

TESTING THE WATERS

In the same period of time it takes to earn a Ph.D., budding scientists can experiment with a wide variety of educational paths and career tracks—and discover what they really want to do. **By Jill U. Adams**

Love science? Want to work in a company or a government agency? Amgen hired 4,000 people worldwide last year, a good number of them scientists. The US Food and Drug Administration (FDA) added nearly 50 new project managers to its Center for Drug Evaluation and Research (CDER) in Washington, D.C.

Want more education first? Georgia Tech seeks “Ph.D.-caliber students” for its professional Master’s program, which trains them to apply innovative, interdisciplinary science to current, real-world problems.

You don’t need a Ph.D. to be a scientist. Companies large and small hire Bachelor’s of Science (B.S.) and Master’s of Science (M.S.) scientists every year, as do government agencies and other nonprofits. Universities are noticing, tailoring programs of study to the demands of the job market.

“I always say there isn’t a company out there that doesn’t need a scientist,” says **Rich Pennock** of Kelly Scientific Resources, a global human resources firm.

Trends in the Marketplace

Listen to these employers from across the spectrum of employment sectors. “We are a science-led organization,” says **Kathryn Carbone** of the FDA. “Amgen is a science-based company,” says **Cindy Morrison**. “Science and scientists form the fundamental background of what we do at Kraft in R&D,” says **Russ Moroz** of Kraft Foods.

The biotechnology and pharmaceutical industry usually pops up first in many people’s minds, with companies in that sector continuing to hire scientists at both the B.S. and M.S. levels. Disciplines that are in particularly high demand are microbiology, molecular biology, and organic chemistry, with opportunities for technicians in research and development (R&D), quality control (QC), and manufacturing.

Another place to consider is the chemical industry, where there is a need for scientists in quality assurance (QA) and QC who are well versed in chemical processes.

But taking time to look beyond the obvious reveals a range of opportunities. In addition to pharmaceutical and chemical companies, commercial operations based on science include producers of cosmetics, food, and medical devices, as well as clinical research and environmental organizations.

The food industry, while not often considered by biology majors, has high demand—particularly for microbiologists—both in the R&D and QC areas, says Pennock. “If companies are producing a product for human consumption, they need to do biological testing on it—and on the equipment,” he says. This is true for big companies, as well as “your small local company that makes potato chips.”

The semiconductor industry and nanotechnology areas are very active, with plenty of startup companies. Government careers range from federal agencies concerned with regulatory issues, like the FDA and the US Environmental Protection Agency, to the municipality level, for example, a county interested in using geographical information systems to plot local resources.

All these organizations hire scientists at all degree levels, but that doesn’t mean B.S. and M.S. scientists are just support staff for Ph.D.-level employees. In fact, a science background is valuable for a broad array of career tracks in which you can rise to the top with a Bachelor’s degree.



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Careers and Grad Programs for B.S./M.S. Scientists

Educational Paths

Earning a Ph.D. in science is a long road that becomes more narrow and specialized as you travel along it. For some people the time investment—six to 10 years including postdoctoral training—is worth it because they know that’s what they want. However, for those less certain about forecasting their career, the shorter road to a B.S. or an M.S. degree may offer more choices and more flexibility in putting a career path together.

Don’t underestimate the job market as an educational tool. Budding scientists can test-drive employment sectors, individual companies, and career tracks by taking advantage of internships and entry-level positions with on-the-job training. These experiential opportunities can help inform even the most indecisive person. And rather than shelling out for tuition, job experience as education is a paid endeavor.

Some people know early on that they want a career in science, but not necessarily to advance fundamental knowledge. They’d rather apply current knowledge to problems in society or marketplace solutions. In addition to traditional B.S. and M.S. programs, a growing trend in Master’s programs is to focus on interdisciplinary fields with an applications bent.

And yet... “It’s still a struggle everywhere, both on and off campus, to raise the profile of M.S. degrees,” says **Jung Choi**, the director of the bioinformatics program at Georgia Tech in Atlanta, who thinks such students have much to offer. Georgia Tech is one of more than 50 institutions awarding so-called professional Master’s degrees in a hundred or so, sometimes avant-garde, disciplines. In addition to bioinformatics, Georgia Tech has programs in computational finance, human-computer interactions, and prosthetics and orthotics.

