People and particles

Philip Davenport

The Infancy of Atomic Physics: Hercules in his Cradle.
By Alex Keller.
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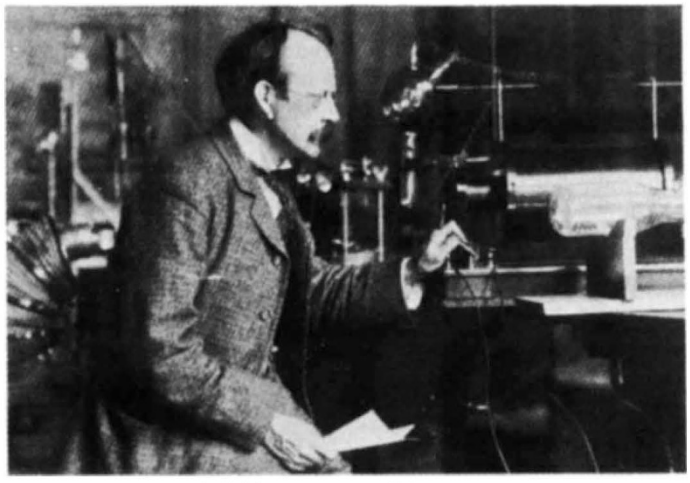
AWESOME and austere were the sepia portraits of famous men of science that looked down from our classroom walls or gazed somewhat reproachfully from our textbooks. Such demigods, we thought, were never a prey to human foibles and fallibilities; their hearts never ruled their heads nor their passions coloured their judgement. Alex Keller shows us just how mistaken we were.

The great merit of his history of atomic physics is the clarity and insight with which the leading figures are portrayed. This extends to their family backgrounds, their personalities, their domestic affairs and in some cases their courtships which are so sensitively described that the reader soon feels an almost uncanny empathy with them. This is moreover achieved without a hint of prurient irrelevance; Keller is far removed from the genre of gossip columnists.

As regards the subtitle, Hercules symbolizes the tremendous potential for good and evil of atomic physics. His infancy sees the gradual and painstaking evolution of the atomic model which today we take for granted. Ultimately (to adapt Milton) this noble and puissant science, mewing its mighty youth, presents mankind with the invidious options of nuclear energy and nuclear weapons.

The story begins in the 1880s with the speculations and experiments of William Crookes. Versatile, imaginative and enterprizing, he was by far the most flamboyant figure in British science. He is the first of a formidable galaxy of principal investigators to whom we are introduced, men of genius whose names are household words and, in many cases, SI units. We meet them in their home environment, become acquainted with their circumstances, abilities and ambitions, and accompany them on their journeys of exploration and elucidation. Progress demanded the gradual assimilation of the fruits of many diverse lines of patient research and fortuitous discovery, whose interrelation was initially unsuspected. Such phenomena as cathode rays, X-rays, radioactivity, isotopes, nuclear transmutation and ultimately nuclear fission were one by one embodied into the grand design until no loose ends remained.

Many separate accounts have been written of the scientific development of these subjects, mainly in the context of biographies and memoirs. There are also surveys of contemporary scientific advances during the period, but they tend to be impersonal and idealized in approach. Keller has deliberately set out to achieve what few historians have attempted, a synthesis of both the subjective and objective approaches, and he has succeeded in producing an honest account of man's erratic progress towards the concept of the nuclear atom as it happened. His book well illustrates the validity of Watson's remark in *The Double Helix*, that "science seldom proceeds in the straightforward logical manner imagined by outsiders" but rather by stages which are often "very human events in which personalities and cultural traditions play major roles".



J.J. Thomson in his laboratory.

Keller contrasts the differing national attitudes to physical science at the turn of the century, when in his words, "the language of racial competition and the imagery of war and soldiering came easily to the tongue". The British stressed the value of models and analogies, the French looked for their theories to lead to principles and laws, and the Germans accumulated data.

Nevertheless internationalism was regarded as the birthright of science until such ideals were rudely shattered by the outbreak of the First World War. It has been said that Britain has habitually tended to be in a state of preparation for the previous war. Be that as it may, no attempt was made by the Government in 1914 to mobilize scientific talent in order to develop new and improved weapons. A wave of patriotic fervour swept the country and scientists were able to volunteer for service in the armed forces without restriction. As a result many physicists were killed, Moseley being an outstanding example. Keller implies that this situation was remedied at the outset of World War Two, but those of us who suffered misdirection at the hands of the Joint Recruiting Board will have reservations on this point.

Something which may come as a surprise is the dominant role apparently played by the British Association for the Advancement of Science in providing a forum for the announcement of new discoveries and developments in atomic physics. In those days several of its annual meetings were held overseas, in Canada, Australia and South Africa, in spite of the long sea voyages this entailed for European participants. Nevertheless most leading scientists seem to have attended to hear of the latest results and ideas in original and often inspirational lectures delivered by such eminent figures as Crookes, J. J. Thomson, Rutherford and Bohr. Nowadays, the function of the British Association seems to be more educational, bringing broad surveys of current scientific advances to wider, non-specialist audiences.

Included is a generous and candidly annotated bibliography, listing biographies of the principals, surveys of contemporary scientific advance and some modern historical studies of the period. Keller's comments are not only amusing and apposite, but they also indicate the shortcomings of the existing literature on his subject which he has so stylishly remedied in this book.

There are very few references in the text — no chapter has more than four. No doubt there will be some professional historians who cavil at this, but pay no heed to them. For this is a story to be read, enjoyed and savoured, not a definitive work of reference.

Few with a mature interest in the history of science are likely to forego this book. There is however another kind of potential reader who should be encouraged to acquire it, the younger practitioner of the physical sciences, who would thereby gain an awareness of what it must have been like to work in the laboratory alongside one of the founders of modern physics, in the days before huge machines came to dominate the field. □

Philip Davenport worked in the Clarendon Laboratory under Lord Cherwell and subsequently on the UKAEA Fusion Project, with which Sir George Thomson was closely associated. Now retired, he is an honorary consultant to Culham Laboratory on historical matters.