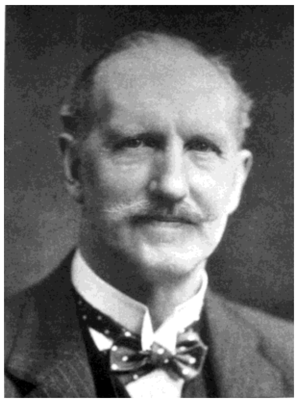
The Mayneord-Phillips Summer Schools

Background to the Schools & Short Profiles of the Two Pioneering Physicists

C R Hill and S Webb

W V Mayneord



C E S Phillips

Background to the Summer Schools

The Mayneord-Phillips Trust was established in 1991 to commemorate the work of the late Professor W V Mayneord, and Major C S Phillips. The Trust was founded and continues to be supported by the Institute of Physics, the British Institute of Radiology and the Institute of Physics & Engineering in Medicine. Trustees are drawn from the membership of the founding bodies and serve for a term of three years.

The main activity of the Trust is the organisation of biennial Summer Schools on topical areas of medical physics, primarily aimed at PhD students, post-doctoral researchers early in their careers and medical physics trainees.

Profiles of two pioneering Physicists

W V Mayneord and C E S Phillips were two outstanding pioneers of the applications of Physics to Medicine. In their nature as pioneers they both had strong concern to help and encourage younger colleagues develop their own interests and expertise in this worthwhile and stimulating field.

A number of their former colleagues and successors, members of the scientific societies with which Mayneord and Phillips were themselves closely associated, share this concern and have felt that an effective expression of it would be a series of summer schools that would explore some of the currently active developments in the various applications of Physics to Medicine.

We hope that the following short accounts of the careers of Phillips and Mayneord will give participants in the Summer Schools, and others, an impression of these two individuals as real working scientists, only separated from the rest of us by the accident of time.

Major Charles Edmund Stanley Phillips

Major Phillips has been described as the first British medical physicist. Born in 1871, he was educated privately, never attending College. A Gentleman Scientist, he knew well such men as Kelvin and Crookes. Primarily an experimentalist he worked at home and was, in common with many contemporary physicists, studying the electrical discharge in evacuated glass tubes at the time of Röntgen's discovery of X-rays on 8th November 1895. His laboratory notebooks are preserved in the library of The Institute of Cancer Research.

Experiments with discharge tubes led to the observation of the rotation of a luminous ring in the electrical discharge tube within a static magnetic field; the effect soon became known as the "Phillips' Phenomenon". His notebooks detail how he brought this to the personal attention of established physicists such as Crookes and Silvanus Thompson and his ecstasy when being allowed to publish in the Proceedings of the Royal Society. These were the days when FRS patronage was the only way of having one's work appear in this revered journal. His notebooks contain exquisite line drawings of his apparatus with blow-by-blow accounts of what he achieved (and what went wrong) with his experiments. Such was his joy being noticed by Crookes that he even stuck into the notebook the envelope of the letter bearing the news of his paper's acceptance by the Royal Society.

In the autumn of 1896 he began, for reasons that are not known, to record all his daily notes in Pitman shorthand, an annoyance for today's historian. In 1897 he published a book listing a complete bibliography of X-ray literature, a task just possible at the time and almost certainly impossible thereafter. The work also contained all sorts of practical tips on how to make one's own equipment.

In the early 1900's Phillips became interested in quantitative radiation and in 1909 he was commissioned to prepare three small radium standards which were calibrated against a standard in Rutherford's laboratory and then presented to the Röntgen Society of which he was a founder member and President in 1909-1910. The standards are preserved by the British Institute of Radiology. During the 1914-1918 War he was physicist to the X-ray Committee of the War Office where he advised on such things as high-voltage equipment for X-ray tube supply. Taking advantage of the luminosity of zinc sulphide he had made, even before 1914, the first "night marching compass" the first model of which is preserved in the London Science Museum.

At a time when physics as Applied to Medicine was a considerable novelty, the radiologist Robert Knox invited Major Phillips to become honorary physicist to the Cancer Hospital, London (now the Royal Marsden NHS Foundation Trust) where he worked until the retirement in 1927 on the development of the scientific basis of radiotherapy, on techniques for manipulating radioactive substances and in radiation protection.

Despite his own lack of public education Phillips fostered education in the physical principles of radiation in medicine. He was honorary lecturer in radiology at University College and lectured on X –ray physics to medical orderlies to overcome the shortage of radiographers. The X –ray physics lectures at the Royal Herbert Hospital, Woolwich and at Imperial College were also taken care of by Phillips. He was awarded the O.B.E (Military) for services. He would surely have approved of the "Mayneord – Phillips Summer School".

Phillips played an important role in the X-ray Societies. He was President of the British Institute of Radiology in 1930-31, a founder member and Honorary Treasurer of the Institute of Physics, Honorary Secretary of the Royal Institution from 1929 to 1945 and a Founder member of the Society of Radiographers.

