



1. Finding Your Way

Mastering Your Ph.D.: Mentors, Leadership, and Community

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By Patricia Gosling, Bart Noordam—First published August 31, 2007

One of the best things you can do at the start of your scientific career is find a mentor. A wise and caring mentor can mean the difference between wandering around aimlessly and striding purposefully down the path of academic life and beyond.

But don't you already have a mentor, you may wonder? Won't your research adviser play that role? Perhaps, but mentors and advisers aren't usually the same thing. For one thing, an adviser directs, a mentor guides.

If your research adviser is a natural mentor and is willing to take on that role in your life—and if that relationship works for you—count yourself lucky. Not every graduate student is fortunate to have such readily available guidance and counsel from a more senior person. So, chances are you'll need to look beyond your lab to find a good mentor. What should you look for, whom should you ask, and how can you help your adviser—and yourself—be a good mentor?

Mining for Gold: Defining Mentorship

Before you start looking around, you first need to take stock of what a good mentor is and what you hope to get out of the relationship. A good mentor has many characteristics but must first and foremost care about your professional development and have an interest in guiding younger scientists as they move through their careers.

This sounds time-consuming, and it can be. Why would anyone want to take time out of a busy schedule to mentor you? It's not all about "taking" on your part. Many good mentors cherish the role of guiding younger colleagues. They gain something by giving back to the community of professionals from which they themselves were nurtured. Now that they've moved up in their careers, these scientists believe it's time to help others make the trek to the summit.

Mentorship is a lot about experience and wisdom. So it goes without saying that a good mentor will be someone who is further along on the career path than you are. Before approaching another person and asking him or her to act as your mentor, however, you need to think carefully about the kind of person and professional you wish to emulate. On a more specific level, is there someone whose career choices you admire? Who has a great work/life balance or is particularly good at getting work published in top-tier journals?

Importantly, a good mentor should have no ulterior motive in helping you (beyond the intrinsic satisfaction that mentorship provides). He should be able to help you meet your own goals (not follow his own agenda) by providing you with support and guidance, modeling successful behavior, introducing you to a strong network, and helping you identify your strengths and weaknesses as a scientist and a person.

Choosing a Mentor

When choosing a mentor, you'll need to be honest about your own needs and what you think a mentor can do for you. Do you want your mentor to offer you regular advice on how to negotiate graduate school and your career beyond? How specific or general do you want this advice to be, and how much of a time commitment will you require? Do you want your mentor to offer you detailed career and networking advice? Or are you just looking for someone who is a good listener and can act as a sounding board when you find yourself on shaky ground?

If your research adviser is also your mentor, you may want to establish clear goals for your relationship as both a Ph.D. student and a mentee. For example, you may want to meet on a regular basis just to discuss issues outside your research. A good, comfortable relationship with your adviser, as well as a certain amount of personal chemistry, will be key for the mentor/mentee relationship to flourish.

But what if your research adviser isn't able or isn't willing to act as your mentor? If you find yourself in this situation, you need to take the initiative and find someone else. The first place to start is your own lab. How about a postdoc or even a fellow Ph.D. candidate who has more experience than you in the lab? If no one in your lab is a suitable candidate, someone else in your department may be. Some institutes even have a mentor program in place for those who are unable to find a mentor for themselves. Even if such a program is in place, however, you'll still have to do some work. Mentor/mentee rela-



You and your mentor should decide how to move forward and how much interaction you will have. Perhaps you'll meet over lunch once a month or touch base regularly via e-mail, or your mentor will be available whenever you have a specific issue.

tionships are largely personal, so it's important to have a mentor for whom you have great respect and warm personal regard.

If you do look outside your lab, be sensitive to possible rivalries or politics between research groups. Even within the same institution, many lab heads are in competition with each other for funding, lab space, and equipment. You won't want to risk angering your adviser by seeking guidance from a direct competitor. The same is true if you consider possible mentors in your field at other institutions; you may collaborate with them on some projects, but they could still be seen as a competing lab.

When you've identified one or two individuals who could act as your mentor, it's up to you to approach them. Some people may feel flattered that you've asked for their guidance. Others will turn you down out of fear that mentoring will take too much time, or that you will become overly dependent on them for all your decisions. Don't be hurt if your preferred mentor turns you down. It's most likely not personal, so be gracious and move on to someone else suitable.

