TRAINING ACADEMIC CHEMISTS FOR INDUSTRY

To what degree should academia be shaping chemists' skillsets for careers in pharmaceutical companies?

Nowhere is the divide between academic institutions and the pharmaceutical industry more apparent than in chemistry. Not only is there a difference in automation and efficiency, as in most areas in drug discovery and development, but there is also a difference in philosophy.

Academic groups are generally involved in project areas such as the multi-step synthesis of natural products like antibiotics, or the development of new synthetic methods. Industry, on the other hand, has different priorities, such as creating libraries of closely related compounds for analysis in biological screens. Even in the recent drive by academic chemistry groups to enter drug-discovery-related areas, academic work in general tends to focus on making molecules, whereas pharmaceutical companies are focused on the properties of those molecules and the relationship between structure and drug properties.

Large pharmaceutical companies almost always hire those graduates that have competence in core skills. This, in reality, means recruiting the best synthetic organic chemists from a handful of respected and successful universities, for no other reason than these groups have a good track record of success. Broadly based synthetic organic chemists are hired, as opposed to those that train in more specific areas of the process such as combinatorial chemistry, because the large chemistry teams within these companies provide the flexibility for chemists to pursue various routes: either pure synthetic organic chemistry or training on the job for other areas.

But there is anecdotal evidence that this recruitment policy can have an undesirable effect on academic training. Talented postgraduate students in academic chemistry groups are persuaded to carry out more 'industry friendly' projects. Ph.D.s that are purely dedicated to synthetic organic chemistry experiments are viewed favourably by large pharmaceutical companies; any that spend less time on synthetic organic chemistry — for example, because the student has also investigated the biological effects of the compounds they synthesized — are viewed less so.

"There is a strong tendency in every organization to recruit in one's own likeness, so if academic groups move away from core synthetic training they risk industry not picking up the students as they emerge from the group," says Simon Teague, principal scientist at AstraZeneca R&D Charnwood, United Kingdom. "The conservative nature of industry recruiting is a major restraint in what areas academic groups can get involved in. It is understandable, but regrettable."

The recruitment situation differs in smaller pharmaceutical and biotechnology companies, who do actively recruit students trained in more specialized areas such as medicinal chemistry, says Christopher Lipinski, Adjunct Senior Research Fellow at Pfizer Global Research and Development, Groton, Connecticut. "These companies have smaller chemistry teams, and therefore can't take the chance that someone won't be interested in medicinal chemistry," he says. "These companies might not be getting the best synthetic organic chemists but they are guaranteeing the hiring of someone who is actually interested in doing what they say they are interested in, and won't change their mind before they join."

Given this dichotomy in recruitment policy, what skills should academic chemistry departments incorporate into their curricula to ensure that their graduates have a high chance of being hired by industry?

"There are two schools of thought on this issue that to some degree reflect the differences between undergraduate training in the United States and Europe," says Brent Stockwell, Professor of Biological Sciences and Chemistry at Columbia University, New York.

The first, which is most like the US liberal arts and sciences undergraduate education model, is that students should get a broad education, allowing them to become well-rounded, informed citizens. This training also includes teaching people how to train themselves and think critically. Once these students complete their education, they learn on the job the specifics of a particular position.

The second, more like the European undergraduate education, is that students should receive focused training in a technical discipline that will allow them to quickly become productive after completing their education. Companies prefer to hire well-trained students and therefore these students will have an edge in finding positions. "Both arguments have merit," says Stockwell.

"I don't think that academia should be training people especially for industry," says Lipinski. "Academia should be training in research and creative thinking to become independent investigators." These key skills are easily transferable from academia to industry and within companies. Moving from a kinase project in arthritis to an ion channel project for central nervous system diseases is relatively easy, compared with a similar situation in biology. "Chemists can be flexible; you can move across several projects in 15 years," says Lipinski. "In biology, this isn't the case."

These key skills will always be desirable, no matter what specialized chemistry subjects appear on the scene, says Teague. "A chemist rang me up in the early 1990s and asked me if his son should train in a combinatorial chemistry group or do a 'traditional synthetic' Ph.D.," he says. "I told him to stick to the traditional training and avoid fashions. This was my advice despite running combinatorial chemistry at the time."

Stockwell agrees that the particular technical skills that are in vogue tend to change over time and the most successful scientists are those who can retrain themselves and learn new areas of science. "I believe the mission of academia is first and foremost to train scientists to think critically and to learn how to learn," he says. "This particular skill will always be valuable."

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