After 8:00 A.M. eye-readings were secured which show that this is by far the largest storm which has occurred since the records of this observatory began, in April, 1901. The following table will give a general idea of the magnitude of the disturbance.

It will be seen that there was an observed range in declination of nearly 5° and in horizontal intensity of 1,156 gammas and an estimated range of over 2,400 gammas, about one eighth of the horizontal intensity. For comparison, it may be stated that in the storm of October 30–31, 1903, which was the largest recorded at Cheltenham before this one, the range in declination was 1° 37′ and in horizontal intensity about 500 gammas.

J. E. BURBANK

COAST AND GEODETIC SURVEY
MAGNETIC OBSERVATORY,
CHELTENHAM, MD.

SCIENTIFIC BOOKS

SOME RECENT BOOKS ON CHEMISTRY

OF the making of text-books there is no end; this season brings an abundant crop. Of those to be considered in this review two are text-books of inorganic chemistry.

Any book written by Professor Holleman repays close study. The English translation of his "Text-book of Inorganic Chemistry"[1] is well known in this country. It is inorganic chemistry for advanced students written from a physical-chemical standpoint. Some of the best known modern text-books seem mainly concerned with electrolytic dissociation and the phase rule, banish the periodic system to a page or two at the end of the book and—like nearly all our older books—practically ignore thermo-chemistry. As most French books practically ignore everything but thermo-chemistry, it follows that many students can not read a French book on chemistry intelligently. Professor Holleman gives due space to electrolytic dissociation, phase rule and thermo-chemistry, retains the periodic system and applies them all in the text. A student trained by this book can intelligently read any of the present methods of interpreting chemical phenomena. The preface to this edition says:

> The portions on the phase rule, spectroscopy, radioactivity, iron-carbon system and metal-ammonia compounds have been largely rewritten by the author, and the chapters on colloids, experimental determination of equivalent weights and unity of matter are entirely new. Professor Werner has kindly approved the chapter on metal ammonia compounds.

Teachers who do not care to use so advanced a book in their classes will find it invaluable for study and reference.

What has been said of the plan of Holleman's book applies also to the "General Chemistry" of Professor Alexander Smith.[2] It is a broad comprehensive book written in a catholic spirit on the same general lines as that of Holleman. It is somewhat simpler than the latter and better fitted for the American student in arrangement. The book is so well known that it needs no further comment here; its friends will be glad to see that it has appeared in German with an appreciative introduction by Professor Haber.

Of the other books to be considered in this review five are about inorganic preparations and two are manuals of qualitative analysis. These numbers are significant, indicating a general change in methods of laboratory instruction. Making inorganic preparations was an important part of the work in the laboratories of Wöhler, Bunsen and the other great teachers of that time. With the increase of interest in organic work, inorganic preparations were neglected more and more till twenty

[1] "A Text-book of Inorganic Chemistry," by Dr. A. F. Holleman, Professor Ordinarius in the University of Amsterdam. Issued in English in cooperation with Hermon Charles Cooper. Third English edition, partly rewritten. New York, John Wiley and Sons, 1908.

[2] "Einführung in die allgemeine und anorganische Chemie auf elementarer Grundlage," von Dr. Alexander Smith, Professor der Chemie an der Universität Chicago. Unter Mitwirkung des Verfassers übersetzt und bearbeitet von Dr. Ernst Stern. Mit einem Vorwort von Professor Fritz Haber. Karlsruhe i. B., G. Braun, 1909.

years ago there were few laboratories in America or Europe which included them in regular student work. The publication of Erdmann's "Anleitung zur Darstellung inorganischer Präparate" in 1891 marked the beginning of a new era. Similar books quickly appeared in this country and in Germany, each adapted to local conditions. All of these were like Erdmann's first book, simply collections of recipes for making different substances, yet the work was very valuable for many reasons, but chiefly because the students liked it; in the present reviewer's own experience students whose interest in analytic work was languid became deeply interested in the preparations and in some cases the interest once awakened extended to chemistry as a whole, and determined the choice of post-graduate work.

