# DAVID NEEDHAM

## ORATION DELIVERED BY PROFESSOR PHIL WILLIAMS ON THURSDAY 10 DECEMBER 2015

Pro-Vice-Chancellor, Ladies and Gentlemen, it gives me great pleasure to introduce David Needham. In the next few minutes I would like to share with you a little about David and his many achievements.

David came to Nottingham in 1972 to study for a degree in Chemistry at Trent Polytechnic. His colourful research career followed working in a pigment factory. David recounts getting the blues, literally, and found himself looking for other opportunities. David replied to an advert for a "Graduate Student Demonstratorship" of Professor Daniel Eley FRS, head of Physical Chemistry here at Nottingham. David studied gas/solid catalysis maintaining the experiments each and every day for three years. Each month David wrote a report of progress and plans, which formed a growing pile at the side of Professor Eley's desk.

Towards the end of his time here David attended a talk at the Cancer Research Laboratories and decided that this was the area in which he would like to work. David was introduced to Professor Dennis Haydon FRS in Cambridge, where he started the day after finishing at Nottingham. Whilst working in Cambridge David turned the 42 reports he had written for Professor Eley into his PhD thesis. He submitted three copies; not in the normal loosely-bound state, but in velour-covered hard-bound books with gold embossed lettering. Such is his incredible attention to detail and scientific rigour David was awarded his PhD with not one correction required to his thesis.

David studied black lipid films and how other molecules interacted with them. A chance observation led David to develop a new technique using micropipettes. For David this was a relief; it permitted him to study these molecules and make important discoveries, and it meant that he didn't have to move to use equipment in Liverpool – something a Manchester United supporter would never willingly do.

It is testament to David's talents as a researcher and skills in presentation that in 1982 he was awarded the Oppenheimer Research Fellowship: David had been asked by Professor Haydon to go to a 'meeting' on his behalf. It was only afterwards when he was congratulated on being awarded a Fellowship that he realized this meeting was actually a presentation to and interview with the selection panel.

David's mastery of using micropipettes led him to be awarded a NATO/SERC Fellowship to work with Professor Evan Evans at the University of British Columbia. There, David studied the mechanics of liposomes using the techniques they pioneered. The combination of experimental skill, tenacious thirst for knowledge, and the Vancouver weather enabled David to make ground-breaking measurements of lipids across a wide-range of temperatures. His paper describing this work has been cited over 600 times.

*Evan Evans wrote:*

> *"David is a brilliant, intuitive scientist who runs to the lab and quickly assembles a simple experiment to reveal deep insights into the unknown complexity of whatever chemical concoction or colloidal soup that interests him! Moreover, he then senses the hidden opportunity to engineer some new advance in material science that aids human health and well being (e.g. from "sighting devices" to aid downtrodden dart throwers in a pub to nano-drug delivery systems to cure cancer patients)."*

David's first research talk, in 1986, was his successful interview for the position at Duke University in North Carolina. At Duke, David expanded his research into the temperature dependent biophysics of membranes, building collaborations in many areas of endeavour, doing this whilst teaching materials science, and in what free time there was, playing darts. David maintained the desire to treat cancer. In the early 1990s, through a meeting with a postdoctoral researcher (whilst playing darts) and crashing a Black Tie party held by the Duke Fund Raising Development Campaign David met Dr Mark Dewhirst, a Radiation Oncologist.

Mark explained to David that neither current medicines nor hyperthermal treatment were working. David had the idea that if he could trap a drug in a liposome membrane below its solid-liquid phase transition, and then heat the tumour, then maybe the encapsulated drug would leak out faster into the tumour and kill the cancer. The "Low Temperature Sensitive Liposome" was realized. David's first two *Cancer Research* papers showing the enhanced anti-tumour effect of this formulation have been cited over 670 times.

Through a number of animal studies and clinical trials David's cancer drug delivery system was demonstrated to successfully inhibit tumour growth. The licensed formulation, "ThermoDox", is currently undergoing phase III clinical trials for liver cancer, and pre-clinical development is ongoing for RCW breast cancer, liver metastases, brain, pancreatic, and breast cancers.

*Mark Dewhirst remarks:*

> *"He has never taken a single piece of data at face value. He has always pushed to understand how an experiment was done – how to interpret results in light of his knowledge of biophysics. We were fortunate to have been able to license the technology. David has been tenacious in pushing the company to fulfill its obligations. David was the lone soldier doing battle. There is no doubt that his reluctance to accept defeat has contributed to their successes. We are still some years away from the results of the definitive trial for use of the drug with thermal ablation for primary liver cancer. But we are all very hopeful for a positive result."*

In 2013 David was awarded the five-year Niels Bohr Visiting Professorship to the Southern University of Denmark where he continues to innovate cancer treatment. His work has been cited nearly 10,000 times. David accepted the invitation to help our research into new treatments and discovery of new biomaterials, and develop teaching in our courses. I haven't the time to describe the innovations in education that David has pioneered, nor the sports science technology he has developed for darts throwers. David's intuition, innovation and rigour in research, passion for education, and commitment to improve the health and wellbeing of society is something that we all look forward to benefitting from in the future.

Pro-Vice-Chancellor, to you and to the whole congregation I present David Needham as eminently worthy to receive the degree of Doctor of Science, *honoris causa*.