NEWS

Eight Attributes of Highly Successful Postdocs

Successful young faculty members offer postdocs some frank tips on how to pick the right lab—and how to flourish in it

Oliver Hobert had a clear vision of his ideal postdoc: Find a prominent principal investigator at a top U.S. lab in a nice geographic area with a well-developed scientific community. An impossible dream? Not for Hobert, who received his Ph.D. in neurobiology in 1995 from the Max Planck Institute for Biochemistry in Martinsried, Germany.

He snared a 2-year fellowship from the international Human Frontiers Science Program, based in Strasbourg, France, and won a spot in the *Caenorhabditis elegans* lab of biologist Gary Ruvkun at Harvard Medical School in Boston. Working with a well-known investigator in a lab small enough to ensure him individual attention but big enough to allow him some independence, Hobert honed his knowledge of the model organism, the first multicellular organism whose genome was fully sequenced, and in 3 years got his name on six published papers—four as first author.

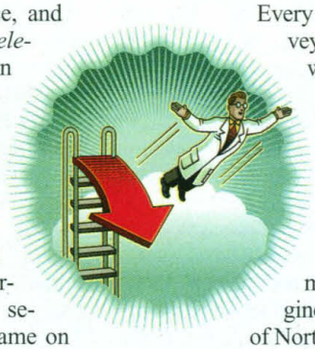
Indeed, his postdoc experience was so productive that in January 1998 David Hirsh, chair of the biochemistry and molecular biophysics department at Columbia University, called him up and asked if he was interested in a job. Now, at 32, Hobert is an assistant professor of neurobiology at Columbia and the recipient of a prestigious international research grant from the same Human Frontiers organization that funded his postdoc.

Such a career trajectory is not in the cards for everyone. But Hobert's success to date rests on more than his intellect: Along the way he also made some canny career decisions that set him apart from his peers. Indeed, when *Science* called up a score of high-achieving young scientists to learn about their postdoc experiences, at least half of them began by explaining that they probably had not done things the way most people do. That was a tip-off to what's special about this group—they trust their own instincts and march to the beat of their own drums.

And that's only part of their formula for success. They've also had the foresight to pick promising fields before they got overcrowded and the ability to see where their work fits into a larger picture. And although they are independent thinkers, they also understand the importance of traditional markers of success: pedigree, publications, and fundability. Finally, they are the type of person others want to be around.

We've transformed these common themes into what might be called eight attributes of highly successful postdocs.

ATTRIBUTE #1: Get ahead of the curve



Every hot young scientist surveyed managed to meld what he or she is really interested in doing with an area that has a lot of growth potential. "Assess your research field," says Scot Martin, 29, an assistant professor of environmental sciences and engineering at the University of North Carolina, Chapel Hill, and a recipient this year of the Presidential Early Career Award in Science and Engineering. "Think about what's opening up and what will be exciting areas that will interest academic departments once you finish your postdoc."

That approach has paid off handsomely for computer scientist Melanie Mitchell, 40, of The Santa Fe Institute in New Mexico. After doing a thesis on artificial intelligence and cognitive science, Mitchell switched to evolutionary computation—applying ideas from biological evolution to computer programming—for her postdoc at the University of Michigan in the early 1990s. "I was following what I wanted to do the most," she says. At the same time, "I thought the field had a lot of possibilities, and there were not that many people working in it." There are now, and Mitchell—a finalist this year for the McDonnell Foundation's $1 million Centennial award to young investigators—has become the scientific equivalent of an investor who bought into a hot stock before it shot up.

But picking a field just because it looks fashionable is not a good idea, warns Alexandre Barvinok, 36, an associate professor of mathematics at the University of Michigan, Ann Arbor. "When you see a bandwagon approaching, it's already too late to jump on," he says. "Better to do what you think is right [for you]."

ATTRIBUTE #2: Follow your heart

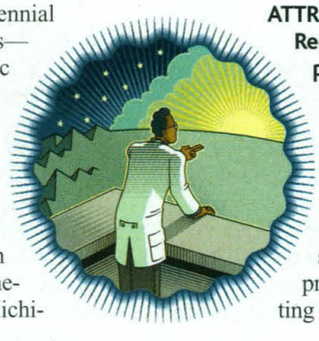
Hot young scientists can't emphasize enough the importance of sticking with what turns you on. Barvinok recites the advice of one of his mentors, Louis Billera of Cornell University: "If you do things the way you want to and others are unhappy, it's their problem. If you do it the way they want you to and they're still unhappy, it's your problem."

