each problem developed, for, as Keele says, "the movement of Leonardo's mind through his life constituted a continuum".

Before embarking on his analysis of Leonardo's perception and understanding of the anatomy and physiology of these aspects of Man and Machine, however, Keele considers the general principles of Leonardo's physics in a succinct discussion of his theories of the four elements and the four powers. "It is not easy to put ourselves into Leonardo's world", he writes, because the preconceptions with which Leonardo was brought up are very different from those accepted in post-Newtonian physics. In a remarkable extended analogy, Leonardo himself showed that he followed the medieval summation of classical, principally Aristotelian, and later thought in identifying the microcosm of Man with the macrocosm of Earth. Both the macrocosm and the microcosm are composed of the four elements, earth, water, air, and fire; and in parallel, the elements of earth and man are controlled by the four Powers of Nature, movement, weight, force, and percussion. Leonardo explained all the forms and forces of Man the microcosm as best he could in terms of these two simple and coherent quartets, and it is fundamentally important both to Leonardo and to Keele that the reader should comprehend this basis of Leonardo's physics and understanding of the physical world.

In his Epilogue, Keele ties together the many threads he has pursued through this volume, which, although large, is nonetheless of necessity only an abbreviated account of Leonardo's entire scientific output. "To do Leonardo's work justice," Keele writes, "every chapter should be expanded into a book." It is an immense enterprise to produce a synopsis of such clarity and depth from so huge a corpus of surviving notes and sketches. Dr Keele has here made an important contribution not only to the history of medicine but also to the history of art, for he illustrates many little-known sketches alongside celebrated Leonardo drawings, and offers insights into the nature of Leonardo's mind and thought which the student of his paintings and drawings will do well to take in. For, in Leonardo's view, painting "explains the causes of Nature's manifestations as compelled by her laws": without the brilliance of draughtmanship which Leonardo displayed in all the drawings reproduced in this book he could not have started to discuss constructively most of the manifold problems in the science of Nature and Man that he investigated, because the language of science at his time was woefully inadequate to the task. Perhaps, then, the art historian has after all a useful part to play in disucssion of this book, for in Leonardo da Vinci's work more profoundly than in that of any other great thinker art and science mix and fuse in coherent complementarity.

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F. W. J. McCOSH, *Boussingault. Chemist and agriculturist,* Dordrecht, D. Reidel, 1984, 8vo, pp. xv, 280, illus., £35.50.

Jean Baptiste Boussingault (1802–87) is generally remembered for three things: as the friend and collaborator of J.B.A. Dumas (though, in fact, the *Essai de statique chimique des êtres organisés,* 1841, was written entirely by Dumas); as a scientific agriculturist whose work brought him into conflict with Liebig, both over the significance of nitrogen in crop rotation and the origin of fat in herbivores; and as the chemist who attended the 1860 Karlsruhe conference on atomic weights where he put into practice his aphorism that "it is not chemistry that grows old but chemists!" by urging that none of the congress's resolutions should be binding upon individual chemists.

However, in this affectionately-written, well-documented, critical biography, Boussingault and his family stand symbolically for France's slow industrial revolution in "a union of steel manufacture, civil engineering, chemistry and agriculture". The son of a shopkeeper, Boussingault was one of Humboldt's many protégés. Like his patron, he trained as a mining engineer before spending ten exciting years in South America (1822–32) in the mining academy at Bogotá in newly liberated Colombia. His experiences there added considerably to the observations of Humboldt and Bonpland and sustained Boussingault in publications into

his eighties. In 1835, he married and settled in Paris as a teacher at the Conservatoire des Arts et Métiers, while conducting agricultural experiments with his brother-in-law on an estate in the Alsace, which was sustained economically by revenues from oil-bearing sands. Although McCosh's account of the collaboration with Dumas and the fat controversy with Liebig does not replace that given by F.L. Holmes in his study of Bernard and animal chemistry, he provides a good account of Boussingault's single-minded devotion to unravelling the nitrogen cycle. The book is marred by copious misprints, but is otherwise an exemplary biography.

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JOCHEN KEIDEL, *Johann Heinrich Dierbach (1788–1845),* Stuttgart, Deutscher Apotheker Verlag, 1983, 8vo, pp. vi, 220, illus., DM.32.00.

Tracing the life-story of a man who never became a household name, despite his contribution to science, can be difficult. Nevertheless Jochen Keidel, using sources such as city and university records, personal letters, published works, and published critiques by other scholars, has pieced together the absorbing story of the Heidelberg professor, J. H. Dierbach.

Against a background of almost continuous financial difficulties and discriminatory uncongenial working conditions, Dierbach, the son of a master-bookbinder, emerged as a first-class classical scholar, a brilliant teacher, a splendid botanist, an experienced and capable pharmaceutist, and a physician who never practised medicine. Keidel reveals the way in which Dierbach sought to present botany as a scientific discipline with up-to-date terminology, although his textbook *A guide to the study of botany* (1820) caused much criticism of his modernizing efforts.

To a pharmacist, Dierbach's *Outline of prescription art* is a veritable mine of information on medicine of the time, and includes a survey of contemporary medicines and 227 formulae with relevant therapeutic information and annotations. Keidel discusses classification, theoretical background of formulations, dosage and form of Dierbach's medicine, but he only reproduces two prescriptions in detail, thereby encouraging the reading of Dierbach's original text.

The author shows how Dierbach the historian was able to use his broadly spread talents to advantage. Thus he was able to assess authoritatively the ancient physicians and botanists, and one of his works, the *Flora mythologica,* was considered worth reprinting in 1970.

Today, as in Dierbach's own time, there are questions still unanswered. Was Dierbach a skilled compiler whose reassessments based on sound classical and scientific knowledge are of considerable value to science or was his torrent of publications of little value? Keidel's book sympathetically presents a well-researched, well-annotated account of Dierbach's life, times, and work, but he shrewdly leaves the reader to draw his own conclusions.

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FRED ROSNER, *Medicine in the Mishneh Torah of Maimonides.* New York, Ktav Publishing House, 1984, 8vo, pp. xiv, 325. $9.95 (paperback).

The author provides a useful introduction to his work in the opening chapters, beginning with a concise biographical sketch of Maimonides and descriptions of his major literary works. Maimonides' ten medical works are then described more fully, with many valuable notes relating to translations and printed editions. The reader's attention is finally focused on the fourteen books contained in *Mishneh Torah* itself.

The corpus of the work systematically draws together the many dicta relative to medicine and medical practice scattered throughout *Mishneh Torah,* presenting a lively insight to the world of medieval Jewry. The second treatise, 'Moral dispositions' (*De'oth*) of the first book of *Mishneh Torah* is translated in full, due to its importance for all matters concerned with health including the ethical standards in which humans thrive. The importance and value of the individual essential to Judaism and strongly upheld by Maimonides is the subject of the third