

Constantly Evolving Choices

Leaving the chemistry department behind doesn't have to mean leaving chemistry behind. Chemists have a broad, and broadening, range of career options to choose from, both in and out of the lab. The biggest challenge is looking beyond the more traditional roles, which represent only a fraction of the options available in this fast-growing field.

By Bea Perks

There has always been a far wider range of career opportunities for chemists than the chemists—or at least newly qualified chemists—recognize, according to **Lisa Balbes**, a volunteer careers consultant with the American Chemical Society (ACS). Balbes is a freelance technical writer and consultant, and the author of *Nontraditional Careers for Chemists* (Oxford University Press, 2006).

Chemists do branch out into what she calls nontraditional roles, but they often think this means they have left chemistry behind.

Balbes has a Ph.D. in organic chemistry and spent several years on a postdoc in molecular modeling. Her career evolved following a move to a job “that turned out not to exist,” she recalls. She ended up being offered a consulting job by a company whose software she'd been using as a postdoc. She took the job, which led to subsequent consulting contracts and, after about three years, she realized she had become a consultant.

“It was completely accidental. It just worked out really well, and I kept doing it. I've been doing it for 15 years now and I love it,” says Balbes.

It's just one example of the career opportunities that chemists might not spot.

Chemistry for Life

Exponential growth in the life sciences arena has led some observers to conclude that employment opportunities for chemistry graduates and postgraduates are on the slide. Far from it. Chemists are central to the success of the biotech and life science industries. While fewer students are choosing to take chemistry Ph.D.s across the US according to a recent news article in *Science* (6 April 2007, p. 35), life science companies are crying out for postgraduate chemists.

The life sciences are in no way an alternative to the chemical sciences. The two are inextricably linked. Career opportunities for chemists haven't decreased with a shift toward the life sciences; they've expanded. There are ever more opportunities to be had, but that means looking beyond more established roles.

Forget straight biology or chemistry; today's successful companies take a multidisciplinary approach. Life scientists kick-started the biotech revolution, but it wouldn't have progressed as rapidly without chemical expertise.

Sigma-Aldrich, which calls itself a leading life science and high technology company, hires about 45 percent chemists to 55 percent biologists at Ph.D. level, says **Roxanne LaPlante**, recruiting manager at the company's headquarters in St. Louis, Missouri. The spread is even closer to 50/50 at the Bachelor's degree level, she says.

Many of the chemists hired by Sigma-Aldrich are medicinal chemists, but the company has a particular challenge recruiting analytical chemists.

“We have difficulty finding Ph.D. level analytical chemists,” says LaPlante. “We are in direct competition with big pharma.”

Chemists seem to gravitate naturally toward the pharmaceutical industry. It's a career choice future chemists might even make before they start at university. And it's well paid, so why wouldn't they?

“It's a less safe job,” offers LaPlante. In LaPlante's opinion, job security in big pharma is not as stable as in other industries, but generally higher salaries attract those willing to make this tradeoff.

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Lisa Balbes and Miles

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Careers in Chemistry

“With the growth of our small-molecule program we are looking for chemists with analytical methods development, synthetic organic, medicinal chemistry, and peptide chemistry expertise.”

—Holly Butler



Analyzing Career Options

Analytical chemists carry out qualitative and quantitative analysis – they sample, define, isolate, concentrate, and preserve samples. They are responsible for setting error limits, validating and verifying results through calibration and standardization, performing separations based on differential chemical properties, developing new ways of making more precise measurements, interpreting data, and communicating results. Sigma-Aldrich, which serves the pharmaceutical and biotech industries, universities, hospitals, and allied organizations with biochemical and organic chemical products and kits, relies heavily on this skill set among its 6,800 employees worldwide.

Analytical chemistry relies on an ever-increasing array of automated and computerized analytical techniques. To a degree, this has meant that fewer chemists are needed at the bench: hundreds of samples can be prepared and measured at the press of a button; data can be stored and analyzed in minutes. But the demand for increasingly sophisticated analytical techniques, instrumentation, automation, and computerization has opened up options for analytical chemists in other areas. New instrumentation and data management systems have ushered in opportunities for chemists with solid technical and computing skills. At the same time, roles have emerged for quality assurance specialists, whose job it is to ensure that analytical laboratories and the chemists working in them follow documented and approved procedures.

