



THE ONES WHO GOT AWAY

Sometimes, the brightest stars in science decide to leave.
Nature finds out where they go.

BY EWEN CALLAWAY

When Soroosh Shambayati left his organic-chemistry lab, he didn't leave chemical synthesis behind. As a chemist PhD turned investment banker, he started working in the derivatives market in the 1990s. The transactions involved arranging a complex series of trades in a precise order, and it reminded him of synthesizing an organic compound, reaction by reaction.

As a graduate student, Shambayati had excelled at synthesis, just as he did at

everything he turned his hand to. He was "other-worldly brilliant", says his former adviser Stuart Schreiber. He juggled three distinct projects during his PhD, one in organic synthesis, one in theoretical physical chemistry and a third in biochemistry and immunology. He was also calm, thoughtful and well read: his bookshelf spans science philosophy, evolutionary biology and physics. Schreiber, a biochemist at the Broad Institute in Cambridge, Massachusetts, knew that if

ILLUSTRATIONS BY SEÑOR SALME

Shambayati wanted to become an academic scientist, he was sure to succeed. “It was very clear to me that he was going to become a star,” he says. But Shambayati chose the financial world — and excelled there instead: he is now chief executive at Guggenheim Investment Advisors (Suisse) in Geneva, Switzerland, a firm that manages billions of dollars for wealthy families and foundations.

Shambayati is among the hundreds of thousands of scientists who train in academia but then leave to follow a different career. According to the latest survey of doctorate recipients conducted by the US National Science Foundation, nearly one-fifth of employed people with science and engineering PhDs were no longer working in science in 2010. This is partly due to a lack of room at the top. In the United States, the number of PhDs entering the workforce has skyrocketed but the number of stable academic jobs has not. In 1973, nearly 90% of US PhDs working in academia held full-time faculty positions, compared with about 75% in 2010.

A common perception is that the weaker science students are forced out of a competitive field, leaving the brightest stars to secure the desirable academic positions. But as Shambayati's story shows — and as most mentors know — this is not the full picture: sometimes the scientists who move on are the ones with the most promise. Their motivations are diverse: some want more money, or more time with family; others are lured by opportunities elsewhere. To get a better sense of why talented scientists are leaving academia and how their training influences their lives, *Nature* contacted group leaders recognized for mentoring and asked: “Who was the one who got away?”

FROM CHEMIST TO CAPITALIST

Shambayati was born in Iran, attended school in Sweden, and then won a scholarship to study chemistry and mathematics at a university in Los Angeles. As an undergraduate, he was drawn to science for its pursuit of objective truth and the opportunity for discovery. A PhD was the obvious next step, and he found a perfect fit in Schreiber's lab in the late 1980s. “When I met Stuart, it was almost a sense of meeting the da Vinci of what I had in my head as science,” Shambayati says. At the time, the lab was focused on synthetic organic chemistry, but Schreiber also took risks — such as branching into biology — which meant that Shambayati could pursue his broad, three-pronged PhD.

The realities of doing science, however, soon butted heads with Shambayati's idyllic view of it. He found that chemical synthesis was slow and full of setbacks — “a bit like banging your head against the wall for long periods of time,” he says — and he was put off by the political aspects of science, exemplified at the time by bickering over who discovered HIV. Still, he did not hesitate to apply for

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faculty jobs at several top universities while finishing his PhD, and he received more than one offer.

While in New York for a job interview at Columbia University, Shambayati met up with a friend in banking, who was shocked to learn how little an assistant professor earned. He encouraged Shambayati to move into the financial world instead. “I said ‘you're nuts,’” Shambayati remembers. “I know nothing about banks or banking. Why would anybody want to interview me?”

But a good salary was tempting to Shambayati, who felt a deep obligation to support his family; his parents had fled Iran after the 1979 revolution, leaving their house and savings behind. Shambayati set up an interview with his friend's bosses at Banker's Trust, which was later bought by Deutsche Bank. The investment bank was a leader in derivatives trading and was looking for quantitative, analytical thinkers such as Shambayati. He accepted a job earning many multiples of an academic salary, figuring that he could always go back to do a postdoc if things did not work out.

