Books

Biography of a Physicist

Joseph Henry, His Life and Work. By Thomas Coulson. 352 pp. Princeton University Press, Princeton, New Jersey, 1950. $5.00.

Because of the demands in time and effort made by the complexities of modern physics, too few students of that subject pay adequate attention to its history or to the biographies of the outstanding contributors to its advance. Beyond the fact that Coulomb's name is associated with a law appearing in the text, or Hamilton's name with a fundamental principle of dynamics, the elementary student has little if any acquaintance with the lives of these individuals. If his studies fail to take him as far as the formulation of the electromagnetic equations, it is unlikely that he realizes that Maxwell is the originator of radio, radar, and all the marvelous applications of electromagnetic radiation which enrich our present science and technology. Still less likely is he to associate with the name of Joseph Henry the pioneering discoveries in electromagnetism which constitute one of the brightest jewels in the diadem of American science. Therefore this excellent full-length biography of Henry by Major Thomas Coulson, director of museum research at the Franklin Institute, is a very welcome addition to the all too meagre collection of biographies of famous physicists. The wealth of well documented material which the author has assembled is all the more remarkable in view of the fact that Henry's correspondence, notes and manuscripts were burned in the fire which destroyed the upper story of the main portion of the Smithsonian building in 1865.

Henry's two grandfathers arrived in New York harbor from Scotland on the same ship in 1775. Soon after arriving his paternal grandfather changed his name from the distinctive Scotch "Hendrie" to the more easily grasped "Henry". Henry's father appears to have been little more than a day laborer but his mother was a woman of strong character. Although the baptismal register of the First Presbyterian Church in Albany gives the date of Henry's birth as December 9, 1797, it seems almost certain that he was born two years later. His first ambition as a boy was to go on the stage, and for a time he engaged extensively in amateur theatricals. His interest in science was awakened by a chance perusal of Gregory's *Lectures on Experimental Philosophy, Astronomy, and Chemistry* at the age of sixteen. This led him to prepare himself for the medical profession, but soon his studies at the Albany Academy diverted him to the fundamental sciences of chemistry and physics, with particular attention to the phenomena of electricity.

Turning aside from other more lucrative offers, Henry accepted a position on the staff of the Albany Academy, and it was here, beginning in the summer of 1827, that he carried out the researches in electricity which were his greatest claim to fame. His first interest was in electromagnets, where, in his construction of "intensity" and "quantity" magnets, he showed experimentally the importance of properly matching the resistances of the different parts of an electric circuit. These experiments led to his greatest discovery, electromagnetic induction, both in the form of mutual and self-induction. It was a discovery for which he was not to get the credit which he deserved, however, for Faraday anticipated him in publication, at least so far as the phenomenon of mutual induction is concerned. This may have been due to a certain indecisiveness in Henry's character which led him in a number of instances to put off too long the formulation of a conclusion.

At the age of 36 Henry was appointed to the chair of natural philosophy at the College of New Jersey (Princeton) where he continued his researches in electromagnetism, developing the electromagnetic relay, discovering the essential characteristics of the transformer, and showing the oscillatory nature of the discharge of a Leyden jar. Undoubtedly other discoveries would have followed had he not been persuaded at the age of 49 to leave Princeton to become the first Secretary of the Smithsonian Institution. Here he showed equal ability in work of a very different character, which brought him into contact with many of the foremost men of the time, including President Lincoln. Although he was not one of the promoters of the National Academy of Sciences, he was one of the original fifty members and gave important scientific advice to the armed services during the Civil War. High as was the esteem in which he was held by his countrymen, his later years were saddened by Morse's failure to give him the credit he deserved for his discoveries underlying the invention of the telegraph. When he died in 1878 Congress paid him the unusual honor of a memorial service in the House of Representatives.

Major Coulson has written a biography which is as entertaining as it is informative. He has resisted the tendency to show a bias in favor of Henry's claims to priority and has appraised with even-handed fairness such controversies as arose. The book should be on the shelves of the library of every physics laboratory, and should be read by everyone interested in the place of the United States in the progress of scientific research.

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Some Unexpected Paradoxes

Hydrodynamics. By Garrett Birkhoff. 186 pp. Princeton University Press, Princeton, N. J., 1950. $3.50.

Theoretical physics has a habit of losing interest in a subject, once it has been "understood in principle". The working out of practical details is left to people whom the pure of heart refer to as "engineers", "applied physicists", and the like. This is less a matter of snobbishness than a very necessary division of labor. People who work on important problems in stellar dynamics or the propagation of microwaves (understood in principle by Newton and Maxwell, respectively) are called astronomers and radio engineers, while physicists are those who are busy hauling in new problems and opening up new fields. In some circles, frequented by the very purest of hearts, one is not considered a theoretical physicist today unless he is working on meson field theory or quantum electrodynamics.

This being the case, one might suppose that a book entitled *Hydrodynamics*, written by a talented mathematician, would be simply the sort of thing that every hydraulic engineer or airplane manufacturer should have on his shelf, because it would be essentially a compendium of computational recipes for the solution of practical problems; for surely hydrodynamics was understood in principle by men like Stokes in the last century, although it must be ad-