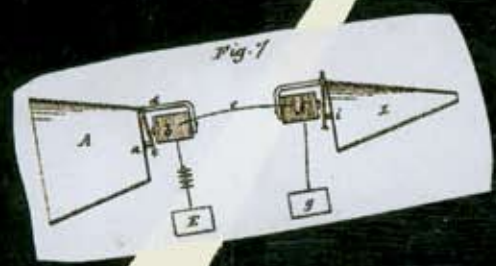
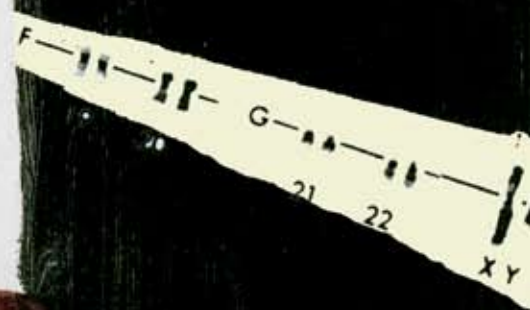
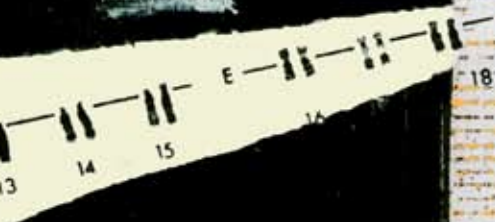




AB > AD.

—||—||—||—



PRS is  
in





A  
WORLD  
OF  
OPTIONS

Postdocs may do well to think outside the tenure-track box. Their opportunities are plentiful.

*By Karyn Hede*  
*Illustration by STEVEN DANA*



# FOR

**INSECT PHYSIOLOGIST DAN BEAN, THE LAST STRAW CAME IN THE FORM OF AN OVERSIGHT THAT SPOKE VOLUMES.**

He had been a postdoctoral research scientist for several years, in hopes of one day fulfilling the traditional postdoc goal—running a lab of his own at a top-tier research university. But after a seemingly endless series of academic job applications failed to produce employment, he took a position termed “lecturer,” teaching entomology to undergraduates at the University of North Carolina at Chapel Hill—while continuing to do some lab work and applying for faculty jobs. When the university’s biology department created its first Website in the mid-1990s, it listed graduate students, faculty, and staff. His name appeared nowhere on the site.

“You couldn’t find me there, even though I had been teaching insect biology for several years,” he says. “I was invisible.” Bean realized he had to stop waiting for that elusive tenure-track faculty position and take charge of his career.

Today he is happily ensconced as the State of Colorado’s chief biocontrol officer, overseeing the state’s efforts to use insects to control invasive plant species. Bean attributes his current position to taking time away from the lab to create a professional network in the field he wanted to pursue. He volunteered to organize sessions at professional meetings and engaged in several collaborative research projects that opened doors for him.

“I looked around at how people advance,” he says, “and I realized I could only get so far hunkered over a lab bench.”

Bean’s experience as a postdoc is hardly unique. In a 2005 survey of 7,600 postdocs, the research society Sigma Xi noted that 73 percent of respondents were “very interested” and another 23 percent were “somewhat interested” in

a research faculty position. Yet, their chances of getting a faculty job are on the decline. According to the National Science Foundation’s report *Science and Engineering Indicators 2006*, for those employed in academia 4 to 7 years after earning their doctorates, about 65 percent had faculty rank in 2003, compared with about 89 percent in 1973.

The result for postdocs, says Alyson Reed, executive director of the National Postdoctoral Association (NPA), has been “a major disconnect between expectations and outcomes.” The sobering truth is that a generation of highly educated and capable scientists has been reaching for a brass ring that many of them may never grasp.

Ironically, the employment outlook for Ph.D.-level life scientists has never been better, but seeing past doom-and-gloom scenarios requires an open mind and take-charge attitude among job seekers and a major shift in the culture of science.

## Entrenched Expectations

Today, there are no accurate data on the number of postdoctoral scientists working in the United States or on where they eventually find employment. However, the biomedical research enterprise is dependent on postdocs, who carry out a large percentage of the nation’s grant-funded biomedical research. And several groups have taken notice.

In recent years, high-profile reports, such as *Bridges to Independence: Fostering the Independence of New Investigators in Biomedical Research* (National Academies Press, 2005), written by a National Research Council (NRC) committee chaired by HHMI President Thomas Cech, and the Sigma Xi survey among others, have drawn attention to the challenges faced by postdocs and made recommendations to help them transition to permanent employment. The NRC report calls for several policy changes to improve training and resources for young investigators.

HHMI has also created a course and several materials to expand the reach of its training course with the Burroughs Wellcome Fund (see resources, page 31). “Graduate school and postdoctoral training rarely, if ever, train people to be in charge, to hire and fire staff, to write and manage budgets, to do all those things that are akin to running a small business,” says Peter Bruns, HHMI vice president for grants and special programs. “These are critical skills for principal investigators (PIs) in academia as well as scientists who choose careers in other settings.”

