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Life Science Graduates Face Daunting Labor Market

JULIE PALAKOVICH CARR

> In my position as CEO of a firm employing over 80,000 engineers, I can testify that most were excellent engineers. But the factor that most distinguished those who advanced in the organization was the ability to think broadly and read and write clearly. (Norman Augustine, former chairman and chief executive officer of Lockheed Martin)

Biology graduate students have a dizzying array of options after completing their degree, including settling on an initial career path. Although many young biologists hope to make these decisions on the basis of personal preference, changing labor market conditions are likely to influence the decision.

The employment prospects for biologists have changed significantly in recent decades. Until the early 1970s, a person with a doctorate in biology had a good chance of being hired in academia; nearly 70 percent of new PhDs who had a job lined up at graduation went to work in academia. Now, fewer than half of graduates with definitive postdegree plans find employment in academia, according to the federally sponsored Survey on Earned Doctorates. One driver of that precipitous drop was the saturation of the academic labor market as the number of trainees increased.

The Great Recession has taken a toll on employment prospects for graduates. The percentage of recent life science doctoral degree graduates with definite job plans for after graduation fell to its lowest level in more than two decades in 2011. That year, only one in five graduates had secured employment, a reduction of nearly 25 percent from 5 years earlier.

"Unfortunately, recent events have not helped graduates recover from the recession and its impacts," stated Maria Marion, chair of the Employment Concerns Committee of the National Association of Graduate–Professional Students. "Sequestration has cut current and future government funding for research and labs. In turn, these cuts affect employment for students and limit opportunities for future generations of scientists."

The increasing number of recent graduates without firm employment plans coincides with an uptick in the number of people pursuing postdoctoral studies. Even prior to the recession, the life sciences had the highest percentage of recent PhDs pursuing postdoctoral studies.

"The number-one concern I hear from postdocs and graduate students is that they are not sure that they want to stay in academia," said Keith Micoli, director of the postdoctoral program at New York University School of Medicine and a member of the board of directors for the National Postdoctoral Association. "There are not enough jobs in academia, but many students are not sure how to prepare for another career."

Doctoral graduates are increasingly looking for careers in other sectors, according to National Science Foundation (NSF) data. The problem, according to some, is that many of these jobs do not fully leverage the research skills of a doctoral scientist. Only 40 percent of new PhDs with employment plans at the time of graduation say that research will be their primary activity.

Declining federal investments in research and development may be affecting employment in science. Fewer research grants to universities and research institutions mean fewer opportunities for young researchers, according to a recent report from the American Society for Biochemistry and Molecular Biology (ASBMB). In their 2013 survey, 53 percent of the respondents—overwhelmingly consisting of faculty and primary investigators—have recently turned away promising young researchers who were interested in working in their labs.

"From the data and anecdotes I've heard, the next generation of scientists are thinking critically about whether to continue on this career path," said Benjamin Corb, public affairs director for ASBMB. "Today's scientists are resilient and determined to find a way through this.… But what about the next generation in school now? What happens when they see the lack of support? That scares me."

Some graduate students who completed the ASBMB survey voiced doubts about their future career options. "It is disheartening to be at the start of what I hope will be a strong and successful scientific career and have to wonder if I will even get a job, be able to fund my research, and have hope of being a competitive scientist," said one graduate student in California.

The changing nature of the science, technology, engineering, and mathematics (STEM) labor market has, for some time, been triggering calls for change in the way graduate students are prepared for their careers. In 1998, the National Research Council released its *Trends in the Early Careers of Life Scientists* report, which called for a new way of educating graduate students. "The future health of the life sciences depends on our continuing to attract

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the most talented students. That will require that students be realistically informed at the beginning of their training of their chances of achieving their career goals and that faculty recognize that current employment opportunities are different," stated the report (p. 4).

More recently, a 2012 report from the Biomedical Research Workforce Working Group—convened by the National Institutes of Health—called for an overhaul of how biomedical researchers are trained. "Graduate training continues to be aimed almost exclusively at preparing people for academic research positions." The working group "believes that graduate programs must accommodate a greater range of anticipated careers for students. Graduate programs should reflect that range and offer opportunities for students to explore a variety of options while in graduate school without adding to the length of training."

The buzz term for such skills is *T-shaped* scientists. Such researchers have a depth of knowledge in one scientific discipline as well as broader skills in communication, computation, and project management. New professional science master's degrees are one way in which institutions have responded to calls to train graduates for careers in the business, government, and nonprofit sectors. There are now more than 300 such programs at 130 institutions in the United States.

For those seeking a more traditional science degree, several federal programs are aimed at preparing graduate students with the communication and personal skills to succeed in research or a related career. The NSF's Integrative Graduate Education and Research Traineeship (IGERT) program, which will soon be transformed into the new NSF Research Traineeships program, transcends scientific disciplinary boundaries. Many of the approximately 150 IGERT programs incorporate opportunities for graduate students to learn broader skills through mentoring other students and communicating with the public.

Other opportunities are more direct in training early-career scientists for jobs outside of academia. The John A. Knauss Marine Policy Fellowship, sponsored by the National Oceanic and Atmospheric Administration, provides current and recent graduates with the opportunity to work for 1 year in the government on policy issues related to ocean, coastal, and fisheries management.

The Knauss fellowship and more than 100 other STEM education programs for K–12, undergraduate, and graduate students were proposed for consolidation or elimination by the Obama administration as part of its fiscal year 2014 budget request. The White House claimed that this reorganization would "cut back lower-priority programs to make room for targeted increases," in other STEM education programs and reduce fragmentation of STEM programs across the government. Members of Congress were not receptive to the changes. The House and Senate Committees on Appropriations have publicly expressed displeasure with the plan and are not likely to allow the reorganization, which requires congressional support, to proceed.

However, career opportunities in STEM fields still offer rewarding prospects. According to the US Department of Commerce, PhDs working in STEM fields earn about 12 percent more than their counterparts in other fields. Moreover, the US Bureau of Labor Statistics estimates that PhD-level jobs in biology will increase by 6 percent this decade.

Maria Marion offers the following advice to graduate students hoping for a competitive edge: "Dare to be different." Although standard academic expectations remain, such as publishing and presenting at conferences, employers are increasingly looking for people who have worked on multidisciplinary projects or who have had unique experiences teaching or volunteering with K–12 students. "Doing something that feels very different from your dissertation may just be the thing you need to stand out," Marion said.

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