

The relation between dielectric constant and dielectric loss is considered in Chapter 1, and expressions are obtained for the energy and entropy of a dielectric in an electric field. Chapter 2 deals mainly with the relation of the static dielectric constant to atomic structure. This is a difficult subject and has caused much controversy; several different formulæ have been proposed, for example, the Clausius-Mosotti, the Onsager and the Kirkwood. Prof. Fröhlich obtains a very general formula, from which others can be deduced in special cases. Kirkwood's formula for a polar liquid is obtained by assuming the liquid to consist of a continuous medium with dielectric constant  $n^2$  containing dipoles of moment  $\mu$ ; Onsager's formula is shown to be a particular case of Kirkwood's, obtained by neglecting the short-range forces between the dipoles; the Clausius-Mosotti formula is shown to be correct if there are no dipoles present. Dipolar solids are then considered; it is shown that, in general, the substance will have an order disorder transition. Below this transition temperature the dielectric constant will increase with temperature, and at higher temperatures it will decrease as in a liquid; some substances, however, melt before the transition temperature is reached.

Dynamical problems are dealt with in Chapter 3, in particular, the dependence of dielectric constant on frequency. The Debye equations for a dipolar solid are obtained, and the conditions for which they are valid are carefully examined; this examination is important, because the equations are sometimes wrongly used. The equations for resonance absorption are also found, and a comparison is made of the behaviour of the dielectric constant for Debye absorption and resonance absorption. In the fourth chapter several applications of the equations derived in the previous one are made; these include accounts of the dielectric constants of water, the paraffins and the ketones. The chapter concludes with an account of the dielectric behaviour of ionic crystals.

The book is a fairly short one and can therefore deal with only a small part of this big subject; but, when he has studied it, the student will be able to read with a better and more critical understanding any of the more specialized papers in which he may be interested.

A. F. DEVONSHIRE

The work falls into three sections. The geology and the physical background are discussed by Dr. F. J. North. This is followed by a study of the natural history by Dr. Bruce Campbell, and finally there is the historical background contributed by Dr. Richenda Scott. Each contributor writes extremely well. Technical terms are kept to a minimum, and the non-specialist reader is greatly helped by the approach of the authors, who have enlivened their narrative wherever possible with first-hand accounts of the trials and experiences of the pioneer scientific workers in the area. Dr. North's contribution is admirable. It is lucid in presentation, well illustrated, and maintains a true balance between the influence of structure and of the erosion processes in the formation of the landscape. In some ways it is a pity that unrelated subsections have crept in. A good case could be made out for a full section on the climate of the area in place of the scarcely adequate subsection that has crept into Dr. North's contribution. Likewise, the subsection on cartography and maps could well go into an appendix.

Dr. Bruce Campbell's section is excellent in every way. One feels that not only does he know the detailed natural history—no creature or flower is too small to be overlooked by him—but also, when he divides the area within and around the proposed national park into alpine, grassland, valley and coastal zones, one feels that he has an understanding of the picture as a whole as well as of its parts. This section of the book is very good indeed.

Dr. Scott has set herself a more difficult task which nevertheless she has most successfully completed. The story of man's contact with the region is traced from the remotest times down to the present day. It would be very interesting to argue whether the periods detailed in all the chronological subsections of this narrative are equally important in the contribution they have made to the present cultural setting, and likewise whether there might not be other periods in Welsh history, such as the time of the Methodist revival in the latter half of the eighteenth century, that deserve a full subsection to themselves. This great formative movement in the life of modern Wales receives but a passing reference on pages 382 and 397.

It is not only the material in this book that is of high quality, but also praise must be given for its production. It is profusely illustrated, well documented and excellently printed. Nevertheless, not all the footnotes (for example, p. 329) have their corresponding reference in the bibliography, and the larger maps may be criticized by the expert, some for their format and others for their titles. Then there are the magnificent illustrations supervised by Eric Hosking, the photographic editor, where the most recent methods of colour photography and reproduction are used with such startling effect. But we may ask whether the bright colours and clear visibility of these illustrations do not give the reader an entirely false impression of what are in their everyday garb bleak, wind-swept, rain-swept mountains, black by night and grey by day. Colour photography may be well suited to climates more fortunate than this; but so far as Snowdonia is concerned it is far more likely that the visitor for whom this is written will see it 'as it really is' rather than as it is on those supremely rare occasions which so delight the eye of the artist and the colour photographer.

E. G. BOWEN

## SNOWDONIA

### Snowdonia

The National Park of North Wales. By Dr. F. J. North, Dr. Bruce Campbell and Dr. Richenda Scott. (New Naturalist Series.) Pp xviii+469+72 plates. (London and Glasgow: Wm. Collins, Sons and Co., Ltd., 1949.) 25s. net.

THIS is the first of a series of regional volumes to be issued by the editors of the *New Naturalist*. They propose to deal with those parts of Britain which lie within areas which are likely to become national parks in the near future and which possess a special appeal to naturalists and lovers of the countryside. If the standard set in this first volume is maintained by those that follow, then we shall have a series of which the editors may justifiably be proud. "Snowdonia" is no guide-book in the usually accepted sense of the term. It attempts to direct the visitor's attention to, and arouse his interest in, the whole range of natural and man-made phenomena that together constitute the appeal of the region.