They did. Finance was an eye-opener for Shambayati, who worked on chaotic emerging markets, losing and making back tens of millions of dollars in a day. He found the trading floor, surrounded by his colleagues, not unlike his chemistry lab, but with “even less privacy,” he says. His career progressed quickly and he moved on to jobs at Goldman Sachs, Citigroup and then Lehman Brothers.

(He was there in 2008 when the firm abruptly went into bankruptcy, catalysing the global economic crisis — an experience he compares to “being in a plane crash.”)

Schreiber never questioned Shambayati's decision to leave science. He works hard not to presume that his best students will follow in his footsteps, he says. And Shambayati credits some of his success to the influence of his former mentor's approach to science, based on calculated risks, hard work and creativity. “I don't think I'm the most natural banker or financial thinker, but I know that I have a certain amount of intellectual ability that I can utilize, if I work very hard,” he says. “That was very much informed by the way Stuart operates.”

FROM PHYSICS TO CYBERSPACE

Sometimes, the decision to leave science is partly push, partly pull. That was the case for Renata Sarno, who after eight years in theoretical physics ran up against a dearth of academic jobs in her native Italy. Then the World Wide Web happened. Sarno started an online business — one of Italy's first — that would eventually sell for hundreds of millions of euros.

“She was a very brilliant student,” remembers her supervisor Giorgio Parisi, a theoretical physicist at the University of Rome. She could comprehend problems posed in theoretical physics and then determine how a computer might tackle the challenge. Sarno came to Parisi's lab to finish her undergraduate thesis in mathematical physics in 1987, and continued to work with him through a PhD and postdoc position. She helped to build a supercomputer, one of the world's fastest at the time, then used it to model subatomic particles called fermions using lattice gauge theory, which divides



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continuous space-time into series of discrete points. She was inspired by Parisi's diverse interests, such as protein folding and neural networking, as well as his desire to tackle new computational problems in particle physics.

An academic life seemed ideal to Sarno, and Parisi thought that she would make an excellent group leader. But when Sarno's postdoc funding ran out in 1994, she was unable to find more money, and there were few job opportunities for those starting out in science. Women were, and are, exceedingly rare at the highest levels of physics in Italy, and she also felt that discrimination held her back.

But there were opportunities opening up elsewhere. A year earlier, the European particle-physics lab CERN had made the World Wide Web public, and Sarno saw a chance for people with a background in computer science. "I found myself without a salary and a big road full of possibilities in front of me," she says. "I decided to take this road."

With three colleagues and roughly €10,000 (US\$13,000), Sarno launched a series of websites, including a travel website called Venere that was one of the first to offer reservations for hotels and others services. The team created tools to allow people to discuss and rate hotels, a novelty at the time. Sarno says that her research on problem solving and computation was good preparation for running a dot-com business, but she was also inspired by Parisi's tutelage: "My choice to go to the Internet was, in some sense, a choice to do something that is big from scratch, in a direction where nothing exists." Parisi was sorry to see one of his star trainees leave the lab, but he is proud of her success. Sarno and her colleagues sold Venere to the online travel company Expedia for around €200 million in 2008.

Sarno has not completely let go of research. After selling off Venere, she started a foundation to support research into blue-cone monochromacy, a rare genetic disease that runs in her family and which causes vision problems and colour blindness. She stays in touch with Parisi: when she wanted to know how different photoreceptors were arranged in the human retina, she sought his help in interpreting micrographs, and she is hopeful that delivering genes to the retina could help to cure the disease. Just like particle physics and the Internet, she sees an opportunity in gene therapy to solve problems in a new field.