“The goal is that these are all critical and strategic intellectual areas that are critical to our society,” says **Bill Harbert**, co-director of the professional Master’s program in geographic information systems (GIS) at the University of Pittsburgh (fondly dubbed “Pitt”). “With respect to global issues like hydrocarbon exploration, fresh water, global climate change, this is the important stuff. This is where we should be investing.”

The professional Master’s degree programs at Georgia Tech and Pitt are sponsored by the Alfred P. Sloan Foundation. Often compared to an M.B.A., the degree is tailored for landing a company job.

“One way the curriculum differs from a traditional discipline-based Master’s is that it is interdisciplinary,” says Choi. In his bioinformatics program, students take courses in math, computer science, biology, and biochemistry. They also have diverse backgrounds in terms of undergrad-

uate study, and they learn much from each other. “They very quickly form groups, both formal and informal, where they really help each other,” Choi says. “People with programming expertise will pair with people with a lot a bioscience and they work together very well.”

In addition to scientific coursework, the programs include courses in law and business, which Harbert’s graduates consistently say have been most useful. Another difference is that students do an internship rather than a thesis. Georgia Tech students have worked locally, at the Centers for Disease Control or Atlanta software companies, and farther afield, in Boston, Chicago, or the West Coast, says Choi.

The employability of a professional Master’s degree holder is still subject to the marketplace. Choi says the demand for bioinformaticists has not been what he hoped, but blamed industry shakeups since the program launched in 2000. On the other hand, the GIS Master’s students from Pitt are highly sought after. “Our best students receive two to three job offers when they’re done,” Harbert says, running the gamut from the major GIS software firms like Environmental Systems Research (ESRI) to the US Forest Service, from managing university GIS labs to county-level municipal jobs.

Whereas every school in the land awards Bachelor’s in Science degrees each year—in standard subjects like biology, chemistry, and computer science—the University of California at Santa Barbara offers eight different specialized biology majors, including pharmacology. In fact, UCSB was first in the nation to offer an undergraduate degree in pharmacology (the program started in 1974) as a basic science—that is, not related to pharmacy training.

Douglas Thrower, who oversees the pharmacology major at UCSB, says, “The initial motivation was to provide students with a Bachelor’s degree so they could get positions in industry directly out of school.” That vision has been met with constant demand, particularly in southern California, which is dotted with biotechnology and pharmaceutical firms.

Generally students with a B.S. degree in a broad or specialized field get jobs as research assistants. “They’re good stepping stone positions in that students can work their way up without getting further degrees,” says Thrower.

Without a doubt, one of the choices that many B.S. and M.S. scientists take is to go back to school and get an advanced degree. The No. 1 plan for UCSB’s pharmacology students is to earn a Pharm.D. and work as a pharmacist, says Thrower. Number two is medical school. Likewise, a quarter of the students that Choi has tracked have gone on to Ph.D. programs.

Career Ladder

Kraft Foods employs a variety of scientists (and engineers), *continued* »



Abbott
www.abbott.com

Amgen
www.amgen.com

Georgia Institute of Technology
www.biology.gatech.edu/graduate-programs/
bioinformatics

Kelly Scientific resources
www.kellyservices.com/web/
global/services/en/pages

Kraft Foods
www.kraft.com

**University of California,
Santa Barbara**
www.lifesci.ucsb.edu/undergrad

University of Pittsburgh
www.pro-ms.geology.pitt.edu

**US Food and Drug
Administration (FDA)**
www.fda.gov

Careers and Grad Programs for B.S./M.S. Scientists

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—Jim Summers



says Moroz, a vice president of global technology and quality at the company. Scientists work in the development of products, packaging, and processes and they work in basic research to explore the chemistry of flavors, the physiology of taste, and nutrition of novel ingredients. Kraft has four major research and development sites in the United States: in New Jersey, New York, Wisconsin, and Illinois.

Amgen values science degrees across the company, says Morrison, including project management, clinical research, licensing and business development, and marketing. Company sites are located in California, Washington, and Massachusetts.

