Book Reviews

Life and Work of Ronald Fisher

R. A. Fisher. The Life of a Scientist. JOAN FISHER BOX. Wiley, New York, 1978. xiv, 512 pp. + plates. $24.95.

Joan Fisher Box has written a finely crafted and richly detailed account of her father's life that will be of great value to scholars seeking to understand the rapid growth of the fields of statistics and genetics. Fisher was a major contributor from 1912 to 1962, with three innovative books in statistics, two in genetics, and about 300 papers. Much of Box's book is devoted to clear and semitechnical exposition of the scientific issues Fisher addressed and to accounts of how Fisher was led to them, first as a student and later as the first statistician at Rothamsted Experimental Station (1919–1933), Galton Professor of Eugenics at University College, London (1933–1943), and Arthur Balfour Professor of Genetics at Cambridge (1943–1957). Box presents a balanced view of Fisher's character, showing that he was often unfairly quick to take offense with his family and colleagues, but also documenting his personal vitality, loyalty, and love of stimulating intellectual discourse.

Fisher was born in 1890 to a well-off London family. His extraordinary mathematical abilities were recognized early and were fostered through excellent schooling at Stanmore Park and Harrow. Proceeding to Cambridge, shortly after his mother's death and his father's financial ruin, Fisher obtained a first-class degree in mathematics while starting to develop his ideas relating Mendelian genetics and biometrics. Unable to join the armed forces, he spent the war years supporting himself by schoolteaching and farming, before formally starting his professional career at Rothamsted in 1919.

During the war years, Fisher managed several publications, including important papers on the sampling distribution of the correlation coefficient (1915) and on the implications of Mendelian genetics for empirical correlations between relatives (1919). The Rothamsted years saw an astonishing outpouring of highly original work. Using his deep understanding of n-dimensional geometry, he derived many small sample distributions, which are the bread and butter of contemporary statistics. He also founded modern mathematical statistics with an important series of papers on foundations that introduced such basic concepts as likelihood, efficiency, and sufficiency. Box reports that this work gained him election to the Royal Society in 1929 as a mathematician. The mainspring of his work was, however, the deep logical insight he brought to bear on real scientific questions, mainly in the biological sciences, from which the papers in pure theory were simply a spin-off. On the applied side, he devised the basic statistical tool called the analysis of variance, and he introduced randomization and factorial experimentation, thus founding modern statistical design and analysis of experimental data. Along with all this, he found time to introduce important mathematical techniques as well as revolutionary scientific concepts into genetics. In his subsequent professorships in London and Cambridge, and in retirement in Australia until his death in 1962, Fisher kept up a steady output in the many fields where he established leadership.

Fisher was an early and major actor in the controversies that have rocked statistics as the field has struggled to assimilate the major theoretical advances of the 20th century. Fisher demanded a great deal of his listeners and readers. Deep and subtle ideas were so plain to him that he often failed to create the explanations required by less able minds, who were therefore often reluctant to embrace important contributions. Also, Fisher disdained mathematics for its own sake and opposed teaching of statistics in an environment separated from direct contact with ongoing applications. He fought hard against the Neyman-Pearson school of statistical theory, which developed and achieved dominance during his working life, because he perceived that the frequency theory of statistical inference was too enamored of abstraction and too distantly related to practice. Fisher apparently lost most of his academic battles, and although his ideas permeate statistical science they are rarely taught in the form in which he understood them. He has left many tracks, however, especially in the English-speaking world, since he traveled widely in North America, India, and Australia. The tendency of mathematical sciences to diverge from the real sciences that spawn them is a major problem, not, as Fisher misguidedly thought, because these mathematical sciences do not deserve a life of their own but rather because the resources of mathematical talent that are brought to bear on the interfaces with real sciences are all too skimpy. Fisher will repay much study, not only for his ideas but also as a shining example of how to bridge the gap between mathematics and science.

Box tells her father's life sympathetically but fairly and very much as he saw it. As a consequence, her biography does little to set his work in context. Fisher himself was not much of a historian and was largely unaware of important antecedents of his own work, such as the work of Edgeworth, even quite close to his own time. And he saw his differences with others to be so great that he did not see how important his own ideas were to his opponents. The time will soon be ripe for further works on Fisher that will clarify the place of this undoubted giant in intellectual history.

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A Public Institution

Social Change and Scientific Organization. The Royal Institution, 1799–1844. MORRIS BERMAN. Cornell University Press, Ithaca, N.Y., 1978. xxviii, 224 pp., illus. $17.50.

In the spring of 1799 a group of wealthy Englishmen agreed to back Count Rumford's proposals for a "Public Institution for diffusing the knowledge and facilitating the general introduction of useful mechanical inventions and improvements, and for teaching by courses of philosophical lectures and experiments the application of science to the common purposes of life." The target and beneficiary of this Royal Institution were to be the laboring classes. They did not long enjoy its solicitude. In place of educator to the masses, the RI became entertainer to the fashionable and consultant to the interests that supported it.

Berman has determined these interests by compiling biographies of the RI's pa-