

tent even in the absence of alkali, but increases rapidly on the addition of small amounts of alkali up to a concentration of about 0.1 *N*, after which it diminishes somewhat. By careful analyses of the manganese precipitate, it was found, in the solutions containing little or no alkali, that the oxidizing power of the precipitate was only slightly less than it would have been if all the permanganate used had been quantitatively converted into manganese dioxide. In the more alkaline experiments there was no deficit of this kind. It was thus shown that the excess oxidation in these experiments was not due to a permanent reduction of permanganate to manganous oxide. If it is thus reduced at first it was subsequently oxidized by atmospheric oxygen or permanganate to the peroxide. It is thought probable, however, that a considerable part of the permanganate deficit is due to the direct oxidation of the sugar in the alkaline solution by atmospheric oxygen. Both of the preceding processes may, however, play a part in producing the permanganate deficit. But, whatever the mechanism of this excess oxidation may be, it was clearly demonstrated that the excess oxidation was due to the action of atmospheric oxygen in some way.

The sole products of the complete oxidation of glucose under these conditions are carbon dioxide and oxalic acid. It was shown that the oxalic acid increases very rapidly from none to a large amount within small range of change in alkalinity. But it was successfully proved from the data that this is not solely a question of the initial concentration of the alkali, but is also dependent on the degree to which the initial concentration is maintained. Oxalic acid or potassium acid oxalate are not stable in permanganate solution, so that such oxalic acid as is formed cannot persist even in part until the amount of alkali present is sufficient to convert it into normal potassium oxalate (which is stable in permanganate solution).

Some deductions about the mechanism of the formation of oxalic acid were also made.

CHICAGO, ILL.

NEW BOOKS.

Chemical German. By FRANCIS C. PHILLIPS, Professor of Chemistry in the University of Pittsburg. Second Edition. Pp. viii + 250. Easton, Penna.: The Chemical Publishing Co. Price, \$2.00.

The sub-title of the book expresses its scope. It is "an introduction to the study of German Chemical Literature, including rules of nomenclature, exercises for practice, and a collection of extracts from the writings of German chemists and other scientists, and a vocabulary of German chemical terms and others used in technical literature." The book is intended for students who have had at least a year of German, and who

have mastered the elements of chemistry. It covers the field of inorganic and organic chemistry, and emphasis is put upon the processes used in the laboratory. Selections from the writings of chemists follow the general exercises, the purpose of which is to make the student familiar with the technical vocabulary of the science. These selections are well chosen, both from the standpoint of the language and of the general interest connected with their contents. The student has an opportunity to read from the writings of Wöhler, Berzelius, Döbereimer, V. Meyer and Jacobson, Engler, Elbs, v. Brunck, Bleier, Bunsen, Caro, Jahn, Landolt, and other well known chemists. The vocabulary is excellent; it contains many technical words and abbreviations which can be found elsewhere with difficulty, and it is, therefore, of value to the student who is beginning to read the German chemical journals. The work has been well done and the book merits the success it has reached. In the opinion of the reviewer it is by far the best book published for the student who desires to acquire a reading knowledge of chemical German. The value of the book would be increased by including a few articles on physical chemistry, which introduce the special words used in this branch of the science; or these words could be added to the vocabulary in a later edition.

JAMES F. NORRIS.

Scientific and Applied Pharmacognosy. By HENRY KRAEMER, Professor of Botany and Pharmacognosy, Philadelphia College of Pharmacy. Pp. 857; plates, 300+, comprising about 1000 figs. Philadelphia: M. G. Smith, 145 N. 10th St. Price, \$5.00.

Disputes as to the genuineness and quality of drugs offered for importation into the United States have as frequently been appealed to the chemist as to the botanist, and not infrequently both have been called upon to arbitrate between the importer and the port officials. This work of identification and verification of drugs at ports of entry has created a demand for trained pharmacognosists, a demand which will most likely be increased with the appearance of the new pharmacopoeia, which, for the first time, will devote considerable space to descriptions of the microscopic appearance of vegetable drugs in powdered form.

While employment in the field of applied pharmacognosy has become abundant, the workers are still few in number, and in many cases their training has been along the separate lines of the chemist or botanist, so that they are often called upon to search for information in special fields with which they are not familiar. Most of the available authoritative works on pharmacognosy have been by foreign authors, and give but scant attention to many important plant drugs of American origin; or the information desired has been widely scattered through special journals and not readily accessible to the average worker.

No one was better fitted to fill this gap in the literature of crude drugs

than Professor Kraemer, and this new volume fills it in an eminently acceptable manner.

