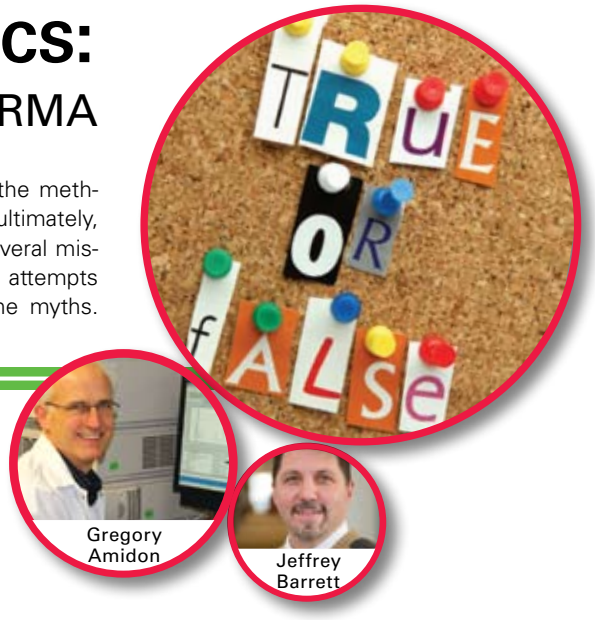
MYTHBUSTING FOR ACADEMICS:
CONSIDERING A JOB IN BIOTECH/PHARMA



Gregory Amidon

Jeffrey Barrett

Although academia and industry differ in many ways—the speed of research, the methods of funding, and the asking of basic versus applied research questions—ultimately, the two environments are more similar than they are different. Nonetheless, several misperceptions about a career in industry tend to circulate in academia. This article attempts to clarify some of these differences and perhaps will help dispel some of the myths.

By Emma Hitt

Among academics, a job in industry can represent the quintessential black box; for example, intellectual property that results from commercial science is necessarily protected. As a result though, certain myths, some of which carry extra weight because they do in fact involve a kernel of truth, tend to circulate among academics about industry. These include the idea that working in an industry job is somehow "easier" than pursuing a career in academia, or that a job in industry does not allow the opportunity to be creative or to publish work in one's own name. Also, fueled by the existence of closed off labs and lack of published results, aspersions may be cast about the quality of science practiced in industry and even the validity of the data.

MYTH: Industry Is the Easy Road

With rates of government grant funding in academia currently lower than 10 percent, no guarantees exist anymore in the academic world. "The fact is it's a lot harder being an academic scientist today than it was even 15 years ago when I made the transition," says **Harry Klee,** professor in the Plant Molecular and Cellular Biology Program at the University of Florida in Gainesville. Klee spent 11 years in industry in the plant sciences program at Monsanto before returning to academia. According to Klee, in academia, grant funding is harder to get and there are fewer jobs than there were previously. "These factors put pressure on people to work harder and harder to succeed," he says. He adds that "it's not necessarily the students with the best grades that succeed in academia—it requires a very large skill set, only one part of which is intelligence." According to Klee, these challenges in academia lead students to think they will not have to work as hard if they go into industry.

However, Klee says it's an "absolute fallacy" to think that if you cannot write well, give a good talk, or do not want to justify your spending, you should simply get a job in industry. "If you want to succeed and really get ahead, you'd better know how to write and how to talk in front of a group. At the company I worked for," he says "we had to justify what we were doing and defend it to our peers because we were competing for a pool of money."

MYTH: You Cannot Publish or Present Your Work in Industry

Another misperception is that no opportunity exists to present or publish research findings in industry. According to Klee, one of the things that fuels misperceptions about industry is the fact that the best scientists in industry generally have to keep their work confidential. "Some of the best scientists I know are in industry, and none of them will ever get the recognition they deserve because they don't present it outside the company," he says.

"Publishing may be delayed until the intellectual property considerations have been dealt with adequately."

However, it depends on the company whether research findings get published. There is an opportunity to present and publish research findings, just less than in academia, where the old adage is "publish or perish." Considerations about patenting and intellectual property exist in industry, although the same is true for academia these days, says **Alan Goldhammer,** vice president of scientific and regulatory affairs for Pharmaceutical Research and Manufacturers of America (PhRMA), an organization that represents the country's leading pharmaceutical research and biotech companies. "It just means that publishing may be delayed until the intellectual property considerations have been dealt with adequately," he says.