Postdocs with an interest in nonacademic careers must first overcome long-standing expectations within the culture of science that lead trainees to fear voicing any career aspiration other than that of principal investigator.

Bonnie Baxter, an associate professor of biology at Westminster College in Salt Lake City, Utah, was a graduate student in the early 1990s at the University of North Carolina at Chapel

“If we could populate the world with people who really understand how to do science that would be a good thing.”

Darcy Kelley, *Columbia University*

Hill. Like her fellow students, she considered the PI route to be her only acceptable option. Then one day she met with a thesis committee member, professor of biochemistry Aziz Sancar, who asked, to her surprise, “What do you want to do with your life?” She gathered up her courage and told him that she wanted to teach undergraduates, steeling herself to a negative response. Instead, Sancar replied, “That’s fantastic!” And he told her how he had been pushed into a research track when what he really wanted was to be a pediatrician. “He said, ‘Don’t let anybody tell you to go and do anything you don’t want to do.’ It was so empowering to have someone I respected so much tell me this was a good idea,” says Baxter.

“We need to move beyond the mindset,” says the NPA’s Reed, “that if you are not emulating your PI there’s something wrong with you, or that if you don’t end up getting that faculty job you are somehow a failure.”

Lori Conlan, program manager of the Science Alliance, a career-development and mentoring program at the New York Academy of Sciences, says that while having dinner recently with a group of Ph.D. scientists who are now program managers at public and private granting agencies, two of them told her they no longer considered themselves scientists.

“That floored me,” she says. “How are we going to change the culture to make people see that their jobs—which usually are very good jobs in science—are valuable and that you are still a scientist even if you leave the bench?”

Conlan traces the problem to the structure of graduate science training, which values laboratory skills, research results, and publishing above all. To expand the agenda, Science Alliance, NPA, and others are helping postdocs see the entire range of career options open to them (see Web Extra). For example, these organizations have lobbied the federal funding agencies to make it incumbent on PIs who receive training-grant funds to help postdocs enhance their professional skills, such as teaching, public speaking, grant writing, and managing a budget, so that they have the best chance of landing whatever type of job they want.

In 1998, the Association of American Universities (AAU) observed that “virtually no institutions” offered job-placement or career services designed specifically for postdocs. A 2005 survey showed some progress, with 16 of 39 AAU members who responded reporting that they provided career-development services for postdocs.



None of the institutions, however, reported offering incentives to faculty members for providing mentoring to postdocs. Yet that too may be changing, as the National Institutes of Health (NIH) is moving toward increased accountability for the mentoring component of training grants. The most recent announcement of NIH’s Research Training Grants, a major source of funding for doctoral and postdoctoral stipends, includes the statement that grantees “should provide trainees with additional professional development skills and career guidance.” The announcement stops short of requiring such training or providing funding for it, but it’s a big step in the right direction, says Reed.

## Critical Analysis

Meanwhile, many postdocs still think professional development means asking their mentor to write a letter of recommendation or help them get a speaking engagement at a scientific meeting. Some postdocs reach age 30 without ever having given serious thought to the marketable skills they have acquired over years of professional training or how to translate those skills into a job.

“I’ve found that for people who’ve spent their whole training expecting to follow that path into academia, the outside world is a swirl of possibilities that they just don’t know anything about,” says Peter Fiske, a geologist, entrepreneur, and author of two books to help scientists achieve their career goals.

Bill Lindstaedt, who runs the career-counseling center at the University of California, San Francisco, has developed a set of basic tools geared specifically for Ph.D. scientists. “We ask them about their skills, values, interests, and passions, and we ask them to prioritize their list. Once they get a feel for what they might want to do,

## CRASH COURSE IN HOW TO RUN A LAB

For postdocs who land a tenure-track faculty position, a lack of professional training often results in assistant professors suddenly running their own laboratories and being thrust into hiring staff, creating budgets, teaching, and being called on for committee work—all with precious little experience. Organizations such as HHMI and the Burroughs Wellcome Fund, which support a large number of postdoctoral scholars and young assistant professors, have begun running workshops and providing professional development materials to help scientists make the transition to a full-time position.

Karen Zito, a former HHMI predoctoral fellow and a first-year assistant professor at the University of California, Davis, took advantage of the HHMI/Burroughs Wellcome summer workshop. She says it helped her better negotiate with prospective employers and provided crucial information on how to apply for her first big government grant.

“One thing that was very helpful for me was to see a mock study section, particularly to learn about the differences between NIH (National Institutes of Health) and NSF (National Science Foundation) and how to approach them,” says Zito. “I had no idea that, for example, it was important to pick a study section and maybe even approach the head of the section in advance to see if they thought my proposal would be appropriate for that section.”

She admits to still feeling out of her element in some areas, especially in managing money. “I’m spending 70 to 75 percent of my time talking to vendors and negotiating for better deals and prices for equipment and reagents,” says Zito. She says all postdocs ought to receive some training in negotiation and budget management, no matter what career path they choose.

— K.H.

we help introduce them to people in that field and they can start building a career network. Oftentimes, they find they don’t even have to look for a job, because once they begin meeting people, opportunities start coming their way.”

