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Chairman's Message

This year above all others brings to us a palpable reminder of the power of fibre diffraction. Without the excellent X-ray diffraction patterns from DNA fibres produced by Rosalind Franklin in the laboratory of Maurice Wilkins at King's College London, the modelling studies of Francis Crick and Jim Watson at Cambridge 50 years ago would have had nothing concrete about the dimensions of the DNA molecule to go on apart from Astbury's earlier demonstration of the 3.4 Å repeat of the bases. The facts that the structure was helical, based on the helical diffraction theory of Cochran, Crick and Vand (1952: Acta Cryst. 5, 581), theory which also been developed (but not published) by Alec Stokes at King's College London, that the space group contained a dyad axis perpendicular to the fibre axis suggesting a pair of anti-parallel strands of polynucleotide, and that the axial repeat was 34 Å, all came from the fibre diffraction patterns of the King's College group. Without knowledge of these key experimental observations it is hard to see how the Watson-Crick double helix model for DNA could have been developed. Together with Watson's almost mystical discovery of base-pairing, following Jerry Donohue's advice on the correct tautomeric forms of the bases, fibre diffraction led inevitably to the solution of probably the single most important question in biology 'how is the genetic information passed from parent to offspring?' (J.D.Watson & F.H.C. Crick, Nature 171, 737-738, 1953 and other papers in the same issue). An excellent insight into this story and the role of the Cavendish laboratory was recently given by Hugh Huxley (2003: Physics World, March 2003, 29-35), himself a pioneer in the application of fibre diffraction methods, this time to muscle.

Despite this initial flurry of activity on DNA structure, in fact it took the Wilkins group about another 10 years to prove that the Watson-Crick model was essentially correct by providing accurate coordinates of helical, base-paired duplexes that fitted improved fibre diffraction patterns very much better than the first Crick-Watson wire model. Nowadays of course there are many known DNA forms, almost all recognised first from fibre diffraction studies, and there are new structures still being discovered, such as the polyhexanucleotide