

Separate sections of the book deal with the auditory region of the Microsaurs and its phylogenetic significance; with Gymnarthrid tooth implantation and succession; and with the postcranial elements.

The authors' conclusions are that the Microsaurs are probably ancestral to the Gymnophionans and are much less closely related to the Nectridia and the Urodela derived from them. The Aistopoda are still more remotely connected.

W. E. SWINTON

THE IONOSPHERE

The Ionosphere

Its Significance for Geophysics and Radio Communications. By Dr. Karl Rawer. Translated from the German by Ludwig Katz. Pp. 202+10 plates. (London: Crosby Lockwood and Son, Ltd., 1958.) 42s. net.

QUITE apart from its vital role as a propagating medium for the radio waves used in long-distance communication, the ionosphere forms an extremely important and fruitful field for geophysical investigation, and, moreover, one in which there is pressing need for further work to be done—work which embraces several branches of physical science. It is surprising, therefore, considering that the world's communication services are largely established by its means, how little attention is yet given to the ionosphere by the average radio engineer.

To the geophysicist as well as to the radio engineer, therefore, the publication of an English translation of Dr. Rawer's original German book on the ionosphere should be welcome, for though there is a vast scientific literature on the subject, there are very few textbooks upon it.

The author first deals with methods by which the ionosphere is 'sounded', including those of radio reflexion, spectroscopic and geomagnetic observation and with a brief mention of the possibilities of rocket flights. The results obtained by these operations are then dealt with in considerable detail, after which the theory of layer formation is discussed, including that of atmospheric ionization by various solar radiations and that of de-ionization by different processes. Chapter 4 discusses the regular changes to which each layer is subject and also describes the different kinds of ionospheric disturbances and other irregular phenomena. An interesting explanation of the special conditions which prevail within the polar circles is given. The final chapter is devoted to the influence of the ionosphere on radio-wave propagation and to methods for predicting the radio conditions in terms of the usable frequency bands. British, Australian and American methods for doing this are described, but the author devotes most space to the method developed by his colleagues and himself, and which is considerably more complicated than the others. Little information is, however, given as to the accuracy of prediction achieved by any of the methods, and one judges, from the final section, that there is room for improvement in this direction.

The book is of a suitable length for a comprehensive introduction to the subject, though much of the material is very condensed. The translated English is not always good, and this, together with the condensed style, tends to render the reasoning, in parts, a little obscure, which may make the book hard going for the student. Against this, however, is the fact that it is profusely illustrated by line

drawings and plates, and frequent samples of data in tabular form are presented. An extensive bibliography is given at the end. Undoubtedly, therefore, the book will serve, for many, as a useful introduction to the ionosphere.

T. W. BENNINGTON

BREWING

A Textbook of Brewing

Vol. 2. By Prof. Jean De Clerck. Translated by Kathleen Barton-Wright. Pp. xx+650. (London: Chapman and Hall, Ltd., 1958.) 105s. net.

WHEREAS Vol. 1 was predominantly descriptive in the sense of being concerned with various processes as actually managed in maltings and breweries, the present volume is largely complementary in consisting of an account of corresponding laboratory analytical procedures.

This account of practice in a brewing laboratory covers an extraordinarily wide range and there will be few to whom all the numerous estimations are familiar. For example, in addition to dealing exhaustively with the raw materials of brewing and with worts and beers as commonly understood in Britain, the book includes methods relating to vitamin assays, several antiseptics, synthetic sweetening agents and artificial colouring matters which would not normally come into question in Britain. A further valuable feature is a substantial section dealing with the specification of diverse accessory materials such as filtering agents, pitch, detergents, finings, plastics, varnishes, and various fuels and lubricants. Not least important is the concluding part amounting to about 70 pages, which describes the application of such methods to scientific, including microbiological, control in breweries and maltings. The descriptions of the methods themselves are, of course, factually based on published data as indicated by adequate references, while the applications are more in the nature of informal recommendations subject to modification according to the circumstances prevailing in individual establishments.

This book is clearly not intended primarily to establish any scientific principles. For example, to take a single example at random, various empirical estimations of the tannins in hops are adequately described, but the reader must seek elsewhere for evidence that the different results can be inter-related or that they refer to recognizable chemical entities. Other topics, such as the determination of the resistance of beers towards the development of haze, are almost matters of controversy. On the other hand, much of the detail, for example, the colours of light of various wave-lengths (p. 25), and many of the illustrations might seem somewhat tedious or even unnecessary to those whose knowledge is such that they might be turning to this encyclopaedic volume. Despite these reflexions, however, this book is the most up-to-date and possibly the most comprehensive handbook and reference work of its kind in existence. Its great virtue lies in describing diverse methods in such detail that, thanks in large measure to the excellence of the translation and general presentation, non-specialists can hope to achieve useful results. Within these limitations it is likely to prove invaluable to those engaged in laboratory work in connexion with brewing.

A. H. COOK