Analytical chemists, regardless of which path they take, need a strong background in chemistry, an eye for detail, good computer skills, and good laboratory and problem-solving skills.

At Agilent Technologies, based in Santa Clara, California, with a worldwide work force of 19,000, the demand for chemists is shifting from analytical to biochemical. “There is a very heavy emphasis, because of the life science focus, on biochemistry,” says **Linda Lim**, technical recruiter for the company’s life sciences business groups. “Traditionally we had the analytical chemists for our more mature products. For the last 4–5 years we’ve gravitated toward the biochemistry part of our business.”

Think Out Of the Box, Out Of the Lab

Importantly, whichever sort of chemist you are, having those skills should not restrict you to working at the lab bench.

“It’s a skill set urgently needed in sales and marketing roles, dealing with products and cus-

tomers at the pre- and postsale stages,” says **Alexis Difrenzi-Swale**, director of worldwide staffing at Agilent. “If you’ve been in university, often the professors only know about R&D positions, but don’t always know about the broader positions that use the same skill sets,” says Difrenzi-Swale. Chemists leaving university, she fears, may not know the opportunities that are available, and might see essential marketing roles as somehow less attractive than R&D roles.

All of which could contribute to the fact that Agilent has to give itself a longer lead time when looking for pre- and postsales support. The company’s sales activities are concentrated in the UK, says Difrenzi-Swale, while its main manufacturing sites are based in the US, China, and Germany.

Master’s and Ph.D.s now represent about 60 percent of Agilent’s campus hiring population in the US. It’s roughly the same in China, but slightly less in India and Malaysia where there are fewer candidates with higher degrees. In Europe a slightly higher proportion of Agilent’s work force has higher degrees.

Agilent recommenced hiring college graduates relatively recently, following a difficult year for the company in 2001, says the company’s staffing manager for the Americas, **Mark Bajan**. “The company was actually a lot more focused on Ph.D. hires at that time,” he recalls. “That’s really switched over the last couple of years; we hire a great deal of Bachelor’s and Master’s degree candidates to fill our college and intern openings.”

Companies that serve life science markets, like Agilent and Sigma-Aldrich, have developed close working relations with universities in order to introduce themselves to, and select, future employees.

Sigma-Aldrich runs internships for university students in the summer. The program involves full-time employment for 10 to 12 weeks in the company’s analytical services, production, or R&D departments, providing marketable experience in an industrial setting. Likewise, Agilent’s university relations programs include research grants, fellowships, equipment grants, and matching of employee gifts to colleges and universities.

California-based Genentech, one of the originators of the biotechnology industry, has always gone to the fall and spring recruiting events for graduate students at the major universities known for their chemistry programs. As well as analytical and computational chemists, the company, with a work force of over 10,000, looks for synthetic organic chemists, medicinal chemists, and combinatorial chemists to join their research teams.

“With the growth of our small-molecule program we are looking for chemists with analytical methods development, synthetic organic, medicinal chemistry, and peptide chemistry expertise,” says **Holly Butler**, Genentech’s principal staffing consultant for research. “The primary change is that we are hiring more of them now.”

Genentech, as with many other biotech companies, preferentially (though not exclusively) recruits graduates in applied chemistry over those studying basic chemistry. The company looks particularly for candidates who have successfully contributed to drug targets going into development and, ideally, for those with experience filing investigational **continued** »

Agilent
www.agilent.com

American Chemical Society
www.chemistry.org

Balbes Consultants
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Genentech
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Royal Society of Chemistry
www.rsc.org

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www.sigmaldrich.com

Careers in Chemistry

“Increasingly in the life sciences, developments are based on an understanding of processes at the molecular level, even where the molecules are large and in complex systems.”
—Tony Ashmore



new drug (IND) applications with the US Food and Drug Administration (FDA). “Project leadership experience is important as well,” says Butler.

Once they are out of university, “we are more likely to recruit those with work experience in the small-molecule field, often from pharma companies,” she says.

Emerging Occupations

There are a growing number of career choices for scientists with degrees in chemistry, agrees **Tony Ashmore**, registrar at the Royal Society of Chemistry in the UK. “Career choice in general has broadened as new occupations emerge,” he says.

