Visions of the Future

A Day in the Life of a Scientist

Earlier this year *Science* asked readers to imagine what life would be like in the year 2050. As described in the editorial on page 1851, we now present the first of four installments of these fictional essays.

Agents and IPOs:

A retrospective of my academic career (2000–2050)

by SIMON H. FRIEDMAN

It's been a long and exciting career as an academic scientist, and as I look back on the time I spent doing science, I realize that perhaps my greatest contributions were in the way science is done and not in my specific academic contributions.

Early in my career as an assistant professor, I was being eaten alive in negotiations, especially by MBA types from venture capital firms. It seemed their whole lives were centered around setting up deals, and their skills were honed for that purpose. I, on the other hand, spent most of my time thinking of ideas, working in the lab and writing grants. Oh sure, there are minor negotiations that permeate human interactions, but I was completely out of my league in talking to these guys.

As an assistant professor in aero/astro, I had come up with a small, personal jet pack that would allow people to move through the airspace of crowded cities with ease, crossing Manhattan in about 2 minutes at rush hour, compared with a 30-minute drive in traffic. There were specific scientific issues that needed to be resolved, including the characterization and refinement of a lightweight composite material (one of my areas of specialty) that was key for making the jet packs light. There was considerable interest from a couple of venture capital firms in supporting the work. However, when I went to discuss the nitty-gritty details with them, it became clear that by signing on, though I would get the quick infusion of money I needed to push the research forward, I would also quickly lose control of my ideas and labor. It was a source of frustration.

It was around then that I met a man who was to turn around my situation and, at the same time, start a revolution in the way academics pursue research and funding. I played racquet ball at a health club in the Los Angeles area and, by joining a "ladder," I played different people of similar ability a couple of times a week. One guy I kept playing and grew friendly with was Ed "Buddy" Miller. Ed was an agent involved in the music industry and represented a bunch of folks (most of whom I hadn't heard of but was assured were "big names").

He found my stories of negotiations with the venture capital firms interesting, and he liked to point out the parallels between the two businesses, which I didn't quite see. "You know, these situations are almost identical ...," he told me one day after a game. "In the music biz, like in the science biz, you have talented individuals with ideas and skills that are rare or unique. It makes negotiations for me pretty straightforward. Of course, there is this unknown aspect of the final product: do people want it, are they going to buy it? But once you have a 'hit-maker,' negotiating a great deal just isn't so hard."

I just laughed. The idea of having an agent for negotiating in science seemed silly. Ed continued: "You know, a generation ago musicians were signing their own deals too. These kids got screwed in the process. And you know why? Because they were like you!" I frowned

and raised an eyebrow. Ed laughed: "Hey, relax! They are like you in a good way, but it's a way that gets 'em screwed every single time. They love music, like you love science. They spend their lives thinking about songs, writing lyrics, honing their chops. You do the same thing. But because of that, you got no skills with the people! Not only that, but as soon as someone waves a little green in front of your nose to do your creative thing, you think you've died and gone to heaven. 'They like me! They think I'm great!' What a bunch of egos!" He winked at me and I just said, "Yeah, yeah, yeah."

He continued: "Of course, that ego stuff is great, but it screws you over good. After going through the grinder (that's the small clubs for these bands and grad school for you I'm guessing), they are so beat down that the first person to smile at them gets the nod. Some of them get into contracts that they never get out from under!"

I nodded and said, "The time I spend on the business side of science just drains me. I don't want to use energy to worry about the kind of deal I'm setting up or whether it will give me enough money to really explore my ideas." I paused, and then looked up quickly, "Hey! Maybe you should negotiate for me, Ed. You could be my academic agent!"

He looked up at me and didn't smile. "You know, that would probably be the best thing you could do for yourself."

Over the next weeks, we talked about it more, and finally we set it up. Ed was going to be my agent. He waived the 15% fee he normally charged: "First of all, this is going to be a learning experience for me, so I don't feel right about charging. Second, if this thing works out like I think it will, I think there is going to be a big future for this business, and I'm going to be in on the ground floor." Well, it turned out Ed was right. There was a big future for academic agents.

He liked to say, "Money is generic ... lots of folks have money, but your talent is unique. Don't undersell it." He almost doubled the amount I had coming from the venture capitalists and cajoled more lab space from my dean. By 2010, a majority of top academic scientists had agents. Indeed, getting noticed by an agent had become part of the academic process, right out of grad school. As academic agents became more and more knowledgeable about science, they had made inroads into helping postdocs find academic positions. There was even talk about instituting a draft, like in pro sports, and that came to fruition in the 2030s.