For research positions, there’s no substitute for laboratory experience, says **Jim Summers**, vice president of advanced technologies at Abbott, which has research sites in Illinois, New Jersey, Massachusetts, and Germany. That means M.S. scientists, with more time at the bench, have an advantage over B.S. candidates. To Summers, it represents a certain level of intellectual maturity. “It’s people who have tackled a research problem from a problem-solving point of view as opposed to simply following a procedure,” he says.

At the same time, “it’s not uncommon to hire a Bachelor’s graduate who has had a few years of experience,” says Summers. “Those folks are able to hit the ground running and are able to take on the kinds of problems that we would typically have for them.”

Laboratory experience is very important on an applicant’s resume, says Moroz, “even if the person’s not going to be doing what you would view as a classical lab type job.” He sees hands-on experimental work as good practice in connecting theory to application. In the workplace, “it’s all about how you solve the problem,” he says. “Most of what we work on, in one form or another, are problems.”

Employers also value evidence of “soft skills” on a resume: leadership, teamwork, and communication. “A team environment—it almost sounds trite, because you hear it more and more in business,” says Pennock of Kelly Services, “but it’s even more important in the science world as scientific disciplines are starting to cross.”

Kraft is a company that represents the breadth of opportunities for scientists, from basic research and quality control to regulatory affairs and management. And yet, the most specialized scientists doing the most fundamental research are likely to be Ph.D.s. Other companies, like the entrepreneurial biotechnology giant Amgen and the century-old pharmaceutical company Abbott, pride themselves on having no glass ceiling for those without a doctorate.

With good performance and accumulated skills, B.S. or M.S. scientists can be promoted into positions to which a Ph.D. with post-doctoral experience would be hired, says Morrison, vice president of human resources for research and development at Amgen. “We have several examples of that,” says Morrison. “One of our vice

presidents of research does not have a Ph.D.” Similarly at Abbott, both B.S. and M.S. scientists are members of the company’s scientific honorary society, “which is recognized as the very top tier of scientists in the organization,” Summers says.

On-the-Job Education

Kraft, Amgen, and Abbott all have active summer internship programs for students from undergraduate to doctoral. In addition to making connections and gaining on-the-job experience, interns benefit from the same evaluation and development plans that employees do. By mapping out plans with their supervisors, students can learn what is required for different career tracks, including what they need to do to get there.

Large corporations typically offer job-related training and encourage employees to move among different company divisions. Many have tuition reimbursement plans for those who wish to pursue further university education. Abbott has a formal program for B.S. scientists to obtain their Master’s degrees in night school.

In other situations, employees receive specific training for a particular job. Regulatory affairs is the name of the game at the FDA, in Washington, D.C., and the specialized aspect of reviewing and evaluating drugs or vaccines means there’s significant training after hire, says **Kathryn Carbone**, associate director for research at the Center for Biologics Evaluation and Research (CBER). “This is one of the few places where you can get training in regulatory oversight within a research environment,” Carbone says. And it’s critical, she says, because “we have an enormous public health responsibility.”

Over at the FDA’s CDER, B.S. and M.S. graduates are hired as regulatory project managers for new drug applications. In addition to a science degree, the best recruits have some project management work experience, but laboratory experience is not that important, says **Eldridge Coles**, head of recruitment for the Office of New Drugs (OND). Analytical skills and communication skills, however, are key.

“Project managers play an important role in shepherding an application through the review process,” Coles says, which requires coordinating with the FDA’s multidisciplinary teams of scientific and medical reviewers and liaising with their industry counterparts. Each project manager is assigned a mentor to help get through the first year of intensive training and to provide advice on the responsibilities of the position.

Coles says the CDER is constantly looking to hire well-qualified candidates to fill its project management ranks. “It can be a very challenging and demanding job,” says Coles, who acknowledges the position has one of the OND’s higher turnover rates. For many, the demands are offset by the rewards of the work itself, not to mention the competitive benefits and salaries that government offers. Others take advantage of the on-the-job training and translate it into new opportunities—with several years experience, FDA project managers are highly sought after by industry.

Still not sure what you want to do? Realize that a wide variety of companies and organizations are built upon scientific foundations. Consider something off the beaten track, try stuff out, and start educating yourself with experience.

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