Carolyn Bertozzi, a 32-year-old assistant professor of chemistry at the University of California, Berkeley, agrees that you're more appealing to employers if you're following your bliss. "I definitely find myself most attracted to those who are in my mind a singularity. … I like to see someone drawn to their chosen field out of pure interest, excitement, and passion," she says.

Bertozzi went against the advice of her professors when she decided to do a postdoc in immunology after her Berkeley Ph.D. in chemistry. "I was counseled very strongly against it. They warned me that everyone would forget me if I left chemistry," she says. But she wanted to apply chemistry to a "very interesting problem" involving cell adhesion that Steven Rosen was working on at the University of California, San Francisco.

The detour wound up helping, not hurting, her career. "When I applied for academic positions, I'm sure I gave a job talk that people hadn't heard from anyone else," says Bertozzi, who joined the Berkeley faculty in 1996. Her latest achievement is a MacArthur "genius" fellowship, given in June after she figured out how to modify sugar molecules on cell surfaces to reveal characteristics of carbohydrates. The technique can be applied to learning more about cell communication and protein folding, for example.

ATTRIBUTE #3: Remember the big picture



As important as knowing one's own field is knowing how it fits into the work of others. Nalini Ambady, an associate professor of psychology at Harvard University, wasn't thrilled about the prospect of a postdoc after getting her Ph.D. in social psycholo-

ILLUSTRATIONS: PETER HOEY

gy from Harvard in 1991—"People [in psychology] usually go straight to academic positions," she says. But there weren't many jobs around, so when her adviser Bob Rosenthal offered her a position, she took it.

That decision allowed her to continue a line of research—studying how people make social judgments about each other after brief observations—that bears on such areas as teaching effectiveness and doctor-patient relationships. "I was able to plan for the next 3 to 4 years and start thinking programmatically about the work and where it fits in," says Ambady. "If I'd gone straight into an academic position, I would have been overwhelmed." The experience has clearly paid off: She was hired by Harvard in 1993, and this year she received a presidential early career award for "fundamental contributions to understanding the accuracy of social judgments based on thin slices of information."

ATTRIBUTE #4: Acquire a pedigree

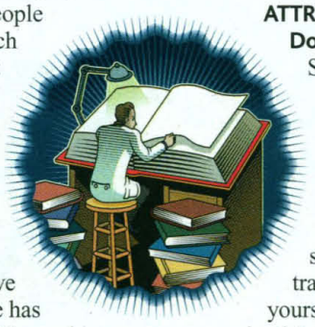
Although following your own instincts is vital, it's also important to look good to potential employers. That's what doing a postdoc with a prominent person can achieve, as well as generating an invaluable network of contacts.

"The notion of the pedigree still holds some water," says Bertozzi. Neuroscientist Randy Buckner, 29, an assistant professor of psychology at Washington University in St. Louis and another Centennial finalist, agrees: "Coming from a great lab is a major predictor of future success." Chemist Cassandra Fraser, 36, an assistant professor at the University of Virginia, Charlottesville, who did her postdoc at the California Institute of Technology (Caltech) with well-known chemist Robert Grubbs, says she has observed that a strong candidate from a top lab will often have an edge over even a reportedly brilliant applicant from a so-so lab.

Not everyone agrees. Ruvkun says some people coming out of great labs may look good based on the work of others, on the principle that a high tide raises all boats. "So someone [good] coming out of a lab not so well known is really impressive."

As important as a pedigree is a track record. A strong list of publications helps the potential employer figure out, as Buckner puts it, "Is this person a 'closer'?" For every paper published, Buckner believes, "there are two others that people have dropped" just short of getting them ready for publication.

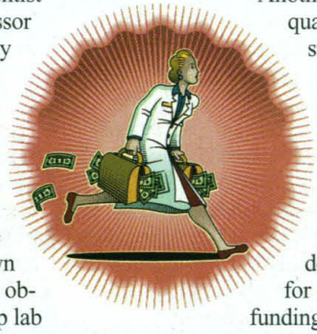
ATTRIBUTE #5: Do your homework



So how do you land that great postdoc position? Start by acting like a grown-up. "There's a transition you have to make, from thinking of yourself as a person in training to thinking of yourself as an independent scientist with opinions to offer," says neuroscientist Jennifer Groh, a 33-year-old assistant professor at Dartmouth College in Hanover, New Hampshire.

Applicants need to be thoroughly prepared to explain what they can contribute to the lab. Ruvkun says he looks for people who "exude mastery"—something Hobert did "right from the start." But, he says, "when people apply I'm always surprised at how few of them have actually read everything from my lab." Hobert agrees: "Now I'm interviewing [postdoc applicants] myself, and it's important if this person really read the papers I've written. … I would think only half of them do." Enthusiasm is important, too, he adds: "I just had an applicant here whom I really liked. But I did not make him an offer for the simple reason that he didn't send me an e-mail afterward telling me he was interested."

