

such creatures as sea squirts. He provides some very interesting comments also on the adult structure of tunicates. There is a good account of the subneural apparatus and of the work of Huus and Carlisle on its possible receptor functions, with all that this implies for the origin of the vertebrate pituitary gland. Berrill adds the interesting suggestion that the dorsal cord, a strand of cells between the subneural gland and the gonad, controls release of the genital products by "neuroid or hormonal transmissions along its plasmal surface". Almost as an aside he introduces the conception of the tunicate epicardium as the ancestor of the coelom. All these and many other questions are discussed lightly, concisely and yet with full scholarly appreciation of their significance, making a book that every zoologist can enjoy.

J. Z. YOUNG

WILD-LIFE REFUGES IN THE UNITED STATES

Seeing America's Wildlife in our National Refuges By Devereux Butcher. (Prepared under the auspices of Defenders of Furbearers.) Pp. ix+338. (New York: The Devin-Adair Company, 1955.) 5 dollars.

WILD-LIFE refuges in the United States are so many, so far-flung and so astonishingly rich in vertebrates that to become familiar with the majority is an unattainable ambition for all but a very few, even of Americans. Most European naturalists have only the vaguest idea of them. One should therefore be grateful to Mr. Devereux Butcher for this highly informative book, with its three hundred and fifty excellent half-tone illustrations, which show a generous sample of the mammals and birds of the refuges, and a fair but smaller sample of the refuges themselves. Forty-one of them are briefly described, together with a number of national parks and other public and private refuges. Nevertheless, the author is compelled to dismiss more than a hundred other refuges of the Federal Fish and Wildlife Service alone, in a final ten-page summary, although several of these are each larger than all the nature reserves in Britain put together. Many hundreds of interesting State refuges cannot even be mentioned by name.

Mr. Butcher has made his selection wisely from a wide variety of habitats and regions, although coastal, desert and mountain refuges naturally come off best, and the representation of New England and the Middle West and Prairie states is disappointingly thin. He has packed his descriptions with accurate and up-to-date facts, with a minimum of padding but with a vivid and colourful presentation of what each has to show and of the achievement which it represents. The propaganda for the defence and expansion of the system and against rival interests, particularly shooting men, rings somewhat stridently to a British ear; but apart from differences in national character and tastes, it must be borne in mind that the problems created by some fifteen million 'hunters', or shooting men, have no sort of parallel in Great Britain, while threats to alienate national parks and refuges for economic or defence purposes have recently grown to very serious proportions in the United States just as much as in Britain. Nevertheless, the reader should not forget that the American

restrictions on shooting wild-life, which receive bare mention in this book, are far more drastic and more strictly enforced than anything ever contemplated in Britain, and that not all who are in a position to judge would agree with, for example, the author's condemnation of the Department of Interior for permitting the New York State Thruway to be driven across the marshes of Montezuma Refuge, in view of the improved control of water-levels which it facilitated.

American wild-life is often astonishingly tolerant of human beings, who will no doubt be tempted by this most attractive book and by growing prosperity and leisure to flock to the refuges in alarming numbers. The author appreciates the danger, at any rate for the California condor, which can be prevented from feeding its only chick all day by one man showing himself within five hundred yards of the nest for a few minutes only.

Characteristically, but in contrast to British practice, the vegetation and invertebrate fauna are treated as little more than background for the main drama of the vertebrate actors. There is a certain amount of history but relatively little ecology, and little attention to the natural as against the human dangers to the successful management of refuges. It seems too much to hope that this fairly expensive work can be widely bought by private individuals in non-dollar countries; but it should not be missing from any serious library concerned with Nature and its conservation.

E. M. NICHOLSON

CATALYTIC HYDROGENATION

Catalysis

Vol. 3: Hydrogenation and Dehydrogenation. Edited by Paul H. Emmett. Pp. vii+504. (New York: Reinhold Publishing Corporation; London: Chapman and Hall, Ltd., 1955.) 100s. net.

WITH the appearance of the third volume this comprehensive work on catalysis begins to take a new form, in that a specific type of catalytic reaction is considered in place of catalysis in general. The present collection of monographs deals with various aspects of catalytic hydrogenation. Much can be learned with regard to the mechanism of the catalytic activation of hydrogen itself from reactions such as the ortho-parahydrogen conversion and hydrogen-deuterium exchange, which are treated in an initial chapter by B. M. W. Trapnell. Catalytic hydrogenation, however, involves also the simultaneous activation of a second component, namely, the substrate to be hydrogenated; and the mechanism of this two-component process, in the typical case of the hydrogenation of ethylene, is discussed fundamentally and very clearly in the subsequent monograph by D. D. Eley. The next three sections, on the catalytic hydrogenation of olefinic hydrocarbons in general, by B. B. Corson, on the addition of hydrogen to acetylenic linkages, by G. C. Bond, and on the hydrogenation of nitro compounds, by H. A. Smith and W. C. Benoit, have largely a practical character and deal with aspects such as selective hydrogenation and the degree of specificity which can be exerted by variations in the hydrogenating metal and in the working conditions.

In connexion with a review of the present state of industrial reactions involving hydrogenation, a wel-