REAL LIFE I

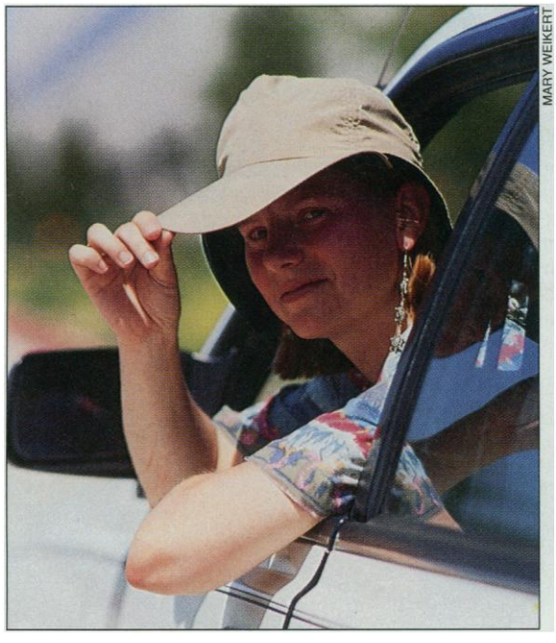
The Attractions of Biotech Careers Over Academia

No grant sweats, no teaching torpor, no administrative angst: Time for an alternative?

From the time she was an undergraduate at the University of California, Berkeley, doing research on molecular biology, Teresa Burgess seemed headed for an academic research career. After doing her Ph.D. work in a high-powered lab at the University of California (UC), San Francisco, she was awarded a prestigious Helen Hay Whitney postdoctoral fellowship, which she began at Yale and completed at UC Santa Barbara, where her husband had landed a job. The next career step, to a faculty position, could have been more problematic, since UC is the only university in the Santa Barbara area. But once again things were in Burgess' favor. Five years into her postdoc, a position in cell biology opened up at Santa Barbara, Burgess applied, and she was offered the job. That sounds like a perfect beginning for an academic career—except that Burgess did the unheard of: She turned down the position.

What caused the promising biologist to give up an academic dream come true? She had caught a glimpse of life in the biotech industry. In case nothing turned up at UC, Burgess had hedged her bets by interviewing for a job at Amgen, a company in Thousand Oaks, north of Los Angeles. She liked what she saw—so much so that when they extended a job offer, she snapped it up, despite the hour-long commute she would have to face twice a day. "What impressed me the most," she says, "was how easy it is to do science here. There is no money trouble...and there is a large support staff to make your life easy."

Now it's been several months since Burgess became a research scientist in Amgen's mammalian cell biology department, and she is still impressed, and happy not to have the grant-writing, teaching, and administrative burdens that often make assistant professors long for a world where they could just be highly paid postdocs and focus on research. Indeed, Burgess feels she has found something close to that fantasy at Amgen. "It feels like I'm going to get to be a postdoc forever," she enthuses, "which some people may describe as heaven."



MARY WEIKERT

Contented commuter. At Amgen, says Teresa Burgess, "it feels like I'm going to be a postdoc forever."

Burgess is just one of a growing cohort of top young biologists and chemists who are breaking with academic tradition and taking a serious look at careers in biotech. Some are driven by fear of funding difficulties if they stay in academia, or by the desire for a more focused work environment and saner work hours than their assistant professor peers. Others are drawn to biotech because they want to work as part of a team and to see their findings put to practice, and by the growing sense that the quality of science in the private sector matches that in academia. Almost all have discounted the stereotypical notion rampant in academia into the 1980s: that going to industry meant selling out your ideals as a researcher. "There was a prejudice 10 years ago that all the good research was in academia, and poor scientists went to industry," says Peggy Wentworth, an immunologist working on new forms of disease therapy at Cytel, an immunology-based company in San Diego. "That has really changed....A lot of good scientists are migrating to industry."

Still, for those who haven't made the switch, old attitudes die hard. "Many people recommended that I not go into industry," says Wentworth. "But I kept an open mind." John Fikes, a molecular biologist at Cytel, says he too had to combat mainstream opinion. "The prejudice is reducing, but you do go through training being taught that the apex is the faculty position," he says. Fikes simply refused to accept that view. "The most important thing is to make the decision for yourself—not for your peers, not for your mentors."