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Perhaps the biggest advancement came around 2015, when Ed and I came up with the idea of the academic IPO (initial public offering). Although my career was going well and my ideas were maturing and moving forward, I had become increasingly tied to the desk writing grants, especially for the more "academic" areas I was interested in. This was a source of frustration, as I loved doing science and thinking about science, but I found myself spending about half my time on the grant process.

I was complaining about this to Ed one day, and he said, "I've been thinking about this whole funding issue, and I think I have a solution: an academic IPO. What we do is an initial public offering, selling shares of your future career." My forehead furrowed. "OK, just hear me out. The money you raise from the sale of shares is in-

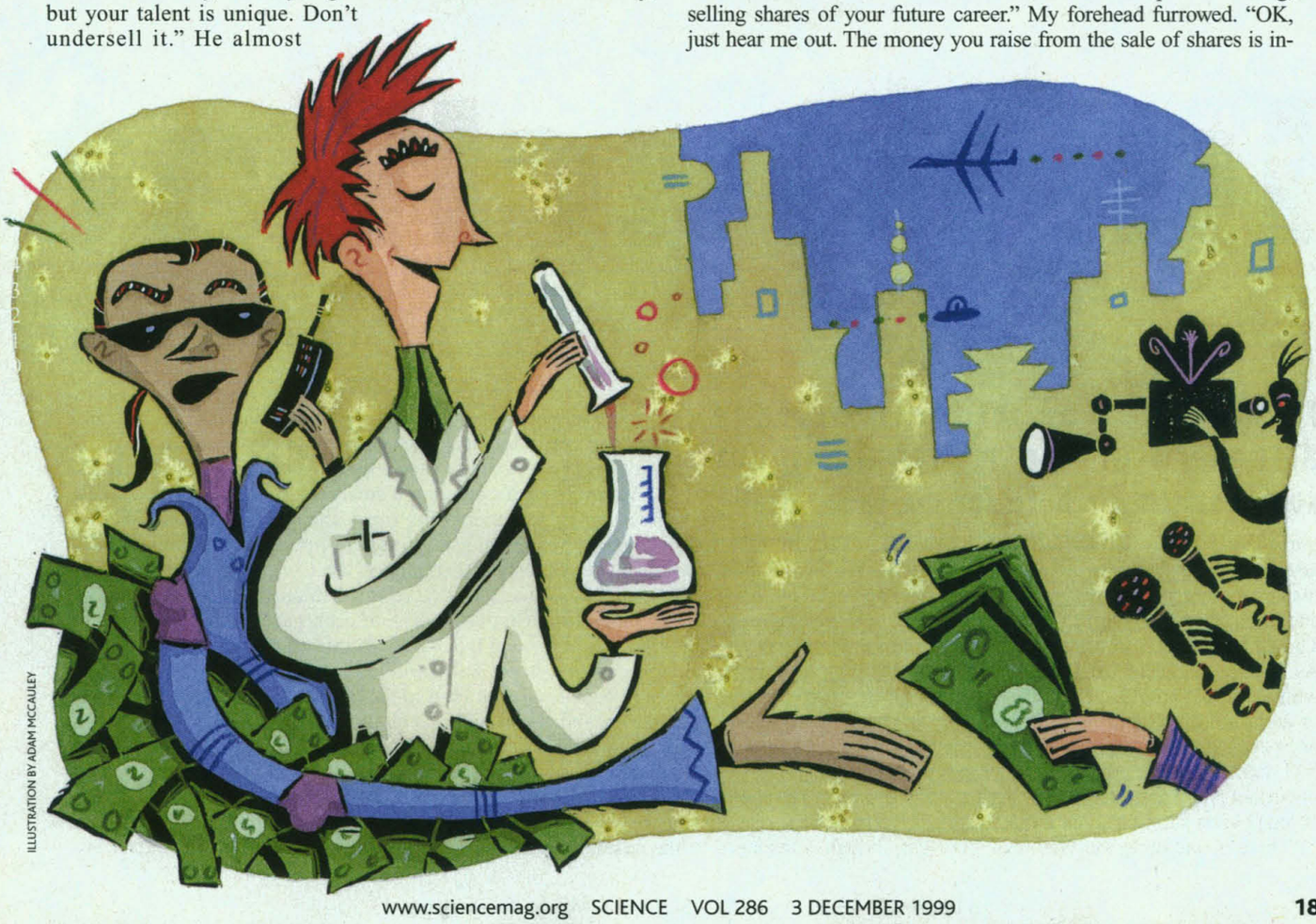

ILLUSTRATION BY ADAM MCCAULEY

vested and the interest is used to support your research. It will be like a permanent endowment." I shot a rubber band across my office. "So how much money are we talking about and why are these people giving it up?" I queried.

