

# Chemistry's small world

Recruitment of chemists in traditional bulk commodities and manufacturing may be slumping, but fresh opportunities are opening up for those whose skill sets are amenable to biotechnology applications, say **Claudia Caruana** and **Paul Smaglik**.

**F**red Vinick can remember a time when the large drug companies used to fight tooth and nail to secure the services of synthetic organic chemists. When he left Pfizer just over ten years ago, the company regularly took on entire classes of graduating PhDs from top universities. But those days of abundant industry jobs for small-molecule chemists are now over, Vinick says. Instead, many graduates in the field will need to follow in Vinick's footsteps and head for the smaller firms in the biotechnology industry. Vinick, now senior vice-president of drug discovery at Genzyme in Cambridge, Massachusetts, says that he has seen the number of such posts grow at his company in the past decade. But the opportunities tend to be more scattered than they were, with a few openings across a number of small biotech companies rather than the bonanzas that used to be offered by the drug industry.

Mukund Chorghade, president of chemical consultancy Chorghade Enterprises in Natick, Massachusetts, and a consultant to the American Chemical Society's career-services department, says that for now, about 85% of new jobs for chemists will be in the smaller companies. "They may not be working in their particular areas of research interest," he says of mid-career chemists and PhDs, "but they will use their skill sets in new applications."

Yet there will always be jobs in key applications at large drug companies, predicts Graham Richards, chair of the chemistry department at the University of Oxford, UK. "Big pharma does still employ people," he says. His department actively trains people for such positions, although it is also involved in creating small spin-off companies (see 'Local industry', opposite).

The same types of skill are also prized by the first wave of biotechnology companies. When the biotech revolution began, most companies focused on protein-based therapeutics and so recruited mainly molecular biologists. Now biotechs are diversifying their therapeutic approaches, so they need the synthetic



Biotechnology companies are now employing more synthetic organic chemists than they were ten years ago.

organic chemists. Some companies are pursuing other avenues of research beyond small-molecule drugs, such as diagnostics and drug delivery. And agricultural biotech and food-science firms also need chemists to keep them in business.

## Changing view

But chemists pursuing jobs at such companies, rather than at the chemical and pharmaceutical giants, need to be aware of changes to the playing field. Chorghade warns. Strategic outsourcing of chemistry jobs is now part of the equation, and many jobs are going to India, China and countries of the former Soviet Union, he says. This means that big pharma jobs in once-attractive areas such as medicinal chemistry may no longer be available in the United States or Europe (see *Nature* 433, 902–903; 2005).

Genzyme's genesis reflects trends in the field. Ten years ago, the company had only a handful of small-molecule chemists, says Vinick. This has slowly grown

— sometimes through acquisitions of other companies — to more than 50 chemists scattered across various locations. They work on a range of projects from drug discovery, to materials science or drug delivery. Genzyme has outsourced some manufacturing to developing countries, but so far has kept its research and development in-house. For chemists hoping to break into industry, Vinick says it is more important to learn how to solve problems than to focus on specific technologies or products.

Genzyme is not the only biotech company to expand its remit to include small molecules. Most major biotech firms now have at least some synthetic organic chemists on staff. Genentech in South San Francisco, for example, has its own medicinal chemistry unit, and Amgen and Chiron have recently advertised for biochemists and physical chemists.

The Sanochem Pharmaceutical Research Institute, based in Plan-les-Ouates near Geneva, seeks chemists with expertise far beyond synthetic organic chemistry for its growing biotechnology businesses, says Matthias Schwarz, head of chemistry there. Skills in demand include pharmacokinetics and toxicology, which both interface heavily with the life sciences. "Our chemists need to be experts in biology," Schwarz says. Sanochem has up to 20 chemists at each of its Boston and Swiss facilities, and has been specializing in small molecules for the past six years. According to Schwarz, the firm has a staff of 200 with 32 different nations represented.

## Tiny steps

Some newer biotech companies are actually basing their business on small molecules, rather than proteins, making them even more chemist-dependent. In London, about 30 of the 200 or so employees at Arrow Therapeutics are chemists. Ken Powell, the company's chief executive, says that Arrow is always on the look-out for small-molecule chemists who have skills that can be applied to biotechnology.