Of late several authors have endeavored to write manuals of preparation on a more scientific basis. The books of the two who perhaps have succeeded best are on our list. Professor Blanchard's little manual[3] is written for beginners and is to precede analytical work. It is a selection of simple preparations of compounds generally of industrial importance. The notes for each exercise are divided into three parts: (1) A discussion of object of exercise and principle of method, (2) explicit working directions, (3) questions for study which involve additional laboratory experiments, the consulting of text-books and original reasoning. It is assumed that the student has an elementary knowledge of the electrolytic dissociation theory and of the principle of mass action. The present reviewer used Professor Blanchard's book with beginners last winter with very encouraging results. The attention of teachers is specially called to this book.

The second book referred to is that of Professors Heinrich and Wilhelm Biltz,[4] whose German manual has been ably translated by Professors Hall and Blanchard. This is a book for chemists and advanced students, not for college students. The authors describe and discuss 171 preparations—few of them easy—divided into seven groups. Group I. contains the elements including reductions by carbon, by aluminothermy, by potassium cyanide, etc. Under group II. changes of condition are considered, including allotropy, passive condition, colloidal state and adsorption compounds. Group III., simple binary compounds. Group IV., compounds containing a complex negative component; such as sodium peroxide, sodium hydrazoate, potassium perchlorate. Group V., compounds containing a complex positive component; including ammonium salts and the metal-ammonia compounds. VI., complex non-electrolytes; including acid-chlorides, esters and metal-organic compounds. VII., preparation of the rare elements from their minerals.

To aid in the study of the theoretic relations brief general discussions are scattered throughout the book, as well as references to the original literature and to text-books of inorganic and theoretical chemistry. The book is admirable; it is by far the best and most thorough work on the subject which has appeared.

The book of Messrs. Hanson and Dodgson[5] treats of inorganic preparations, volumetric and gravimetric quantitative analysis and very elementary qualitative analysis. It is one of those curiously proportioned English books written to enable students to pass a given examination, in this case the London Intermediate Science Examination. While the book is well written and is doubtless well adapted for its special purpose, it can be of little interest to teachers here.

[3] "Synthetic Inorganic Chemistry, A Laboratory Course for First-year College Students," by Arthur A. Blanchard, Ph.D., Assistant Professor of inorganic chemistry at the Massachusetts Institute of Technology. New York, John Wiley & Sons, 1908.

[4] "Laboratory Methods of Inorganic Chemistry," by Heinrich Biltz, University of Kiel, and Wilhelm Biltz, University of Göttingen. Authorized translation by William T. Hall and Arthur A. Blanchard, Massachusetts Institute of Technology. First edition. New York, John Wiley & Sons, 1909, pp. 258.

[5] "An Intermediary Course of Laboratory Work in Chemistry," by Edward Kenneth Hanson, M.A., and John Wallis Dodgson, B.Sc. London and New York, Longmans, Green & Co., 1908.

Professor Lee's book[6] is written for beginners. There are many experiments, most of which are those performed in most laboratories during the first years. Many however would come under the head of preparations, while others are quantitative or physical-chemical. The experiments are well chosen; the only adverse criticism to the book is that while the text is generally very clear and simple, Professor Lee has introduced matter from chemical journals, some of which would be out of place even in a text-book for advanced students. A few omissions and some minor revisions would remove the defects from this otherwise excellent manual.

Professor Stoddard's book[7] is a collection of rough quantitative experiments illustrating the gas laws, gas densities, specific heat, analysis of gaseous compounds and of a number of metal derivatives. The experiments are well selected and are intended for beginners.

The remaining books on our list are two manuals of qualitative analysis, one for colleges the other for schools; the first is by Professor Tower;[8] it is a clear, thorough yet brief exposition of qualitative analysis explaining reactions with help of the theory of electrolytic dissociation. The methods of separation given are very good, Noyes's method of separating antimony and the separation of strontium from calcium by amyl alcohol being the only ones not generally known. The present reviewer has used the Noyes method from the time of its publication and can join Professor Tower in commending it.

[6] "A Text-book of Experimental Chemistry with Descriptive Notes for Students of General Inorganic Chemistry," by Edwin Lee, Professor of Chemistry in Allegheny College. Philadelphia, P. Blakiston's Son & Co., 1908.

[7] "Quantitative Experiments in General Chemistry," by John Tappan Stoddard, Professor of chemistry in Smith College. New York, Longmans, Green & Co., 1908.

[8] "A Course of Qualitative Chemical Analysis of Inorganic Substances, with Explanatory Notes," by Olin Freeman Tower, Ph.D., Hurlburt professor of chemistry, Adelbert College of Western Reserve University. Philadelphia, P. Blakiston's Son & Co., 1909.

