Book Reviews

A Short Career in Science

H. G. J. Moseley. The Life and Letters of an English Physicist, 1887–1915. J. L. HEILBRON. University of California Press, Berkeley, 1974. xiv, 312 pp., illus. $15.

It would be difficult to think of a 20th-century scientist whose career would make him a more suitable protagonist for a novel than Henry Gwyn Jeffreys (Harry) Moseley. The son and grandson of reputable British scientists, Moseley attended Eton as one of the elite King's Scholars, managed to educate himself in physics at Oxford despite the virtual absence of formal opportunites for doing so, and, in the fall of 1910, obtained a research fellowship at Ernest Rutherford's laboratory in Manchester. Two years later, having served his apprenticeship pursuing radioactive decay experiments, he became convinced that x-ray diffraction studies provided the key to the elucidation of atomic structure. This conviction was strengthened by conversations with Niels Bohr, who was in Manchester periodically in 1912 and 1913 and was then publishing the first of his celebrated series of papers on atomic structure. In the autumn of 1913 Moseley returned to Oxford on a fellowship and threw himself into a feverish research program which within a few months led him to a simple empirical relationship between the frequencies of the discrete K- and L- x-rays of the elements and their atomic numbers. This relationship, the description of which is now called Moseley's law, permitted an unambiguous interpretation of atomic number in terms of atomic electron structure, and thereby provided a fundamental basis for the empirical ordering of the elements in the Periodic Table. It also brought Moseley almost instant international recognition.

The recognized importance of his work led to his being invited to read a paper at a special British Association meeting in Australia during the summer of 1914. When World War I broke out he recalled the duty to King and Country he had learned at Eton, and, leaving Australia as soon as he had discharged his obligations to the British Association, rushed back to England to enlist in the Royal Engineers. On 10 August 1915, a little more than two months before his 28th birthday, Moseley was killed in a charge of 30,000 Turks at the battle of Sari Bair in the ill-conceived Gallipoli campaign.

Given material such as this, many authors might not have been able to resist writing a nostalgic romance. Other authors, concerned with the reviews their strict internalist colleagues would write, might have tried to avoid any reference to the admittedly romantic aspects of Moseley's career. Happily, both for historians of 20th-century physics and for more general readers, Heilbron has managed to maintain a balance, providing an exhaustive and comprehensible treatment of Moseley's scientific achievements and a readable account of the other important aspects of his life. He has also permitted himself an epilog in which he speculates on what Moseley's subsequent career might have been had he survived Gallipoli. Indeed, given the fact that he was a contemporary of C. G. Darwin and Julian Huxley and of Henry Tizard and F. A. Lindemann (he and Tizard rushed back from Australia and enlisted simultaneously, and he was the primary contender for the chair at Oxford that Lindemann later obtained) Heilbron would have been remiss had he neglected to consider what Moseley's place in the British scientific establishment could have been.

Moseley's spectacular, short-lived research career and the intellectual climate in which he worked provide the focus for Heilbron's work. His elucidations of the problems that plagued physics and chemistry in the 1910's, when new data and insights were being produced at an unbelievable pace, and his re-creation of the freewheeling atmosphere at Rutherford's Manchester laboratory where Moseley learned his trade are excellent. One wonders whether Moseley could have been led to his x-ray studies at any other laboratory. More experienced physicists such as W. H. Bragg and Maurice DeBroglie used x-ray diffraction techniques to study the nature of the x-rays themselves. Moseley alone judged them to be the ideal tool for studying atomic structure, even as Rutherford had been employing radioactivity as a tool for elucidating nuclear structure. This aspect of Moseley's work would seem to provide an excellent case study in what Holton refers to as the thematic content of science.

Both specialists and nonspecialists should find the chapters on Moseley's careers at Eton and Oxford of interest. Heilbron has used this material as a means for discussing the evolution of science education at the elite English educational institutions during the Victorian and Edwardian eras. As he remarks, "it almost appears that the chief joint objective of British scientists and educational reformers of the 19th century was to smooth the path of Harry Moseley."

Moseley's letters, all of which are reproduced without any essential cuts, occupy almost half the volume. These are written with that combination of elegance and assurance which seems to have been an almost unique product of the British classical education. With Heilbron's biography, they provide a vignette of a brief, almost heroic era in the history of science, during which Moseley and his class could have no doubts that both science and society not only could be comprehended in rather simple terms, but were also unquestionably good.

WILLIAM A. BLANPIED
Jefferson Physical Laboratory,
Harvard University,
Cambridge, Massachusetts

Structural Proteins

Conformation in Fibrous Proteins and Related Synthetic Polypeptides. R. D. B. FRASER and T. P. MACRAE. Academic Press, New York, 1973. xviii, 630 pp., illus. $45. Molecular Biology Series.

Because of their dynamic involvement in biochemical interactions, enzymes, and other globular proteins and complexes, have generated a structural interest that is widespread and justified. As a result of the ability to obtain three-dimensionally ordered single crystals of such molecules, modern x-ray diffraction methods are rapidly and straightforwardly opening up our atomic view of this domain. The fibrous proteins generally serve less glamorous biological functions, being primarily structural proteins, and their lower degree of order has made them poor relatives in the high society of