And even to the young scientists who are willing to rise above prejudices, the biotech industry is a bit of a black box stuffed full of unanswered questions about lifestyle, research autonomy, and how business considerations will affect their research and their lives. Last year, "Real Life" concentrated on young scientists beginning their careers in academia; this year, by popular request, we interviewed young scientists who chose careers in the biotech industry, to find out why they made their choices, and how they liked what they found. Their answers are as varied as the companies now proliferating on the biotech landscape. Nevertheless, from their collective experiences, some themes emerge that may prove instructive to scientists of all ages who are considering a move to biotech.

Industry: An unlikely haven for basic research

The primary question on the minds of many postdocs in biology who are looking for permanent jobs is a simple one: Where can I spend the most time doing independent, question-driven, basic research? Increasingly, the answer they come up with is industry, and one major reason is that many companies not only support their basic researchers well, but let them pursue their projects with minimal direction from above. Molecular biologist Douglas Fisher, who took a position at Pfizer, a large pharmaceutical company headquartered in Groton, Connecticut, after completing a postdoc at UC Irvine, says he had never planned to go into industry, but when he saw so many of his peers "going bananas" trying to fund their academic labs, he changed his mind. "I enjoy doing science," Fisher says. "The prospect of spending most of my time getting the money to do the science, rather than doing it, was less attractive to me."

Fisher, whose training is in immunology, found his niche in a group studying the biology of inflammation at Pfizer. "I'm in a basic research unit to which the company looks for ideas," says Fisher. And that means there is a lot of room for individual exploration within the subject designated by the company.

How did he know he'd found a place where he could

Stories From the Dark Side of Company Science

A career in biotech is not for everyone, and scattered among the happy corporate scientists are those who once thought biotech might hold the answer for them but who have instead learned the hard way that—at least at the companies they had chosen—the compromises were just too great.

Most frequent among the complaints voiced by these scientists is a sense of a serious loss of independence—or, as some researchers put it, a feeling that they were compelled to compromise their scientific standards. Some of the disgruntled are still in their ill-fitting jobs, and others have beaten it back to academia. But one thing all had in common was that every one requested—either for self-protection or out of company loyalty—that their stories be told anonymously.

Take the young molecular biologist who says he was drawn to a large drug company for job security, higher salary, and unlimited research resources, but is now having second thoughts. "I know different companies have different cultures," he says, "but here the security is an illusion. People are asked to leave if they don't do what they are told, if they don't conform to company culture."

He also felt used by the company's attitude toward publication. "They pay lip service to publication," he says, "but really it is just promotion. You are putting [the company's] name on the papers. That is publicity for them."

Indeed, many young scientists cannot adjust to industry attitudes toward publication. One of the biggest issues, they say, is the fact that some of their best work may be delayed or not published at all for proprietary reasons. "The answer that is required for drug development is obtained and then that's the end of it," says one researcher. "Putting the finishing touches on [the work] and doing the kind of experiments required to make a nice paper out of it never get done." That relegates the work to eventual publication in second-tier journals, he says, which can hurt a researcher's resume and make it difficult to return to academia. Another disgruntled researcher says his best work may not be published at all. "You can only publish on drugs that have bad side effects, or don't work effectively," he says, "not on the things that they think may be fruitful."

And what if your work turns out to be commercially fruitful? This might sound like the ultimate high for a researcher who has chosen industry, but for one postdoc the experience instead drove home the message that she was too independent-minded to be satisfied with life in biotech. When, after several years, her research project at a mid-sized biotech company began to look as though it had promising commercial potential, she hoped that success would get her an offer of a permanent job running the project. But instead, her work was yanked from her hands by upper management. "My project is being run by a committee," she complains. "Having worked this hard and long that's not what I expected."

Even those who aren't so fiercely independent can find themselves disillusioned. "I'm a team player," says another young researcher, who thought that this outlook made him well suited to biotech. But he soured on the management at the startup company he joined when he was asked to "put the right spin" on his research when presenting it to potential corporate partners. His bosses were asking for more than benign optimism, he says—they wanted him to withhold negative data to make the story seem rosier than it was.

Another complaint by scientists who join startups is that business realities can cause the company to shift direction overnight, leaving research employees caught in the lurch. "It's typical for a young company to try to shuffle people around to meet their needs," says a molecular virologist who knows firsthand from her experience at a biotech startup. The basic research project for which she had been hired was pared back, and she was reassigned to a contract service lab where she found the work boring. "They didn't have a commitment to basic research," she says. "They were trying to redirect their resources toward product development." Frustrated and disillusioned, she quit.

