

The Correspondence of Isaac Newton. vol. 1. 1661–1675. H. W. Turnbull, Ed. Cambridge University Press, New York, 1959. xxxviii + 468 pp. Illus. + plates. \$25.

It is nice, at long last, to have the privilege of reading the words of Sir Isaac Newton as the volumes of his *Correspondence* are published. The greatest is also almost the last of the quintessential heroes of science to receive the full modern treatment of scholarly editing. It has, indeed, long appeared almost scandalous that Newton's correspondence and complete works, as well as the enormous mass of manuscript material, have waited so long for adequate handling. Again and again the demand has been made, notably in 1924 by J. L. E. Dreyer, who had the great experience of almost singlehandedly performing the same biographical midwifery for Tycho Brahe by producing a masterful and sufficient edition of Brahe's works.

Nevertheless, the difficulties have been enormous in Newton's case, and for many years the project appeared subject to an insuperable fate not only because of internal difficulties inherent in a huge bulk of intrinsically difficult and highly technical material, but also because of external conditions of wartime and editorial personnel. Now, we have the first of the many volumes that will be needed to cover the correspondence to and from Newton as well as the correspondence between his contemporaries that bears directly on his work. The volume fully lives up to all expectations. In all, some 1500 letters will be published, as well as sundry short and unpublished manuscripts illustrating Newton's life and work.

Of the 156 items printed here, only 19 (mostly letters to Newton) are appearing for the first time; the others were already available, but in most cases they were incomplete and often miscopied and were in markedly inferior editions. Now they are all critically edited in chronological order and amplified with a series of notes. The discussions of the technical content of the letters represent a tour de force of "hard" history of science, and we shall long be grateful to H. W. Turnbull and to his editorial successor, J. F. Scott, for their most lucid explanations, in modern terms, of the technical content of the mathematical and optical passages.

Among the apparatus in this edition is a series of biographical notes and an

index. Neither seems to me quite worthy of a work on this scale. It will irritate those who are interested enough to use this edition that thumbnail biographies are given of such people as Descartes, Hooke, Wren, and Huygens. Such information is doubtless needed for the host of minor actors on this stage, but it might have been better to provide a biobibliographical index at the end of each volume or in a terminal volume instead of all these mentions *passim*. The index, although competently executed, is not quite complete since several names and subjects mentioned in the footnotes are not covered; in the arrangement, until one gets used to the secret code and mystery of this sort of librarianship, it is difficult to know that the subheadings under *Newton, Isaac* should be given in the following order: letters to various people, description of telescope, manuscripts by Newton, letters from various people (a selection of entries beginning often with a *his* or *and* masks the alphabetical order).

Although this volume avowedly covers some 14 years of correspondence, two comparatively trivial items account for the entire first seven years of the period. During the rest of this time one is dealing with the Newton of the *Opticks* rather than of the *Principia Mathematica*. Some mathematics there certainly is, but by far the most important sections deal with the fundamental discoveries on light and color and with the reflecting telescope. It is a loss, at this point, that the editors have not accorded the status of a document to Newton's own telescope which he made and which is preserved in the rooms of the Royal Society; its photograph might well have been placed adjacent to plates 1 and 2.

For the nontechnical historian, it is a bitter pill that in his letter writing, Newton represents a pole opposite to Aubrey and Pepys; his letters are devoid of any delicious morsels of personal comment and chitchat. In an age when the scientific journal had not entirely assumed its place as a dominant carrier of scientific information, the professional letter was often a rather formal preprint and not in any way an expression of personality. However, this section of the correspondence now exposes all the elements of the controversies between Newton and his contemporaries, notably Hooke; from this correspondence one can better appreciate the psychological peculiarities of Newton and Hooke (they both had more than a modicum of these) and also those of Henry Olden-

burg, secretary of the Royal Society, who apparently considered it his duty and pleasure to misinterpret and inflame the one genius against the other.

For all historians of science, this edition will stand as a monumental classic of most precious source material, in which we shall have to quarry for the next several generations. What we need now is to be assured of reasonably rapid publication of the remaining volumes of correspondence and of scholarly editing, now that the pace is increased, of all the other printed and manuscript Newton material. The humanistic examination of science, long underpaid and understaffed, is now rapidly becoming popular and populated. In our efforts to understand the way in which science works, the *Correspondence* will be one of our most valuable and cherished resources.

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The Papers of Benjamin Franklin. vol. 1. January 6, 1706 through December 31, 1734. Leonard W. Labaree, Ed. Yale University Press, New Haven, Conn., 1959. lxxxviii + 400 pp. Illus. + plates. \$7.50.

"*The Papers of Benjamin Franklin* is intended to be comprehensive. It cannot, of course, be complete . . ." (page xxi); this publication idea "was born one evening in 1952 . . ." (page xi), it took shape in conferences between officials of Yale University and the American Philosophical Society, with assurance by Henry R. Luce "of a substantial gift in the name of *Life*." By 1954, on the date of Franklin's birth, the project was sufficiently organized to be publicly announced. Now the first volume has appeared, printed in a new type that was cut for this work, adorned with seven picture plates and the complete photographic facsimile of the first annual almanac of Poor Richard (1733).

