

Groups, matrices, determinants, fields, rings and ideals are then brought in at a gentle pace, with a wealth of concrete illustration. The author does not disdain to exhibit a diagram of the inter-relations of fields, integral domains, commutative rings, rings, which should help the beginner in the rather tiresome task of remembering the connexions and differences of these concepts. The Cayley-Hamilton theorem for matrices is proved, and in dealing with groups the reader is led to see the importance of the Jordan-Hölder theorem, though the proof is omitted.

The author tells us that the lecture courses on which this book is based have been increasingly popular in the University of Oklahoma, and that engineering students have found the work on Boolean algebra and matrices valuable and stimulating. One can readily believe this, for the style is easy and informal; most readers will be keen to go further, and for them the carefully selected references to more advanced works will be useful.

T. A. A. BROADBENT

The Terpenes

By the late Sir John Simonsen and Dr. W. C. J. Ross. Vol. 5: The Triterpenes and their Derivatives—Hydroxy Acids, Hydroxy Lactones, Hydroxyaldehydo Acids, Hydroxyketo Acids and the Stereochemistry of the Triterpenes. With Addenda to Volume 3 by the late Sir John Simonsen and Dr. P. de Mayo. Pp. ix+662. (Cambridge: At the University Press, 1957.) 84s. net.

VOLUME 5 of this well-known series contains a comprehensive summary, up to about 1954, of work on the subjects named in the title. A few references and rather more ideas date to about 1956. An important section is concerned with the classical stereochemistry of the various then known triterpene skeletons, with some consideration of conformational questions. As in previous volumes, conformational formulae are inadequately used, but the volume marks a distinct improvement in this respect. There is a considerable addendum bringing up to 1956 work on configuration and structure in the sesquiterpene and diterpene series.

Inevitably in a rapidly moving field the book is seriously out of date. For example, a number of structures quoted have been superseded and many others then unknown have since been determined. There is, inevitably, no consideration of important recent methods such as rotational dispersion, but a rather full account of the use of molecular rotation differences. However, it can form a starting point for the research worker and provides some useful summaries of more classical aspects of the subject for teaching purposes.

A. J. BIRCH

Carbon Dioxide in Water, in Wine, in Beer and in other Beverages

By F. Justin Miller. Pp. 49. (Oakland, Calif.: F. Justin Miller, 3166 Birdsall Avenue, 1958.) 15.00 dollars.

THIS memoir comprises three almost independent essays on (a) a numerical method of representing the gas pressure relationships in various carbonated beverages, (b) the rate at which such beverages become impregnated by the gas, and (c) the rate at which the gas is lost from the carbonated liquids under various conditions. No radically new conceptions are developed but numerous graphical and tabulated data are included and the discussion covers

many vexed questions such as the role of nuclei and agitation in the effervescence of carbonated drinks and the suggestion, not supported in the present thesis, that various forms of bonding of carbon dioxide, for example, to proteins or as "carbonic acid", play a part. Some readers may find the presentation rather verbose and obscure and may feel somewhat perplexed by the description of numerous 'experiments' where it is not always easy to appreciate either the objects or the results. Furthermore some at least of the ideas will be provocative as, for example, the view that solutions of carbon dioxide in aqueous liquids may be regarded as dispersed systems similar to emulsions. It is further suggested that increasing the level of disturbance during carbonation results in a coarser 'emulsion' so that the gas is entrapped in comparatively large aggregates which are unstable and tend to give rise to over-foaming ('wildness' or 'gushing') when the pressure is released. While this view may help in describing the phenomenon of gushing, it leaves out of account much that is known from scientific experiment about this behaviour and moreover does not in any material way contribute towards means of controlling or avoiding the defect. As this is only one example illustrating the general character of this monograph it will be clear that the latter makes no claim to be comprehensive; but, nevertheless, it contains a good deal of interest to the physical chemist as well as much that will be stimulating to the more technical reader.

A. H. COOK

Animal Behaviour

By Dr. John Paul Scott. (The College Library of Biological Sciences.) Pp. xi+281+16 plates. (Chicago, Ill.: University of Chicago Press; London: Cambridge University Press, 1958.) 37s. 6d. net.

THE particular value of this book is that it is comprehensible to reasonably intelligent people who have not steeped themselves in the jargon of the ethologists. It may be used as a text-book because it covers well the general field of animal behaviour, especially in basic social aspects, but the book is also an introduction which will subtly draw the student forward into a wider range of reading. The scientific discipline throughout is commendable.

Animal behaviour is concerned with the activity of the whole organism and groups of organisms: what an animal is doing is as important as what it is, and behaviour is one of the central problems of existence. Dr. Scott develops his work from the elements of behaviour, the limitations imposed by anatomy, and the internal causations from physiology, to the subject of learning and the effects of experience. This is straightforward going with field and laboratory illustration, but when the study of organization of behaviour and social organization is reached Dr. Scott becomes an inspiring teacher. He is not to be classed with those practitioners in ethology who cannot see wood for trees: he becomes a naturalist seeing individuals and populations in their larger environmental setting. The problems of developing sociality and social disorganization in relation to ecological factors are well chosen and illustrated and the reader is left wondering—a valuable mental state—about the puzzling field of the gene complex in relation to homeostasis and habitat selection in very slightly different races of animals. It is something of an achievement to write so simply without writing down.

F. FRASER DARLING