

prairies or steppes and deserts is, of course, primary and affords an altogether satisfactory basis for the arrangement of the formations. The statement that the constitution of the floral covering is determined by the three factors, temperature, hydrometeors and soil, is axiomatic; one is inclined, however, to give only partial assent to the conclusion that temperature determines the flora, hydrometeors the vegetation, and soil composition the formation. The analysis of the determining factors of forest, prairie and desert vegetation is excellent. Moderate frequency of precipitation is of first importance for forest vegetation. A rainy growing period is less favorable, the primary requisite being considerable water content in the soil, especially at some depth. The time of year in which the water supply is replenished is unimportant. The latter may occur throughout the year or only periodically. In the last case the rainy season may coincide for the most part, or entirely, with the growing period, as in the tropics and in the interior of Argentina, or with a period of relative rest, as in extra-tropical regions with wet winters, Mediterranean countries, Chili, California, south and southwest Australia. Forests are limited only by such degrees of dryness as prohibit all other vegetation, with the exception of fungi and algæ. The polar limit of forested areas is determined by dry winds during the season of frosts. Summarizing, a climate favorable to forestation presents the following conditions: warm growing period, constantly moist substratum, moist, quiet atmosphere, particularly in winter. It is unimportant whether the water content of the soil is supplied from meteoric or telluric sources, whether the precipitation is frequent or rare, coincident with the growing period or the period of rest. A climate with dry winters is unfavorable to forests in the highest degree, since the trees are unable to recover from the transpiration loss of the winter.

For prairies and steppes a moist substratum is unimportant, but a moist upper surface is essential. The most favorable conditions for grass vegetation are frequent, if only slight, precipitation during the growing period and concomitant moderate warmth. Prairies are affected little by the moisture of the substratum,

except in the case of extreme capillarity of the surface, by the dryness of the air, especially during the period of rest, and by winds. Dryness in the maximum of the growing period, spring and early summer, is inimical, in a high degree, to grass vegetation. Axiomatically, in a climate favorable to forestation, forests predominate; in one favorable to grasses, prairies and steppes are the rule. In transition regions predominance is determined by adaptation to edaphic factors. Extreme departures from the mean favorable to forest or to prairie vegetation produce deserts.

It is impossible even to touch upon the third part of the volume, which constitutes by far the largest portion. It deals with the zones and regions of the vegetative covering of the earth. The latter is treated in the most exhaustive manner since Grisebach under the captions: tropical zone, temperate zone, arctic zone, montane regions and hydrophytic formations. Each zone is considered in a very logical manner with reference to the three main manifestations of the vegetation, forest, prairie and desert. The high value of the text is greatly enhanced by the large number of fine illustrations. It seems impossible to commend too highly this marked feature of the book. It may be regarded as significant of the time when phytogeographical results will be embodied, for the most part, in graphic fashion, in photographs, abundance-frequency indices and charts, and formational lists and contrasts.

FREDERIC E. CLEMENTS.

THE UNIVERSITY OF NEBRASKA.

Victor von Richter's Organic Chemistry. Edited by Professor R. ANSCHÜTZ, University of Bonn. Authorized Translation by EDGAR F. SMITH, Professor of Chemistry, University of Pennsylvania. Third American from the eighth German edition. Vol. I., Chemistry of the Aliphatic Series. Philadelphia, P. Blakiston's Sons & Co. 1899. Pp. 625. Price, \$3.

Anschütz, in editing v. Richter's 'Organic Chemistry,' has raised it from the rank of a good descriptive manual to a place in the front rank of books on this subject. He has had the aid of Emil Fischer in the supervision of the chapters

on the carbohydrates and on uric acid; of v. Baeyer, Claisen, Waitz and others on the work in their respective fields.

The introduction occupies 77 pages, and among other subjects includes condensed presentations of the aims of physical chemistry and stereochemistry, of the work based on the optical and magnetic properties of carbon compounds, and of that based on measurements of conductivity. The book is written tersely and clearly. The nomenclature in common use is retained, but that recommended by the Geneva Conference is also given. The literature and historical references are abundant.

Professor Smith's translation is very good. A slip is on page 122, where wine is said to be obtained from 'St. John's berries;' a term not found in the Century Dictionary. The German word 'Johannisbeeren' means currants. The volume before us contains the results of the latest work on the subject, and, as the second (and last) volume on the aromatic series is promised by the publishers during the present year, the student purchasing this excellent book may feel confident that he has the last word on the subject up to the date of publication.

E. RENOUF.

Physical Chemistry for Beginners. By DR. CH. VAN DEVENTER. With an Introduction by Professor J. H. VAN'T HOFF. Authorized American edition from the German edition. Translated by BERTHRAM B. BOLTWOOD, PH.D., Instructor in Physical Chemistry in the Sheffield Scientific School of Yale University. First edition, first thousand. New York, John Wiley & Sons; London, Chapman & Hall, Limited. 1899. Pp. 154.

In the preface it is stated that "in the book at hand the author has endeavored to collect the most important results of physical chemistry in such a manner that this important branch of modern chemistry may be accessible to those who have not made an exhaustive study of physics and mathematics. The requirements of students of medicine and pharmacy, as well as of elementary chemistry, have been especially considered in the preparation of this work."

Chapters are devoted to the fundamental

laws of composition, the properties of gases, thermochemistry, solutions, phenomena of light and the periodic system. It would seem that a chapter on electrochemistry would add to the value of the book.

The work has been used by Van't Hoff in connection with his lectures on chemistry to students in Amsterdam, and is spoken of as having furnished him welcome assistance.

The work of translation has been done with care by Dr. Boltwood, his purpose being, in part, to place in the hands of his own students a book which shall contain a clear and concise statement of the fundamental facts of physical chemistry.

HARRY C. JONES.

BOOKS RECEIVED.

Das Tierreich. 7 Lieferung, *Demodicidæ* und *Sarcop-tidæ*. G. CANESTRIUM and P. KRAMER. Pp. xvi + 193. M. 9.20. 8 Lieferung, *Scorpiones* und *Pedipalpi*. KARL KRAEPELIN. Pp. xviii + 265. M. 12.60. Berlin, R. Friedländer und Sohn. 1899.

Steinbruchindustrie und Steinbruchgeologie. O. HERRMANN. Berlin, Borntraeger. 1899. Pp. xvi + 428. M. 10.

Essai critique sur l'hypothèse des atomes dans la science contemporaine. ARTHUR HANNEQUEN. Paris, Alcan. 1899. Second Edition. Pp. 457.

The Newer Remedies. VIRGIL COBLENTZ. Philadelphia, P. Blakiston's Sons & Co. 1899. Third Edition. Pp. vi + 147. \$1.00.

The Psychology of Reasoning. ALFRED BINET. Translated from the second French edition by ADAM GOWANS WHITE. Chicago, The Open Court Publishing Co. 1899. Pp. 191.

SCIENTIFIC JOURNALS AND ARTICLES.

THE first article in the *American Naturalist* for May is by H. S. Jennings, and is a continuation of 'Studies on Reactions to Stimuli in Unicellular Organisms.' The present part, III., treats of 'Reactions to Localized Stimuli in Spirostomum and Stentor,' the writer reaching the conclusion that the organisms react as individuals and not as substances. But while it will not do to think of their reactions as those of chemical substances, neither will it do to attribute to unicellular organisms the psychological powers of higher animals. Under the title of 'Vacation Notes, II., The Northern Pacific