REAL LIFE VI

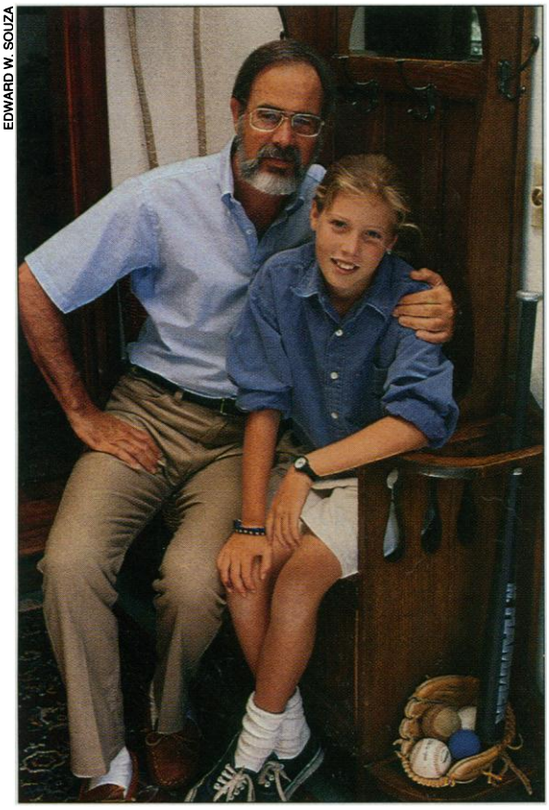
Alternate Careers: Surviving off the Beaten Path

Tired of reading about those who have successfully climbed the traditional academic ladder, scaling its rungs from postdoc to prize-winning researcher to professor emeritus without a misstep? The eight case histories that follow portray scientists who were willing to desert successful career tracks at various stages in life, to tackle new fields and professions, to leave behind the comfort of tenure for the challenge of the unknown. In each case, the scientist has deemed the risk worth taking. And that, in turn, should make it clear that the traditional academic road is by no means the only path to fulfillment—nor is there only one summit.

Switching disciplines in mid-career

In 1981, Stanford University psychologist Jeffrey Wine thought he had it made. A tenured professor at one of the world's most prestigious psychology departments, and a highly regarded researcher of invertebrate nervous systems, Wine was also a father for the first time. But his little girl had one peculiarity—she tasted salty. "She was so salty that it actually burned your tongue," Wine recalls.

Thinking it was nothing more than a regulatory problem that would disappear, Wine did not worry about his daughter's saltiness. But then, "I mentioned it to a woman I knew and she suddenly got a very strange look on her face," says Wine. "She said she didn't want to alarm us, but saltiness might be a sign of cystic fibrosis (CF)." Sadly, Wine's friend was right: His infant daughter was diagnosed with the dread disease.



EDWARD W. SOUZA

Wine and daughter. Her illness opened new doors for the psychologist turned medical researcher.

"It was a real shock to us," Wine recalls. "I knew absolutely nothing about CF, and my first response was to read everything I possibly could about the disease." As he read, Wine's career path, hitherto pointing straight to the top of his chosen profession, took an unexpected turn.

Through his copious research, Wine discovered that physiologist Paul Quinton of the University of California, Riverside, had traced the saltiness of cystic fibrosis children to a problem in their body tissues' chloride channels. The defect prevents their sweat glands from readily reabsorbing the salt in their sweat. "In some ways Quinton's work was very much like the nerve research I was doing," Wine says. "I thought, 'Maybe there's a connection here; maybe I can help.'"

He arranged a sabbatical at Quinton's lab, and by the year's end, Wine had decided to jump disciplines—from neuroscience to medical research—a leap not often attempted, much less successfully negotiated in the cliquish world of science. Says Wine: "I think if I'd decided to change fields before getting tenure, I might never have received it."

Today, at 52, nearly 10 years after his switch, Wine runs his own CF laboratory at Stanford. Officially, he is still a member of the psychology department and continues to teach introductory courses in neuroscience. While he has made significant contributions to his new field, Wine also acknowledges that "there are real problems with a sea change like this. The biggest one for me is that since I'm in the psychology department, I don't have ready access to medical students." To skirt this problem, Wine enlists postdoctoral and graduate students in psychology to assist his CF research, and grabs the odd medical student when he can.

Wine knows that he will never be considered an expert in his new career as he was in his old one. "Now, I'm much more the student—I always feel like I'm playing catch-up," he says. "But it's a mode I've gotten used to and find exciting." Wine's mid-career switch has also given him a new perspective on research in general. "I had to readjust my expectations," he explains. "I was no longer trying to be the best person in my field, but simply looking for a way to make a worthwhile contribution. It's not a race I'm trying to win. But anything I do that helps the research along is very, very satisfying to me." Wine's daughter, by the way, has benefited from several recent breakthroughs in CF treatment, and today, he reports, she is a happy, energetic 12-year-old.

