

abundance of good-quality photographs and diagrams. It is inevitable that the book must be to a high degree an analysis of the huge literature of the subject, and a large part of its value will rest upon the facilities offered by the terminal bibliography of 1,924 selected titles, and of the vastly more numerous (but untitled and unsorted) references which are given after each chapter. Vol. 1 deals with two of the three parts making up the book as a whole; these respectively concern glaciology and glacial geology. Vol. 2, the larger, deals with the Quaternary era itself.

It is indeed a stupendous achievement to have surveyed so vast a field, and every research worker in the field of Quaternary study will have to turn time and again to this reference work. So wide, however, has the field of knowledge become that each chapter and each section has inevitably taken the character of a brief glance at, and short reference to, its main features and lines of development. To some extent critical appraisal and measured exposition have gone by the board, and this was perhaps inevitable. Experts in each part of the field may well feel their own area to have been inadequately treated, and the time required not only to compile but also to print so compendious a work must mean that parts are outdated even at publication. British Quaternary geologists will be sorry that there was not time for a full discussion of the synthesis of pollen-analysis of organic interglacial deposits and of till-fabric analysis in East Anglia. This would perhaps have persuaded Prof. Charlesworth to a different correlation of the East Anglian glacial sequence with that of western and alpine Europe, especially since what he proposes appears to place Hoxne and Clacton in the Riss-Würm Interglacial, leaving no place for the subsequent Histon Road or Ipswich interglacial beds, which are almost certainly Eemian and therefore equivalent to Riss-Würm themselves. Present opinion here and in the Netherlands certainly places the Hoxne deposits in the Great or Mindel-Riss Interglacial.

Most authors, aware of the risk (as Prof. Charlesworth is) of making multiple minor errors in seeking to cover so extensive a field, would have shirked the task altogether and have saved themselves a mountainous labour and a lot of criticism. Prof. Charlesworth deserves our thanks that he has persevered to the end with his task: his book will long remain a major means of entry into the many complex territories of Quaternary history, and it will be found of the utmost value to students in all those developing sciences which find themselves bound to take cognizance of the world-wide and profound transformations which accompany the Great Ice Age.

H. GODWIN

EGYPTOLOGY

Tombs, Temples and Ancient Art

By Joseph Lindon Smith. Edited by Corinna Lindon Smith. Pp. xv+350. 36 plates. (Norman: Oklahoma: University of Oklahoma Press, 1956.) 5 dollars.

WRITING in 1907, the late Walter Tyndale, a fellow artist, described Lindon Smith as "one of the most amusing companions which it has been my good fortune to meet". So he remained all his life, and this charming book brings to life again the lovable and happy personality of its author. Lindon

Smith's great contribution to Egyptology has long been recognized, for his paintings of Egyptian subjects were numerous and of unsurpassed quality. The Egyptian collections of America, particularly those in the Boston Museum of Fine Arts, have been enriched by the products of his brush, which have brought to the student who has not visited Egypt all the glories of pharaonic art. Now Egyptology finds itself further in his debt, for in these writings, edited by his wife, Lindon Smith presents us with character studies of many of the famous figures of Egyptian archaeology, and, what is even more important, side-lights on important discoveries and events hitherto not known. This valuable feature of the book is shown in the chapter on 'Great Discoveries', particularly in the section dealing with the finding of the so-called Akhenaten mummy, in which Lindon Smith marshals the evidence and relates the arguments of such authorities as Maspero, Weigall, and Engelbach, which ultimately solved the problem of this mysterious find.

Among the illustrations, there are many reproductions of the author's paintings, and although the absence of colour is much to be regretted, they yet show his genius as a copyist and interpreter of ancient art. This is particularly shown in the illustration facing p. 16, which is a photograph of Lindon Smith at work in the tomb of Mereruka; here the editor has rightly found it necessary to distinguish in the sub-title between the painting and the original bas-relief. I can recommend this book as a very valuable contribution to the history of archaeological research in the Nile Valley.

W. B. EMBRY

THE ATOMIC NUCLEUS

Elementary Nuclear Theory

By Prof. Hans A. Bethe and Prof. Philip Morrison. Second edition. Pp. xi+274. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1956.) 50s. net.

THE first edition of Bethe's "Elementary Nuclear Theory" appeared ten years ago and thus dealt mainly with what may be called pre-war physics. For the second edition, Prof. Bethe has been joined by Prof. Morrison as co-author. Together they have endeavoured—successfully, in my opinion—to cope with our greatly increased knowledge of atomic nuclei. The result is a book of nearly double the size, due to an expanded treatment of many of the original topics as well as the inclusion of some new ones. The book has been virtually rewritten, as was necessary to bring it up to date, yet the reader familiar with the first edition will recognize an old friend.

