Paley Johnson (1917–2011)

Earlier this year, Paley Johnson died after a long and highly respected life and career of scientific research and teaching. He was one day short of his 94th birthday.

Despite his distinguished academic career as a colloid scientist – where he became a world authority – focusing on the physical properties of biological macromolecules in solution, Paley never forgot his roots in the North East of England. He was born in Middlestone, County Durham, and attended Alderman Wraith Grammar School in Spennymoor. He then won a place at Trinity College Cambridge in 1935. He became particularly interested in the work of E.A. Moelwyn-Hughes, who subsequently recruited him as a PhD student to investigate the effect of temperature on the activation energy of reactions between molecules in solution. In his memoirs, Paley acknowledged what an important influence Moelwyn-Hughes had had on his subsequent career, "Looking back I can see clearly that such a period of supervision by a sound and demanding experimentalist as well as an accomplished writer of clear unambiguous English was as good an initial training period as one could have hoped for."[1] These are precisely the skills that Paley himself would later pass on to many others.

During the war, Moelwyn-Hughes was called away by the Ministry, and the supervision of Paley's thesis switched to Professor Eric Rideal in the Department of Colloid Science. Colloid science was then a relatively new discipline at the interface between physics, chemistry, mathematics and biology and, under Rideal's guidance, he addressed issues as diverse as characterizing the nature of sugar-type polymers called nitrocelluloses – for improved performance as cordite in rockets – to the extraction, purification and analysis of groundnut proteins as a source of food. This gave him an introduction to the physical chemistry of linear polymers, which proved invaluable training for when he later moved to address the nature of asymmetric proteins such as muscle proteins – expertise later passed on to some of his own research students many of whom became authorities in their own fields.

A short period at the Royal Institution in London followed, where, along with Albert Alexander, he produced a comprehensive two-volume Oxford University Press monograph on Colloid Science, which, for nearly half a century, remained the authoritative text in the field, and is still a valuable reference source, even today[2]. Primarily in recognition of this, along with other achievements, the University subsequently awarded Paley the distinction of an ScD degree. In 1950, he returned to Free School Lane to take up an academic post at the Colloid Science Laboratory.

Paley was first and foremost an experimentalist, one of the best, and his attention turned to physical techniques for solving biological problems – to two techniques in particular, of which he became the master and a world authority. One was the analytical ultracentrifuge. This had been invented 25 years previously by Svedberg in Sweden. In essence, the very high centrifugal forces this machine created, by rotating dispersions of proteins or polymers in solution at up to 1000 revolutions per second, caused them to sediment and, from the sedimentation rate picked up by special optical systems, deductions could be made about polymer size, shape and interactions. Paley found a completely new application for this technique in the characterization of gels, gelatin and other jelly-like materials[3].

One of the present world leaders in colloid science, Professor Helmut Cölfen at the University of Konstanz in Germany, comments on this work on gel analysis in the analytical ultracentrifuge: "Paley did the first systematic analyses of gel systems in the centrifuge which was highly pioneering work since up to then, only solutions or dispersions of particles had been investigated. He found that the behaviour of a gel in the centrifuge was fundamentally different from a solution or dispersion and established the theory describing this. He was thus the first one to accurately describe the behaviour of gels in the centrifugal field and laid the foundations for the analysis and understanding of the important class of materials known as hydrogels, crucial for their application in food and biopharmaceuticals."

The other technique which became Paley's trademark was light scattering of macromolecular dispersions – a technique requiring meticulous attention to detail. Without that attention, as Paley would say, "experiments were not useful". In his own research and publications, he did a lot to establish good practice, giving detailed procedures for achieving this, and was very critical of other studies where this attention to detail was not followed or shortcuts had been taken. *And this was it with Paley*: he was an absolutely meticulous experimental scientist and an excellent teacher at undergraduate, postgraduate and postdoctoral levels. He provided a platform and excellent grounding for many distinguished careers in science, and was highly respected by all researchers in the field.

Colloid science at Cambridge and Paley Johnson were almost synonymous. Indeed, when Francis Roughton retired as head, it seemed only a natural progression

that Paley would be the next Professor and Head of Department. Sadly, University politics conspired against him: the Department of Colloid Science was closed and fragmented. Paley's group moved, at the invitation of Sir Hans Kornberg, to the Department of Biochemistry, where he continued to produce first-rate science until his retirement in 1984. From there he was given an emeritus position in the Cavendish Laboratory by Sir Sam Edwards – and for 9 more years, with his centrifuges and light scattering, contributed to the establishment of the highly successful polymer physics group led by Athene Donald.

I had the privilege of being his last Research Assistant in the Department of Biochemistry at the University of Cambridge before his retirement in 1984. His laboratories were a wonderful mixture of commercial equipment purchased only when necessary – such as the latest laser for his light scattering – supplemented by in-house, sometimes ingeniously constructed, components. Examples included the use of a model aeroplane propeller, to ensure optimum circulation in the water baths used in one of his light-scattering instruments, and a temperature-control system for his viscometer water baths that involved a light bulb immersed in water which would flash on and off, holding the temperature constant to within a few hundredths of a degree. But Paley was more than an excellent scientist. He was a dedicated Christian, and at Cambridge he attended the Methodist Church on Castle Street for 75 years. It was here, and through the University Methodist Society, that he met Margaret, a Homerton College girl who became his wife and companion for 35 years until, sadly, she died. They had two children – John, who is now an eminent lighting designer sought by top art galleries in the country and abroad, and Helen, who is a communications consultant for the biopharmaceutical industry – and three grandchildren: Ben, Tom and Emily. After Margaret's death in 1978, he was alone for a while, then he married again – to Muriel, a retired school headmistress, who became his companion for 20 more years until, sadly, she was lost too.

Back in the laboratory, tea-time discussions were always something to look forward to. First of all, and, most importantly, Paley would often bring in the most splendid of cakes, made by Muriel, who would sometimes come in to join us. He would often speak very fondly of his family and of games of cricket in the garden with his grandchildren. He was keen on sports; we got the impression he was a bit of a Darlington FC fan, but subsequent discussions with his family suggested that he had a strong affection for Middlesbrough. There was no mistaking that cricket was his great love and he would have been immensely proud when Durham were promoted from the Minor Counties to full County Championship status in 1992. At these tea times, we would sometimes chuckle at Paley's thriftiness. We were amazed at how many cups of afternoon tea he could extract from a single tea bag! Like many others, I found my own time in his laboratory to be one of the most productive in my scientific career, and I will always be grateful for his masterly guidance, a guidance enjoyed by many others who themselves went on to distinguished scientific careers. On behalf of all friends, family and colleagues we thank you, Paley, for everything, and say goodbye to this good man. ■

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References

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2. Alexander, A.E. and Johnson, P. (1950) Colloid Science, Clarendon Press, Oxford
3. Johnson, P. (1964) Proc. R. Soc. A **278**, 527–542