



Anne-Katrin Pukiss/Wellcome Images

Louise Napier Johnson

Pioneering protein crystallographer. Born in Worcester, UK, on Sept 26, 1940, she died in Cambridge, UK, on Sept 25, 2012, aged 71 years.

When Isaac Newton wrote of seeing further by standing on the shoulders of giants he was using a poetic metaphor to describe a feature of most human endeavour, and of science in particular: the intellectual dynasty. Within her discipline of crystallography Louise Johnson's lineage is particularly evident. Her science was founded at the end of the 19th century by the Australian mathematician William Henry Bragg who discovered how to determine the molecular structure of crystals using a beam of x-rays. He was joined in this by his son William Lawrence Bragg, both of whom worked at the crystallography laboratory of London's Royal Institution. Bragg junior subsequently recruited physicist David (later Lord) Phillips to his research group at the Royal Institution; Phillips went on to supervise Louise Johnson's PhD there. And Johnson lived up to this promising start, becoming the fourth of four generations of researchers whose combined careers, each notably successful, spanned some 120 years.

Johnson had begun by studying physics at University College London, graduating in 1962 and moving directly from there to the Royal Institution. Phillips had been there since 1956 and had begun working on the structure of the antibacterial protein lysozyme. Besides being part of the team tackling this task, Johnson set out to explore a related issue: the position on the molecule of the site responsible for its catalytic action. In 1964 she began crystallographic studies of lysozyme that had been complexed to a type of

sugar molecule known to inhibit its activity. As intended, this ploy successfully revealed the location of the catalytic site. Moreover, the insight allowed Phillips to propose how lysozyme was able to exercise its catalytic action: the first time that the activity of this or any other enzyme had been properly explained at the molecular level.

Her PhD complete, Johnson spent a year in the USA at Yale University working for crystallographer Frederic Richards, who was then in the closing stages of solving the structure of a further enzyme, ribonuclease. She returned to the UK in 1967, first as a lecturer in biophysics at Oxford University and later, from 1990 until her retirement, as the David Phillips Professor of Molecular Biophysics. A colleague, Professor Sir Tom Blundell of Cambridge University, describes her career following the lysozyme study as falling into two phases: her subsequent 20-year study of glycogen phosphorylase ("a huge challenge", he says); and then a switch of target to the kinases that regulate enzymes like phosphorylase. "She was always picking the most challenging projects", says Blundell, adding that crystallography is not a good career choice for those who favour quick wins. A project which the two of them shared was the authorship of a 1973 textbook *Protein Crystallography*, still highly regarded. "We were fortunate that it turned out to be so influential", says Blundell. "We were both quite young, and we certainly weren't the most experienced people in the field. We just put down everything we knew." The book lasted far longer than either of them could have imagined.

Johnson retired from Oxford University in 2007, but continued working. Since 2003 she had spent half her time as the Director of Life Sciences for the Diamond Light Source, the UK's national research synchrotron facility for generating powerful beams of radiation ranging from infrared to x-rays. Her role there was essentially strategic, according to David Stuart, Professor of Structural Biology at Oxford University and Johnson's successor at Diamond. Stuart describes her as friendly, unassuming, and reserved. "She kept her private life very much separate from her science life", he says. Blundell agrees. "You had to get to know her to find out that she was well informed about all sorts of things from philosophy to international affairs." He recalls working with her on their joint textbook as pure pleasure. "She also had a tremendous interest in science in developing countries", says Stuart. This was no doubt fostered by her marriage to the Nobel Prize winning physicist Abdus Salam: a marriage that caught people's attention because Salam, a Muslim, already had a wife. "It was a very happy marriage", according to Blundell. "They were intellectually very complementary." Johnson, a Fellow of the Royal Society, became a Dame of the British Empire in 2002 and a Foreign Associate of the US National Academy of Sciences in 2011. She leaves a son and a daughter.

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