Major Phillips was an accomplished musician, owning and playing a Stradivarius violin. He made, repaired and played both violin and spinets. An accomplished artist, he also exhibited at the Royal Academy. His portraits of Dr Knox and Sir Archibald Reid hang in the entrance hall at the British Institute of Radiology; his portrait of Sir William Bragg is in the

Royal Institution. At the time of his death in 1945 he was working on a commemorative portrait of Röntgen for the fiftieth anniversary. His wife designed the Presidential Badge still worn by the holder of the highest office in the British Institute of Radiology.

Steve Webb

Professor William Valentine Mayneord, FRS

Val Mayneord started his first job in medical physics, at St Bart's hospital, London in 1924, at the age of 22. That was, of course , a time when radiotherapy was in its infancy; there was almost no scientific basis for radiation dosimetry , artificial radioisotopes and pulse-echo ultrasound were still 20 odd years in the future, and the concept of radiation protection was unheard of.

Within 30 years all that had changed; medical physics had achieved much of its present –day structure, character and rigour; and, although many individuals had contributed to this development and much useful ground work had previously been laid by people like C E S Phillips, a remarkable proportion of the intellectual leadership and sheer physical hard work behind it was that of Mayneord. Indeed, any modern medical physicist with an interest in the origin of his or her subject is warmly recommended to read Mayneord's official biography (1), which is one of the most lively and illuminating brief histories of medical physics that has been written.

In the 1920's radiotherapy was largely based on surgical implantation of radium needles and, at Bart's, Mayneord worked with Geoffrey Keynes, a pioneering surgeon and brother of Maynard , the economist, who in his autobiography described how, in this work, surgeons such as himself had to put themselves "completely in the hands of the physicist".

His firsthand experience at that time of the sometimes appalling radiation injuries to both patients and staff made a deep impression on him and, very soon after his move, in 1927, to the Cancer Hospital (now Royal

Marsden), he started making major contributions to the modern subject of radiation dosimetry. He had a major hand in making the case for an ionization method for the measurement of X-ray dose, and hence in defining and establishing the Röntgen and subsequently in the move towards the absorbed dose and the rad. It was also he at that time who introduced the concept, that was to become central to radiation protection, of integral dose. It was once remarked that the Röntgen was the quantity that we could measure but did not want, the rad was what we wanted but could not measure, whilst kerma was neither wanted nor measurable. That may have been an overstatement but certainly, when in 1960 Mayneord first heard that this new radiological quantity was being introduced without his having been involved, he remarked to a colleague that it was surely time for him to retire!

However retirement was still a long way off when the Second World War broke out and when, immediately after it, Val was seconded by the Government to a year's consultancy in Canada in connection with the radiobiological aspects of atomic energy development. He returned from this to London, according to a colleague "brimming with new ideas, both technically and in relation to the scope of physics in medicine. In particular he saw that the work had to be broadened to take advantage of all the new developments in electronics and to exploit the exciting medical possibilities of nuclear physics". Thus, within a few years , his department was reporting pioneering work, and the first outside the U.S.A, both in diagnostic ultrasound and in nuclear medicine, including construction of one of the world's first radioisotope scanners – preceding the gamma camera by some 10 years. As another practical response to the nuclear age, Mayneord established, in the 1950's, a major research programme that made a substantial (and importantly at that stage, academically independent and objective) documentation of man's natural and artificial radiation environment.

This was, in a sense, a practical expression of his long-standing interest in radiation carcinogenesis and it was to the more philosophical and theoretical aspects of this complex subject that his attentions returned during a long and active "retirement" leading in particular top publication of a “Biomathematical Reconnaissance” of the subject, which has become a classic in the field (2).

Perhaps even more important than his own personal scientific achievements was his building up of an internationally renowned department of “physics as applied to medicine” (he never liked the term Medical Physics, believing as he did that physics is one entity, fundamental and indivisible!). He achieved this, partly by having the vision to see that good medicine must be based on good science and that good physical scientists need a strong and stimulating environment in which to thrive, and partly by a personality that somehow inspired loyalty, friendship and respect in just the right proportions. For those who had the good fortune to work with him he was an inspiring teacher, sometimes a hard task master, but always a sensitive , supportive, and very human colleague and friend.

References

1. Spiers F.W (1991), William Valentine Mayneord, in Biographical Memoirs of the Royal Society, 37, 341-364.

2. Mayneord W. V and Clarke R. H (1975) Carcinogenesis and radiation risk: a biomathematical reconnaissance. Brit. J. Radiol. Supplement 12

Kit Hill

Cour de la Sorbonne 1931. Pictured from the left: Professor Hopwood, Dr Thurston-Holland, Major Phillips, Dr Kay, Dr Lynham, Brigadier MacGrigor and Professor Mayneord.

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