into the problems of evaporative film-cooling at hypersonic speeds. R. H. Battin and J. S. Miller discuss the guidance requirements for a novel low-thrust approach trajectory to the Moon, spiralling out from the Earth and in towards the Moon, while J. W. Salisbury reviews the geological problems in establishing a base after arriving at the Moon. Together the volumes constitute a most useful and wide-ranging survey of space technology.

D. G. KING-HELE

THE RUTHERFORD JUBILEE AND NUCLEAR PHYSICS

Proceedings of the Rutherford Conference

Edited by J. B. Birks. Pp. 856. (London: Heywood and Co., Ltd., 1961.) 189s.

THE scientific proceedings of the Rutherford Jubilee International Conference on Nuclear Physics which was held in the University of Manchester during September 4-8, 1961, to commemorate the discoveries of Rutherford at Manchester, and in particular, the fiftieth anniversary of the Rutherford scattering law and the discovery of the atomic nucleus, are recorded in the present volume. The addresses delivered at the special commemorative session by four of Rutherford's former colleagues are to be published separately in a special volume which will contain also other biographical, historical and bibliographical articles and a selection of the important papers published from Manchester during 1907-19.

The contents consist of the brief welcoming address by the vice-chancellor of the University of Manchester (Prof. W. Mansfield Cooper) and the reply by the president of the Conference (Sir Ernest Marsden); contributed papers; invited papers; discussion; open session; and conference summary by D. R. Inglis. All the manuscripts, whether issued as preprints in time for the conference or obtained by tape-recording during the conference, have been corrected by their respective authors. Abstracts of the 180 contributed papers are included, together with a list of delegates and an index of authors.

There were seven sessions in addition to the commemorative session (Session 4) and the open session. In the first session, on high-energy investigations of nuclei, there were invited papers by H. Pierre Noyes on nuclear forces; H. McManus on the interaction of fast nucleons with nuclei and R. H. Dalitz on hypernuclei and hyperon-nucleon interaction. In the second session, on collective motion in nuclei, B. H. Flowers spoke on pairing correlations in nuclei; B. L. Cohen on experimental evidence for collective oscillations and G. E. Brown on the theory of collective oscillations. The third session, on the nuclear ground state, included papers by D. H. Wilkinson and P. E. Hodgson on the nuclear surface and J. S. Bell on the many-body problem. Session 5 dealt with direct interactions with three invited papers; session 6 consisted of two invited papers, by S. Devons on limitations and needs in instrumentation for nuclear physics and by W. A. Fowler on "Rutherford and Nuclear Cosmochronology" respectively; and session 7 was concerned with weak interactions, with invited papers by R. J. Blin-Stoyle; S. A. Moszkowski; C. Rubbia on muon capture in nuclei; and V. L. Telegdi on the spin dependence of the interaction

responsible for muon capture. In the open session (Session 8) there were four invited speakers, including R. E. Peierls, who took as his subject "Velocity Dependent Nuclear Forces", and Bohr, who discussed selected topics concerning nuclear spectra.

The volume is excellently produced and will remain both of scientific and historical interest for a very long time. The discussions are valuable, but because they are given verbatim they sometimes reflect the heat of the moment and quite often descend to ridiculous comments like "Oh, no! no!". It is a pity that some editorial deletions or alterations were not made before publication. The price is high, but not too high for the material the volume contains.

S. WEINTROUB

SALT RELATIONS OF PLANTS

Mineral Salts Absorption in Plants

By Dr. J. F. Sutcliffe. (International Series of Monographs on Pure and Applied Biology. Division: Plant Physiology, Vol. 1.) Pp. x+194. (London and New York: Pergamon Press, 1962.) 35s. net.

THIS is a straightforward account of the principles involved in the absorption of mineral constituents of plants. After a brief review of the methods and plant materials now generally used in investigations on salt absorption, the problems presented by the subject are dealt with in seven chapters. Under the heading "Mechanisms of Ion Transport" the various processes which might be concerned in the movement of ions into and in the plant are briefly considered; they are diffusion, mass flow, ion exchange, Donnan equilibria, adsorption, chemical combination and active transport. How various external and internal factors can affect salt absorption forms the subject of the next chapter, while the relation of salt absorption to metabolism rightly claims a chapter to itself.

Much of a chapter on the location of absorption mechanisms is naturally devoted to a discussion of the concept of free space, but brief consideration is also given to the salt relations of cell walls, cytoplasm, mitochondria and chloroplasts. The plasmatic membranes are indeed described but these important components of the cell might well have received a more detailed treatment. In a chapter entitled "Salt Relations of Vascular Plants" there are considered the zones of ion absorption in roots, salt absorption and translocation, transport across the root cortex, upward transport of salts, distribution of salts in the shoot, foliar absorption and excretion of salts. These altogether constitute a vast subject on which much work has been done and much written in the past thirty or forty years, and in a book of the size of the one under notice the brief outline which is given is all that can be expected. Much the same can be said of the subject-matter of the next chapter dealing with the soil as a source of mineral salts. The final chapter, apart from an epilogue, deals with salt tolerance, particularly of halophytes. The term diffusion pressure deficit, that is, suction pressure, is here introduced without definition. While many readers will no doubt be acquainted with the term this should probably not be assumed.

The book is clearly and pleasantly written and should be found useful to students who want a general account of the aspects of plant nutrition with which the book sets out to deal.

W. STILES