

Professor Raymond Dwek, Oxford GlycoSciences Ltd

An American Opportunity

Raymond Dwek's first degree was from Manchester University, after which he moved to Oxford to work for a Ph D. In 1968, Dwek attended a lecture given in Oxford by a US general and, during the discussion period, made perceptively critical comments on the American army's approach to science. To his surprise, instead of hampering him, this fortuitously had positive results and he was invited to the USA to work for several months with the US army's huge electronics command.

It was a very important experience for Dwek because the sheer size of the team assembled under that command enabled him "to see how big science could be done". He had access to every contract that the US army had with a university, and was free to visit any of these universities and to question academics working on particular contracts. He could ask how they were tackling those contracts and what they were achieving. Similarly, he could seek assistance from US industry, not least in obtaining its help in evaluating research outcomes. He had access to huge resources, "with no checks and balances" – a unique opportunity for a young UK academic in the 1960s.

Initially, when he returned to Oxford, Dwek followed a normal academic career. Then, in 1979, successful consultancy work he had performed for Monsanto led the company to offer him payment. Typically, Dwek refused but then, so much were Monsanto interested in Dwek's own 'blue skies' research work that the company gave Oxford University £100,000 to fund it. Dwek had tapped a continuing source of example, expertise and funding that would both profoundly influence him and support the university's research effort.



A Third Biochemical Alphabet

Three years later, in 1982, while strengthening his early links with Monsanto, Dwek's research revealed that besides DNA and proteins 'there was a third biochemical alphabet – sugars'. He was keen to develop a technology for handling sugars, but his professor, Rodney Porter, insisted that no UK Research Council would have sufficient resources to be able to fund him to do this. "Why not go back to Monsanto and seek funding there?" Professor Porter asked. And Raymond Dwek did precisely that.

Exploratory work revealed big, though expensive, opportunities and Monsanto agreed to provide Oxford's first major industrial contract – which in the event yielded £50 million over 14 years. Dwek was inevitably accused of unbalancing the university, but he came to see Monsanto as idealistic, providing high-quality people and important spin-offs for Oxford. Not least, Monsanto financed the establishment Oxford University's Glycobiology Institute, inside Oxford's biochemistry department. The latter is now by far the biggest university biochemistry department in the world, and Raymond Dwek, Professor of Glycobiology, is its head.

Dwek saw the commercial potential of sugars as reagents and actually established a company – with two shares! – to exploit them. But Monsanto had just acquired the US drug company Searle, and offered Dwek compensation to leave the field open for Searle. Again typically, Dwek spotted a different opportunity and persuaded Monsanto to send scientists to Oxford. They worked under his direction and reported to Searle, while helping to establish the technology of a new company.

Dwek wanted to create a cycle. As he puts it: "The university spins-off discoveries into a company; the company feeds back technology; and it also provides grants to produce more discoveries".

OGS

A company which could do this – initially called Oxford Glycosystems, (OGS) - was set up in 1988 and was the first company in which Oxford University held shares, though it paid nothing for them.

To demonstrate his anxieties about safeguarding the university, Dwek resigned as an individual director of OGS on its first day, becoming a university director instead. In 1989 – 1990, OGS issued its shares to the public. Up to this point, Monsanto had held a 'golden vote' and had used this to prevent OGS from producing drugs. Monsanto withdrew that blocking vote. In future, as well as producing technology, OGS would be able to develop some drugs which came from the Glycobiology Institute and in doing so, to provide funds for the Institute's research.

Dwek's 'cycle' was complete and OGS, renamed Oxford GlycoSciences, brought in top big-company managers. Kurt Raab from Genentech, was appointed Chairman of OGS, while Michael Kranda, from Immunex, became its Chief Executive. Interestingly, Kirk Raab later became a member of the Chancellor's Court of Benefactors, in recognition of the substantial gifts from Oxford GlycoSciences to Oxford University. Thus far, OGS is the only spin off company whose representative has joined the Court, and this appointment reinforced Dwek's ideas by recognising and rewarding industrial support for the University.

OGS itself has now diversified into a real drug discovery programme. In late 2002, OGS announced that its drug for Gaucher's disease had been granted a licence for sale in the EU; this was a drug that resulted from research in the Glycobiology Institute. Having raised £200 million in cash through a share issue in 2000, OGS had substantial funds and in 2003, the company was acquired by Celltech for £106 million, entirely in cash. Celltech explained that it was keen to develop OGS's work on oncology; that its managers were "installed in key positions to direct the rapid integration of key elements" of OGS; but that some activities would be divested.

Celltech itself was later taken over by UBS and the glycolipid drug was successfully marketed by Swiss company Actelion under the trademark name Zavesca. A few companies have succeeded in bringing the drug from laboratory to clinical usage; this clearly heralds an era of wider use of imino sugars.

Like many of Oxford's original entrepreneurs, Professor Dwek continues to be passionately committed to on-going research. He remained as the University's Head of Biochemistry from 2000 to 2006. In 2007, he held the Kluge Chair of Technology and Society at the US Library of Congress, an opportunity he used to focus on several of his other long-standing interests, such as the quest for an Aids vaccine and the use of biotechnology to address environmental issues. In April 2008, he was elected President of the Institute of Biology.

He was instrumental in establishing the Israeli National Institute for Biotechnology at Ben-Gurion University of the Negev, where he hopes that advances in science and quality of life will bring about, not merely material comfort but enhanced inter-faith and racial understanding and cooperation to the Middle East. "The goal is to use technology as an instrument of peace," he explains. The Institute has already established vital water harvesting, solar energy and desalination practices which have triggered an extraordinary agricultural boom in the arid conditions of the Negev. He also used his pioneering experience at Oxford to help set up and develop Ben-Gurion's Technology Transfer Unit.

Over the last six years, he has also found time to help modernize the Institute of Biochemistry of the Romanian Academy in Bucharest, for which work he was presented with the Romanian National Order of Merit with rank of Commander. Professor Dwek considers it vital to retain a comprehensive network of links with both academic and commercial organizations in the biotechnology world.

He is on the board of Scientific Governors of the Scripps Research Institute and a Director on the Scientific Advisory Board of United Therapeutics which works to develop and commercialize unique products designed to address the unmet medical needs of patients with chronic and life-threatening cardiovascular and infectious diseases and cancer. He praises both organizations for their 'blue-sky thinking' – an approach which he believes is often lacking in industry.

If peace in the Middle East were not ambition enough for Professor Dwek, another mission close to his heart is the establishment of a dedicated virology institute in Oxford. He is using his extensive network of contacts to complete funding for the institute, where he believes that a vaccine for Aids, a project he is working on alongside colleagues from Scripps, will eventually become a reality.

Asked about his motivation, he insists: "It is reward enough to know that a drug which I was involved in creating is making a material difference to people's lives. I treasure every letter I receive from Gaucher's disease patients whose symptoms have responded significantly to Zavesca."

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