Book Reviews

Newton's Letters Continued

The Correspondence of Isaac Newton. Vol. 5, 1709–1713. A. RUPERT HALL and LAURA TILLING, Eds. Published for the Royal Society by Cambridge University Press, New York, 1975. liv, 440 pp. $55.

The appearance of volume 5 of Newton's *Correspondence* will be occasion of rejoicing by all students of 17th-century science and of Newton. The edition, begun so auspiciously in 1959, has been almost at a standstill for 14 years since the death of the original editor, H. W. Turnbull. The ill health and eventual death of his successor, J. F. Scott, limited his contribution to a single volume. Now at last the edition gives every indication of renewed life under the confident editorship of A. Rupert Hall and Laura Tilling; and with confidence equal to theirs, we can look forward to its early completion.

Indeed, as far as the history of science is concerned, the remaining volumes of the edition will have progressively less interest; volume 5 carries us close to the end of Newton's active career. The third edition of the *Principia* and the second and third editions of the *Opticks* did not generate correspondence that even approaches the importance of his extensive exchange with Roger Cotes, the editor of the second edition of the *Principia*. That correspondence furnishes the core of the present volume, which begins effectively (after two minor items) with Cotes's first letter to Newton in August 1709, and ends (except for a memorandum) with Bentley's letter announcing the publication of the second edition. Most of it has long been known through the work of Joseph Edleston in the middle of the 19th century. The present volume adds 11 items to their correspondence, however, some of them significant. Thanks to the acuity of D. T. Whiteside, editor of Newton's *Mathematical Papers*, the correspondence about the second edition is further enhanced by the publication of an important paper, *De vi electrica*. (Unfortunately, the editors mistakenly equate the electric fluid discussed in the paper with the aether that Newton resurrected in the second English edition of the *Opticks*.) Despite the interest that attaches to the second edition of the *Principia*, however, Newton's life had ceased to focus upon scientific activity. Mint business, in all its monotonous proliferation of memoranda, occupies more of the volume than the correspondence with Cotes. Symbolically, the volume opens with a letter about details of the recoinage in Scotland and closes with a memorandum on pennies and farthings.

Meanwhile, the *Principia* and the Mint do not exhaust the content of volume 5. The volume also witnesses the climaxes of two of the notable conflicts of the man who claimed to hate controversy. Both had been kindled earlier; both were now fanned back into vigorous flames, apparently by Newton himself. There can be little doubt that Newton instigated the Royal Warrant that appointed him Visitor of the Royal Observatory, put Flamsteed under his power, and established the grounds on which he could publish coercively the *Historia coelestis*. Like the correspondence with Cotes, the humiliation of Flamsteed is a story already well known. It is an essential element in any complete picture of Newton, and one that becomes even more depressing with repetition.

Much the same must be said of the controversy with Leibniz, which does not occupy much space in volume 5 though it hovers ominously in the background. It is fashionable to blame its resurgence on Keill, as the present editors do. In light of the known authorship of the *Commercium epistolicum*, it must surely remain a moot question, however, whether Keill acted on his own initiative when he charged Leibniz with plagiary in the *Philosophical Transactions* or whether he acted at Newton's behest. Be that as it may, the *Commercium epistolicum*, Newton's own composition which he foisted onto an "impartial" committee, appeared in 1712, and from that time on the battle with Leibniz would never be far from Newton's consciousness.

In all, the years 1709–13 covered by volume 5 were an important period in Newton's life. It is a joy to have them covered by the definitive edition of his correspondence. To be sure, the volume is not free from flaws. The editing of the correspondence with Cotes, so rich in scientific detail, does not attain the level of technical proficiency we expect to receive in an edition under the imprint of the Royal Society. Nevertheless, the volume is thrice welcome. If, as we have every reason to hope, its appearance presages the early completion of the entire edition, we shall be fortunate indeed.

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Historical Inventory

Historical Studies in the Physical Sciences. RUSSELL MCCORMMACH, Ed. Vol. 5, *Physics circa 1900: Personnel, Funding, and Productivity of the Academic Establishments.* PAUL FORMAN, JOHN L. HEILBRON, and SPENCER WEART. Princeton University Press, Princeton, N.J., 1975. x, 188 pp. $12.50.

In this slim, ambitious volume, Forman, Heilbron, and Weart present an inventory, quantified to the degree possible, of the academic physics enterprise around 1900 in Austria-Hungary, Belgium, the British Empire, France, Germany, Italy, Japan, the Netherlands, Russia, Scandinavia, Switzerland, and the United States. It is the first such multinational study, and its publication is an event of major significance in the study of the social history of physics.

For each country, the authors, who are all historians of science, have assessed the number and personal incomes of academic physicists, expenditures for laboratory equipment and plant, and productivity in research, meaning paper publication rates. The necessary data were nowhere conveniently gathered, and the authors explored a wide variety of dusty sources, including the reports of universities and professional societies, government and budgetary documents, and autobiographies and memoirs, along with scholarly treatments of physics and higher education. To facilitate comparisons across national boundaries, they have presented all income and expenditures in German marks and have summarized the data in a series of well-constructed tables.

The authors acknowledge that neither their subjects nor their sources made for precise analysis. But they have processed the data with admirable good sense and brought to bear upon it their considerable knowledge of the history of modern physics. The text, which explicates the statistics clearly, absorbingly, and sometimes wryly,