

hoping thereby to succeed in replacing the oxygen of many oxygenated compounds by alcohol radicles derived from zinc-methyl, zinc-ethyl, and allied bodies. In the primary research of this new series, nearly all of which were conducted in conjunction with the late Mr. B. F. Duppa, ethylic oxalate was the subject of experiment, with the result that a portion of its oxygen was replaced by methyl, and the first step taken in the synthesis of acids of the lactic series. A large number of new compounds were discovered, and the relations of the members of the lactic series of acids to each other and to the acrylic and to the fatty group of acids clearly made out. Then followed researches on the members of the acrylic series which were suggested by those on the lactic acids and which also afforded a rich harvest of results.

Up to this point Dr. Frankland's investigations are seen to have been intimately connected with one another and to have resulted in some of the most valuable contributions yet made to synthetical chemistry; but the last research of importance included in this section of the volume seems to stand alone, for it is concerned with the synthesis of acids, ethers, and ketones of the fatty series by a method differing from that previously employed in the important particular that the alcohol radicles were substituted for hydrogen and not for oxygen. These new investigations resulted in the discovery of a mode of effecting the synthesis of the acids of the fatty series and of bodies related to them, of dissecting their molecules, and thus, in some measure, of determining their structure. Although these researches were not directly connected with those that preceded them, there can be scarcely a doubt that they were suggested by the insight into the constitution of the acids gained in the course of Dr. Frankland's previous researches.

A few short papers—on Gas Analysis, on the Composition of Air from Mont Blanc, on the Analysis of Organic Compounds containing Mercury, and on the Combustion of Iron in Compressed Oxygen—bring Section I. to a close.

Section II. contains the author's researches on Artificial Light, on Drinking Water, on the Purification of Foul Water; together with miscellaneous work in Applied Chemistry. Section III. includes Dr. Frankland's valuable memoirs on the Influence of Atmospheric Pressure on Combustion, on the Spectra of Gases of Vapours (an investigation carried out in conjunction with Mr. Lockyer), on the Source of Muscular Power, and on Climate.

The contents of these two sections are much too interesting to be lightly passed over—and those of Section II. in some degree challenge criticism—but we must leave them for consideration in another article and now return to Section I. This section forms just half the book, and by far the most important half. In fact Dr. Frankland's work is so naturally divisible into two parts that we regret he has not issued it in two volumes rather than in its present form, for its value as a work of reference would not have been lessened thereby, while the section of chief educational importance (Section I.) would have been rendered more easily accessible to students. This is, however, but a trifling fault—if a fault it happens to be—but the really important fact remains that we can point students to the volume before us for a clear and detailed account of some of the most remarkable researches of our time in synthetic chemistry. It is

difficult to over-estimate the importance of inducing senior students to consult original memoirs rather than abstracts of researches. The temptation to rest content with a statement of results is great, but we have no hesitation in expressing the opinion that the careful experimental study of a single good memoir, on a subject suited to the capacity of the student, is of far greater value to him than the immediate knowledge of the contents of a volume of the "Abstracts" given in the *Journal* of the Chemical Society, useful though these are when properly employed. The publication of such groups of researches as Dr. Frankland's will, we believe, do much to promote the kind of higher chemical education referred to, and to foster a taste for research amongst senior students of chemistry.

J. EMERSON REYNOLDS

(To be continued.)

OUR BOOK SHELF

Bericht über die Thätigkeit der botanischen Section der schlesischen Gesellschaft im Jahre 1876. Erstattet von Prof. Dr. Ferdinand Cohn,zeitigem Secretair der Section.

THIS is a journal of the proceedings of the ten ordinary and one extraordinary meetings of the Silesian Society held during the year 1876. The chief contributors are Professors Goepfert and Cohn, and their communications relate to a great variety of subjects. The most important paper of Goepfert's is on the effects of the cold of December, 1875, on the vegetation in the Breslau Botanic Garden, much interesting information being given on the action of cold on plants, the effects of snow in protecting vegetation, and the action of frost on roots. Another interesting paper, by the same author, is on Plant Metamorphoses. The indefatigable industry of Prof. Cohn is well shown in this journal, as he contributes a large number of valuable papers. His recent visit to Britain affords materials for two papers, while a short communication on Spontaneous Generation is interesting on account of the ingenious form of the tube in which the experiments were made, the shape being that of a capital N turned upside down. The other papers of interest are chiefly connected with the newly-published "Cryptogamic Flora of Silesia," noticed a short time since in our columns. The last paper is by Uechtritz on the Phanerogams of the Silesian Flora, and occupies a large part of the whole *Bericht*.

A List of Writings Relating to the Method of Least Squares, with Historical and Critical Notes. By Mansfield Merriman, Ph.D. (From the *Transactions* of the Connecticut Academy, vol. iv., 1877, pp. 151-232.)

MR. MERRIMAN is already favourably known as the author of a good text-book on the "Elements of the Method of Least Squares." In this work he gave a short "list of literature," and said he could easily have extended its limits; indeed he hoped some time to publish an extended list. All students of this branch must be greatly indebted to Mr. Merriman and to the Connecticut Academy for this excellent critical list of writers. There are 408 titles, classified as 313 memoirs, 72 books, and 23 parts of books, dating from Cotes (1722) down to 1876. Of these 408, 312 are described from actual inspection. We could wish for similar lists in other branches, for then much time would be saved and students could easily determine what books would be most advantageous to them, and also get an idea of what had already been done by previous investigators. There are numerous clerical errors, easily to be corrected, but we are surprised that so well-informed and painstaking a writer should call Sir W. Thomson, Thompson, and Dedekind, Dedakind, as he does on all occasions when their names occur.