Switching for fun

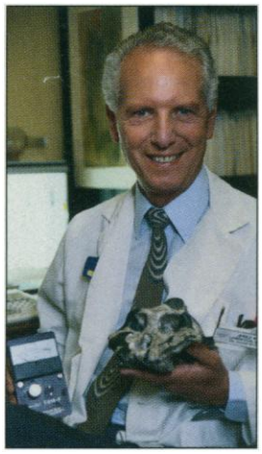
The thirst for novelty as well as the desire to do something for society have driven the multiple careers of Jerold M. Lowenstein, chairman of the department of nuclear medicine at the California Pacific Medical Center in San Francisco. "I've probably had more fun switching careers than most people do in sticking with their one career," says Lowenstein, 66.

Hooked on physics at a young age, Lowenstein initially planned to devote his life to discovering "what the world is made of." But during a stint as a weapons researcher at the Los Alamos National Laboratories in 1948, he attended a lecture by chemist Richard Meier from the Federation of American Scientists. "Dick was trying to prevent the atomic race that has since occurred," said Lowenstein, "and his speech was like an illumination for me." Lowenstein quit his job and spent several months as a lobbyist for the federation in Washington, D.C.

Satisfying? He says yes, but at the same time, he was exploring yet other ways to use his physics background "in a more humanistic way." The result of this quest: a radical career shift into medicine. At the age of 23, physicist Lowenstein enrolled in Columbia University's Medical School. "I didn't intend to be a physician," he says. Rather, he wanted to do research on brain biophysics. Much to his surprise, though, Lowenstein found he thoroughly enjoyed working with patients.

Still, this is not a man to be easily satisfied with one pursuit. Wanting to stay in touch with research as well as patients, Lowenstein found, during his internship at Stanford Medical School in 1953, his ideal mix in the nascent field of nuclear medicine. "People were just starting to use isotopic tracers, and I decided to specialize in this," says Lowenstein. He opened a practice in internal medicine in San Francisco, and received a research appointment at the University of California where he worked for two or three mornings a week developing isotopic tracers for the brain, liver, and kidney. Lowenstein continued both clinical work and research even after San Francisco's Pacific Presbyterian Hospital tapped him to lead its new nuclear medicine department in 1973.

The Lowenstein nontraditional success story doesn't end there. Three years later he met Adrienne Zihlman, a woman who was to become his second wife—but she was also to give him a third life in science. Zihlman was a professor in physical anthropology at the University of California, Santa Cruz. "I started attending anthropology conferences with her and noticed that a lot of the arguments were about the relationships among the hominid species. I thought that if you could look at the proteins in the fossils, you might be able to solve some of these puzzles." He was particularly excited about the possibility of applying radioimmuno-assays (RIA) to the anthropologists' problems.



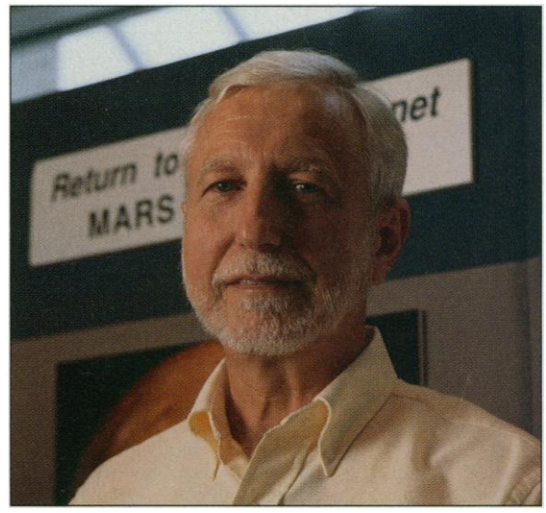
Lowenstein. Driven by thirst for novelty.

Anthropologists were decidedly lukewarm about this unconventional idea, though. "I was considered an outsider," says Lowenstein. "I didn't have a track record in anthropology, and very few people thought I could find any proteins in fossil bone." Nonetheless, by 1980, he had developed an RIA test that revealed albumin in bones ranging in age from 900 to 9 million years. The technique has proved particularly useful in wildlife forensics (the U.S. Fish and Wildlife Service calls on him to identify smuggled products), and Lowenstein takes special pleasure in having watched the field of molecular anthropology blossom into a discipline of its own.

"Many times I've been asked, 'Isn't it difficult to do all these different things?'" says Lowenstein of his multiple specialties. "But it's a turn-on to me to take on a new subject, and not only learn about it, but find a way to make a contribution."