Fiske says that the eye-opening exercise of developing a list of skills while still in graduate school made him realize he had a lot to offer a prospective employer; his 35-item list ran the gamut from “ability to conceive and design complex studies and projects” to “good listener.” Moreover, he suggests, all postdocs should do a critical assessment of their strengths and weaknesses each year and create a concrete plan to gain the skills they need to get the job they want.

In that spirit, some universities are now offering professional development through a tool called the Individual Development Plan (IDP), which was first devised in 2002 by the Federation of American Societies for Experimental Biology. The IDP is a template

intended to guide postdocs through a process, with the participation of their mentors, that allows them to create a roadmap of where they are, what they hope to accomplish during their postdoctoral fellowship, where they’d like to end up afterward, and what skills they need to acquire in order to get there. It’s a simple exercise intended to lay out a plan and clarify expectations for postdoc and mentor alike.

HHMI investigator Celeste Simon has always talked frankly to prospective postdocs about their career aspirations and how time spent in her lab could benefit both parties. Simon says she is dismayed when she hears other scientists belittle nonacademic career paths. On the contrary, she has mentored postdocs who chose careers in the pharmaceutical industry, education, M.D./Ph.D. track, and science editing.

“If one day I look back on my career and know that people say ‘she was a really good mentor,’ then I will feel that I really succeeded,” says Simon, professor of cell and developmental biology at the University of Pennsylvania School of Medicine. “And if I got a few good experiments done along the way, great!”

One of Simon’s former postdocs, Jeffrey Perkel, a science writer and undergraduate lecturer at Idaho State University, Pocatello, calls Simon a “sterling adviser” because of her determination to bring out the best in graduate students and postdocs in her lab, no matter what career path they choose.

## The Cachet of the Ph.D.

After investing up to a decade in graduate school and as a postdoc, transitioning away from academic research can be difficult. But programs are available to help graduate students and postdocs determine if that’s the right move for them and to



test the waters in a variety of careers before making any commitments.

“I started out believing that graduate students and postdocs would just go on to a career like my own, but gradually it has become clear that the array of careers available to people with Ph.D.s in the biological sciences is much broader than it used to be,” says Columbia University’s Darcy Kelley.

A biologist and HHMI professor, Kelley initiated a course—Frontiers of Science—that enables postdocs to learn what’s required to be an effective teacher. It combines the typical postdoctoral research training with a formal teaching fellowship that gives the young scientists a chance to create course materials and teach undergraduates. Some fellows emerge from the experience ready to combine research and teach (see Web Extra). Others find an entrée into careers outside academia.

Jennifer Blanck Weitz went through Kelley’s program during her postdoc and is now teaching high school science in Atlanta. “The experience at Columbia changed my life,” she says. “It made me realize that teaching full-time would give me a true sense of fulfillment.”

“There has been this reframing of what you can do with your degree,” says Sophia Colamarino, science director of the nonprofit research organization Cure Autism Now and former president of the Salk Institute’s postdoctoral association. “Once people start to see all the possibilities, it is liberating.” Colamarino and Gael McGill, both former HHMI predoctoral fellows, spoke about career options at a 2006 meeting at HHMI headquarters for HHMI-supported graduate students and postdocs.

Colamarino described her work to organize a career exposition when she was a postdoc at Salk. She called the event a “celebration of scientific careers” to get away from the conventional thinking that labels any nonacademic job as an “alternative” career. She says it was incredible to watch people discover that their degrees were viewed as valuable assets by employers from a wide variety of fields.

“There are definitely unique skills that you can only get from the 12-hour-days, following-a-problem-for-six-years approach that carry over to anything else you do in life,” says McGill, a former cancer researcher who started his own company, Digizyme, which provides scientific visualization and animation. McGill points out that orga-

#### RESOURCES FROM HHMI

HHMI has developed several resources for the development of early career scientists. Each can be downloaded from the HHMI Website: [www.hhmi.org/resources/labmanagement](http://www.hhmi.org/resources/labmanagement).

**Making the Right Moves: A Practical Guide to Scientific Management for Postdocs and New Faculty** is a collection of practical advice and experiences from seasoned biomedical investigators. A new second edition contains three new chapters on laboratory leadership, project management, and teaching and course design.

**Training Scientists to Make the Right Moves** is a guide to help universities and professional societies develop their own programs in scientific management.

**Entering Mentoring** is a guidebook to becoming a mentor by HHMI professor Jo Handelsman and colleagues at the University of Wisconsin–Madison.

nizing meetings of the Harvard Biotechnology Club as a Harvard postdoc, which brought in area business leaders and investors, made him realize how highly his Ph.D. was regarded in the outside world.

In fact, some PIs, like Darcy Kelley, are actively encouraging their trainees to look beyond the ivory tower and take their scientific training and mindset into other professions. “I think if we could populate the world with people who really understand how to do science,” says Kelley, “that would be a good thing.” ■

WEB EXTRA: For a story on teaching postdoctoral fellowships and a list of additional resources to help postdocs with career options and job preparation, go to [www.hhmi.org/bulletin/feb2007](http://www.hhmi.org/bulletin/feb2007).