Madagascar; and that the femur of a bird is short *because* the knee is concealed. There is also an occasional tendency to overestimate the size of birds; for example, it is stated that the South American condor sometimes has a spread of wing of fifteen feet. As a matter of fact this bird is slightly exceeded by the California vulture, whose greatest recorded spread is ten feet six inches, and it is an unusually large condor that measures even nine feet from tip to tip. We *believe* that the albatross sometimes exceeds twelve feet across the wings and *may* reach fourteen, but never measured one greater than ten. However, the above are but minor blemishes, the book abounds in information and represents a large amount of original work.

The illustrations, mostly from photographs taken by the author, are numerous, and, with rare exceptions, good. One of the exceptions is that on page 85, showing the shoulder girdle of a pigeon, and is not only taken from a diseased specimen, but fails to show the parts described. Some particularly good pictures are to be found in 'Heads and Necks' and 'Wings,' the young green heron and his *vis-à-vis,* the great white heron, being most excellent.

All in all, this volume of The American Nature Series is admirable.

F. A. L.

Einleitung in die Chemische Krystallographie. By P. GROTH. Pp. v + 80, 6 figures, 8vo, cloth, 4 marks. Leipzig, Wilhelm Engelmann. 1904. English translation by HUGH MARSHALL, 12mo, cloth, $1.25. New York, John Wiley & Son. 1906.

Chemische Krystallographie. By P. GROTH. In four volumes. Vol. I., pp. viii + 634. 389 figures, 8vo, cloth, 20 marks. Leipzig, Wilhelm Engelmann. 1906.

For nearly a score of years Professor Paul von Groth, of the University of Munich, has had in preparation this 'Chemische Krystallographie' which aims to include in systematic order trustworthy data of all crystallized chemical substances.

The introduction to this monumental work appeared as a separate publication under the title 'Einleitung in die Chemische Krystallographie' in 1904, and has since been translated into English. In the 'Einleitung' the recognized relations existing between the properties of crystals and their chemical constitution are explained in the light of modern ideas of crystal structure. In so doing Professor von Groth assumes a knowledge of physical crystallography and chemistry. In order, such topics as crystal structure and its varieties, polymorphism, morphotropy, isomorphism, and molecular compounds are discussed. In the chapter on morphotropy much attention is given to a full discussion of the 'topical parameters,' first proposed by Muthmann and Becke, by means of which it is possible to compare to better advantage than was hitherto possible the crystal structure of different substances as well as to note the variation caused in their crystallization by changes in chemical composition.

The English translation by Hugh Marshall, of the University of Edinburgh, is in every respect admirable. A copy of this introduction ought to be in the hands of every chemist.

The 'Chemische Krystallographie' proper is to comprise four volumes as follows: Volume I., Elements, inorganic binary compounds, simple and complex haloids, cyanides, nitrites and their alkyl compounds of the metals; Volume II., inorganic oxy- and sulfo-salts and their alkyl compounds; Volumes III. and IV. will contain the organic compounds. Of these only the first volume has been published. The remaining volumes are to appear at intervals of one year.

The arrangement of Volume I., which is also to be followed in the others, is such that substances, which are similar chemically are treated together in separate groups or sections by first discussing our present knowledge of the same. These discussions present a very clear and concise survey of the literature, point out the conclusions to be drawn concerning the crystal structure of the substances under consideration, and in many instances indicate important lines of needed research. The second portion of each section is devoted to a systematic description of the members of that group for which crystallographic data

were obtainable. These data are uniformly complete and usually accompanied by numerous figures. For example, 42 pages and 40 figures are devoted to the elements. In this chapter on elements there are no less than 237 references to literature given. The monohaloids are described in 40 pages containing 50 figures and 147 references, of which over two pages and six figures are given to ammonium chloride alone.

Chemists, crystallographers and mineralogists have long felt the need of a good reference work of this character and are greatly indebted to Professor von Groth for placing at their command in a clear and concise form such a vast amount of information concerning crystallized bodies. The appearance of the remaining three volumes will be awaited with much interest.

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Mineralogical Laboratory,
University of Michigan,
December 14, 1906

Principles of Botany. By Joseph Y. Bergen, A.M., and Bradley M. Davis, Ph.D. Boston, Ginn & Company. 12mo. Pp. x + 555.

Ten years ago Mr. Bergen, then instructor in biology in the English High School of Boston, brought out an admirable little book entitled 'The Elements of Botany' designed to be a text-book for use in the high schools. It soon became deservedly popular and was very widely used. Five years later there appeared 'The Foundations of Botany,' a much larger book, in which the author, after revising the chapters of his earlier book, had injected a good deal of the new branch of botany—ecology—accompanied with a considerable number of half-tone and other illustrations of leaf-patterns and landscapes, in accordance with the ecological fashion of that day. In the book before us, we have a further modification of the author's idea of the kind of matter to be presented to the young beginner in botany in the high school, and perhaps the first course in college. In its preparation the author associated with him Dr. Davis, until recently of the University of Chicago, so that it appears under their joint authorship.

After a brief introduction, mainly devoted to a definition of botany and its subdivisions (morphology, physiology, plant geography, paleobotany, taxonomy, ecology and economic botany), we have the remainder of the book divided into three parts, viz., I., 'The Structure and Physiology of Seed Plants' (146 pages), II., 'The Morphology, Evolution and Classification of Plants' (257 pages), and III., 'Ecology and Economic Botany' (129 pages). Parts I. and III. are the work of the senior author, while Part II. is from the hand of Dr. Davis.

Part I. is a still further revision of the first dozen or so chapters of the 'Foundations.' The treatment is much briefer, and all 'experiments' are left out, so that instead of 227 pages in the 'Foundations' only 146 pages are given to this portion of the subject in the 'Principles.' Part II. is entirely new matter, and is an admirable presentation of the elements of systematic botany. Dr. Davis has shown his ability to present an outline of this vast subject in such manner as to give the student a clear picture of the whole. The only criticism of this part of the book is that it will probably be found to be quite too full, and perhaps too difficult for pupils in secondary schools, and better adapted to the capacity of college students. Part III. is based upon the second part ('Ecology') of the 'Foundations,' containing, however, much new ecological matter, which is well and clearly presented, and several chapters on economic botany which do not appear to be necessary in a book of this kind. One may seriously question the usefulness to beginning students of chapters including such topics as plant breeding, the production of hybrids, selection among corn, selection among wheat, results of hybridizing citrous fruits, and wheat, food products for human use, and for domestic animals, plant-fibers, timber, forestry and fuel. These subjects can not be adequately treated in an elementary text-book intended for children. The little that is said under each topic is not enough to serve as a beginning of the subject, and there is certainly neither space nor time for more. It has often