The good old days

R.S. Pease

Cambridge Physics in the Thirties.
Edited by John Hendry.
Adam Hilger: 1984. Pp.209. £17.50, $30.

NINETEEN physicists contribute their accounts of research at the Cavendish Laboratory during the 1930s. All of them were participants in that great era of discovery which laid the experimental foundations of nuclear physics. Some of the material — the articles by Feather, Chadwick, Cockcroft, Blackett and Oliphant — are reprints which, though covering familiar ground, can well bear repeat performances. Fresh material has been written by Dee, Walton, de Bruyne, Duncanson, Massey, Mott, Dirac, W.B. Lewis, A. Wilson, Allibone, Goldhaber and Peierls.

An introductory framework and a bibliography are provided by John Hendry, whose growing work as a historian of physics is marked by the extensive and careful use of original source material. As a consequence, the book, though commendably short, presents a substantial canvas, ranging from the background of Cambridge society and personalia, to the substance of the discoveries themselves.

The new accounts of the theoretical physics from Peierls, Massey, Mott and Wilson go far towards redressing the often-accepted view that Rutherford's experimental approach always dominated, and that his team neglected theoretical guidance. Allibone discusses the fruitful involvement of the Metropolitan-Vickers Company in the engineering work and the personnel at the Cavendish. It is a mark of the time that then so little was said of the contribution of the Cavendish to the profitability of industry; but Allibone stresses the widespread subsequent application of the high-voltage and high-vacuum techniques generated by the research. Similarly Wynn-Williams and Lewis stress the application of the electronics developed primarily for counting. The teaching is illustrated well by de Bruyne, especially in his thumbnail sketch of G.F.C. Searle.

Much of the credit for the success of the Cavendish is attributed to the leadership of Rutherford, whose genius and personality is a feature of almost all the accounts. By contrast Lord Bowden emphasizes the part played by luck. Hendry himself, though providing a background, does not endeavour to penetrate beyond these simple explanations. But the articles themselves, and indeed almost all of the recollections of pre-War Cambridge, illustrate the relative stability and security of that society. Surely this is a contributory factor to the dedication needed for the highest intellectual achievements brought out — albeit not explicitly — especially by those who came from overseas to bring so much to physics at Cambridge in the 1930s.

The strength of this book is the skilful welding of original but rather anecdotal material into a coherent (and very readable) presentation of great research. But the book concentrates on nuclear physics in the early 1930s; consequently there is only passing mention of (for example) the founding of the low temperature physics school, and of the crystallographic work, the development of which into the next great era of Cavendish research was initiated by W.L. Bragg in 1938. □

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Resonance applied

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Nuclear Magnetic Resonance Imaging: Basic Principles.
By Stuart W. Young.
Raven: 1984. Pp.163. $27.
Magnetic Resonance in Medicine and Biology.
By M.A. Foster.
Pergamon: 1984. Pp.244. Hbk £27, $50; pbk £14, $25.

NUCLEAR magnetic resonance (NMR), a branch of spectroscopy in the radio region of the electromagnetic spectrum, is well established as an analytical and structural technique in chemistry and physics. In the past decade it has become important in medicine also, in providing *in vivo* anatomical images similar to computed tomography (CT) X-ray scans.

NMR has the merit of producing images of similar resolution to CT X-ray scans, but with superior tissue and pathological contrast, of giving scans not only of transverse sections, but also of coronal and sagittal sections, and of doing all this without hazard since no ionizing radiation is used. Moreover the additional degrees of freedom afforded by tissue relaxation times provide extra dimensions of diagnostic information. As a consequence of these advantages, NMR scanners are rapidly being deployed in hospitals. Diagnostic radiologists and clinicians generally are having to learn about this new technique, which is rather more difficult to comprehend than earlier modalities.

In his book, Stuart Young attempts to explain from scratch the principles of NMR imaging to medical doctors and biologists, without using mathematics or any depth of physics. It is a daunting task in which the author succeeds rather well with the aid of homely analogies from music and sport; indeed, the non-American reader may learn more about the intricacies of baseball from the analogies with NMR than vice versa. There are many images illustrating the clinical power of NMR, a chapter on site planning and also a rather incomplete listing of systems available. The physicist may complain about some incorrect definitions and an error of 2π in the only equation, but on the whole the book succeeds in providing a straightforward and comprehensible entry into the subject for the physician.

NMR imaging is just one of the important aspects of magnetic resonance. M.A. Foster's book is a more substantial work, covering a wide range of magnetic resonance applications in medicine and biology. The first third is concerned with electron spin resonance and includes a specialist chapter on spin label studies of cells. The remainder of the book is devoted to NMR spectroscopy *in vitro* and *in vivo*, and to NMR imaging, the latter covered in 34 pages in chapters written by Hutchison and Smith. One important area which the author does not attempt to cover is applications of NMR spectroscopy in molecular biology, to the structure and conformation of proteins, nucleic acids and other molecules of biological importance. For the rest, the book is clearly written at a fairly elementary level and should be easily understood by scientists from a wide range of disciplines encountering magnetic resonance in biomedicine for the first time. □

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