The volume embraces as comprehensive a survey of the general subject of pharmacognosy as could be looked for within a work of its size, and the subject matter has been assembled and arranged by one who is not only a practical laboratory worker but who has also made numerous valuable contributions to the science. The various drugs are assembled under their respective families, which is not only the most logical arrangement from the standpoint of systematic botany, but facilitates their comparison with allied drug products.

One feature which will be appreciated by the pharmaceutical chemist who is an occasional rather than a constant worker in pharmacognosy are the references to leading articles in other publications which are attached to the description of nearly every important drug. This information will be especially useful to those whose training has been mainly along chemical lines, and is a feature that may with benefit be still further expanded in future editions.

The illustrations are numerous and well executed, most of them from original drawings or photographs by the author, and as a rule are not mere idle embellishments, but have a close and organic connection with the text. But few important drugs have been overlooked in the illustrations, and in many instances, figures of crystalline chemical constituents are given as well as those of tissues and tissue elements.

The concluding section of the volume consists of an elaborate "key" or scheme for the identification of powdered drugs by means of their physical appearance to the eye or under the microscope, which should do much to relieve the feeling of utter helplessness with which the analyst is apt to be afflicted when confronted with a comminuted vegetable drug of unfamiliar organoleptic qualities, and devoid of characteristic chemical constituents which might throw light upon its identity.

This key is almost or quite wholly the original work of the author, and its presence is of itself a sufficient reason for the inclusion of the volume in the library of anyone who has much to do with the identification or testing of powdered vegetable drugs.

J. H. BEAL.

Alcoholometric Tables. By SIR EDWARD THORPE. London: Longmans, Green & Co. 1915. 16 mo., xv + 91 pp. Price, \$1.10, net.

These tables have been compiled under the direction of the long-time principal of the British government laboratory. They were originally published in "A Dictionary of Applied Chemistry," and have now been extended so that Table I shows the percentage by weight and by volume as well as the percentage of fiscal proof spirits for each even number from 0.7940 to 0.9998, or 1030 entries of specific gravity in air at 60° F./60° F.

The greatest difference between consecutive percentages of alcohol is 0.19, so that interpolation is sufficiently easy.

Table II shows for each fifth of a degree of Sikes hydrometer (550 entries) the amount of British proof spirit, of American proof spirit, of alcohol by weight according to the German system of alcoholometry, and of alcohol by volume according to the system adopted in France and according to Tralles.

Table III gives the indications of the hydrometers legalized in Russia, Holland, Spain and Switzerland which correspond to integral degrees of Sikes.

The tables are founded on the results of Mendeléef. The data obtained by Blagden and Gilpin about 1794 and by Drinkwater about 1848, at least those relating to weak alcoholic mixtures, were so good that many of them were included by Mendeléef in his published tables, and the results of these four authorities are the basis of the present convenient and well printed tables.

EDWARD W. MORLEY.

Practical Organic and Biochemistry. By R. H. A. PLIMMER. London: Longmans, Green & Company. Price, \$3.60.

A new improved and extended edition of the author's "Practical Physiological Chemistry," intended primarily for the use of medical students.

Although an attempt has been made to include the latest discoveries in organic and biochemistry, the value of the work as a text-book is largely curtailed by the almost complete absence of theoretical discussion, and, as a reference work, by the necessary omission of many important methods and facts, if the book were to be kept within the bounds to which the author limits himself. However, the work has many good features and would be of great use as a review of the subjects.

Too brief a treatment of important principles leads only to confusion and as one of many such instances may be mentioned that in the chapter on carbohydrates the usual projection formulas for the sugars are given without proof of their configuration.

Unfortunately, there are numerous errors and misstatements. As in the above mentioned chapter, page 174, "Hexahydric alcohols exist in ten stereoisomeric forms;" page 185, "Xylose is obtained from straw and various forms of cellulose. It is optically inactive;" page 195, "Pentoses are dextrorotatory or inactive." There is a typographical error on page 139 in the formula for azoxybenzene, also an hydroxyl group is omitted in the formula for morphine, page 357, and, page 358, that of narceine contains a carbonyl in place of a methoxy group.

In the chapter on nucleic acids, page 301, inosinic acid is stated to contain xanthine and to be identical with vernine. Many more, less conspicuous errors are present throughout the book.

The best features of the biochemical section are the chapters dealing

with proteins and enzyme action and the analysis of tissue and excretions.

Tables and a list of common reagents are appended.