ATTRIBUTE #6: Bring money

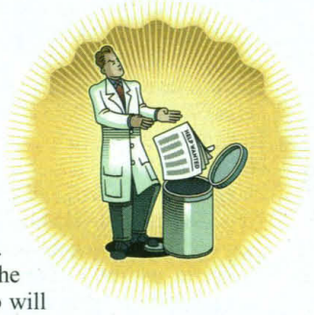


Another very attractive quality is the ability to stand on your own feet financially. Hobert offers this bit of advice: "If you are accepted in a lab, and the principal investigator tells you you don't need to apply for funding, apply for funding anyway." It looks good on your CV, helps you organize your thoughts, and demonstrates that you can generate "excitement about your research plan." Conversely, adds North Carolina's Martin, if you are applying for a postdoc position, "a bad way to open the conversation is by asking, 'Do you have money?' "

Martin used his fund-raising prowess to land in the lab of a Nobel Prize–winner. After doing his Ph.D. at Caltech on water (aquatic photochemistry), he got interested in air and decided he wanted to work with Mario Molina at the Massachusetts Institute of Technology (MIT). Instead of asking for a job, however, Martin asked Molina to sponsor his fellowship application to the National Oceanic and Atmospheric Administration. From there it was a short step into the MIT lab, which Martin joined 2 weeks before Molina won the 1995 Nobel Prize for ozone chemistry.

The type of fellowship can also be very important, says Andres Garcia, 30, a biomedical engineer who snared a tenure-track position at the Georgia Institute of Technology in Atlanta only 1 year into a Ford Foundation minority postdoc in David Boettiger's microbiology lab at the University of Pennsylvania. "Bioengineering is a very hot field, and the prestige of the Ford Fellowship made me look good," says the Puerto Rican–born Garcia.

ATTRIBUTE #7: Forget the want ads



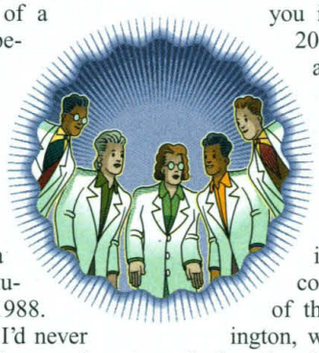
"A lot of people view the postdoc position as just a buffer against a bad job market. They look at the ads and see who will pick them up for 2 years while they wait to get their shot at the market," says Bruce McCandliss, who is finishing up a postdoc in cognitive neuroscience at the Center for the Neural Basis of Cognition at the University of Pittsburgh. That's the wrong approach, says McCandliss. A postdoc, he says, "offers the chance to form a unique collaborative relationship that should not be considered lightly."

McCandliss, 33, wanted to extend his doctoral work on tracking learning-related changes in brain waves into a project that uses functional magnetic resonance imaging (fMRI) to track changes in brain activation as children learn to read. "The domain was brand-new," he says, and very few investigators were working on this question. He decided that Pittsburgh was the best place in the country for him to both learn fMRI and collaborate with experts on reading. Although there was no direct funding available for such a postdoc position, McCandliss brainstormed with his Ph.D. adviser Michael Posner at the University of Oregon and several researchers in Pittsburgh. He ultimately won a grant from the McDonnell Foundation for his salary, and the Pittsburgh team later obtained a large grant from the National Science Foundation.

"I thought of the postdoc as a way to set

up the most exciting collaboration I could imagine, rather than a process of hunting for an advertised job," says McCandliss. "People who wait and answer general ads for postdocs can wind up working on a preexisting project and have less of a hand in designing the whole experience."

Another high achiever who strayed off the beaten track is 32-year-old computer scientist Michael Littman, an assistant professor at Duke University, who pursued what he now calls a "predoc." He spent 4 years as a researcher at Bellcore after graduating from Yale University in 1988. "My family was convinced that I'd never go back to school," he says. But the experience allowed him to discover his real interests, laying a solid foundation that "helped me go through my Ph.D. faster." It also served the function of a regular postdoc: His current lines of research—artificial intelligence and cross-language information retrieval—"both have their roots in my time at Bellcore."



