

The survey article on the sugars perhaps omits too much, and that on the proteins seems to include very little of the results of interesting recent attacks on their structure by X-ray methods.

Some articles in some of their aspects and in relation to the quotation of bibliographical references are apt perhaps rather to overstress recent work in the United States and to understate the scientific development of the subjects as resulting from a world-wide effort. This is a tendency in every country, particularly in regard to technological subjects rather than to fundamental scientific subjects, and it should be avoided so far as possible.

This fifteen-volume work as a whole (there is one volume yet to come) is beautifully produced. Although it is costly, it is a worthy publication of a great industrial nation, and most technical libraries will need to keep it readily available.

A. C. EGERTON

SKYHOOKS AND SATELLITES

200 Miles Up

The Conquest of the Upper Air. By J. Gordon Vaeth. Second edition. Pp. xiii+261. (New York: The Ronald Press Company, 1955.) 5 dollars.

THE approaching International Geophysical Year of 1957-58, with the incidental project of an artificial satellite, has stimulated the second edition of this book, which first appeared in 1951. As head of the New Weapons and Systems Division in the United States Office of Naval Research, Mr. Vaeth speaks authoritatively, and it is good to read an account of upper-air research which, intended primarily for the general reader, is so completely scientific in its outlook. People naturally want to know also how far at the present time the fantastically improbable has developed towards the fantastically possible, and there is a little speculative spaceman-ship at the end. But this is not confused with actual achievements or projects seriously in hand, and the great value of the book is in its emphasis on the real objects of high-altitude exploration.

The reader will probably turn first to Chapter 12, which outlines the possible construction, and the problems of launching, instrumenting, and tracking the Minimum Orbital Unmanned Satellite of the Earth (entitled MOUSE) suggested by Dr. S. F. Singer. Circulating at a height of about two hundred miles, in a track passing over two stations near the poles, this would release stored information to the stations every half-revolution. (One can forecast that the whimsical trend of scientific jargon will find an appropriate name for the reception of these observations, such as 'taking the Mickey'.) Trial runs may first be made with uninstrumented projectiles. Launching will most likely be from ships at sea—not, as in the almost prophetic diagram in the "Principia", from a mountain-top. The life of such a satellite is expected to be a day or two.

The earlier chapters give an excellent account of the physics of the atmosphere, the information sought, the various instruments used, and the telemetering equipment for transmitting results from rockets and balloons. Pictures of the complete laboratories and radio stations fitted in modern rockets give a good idea of the complicated tasks each fulfils in its short mission. The activities at the

White Sands Proving Ground are described at first hand, and the development from the early captured V2 to the W.A.C. Corporal is explained with a good deal of technical detail. The progress of the modern balloon, culminating in the gigantic Skyhook cells, which may be as large as three million cubic feet, is fully dealt with. To the rocket-minded, this revival of interest in large balloons may seem like an echo of the 1930 period. But the firing of a rocket is an event, and the recovery of the remains an enterprise, while unmanned balloons carry the routine traffic of the upper air, and are very much less costly. Indeed, Mr. Vaeth says that it is probable that the first steps towards a closer acquaintance with Mars will be made in the summer of 1956 from a manned balloon observatory, carrying a 6-in. telescope and spectrographic equipment above the disturbances of the earth's atmosphere. Little information is available about this, except that the craft will be called Explorer III, as a successor to the balloons manned under the late A. W. Stevens. Incidentally, Skyhook balloons, travelling rapidly in high-altitude winds, have been shown to account for many 'flying saucer' observations; indeed, as the photographs of them show, they look like nothing else. But the author records one unidentifiable object that was definitely not a balloon, and refuses to be drawn into controversy.

Admirable photographs, a readable style, and an objective approach make this a book which will be received both with enjoyment and with confidence.

G. R. NOAKES

DIELECTRIC CONSTANT AND LOSS

Dielectric Behaviour and Structure

Dielectric Constant and Loss, Dipole Moment and Molecular Structure. By Prof. Charles Phelps Smyth. (International Chemical Series.) Pp. x+441. (London: McGraw-Hill Publishing Company, Ltd., 1955.) 64s. 6d.

DURING the past ten or fifteen years, measurements of the dispersion of dielectric constant have been characterized by a new and altogether higher level of precision. This has been achieved partly by the development of microwave methods and partly by experimentation at low temperature when the dispersion is shifted into the radio- and audio-frequency region. The use of microwaves has the unique advantage that the investigation of electrolyte solutions has become practicable. Prof. C. P. Smyth's book is a timely summary of the knowledge and attitudes that are the result of these advances. The subject is treated in two parts. The first, a discussion of the dielectrical properties of matter, occupies rather more than half the book; the second part is devoted to a survey of dipole moments as a tool in the study of molecular structure. Comparison with the author's previous book published twenty-five years ago shows how great has been the expansion of the subject in the intervening time.

In fundamental theory the developments represent a consolidation rather than an advance to new positions, and it is perhaps of interest to glance at the current picture of the mechanism of dipole reorientation. Hindered rotation, introduced as a