F. B. LA FORGE.

Chemical Constitution and Physiological Action. By PROF. DR. LEOPOLD SPIEGEL, Berlin. Translated, with additions, from the German by C. LUEDEKING, PH.D., Leipsic, and A. C. BOYLSTON, A.M., Harvard. New York: D. Van Nostrand Co. v and 155 p. Price, \$1.25, net.

This concise and able treatise is a translation of an address published originally in the "Sammlung Chemischer und Chemisch-technischer Vorträge," Vol. 14, Enke, Stuttgart. It is obvious that a small work of this type cannot cover with any great thoroughness a vast field bristling with indefinite statements and contradictions which render extremely difficult the culling of the main facts and principles. The author has, however, succeeded admirably in presenting the essentials in a very compact form, so that the little volume should serve as an excellent introduction to its subject. In the chapter entitled "General Considerations," especially, he has also attempted a certain measure of critical discussion that is decidedly refreshing to one who has struggled through the corresponding part of Fränkel's classic "Arzneimittelsynthese" in the hope of finding guidance rather than what is often a mere catalog of irreconcilable assertions. It is only to be regretted that the apparent unfamiliarity of the translators with the terminology of organic chemistry has permitted an absurdity such as "stearic structure of complex molecules" and so little-used a word as "acetylyzation" to figure in the text.

MICHAEL HEIDELBERGER.

Physiological Chemistry. Text-Book and Manual for Students. By ALBERT P. MATHEWS, PH.D., Professor of Physiological Chemistry, University of Chicago. One volume of 1042 pages, octavo, illustrated by cuts, tables and diagrams. New York: William Wood & Company. Muslin, \$4.25, net.

This is the most important new text-book and manual, written in the English language, that has been contributed to the literature of physiological chemistry in several years. It differs from its nearest competitor—if that is an appropriate expression to apply in the field of learning—both in the viewpoint and mode of presenting the subject matter. Mathews' volume is not of the cyclopedia type, like a work of ready reference to which one turns to ascertain specific facts or formulate analytical procedures. It is rather a book which, in a most delightful manner, weaves the history of the chemical aspects of physiology into the story of its modern discoveries. There is no dearth of facts, of statistics, of reactions, of formulas and descriptive biochemistry; but for the most part these are made to fit in unique ways into a dynamic conception of physiological chemistry. The functional aspects are nowhere overlooked;

and a profusion of problems of the science are pointed out by direct emphasis or by intimations which one is not likely to fail to appreciate. There is, furthermore, a novelty of statement, a freshness of presentation, quite unlike the conventional text-book that is merely compiled from current writings. The reviewer cannot refrain from citing an illustrative passage or two as an instance of these human touches. Thus:

"It is certainly not without significance that living matter is so watery and contains the salts of the sea. It would appear probable from this that living matter originated either in the sea itself or, perhaps, in some pool of water which contained, possibly in dilute form, the common salts. It has been suggested that it was in some slowly drying volcanic pool where concentration could take place, and where cyanides and other similar reactive organic compounds might have been formed by the vigorous electrical discharges accompanying the eruptions, that living matter first appeared. We would thus have sprung from the thunderbolts of Jove, if this theory is true; but we are, at any rate, the children of the sun and the sea, of Apollo and Aphrodite." (P. 15.)

Or, again, in the description of the nature of the substances concerned in intermediary metabolism:

"One way of finding out what these substances are is by combining them with something so as to make them stable and thus cause them to escape, or to pass unscathed through the fire of metabolism, coming like Shadrach, Meshach and Abednego to testify to the truth or falsity of our faith. Baumann discovered that cysteine was such an intermediary metabolic product." (P. 815.)

One could readily select a series of entertaining passages, such as those telling the story of Pasteur's discovery of the two forms of tartaric acid crystals (pp. 20-21), or the epoch-making contributions of Lavoisier, or the reasoning which led Claude Bernard to some of his discoveries—in further illustration of the exceptionally fascinating style of the book. In the detail with which some of the historical aspects of physiology are reviewed one is reminded of the earlier text-book by Gamgee.

As might be expected from a knowledge of the author's own investigations, the physico-chemical aspects of the subject are prominently treated. Speculation is not excluded so that, for example, in a fanciful discussion on the resemblance of the body to a magnet we are told (p. 268) that "All is in flux in nature. Stability is but an appearance. Our brief lives are like the fraction dt in a differential equation, infinitely brief in the time of the universe. Things appear constant when observed for such an infinitely brief time."