Once someone agrees to be your mentor, hold up your end of the relationship by respecting your mentor's time and professional responsibilities. You and your mentor should decide how to move forward and how much interaction you will have. Perhaps you'll meet over lunch once a month or touch base regularly via e-mail, or your mentor will be available whenever you have a specific issue. Whatever you decide, remember that your mentor's role is to provide you with professional guidance and to help you develop independence, not to hold your hand every step of the way.

Working with What You've Got

What do you do if you try all these things but fail to find a suitable mentor? You may want to take a second look at your supervisor. Even if he or she seems less than willing, think of ways you can help your supervisor become a (better) mentor. Start by making an appointment to talk about your needs. Recognize that time is in short supply and make it clear that you don't intend to add to an overly long to-do list. But be up front about your needs. Is it regular discussions you're after, an open-door policy, or just open lines of communication so you feel you can go to your supervisor when you need a bit of guidance and support?

Encourage your supervisor to involve you in group meetings and discussions, and state that you are willing to do whatever extra things need to be done to learn and grow in your field. Volunteer to give a presentation to the department, or offer to spend time with a visiting scientist as a way to expand your network. When it comes time to write your first paper, offer to write the first draft and meet with your supervisor for comments and suggestions.

Develop a Community of Peers—and Become a Mentor Yourself

Professional success doesn't begin and end with having a mentor. Your time in graduate school is an excellent chance to strengthen your professional and social networks and create a community of your peers. Some of these professional relationships will develop into lifelong friendships and be a source of support throughout your professional life.

Be a leader among your peers. Participate in group meetings and encourage quieter members to speak up. If you don't already have one, start a journal club in your group and invite others in your department to join. Set up social activities or team-building activities to help strengthen relationships outside the lab.

As you move up the lab food chain, become a mentor yourself by offering to supervise an undergraduate's research project. Offer to teach when possible or provide tutoring sessions for undergraduates interested in pursuing an advanced degree.

As you progress through your career, you'll find that the mentoring you received as a graduate student and postdoc and the networks you developed as a young scientist will provide both a firm foundation and a strong scaffolding for your career to grow. When the time comes for you to mentor others just starting out, use your insights and hard-earned wisdom to give junior colleagues a boost. It's also another way of giving back and saying thank you for the help you received early in your career.

Mastering Your Ph.D.: Preparing for Your Post-Ph.D. Career

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Among the most difficult decisions during your Ph.D. is what to do when you're finished. You're probably familiar with the "typical" career track: Ph.D., postdoc, then a climb through the academic ranks of assistant, associate, and full professorship. Any other path is often looked upon with derision by peers, as though leaving academia means you can't handle the academic track.

But this "move up or move out" attitude is a purely academic perspective. Universities don't just train new professors; they prepare people to contribute to society in many ways. In the Netherlands, for example, 60 percent of Ph.D.s leave university right away to take jobs in corporate, not-for-profit, or government organizations.

Most of the remaining 40 percent continue their academic careers as post-doctoral fellows. But within five years of graduating, half of those will wander off the academic campus. The picture is the same in other Western countries. So, your career is likely to take you outside the hallowed halls of academia. Get used to the idea.



Evaluating all the options is a lot of work, so allow time to do it properly and start well in advance.

As you move toward the last months of your Ph.D., consider the full range of employment options. What you do directly after graduation will have a major impact on your professional progression. Evaluating all the options is a lot of work, so allow time to do it properly and start well in advance.

We suggest splitting the job-search process into two parts. First, decide which type of job appeals to you most. Then start the application process, which typically takes several months. You should start evaluating your options at least six months before you graduate.

What Really Makes You Tick?

Your education puts you in a position to find a job that not only pays the bills but also provides satisfaction. To discover what type of job will do the trick, analyze what you most enjoyed while working as a Ph.D. student. Was it working in a team of enthusiastic young people exploring unknown (scientific) territories or working to solve a tough problem? Or perhaps you were most excited by the challenge of mastering particular technical skills, learning the multidisciplinary aspects of your project, or teaching. Maybe you were most enthusiastic about the impact your results have (or are likely to have) on society.

At first glance, you may conclude that your particular research topic makes you want to get out of bed in the morning. But after more careful consideration, you're likely to realize that narrower aspects of your project are more important than the topic itself. Ask close friends what they see as your strengths; friends can often see what you were best at and what gave you the most satisfaction, even when you can't see it yourself.

Map Out Your Options

Somehow you need to make sense of all the possibilities—yes, there are lots of them—and discover which path is right for you. A decision tree will give you an overview and help you sort out your long list of options into a shorter list of opportunities worth pursuing further. Ask around the lab to find out what types of jobs previous generations of students have chosen.

