

By Jessica K. Polka and Kristin A. Krukenberg

Making science a desirable career

Most scientists (ourselves included) **headed off** to graduate school **eager** to discover new things, test crazy ideas, and hopefully change the world, or at least explain a piece of it. Sadly, these days such aspirations are **overshadowed** by fierce competition for papers, grants, and the **tenured positions** trainees need to build independent careers in academic research. Even those who have attained one of those rare, **coveted** professorships are under intense strain: A preoccupation with funding and other **career-related metrics crowds out** real discovery among aspiring and established scientists alike. The result: Science has become a less desirable career. We can fix the problem, but only if we're willing to make fundamental changes to how academic science is structured and funded.

For decades, trainees—graduate students and postdocs—have performed most of the day-to-day work of academic science. Motivated by the promise of satisfying careers, they are willing to work long and hard for minimal pay. For science, that works out well in the short term but not the long: The distinction between trainee and employee **blurs**. When more is invested in science—a good thing—the ranks of graduate students and postdocs **swell** to meet the demand for temporary labor. Permanent positions don't **keep pace**, eroding the economic and intellectual value of scientific training. Trainees take ever longer—into their mid-30s and beyond—to **accrue credentials** sufficient to **stand out** and get hired for serious, long-term faculty jobs. With each passing year, scientists young and old spend more time worrying about their careers and less time making discoveries. As long as academic science is structured the way it is, we don't really have a choice.

Some argue that intense competition strengthens science by allowing only the fittest to survive. But the incentives that arise from such competition **run counter** to creativity, openness, and innovation. We may even be selecting for undesirable traits, such as **recklessness** and a focus on self-marketing over **scientific substance**. The weight put on publishing papers in high-impact journals may encourage scientists to exaggerate their findings, or worse. In short, it is evident that hypercompetition is inconsistent with “affording the prepared mind complete freedom for the exercise of initiative,” which Vannevar Bush, who devised our system of academic research funding in the 1940s, considered to be of “supreme importance.”

So why do students even **start down the road** to science careers? We believe it's a combination of ignorance of the



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realities, overconfidence, and a **punch-drunk passion** for science. At some point during training, however, that enthusiasm starts to **wear off**. Every trainee has encountered exceptionally talented students who would have made major contributions but decided to leave science—its uncertain prospects, **risk-averse funding**, and incentives for distortion and dishonesty—in favor of more practical and lucrative careers.

To **draw the best** young **minds** to research and then keep them here, we need to change how we train scientists and how academic science gets done. More of the work should be done by staff scientists in stable positions and less of it by (fewer) trainees. We should move

the **career bottleneck** from faculty to the postdoc or even to graduate school admissions. Training grants and fellowships should replace grant support for most trainees so that more can be invested in research grants without increasing the number of trainees and further glutting Ph.D.-level science labor markets. Such measures would have useful side effects: encouraging better training and intellectual independence. More important, they would improve young **scientists' career prospects**.

It is time to address the career instability that **turns some of the best talent away** from science. The effort and investment needed to make research careers more attractive will be **handsomely repaid** in the form of future discoveries. ■

Postdocs Jessica K. Polka and Kristin A. Krukenberg are organizers of the Future of Research Symposium held in Boston in early October and corresponding authors for the resulting report. For more on life and careers, visit www.sciencecareers.org.