied Spectroscopy

Society for Mathematical Biology

Society for Social Work and Research

Society of Systematic Biologists

Society for the Psychological Study of Social Issues

Society of Toxicology

United States Society for Ecological Economics

About the Authors

Ashley Brady, Ph.D., is assistant professor of medical education and administration at Vanderbilt University, and serves as director of Career Engagement and Strategic Partnerships in the Biomedical Research Education and Training (BRET) Office of Career Development. She is integrally involved in executing the goals of Vanderbilt's ASPIRE Program, funded by a Broadening Experiences in Scientific Training (BEST) award from the NIH Common Fund. As such, she designs, develops, and delivers curricula and programs in career development and professionalism for biomedical sciences doctoral students and postdoctoral fellows. Leveraging her prior experience in foundation relations at Vanderbilt, she is also responsible for developing and managing relationships with internal and external partners as part of the ASPIRE program's internship and externship program.

Janet Branchaw, Ph.D., is an assistant professor of kinesiology and the director of the Wisconsin Institute for Science Education and Community Engagement (WISCIENCE) at the University of Wisconsin-Madison. Branchaw's work focuses on the development, implementation, and evaluation of innovative approaches to undergraduate science education, with a special emphasis on undergraduate research, assessment of student learning and broadening participation in science among underrepresented groups. She is a co-author on the *Entering Research* and *Entering Mentoring* training curricula and serves as the associate director of the Mentor Training Core of the National Research Mentoring Network.

Belinda Lee Huang, Ph.D., serves as the executive director of the National Postdoctoral Association (NPA), headquartered in Washington, D.C. She manages operations of the 501(c)3 nonprofit association, which works to develop and promote national policies and programming that benefit the postdoctoral community and the U.S. research community. She collaborates and communicates the needs of the postdoctoral community to academe, government, industry, professional societies and funding organizations. Committed to diversity, equity and leadership, Huang's research focuses on postdoctoral policies and services, faculty of color, campus climate, and pathways to senior leadership for women of color.

Janet Bandows Koster, MBA., CAE, executive director and chief executive officer, Association for Women in Science (AWIS), has served in that position since July 2006. She has over 25 years of experience leading organizations in both the United States and overseas with particular expertise in global gender and workforce issues. Bandows Koster has authored numerous reports and presented at professional meetings about issues at the nexus of gender and science, technology, engineering, and mathematics (STEM).

Steve Lee, Ph.D., is the graduate diversity officer for the STEM disciplines at the University of California, Davis. His current work focuses on strengthening graduate education through diversity, by increasing the recruitment and retention of graduate students from underrepresented minority groups. He loves to translate cross-disciplinary research into evidence-based activities for professional development, covering topics such as mentoring, oral and written communication skills, self-assessment, and career planning.

Rick McGee, Ph.D., has been engaged in mentoring and leading research training, and designing new approaches to research training, for nearly 40 years across multiple universities and the NIH. After conducting bench research for 20 years, he shifted to full-time effort with research training. Most of his work has been with doctorate students but recently he has shifted his primary focus to the development of junior faculty. Throughout this time, he has played key roles in efforts to increase diversity across the biomedical community. Over the past 15 years, he has added a new research effort to actually study how scientists develop from the perspective of social science theories and models. Today, he is leading a team of more than 10 social science researchers in a one-of-a-kind longitudinal study of over 250 doctorate students based on in-depth annual interviews. His team is also conducting a randomized controlled trial of a novel coaching model to complement mentoring in research training.

Kim Petrie, Ph.D., is assistant professor of medical education and administration, and founding director of the Office of Career Development within the Biomedical Research Education and Training (BRET) Office of Career Development at Vanderbilt University School of Medicine. Petrie aims to help biomedical sciences doctoral and postdoctoral scholars transition to meaningful careers. As a principal investigator of Vanderbilt University's NIH BEST award, she develops career and professional development programs and services that broaden the training experiences of Vanderbilt University's trainees and empower and prepare them to make well-informed career decisions.

Christine Pfund, Ph.D., is a researcher with the Wisconsin Center for Education Research and the Department of Medicine at the University of Wisconsin-Madison (UW). Pfund's work focuses on developing, implementing, documenting, and studying research mentor training interventions across science, technology, engineering, mathematics and medicine (STEMM). She is co-author of the *Entering Mentoring* and *Entering Research* curricula. She is one of five principal investigators leading the newly established National Research Mentoring Network.

Cynthia Simpson, CAE, M.Ed, is the chief business development with the Association of Women in Science (AWIS). Simpson joined AWIS in 2009 and is responsible for developing and overseeing all corporate and institution partnerships for the association. She has given over 100 presentations on the topics of work-life satisfaction, mentoring, communications skills, and volunteer management at universities, corporations, and professional societies devoted to STEM.

Joe Sostaric, Ph.D., started his career at the American Chemical Society (ACS) in 2009, after spending 15 years studying the effect of high intensity ultrasound on the chemical effects of ultrasound as a grad student at the prestigious University of Melbourne, Australia, and at the NIH, and The Ohio State University. His scientific work has been published in over 20 scientific journals including sole authorship letter in Journal of the American Chemical Society (JACS), one of the highest rated chemical journals in the world. Sostaric considers his greatest accomplishment the many graduate students and postdocs who have benefited from the career development programs that he manages at the ACS.

PROFESSIONAL SOCIETIES AND ASSOCIATIONS have a wealth of resources and programs to share with postdoc women. The Elsevier Advancing Postdoc Women survey captured 46 professional associations' and societies' information about the programs and resources offered to postdoc women or women in general to enhance their advancement into science, technology, engineering and mathematics (STEM), and social, behavioral, and economic sciences (SBE) disciplines. The *Advancing Postdoc Women Guidebook*, includes the survey results and has informative chapters on:

- Utilizing Professional Societies and Associations to Advance Your Career

- Beyond "Finding Good Mentors" to "Building and Cultivating Your Mentoring Team"

- Making the Most of Your Postdoc: Career Preparation and Planning

- Beyond Graduate School

- Work-Life and Childcare Resources for Postdoc Women

Book chapters detail how to develop a positive, mutually beneficial professional relationships both as a mentee and a mentor; how to prepare for career exploration and preparation, and identify a few key career paths of interest; how to find industry, government, and association management jobs; and how to find childcare and dependent care options to enable postdoc women to attend professional conferences/meetings.

The *Advancing Postdoc Women Guidebook* has information about online mentoring, boot camps on professional development topics, webinars on writing CVs, networking, obtaining grant funding, negotiating your salary package, and much more.

BELINDA LEE HUANG, Ph.D., serves as the executive director of the National Postdoctoral Association (NPA), headquartered in Washington, D.C. She works to develop and promote national policies and programming that benefit the postdoctoral community and the U.S. research community. Huang's research focuses on postdoctoral policies and services, faculty of color, campus climate, and pathways to senior leadership for women of color.

ABOUT THE NPA
The mission of the NPA, a 501(c)3 nonprofit educational organization, is to improve the postdoctoral experience by supporting enhanced research training and a culture of enhanced professional growth to benefit scholarship and innovation. For more information on the NPA, visit www.nationalpostdoc.org

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