

with modern methods of air warfare, the possible methods of protection against each of these and finally with the formulation of a tentative scheme for a practical civil-defence organization. The fifteen chapters, comprising Parts 1 and 2, are a masterpiece of condensation. A realistic picture of chemical, 'bacterial' and atomic warfare is presented, avoiding the alarmist sensationalism that has been all too common in some publications in recent years, and yet in no way under-estimating the potentialities of these methods of attack if timely preparation of appropriate counter-measures is neglected. The subject is studied from the point of view of a military scientist, and a short interesting chapter on "Choice of Military Agents" summarizes the arguments likely to influence an enemy in his selection of weapons for an attack on a civilian population in given circumstances.

In a work so packed with factual information, and in which the arguments are so logically presented, a serious critical review within the limited space available is scarcely possible, and the selection of isolated points for detailed criticism would be ill-judged and misleading since, in my opinion, the special merit of the book lies in the method of approach to, and treatment of, the subject as a unified whole. Readers familiar with the trend of thought in Great Britain will doubtless find points where they disagree with the author's conclusions; but it should be remembered that, in a vast country like the United States with its numerous but widely spaced cities and large areas of thinly populated land, some of the problems of civil defence must inevitably differ from those facing a compact and densely populated island like Great Britain. This fact may well account for some of the differences in the relative values attached to alternative methods of defence against specific hazards as compared with those generally accepted in Great Britain.

There is, of course, nothing new in the technical data, but the information is well and concisely presented, and the reader will find much of interest in the author's exposition of his views on how this important problem should be approached and how an effective scheme of defence might be developed. The book is excellently produced on high-quality paper, is illustrated with charts, diagrams and photographs, and contains an extensive bibliography and useful index.

J. W. MARTIN

THE RHYTHM OF REPRODUCTION

Vertebrate Sexual Cycles

By Dr. W. S. Bullough. (Methuen's Monographs on Biological Subjects.) Pp. viii+118. (London: Methuen and Co., Ltd.; New York: John Wiley and Sons, Inc., 1951.) 6s. net.

THE hundred pages of this well-arranged and useful little book provide a general picture of the rhythm of reproduction in vertebrates. The opening chapter deals with the age at which different creatures become sexually mature; with the timing of the mating season; with the effects of natural selection on breeding habits; with possible changes in reproductive habits caused by domestication; and finally with the oestrous cycle, starting with fish and amphibians.

In the chapter which follows, Dr. W. S. Bullough proceeds to consider the influence of environmental

factors on the physiological mechanisms which underlie the annual breeding season. He refers to the reproductive behaviour of seasonal breeders that have been moved across the equator, and briefly discusses the influence of light on reproductive periodicity. Other possible external factors which in some species may initiate the breeding season—for example, rainfall and temperature are also mentioned.

The next of Dr. Bullough's chapters deals with the hormonal control of reproductive processes. Here, for the first time, the review becomes coloured with some of Dr. Bullough's own beliefs: in particular, the view that the androgenic and oestrogenic hormones can be regarded as 'mitogenic' hormones that stimulate cellular proliferation not only in the reproductive organs but in the body as a whole; and the idea that the gonadal hormones themselves stimulate gametogenesis—especially the idea that, when a follicle ruptures at the appointed time in the oestrous cycle, follicular fluid bathes the surface of the ovary and stimulates the germinal epithelium to form a new crop of oogonia.

Dr. Bullough then moves on to consider the hormonal control of the accessory reproductive organs, and the possible links between receptor organs such as the eye, which are apparently involved in the control of reproductive periodicity by light, and the pituitary. The final chapter deals with sexual behaviour and its hormonal control.

A book of this kind inevitably has defects, for brevity is the most exacting of task-masters where accuracy of statement is being sought in a field of knowledge the boundaries of which shift almost daily. In the paragraph with which he concludes his chapter on hormones and reproduction, Dr. Bullough warns his reader—and reviewer—that another worker might well have emphasized different features of the story, and possibly drawn different conclusions. But he opens the section in which this particular remark appears with the statement that the conclusions which he proposes to underline are non-controversial ones. That, unfortunately, they are not. Among the few which he includes in the category of presumably established generalizations are the statement that the gonadal hormones are gametogenic—a thesis which the facts more readily dispose of than sustain—and the view that the gonadal hormones are general, as opposed to specific, stimulants of mitosis—a view for which the evidence is both scanty and contradictory. The book also contains some statements which appear to be incorrect, apparently because of misplaced emphasis—for example, the suggestion that platyrrhine monkeys have typical oestrous cycles of the kind seen in non-primate mammals, as opposed to the menstrual cycle of the Old World primates; the implication that the ovulation which is induced in the rabbit by mating does not occur until about twenty-four hours after the stimulus is applied; and the suggestion that there has been no detailed study of the human menstrual cycle. There are also a few sins of omission—for example, the book contains no reference at all to the occurrence of pseudopregnancy.

Happily, these shortcomings do not obscure the positive merits of the monograph; and Dr. Bullough could always correctly claim that he did go to the trouble of cautioning his readers that final answers belong to the future, and that, in the nature of things, they might not necessarily coincide with any contemporary views.

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