to every chemist, student, and expert alike, for it should go far to dispel that somewhat doubtful confidence which the author quite rightly complains is still felt by the pure chemist as regards this important and fascinating branch of science.

E. C. C. BALY.

THE CONSTITUTION OF THE SILICATES.

Die Silicate in chemischer und technischer Beziehung: unter Zugrundelegung der seitens der philosophischen Fakultät der Universität Göttingen preisgekrönten Hexitpentit-Theorie nebst Umwandlung derselben in eine allgemeine stereochemische Theorie. By Dr. W. Asch and Dr. D. Asch. Pp. xv+409. (Berlin: Julius Springer, 1911.) Price 16 marks.

THE present work, which is an expansion of an essay originally submitted for a prize offered by the philosophical faculty of Göttingen, is a bold and original attempt to grapple with the difficult problem of the chemistry of the silicates and related compounds. The authors have sought to give a structural explanation of the behaviour of such compounds consistent with the doctrine of valency. The "Hexite-Pentite" hypothesis, which forms the basis of the work, assumes that silicates and aluminosilicates are not, in general, derived from the simpler hydroxides, such as $\text{Si}(\text{OH})_4$ and $\text{Al}(\text{OH})_3$, but from compounds formed by the condensation of six such molecules, with elimination of water, to form a closed ring. Less frequently, five-membered rings may be produced, and complex molecules are built up by the union, according to certain definite principles, of two or more such "hexite" or "pentite" groups. By the replacement of hydroxylic hydrogen by metals, or of hydroxyl by fluorine, &c., formulæ are constructed which are capable of expressing with remarkable completeness the properties and reactions of many silicates and aluminosilicates.

The formulæ, especially in the contracted notation chiefly employed in the text, strongly recall the Kekulé theory of aromatic carbon compounds, but the analogy is not a real one, as the linking is never from silicon to silicon or aluminium, but always through an intervening oxygen atom. Praise is due to the authors for the ingenuity with which the hypothesis is applied, and for the labour expended in recalculating the enormous number of analyses given, and expressing them in terms of the new structural theory. A certain arbitrariness in the choice of many of the formulæ is unavoidable, in the absence of experimental investigations specially designed to test the points in question.

The most serious defect of the work is its disregard of physical considerations, owing to the

exclusively chemical viewpoint adopted. This one-sidedness is well seen in the lengthy and detailed treatment of Portland cement and blast-furnace slag. Definite hexite-pentite formulæ are assigned to a great variety of these artificial products on the evidence of ultimate analyses only, and the microscopical proof that such materials are heterogeneous is brushed aside in a single sentence. Thermal analysis, by means of which such great advances are being made, including the brilliant work of the Geophysical Laboratory in Washington, is not considered, and the names of Day, Shepherd, and their collaborators do not even appear in the bibliography, although this includes some 1500 references. Again, the great additions made in recent years to our knowledge of colloids and of the part played by them in the chemistry of silicates are passed over in silence or with a brief allusion, in spite of the intimate bearing of such work on the weathering of feldspars, the setting of cements, the hydration of zeolites, and similar questions, all of which are discussed from a purely structural point of view. Even to glasses and porcelain definite structural formulæ are assigned.

By replacing silicon and aluminium atoms by other elements, and by introducing stereochemical considerations, the hypothesis is extended to complex salts, metal-ammonia compounds, and salts with water of crystallisation. Some shorter chapters are devoted to further and more hazardous speculations, the hexite-pentite arrangement being applied to aliphatic organic compounds, and even to the structure of the atom and the explanation of radioactivity. These extravagances, however, do not detract from the value of the main thesis, which certainly deserves the attention of inorganic chemists and mineralogists, as possibly affording assistance in the further study of a complex and difficult subject. C. H. DESCH.

BRITISH VEGETATION.

Types of British Vegetation. By members of the Central Committee for the Survey and Study of British Vegetation. Edited by A. G. Tansley. Pp. xx+416+36 plates. (Cambridge: University Press, 1911.) Price 6s. net.