While growing your own decision tree, you may notice that branches you intuitively ignored (e.g., working for the government) have interesting subcategories (for instance, working at the patent office). Maybe you're certain you want to be a bench researcher but thought you'd need to stay in academia. In fact, an accurate decision tree often includes research opportunities in the academic, industrial, and not-for-profit sectors, depending on your research area.

Explore the Unknown

So now you know what makes you tick and have a map of options, but you may have only a vague idea of what some of those jobs entail. So explore the less familiar options on your decision tree. If

you're considering a job in industry but don't know much about it, visit one or two companies to get a feel for the culture and gain a sense of whether you would enjoy working in such a place. This research will allow you to base your decision on your own observations rather than those of your colleagues. Such "informational interviews" are also great ways to add valuable people to your network. (Shameless plug: You might also search *Science Careers* for articles about types of jobs that you aren't as familiar with.)

Leverage Your Hidden Network

Your network is a great asset in the job search, but do you even have a network? You do, even if you don't realize it. Many Ph.D. students have graduated from your institute in the past, and your supervisor and other staff members will most likely know how to find them. These people will be happy to discuss their current and past employment, especially if you offer to buy them lunch.

Double-check Your Decision

It may take a while, but it is hoped that your research on the job market will reveal a direction in which you want to head. Double-check this decision by talking to friends, relatives, and close colleagues. Sometimes people who know you have remarkable insight into what will work for you and what won't.

So ask around but keep in mind that some professors may not like the idea of having their star students stray from their own exemplary career paths; they might be biased against jobs outside academia. People working outside universities have lived in both worlds long enough to judge the difference. Yet many people who have left academia are like reformed smokers, pro-industry to the point of tedium. So talk to Ph.D.s working in every sector that you're interested in, then make up your own mind.

Do You Want the Job?

You've been offered a job. Congratulations! But during the job search, you may have become so anxious about getting a job that you lost sight of whether you really want the position that's offered. So go back to your decision tree and to the list of things that were really important to you. Consider whether you will enjoy working for this employer, taking full account of your interactions with the people you met during the interview.

Tempted to say "no"? There is no need to take the first job you are offered, but there is a limit to how often you can say no.

Your Direction Is Not Carved in Stone

If, after working for a while, you feel that you are on the wrong track, consider switching to a different branch of the career tree. There is mobility among the various sectors, so don't feel like you're trapped if you're unhappy. While you restart the job search, make the most of your current job by learning new, practical, and transferable skills.

As a scientist, you are used to tackling complex problems in a systematic way. Finding a job is a complex process requiring a serious commitment of time and smarts. It is worth making the effort to start well before your thesis defense to kick your post-Ph.D. career into high gear.



Grad School Campus Visits

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Cary Supalo visited five campuses before deciding to attend Pennsylvania State (Penn State) University in State College to study chemistry. Some of what he learned might have been learned from a website or a phone call but not all. “The bottom line was the research opportunities,” he says. “I felt confident that I could find a niche in any of three or four research groups” at Penn State. “There were also opportunities for cooperative research with other research groups. Finally, the department was more informal than other departments I visited. I enjoyed the relaxed atmosphere.”

On-campus interviews are rarely required for graduate-school admission, but campus visits are common. James Faubion, chair of the department of anthropology at Rice University in Houston, Texas, estimates that about half of his department’s current graduate students visited before deciding to attend Rice. At other institutions and in other fields, the numbers seem to be even higher. Campus visits allow students like Supalo to learn things about the department and institution that might not be obvious from the university’s marketing materials, such as just how it feels to be on campus. Campus visits also provide an early opportunity to make a good impression on faculty members and administrators.

Choreographed or Improvised

Several departments at Northwestern University in Evanston, Illinois, set aside certain days for campus visits and plan those visits out carefully. Northwestern’s chemistry department, for example, schedules grad-student visits on three weekends in March. “Each student visiting the chemistry department can schedule five visits with faculty members,” says Jonathan Maendel, graduate program assistant for Northwestern’s chemistry department.

The approach of Rice’s earth sciences department runs more toward the ad hoc, helping prospective graduate students schedule visits on an individual basis. “We will help them customize visits to their interests and assist in scheduling visits with particular professors,” says Sandra Flechsig, department coordinator for Rice’s earth sciences department.