Lately, the company has seen a substantial number of applicants from other European Union (EU) countries, even though the number of chemistry postgrads is declining throughout the region. "The EU has made recruiting chemists from outside Britain easier," Powell says. "We have chemists from France, Spain and other EU countries here. Chemists trained in the United States are also in demand, and there are several on staff now."

Some companies without a traditional biotech bent now need chemists with a drug-discovery background. John Flores, a food chemist at Pennsylvania State University in University Park, sees some demand for chemists in the food industry.

Chris Nelson, chief executive of Kemin Industries in Des Moines, Iowa, says that the company, which for 40 years focused on its animal-feed business, is now using molecular chemistry to develop and manufacture enzymes and nutraceuticals, foods with added health ingredients. "We now have a need for chemists with strong biotechnology skills — for research and development and managerial positions," he says.

Neil Almstead, vice-president of chemistry at PTC Therapeutics in South Plainfield, New Jersey, stresses his company's need for chemists with product-based

## LOCAL INDUSTRY

The chemistry department at the University of Oxford, UK, is one of the biggest in the world. As befits a place of its stature, it takes a leading role when it comes to training people for companies focused on small molecules. "What my department is doing is creating these companies," says Graham Richards, who chairs the department.

Richards himself was behind several spin-off companies, including Oxford Molecular. The department has launched nine companies in the past three years, one of which, Vastox, floated on the stock market last year. None of the companies is managed by the professors who spun them out; almost all of them are staffed by former postdocs and graduate students who worked under them.

One of the reasons the department is an engine for job creation is the US\$100-million Chemistry Research Laboratory, which opened in February 2004 and is designed to bring biology and chemistry training together. The lab was partly paid for by investment bank IP2iO, which in return gets an equity stake in each spin-off. The bank also helps new start-ups to find more funding and management, and, if it is confident in the companies, increases its own equity stake. This means that the best young scientists can readily find a job in the area. "The people who are most likely to join these companies are the very best postdocs who come from the groups whose basis is the intellectual property," Richards says.

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experience in biotech applications. PTC develops small molecules to help the body make its own proteins. But like many of the larger drug firms, it is looking to the developing world in order to cut costs.

Although Genzyme has outsourced some of its manufacturing to developing nations, Vinick doesn't see its basic biotech R&D going to India or China any time soon. The relatively few US-born chemists joining the company bears out US National Science Foundation figures, which show a slight decline from 1,228 US chemists getting PhDs in 1998 to 1,169 in 2003.

Vinick agrees that the job market for small-molecule chemists has shifted from big drug firms to biotech companies. But he thinks that skilled synthesizers will always be able to find work — as long as they're aware that the demand for new molecules could shift from proteins to small molecules or materials. Growing biotech firms will always need people who can "make stuff", whether it's protein or small-molecule therapeutics, says Vinick.

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Chemists with interdisciplinary skills are very much in demand in industry.

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## NICHE ROLES IN BIOTECHNOLOGY

Opportunities in small-molecule chemistry are shifting from large to small companies, and although large companies still have some needs, they are changing to reflect the move towards biologically influenced fields.

Take Monsanto. A spokesperson for the multinational based in St Louis, Missouri, says it has hired fewer chemists lately than in previous years. As agricultural life-sciences has faltered (see *Naturejobs* 4–5; 10 October 2002), new hires have become hard to come by, and tend to be in highly specialized areas. Monsanto's hiring needs in chemistry are moving towards areas such as crop analytics, where it needs chemists to analyse seeds and grain and to develop new food traits. "These scientists tend to have more of a biology background, as they've trained in understanding the interaction of molecules within living organisms," the spokesperson says.

Scientists with biochemistry expertise are also in demand for specialized roles at DuPont in Wilmington, Delaware. John Pierce, director of biotechnology for central R&D at the company, emphasizes that its industrial technology depends on chemistry and materials-science expertise. "More than 25% of our industrial biotechnology scientists are chemists. We continue to look for, and hire, chemists who have interdisciplinary skills," Pierce says.

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