Another scientist, who experienced a similar reassignment shortly after joining a different startup company, attributes such situations to managerial structure. In both instances, the companies are led by people with backgrounds in business rather than research. Business types, he says, tend to expect basic research to produce results on an unrealistic timetable, and may be too quick to abandon it when it doesn't.

"There are two kinds of startups," says this scientist. "There is the startup where a group of scientists with a really good idea went to venture capitalists [for support], and the scientists are the ones running the show. The second kind is a place headed by business people who don't know the technology but have brought in people with expertise." Avoid that second type, he advises. As for himself, his biotech experience has sent him heading back to academia. It may be tough to get grants these days, he says, "but at least you have some control of your destiny."

–M.B.

be happy? Fisher says it is important to have your antennae up for telltale signs when interviewing for a position. "If [it's clear] they will be looking to you for ideas, that's a good sign," he says. "If they say, 'We have this project and we want you to do it,' that is probably a warning sign." Fisher says his screening paid off: "In many respects I feel like I have almost more freedom to explore things here than I would in academia," he says, since he is not bound by having to fulfill the stated goals of a grant.

Closing the academic freedom gap

Indeed, many young industry scientists pointed out that the funding difficulties faced by academic scientists have narrowed the "academic freedom" gap between academia and industry. Industry scientists have to pursue research in areas that interest the company, says Mark Gallop, a chemist at Affymax, a Bay Area biotech company seeking new methods of drug discovery. But, he says, academic scientists are no less constrained these days, as they try to figure out what will interest the study sections that award grants: "There is an illusion in this whole business of academic freedom," he says. "You are forced to work on what will be funded."

Of course, there are other considerations that make freedom within a company more qualified than it is in academia, such as the fact that companies have managers who can tell you what to do. "The fear of [losing] control over your research... will always be there in industry," says Kevin Coleman, a molecular biologist who took a position in cancer research at Bristol-Myers Squibb 4 years ago after completing a postdoc at UC San Francisco. In industry, change must be accepted as simply "a part of life," says Coleman, who knows firsthand how jarring sudden change can be. Shortly after he joined Bristol-Myers, it merged with Squibb, and after putting a year and a half of work into a growth-factor research project,

For Non-Ph.D.s: The Grass Is Greener in Biotech

When she decided to return to work after raising her three children, Carol Foxall went back to school to supplement her bachelor's degree in biology with a master's. Then, in 1984, she got a job as a lab manager in a top research lab at UC San Francisco. But Foxall says she quickly became disillusioned. "The academic concept of 'lab manager' [is someone who] makes sure all the supplies are there and acts as nursemaid to the graduate students," she says. "I didn't go back to graduate school to be a lab mother." So Foxall quit that job within a year, guessing that her opportunities would be better in biotech. And she was right.

Today, Foxall is a staff scientist and lab manager in the industry style at Glycomed, a small Alameda, California, startup company. And at Glycomed she's no nursemaid: She designs and directs research projects. "I have a very satisfying career," says Foxall. "I'm allowed to work at a Ph.D. level without the letters after my name."

This may be unheard of in academia, but non-Ph.D.s are finding that the ceiling to their advancement is a bit more penetrable in the world of biotech. "There is more opportunity for someone without a Ph.D. in industry," confirms Dennis Danley, a non-Ph.D. research scientist at Pfizer. "Performance per se can allow you to be more recognized and obtain more responsibility than you can in [academia]."

PAMELA GENTILE

No nursemaid. Master's degree holder Carol Foxall designs and directs research projects at Glycomed.

That's not to say success-hungry grad students should jump ship in large numbers. Only a few non-Ph.D.s in biotech manage to break out of technical-level research-associate positions to the scientist-level positions normally held by Ph.D.s, and many of those who do specialize in production skills, such as large-scale protein purification, that are less stressed in academia. Understandably, they often credit luck as much as skill or perseverance for their success, and while they are generally satisfied, few would recommend the difficult path they have taken to anyone who has the chance to get a Ph.D.

Terry Martin credits her success to good fortune: She was in the right place, she says, when a need arose. Martin has a master's degree in biology, and had worked for several years as a technician in Alzheimer's disease research before taking a technical position at Bristol-Myers 6 years ago. A year later, when the company decided to begin an Alzheimer's research program, it had no Ph.D.s with experience in that area, so Martin was given the opportunity to give presentations on Alzheimer's within the company. After that division was up and rolling, she was eventually promoted to scientist and now runs her own research lab. "I was very lucky," she says. "I'm sure there are a lot of people who have the right stuff but haven't been given the opportunity to show it."

