

obituary

With the death of **Professor J. C. Slater** at the age of 75, America, and indeed the world, has lost one of its most influential and active practitioners of theoretical physics. For over fifty years Slater produced a continuous and substantial flow of research work, most of it concerned with those aspects of matter which depend primarily on the electronic properties of atoms; treating first the properties of individual atoms as revealed by the multiplet structure of their spectra, and later the properties of atoms in molecular combinations and in the solid state.

With the advent of wave mechanics he quickly realised that all such properties are determined by the many-electron wave function of the system, and therefore directed his attention to the invention of suitable approximations and mathematical methods for its calculation. In his search for the wave functions, their eigenvalues, and the density of states they imply, he led a numerous band of gifted students many of whom (now somewhat advanced in years) have followed the trail which he blazed and, with more powerful computers and more refined techniques, have achieved even better results. Surely no greater tribute can be paid to a scientist than the successful continuation of his work by succeeding generations.

John Clarke Slater was born on December 22, 1900 into an academic family; his father was professor of English at the University of Rochester. John, after taking his bachelor's degree at this university, went on to Harvard as a graduate student to work under the direction of P. W. Bridgman. In 1922 he travelled to Europe and during a stay of a few months in Copenhagen he became part author, with Bohr and Kramers, of a well-known paper on the quantum theory of radiation. Although

the conclusions of this paper proved to be incorrect, it was influential for a time, and for a young man of 23 the association with such famous names was a happy augury indeed.

In 1929 Slater published one of his most important papers which dealt with the theory of multiplets in complex spectra. Following the work of F. Hund and applying the newly developed wave mechanics he was able to simplify and extend the calculations of the multiplet structure of atoms with many electrons. The basic concept in this work was the expression of the total wave function as a determinant of the single electron wave functions including their spin states. Such determinants have ever since been known as Slater determinants and have found applications in many fields, for example, chemistry and metal physics.

Following the publication of Heisenberg's theory of ferromagnetism and Bloch's famous paper on the quantum mechanics of electrons in crystal lattices, Slater wrote a paper in 1930 entitled *Cohesion in Monovalent Metals*. The significance of this paper in Slater's scientific life is that it marks his introduction into what is now known as solid state physics and which was to remain his principal interest for over forty years. As with many other physicists, however, the years of the second world war caused an interruption in Slater's academic research. During these years he was active in organising the Radiation Laboratory at M.I.T. and was involved with research concerning the principles of magnetron design. For this work he was awarded a Presidential Certificate of Merit.

After the war Slater returned to his interests in solid state physics and began a series of calculations aimed at improving the accuracy of wave functions and the energy levels of electrons

in metals. He developed the method introduced by Wigner and Seitz so that it could be applied to states of higher energy and used the resulting eigenvalue spectrum to construct curves of the density of states. Later he introduced the augmented plane wave method which was widely used by his own students and other physicists. This work, carried out mainly in the decade 1950-60, is not to be judged by the accuracy, or inaccuracy, of particular results but by the thrust which it gave to the advance in this sector of the subject.

Slater was a most prolific writer. Besides about one hundred original papers he wrote eleven books, a few in collaboration with N. H. Frank, but mostly alone, and in addition produced many survey articles, including one giving a detailed history of the development of solid-state and molecular theory. A notable feature of Slater's pedagogic writings is the extraordinary complete bibliography which is invariably attached to each book or article. Evidently very little escaped his attention. It seems clear that he wrote with great facility and speed and that he maintained a confidence in his knowledge and understanding of physics throughout his life.

Other aspects of Slater's life and character, for example, his administrative ability which enabled him to take over the headship of the physics department of M.I.T. at the early age of 29, and his gifts as a teacher, can be dealt with adequately only by a close colleague, and in an introductory passage to the volume of articles published to commemorate his 65th birthday, Professor Philip Morse pays a warm tribute to Slater with regard to exactly these qualities. Clearly, Slater was a man of quite exceptional stature in many respects. **H. Jones**

announcements

Meetings

March 28-30, **Nuclear Magnetic Resonance in Biology**, Oxford (Dr R. A. Dwek, Department of Biochemistry, University of Oxford, South Parks Road, Oxford OX1 3QU, UK).

April 4-6, **Microcalorimetry in Biology**, London (3rd International Symposium

on Microcalorimetry, LKB Instruments Ltd., LKB House, 232 Addington Road, Selsdon, South Croydon, Surrey CR2 8YD, UK).

April 25-27, **Bioengineering**, Fort Collins (Deadline for abstracts: January 1) (Dr C. W. Miller, Department of Physiology and Biophysics, Collaborative Radiological Health Laboratory, Colorado State University,

Fort Collins, Colorado 80521).

April 27-29, **Food, Fertilizer and Agricultural Residues**, Syracuse, New York (Waste Management Conference, Cornell University, 207 Riley-Robb Hall, Ithaca, New York 14853).

May 21-25, **Carboniferous Stratigraphy and Geology**, Urbana-Champaign (Dr Mackenzie Gordon, U.S. Geological Survey, Washington D.C.).