ATTRIBUTE #8: Be a team player

"Your accomplishments can get you into the top 20 out of 200," says Martin. "But after that any one of those top 20 can do the job well." At that point, it's the nuances that count—and that's where the interpersonal part comes in. Groh is a good example, according to Mike Shadlen of the University of Washington, who did a postdoc with her. Groh, who does experimental work with humans and monkeys on how visual and auditory signals combine and generate behavioral responses, is "extremely generous and kind-spirited," says Shadlen. She's "very open with her ideas—enthusiastic, willing to engage, willing to be wrong. She's the kind of person you want to hire in your lab."

Groh, who also has an impressive pedigree—she worked with David Sparks at the University of Pennsylvania and did a postdoc with William Newsome at Stanford University—makes it clear that interpersonal skills have to include savvy as well as nice. When she interviewed for a postdoc, she asked people about the atmosphere in the lab and whether there were any hidden conflicts. And she expects people applying to her lab to do the same. Her combination of attributes won her nine job offers while a postdoc, including a $1 million start-up offer—four times the norm—from The Rockefeller University, which she turned down because she and her husband were looking for jobs in the same place.

Following all these rules doesn't guarantee you the job of your dreams, of course. But ignore them at your peril, say those former postdocs who have found them helpful in achieving success at a young age.

–CONSTANCE HOLDEN

NEWS

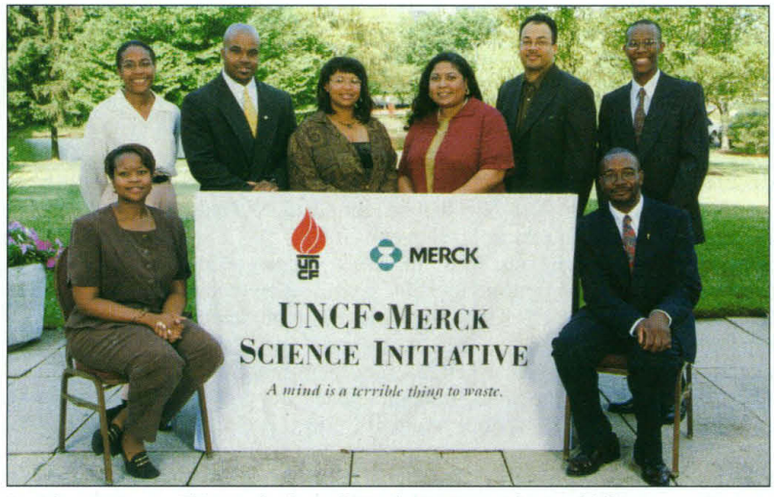
Minority Postdocs Are Rare, Independent Breed

The tiny number of minority postdocs suggests that the problem starts at the beginning of the pipeline. Still, very little is being done to plug the leaks near the end, where careers are meant to blossom

For the past 3 years, 10 talented U.S. African Americans have won a biomedical postdoctoral fellowship under a program funded by pharmaceutical giant Merck & Co. and administered by the United Negro College Fund (UNCF). This year, the program will expand to 14 awardees, thanks to additional funding from another drug company, Parke-Davis. It doesn't sound like much until UNCF's director of science education, Jerry Bryant, tells the rest of the story: "By my estimation there are only 124 African Americans currently doing postdocs in the biomedical fields who are U.S. citizens or permanent residents. And we're funding a significant proportion of them."

Minorities are rare in science all along the educational pipeline, but by the postdoctoral level the factors that pluck African Americans, Hispanics, and Native Americans out of science have shrunk the pool to vanishingly low numbers. And because the best way to change the situation is to boost the numbers entering the pipeline—reaching back to high school and even elementary school—minority postdocs haven't gotten much attention. Proponents of these special programs argue that their tiny numbers make each minority postdoc precious and that focusing attention on them is the best way to encourage others to follow in their footsteps. But the vast majority of scientists seem to feel that the scarcity of underrepresented minorities is not an issue that should be addressed at the postdoc level, where performance is all that matters.

Even tracking the numbers of minority postdocs is difficult. Although African Americans, Hispanics, and Native Americans make up 24% of the U.S. population and graduate from high school at rates close to those of whites, they receive only about 14% of the undergraduate science and engineering degrees and only 7% of science and engineering Ph.D.s. By the time they become postdocs, their numbers are so small that the National Science Foundation (NSF), in its regular survey, doesn't even collect data by race; hence Bryant's estimate is based on a rule of thumb that the postdoc population in biomedical fields is roughly twice the number who earn Ph.D.s annually in those fields. Surveys that follow the fate of Ph.D.s likewise come up empty when tracking minorities. A Berkeley study that tracked down 654 biochemists 10 years after their Ph.D., for example, contains replies from only nine Latinos, four African Americans, and no



Postdoc partners. This year's class of Merck-UNCF postdoctoral fellows constitutes a significant fraction of new African-American biomedical postdocs.

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