Moving from investigator to observer

The discovery that she had no appetite for research forced Rosie Mestel, who has a doctorate in molecular genetics from the University of California, Davis, to seek a career outside the ivory tower. "My plan was always to go into academia," says Mestel. "Early on in my doctorate program, I knew I wasn't happy in the lab, but I thought I was just studying something that didn't interest me." And her postdoctoral research—on fruitflies with abnormal biological clocks—left her with the same "sinking, dreary feeling" that she had experienced as a doctoral candidate. What Mestel was drawn to, she recalls, were science articles in magazines. "I liked the idea of writing, of stepping back and seeing the larger picture, and learning about a variety of subjects." So she was receptive when a friend recommended the science writing program at the University of California, Santa Cruz.



STEVE TURNER

Dasch. Happiness for this former university geologist is being a NASA bureaucrat.

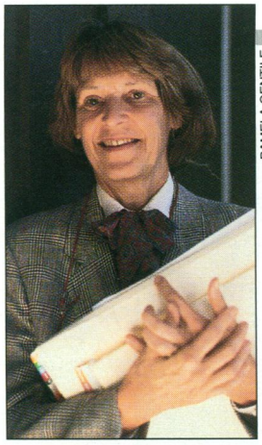
"Those courses were like coming home," Mestel says. And so was her summer internship as a science writer at the *Dallas Morning News*. Now, at 33, she's completed her metamorphosis into science writer, and has been employed since January in an entry-level writing position at *Discover*. Mestel remains pleased with her switch, while noting some key differences between her two careers. "As a researcher, you're very independent. You make your own decisions and keep your own hours. But here, I'm not as free. There are rules to obey, and I'm also now part of a team."

Dropping out of the money-chasing game

Julius Dasch, who pursued a traditional career in geology for 19 years, gradually found that he had become disillusioned with academia. Even though he became a tenured professor at Oregon State University in Corvallis, Dasch claims: "I was never very good at it...I felt that I was foundering with my teaching and research. It was always a struggle to keep my mass spectrometry lab going, and ultimately I couldn't get enough grants to pay salaries and equipment." And not until 1979, when he began teaching an introductory geology course for nonscience majors, did he find a way to inspire his students. Oddly enough, that long-awaited satisfaction was to offer him a way out.

Called "Rocks and Stars," Dasch's only successful course souped up geology and astronomy with rock music, flashy posters, and pure showbiz (Dasch once began a class by having himself shot out of a cannon). The class was such a success that in its third year, 1300 students—10% of the student body—tried to enroll. While Dasch enjoyed teaching the class, he was disconcerted by fans stopping him in supermarkets to ask for his autograph—and troubled, too, by the sniping of colleagues who termed his course "Mickey Mouse." Dasch also says: "I worried that it wasn't really what I was paid to do—which was guiding students into high-quality research."

Paradoxically, that hit course proved to be Dasch's ticket out of academia—it led to a sabbatical at NASA's Johnson Space Center in Houston. They invited him to spend a year studying moon rocks from the Apollo 15 mission. Then, 2 years later, in 1988, NASA asked him if he would like to return as a regular employee. Dasch took the plunge.



PAMELA GENTILE

Murashige. "Too much of a linear thinker" for research.

"It was hard to do that at my age," Dasch concedes, adding, "I do miss the teaching and the freedom of academia." But he says today, "I'm better at this administrative type work." Now, at age 60, Dasch manages a small group of bureaucrats overseeing the federal government's new $15 million National Space Grant College and Fellowship Program. "I also have 12.5 days a year for research," Dasch notes wryly—which he spends at the Johnson Space Center studying moon rocks. That's not much, but "I didn't take this job because of the research opportunities. I took it because what I do affects people throughout the nation—that's what drives me now."

Opting out of research

Kate Murashige, now a law partner with Morrison & Foerster in Palo Alto, California, learned early in her career that "whatever it takes to be a researcher, I didn't have. I'm too much of a linear thinker," she says, "and I found there was no joy in research for me whatsoever." So after completing her doctorate in biochemistry at the University of California, Los Angeles, in 1962, Murashige almost immediately turned to teaching, at the College of San Mateo, a community college in northern California. She stuck to that for 12 years, rising to division chairman. But although Murashige says she genuinely enjoyed teaching, "I also began to feel that I was becoming stale, and I couldn't see doing it for another 25 years." So, like many Americans looking for a new start, she enrolled in evening law school.

"I thought I might eventually go into patent law," she says. That decision, made in 1977, turns out to have been a prescient one. In 1980 Syntex hired Murashige as a patent attorney just as the first bio-engineered drugs were making their way to the U.S. patent office. Today, at 57, she is part of a 15-member team pursuing patents for a variety of biotechnology companies and universities. "Now, I have no chance of going stale," says Murashige, who helped guide the University of California to a patent for its hepatitis B vaccine in 1989.