Mr. Segerblom's[9] book is much fuller in detail than that of Professor Tower's. It contains no physical-chemical explanations, and no new methods of separation. The separation-methods are arranged in tables and there are many pages of equations; in short the method employed in the more conservative German laboratories forty years ago. The contrast between methods as shown in these two manuals is striking, though doubtless—given a good teacher and a bright student—good results are attained by both.

E. RENOUF

Allgemeine Physiologie. Ein Grundriss der Lehre vom Leben. By MAX VERWORN. Fifth edition, revised. Jena, G. Fischer. 1909. Pp. 742; illustrations 319.

Fifteen years after its first appearance the fifth edition of Verworn's valuable book is now issued. It has here received the most extensive of its successive revisions. The final result of the elimination and addition of matter represents an increase of 158 pages over the first edition and of 90 pages over the fourth edition.

In discussing the method of physiological investigation the author makes an interesting presentation of the logic of causation. Long ago John Stuart Mill said that, philosophically speaking, the cause of a phenomenon is the sum total of its conditions. Yet physiologists are constantly guilty of the logical sin of selecting a single condition and setting it up as *the* cause. Verworn rightly inveighs against this, but goes to the extreme of eliminating altogether from his book the idea of causes of physiological facts. He also takes occasion to rewrite his section on the physical world and mind, and to hammer the vitalists anew. The newer views regarding proteins are presented, following especially Emil Fischer's work. A new section is devoted to the functions of membranes and the osmotic characteristics of cells, while osmotic pressure is

[9] "Laboratory Manual of Qualitative Analysis," by Wilhelm Segerblom, A.B., Instructor in chemistry at the Phillips Exeter Academy. New York, Longmans, Green & Co.

now given its rightful place as one of the important conditions of life on the earth's surface. A paragraph is devoted to the mutation theory.

Many of the revisions in the present edition occur in the chapter devoted to stimuli and their actions. In a rediscussion of the action of light rays on living substance the results of Hertel's work are presented approvingly, and the general conclusions are reached that all living substance is sensitive to light as to heat; that light rays act upon living substance primarily by altering metabolism through reduction processes; and that the question whether the rays of any portion of the spectrum are physiologically active or not, is merely a question of their intensity as radiant energy, combined with the fact that the possibility of the absorption of the rays by organisms is inversely proportional to the wavelength. Brief sections are devoted to the physiological action of Röntgen and of Becquerel rays. The discussion of fatigue is extended. New sections deal with the refractory stage of living substance in its relation to stimuli, and the apparent increase in irritability which living substance experiences in the early stages of stimulation. Great stress is laid on the importance of Fröhlich's explanation of this latter phenomenon. It may well be doubted whether the author has not overestimated the value of this explanation.

The final and heretofore long chapter on the mechanism of life is still further extended in the light of a fuller statement of the biogen hypothesis. New sections deal with the question of the rôle of oxygen in metabolism, the self-regulation of metabolism and the law of mass action, and functional and cytoplastic metabolism. In a revision of the treatment of inhibition the question whether the inhibiting stimulus acts by augmenting anabolism or depressing katabolism is answered in favor of the latter view. Godlewski's experiment, in which non-nucleated pieces of the ovum of a sea urchin were fertilized by the spermatozoa of a crinoid, and the resulting larvæ possessed purely maternal characteristics, is regarded as an *experimentum crucis* demonstrating to a certainty the incorrectness of the theory that the hereditary substance is localized in the cell nucleus. The assumption that the nucleus is the organ of oxidation for the cell is dismissed as "blosse Phantasie."

It is only natural for an author to be best acquainted with, and to look with favor on, the products of his own laboratory and his own country. No one can justly minimize the invaluable contributions of Germany to general physiology. But general physiological research is now strikingly international, and it is to be regretted that in so important a book as Verworn's, the literature has not been more widely canvassed. American, English and French work is sadly neglected. Thus, of the host of American investigators, only nineteen in all are cited, and of those who have contributed during the past ten years of great activity, only eight. Notwithstanding this lack, Verworn's book is still the most comprehensive and stimulating of all works on general physiology.

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The Opisthobranchiate Mollusca of the Branner-Agassiz Expedition to Brazil. By Frank Mace MacFarland. Stanford University Publications, University Series no. 2, 1909. 123 pp., 8vo, pl. i–xix.

