

German writing about it. This obscurity comes across in the English version. One of the difficulties is how to reconcile the separate innervation of the seven or eight elements that compose the retina of the ommatidium, with the mosaic theory of vision by the compound eye. The recent contributions by Burt and Catton and by N. Yagi were not published in time to receive critical consideration in Dethier's account.

This monograph can be strongly recommended, but it is a technical monograph which makes few concessions to the possible limitations of the reader.

V. B. WIGGLESWORTH

PHOTOGRAPHIC DIORAMA OF WILDLIFE

The Wonders of Wildlife in Europe

By Franz A. Roedelberger and Vera I. Grosehoff. Pp. 232 (280 pictures). (London: Constable and Co., Ltd.; New York: Viking Press, Inc.; Toronto: Longmans Green, 1963.) 42s.

THE rise and rapid advance of colour photography in recent years have placed in the hands of the book illustrator a wonderful medium for the illustration of ornithological works.

The Wonders of Wildlife in Europe is a fine example of what can be done in this respect. It is a picture book, a collection of 280 remarkable photographs, the striking illustrations being accompanied by descriptive paragraphs telling the reader some facts concerning the subject, or rather subjects, shown in the pictures. These cover a wide field, from marine life and insects to reptiles, mammals and birds. The leading natural history photographers of Europe have contributed to the gallery.

By their grace and beauty, birds afford the artist wonderful subjects, and here are shown some of the exquisite results that can be achieved by those using what we may term the 'new medium'.

Comparisons are ever invidious, yet they must inevitably arise in a case such as this when we think of the great illustrated bird books of the past, the work of artists who never dreamed of a time when the camera would come into being and take over much of their work. Personally I do not think comparison possible. The beauty of a plate from Gould's *Humming Birds* cannot be compared with the study of an elephant hawk moth shortly after emerging from the pupa, on p. 162 of *The Wonders of Wildlife in Europe*, or the portrait of a little Egyptian vulture on p. 41. Each in its way is a thing of beauty, and if the ways are different ways the contrast enhances them.

In this volume the colour pictures are, of course, the most eye-catching and impressive of the illustrations, but there are also a large number of monochrome reproductions, including some remarkable snapshots such as that of two young foxes having a dispute and fighting heartily. Seemingly the trouble arose over a white hen. Another fine shot shows a female white-toothed shrew, *Crocodyra leucodon*, followed by her family. The first young one is grasping the mother by the fur of her rump, while the rest of the litter are in line astern, holding on to the hind-quarters of the one ahead; there are six in all.

For the depiction of sheer joy and delight in life a fox-cub springing high in the air (p. 196) is hard to beat; it is such a fine photograph and the young animal is in such a joyous pose. Another remarkable photograph is of a herd of wild reindeer in extended formation, described as a view over Hardanger Vidde, Norway.

There is a foreword by Peter Scott stressing the need to protect wild creatures and laying stress on the problems of the conservation of animal life in general, now and in the future.

FRANCES PRITT

PRODUCTIVE CYCLES IN THE OCEAN

Plankton and Productivity in the Oceans

By Prof. John E. G. Raymont. (International Series of Monographs on Pure and Applied Biology. Division: Zoology, Vol. 18.) Pp. viii+660. (London and New York: Pergamon Press, 1963.) 110s. net.

THE first four chapters in this book on oceanic production give a brief account of physical oceanography as it affects life in the sea. The distributions of temperature, salinity, oxygen and carbon dioxide are described. Pictures of the oceanic current systems are reproduced from Sewell¹. This is part of an attempt to "approach the study of oceanography through biological science". Much of the physics and chemistry relevant to the study of productive cycles is to be found in later chapters.

The subject of production is introduced with a chapter on the phytoplankton. The structure of diatoms, dinoflagellates and μ -flagellates is well described. The illustrations are clear and well reproduced. The decrease in size of diatoms, division rates, formation of auxospores, heterotrophy and flotation are physiological subjects brought into the discussion, which are of particular interest to production biologists. Prof. Raymont defines nanoplankton as plant cells "not normally retained by the finest silk nets" and they belong to "a variety of plant groups, Chrysophyceae, Chlorophyceae and Cryptophyceae"; Yentsch and Ryther² are quoted as showing that "the major part (of nanoplankton) is made up of small diatoms rather than microflagellates". Prof. Raymont says that the quantitative estimation of nanoplankton is extremely difficult. It is quite true that μ -flagellates cannot be counted, but small diatoms and dinoflagellates can be counted quite well with Utermöhl's sedimentation technique³, which is not mentioned.

Algal production is described in five chapters. An introductory one deals with photosynthesis, compensation depth and compensation point, the inhibition of photosynthesis at high-light intensities near the surface and the adaptation of photosynthesis (measured as mg carbon/mg chlorophyll/h) to different conditions. The next four chapters treat of nutrients, light, micronutrients and grazing respectively. Since the time of Lohmann⁴, who counted all the plankton and who made a simple model of plankton predation, it has been clear that any productive-cycle is a complex sequence involving all these factors all the time. The division into chapters treating the factors separately is a little artificial. Indeed, one might say that the study of production is not fully described until the chapter on grazing, where the models of productive cycles are dealt with.

In the chapter on nutrients, the seasonal changes in phosphorus, nitrogen and silicon and their distributions in the oceans, both vertically and horizontally, are well described. It is said that silica is rapidly regenerated; I believe this is so, but the evidence is not given, nor is any authority quoted. In the subsequent chapter (on light) a diagram of the nutrient-cycle is given, showing that the decline in nitrogen and phosphorus starts in late April well after the peak of the algal outburst at the end of March. This is what happens at Plymouth, comparing Fig. 7-29 showing seasonal nutrient distributions with Fig. 8-1 giving the seasonal algal distribution. In contrast, Fig. 7-2 (showing seasonal distributions of phosphorus, nitrogen and chlorophyll in Long Island Sound, from Riley and Conover⁵) demonstrates that the chlorophyll peak occurred exactly when the very low values of nitrate were reached. It is this sort of contrast that suggests that the effect of nutrient lack on algal production is not a simple one. In discussing models, Prof. Raymont points to the need for good physiological estimates. Here is one badly needed—the effect of various nutrients on algal division rates. A little has been done, but not enough.