Biotech education

Key skills and business knowledge that are important for success in biotechnology are often acquired on the job rather than taught, but programmes that provide formal training in the field are becoming increasingly popular worldwide. This month, we feature two leaders of such programmes.

Christopher R. Lowe, Ph.D.
Director, Institute of Biotechnology, University of Cambridge, UK.

In the early 1980s, the biotechnology industry was rapidly emerging. Reflecting its scientific and commercial significance, a position of Director of Biotechnology was created at Cambridge University in the UK to promote biotechnology research and training. Christopher Lowe, who took the initial position in 1984, has since established one of the world's leading programmes in biotechnology education, based at a dedicated institute he founded in 1988.

"Establishing an outward facing and commercially oriented institute with limited funds was a challenge," says Lowe. Now, from an initial grant of £50,000, the Institute has an annual turnover of £3.5 million, and has been successful in integrating biotechnology research with training in entrepreneurship. This success was recognized in the recent award of The Queen's Anniversary Prize for Higher and Further Education.

As well as acting as a model for other such organizations around the world established since, several companies have been spun out of the Institute, and a number of company leaders have followed courses there. For example, Prometic Biosciences, a company based on protein mimetic technology originally developed from research directed by Lowe, now has two therapeutics in clinical trials, and their current CEO, Stephen Burton, received a Ph.D. at the Institute.

Following his Ph.D. in biochemistry at Birmingham University, UK, Lowe took the classic route to academia with postdoctoral fellowships at Liverpool University, UK, and Lund University, Sweden, before taking up a lectureship in biochemistry at the University of Southampton, UK, in 1975. Here, his research shifted from fundamental biochemistry towards a number of areas important to the emerging biotech industry, such as efficient techniques for the purification of high-value biopharmaceutical proteins.

"At the same time, I became more involved with industry, patents and commercial exploitation, as I could see that academia and industry had to work much more closely to sustain the rapidly de-industrializing UK economy and its move into knowledge-based industries," recalls Lowe. So, taking on the position of Director of Biotechnology at Cambridge was a natural move to pursuing this goal.

"Creating a seamless route from fundamental science to exploitation in a single academic organization has been the major challenge," Lowe says. "Getting people with multiple disciplinary backgrounds to talk and listen to each other and act in concert can also be difficult, as is finding individuals with the ability to appreciate the market potential of their science."

With these issues in mind, Lowe has aimed to foster a strong entrepreneurial culture within the Institute, which is also reflected in his advice to would-be entrepreneurs. "The most valuable experience and lesson I have learned is to realize that one can do almost anything in life if one is sufficiently motivated, determined to succeed and willing to take calculated sensible risks," says Lowe. "One has to take that leap of faith into the unknown — or to put it another way: 'unless you buy a lottery ticket, you won't win the lottery'. Being entrepreneurial is all about seeing opportunities, ideally before anyone else does, and acting quickly and decisively to gain the advantage."

Judith A. Kjelstrom, Ph.D.
Director, UC Davis Biotechnology Program, University of California, Davis, California, USA.

California is the birthplace of the biotechnology industry; it is also home to one of the longest established biotech educational programmes, created at the University of California Davis in 1986. As Judith Kjelstrom, the director of the Biotechnology Program, explains, "Our mission is to promote biotechnology education, training and research as well as serve as a community resource. We are also deeply involved in academic–industry partnerships and entrepreneurism, and try to assist faculty and students in moving ideas from bench to market."

With these goals in mind, the Program is involved in a wide range of NIH and NSF training grants and educational programmes for Ph.D. students. For example, the Designated Emphasis in Biotechnology graduate programme has over 150 Ph.D. students from 24 different disciplines. These students are exposed to cross-disciplinary, team-based research and entrepreneurship, and most of them complete a 3–6 month internship in the biotech industry. Emotional intelligence is also highly valued; Kjelstrom tells her students: "Your technical skills will get you the interview, but your social skills will land you the job."

Other Program activities are aimed at promoting understanding of biotechnology in the wider community. "For example, we have established "Train the Trainer" workshops for community college faculty and high school teachers on biotechnology and bioinformatics topics," Kjelstrom says. "We also oversee summer technical short courses for graduate students, faculty and industry scientists."

Kjelstrom began her scientific career with a degree in biological sciences at California State University, Sacramento, specializing in clinical laboratory technology. She then spent 12 years in clinical medicine, before earning her Ph.D in microbiology from UC Davis in 1992. Soon after finishing her Ph.D., she decided to pursue her passion for teaching, and held several positions in Californian colleges and universities teaching undergraduate microbiology and general biology. She was recruited to the UC Davis Biotechnology Program in 1999 to be the associate director.

"Although I loved undergraduate teaching, I believed my impact would be greater in this programme and I loved the idea of working with Ph.D. students and networking with the biotechnology industry and government leaders," says Kjelstrom. She took over leadership of the programme in 2001. In addition, she directs the Advanced Degree Program (ADP) for corporate employees, a Ph.D. programme in the life sciences and engineering for the working professional. Her experience in clinical medicine has also proved valuable in her role as co-director of a Howard Hughes Medical Institute's Integrating Medicine into Basic Science (IMBS) graduate training programme focused on translational research.

As well as organizing innovative educational programmes, she likes being closely involved with cutting edge technology. "The key to making the most of these emerging opportunities is to be flexible in your thinking and create dense networks of colleagues," says Kjelstrom. "Don't be afraid to re-invent yourself during your career…it can be fun."

WEB SITE
Career snapshots: http://www.nature.com/naturejobs/magazine/career_snaps.html