Among the more important additions is a most lucid chapter on the polarization of nucleons. The use of the density matrix and of trace techniques is explained and double-scattering experiments are discussed, the geometry of such an experiment being illustrated by a most helpful diagram. There is an excellent chapter on the theory of nuclear reactions and scattering, dealing among other matters with resonance formulae, level-widths, the matching of the logarithmic derivative of the wave function on the nuclear surface, compound nucleus theory, the cloudy crystal ball model and radiative processes. A very good balance is here maintained between the mathematical formalism, its physical interpretation and its

application to experiment. Chapter 19 on nuclear structure seems less successful. It contains a very useful up-to-date account of the achievements and physical concepts underlying the shell model and the collective model; but here the balance between mathematical formalism and physics, mentioned above, has not been achieved. Not enough mathematics is given for the reader to be able to appreciate how the qualitative concepts lead to far-reaching detailed quantitative predictions. The relevant theory is, of course, highly specialized and intricate, but just for that reason a bowdlerized version would have been most welcome. The authors have rightly refrained from an extensive application of meson physics to nuclear theory: as it is understated in the preface, "field theory is still no sure guide to correct results in nuclear physics". An attractive feature of this book is the use, wherever possible, of the effective range approximation, enabling the reader to become familiar with this very useful approach.

Nuclear physics covers a vast field, and our understanding of it has not yet reached a stage which allows a uniform presentation. This makes a first introduction to this subject difficult. It is most valuable to have a slender book, such as this second edition of "Elementary Nuclear Theory", which will serve this purpose admirably. It gives lucid and concise introductory accounts, the stress always being on the physical essentials, of most topics in nuclear theory which at the present time appear of fundamental importance.

F. MANDL

SWANS, GEESE AND DUCKS

The Water Fowl of the World

By Jean Delacour; illustrated by Peter Scott. Vol. 1: The Magpie Goose, Whistling Ducks, Swans and Geese, Sheldgeese and Shelducks. Pp. 284 + 16 plates. 105s. Vol. 2: The Dabbling Ducks. Pp. 232 + 24 plates. 126s. net. (London: Country Life, Ltd., 1954 and 1956.)

A THIRD volume will complete this monograph of a family of birds, the Anatidae, which makes a special appeal to the sportsman and the aviculturist as well as being of much ornithological interest. The work is handsomely produced, with text by one and illustrations in colour by another well-known authority. There is an account of every species and subspecies, giving its characteristics, distribution, general habits and record in captivity—this last a special feature, often with additional information on habits. Maps illustrate the distribution, but some of these have the defect of ignoring overlap between the breeding and non-breeding ranges.

The family is largely made up of a few familiar groups with numerous representatives widely spread. Thus, in the first volume, we find the whistling ducks of southern countries; the swans, a small but cosmopolitan group; the true geese, grey and black; and the assemblage of species covered by the general title of sheldgeese and shelducks. Again, in the second volume, we have the dabbling or surface-feeding ducks, mostly placed in a single genus including such well-known species as mallard, teal, wigeon, pintail and shoveller, with related forms throughout the world.

There is, however, a notable addition of peculiar forms of limited range. Thus, the magpie goose of

Australasia is put in a sub-family by itself; the unique coscoroba of southern South America is apart from the typical swans; and monotypic genera are required for the Cape Barren goose, the blue-winged goose found only in Abyssinia, the Orinoco goose, the Egyptian goose and the South American crested duck. There is also the interesting genus of steamer ducks of southern South America and the Falkland Islands, once the subject of controversy but now considered to comprise three species—two flightless and one volant.

Other peculiar species, dealt with in the second volume, are the pink-headed duck of India, the pink-eared duck and freckled duck of Australia, the mountain blue duck of New Zealand, and the little torrent duck, inhabiting the swift streams of the Andes from the Caribbean to Tierra del Fuego and divisible into six sub-species.

Although the members of the family have many obvious points in common, there is considerable diversity in habit and still more in appearance. Mr. Scott figures the different plumages of each form, and the plates of the young in down are a pleasing feature.

LANDSBOROUGH THOMSON

THE LEAF

The Growth of Leaves

Proceedings of the Third Easter School in Agricultural Science, University of Nottingham, 1956. Edited by Prof. F. L. Milthorpe. Pp. x + 223. (London: Butterworths Scientific Publications; New York: Academic Press, Inc., 1956.) 40s.

THE organizers of this symposium on the growth of leaves were prompted by the consideration that in attempts to improve agricultural production too much attention has been concentrated on the photosynthetic processes, changes in which, under normal agricultural conditions, are relatively unimportant in determining yield when compared with the effects of variations in the extent of the surface of the photosynthetic organs. The symposium was arranged to emphasize this principle, and follows the development of leaves from their inception, through expansion, to maturity.

The first part of the work deals with general aspects of growth and differentiation. In the introductory chapter by F. G. Gregory there is an interesting discussion of the general concept of the leaf and of the principal characteristics of leaf growth. E. Bünning contributes a valuable summary of his views on differentiation, while J. K. Heyes and R. Brown discuss the growth and differentiation of cells, using data obtained from their studies on roots. The second part of the symposium is concerned with the initiation of leaf primordia and opens with a chapter by C. W. Wardlaw on the inception of leaf primordia in relation to metabolic and geometrical aspects of apical organization. This is followed by a mathematical treatment by F. J. Richards of the spatial correlations involved in the production of leaf pattern at the apex. N. Sunderland, J. K. Heyes and R. Brown conclude the section with an account of their original observations on growth and metabolism in the shoot apex of *Lupinus*. In the third section of the symposium, which deals with leaf expansion, H. Jones has covered a very wide field within the limits of his chapter on morphological aspects of leaf