No doubt that is true, but despite Martin's modesty, a big factor in her case was her readiness to seize the opportunity and to show off what she knew. "I know a lot of people who are very bright [but who] got stuck at a certain level job," says Sid Wolfe, himself a non-Ph.D. chemist working at the scientist level at Chiron Corp. "A lot of it was because they were never willing to extend themselves to being able to give well thought-out presentations. When they get up and talk in front of people, they don't sound like scientists, they sound like technicians." Wolfe, who directs a product analysis lab, feels that the thoughtful in-house presentations he gave at his former job at Cetus were key to his promotion to scientist there.

Another way to get noticed, according to Wolfe, is by doing creative work at the bench. In his early days at Cetus, he was working on protein purification schemes that were brand new, and there were few people who were expert in the process. "There was a lot of room for innovation," Wolfe says, and he concentrated on making creative improvements. "If you made an improvement, people really saw you very quickly, and it was very clear who was doing things."

Jeff Gorrell, a senior scientist at Genentech, agrees. With a bachelor's degree in biochemistry, Gorrell used his aptitude for innovation to climb to his present position, running a protein purification group. "If you don't go out and take some risks, and try to show some innovation on your own, you're going to be promoted from research-associate level 1 to 2, 3, 4, 5, [all technical-level positions] ad infinitum," he says.

One of the most important features that Gorrell and Wolfe share with most non-Ph.D. scientists who have reached the scientist level is a skill that is in strong demand. In the early 1980s, both had rare experience in large-scale protein purification, making them hot commodities in the budding biotech world. "Develop as many skills as you possibly can," says Glycomed's Foxall, and then find a company that needs them. Foxall's colleague, Pam Hirtzer, did just that—she was able to negotiate a job offer at the scientist level when she joined Glycomed 3 years ago because the company needed her unique skills as an analytical chemist.

Hirtzer was more fortunate in that regard than many other scientists without Ph.D.s, who find themselves demoted back to technical-level jobs whenever they change employers. Wolfe, who had reached a mid-level scientist position at Cetus, temporarily lost that status when he switched to Chiron before the companies merged. And Gorrell, who had been working for years at the same level as Ph.D.s at Calbiochem in San Diego, had to enter as a research associate when he joined Genentech. He wasn't promoted to scientist for nearly 3 years. Without a Ph.D., says Gorrell, "no matter where you go and what you do, there is always going to be the necessity to prove yourself all over again."

In addition to those occasional career-slowing steps backward, there is also a point where non-Ph.D.s do reach an effective ceiling, says Wolfe. That's when it comes to promotion into upper management. "I'm a little bit stuck in terms of moving along management lines," he says.

So what do these veterans of the system recommend to aspiring non-Ph.D. scientists? "It depends on the level at which you wish to contribute," says Martin of Bristol Myers. "If you really wish to be involved in directing [research]...you would certainly be doing yourself a disservice not getting a Ph.D. at the outset." Gorrell agrees: "A lot of young kids come into manufacturing at Genentech as their first jobs, and...I tell them the best thing you could have done was to stay in school. If I had it to do over again...I would definitely stay in school."

–M.B.

Coleman was notified it was being canceled. "It was upsetting that management was making these decisions, [and] that I didn't have control over them," he recalls.

In his case, though, things worked out well. "To [management's] credit, and to my satisfaction," he says, "if you could make a strong argument for what you thought they should be [pursuing], they let you do it." Coleman made a successful pitch for a project on tumor suppressor genes. "It was a golden opportunity for me to be able to start up a program that was completely self-initiated," he says.

Commercial satisfaction

While commercial considerations can put a crimp on unfettered basic research, they also can provide a new form of satisfaction for scientists—that of being part of a team, working toward a focused, and applied, goal. "It's very exciting to see an endpoint for your research," says Cytel's Wentworth. Since joining the company, she has been involved in the development of a vaccine for hepatitis B virus that will soon enter clinical trials, and has also worked on a cancer therapy project that involves treating and reintroducing a patient's blood cells. Companies also can provide a multidisciplinary approach to a problem that is rare in academia, says Brian Brandley, who was drawn to leave his academic postdoc at Johns Hopkins University 4 years ago for Glycomed, a startup company based in Alameda, California, that specializes in carbohydrate research. At Glycomed, the research group ranges from analytical chemists to cell biologists, all with a primary interest in carbohydrates. "Being able to work with a group of people who really care about carbohydrates is really unique," says Brandley.