The introduction first describes both the previous, partial publications and the search for scattered Franklin papers. "We began as scholars, but have become sleuths and venturesome serendipitists as well" (page xxix). The principles of selection from the large legacy of papers and the form of presentation are explained in detail. The full text of every document of Franklin's career, written by Franklin alone or with

others, will be given; all "products of his mind" will be presented, those on routine matters at least by bibliographical references. The introduction includes a genealogy and genealogical charts, beginning with great-great-grandfather Thomas Franklyne (fl. 1563-73) and great-grandfather John Foulger (Folger, born about 1593) and including a great-grandson born in 1821.

Benjamin Franklin began as an author at the early age of 16, with the 14 letters he wrote and printed in the *New England Courant* under the guise of the elderly widow, Silence Dogood. The editors tell us in their headnote that he followed a certain tradition in selecting such a pseudonym. The letters are often very amusing; although they are exercises on old themes, they are made fresh and new by his writing. He may even have been as autobiographical as most young authors when he wrote "I have from my Youth been indefatigably studious to gain and treasure up in my Mind all useful and desirable Knowledge, especially such as tends to improve the Mind, and enlarge the Understanding . . ." (No. 3, of 30 Apr. 1722; reproduced on page 13). When his brother James fought against censorship Benjamin stood up for James and, in his absence, kept the *Courant* going.

Having reached the ripe age of 19, Franklin published (in London) "A Dissertation on Liberty and Necessity, Pleasure and Pain" in which he gives "my present Thoughts of the general State of Things in the Universe." The models on which he fashioned this work are described by the editors. The "Journal" of his return voyage from London (in 1726), which took almost 3 months, is full of lively incidents and observations. In England he did not meet Newton, but the influence of his religious thoughts found expression in a "Plan of Conduct" and in the "Articles of Belief" Franklin wrote shortly after his return.

Using the name *Busy Body*, he signed articles in the *American Weekly Mercury* (1728-9) and, as the *Casulist*, in the *Pennsylvania Gazette* (1729-32). And then followed *Poor Richard* (1733), again along a traditional line, with inserted pearls of wisdom that he reshaped from his source.

In between there were business activities and efforts to form new organizations for various literary and moral pursuits. All these, too, are documented here, with introductions and footnotes

by the editors, which give all the information related to men and events mentioned in the *Papers*.

Some of these papers are delightful to read; taken together they show the way in which this active mind grew and reached out toward public communication and improvement. But why should a scientist be interested in them? The answer to this question was given, just a few years ago, by I. B. Cohen in his great study, *Franklin and Newton* (1956). The man whom Balzac so wrongly summed up as "the inventor of the lightning rod, the hoax, and the republic," but whom Priestley and Davy extolled, remained widely unknown for his scientific achievements. As Cohen wrote (page 29, of *Franklin and Newton*), "In point of fact, most American scientists do not even appreciate Franklin's major stature in the development of physical thought and would be hard pressed to explain how Franklin could ever have been considered a 'Newton,' save in jest." With the revived appreciation of Benjamin Franklin, the new, comprehensive publication of his papers will be as highly welcomed by scientists as by general historians. They will all be eagerly awaiting the subsequent volumes that are scheduled to appear at short intervals within the next 15 years.

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Kepler. Max Caspar. Translated and edited by C. Doris Hellman. Abelard-Schuman, New York, 1960. 401 pp. \$7.50.

All persons interested in the history of the mathematical sciences will welcome this excellent English translation of Max Caspar's great biography of Johannes Kepler (1571-1630). Ever since it appeared in German in 1948 (reprinted in 1950 and 1958), it has been recognized as definitive. The reason is not hard to find. No other individual has spent so many painstaking years studying and editing the astronomical and mathematical works of Kepler as did the late Max Caspar. His biography has enjoyed immense popularity among German readers; hence, Doris Hellman's translation has been eagerly awaited, and her labor should be well rewarded.

In addition to chronicling the personal events in Kepler's sometimes

tragic life (including more than one disappointment which would surely have ended the productive work of a lesser genius), Caspar relates in simple yet accurate fashion the internal development of Kepler's cosmological and astronomical ideas. This is no mean feat, for, as anyone who has read Kepler's works will agree, these ideas are as involved as they are brilliant. For this very reason, I can think of no better advice to give anyone who intends to read Kepler's astronomical works than to advise him first to read this lucid "popular" account in order to gain an accurate over-all picture.

The translation reads smoothly (though one might, for example, quibble that the term *planet laws*, which occurs repeatedly, is usually rendered in English as *planetary laws*), and the book has been very carefully proofread. In addition, and at least as important and welcome, are the excellent footnotes which Doris Hellman has added. These give the reader invaluable historical and bibliographical help.

My only objection to this otherwise laudable book is its physical makeup. The over-all format is stingy, to put it mildly. The type in the text proper is too small, the lines are too closely spaced for comfortable reading; and the excellent footnotes are set in impossibly small type. It must be a disappointment to the translator, who labored so long on this worthy book, to have the publisher (we must assume) decide to cut corners in its physical production. Even after admitting that in its present format the book runs a hefty 400 pages, and not suggesting that it should have been produced in an expensive collectors format, it still seems a shame that some more eye-pleasing compromise was not found.

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The Edge of Objectivity. An essay in the history of scientific ideas. Charles Coulston Gillispie. Princeton University Press, Princeton, N.J., 1960. x + 562 pp. \$7.50.

This is an extraordinarily good book; it is quite impossible to do justice to it within the limits of a 300-word review. The book is based on lectures given to undergraduates at Princeton University in the years 1956, 1957, and