FROM PHYSIOLOGY TO STAY-AT-HOME DAD

When Eric Pane started a PhD in physiology, he was already onto his second career — or was it his third? He had been teaching at a prestigious primary school in California, which was filled with the offspring of ambitious, demanding parents. Meanwhile, he was simultaneously working as a waiter, tutor and babysitter to make ends meet. The heavy workload was wearing him down, and he wanted a way out. "I didn't want to die in a

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kindergarten classroom of a heart attack at age 70," he says. So Pane went back to university to study biology. He found that fish physiology, in particular, fascinated him for its efforts to understand how a complex living organism was put together. "I liked the 'take apart the toaster, take apart the fish' aspect," he says.

As Pane read the scientific literature, he repeatedly noticed the name of Chris Wood, a physiologist at McMaster University in Hamilton, Canada. Pane contacted him, and asked to join his lab. "He was sort of an unusual applicant," Wood recalls. Most of Wood's graduate students arrived just out of their undergraduate degrees, but Pane was already 31 when he joined the lab in 2000 and embarked on a PhD.

Pane quickly made an impression. He investigated the toxic effects of nickel on fish and became the lab's most productive member, publishing seven papers as part of his thesis, collaborating on another three and winning an industry award for his research. "He was one of those dream graduate students that everybody wishes they had. They come to you and generate their own ideas," says Wood. "I figured this guy was going to become a faculty member some day. He was the whole package."

With that faculty job in mind, Pane moved on to a postdoc studying ocean acidification at the Monterey Bay Aquarium Research Institute in Moss Landing, California. But when it came to the next career move, the rest of life had intervened. By then, Pane and his wife Michiko had had two boys, Michiko's career as a research-grant administrator was flourishing, and they had settled in the San Francisco Bay area. While Pane's colleagues were being interviewed for faculty positions all over the world, he was limited to local

universities so that the family could stay put. The time demands and comparatively low pay of an assistant professor also weighed heavily: Michiko worked 60-hour-plus weeks, and Pane wanted to be able to pick up his boys from school. "I could have gone for it," he says, of the faculty job, "but our children would have been raised by wolves and gypsies at that point." Pane now teaches two days a week at a community college — much of it done online. He spends the rest of his time as a stay-at-home parent.

Pane is still envious of the environment of productivity and achievement his former mentor encouraged, and he tries to build that culture in his own classes. He is proud to be described as "tough, but fair" on the website ratemyprofessor.com.

Wood was surprised that his former student took an alternative career route. "Initially I was disappointed. But it's up to everybody to make their own path in life," he says. Wood's reaction mirrors those of many group leaders who see their star students quit the lab: pleasure that he or she has found a life they are happy with, tinged with regret that science will not benefit from the student's talent. But most of the scientists *Nature* contacted while researching this story saw mentoring as more than simply grooming a new generation of professors, and they recognize that non-academic jobs are a good application of scientific training.

In a paper published in 2012, a team of science-policy researchers tried to work out why scientists exit academia (B. van Balen *et al. High. Educ. Policy* 25, 313–334; 2012). The team, led by Peter van den Besselaar at VU University Amsterdam, compared 21 pairs of Dutch researchers who were of comparable ages and working in similar fields. Both were deemed very talented in their early careers, yet one left academia and the other stayed. The team found few concrete differences between stayers and leavers to explain their divergent paths; both published similar numbers of papers that were cited just as highly, for example. But the stayers were more likely than the leavers to have had a stimulating mentor, support from a partner and good job opportunities. When it comes to securing an academic job, says van den Besselaar, "it may be a question of luck — are you there at the right moment and the right place?"

Nearly a decade out of Wood's lab, Pane still misses it — and he wonders every day if he made the right choice. "It's just a fork in the road. You've got to go one way or the other, and you're always going to regret what the other one looked like." But on this particular day, a Friday in early July, there is no time for regret because he has got plans with his kids. "The blackberries are exploding right now," he says, "so we'll go pick some." ■ [SEE EDITORIAL P.5](#)

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