The question of the relative importance to be assigned to individual topics is naturally answered in accord with personal preferences. It can be said fairly that Mathews has not neglected incompletely explored topics,

of which the coagulation of the blood and the chemistry of nervous substance may serve as examples always difficult to present satisfactorily. Mathews' mode of approach is usually biological, as may be seen in discussions such as that on the formation of pepsin (pp. 353-354). Physiology and histology are woven into the chemical considerations. The presentation of disputed topics is in general commendable and well balanced. Each important chapter ends with a resume that is useful for didactic purposes. The statements cover even very recent literature in this field. Where so much must be said in praise it can do no harm to add that the discussions concern almost exclusively the themes of animal physiology, with little regard to equally interesting features in plant biochemistry.

To the text-book proper is added a series of about 250 practical exercises including directions for the execution of approved routine methods of biochemical research. The selected experiments furnish considerable latitude to the teacher and the carefully worded directions for quantitative work offer useful assistance to the advanced worker in the physiological chemistry laboratory. It matters little whether the arrangement of this part of the book is entirely acceptable as a scheme of instruction; for in biochemistry, as in the older discipline of elementary chemistry, the competent instructor is still likely to be guided by his own ideas of sequence and proportion in the practical work. Individuality in teaching is rarely a misfortune; and the series of directions in Mathews' book segregated from the text itself make possible a maximum latitude in its use with students. The author may be assured that his welcome contribution will accomplish what he terms the main objects of every teacher: to arouse interest in the subject and to stimulate curiosity and inquiry; for he has written a readable text-book in a broadminded spirit.

LAFAYETTE B. MENDEL.

Temperatur und Lebensvorgänge. By ARISTIDES KANITZ. Berlin: Gebrüder Borntraeger. 1915. P. 175.

"The velocity of the majority of chemical reactions, at customary temperatures, is approximately doubled or trebled by a rise in temperature of ten degrees," while the majority of physical changes are affected in a much less degree at corresponding temperatures by a similar change in temperature. This fact led E. Cohen, in 1896, to throw out the exceedingly fruitful suggestion that a study of the influence of temperature changes upon the velocity of life processes might indicate whether these processes are or are not primarily the expression of underlying chemical changes.

Following the pioneer work of Herzog, Abegg, Kanitz, Loeb and Snyder, a very considerable number of investigators have in recent years entered this field of research. Among them none is more closely identi-

fied with these investigations than the author of this very timely and exhaustive monograph.

The author has brought together in form convenient for reference a truly impressive array of facts upon the foundation of which we are unquestionably entitled to base the conclusion that the vast majority of the measurable activities of living tissues are determined, in so far as the rate at which they occur is concerned, by underlying chemical processes, a conclusion which is also supported in numberless special instances by the modern developments of analytical biochemistry.

Not only are we enabled by the use of this method to establish the probable chemical nature of the processes which determine the velocity of life-phenomena, there also appears to be some ground for hoping that in the future we may be able to sharply distinguish between the chemical processes underlying different life-phenomena by means of the marked differences which subsist between the magnitudes of the effects of temperature upon them. As an example we may cite the fact that whereas the temperature coefficient of growth and development is of the customary magnitude, namely between 2 and 3, that of cytolysis and death lies between 200 and 4000 (pp. 107-110), the lower figures obtained by Goodspeed (p. 111) being probably attributable to the high temperatures employed and the complication introduced by the coagulation of proteins. This fact is in sharp disagreement with the view which has been expressed in some quarters that the death of the cell is part of the same process as, and a necessary outcome of, its growth.

The review of the literature of the subject is very exhaustive and the various articles to which reference is made are not cited, as is often the case in such monographs, as if they were all of equal value. Due deduction is made for faulty technique or inference, while exceptionally careful work is brought into the prominence to which it is entitled.

T. BRAILSFORD ROBERTSON.

Laboratory Exercises Arranged to Accompany "First Course in Chemistry." By M^CIPHERSON AND HENDERSON. Pp. ix + 128. Ginn and Co., 1915. Cloth, 40 cents. Biflex binder, 60 cents.

One hundred and one laboratory exercises in elementary chemistry are given. They cover the ground generally given in a good high school course in chemistry, meeting the demands of those who desire a practical application of the principles of chemistry as well as the demands of those who take chemistry as a college entrance requirement. The work in organic chemistry is naturally superficial and not thorough. The criticisms applied to the diagrams of the apparatus in the Laboratory Manual can be applied to the diagrams in the Exercises. The Exercises contain information in an appendix with regard to apparatus and materials of special value to inexperienced teachers. LILLIAN COHEN.