And things move faster at tightly focused companies. At Hopkins, says Brandley, he might have taken a newly isolated carbohydrate to an analysis facility, only to find out 6 months later that they had handled it improperly. "Here I can do projects in weeks or months that in other situations would have taken me years."

John Fikes of Cytel finds working with a multidisciplinary team intellectually enriching as well as expedient. In academia, he says, "you tend to focus on your work and your lab and your problems and your grant in your field. What I enjoy is to be part of a project and to learn from it." And he has plenty of opportunity, since much of his time away from the bench is spent "meeting and discussing basic science with immunologists, chemists, cell biologists." And the intellectual broadening can go beyond just discussion, to new lines of research, says David Fontana, who finished a postdoc on the pharmacology of drug abuse at NIH and joined the pharmacology department of the Palo Alto drug company Syntex about a year ago. "I've expanded my scope; I'm doing stuff with anxiety, cognition, things I thought I'd never do. It's exciting," he says. "I feel like I'm in grad school again."

Workplace sanity

There are other aspects of graduate school life that many scientists would just as soon not relive—such as the long hours that leave little time for life outside the lab. And while that's just what they expect if they take a position at a top research university, it's not reputed to be the norm in industry. Indeed, many scientists see a job in biotech as a way to bring some sanity to their work hours. Coleman, of Bristol Myers, says his son was born as he was completing his postdoc and beginning to consider academic jobs. "I had fears that because of the tenure process, I would be so devoted to the lab that I wouldn't see him until he was 7 years old," he says, so he took a job in industry instead. But as Coleman and many others told *Science*, the industry lifestyle doesn't exactly live up to the 9-to-5 reputation it has acquired in the minds of many academics. "The same pressures are still there," he says, adding that the self-imposed drive to keep his research moving forward has got him working 12-hour days. Gallop of Affymax expands on this point: He was attracted to the company, he says, because "it was a group of people who liked what they

(Continues on page 1765)

Checking Out Industry as a Postdoc

Unsure whether biotech is the right choice for them, some scientists find it helpful to test the waters before they're committed. How? By taking a postdoc in industry.

That's what Cynthia Hemmenway did.

After finishing graduate school at Columbia, Hemmenway wanted to get training in plant molecular biology, and she was also curious about jobs in industry. So she decided to join the postdoc program at Monsanto, which has a reputation for its research strength in plant biology. "I had a really good feeling that I would be able to do well there in terms of publishing, be in an area that is moving very quickly, and at the same time learn a little bit more about how companies work," says Hemmenway. She didn't stay at Monsanto—she is now an assistant professor at North Carolina State University—but she says it was "a great place to work."

KAREN TAM

Plant virologist Hemmenway. Monsanto experience gave her more options.

The beauty of a well-chosen industry postdoc is that it can leave you well-positioned to move on to a job in either industry or academia, says Linda Hanley-Bowdoin, a North Carolina colleague of Hemmenway's who also did a postdoc at Monsanto. The key to keeping both options open, she says, is to be sure that "you have all the credentials that an academic postdoc would have when you're out looking for a job." That was easy at Monsanto, Hemmenway adds, where postdocs were "encouraged to work on [a project] that was not necessarily going to be proprietary." That left them free to build their resumes by publishing their work and presenting it at meetings. At the end of their postdocs, both Hemmenway and Hanley-Bowdoin had the best of both worlds—research projects they could take with them to start academic labs, and job offers at Monsanto as well.

Hemmenway originally chose to stay at Monsanto, and only left when both she and her husband were offered jobs in North Carolina. Hanley-Bowdoin says she too would have taken a job with Monsanto, but one of the realities of industry life tipped the balance toward academia: She was deeply involved in her plant virology project, but it was of little proprietary interest to Monsanto; if she were to stay as a staff scientist, she would have had to give it up. And she cites another reason for leaving: She wanted to try running her own academic lab. Still, she says the Monsanto experience afforded her an insight into industry life that she otherwise would have missed, as well as a future industry entree if the academic route doesn't pan out.

–M.B.

But then, every once in a while we see a real advance—even if it's nothing more than the fact you can now get carrot sticks at McDonald's."

Opportunity in disaster

Sometimes you don't have to do anything at all to see your job change in unexpected and rewarding ways. Joseph R. Sullivan was a fish pathologist with the Alaska Department of Fish and Game in 1989 when the Exxon Valdez ran aground in Prince William Sound. "I was as sorry as anybody when the spill happened," says Sullivan, 45. "But I also felt that a huge research project had just dropped in our laps." Suddenly fish pathology was a hot topic, and Sullivan's advice was needed—how much had the fish in the Sound suffered, and how soon could the natural fisheries be restored? Appointed fisheries program manager for the state's special Oil Spill Impact, Assessment and Restoration Division, Sullivan soon realized that merely providing the scientific answers to these questions was not enough. "There are six different agencies that have to agree on how we're going to do things," he explains.