During the work of the Branner-Agassiz expedition to Brazil in 1899 a small collection of Opisthobranchiate mollusca was made by Mr. A. W. Greeley, a study of which forms the basis of the present paper. This comprised seven species of which five are regarded as new, one being a *Pleurobranchus* and the others nudibranchiata.

Following the introduction the author gives a list, with references, to thirty species of Opisthobranchs, all yet reported from the east coast of South America. Although this doubtless comprises only a moiety of the species which may be expected to occur and is too small to base extended generalizations upon, yet it indicates a fact already definitely shown by collections of other groups of mollusks—that the Antillean fauna extends for a considerable distance southward along the coasts of Brazil without interruption by the fresh waters of the Amazon, which points to the

further conclusion that the present distribution of the litoral fauna was completed before the Amazon bore its present geographical relations. If it were otherwise the vast mass of the river waters would have formed an insurmountable barrier to the southward extension of marine forms living in shallow water.

The main body of the paper consists in an anatomical study of two species of *Tethys* and the new species above referred to. The investigation is carried out in great detail, the most noticeable feature in the genus *Tethys* being the determination of nerves issuing from the pleural ganglion and anastomosing with pedal nerves in each case, contrary to the results announced by some investigators from studies of Mediterranean species of *Tethys*. Excellent figures are given of the anatomy, especially of the nervous and alimentary tracts, and comparisons instituted with the results of other investigators. On the whole the paper is creditable to the author and to the university under whose auspices it appears, and will prove, we hope, the forerunner of other contributions to a subject which has hardly received hitherto its proper meed of attention. WM. H. DALL

SUMMARIES OF FOUR OPINIONS (6, 7, 8, 12) BY THE INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE

THE following summaries of recent opinions by the International Commission on Zoological Nomenclature are published for the information of persons interested in the points in question. It is expected that the full details of the arguments will be published later in connection with certain other cases now under consideration. These summaries do not give the reservations made by certain commissioners, but these reservations will be presented in the final publication.

6. *Genus* A *Linnæus, 1758, with two species* Ab *and Ac.*—When a later author divides the genus *A*, species *Ab* and *Ac*, leaving genus *A*, only species *Ab*, and genus *C*, monotypic, with species *Cc*:

The second author is to be construed as having fixed the type of the genus A. [See Article 30.]

Vote: Affirmative 14; negative 0; not voting 1.

7. *The interpretation of the expression* "n. g., n. sp." *under Article 30* (*a*).—The expression "n. g., n. sp." used in publication of a new genus for which no other species is otherwise designated as genotype, is to be accepted as designation under Article 30 (a).

Vote: Affirmative 9; negative 4; not voting 2. [As the vote on this case is not unanimous, the point in question may possibly come up for consideration at the next meeting of the commission.]

8. *The retention of* ii *or* i *in specific patronymic names, under Article 14* (c) *and Article 19.*—Specific patronymics originally published as ending in *ii* (as *schrankii, ebbesbornii*) are, according to Article 19, to be retained in their original form, despite the provision of Article 14 (c) which provides that they should have been formed with only one *i*.

Vote: Affirmative 11; negative 2; not voting 2. [As the vote on this case is not unanimous, the point in question may possibly come up for discussion at the next meeting of the commission.]

12. *Stephanoceros fimbriatus* (*Goldfuss, 1820*) *vs.* S. eichhornii *Ehrenberg, 1832.*—The generic name *Stephanoceros,* 1832, is to be used in preference to *Coronella,* 1820 (preoccupied, 1768); the specific name *fimbriatus,* 1820, takes precedence over *eichhornii,* 1832, which is admittedly (Ehrenberg, 1832b, 125, and 1838a, 400–401) *fimbriatus,* 1820, renamed. Ehrenberg was right in rejecting *Coronella,* 1820, but in error in rejecting *fimbriatus,* 1820; no reason is apparent for perpetuating his error.

Vote: Affirmative 14; negative 0; not voting 1.

C. W. STILES,
Secretary of Commission

SPECIAL ARTICLES

CARBON DIOXIDE AS A FACTOR IN HEART BEAT

CARBON dioxide when distributed uniformly in the blood in large quantities exerts a definite injurious effect on the heart. In the normal circulation, however. the right heart