Notes and News

Announcements and other items of crystallographic interest will be published under this heading at the discretion of the Editorial Board. Copy should be sent direct to the British Co-editor (R. C. Evans, Crystallographic Laboratory, Cavendish Laboratory, Cambridge, England).

Computing Methods and the Phase Problem in X-ray Analysis

The papers which were given at the conference on the above subject held in April 1950 at the Pennsylvania State College (see *Acta Cryst.* (1950), **3**, 401) have now been issued in a final form. Those who attended this conference will remember the lively discussions and the wealth of information it produced. The present photo-offset volume of 390 pages makes this material available to a wider group of crystallographers. It also brings up to date some of the matters which were still in the development stage at the time of the meeting—for instance the structure-factor computer of Prof. Pepinsky. The volume, which bears the title *Computing Methods and the Phase Problem in X-ray Crystal Analysis*, is obtainable at a cost of $7·50 from the X-ray Crystal Analysis Laboratory, Pennsylvania State College, State College, Pa., U.S.A.; cheques should be made out to the Laboratory.

Orientation des molécules d'eau dans le cristal $ClO_4Li.3H_2O$: correction

In this article by Couture-Mathieu & Mathieu (*Acta Cryst.* (1952), **5**, 571) the following correction should be made: p. 573, 2ème colonne. — Les résultats relatifs à la raie 3547 sont à modifier de la façon suivante: ε_{XX} et ε_{ZZ} d'une part, $\varepsilon_{xx}+\varepsilon_{zz}$ et ε_{yy} d'autre part, ont même signe (et non des signes contraires). Ce résultat est en désaccord avec la théorie de Silberstein.

Book Reviews

Works intended for notice in this column should be sent direct to the Editor (P. P. Ewald, Polytechnic Institute of Brooklyn, 99 Livingston Street, Brooklyn 2, N.Y., U.S.A.). As far as practicable books will be reviewed in a country different from that of publication.

Principles of Geochemistry. By B. Mason. Pp. ix+276, with 42 figs. New York: Wiley; London: Chapman and Hall. 1952. Price $5·00; 40*s*.

As the author of this book points out, geochemistry is essentially a development of this century, although the name was coined by Schönbein over a hundred years ago and the Russians have recently emphasized that some statements of Lomonsov have a distinct geochemical flavour. Like other aspects of earth science, geochemistry has shown remarkable advances during the last 30–40 years owing to great developments in physics and chemistry; these developments provided the basic knowledge and techniques without which the great mass of data accumulated by geologists over many decades could not be adequately co-ordinated and explained. What may be called the 'accumulative phase' of geochemistry ended with the last edition of F. W. Clarke's classic *The Data of Geochemistry* in 1924, just when V. M. Goldschmidt had begun to apply the newer physical techniques to the study and development of crystal chemistry and to add so greatly to our knowledge of the distribution of the less common elements. Not without justification did Goldschmidt entitle his famous series of papers *Geochemische Verteilungsgesetze der Elemente*, for in them he developed the necessary theory to explain the abundance and distribution of the elements which he expounded so well in Part IX—*Die Mengenverhältnisse der Elemente*. In this he was able to consider not only the data for the earth but also data for stellar bodies and meteorites, and to arrive at a first approximation of cosmic abundances.

This latter extension of geochemistry fittingly begins Prof. Mason's excellent introduction to the principles of the science. It is obvious that whatever theory is adopted for the origin of the earth and other planets some guidance on the abundance of the elements in the earth can be gained from the study of stellar matter, and indeed the first adequate explanation for the scarcity of the light elements lithium, boron and beryllium came from astrophysics. Coming down to earth, as it were, Prof. Mason passes to a consideration of the structure and composition of the earth and its pre-geological history, making full use of the latest information. In the table of element abundances, however, one or two revisions are desirable. Sandell's values for molybdenum and tungsten are more in line with the actual abundance of these elements than Goldschmidt's old values, and Prof. Mason repeats the value of 250 p.p.m. barium for which there seems to be no justification, since von Engelhardt's data indicate a value about 400 p.p.m. Another, minor, point may be mentioned here: the term *clarke* for the percentage of an element in the earth's crust was introduced by Fersman, and not Vernadsky as stated.