"The requirement to publish is not as strong in industry, obviously," says **Sarah Jones,** education and skills manager for the Association of the British Pharmaceutical Industry. "Making sure that intellectual property is secure before publication has become essential, but this is becoming more common in academia also." continued »

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"Making sure that intellectual property is secure before publication has become essential, but this is becoming more common in academia also."
—Sarah Jones

MYTH: There Is a Lack of Intellectual Freedom and Ability to be Creative in Industry

The misperception also exists that scientists in industry lack intellectual freedom, that they are told what to do by the company, and are not encouraged to think for themselves or pose research questions not closely related to the bottom line.

Mary Delong, director of the Office of Postdoctoral Education at Emory University in Atlanta, Georgia, says that postdocs tend to see industry as a place where they have less independence—where they cannot do "their own thing." By the time a graduate student has transitioned to being a postdoc, independence and ability to think for oneself are traits that have been well honed. "Most postdocs who avoid going into industry tend to cite lack of independence as the reason," she says.

To some extent, concerns over lack of freedom may be well founded, but the extent varies depending on the goals, structure, and especially the size of the company. "Industry jobs do tend to prize creativity, but within the confines of a predefined goal," says **Paul M. Matthews,** vice president for imaging and head of the GlaxoSmithKline Clinical Imaging Centre in Hammersmith Hospital within the company's drug discovery division. According to Matthews, there is as much freedom and as much encouragement to use creativity to find innovative solutions in industry as anywhere else.

"Certainly, in industry it is critical to work within teams to accomplish goals that are defined more by the company than by individuals," he says, "but I see industry and academia as equally exciting and valuable career options for students," says **Gregory E. Amidon,** a research professor at the University of Michigan, College of Pharmacy, in Ann Arbor and American Association of Pharmaceutical Scientists (AAPS) Fellow.

The level of independence and also the percentage of time spent doing research may vary depending on the size of the company. According to **Jennifer Flexman,** a bioengineer who now works in technology transfer at the University of British Columbia in Vancouver, large companies such as Genentech have a strong basic research component that is not so closely related to the pipeline. "By contrast, a smaller company or startup may be more focused on the bottom line and will not provide as much opportunity for exploratory research," she says. However, at a smaller company, a scientist may wear many hats, performing nonresearch roles, such as "marketing or sales, which can be interesting, but may not be what was expected."

MYTH: Biased Results in Industry?

With only one approval being given for every 5,000 to 10,000 compounds entering the R&D pipeline, according to PhRMA, and the cost of bringing a drug to market estimated at over $1 billion, the pressure to produce results in industry is high. Results are directly tied to the bottom line. For this reason, science conducted in an industrial setting might be distrusted, says **Jeffrey S. Barrett,** associate professor of pediatrics at the Children's Hospital of Philadelphia, University of Pennsylvania, and member-at-large on the AAPS Executive Council.

According to Barrett, for the most part however, industry studies are "well designed, well conducted, and above reproach due to the obvious regulatory scrutiny they endure." He added that skepticism exists regarding the fact that potential safety concerns are masked by industry scientists or simply ignored. There are a few bad apples, with any occurrence of transgressions making headline news, but "the Hollywood version of this is much more interesting than the reality," he says.

Academia v. Industry—Kernels of Truth That Help Fuel Misperceptions

Although the two worlds of academia and industry are similar, distinctions do in fact exist that may help contribute to some of the misperceptions. The first is that the speed of work is usually much slower in academia as compared with industry, in which time is more directly linked to financials.

"Coming from the pharmaceutical industry, I see one of the biggest differences as being the timelines over which things in academia and industry are accomplished," says Amidon. In the pharmaceutical/biotech industry, projects move very quickly, and there is a tendency to integrate both science and problem continued »

American Association of Pharmaceutical Scientists 2009 Salary Survey

According to the American Association of Pharmaceutical Scientists 2009 Salary Survey, the median annual income of a Ph.D. with less than five years of experience working outside of academia is about $90,000.

A large majority of AAPS members employed outside of academia (68 percent) are involved with a variety of specialties, led by pharmaceutical development, biopharmaceutics/pharmacokinetics, and management/administration of research and development.

Job responsibilities held by pharmaceutical scientists outside academia include 3 percent who said they are owners or partners, 10 percent executives, 41 percent directors or managers, 19 percent supervisors or coordinators, 19 percent technical contributors, and 10 percent staff or something else. Nearly three-fourths indicated they directly or indirectly supervise others, and about a third manage a budget (over half of which are $1 million or more).