THE great impetus that has been given during recent years to the study of the British flora is largely owing to the development of that branch of botany known as ecology. This subject—the study of plants in connection with their habitat—has raised many questions, and amongst them that of plant-communities has received foremost attention, and has been zealously investigated. The committee which was formed in 1904 to

organise and carry out a systematic survey of the vegetation of the British Isles has worked hard. Much surveying and mapping has been done, and several memoirs dealing with widely separated areas have been published. Though further work is required before a complete account could be presented, yet enough has been accomplished to obtain a general idea of the principal types occurring.

The volume now issued summarises in a clear and useful manner the results that have so far been obtained, and provides the student with a sketch of the British vegetation from an entirely new point of view. The book is based on the work of the committee referred to. Mr. A. G. Tansley has acted as editor, chapters being furnished by different workers, he himself, moreover, being responsible for a large proportion of the whole. The joint authorship works well, and results in a certain freshness of style, owing to each writer being specially familiar with the region he describes.

A short section in the first part of the book deals with the general conditions obtaining in the British Isles, the whole of part ii. being devoted to the description of the various formations and associations recognised. The plant-formations of clays and loams, of sandy soils, and of heaths are first described by the editor, and a chapter follows, by C. E. Moss, on the plant-formation of the older siliceous rocks. The vegetation of calcareous soils is next taken up, Tansley and Rankin dealing with the sub-formation of chalk, and Moss with that of the older limestones. A short chapter on general aquatic vegetation is inserted, though information on this subject is scanty. The fen and aquatic formations of East Norfolk are, however, dealt with in detail by Miss Pallis; and G. S. West gives a short account of the Phytoplankton of the lakes of the British Isles. The moor formation receives considerable attention, the lowland and upland moors being described by Rankin, and by Lewis and Moss respectively. A very interesting section on the Arctic-alpine vegetation is contributed by W. G. Smith, who deals chiefly with the slopes and corries of Ben Lawers, though here again much further work is required. The final chapter concerns the vegetation of the sea-coast, and contains, amongst others, an account by Oliver of the maritime communities of the Blakeney Harbour district.

The principal formations are in many cases divided into three associations, representing woodland, scrub, and grassland, and these, if need be, are subdivided into a number of smaller communities (sub-associations and societies). Progressive and retrogressive associations receive due

attention, and the serious amount of degenerating woodland that exists in England is repeatedly emphasised.

Although many areas in Great Britain and Ireland remain to be investigated, Mr. Tansley's "Types of British Vegetation" forms a most welcome addition to ecological literature, and one which will be indispensable to every student of the subject in this country. Well arranged, and illustrated by a number of excellent photographs, the book will not only be valuable to botanists, but should attract and stimulate inquiry amongst all who take interest in the vegetation of our islands.

A. D. C.

RECENT BOTANICAL PUBLICATIONS.

- (1) *Plant Life: a Text-book of Botany for Schools and Colleges*. By Prof. Eug. Warming. Translated from the fourth edition of the Danish (Eug. Warming and C. Raunkjær) by Metta M. Rehling and Elizabeth M. Thomas. Pp. viii+244. (London: G. Allen and Co., Ltd., 1911.) Price 4s. 6d. net.
- (2) *Wild Flowers as they Grow: Photographed in Colour Direct from Nature*. By H. Essenhugh Corke. With descriptive text by G. Clarke Nuttall. Second series. Pp. vii+197. (London: Cassell and Co., Ltd., 1911.) Price 5s. net.
- (3) *Plant Life and Evolution*. By Prof. D. H. Campbell. Pp. iv+360. American Nature Series. (New York: Henry Holt and Co., 1911.) Price 1.60 dollars net.
- (4) *An Intermediate Text-book of Botany*. By Ernest Evans. Pp. viii+394. (London: Longmans, Green and Co., 1911.) Price 6s.

IN the first of these volumes the treatment of the subject matter is excellent, and follows a plan which is considerably different from that generally adopted in most of the English elementary text-books. The whole book bespeaks of the wide range of knowledge possessed by its illustrious author, and is written with a terseness and accuracy which is the outcome of a deep and extensive store of fact. A good feature of the book is the reference to so many plants with which the student has a common and almost every-day acquaintance.

The illustrations are for the most part very good, and not only are they more varied than is usually the case in such a small volume, but they are likewise considerably different in character from those found in most of the English text-books. The illustration of *Atropa belladonna* (on p. 178) is poor, and that of *Sphagnum* (on p. 210) presents a peculiar appearance owing to