Management, rather than fish pathology, now constitutes the biggest part of Sullivan's job. It is also his biggest headache. "In school, I learned how to manage a resource," he says, "I learned nothing about managing people—and it's tough," says Sullivan, who is taking management courses by mail. Still, the restoration of the Sound's fisheries is the most satisfying work he has tackled. "I expect this is how life is for most people," he says about the unanticipated change in his own career. "Things happen—sometimes not the best—and there you are, and you do what you can."

–Virginia Morell

Biotech Careers

(Continued from page 1721)

were doing and worked hard, and where I wouldn't feel like I was a freak for working 15 or 16 hour days."

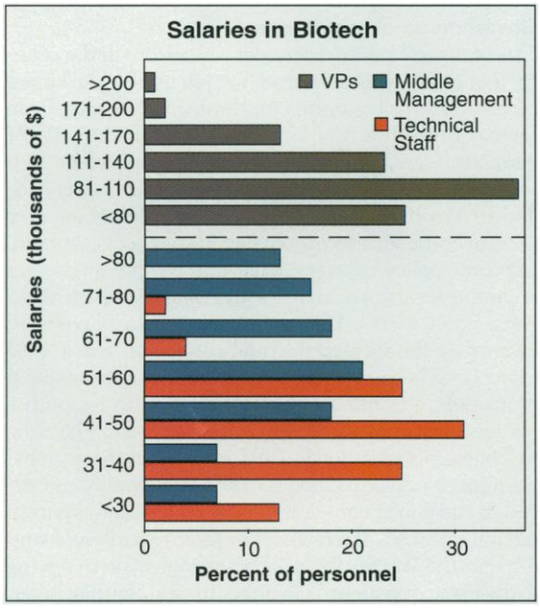
Nevertheless, most of the young industry scientists who spoke with *Science* found life in industry, while not laid back, less pressured than academia. "People at Cytel work very hard," says Fikes—which means they will be found in the lab on evenings and weekends. But "it's still easier [than academia]....I can put in 50 to 60 hours and do a very good job here, where in striving to get tenure I would have to do much more."

Life in the fast lane: startups

But what of those young scientists like Gallop who actually seek out intensity and yet want to work in industry? They often gravitate toward startup companies, where they have heard just how frenetic the pace of life can be. "I figured I was going to be working hard, because it was a startup," recalls Glycomed's Brandley, who was one of the first five scientists on the young company's payroll 4 years ago. But what Brandley hadn't anticipated was how much of a Jack-of-all-trades he would have to be. The cell biologist found himself not only planning projects, but building all the infrastructure that university scientists take for granted. That included setting up mechanisms for ordering supplies, procuring licenses for using radioactivity, and being sure safety regulations were met. "When you really start from ground zero, you have to do everything," he says. "What did I know about OSHA regulations? Nothing!...I didn't understand how difficult it would be to set up a laboratory under those circumstances until we actually got in and started doing it."

PAUL MCGUIRK

No banker's hours. Kevin Coleman is putting in 12-hour days on a tumor research project at Bristol-Myers.



SOURCE: J. ROBERT SCOTT

Green fields. 1992 base salaries—not including bonuses or stock options—for vice presidents of R&D, technical middle management, and technical staff.

These aren't exactly complaints, however. The risk and frustration paid off, financially—in the form of valuable equity in the company, which went public last year—and professionally as well. "I am occupying a more senior position in this company than I ever could hope to at this stage of my career at a more established company," says Brandley, who, just 4 years out of his postdoc, heads the 6-member cell biology department and runs an interdepartmental project with 15 members. And, he adds, "the best part is that you...really do feel that this is your company. You built it."

Gallop of Affymax says, similarly, that he's gotten quite an education being at a startup company. "I've gotten some insight into the way business works." It's a different culture, a different kind of mentality." That first-hand experience, he says, would be much more useful than a business degree were he ever to consider starting a company himself.

That's an unlikely gleam of entrepreneurial spirit from a scientist who 5 years ago, like many of those mentioned here, felt certain that his future was in academia. And in that revelation is perhaps the most important lesson for today's postdocs weighing a future in biotech versus one in academia: keep an open mind.

–Marcia Barinaga