The traditional generic attributes of chemists, in addition to subject specific skills, include complex numerate problem solving capabilities, particularly for those with backgrounds in physical and theoretical chemistry, notes Ashmore. Chemists tend to share an ability to sift, correlate, evaluate, and manipulate nonquantitative data and solve problems where there is incomplete information, particularly for those with a background in inorganic, organic, and biochemistry, he adds.

“Increasingly in the life sciences, developments are based on an understanding of processes at the molecular level, even where the molecules are large and in complex systems,” says Ashmore, “so an increased hiring of folk with a thorough understanding of the fundamentals is taking place.”

Multidisciplinary teams are key, he says: where each member is a specialist in a particular field, but also has the ability to work with team members from other fields. This is quite distinct from what might be called an interdisciplinary team, “where everyone knows a little about everything,” says Ashmore.

Once a Chemist, Always a Chemist

Consultant Balbes says she became a volunteer careers consultant for the ACS when worried chemists began asking her if there was anything they could do beyond working in a lab.

“I actually have a brochure that was put out by ACS in 1963 talking about all these other careers for chemists – sales, marketing, patent law. All these other things, back in 1963!” she says. But even today, chemists can fail to look beyond academia. “Most university professors train students to become university professors,” she says, echoing the concerns of Agilent’s Difirenzi-Swale.

In fact, says Balbes, chemists have always found jobs in sales, marketing, and beyond, but they’ve tended to treat it as a “dirty little secret,” as if they have ceased to be chemists. But they still are

chemists, she insists. The skills they have developed as chemists are essential in those other roles.

There is a growing school of thought that chemists are trained to approach problems in a certain way. “Analytical is the best word I’ve come up with,” says Balbes. “Chemists know how to ask the right questions.”

For the purposes of her recent book, Balbes defined a nontraditional career in chemistry as “non laboratory, non university professor.” Such careers, for people with either a Bachelor’s or a Ph.D. in chemistry, used to be called alternative careers, but this has ended up sounding relatively unappealing. Perhaps just “non laboratory” would have been best, she suggests.

The big employers of nontraditional chemists include all the science companies—chemical companies, biotech companies, pharmaceutical companies—but also law firms, companies involved in public policy, and companies involved in manufacturing or information technology.

Balbes once met a Ph.D. chemist who had moved into sales and marketing of scientific products, and who gave a talk entitled “A Chemist Moves to the Dark Side.” “That’s what scientists think,” she sighs. “But if nobody sold your products, you wouldn’t have a job, would you?”

Selling products to scientists demands a particular skill set, she notes. “It’s not used car sales. Scientists want to see the technical merits of products. They want to be able to make their own judgments based on the merits of the product.”

Balbes hopes she’s starting to see some of the stigma eroding: “For example, people not apologizing for not working in the lab,” she says. “I find myself doing it sometimes, and I really have to stop!”

She firmly introduces herself as a chemist, despite not having worked in a lab for 15 years. You have to consider your audience though, she admits. She once spoke to a group of Boy Scouts who, on hearing that she was a chemist who worked from home, wondered if she might be running a methamphetamine lab. Overall, though, the message is getting across, she says.

Balbes has been a volunteer career consultant with the ACS for 15 years. ACS members have access to a list of about 80 such consultants who will help them through a career crisis—if they’re about to finish their Ph.D. and don’t know what to do next, or if they’ve just lost their job. Each volunteer provides a short biography, and members can pick the individual they think is most likely to help them—they can then phone or e-mail for tailored assistance. The consultants also attend twice-yearly ACS national meetings and run workshops on career-related topics, from CV writing, to interview techniques, to starting up a company.

“You don’t get paid, but it’s incredibly rewarding,” says Balbes. So does she encourage everyone to get a chemistry qualification?

“You should get a chemistry degree if you love chemistry,” she says. “If you enjoy it, you’re going to be able to find a job that you love. You shouldn’t say ‘Right now there’s a big market for chemists so I should go and become one even though I hate chemistry,’ because you’ll be miserable,” says Balbes. “I’m not trying to talk people into getting a chemistry degree; I’m trying to convince them that if that’s what they love, they can make a career out of it.”

Bea Perks, deputy editor of the Royal Society of Chemistry’s magazine Chemistry World, writes from Cambridge, UK.