still useful and even essential to ours. There seems to be need of a biography that would shed light on the specific ways by which these ideas entered Kepler's mind, on the way in which they were modified by the circumstances of his life and how they bore fruit in his works. While the third part of the book makes it clear that there is an interesting and important study to be made here, it does not seem to contribute much of a specific or exact nature to it.

Part 4, by Frederick E. Brasch, is an accessible and extensive bibliography of works by and on Kepler. It has the great advantage of brief descriptive notes on many of the important entries.

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Antony van Leeuwenhoek and his "Little Animals." Being some account of the father of protozoology and bacteriology and his multifarious discoveries in these disciplines. Collected, translated and edited from his printed works, unpublished manuscripts and contemporary records. By CLIFFORD DOBELL, F.R.S., protistologist to the Medical Research Council, London. Harcourt, Brace and Company, New York, 1932. Price, $7.50.

THIS book was published on October 24, 1932, on the 300th anniversary of Leeuwenhoek's birth. It covers 435 quarto pages and contains 32 full-page plates, consisting of portraits of Leeuwenhoek, facsimilies of his hand-written letters to the Royal Society in London, figures of bacteria, spirochaetes and protozoa reproduced from original drawings in his manuscripts, illustrations of Leeuwenhoek's "Microscope" and his pepper tube, and scenes of Delft which were intimately associated with Leeuwenhoek's everyday life. The book contains over 600 references to works referred to in the text and gives a short list of Leeuwenhoek's writings. The author gives Leeuwenhoek the title "Father of Protozoology and Bacteriology."

Dobell, with the background of a busy lifetime of research as one of the world's foremost protozoologists, interprets for the reader in copious footnotes Leeuwenhoek's simple descriptions of his "little animals" and identifies them in terms of present-day zoological and bacteriological nomenclature.

The value of the book to the reader is unspeakably enhanced by the circumstance that its author laboriously mastered the Dutch language of Leeuwenhoek's time that he might truly breathe the spirit of Leeuwenhoek's words into his English translation of the original manuscripts still preserved by the Royal Society in London.

The standards of Leeuwenhoek's micrometry of the "animalcules" are discussed—a sand-grain, a human red blood corpuscle, a vinegar-eel, the diameter of a louse's eye, the bigness of a hair on a louse, the thickness of a spider's web and the bigness of a cheesemite.

The modern research worker, housed by towering walls, equipped with elaborate apparatus all ordered from catalogues, and assisted by a multitude of specialists: Contrast him with the Dutch janitor and his simple tools—a home-made lens, some rainwater, some pepper water, some vinegar, some thin pipes of glass and some spittle.

Leeuwenhoek's secret, which he never revealed in any of his writings or to anybody and which was buried with him, concerned the method by which he observed objects with his microscopes. Microscopes he gave and left aplenty, but Leeuwenhoek alone could see with them the minutiae of bacteria and protozoa which he described. One is stunned at the discoveries which he made with his limited equipment. Dobell supplies a notion in elucidation of the missing method by which Leeuwenhoek observed flagella, cilia and spirochaetes.

The dedicatory page affectionately names Paul de Kruif, who in "Microbe Hunters" rates this shopkeeper of Delft "First of the microbe hunters."

The printing and binding of this magnificent book are perfect specimens of the printer's art.

EDWARD FRANCIS

SCIENTIFIC APPARATUS AND LABORATORY METHODS

IMPROVEMENTS IN BIOLOGICAL LABORATORY APPARATUS

THE electrical thermostat without water-jacket has come permanently into use in biological laboratories. Its extreme convenience has made that inevitable. It has one serious disadvantage, however, namely, that the heater is apt to cause explosions if by any means a mixture of air and vapor or air and gas is set free inside the system. Some quite serious accidents have occurred in biological laboratories throughout the country on this account. The rapidly increasing use of hot nitro-cellulose, where the most perfect results in embedding are to be obtained, has made the danger of explosion much more in evidence.

The heater in baths of this type is either directly exposed inside the bath or, if shut off from the main cavity, is surrounded by walls which naturally have apertures to allow the heat to make its way. In either case the conditions for an explosion are present, since the heated wires which produce the necessary tempera-