Among AAPS members working in academia, 45.2 percent of an academic's assignment time is devoted to research, with teaching requiring 32.1 percent, administration 16.1 percent, and other activities the balance of 6.6 percent.

solving into a project under a tight timeline, often less than a year, he says. By contrast, in an academic setting, timelines are generally longer and the focus is more long term, fundamental, and educational. "In academia, it is necessary to think three to five years or even more into the future with a research project," he says.

Likewise, the mechanism of financial support is different between academia and industry, and leads to differences in job function. In academia, says Amidon, there is a need to develop scientific concepts and write grants that will generate the support needed to carry out a project as well as a requirement to work closely with students and collaborators to make sure progress is being made. By contrast, in an industrial setting the focus is more directly on research, with much less focus on infrastructure issues, such as securing lab space, administrative support, and the funding of material costs. "In an industrial setting very often the goals are established by the company and senior management. It is the scientists' role to figure out the best way of accomplishing the goals that are set out," he says.

Matthews concurs that, in industry, science tends to be probably a much more "hands-on" experience, until a scientist reaches a very senior position. "Whereas in academia, a young investigator is often heavily distracted by the need to fund a laboratory, do research, and teach to demonstrate a contribution to the academic community."

Crossing the Chasm

Twenty years ago the worlds of academia and industry were more clearly delineated; now, the lines are less clear. Tentacles of academia reach into industry and vice versa. "Science in academia and science in industry are becoming a lot more similar than they used to be," says Jones with the ABPI. "Certainly, in the United Kingdom, there is an increasing push for academic research to have practical applications and for those applications to be recognized by the people doing the research." In addition, collaborations between pharmaceutical companies and academic institutions are becoming much more common, with pharmaceutical companies supporting Ph.D. studentships and providing placements for students in commercial laboratories.

Barrett agrees that a growing number of industry-based postdocs and internships are now extended to students. "As someone who trains and supports research in these disciplines, I have witnessed both the support from industry in the form of funding for postdoc training as well as the competition for students/trainees."

FEATURED PARTICIPANTS

Association of the British Pharmaceutical Industry
www.abpi.org

Emory University
www.emory.edu

GlaxoSmithKline Clinical Imaging Centre
cic.gsk.co.uk

Pharmaceutical Research and Manufacturers of America
www.phrma.org

University of British Columbia
www.ubc.ca

University of Florida, Gainesville
www.ufl.edu

University of Michigan
www.umich.edu

University of Pennsylvania
www.upenn.edu

Industry funding of universities for various studies has also increased. Academia is simultaneously expanding its relationships with industry with more "biofeeders," and commercial enterprises springing from academic endeavors, which did not occur so much 20 years ago, Delong says.

In general, starting salaries are similar between industry and academia, although in academia, early postdocs trying to prove themselves can potentially put in many more hours than an industry scientist. "Academics put in long hours competing for grants, and it's a very tough lifestyle," says Delong. "Postdocs who have gone into industry typically put in more than a 40-hour workweek, but they are not always struggling for the next grant or trying to prove themselves in the same way," she says.

Klee points out that he actually made more money when he returned to academia from industry, but the pay scales for a starting scientist and a starting assistant professor are similar. "I think it's more the attraction of industry that students feel," he says. "I've heard comments like, 'I can write a great grant proposal, and it doesn't get funded.' What that means is that there is a perception that you can be really good and not make it in academia through no fault of your own, and I think that's probably true."

Emma Hitt is a freelance medical and science writer residing in Roswell, Georgia.

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Principal Industry Facts

- The biosciences industry sector is defined as including the following four subsectors.
  - Agricultural Feedstock and Chemicals
  - Drugs and Pharmaceuticals
  - Medical Devices and Equipment
  - Research, Testing, and Medical Laboratories
- As of December 31, 2006 (the latest time point for which information is available), there were 1,452 biotechnology companies in the United States, of which 336 were publicly held.
- There were 180,000 employed in US biotech companies in 2006.
- The average annual wage of US bioscience workers was $71,000 in 2006, more than $29,000 greater than the average private-sector annual wage.

Biotechnology industry facts are available at http://bio.org/local/battelle2008/State_Bioscience_Initiatives_2008.pdf