In search of kindred souls

What if you love your research, but find the university environment too limiting? That was the problem for Charles Pfleeger, once a computer science professor, and now a computer security specialist at the Institute of Defense Analysis (IDA) in Alexandria, Virginia. "I enjoyed academia; it was definitely what I wanted to do when I entered my doctoral program," says Pfleeger, 44. But after 14 years at the University of Tennessee, where he was tenured, Pfleeger was frustrated. "I found that my colleagues and I had little commonality in our research interests," he explains. "There was no one in my department I could talk technical details with—and I think that's true in general for academia, unless you have an enormous department of 50 or so people." Pfleeger yearned for collaborative brainstorming sessions—"that's the way the best research in my field gets done."

L.J. EVANS

Sullivan. Exxon Valdez oil spill propelled Alaskan fish pathologist into management.

Seeking other computer scientists in his area of expertise, Pfleeger started a consulting company on the side. Through business contacts he discovered that those sought-after comrades usually worked for the government or government-sponsored think tanks. So in 1988, Pfleeger made his move—abandoning his tenured post for just such a job and a veritable nest of like-minded types at a computer security company in Washington, D.C. "It was ideal," says Pfleeger. "Any time you wanted to collaborate on a problem, all you had to do was walk into the hall and there was someone to talk ideas with." The same situation prevails at IDA, where Pfleeger says the best part is "working as a part of a group to extend the forefront of knowledge."

The scientist as activist

Many, if not most, scientists are drawn to their disciplines by an urge to do something worthwhile for society. A few feel the same way but not about their research: These volunteer their time to activist causes. Such was Michael Jacobson's original plan in 1970 when he joined Ralph Nader's Center for the Study of Responsive Law. Jacobson had just completed his doctorate in microbiology at MIT and decided to see if his scientific background could help solve some of society's ills. "I thought I'd leave basic research for a year and work for Nader, then go back to a university career," says Jacobson, now 48. But he never made that return trip.

For Jacobson, the turning point came after Nader's organization had launched an investigation into food additives. Nader suggested that Jacobson write a book on the subject. "Everyone then, including me, thought that food additives were harmless," says Jacobson, adding: "But it turned out that they could kill people who were sensitive." Stunned and energized by his discovery, Jacobson left Nader's group in 1971 to found one of his own: the Center for Science in the Public Interest (CSPI). He thought it might set an example for other scientists, and he liked the idea of working for himself.

Twenty-one years later, CSPI has become a scourge of the food and alcohol industries. Through books, demonstrations, public information campaigns, and media attacks, Jacobson has excoriated the fast-food giants for what he regards as their excessive use of fat, sugar, and salt. Today, even his enemies will concede that at least partly because of his efforts, sulfites are banned from fresh foods, fast-food chains must disclose nutritional information, and all alcoholic beverage containers must carry a health warning.

"What is a scientist?" Jacobson asks in response to a question about his decision to remain an activist. "Are senators still lawyers? I think one can be a scientist in different ways, and that deciding to work with environmental or social advocacy groups is a valid choice. Scientists bring certain ways of thinking to bear in these groups. We're less advocates than evaluators—we like to find a problem, find the evidence to solve it, then tell the world about it and move on to the next problem."

But unlike in science, no problem is ever really solved. "I've had to learn patience," says Jacobson. "Things move so slowly; it takes years of effort to change anything, and the corporations are relentless. They never give up and to some extent our battles are never over.

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."

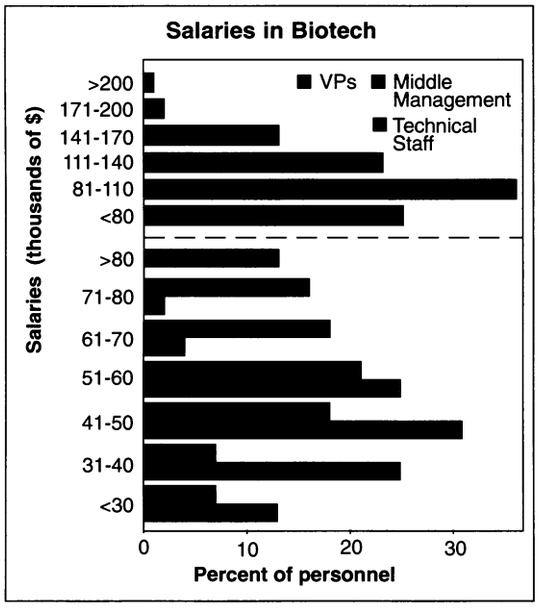
Nevertheless, most of the young industry scientists who spoke with *Science* found life in industry, while not laid back, less pressured than academia. "People at Cytel work very hard," says Fikes—which means they will be found in the lab on evenings and weekends. But "it's still easier [than academia]....I 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