Before a clear understanding can be gained of the migrations of the elements and the transformations of their compounds in the various zones of the earth some knowledge of thermodynamics and crystal chemistry is required, but the chapter dealing with these subjects is barely adequate and could have been expanded with advantage. Prof. Mason then turns to the various zones and gives what to the present writer seems a very clear exposition of the main features of each. Making full use of phase-rule studies on the crystallization of silicate melts, the relations of the various important silicates are discussed and there is a useful summary of the distribution

of the minor elements in magmatic crystallization. The very detailed studies of pegmatites made by Fersman is, however, not mentioned. The weathering cycle and sedimentation are next considered and the importance of ionic and redox potentials is indicated. The treatment of any individual point must inevitably be brief in a book such as this, and in the section on clay minerals the author does well to emphasize the difficulties in the study of this group. It is true that examples of the various clay minerals are found locally in a reasonably pure state, but it appears that as far as normal weathering and sedimentation are concerned the occurrence of a mono-mineralic clay is the exception rather than the rule, and the range of possibility of interstratification of the various basic types seems to be endless. The picture of the environmental conditions required for the formation of the various clay minerals has proved too simple and the physical make-up of the weathering rock is of as much importance in determining the nature of the end-products as its chemical and mineralogical composition. A great deal of the earlier work on sediments needs revision, and reference in this section to Millot's important work on the relation of clay minerals in sediments to environment would have been useful.

The chapters on the hydrosphere and atmosphere, like that on sedimentation, follow broadly the outline given by Goldschmidt in 1933–4, and later work has hardly altered the picture very much. The chapter on the biosphere has a useful discussion of the role of ionic potential in the bio-accumulation of elements and also of biogenic deposits. The discussion on metamorphism, which forms the penultimate chapter, consists in the main of an exposition of Eskola's *facies principle* and follows closely that given by Eskola in his own book; while examples of metasomatism are found in other chapters, a more comprehensive discussion of this aspect of metamorphism could well have been added to balance the picture. A short summary chapter on the geochemical cycle rounds off the book.

Prof. Mason has produced a text-book that does fulfil the 'blurb' on the dust-jacket: it is a coherent and well-presented account of the earth's evolution. One would have liked to see more frequent references to Russian work, for, although Fersman's main publications are in Russian, a large number of articles have appeared in English, French or German, and it is work that should not be overlooked by students of geochemistry.

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Grundriss der Kristallchemie. By J.-E. HILLER. Pp. vii+307, with 209 figs. and 72 tables. Berlin: de Gruyter. 1952. Price DM. 36.

Crystal chemistry is a comparatively new subject, and there are as yet few textbooks devoted to it. We must welcome therefore any new attempt to introduce this field to the ever increasing number of scientists concerned with it. Professor Hiller's book, we are told, is addressed to the interested non-specialist for whom the first forty pages form an excellent introduction. They explain the new terms and concepts required for the study of crystal structures, and introduce some important structure types, which seem to follow logically one from the other. There follow chapters on crystal growth, the application of X-rays, lattice bonding and on the space requirements of ions. Polymorphism and crystal-chemical relationships, such as morphotropy and isomorphism, are also discussed in separate chapters. The rest of the book is mainly concerned with the systematic presentation of structures, including alloys and organic compounds. The importance of atomic size ratios is stressed throughout the text. The reader will be helped considerably by the excellent illustrations, especially in the first half of the book. They are very clearly drawn and it is particularly commendable that a uniform convention is adopted to distinguish anions from cations, and that their relative sizes are always given correctly. One regrets all the more that in the discussions of more complicated structures in later sections of the book the illustrations become scarcer and have to be replaced by verbose descriptions, as, for example, in the spinels or the corundum structure. There is also a tendency to overload the text with enumerations of chemical substances—few of which are of intrinsic importance—crystallizing in a particular structure type, or even belonging to a similar type to the one mentioned. Such lists should be given in tables, if at all, so as not to encumber the text. The arrangement of the structures discussed is that of the *Strukturbericht*, and this rigid framework tends to obscure more fundamental aspects. The result is that there is too much stress on structure and too little on the principles of crystal chemistry. The short chapter on lattice bonding and properties of crystals cannot quite make up for this.

Because of the great importance of X-ray analysis to crystal chemistry, a chapter is exclusively devoted to it, and rightly so; but should it not contain an account of the scope and limitations of this method rather than go into (sometimes misleading) details—the indexing of non-equatorial reflexions, for instance, or the Lorentz polarization factor? There is no mention on the other hand of an electron-density map, or even of the fact that the scattering of X-rays is due to electrons. The electron-density projection of urotropine, reproduced elsewhere in the book, must therefore remain incomprehensible to the uninstructed reader, as must the statement that the electron density halfway between two carbon atoms in diamond is 1·84 e.Å^{-2} (sic!). It also comes as a shock that kX. units should still be confused with Ångström units. One is tempted also to criticize the undue emphasis on the Kossel–Stranski theory in the chapter on crystal growth, and the small space allowed to organic structures. Some of these shortcomings probably arise from the inaccessibility of foreign publications, so that recent advances are left out of the account, others may be due to a reluctance of the author to venture out to the periphery of the subject and to mention problems as well as facts. This undoubtedly makes the book less stimulating for the reader; he will also regret the inadequate arrangement of bibliography and references, which, with the exception of some footnotes, are given collectively in the text. But these are probably teething troubles of a first edition which it may be possible to eliminate later.

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