

The Biggest Challenges Facing Young Scientists

As part of *Cell*'s 40th anniversary celebration, we are spotlighting 40 principal investigators under the age of 40. Among the questions we posed to this group was, "What is the biggest challenge facing young scientists?" A sampling of their responses appears below. But to see the full profiles of all 40 scientists, including their responses to this and other questions, please visit <http://www.cell.com/40/under40>.

A Pyramid Scheme



David Keays
Research Institute of Molecular Pathology

Whether we like to admit it or not, science today is a pyramid scheme. Over the last two decades, there has been a period of unsustainable growth. NIH funding has increased from 13.7 billion dollars in 1998 to more than 31 billion today. This has driven an increase in the number of PhD students and graduates. In Australia alone, the number of PhDs granted has almost doubled to nearly 7,000 a year since the turn of the century. This widening at the bottom of the pyramid has been essential to maintain the publication output of PIs at the top, who face increasing competition to secure limited government funding. As a consequence, it's child's play to get a PhD position but almost impossible to secure a faculty job. You might argue that this is natural selection at work, but I'm unconvinced it's selecting for the best science. What is the solution? People much more informed than myself are thinking about this problem and how to solve it, but at the very least I am inclined to think that universities should stop handing out PhDs like complementary muffins.

Financial Savvy



Luis Barreiro
University of Montreal

To succeed in science today means doing well at many non-research-related activities. The continuous fight for grant money together with the numerous administrative tasks that PIs are expected to fulfill cause scientists to spend more time with paperwork than actually doing true scientific work. Biology has become very enamored of "big data." Doing big science, however, requires big money. Thus, young scientists are not only expected to have great ideas, but they also have to be able to run a successful business. I hardly have a sophisticated knowledge of my personal finances, and I am suddenly expected to raise "capital" and manage a multimillion dollar enterprise. As part of training, communication skills should be emphasized and young scientists should be taught how to best convey their science to funding agencies since, in today's reality, the amount of money brought to the lab is (unfortunately) as critical for success as the science published.

Delayed Security



Devi Stuart-Fox
University of Melbourne

One of the biggest challenges facing young scientists is the intense competition for research positions and delayed job security. Research scientists can often only gain secure (or tenured) employment in their late 30s, which is particularly difficult for those with, or wanting to start, young families. This creates particular challenges for young women scientists. Women are also perhaps less attracted to careers, whether in science or any other profession, if they involve unrelenting pressure, competition, long working hours, and uncertainty regarding future employment. In my experience, young women scientists also often lack confidence in their own intellectual abilities and "undersell" themselves, which disadvantages them in an intensely competitive job-seeking environment. There is no easy solution. I am in favor of setting gender equity targets in research institutions. Science can only benefit from increased diversity, and I believe that targets are necessary to counteract the many and subtle barriers currently stagnating gains in the representation of women in science. More generally, increased private and public funding of research and development and of higher education (currently grossly inadequate) would certainly help to increase job opportunities for young scientists.

Navigating “the Game”



Gloria Brar
University of California, Berkeley

It's well accepted that there are fewer sustainable academic jobs available than there are people that are being trained for this career path. Many frustrated young scientists are forced to readjust their career plans relatively late in life. Equally destructive to young scientists is the intensely competitive atmosphere that results from such job and funding bottlenecks. The tough statistics of job and funding success seem to result in unnecessary secrecy and a culture that selects for some wildly aggressive personalities while often rewarding chasing whatever is “hot” or considered most “medically relevant” at a given point in time. I hear a lot of troubling anxiety from brilliant scientists who feel torn between working on a promising problem or system that they are passionate about and trying to “play the game” most effectively.

This is clearly a complex problem with no easy solution, but we could probably all benefit from increased openness and communication as a community. This could encourage synergy and discourage wasteful and destructive types of competition. We also need strategies for communicating to nonscientists the importance of science funding. The public deserves coherent explanations of the utility of basic research, and we could alleviate a lot of unsubstantiated fears about topics like stem cells and GMOs simply by being clearer in how we collectively communicate.

Judging Publications by Journal Title



Maya Schuldiner
Weizmann Institute

The biggest challenge facing the biological sciences in general and young scientists specifically is the publication culture. There currently exists extremely harsh competition for each “slot” in “high-impact” journals and a mindset that the place we publish has sometimes become more important than what we publish. In direct accordance, the route to publication has become lengthier and more demanding. This has impacted science in a variety of ways from having less time to actually forward scientific research to being less open to talking about interesting unpublished data at meetings for fear of being scooped.

I strongly believe that we *can* make a difference by being mindful of the situation; discussing it at conferences; changing the way that we ourselves review manuscripts (I have made it a point to be the type of reviewer that I would have wanted for my own manuscripts. I never send people back to the bench unless absolutely essential and try to remember the people behind the manuscript and all their hard work.); educating the younger generation on good reviewing practices (I teach a class on how to peer review to most PhD students in Biology at the Weizmann Institute and think that this should be part of students' curriculum); and pushing to integrate more sophisticated methods other than impact factor for ranking of candidates in our home institutions.

I hope to work in a world where scientists are judged by their science and not the journal their manuscript is in.

Building Your Niche and Securing Funding



Mamta Tahiliani
New York University

A major challenge for newly independent scientists today is that the biological sciences are rapidly becoming much more interdisciplinary. This can be a bit daunting when your own training is likely to be focused in one or two disciplines. However, I think it is useful to see this as an opportunity to take on a big question and collaborate with scientists that have complementary areas of expertise. I think that leaving your comfort zone and working on the interfaces of different fields is a great way to bring new techniques and perspective to your science. I also think it is a fun way to build your own niche and distinguish yourself from other labs in your field.

A more vexing challenge relates to funding—the decline in the NIH budget's purchasing power over the last decade is a serious and complex challenge that all young scientists in the US are grappling with. Securing funding is a significant bottleneck in establishing an ambitious and attractive research program. Most significantly, continued funding uncertainties may undermine the optimism that attracts the next generation of scientific talent. If researchers currently training in labs do not see a future for themselves in basic science, the whole enterprise will be weakened. Scientists of all generations must engage the imagination of the public and lawmakers to remind them that basic research has been a powerful engine of economic development and real world progress.