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 Foulgier (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 Casuist, 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

1958 in a course listed as "Humanities 304." In this course there was evidently lively give and take between the lecturer and the students, for the book has an appreciative dedication in which the author acknowledges his debt to his students.

The stage of the book is mostly the time interval between Copernicus and the end of the 19th century, or more exactly, through the time of Maxwell. There is an epilogue, however, mostly devoted to showing how the ideas of the late 19th century found their fruition in Einstein. The principal theme of the book is to show how science has become increasingly objective, thereby leading to conflict with less critical and more self-centered attitudes. The range of topics subject to detailed analysis is unusually wide for a book of this character. Not only is the requisite attention given to the expected subjects of mathematics, mechanics, and physics, but an unusual amount of attention is given to chemistry and biology. I found the discussion of Lavoisier and Darwin particularly illuminating.

If one were seeking for a single phrase to characterize the book I think "sympathetic understanding" would serve. Not only does the author show an unusual degree of technical competence, which can be explained only by a critical thinking through of the issues for himself, but he also enters, in an unusual way, into the personal characteristics of the great scientific innovators, which sometimes even led them into blind alleys. Gillispie's assessment of Einstein — his greatness and his estrangement from the great current of scientific opinion in the field of quantum theory—could not have been made with greater understanding.

In short, the book presents science as a human enterprise, something which we all know it is, but which we seldom can see as clearly.

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Paul Ehrenfest, Collected Scientific Papers. Martin J. Klein, Ed. Introduction by H. B. G. Casimir. North-Holland, Amsterdam; Interscience, New York, 1959. 632 pp. $13.75.

I find it a great pleasure, tinged with nostalgia, to have in front of me the collected papers of my teacher Paul Ehrenfest, professor at Leiden from 1912 till his death in 1933. Together with the collected works of Lorentz, which appeared in a monumental 9-volume edition published before World War II, and the collected scientific papers of Kramers, published in 1956 by the same company and in the same format as the Ehrenfest papers, we now have available at least part of the record of what may be called the Leiden school of theoretical physics, which played such an important role in the development of physics in the first half of this century. Lorentz, Ehrenfest, Kramers—it would be tempting to try to describe and analyze the characteristic "style" of each of this great triad of physicists. They were very different, but they had in common a certain clarity and a deep concern about the fundamental questions of physics. Ehrenfest in particular had a real passion for clarity, which he instilled in all his students, and which is also evident in his papers. As Casimir remarks in his beautiful and sensitive introduction, many of Ehrenfest's papers were devoted to the clarification of a single point; however, this point always was of fundamental interest. As a result, many of Ehrenfest's contributions have been so well digested and, hence, forgotten by the physics community, that, although I thought I knew Ehrenfest's work very well, there still were several surprises.

This is not the place to review in detail the various papers. Let me only mention that the book contains Ehrenfest's dissertation (written in 1904 under Boltzmann) reproduced from the only existing handwritten copy (now in the Vienna University library), and the famous *Enzyclopädie* article on statistical mechanics (written in 1911 jointly with Mrs. Ehrenfest), which is still indispensable for any serious student of this discipline, and which has been recently translated and published by the Cornell University Press.

The editor, Martin Klein, and the publishers have done a remarkable job and have produced a book, which (again quoting Casimir) "we, Ehrenfest's pupils, shall value as a work of reference, as a historical document and as a worthy tribute to the memory of a great physicist; but reading in it we shall also wistfully remember a great and inspiring teacher who was for us the central figure in a happy era of physics that will not come again."

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Surveyor of the Sea. The life and voyages of Captain George Vancouver. Bern Anderson. University of Washington Press, Seattle, 1960. xii + 274 pp. Illus. $6.75.

The northwest coast of North America was one of the last major strips of continental coastline to be explored by European seamen. Although reached by Francis Drake as early as 1579 and probed by Spanish navigators in the first decade of the 17th century, this remote part of the world was not placed upon the map with any degree of accuracy and detail until the last quarter of the 18th century. And the men who did more than any others to fill this gap were two English naval captains and explorers, James Cook and George Vancouver.

It seems appropriate, therefore, that the first adequate biography of Captain George Vancouver to be published in this country should have been written by an American naval officer with experience in navigating the waters which Vancouver was the first to chart, and with more than the usual historian's appreciation of the shipboard problems of navigation and coastal exploration. Yet it is the author's fascination for the man, rather than for his deeds, which is largely responsible for the weakness as well as the strength of this book.

Except for his achievements in exploring and charting the continental coastline and waterways of the northwest coast during three summer seasons —1792, 1793, and 1794—there would be little, if any, reason for a biography of George Vancouver. That in doing this Vancouver and his men carried out the greatest combined ship and boat coastal survey in the history of exploration, that his expedition pioneered in the discovery of Puget Sound and the Inside Passage to Alaska, and that Vancouver himself is responsible for more coastal place names on the map of North America than is any other single explorer would seem to justify major emphasis upon these achievements in any life of Vancouver. But only about one third of this biography is devoted to "The Great Survey."

For those who want to know what a midshipman's life was like in the English navy during the 1770's, or a lieutenant's in Caribbean service during the 1780's, or how Vancouver got along with the Spanish officials in California and the rulers of Hawaii during his side visits to these localities, the *Surveyor of the Sea* is well worth reading.