

because with each of the 150 reproductions of Audubon's colour paintings of American mammals there is an account of each animal's natural history brought up to date by the editor, Victor H. Cahalane, former assistant director of the New York State Museum.

Many naturalists probably associate the name of John James Audubon (1780-1851) with birds after his monumental work *The Birds of America*, for which he completed more than 435 illustrations, and the companion five volume text, *Ornithological Biographies*. Although ornithology was Audubon's first field of study, he later went on to collect, paint and describe mammals, in which task he was assisted by his friend the Rev. John Bachman. Towards the end of his life, Audubon was also helped in the painting by his son John Woodhouse Audubon. The result of this combined effort was *The Viviparous Quadrupeds of North America*. The plates for this book were first published in three imperial folio-sized volumes between 1845 and 1848, and these were followed by three volumes of text in octavo size. These editions, and a later small edition of plates and text together, soon became rare collectors' items. For the many without—naturalists, art lovers and collectors of Americana—Hamlyn's have now published this new edition of reproductions of Audubon's paintings—the first complete collection of full colour reproductions since 1848.

The animals in the imperial folios appeared in the order in which Audubon painted them, so that rodents, carnivores, insectivores and hoofed mammals appeared in any order without reference to natural relationships. The same lack of order was repeated in the smaller octavo edition which followed. In this modern edition, the paintings and text have been rearranged to follow accepted zoological order, so that the only representative of the marsupials, the opossum, in North America (excluding Central America) now begins the collection. Related species, for example, the twenty-four species of tree squirrels which Bachman recognized, are now brought together for the first time. Many of the mammal names in use a century ago, including those invented by the authors to identify what they believed were new species, are no longer valid. This is true not only of vernacular names, but also, although to a lesser extent, of scientific names. Today, under the trinomial system of classification, many of the "species" of Audubon and Bachman's time are considered geographic races (subspecies). Other changes of name have also been necessary because some mammals were given names by Bachman not realizing that they had been identified and named by other zoologists. Under this modern arrangement, 147 of Bachman's different "species" illustrated in the imperial folios have been reduced to 119, including one, the "Woolly squirrel" which is unidentifiable. Each of the 147 "species" and an additional eight "varieties" depicted on 150 plates in the imperial folios appears in this edition. Each plate with its description is given two pages. On the left-hand page are excerpts from the original text which have been chosen not only for their interesting and usually accurate information on the habits of the particular animal, but also for their anecdotes and personal experiences of one or more of the authors. In places, Audubon's rather flowery and rambling style can be contrasted with Bachman's more concise descriptions. Frequently, Cahalane has commented on unusual, obscure or erroneous statements—he is quick to point out Audubon's exaggerated and vivid comments on the ferocious and murderous behaviour of the jaguar, for example. Other information has been added to make the text more meaningful. Brief identification of other naturalists has been given where their surnames only are given in the text. Modern synonyms of common and scientific names have also been inserted. On the right-hand page, Cahalane has written a short modern account, under Audubon's painting, of the habits of the animal.

Some of Audubon's paintings might be described as being a little anthropomorphic today, and some look as if they are of stuffed animals—you can almost see the dried skin stretched over the skeleton. Audubon admitted at the time, in fact, that he had to resort to skins and mounted animals at times and occasionally to pictures by other artists. For his time, Audubon's paintings are full of life and movement. It is amazing really how Audubon was able to paint as he did, considering the difficulties under which he worked; for example, rushing a painting before the animal finally collapsed with decay. In this production, the fine colouring of the original paintings has reproduced well—the plates were in fact prepared from photographs of the imperial folio plates in the collection of the Kennedy Galleries in New York. Some of the lettering of titles was also reproduced from the original edition. The paper is of good quality and was specially made for this edition. All in all, this book seems very good value for money and it must be welcomed by many—particularly by naturalists in America where Audubon's and Bachman's descriptions combined with a modern text give it special value.

SARAH BUNNEY

HOW ANIMALS COMMUNICATE

Signals in the Animal World

By Dietrich Burkhardt, Wolfgang Schleidt and Helmut Altner. Translated by Kenneth Morgan. Pp. 150. (London: George Allen and Unwin, Ltd., 1967.) 63s. net.

THIS refreshing and informative book avoids the usual pitfall of describing some aspects of the complex subject of animal behaviour in equally baffling and complex terms. The presentation is excellent, and the numerous illustrations are outstanding. Although some biological knowledge would provide a useful background, on the whole the book is one which the intelligent general reader should find is not beyond his comprehension. At the same time, however, it provides a scholarly treatment of the subject for the benefit of the specialist.

The approach is simple and enthusiastic, and the contents of the book fall into three parts. The first part is concerned with the functioning of sense organs and describes the mechanical, light, temperature, chemical and electrical senses with which different organs are concerned. The second part of the book shows some of the methods which animals use to orientate themselves in their environment, indicating that this may involve several senses often working in conjunction with one another. The third part of the book deals with the question of how animals communicate and understand one another, describing the organization of life in animal communities. Thus signals have evolved as a means of demarcating territory, of expressing a willingness to mate and of suggesting friendliness. Odour signals may serve to demonstrate an animal's rank and strength, and among penguins wagging of heads and loud braying are signals that "marriage partners" have found each other again after a year or more apart.

This is a useful book, and all those concerned are to be congratulated for their modern approach.

ANNE CLAYTON

PLANET OF THE APES

First Holloman Symposium on Primate Immunology and Molecular Genetics

Edited by C. H. Kratochvil. (Primates in Medicine: a Series in Experimental Medicine and Surgery in Primates.) Pp. xv+99. (Basle and New York: S. Karger, 1968.) 16.50 Sw. francs; 30s.; \$4.

ALL the primates are more nearly related to man than are any other animals, and the chimpanzee is man's