"I think we can raise $30 million easy in an initial sale of shares of your future career. These would represent a total of 49% of your future career proceeds. Forty-nine percent of any awards, honoraria, or patent proceeds would be distributed to your shareholders. In return, they give you complete academic freedom for the rest of your career. You will have about $1 million to $3 million a year for research to do what you want with, depending on how it's invested." Ed continued: "With the success of your jet pack, aside from a few unfortunate outstanding law suits, I think it will be easy to convince folks that you will be generating more money-making ideas in the future."

I countered, "Look, Ed, we've had this discussion before; 'money-making ideas' is not what I'm about. I don't mind commercializing my ideas; heck, I think it's a good idea even, but I don't think I can sell myself as a money-making fund for investors."

Ed considered this for a minute and responded, "You are not selling yourself as anything like that. These investors are savvy enough to know that every once in a while, what you happen to find interesting and study because of purely intellectual curiosity may in fact be the basis for an incredibly lucrative entity. You don't have to misrepresent yourself in any way, shape, or form."

I wasn't convinced, and we decided to call it a day. I still had misgivings about the idea, but eventually the lure of a constant source of funding and the freedom from grant writing won me over. On July 18, 2016, we had an initial public offering of shares of my future career. Thanks to some well-organized hype, these sold fast and brought in more than Ed had envisioned originally: a total of about $50 million.

Since that day, I've never had to worry about funding my lab, and in the end, Ed was right: Although most of my research was of purely academic interest and had no commercial spin-offs, I managed to hit on a few more lucrative ideas that paid off my shareholders many times over. And now, here it is 50 years after I started my career. If I am honest with myself, I have to say that I will probably be remembered more for the revolution I helped start and not for my scientific accomplishments. The use of academic agents and academic IPOs forever changed the face of science and were even more revolutionary than the use of ultralight personal jet packs.

The author was a freewheeling and care-free postdoc in the chemistry department at Caltech when he wrote this essay; now he is a harried and stressed starting faculty member at the University of Missouri in Kansas City with not nearly as much time for such philosophical musings. Simon H. Friedman, Division of Pharmaceutical Sciences, University of Missouri, Kansas City, MO 64110, USA. E-mail: FriedmanS@umkc.edu

This essay is a work of fiction. Names, characters, places, and incidents either are the product of the author's imagination or are used fictitiously. Any resemblance to actual persons, living or dead, events, or locales is entirely coincidental.

In Touch at

by SETH SHOSTAK

It may be the biggest science discovery of the millennium, but somehow that's hard for me to swallow.

Sure, I've got a closet stuffed with awards and offers from two dozen publishers to write the whole thing up. But the awards don't mean much (although my wife enjoyed the trip to Stockholm), and as for the book—well, I'll leave that to the science historians. They'll be better at injecting drama even when there wasn't any. As it is, most of the Web sites already embellish my little result with florid hyperbole such as "the triumph of one man's vision," or describe it with metaphorical chutzpah as "how a lone science prospector hit the mother lode."

I didn't hit the mother lode. Sure, I found something that was important and reactivated a moribund field of research. But mother lode? I just stumbled on a loose nugget.

There is one thing the Web texts get right, though. I managed this discovery on my own. And that's unusual these days. Two centuries ago, an individual researcher could do something significant. Isaac Newton didn't need a lot of pals to puzzle out mechanics. Maxwell wasn't juggling a small coterie of co-workers as he wrote his four equations. But times change. If I log onto the *Astrophysical News*, I'm hard pressed to find a single submission involving fewer people than signed the Constitution. The physics journals are worse: They've resorted to an "authors" link, rather than crowd the first two pages of each paper with the names of academics in 8-point type. Modern science may have begun in the 15th century, but a half-millennium later, it's running out of steam. New results, at least in the physical sciences, are harder to come by, and one brain is not enough.

Personally, I figure the decline and fall began when Bernstein's Theory of Everything deprived theoreticians of something to live for. Astronomy has been on the skids for years. Sure, researchers try to keep themselves busy populating odd nooks and crannies of the cosmic bestiary, but there's a limit to Nature's inventiveness.