

Introduction, Archibald Bruce had the opportunity of making the acquaintance of many leading mineralogists during a five-year period of study and travel. Count de Bournon, Charles Francis Greville, Abbé René Just Haüy and Heinrich Struve were among those notable figures whom he was privileged to encounter. The first publication of the *Journal* in 1810 (January) includes a comprehensive list of 'Geological Inquiries' as proposed by the London Geological Society. The varied professional status of the contributors to the *Journal* certainly confirmed Bruce's intentions to enlist the services of 'the miner, the quarrier, the surveyor, the engineer, the collier, the iron master and even the traveller', to assist in the making of geological observations.

Much of the content of the *Journal* is devoted to the search for and study of minerals of economic importance – coal, iron, lead, copper. Number 3 of the *Journal* includes a lengthy extract by Dr. James Millar of Edinburgh, entitled *Of the Indications of Coal and Methods of Searching for It*. The reason given for this insertion is 'the rising price of fuel due to the interruption of our supplies of coal from Great Britain due to the present state of political affairs!' A similar reference to the importation of bar-iron from England to the United States, 1810, serves, with many other such examples, to illustrate the reversal of the economic interdependence of the two countries in the intervening century and a half.

Contributions under the heading 'Intelligence' comprise many news items which will be read, even today, with considerable interest. The eruption of Vesuvius in September 1810 is graphically reported. Meteoric falls in France and Russia, 1810 and 1811, are catalogued with accuracy and William Meade M.D. gives us such an enthusiastic account of his discoveries concerning 'Elastic Marble' that one's fingers itch to repeat the experiment.

This edition of the *Journal* is ably supported by Professor John C. Greene's biographical account of Archibald Bruce, whose premature death at the age of forty-one cannot but be lamented by anyone who reads of his valiant attempts to establish an *American Mineralogical Journal*.

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Optical crystallography. Fourth edition. By ERNEST E. WAHLSTROM. Pp. 489. London: Wiley, 1969. Price 132s.

This is the fourth edition of a book first published in 1943. It deals in a systematic and exhaustive way with all aspects of the behaviour of light when it passes through transparent materials.

Initial chapters (about 200 pages in all) are devoted to the elementary basic concepts of optical crystallography – crystal morphology, the nature of light, the optics of isotropic materials, measurement of refractive index, polarized light and interference and other phenomena concerned with the composition and resolution of light waves.

The treatment is for the most part descriptive and the mathematics is kept to a minimum. Since the diagrams are numerous and of a good standard the basic concepts are

put over quite well. However in his preface the author states that, quite deliberately, his material is a collection of theory and recipes and sometimes this reviewer felt that the theory was a little underplayed. For example, Miller indices are introduced without any reference to the underlying reasons for their existence and a reader fresh to the subject might well wonder at the good fortune that made them such small integers.

The next 160 pages give a very complete and highly satisfactory explanation of the optical properties of uniaxial and biaxial crystals and their behaviour under the orthoscope and conoscope. Once again the quantity and quality of the diagrams help greatly to clarify the subject matter.

Final chapters are devoted to optically active crystals, the study of crystals mounted on stage goniometers and, finally, a detailed procedure for the systematic microscopic examination of transparent materials.

This book is highly recommended to all crystallographers. Even the least 'optically aware' crystallographer would do well to have it handy as a work of reference.

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Liquid crystals. Proceedings of the International Conference on Liquid Crystals, Kent State University, August 16–20, 1965. Coordinated by GLENN H. BROWN, G. J. DIENES and M. M. LABES. Pp. viii + 486. New York: Gordon & Breach, 1967. Price £ 15.5.0d.

In the years following the publication of *Molecular Structure and the Properties of Liquid Crystals* (G. W. Gray, 1962, Academic Press), much important work has been done in this field. There has been a need for an up-to-date, coherent presentation of the properties of liquid crystals, and it was to be hoped that the book under review would do something to meet this need. Although this does indeed give a wealth of information, it does not give the coherent and evaluative presentation that is required. The book is a collection of 30 papers presented at a conference on liquid crystals in 1965, which were subsequently published as articles in the journal *Molecular Crystals*, mainly reporting on original research. Any individual or library subscribing to this journal would therefore have virtually the entire contents of this book already available. There is a lot of good material scattered throughout this book, but it is difficult to extract, as the articles vary considerably in level of detail, and often employ different terminologies. The arrangement of articles is apparently random, with no evident grouping according to topic, technique or viewpoint. Most of the articles are highly specialized and unrelated to the other articles. It is all the more necessary, therefore, to have a reliable index but there is, unfortunately, no index whatever. And since there is no editorial guidance either, it is difficult to understand why it was thought valuable to publish these articles in book form for, in their present form, they clearly remain more suitable as journal articles than as chapters in a book. Furthermore, editorial attention to some articles would have been welcome.

