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Publisher *Taylor & Francis*

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## Nucleosides, Nucleotides and Nucleic Acids

Publication details, including instructions for authors and subscription information:

<http://www.informaworld.com/smpp/title~content=t713597286>

## Biographical Sketch

**To cite this Article** (1999) 'Biographical Sketch', *Nucleosides, Nucleotides and Nucleic Acids*, 18: 11, xiii — xv

**To link to this Article:** DOI: 10.1080/07328319908044610

**URL:** <http://dx.doi.org/10.1080/07328319908044610>

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## BIOGRAPHICAL SKETCH



### **Professor Gordon Shaw 1922-1997**

Gordon Shaw commenced his university education in 1942 at the Imperial College of Science and Technology. In 1943 he obtained a first class honours degree and was awarded his PhD (supervised by Sir Ian Heilbron and A.H.Cook on the synthesis of penicillin and analogues) in 1945. Following a short period in the pharmaceutical industry he was first appointed as a Lecturer and later Senior Lecturer in Organic Chemistry at the University of New South Wales (1948 to 1959). During this period he won a Nuffield Research Fellowship to work with Lord Todd, the Nobel Prize Laureate, at the University of Cambridge between 1955 and 1956. He returned to England in 1960 to take up the post of Reader in Organic Chemistry at the University of Bradford. In 1981 he was awarded a personal chair in organic chemistry and in 1989 he became an Honorary Professor at the University of Bradford; he continued his teaching and research in this capacity until his death on 25 June 1997.

Professor Shaw was a person with fascinating foresight and imagination and hence an admirable capacity to generate new ideas. He published work on a variety of subjects in the general area of bioorganic chemistry but his major field of activity was undoubtedly the synthesis of purines, pyrimidines and imidazoles including nucleosides, nucleotides and related compounds. The extent of this work is reflected in its publication as a series of 67 Parts in the Journal of the Chemical Society. A key feature of the Shaw routes to purines, pyrimidines and imidazoles is that they all started from a primary amine and allow the regioselective introduction of a wide range of substituents in each of the heterocycles. Such synthetic facility has meant that many other workers have since used the Shaw routes to obtain a large number of related heterocycles. Shaw's route to nucleosides involves condensing an acyclic precursor with a glycosylamine. As part of this work Shaw devised a novel route to a number of isopropylidene protected glycofuranosylamines. Such an approach to nucleoside synthesis provided an alternative to the more traditional direct condensation of a pre-formed base with a sugar. Part of Professor Shaw's interest in nucleoside chemistry was the study of the biosynthesis of imidazole and purine nucleotides where his methodologies became of particular value in the synthesis of intermediates and related compounds for enzymological studies. This work was extended to exploring aspects of the biosynthesis of thiamine which has a branch point in the biosynthetic pathway to purines.

Another major interest was in the field of plant cytokinins. He and his co-workers were the first to synthesise the naturally occurring cytokinin zeatin, its ribonucleoside and ribonucleotide. Later he and his collaborators, M C and D W S Moc, discovered and synthesised another zeatin glycoside (the O-xylopyranoside); this area of research continued until his death.

Professor Shaw was also fascinated by geochemistry, Precambrian organic matter and the origin of life. His thoughts and research in this area were brought together in a book he wrote with J. Brooks entitled *Origin and Development of Living Systems*. As part of this work he became interested in plant spores; particularly, sporopollenin, the outer membrane of pollen grains and some related algal and fungal sexual spores. He studied the structure of this material and found it to be related to

carotenoid monomers. He later used it as an inert solid phase support for peptide and oligonucleotide synthesis and as an ion exchange medium.

A further aspect of his work was a novel synthesis of anthracyclines and their diamino derivatives, making use of a modified Marschall reaction using a carbohydrate as a chiral template. He published this work in a short series of five Parts in the *Journal of the Chemical Society*.

Gordon Shaw will be well remembered by a wide circle of collaborators and friends for modesty and humility coupled with originality of thought and enthusiasm for unfolding the secrets of nature.