John Stewart Orr

Stewart Orr, who died on 21st October 2001, was an active, energetic, and helpful physicist, distinguished for both pure and applied research and practice, who greatly assisted medical colleagues, and their patients, most of whom had cancer. He became Professor of Medical Physics in the Royal Postgraduate Medical School, Hammersmith Hospital, and was soon known internationally for his accomplishments in cell and radiation biology, radiotherapy, imaging, and information technology.

He was born in Milngavie, near Glasgow, on 10th August 1930, second son of Neil Orr, a well known Glasgow lawyer, and lived there for all his life except for his highly productive period in London between 1977 and 1985. He went to Atholl school first, then to Glasgow High School, and lastly to the University of Glasgow where he gained a B.Sc. in Physics. Stewart spent a year as a conscript in the British Army, remaining a private; although on one occasion, when there was a fire at night in his barracks, he displayed better leadership than some of the N.C.O.s and officers, by organising systematic chains of buckets of water to put out the fire.

He worked first with Barr and Stroud, an enterprising Glasgow manufacturer of scientific instruments, who had earlier collaborated on the development of ultrasound as a diagnostic method to be used in medicine. He worked mainly on semi-secret defence projects concerned with infra-red radiation and missile guidance. Stewart undertook fundamental research, and devised "Orr's Spherule" as a teaching tool. He met Jean Williamson, their wedding soon followed, and they had one daughter and three sons. At that time, medical physics was expanding substantially in the West of Scotland under the redoubtable JMA Lenihan, who built up a large unit in the old Children's Hospital building, eventually having three hundred staff. Stewart was recruited by Lenihan as Senior physicist in 1960, working first at the Western Infirmary, and then later also at Belvidere hospital, on the technology of x-ray diagnosis and of radiotherapy. I first met him in 1966, and he was an invaluable friend, colleague, and helper, on the radiotherapy of cancer, on an abortive effort with Bob Lawson on the value of Neutron therapy using a new type of generator (from Manchester), on diagnosis and treatment using radioactive isotopes, and on research, especially in radiation biology, with Professor Tony Nias.

Like JMA, he would take up any medical problem, apply a fresh mind to it and produce new ideas for its solution. Publications began to flow from him in about 1968, beginning on thyroxine (thyroid hormone) kinetics, moving on to the concept of the 'Occupancy principle'. The latter was a useful model to enable assessment of the quantitative distribution of a compound, whether radioactive or stable, in different parts of the body; the method was also useful in detecting radiation damage. Blood cell kinetics was then studied in the same kind of way.

Every one of Orr's publications came from collaboration with other scientists or physicians, whose names were all cited, even though the first draft and most of the work frequently came entirely from him. He won over even the most old fashioned medical colleagues to the need for good science and statistics, and to regard physicists as equal partners rather then underlings. He was promoted to Top grade physicist in 1975 in charge of the radiotherapeutic physics division with a staff of 15 physicists and 12 technicians. He had gained his Glasgow DSc. in 1971, his thesis was entitled *The Kinetics of Biological processes and of Radiation effects*; it quoted over 60 publications. He used computers in the days when they were bulky, about twenty times as expensive as now, and similarly less powerful. Nevertheless they were well used under Stewart's guidance not only for radiation dosage calculation and treatment planning, but, more ambitiously, he and other physicists made a brave attempt at 'computer optimisation' of treatment planning so that there should be maximal tumour dose and minimal side effects.

In 1977 Stewart moved down to London to become Professor of Medical Physics at the Royal Postgraduate Medical School, Hammersmith Hospital, where he found great scope and new fields to study. Magnetic resonance imaging (MRI) was being developed there, its complex mechanism began to be elucidated, and he became involved in a European Commission project to assess its possibility in quantitative as well as diagnostic investigations; his work being under the auspices of the Department of Health. He was the main author of several of the seminal publications regarding MRI. His second major topic was wider use of the computer, building on his earlier work in Glasgow. Computers were installed not only in the departments of physics and of radiation oncology, but also in virtually every other department of the hospital and medical school, for medical reports and records, for imaging of all kinds, for research, and for word processing.

He left the Royal Postgraduate Medical School in 1987 as Emeritus Professor and returned to Glasgow as an independent consultant, continuing his European work on MRI, and on computing. One very important new subject was the coding and classification of medical terms, specifically relating to radiation oncology. Another fresh topic was the harmful effects of environmental radiation, especially carcinogenesis and leukaemogenesis. He played a major part in the assessment of this problem as a member of the Black Committee and of COMARE, the Committee On the Medical Aspects of Radiation. He had been elected

President in turn of the Hospital Physicists Association and of the British Academy of Forensic Science, and had also been elected to Fellowship of the Institute of Physics and of the Institute of Physics and Engineering in Medicine. He was elected FRSE in 1976.

Stewart had been keen on hill walking and on mountaineering from childhood, and also on sailing off the West coast of Scotland. He had a great sense of humour and enjoyed life with his family and with many friends of every kind, who will miss him greatly.

Keith E Halnan

Acknowledgement is due to Professor John R Anderson and to the Orr family for assistance in composing this obituary.

John Stewart Orr BSc, DSc, FInstP, FInstPE M: born 10 August 1930; elected FRSE 1 March 1976; died 21st October 2001.