The articles report the following types of investigation into the properties of certain liquid crystal systems: optical analysis of texture, colour, polarization, dichroism, and of the effects of varying electric fields; nuclear magnetic resonance; dielectric relaxation; infrared spectroscopy; heat capacity and enthalpy; surface tension; ultrasonic absorption and dispersion; X-ray diffraction; effects of chemical variation on phase diagrams.

This is no book for the novice wanting to find out what liquid crystals and their general properties are. It is also unsuitable for use in finding out about the structures of liquid crystals in general. Though structure underlies all of the properties investigated, the basic problem of how the long-range order can co-exist with the short-range disorder is not tackled. The field of the structure of liquid crystals is still in its infancy, in what Rutherford may have called the 'stamp collecting' phase. In the four years since the conference in 1965 much research on liquid crystals has been done, but there has been no fundamental advance in the understanding of their structures. Thus, from the point of view of structure, this book suffers little from age. The clues to structure are liberally spread throughout the book, but the general reader without previous reading in the field would have considerable difficulty in interpreting them. The novice can learn more readily from Gray's book (see above). For the structures of lipid liquid crystals, where much recent activity has taken place, Luzzati's review (Chapter 3 in *Biological Membranes*, Ed. D. Chapman, 1968, Academic Press) is to be preferred.

In conclusion, it may be said that this book can be recommended only to those who are already well-read in the field and conversant with the varying terminologies. For those to whom the journal *Molecular Crystals* is readily available, this book will be a luxury for browsing convenience only, and a considerable luxury at £15.5.0d.

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The observation of atomic collisions in crystalline solids. By R. S. NELSON. Pp. x+281. Amsterdam: North-Holland Publishing Co., 1968. Price f. 50.

This volume, first in a series on defects in crystalline solids, is intended primarily for those interested in radiation damage and ion implantation. The emphasis is on the special effects that a crystalline structure imposes on atomic collisions within a solid – focusing and channelling. It has the distinction of being the first full length book to treat these relatively recent concepts.

In his coverage of the subject Dr Nelson manages to be both comprehensive and concise at the same time, an enviable combination. From the volumes of recently published results and theories, he has selected his material with care, and included the most noteworthy and essential contributions, including many of the most recent. His approach is as straightforward as the subject allows – complicated mathematical arguments are avoided, but copious references

are given. As a review of the subject and a source of information it is excellent.

However, one feels at times that while there is such an abundance of facts there is perhaps not enough in the way of underlying principles. As yet of course no single all-embracing approach to either focusing or channelling has emerged clearly, and a review book can only reflect this lack. No doubt as these concepts become firmly established – and let us also admit a little less exciting – then such an approach will become feasible.

Two minor points: the text in some places shows rather obvious signs of having been too rapidly compiled; there are also instances where the author has cut his arguments so far that the credibility of the results is seriously reduced.

On balance then, not a volume that is liable to endure, but one that will be frequently and profitably used and referred to during the next few years.

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Einführung in die Kristallphysik. By W. KLEBER, K. MEYER and W. SCHOENBORN. Pp. 209. Berlin: Akademie-Verlag, 1968. Price (soft cover) DM 17.

This book is written as an introduction to crystal physics for undergraduate and graduate students majoring in physics, chemistry and mineralogy.

The first chapter by Schoenborn on *Elemente der Kristallsymmetrie* deals with crystal classes including those of the magnetic type. In the second chapter *Phänomenologische Darstellung der Kristalleigenschaften* the same author, after a brief mathematical introduction, discusses certain crystal properties by means of tensors. This includes, for example, pyroelectricity, pyromagnetism, conductivities, optical activity, double refraction, piezoelectricity, elasticity, etc. Chapter 1 appears too brief and superficial but the second chapter gives a good discussion of the mentioned physical properties.

Kleber has written Chapter 3 *Gitterphysikalische Eigenschaften*. He discusses crystal bonding, potential and vibrations, and elastic, magnetic, dielectric and optical properties. This is a very brief and rather unproblematic account of the phenomena.

Finally, Meyer gives in Chapter 4, *Realstruktur und einige physikalische Eigenschaften*, a good and brief description of the geometry of crystal defects, their detection and some physical properties due to defects.

Although there is a strong need for a short textbook on crystal physics, I am not sure this book fulfils this purpose, particularly since the material included is not up-to-date. Also, since this book is very brief, it should include a more detailed reference section.

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