Preparation Is Key to Success

One key to a successful visit is choosing which schools to apply to. There’s no point in going to the trouble for a department that doesn’t have at least a couple of professors you might like to work with. If you haven’t even thought about this yet, consider taking a year off to work or travel.

Once those decisions are made, “start preparing early” for your visit “and make contact with faculty members whose research interests you and with graduate school administrators” at least two weeks ahead, Flechsig says. More advance notice is even better, Faubion advises. Plan your visit with the chair of the department’s graduate admissions committee or call the main department office; someone there will make sure you get hooked up with the right people.

Allow at least a day for your visit. Avoid summer and break-week visits because faculty members are more likely to be away then and because it’s hard to assess how well you fit in when so many students are away. Check conference schedules so you don’t visit when key faculty members will be conferencing. If there’s a conference that week that’s likely to be attended by key faculty members, go to the conference and meet them there instead.

Prepare well. A student who arrives with little specific knowledge of the graduate program or its faculty “is bound to make a bad impression,” Faubion warns. Even if you’ve already been admitted, making a good impression is important. “Financial aid is more likely to be offered to students if they have learned about the graduate program, are motivated, and have a prepared list of questions,” says Carl Wainscott, assistant director for recruitment to the Graduate School of Marquette University in Milwaukee, Wisconsin. And professors are more likely to want to work with incoming students who seem well prepared.

During the Visit

Dress neatly. Although some students wear business suits, most dress casually in neat, button-down shirts or blouses and slacks. “Avoid T-shirts and jeans,” advises Flechsig. Wear comfortable shoes because you could be doing a lot of walking during department and campus tours.

“When meeting professors, ask questions related to your own research interests,” Maendel advises. Here’s where you deploy those questions you prepared before your visit—but also listen well and do your best to engage in intelligent, spontaneous conversation.

Don’t forget to talk with current graduate students. Such discussions can help you “develop an understanding of the department’s culture to decide if it is a place you would be comfortable studying and working,” observes Maendel. Grad-student conversations are also an ideal opportunity to find out what it’s really like to work with the professors you’ve targeted, Maendel says. Some researchers want their students in the lab for long hours; others care only that you get the work done. Finally, a few professors have a reputation for being especially difficult to work with for women, say, or gay men. You want to know these things before you make a commitment, and frank conversations with a few graduate students are your best opportunities to learn them.



Also tour other important places on campus you expect to use, such as the student union, graduate student housing, student health care facilities, and dining halls. For some people, exercise is a key to maintaining sanity during graduate school. If you're one of those, make sure the institution's facilities measure up.

If you haven't done so already, now's the time to track down information on fellowships and assistantships, teaching expectations and support, employment opportunities for your spouse, and any other details that are likely to have a positive or negative effect on your decision or your graduate school experience.

Financing the Trip

For many, visiting a graduate school is an expensive, long-distance trip, but some graduate departments will offset at least some of your expenses. Northwestern's chemistry department "will refund up to \$400 in travel expenses," Maendel says. Other Northwestern departments are willing to reimburse different amounts. Rice's earth sciences department will pay all travel expenses for domestic students who already have been admitted to the graduate program. Rice also has "funds available to bring to campus those students residing in the United States ... whom we are most interested in admitting" but "before we extend formal admittance offers to them," Faubion notes.

Students admitted to a graduate program at Ohio State University in Columbus can apply for reimbursement of travel expenses up to \$250 but only if they have received a university fellowship or been nominated for a graduate school or graduate enrichment fellowship. The University of Washington, Seattle, will pay for campus visits but only if the university's travel office makes your travel arrangements.

Worth the Hassle

"Visiting a campus once you've been accepted, especially if you visit with a group of similarly graduate-school bound students, can help students figure out what it would be like to be a graduate student at a particular institution," writes a professor who has advised many such students. "The only downside to these visits is that they often require missing some classes during one's senior year, just as thesis deadlines are starting to loom. But they are worth the hassles associated with travel. I would not recommend attending graduate school at a place without visiting first."

Additional Articles Online

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sciencecareers.sciencemag.org/career_magazine/previous_issues/articles/2310/informational_interviewing_getting_information_you_can_use

Tooling Up: The Wall

dx.doi.org/10.1126/science.caredit.a0700120

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The Postdoc Experience: Not Always What You Expect

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Reclaiming Life From Work

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The Graduate School Application

sciencecareers.sciencemag.org/career_magazine/previous_issues/articles/2006_04_14/noDOI.5474268556298302823

This booklet is also available online at sciencecareers.org/careerbasicspdf