

the development of microbial genetics during the past twenty-five years. His reason for this may be found in the curious statement on page 91 that "there are not many stable auxotrophs, and this constant 'backmutation' actually makes the accurate control of characteristic inheritance impossible". The author's peculiar aversion to auxotrophic markers may explain why he makes no mention of the advances in *Streptomyces* genetics that have been made by their use in the past five years. In his own work he relies on complex characters such as colonial colour, the morphology of sporophores (whether "spiral, straight or intermediate") and differences in antibiotic activity against a range of test organisms, and not surprisingly the results provide a bewildering mass of observations from which it is hard to draw any simple generalizations.

Many of the author's conclusions are difficult to follow by the reader acquainted only with more conventional genetic concepts, but this may sometimes be due to a loss of clarity during the translation into English (which is generally poor and in places unintelligible). For example (page 93): "These [segregants] come into being not from crossing parental characteristics but from segregation by the fusion of nuclei".

Apart from many inaccuracies in the citation of references, there are some errors in the author's description of the work of others. For example Sermonti and Spada-Sermonti did not use my *Streptomyces coelicolor* strain A3(2) for the experiments described in their 1959 paper, as stated on page 64; they adopted this strain only in later work. Nor is it true, as we read on page 91, that everybody has overlooked the fact that *Streptomyces* nuclei are not identical with those produced by mitosis; it has in fact been well known for ten years that Streptomycetes have a protokaryotic cellular organization.

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## ANOTHER ANNUAL

### Evolutionary Biology

Vol. 1. Edited by Theodosius Dobzhansky, Max K. Hecht and William C. Steere. Pp. xi + 444. (Amsterdam: North-Holland Publishing Company; New York: Appleton-Century-Crofts, a Division of Meredith Publishing Company, 1967.) 120s.

*Evolutionary Biology* is to be a yearly volume covering "a vast array of disciplines from paleontology to molecular biology; and of subject matter, from microbes to man".

Judging from the articles in the first volume the editors have two aims. The first is to include anything to do with evolution and, since evolution is the unifying principle of biology, this means everything. The second is to review subjects relating to the techniques of studying evolution.

The articles by Calvin on chemical evolution, Rensch on the evolution of brain achievements and Stebbins on adaptive radiation and trends of evolution in higher plants fall into the first category, having nothing in common except the theory of evolution by natural selection as their guiding principles. Robinson discussing the taxonomy of hominids, and Estabrook, Fleming and Rogers appraising the use of computer methods in the practice of taxonomy and the interpretation of phylogeny provide useful reviews of the advancing techniques for assessing evolution and classifying living organisms. Between these two groups there are excellent articles by Carson and by Crumpacker on heterozygosity in the evolution of plants and animals including man. Alston reviews the advantages and disadvantages of using biochemical analyses in the interpretation of plant systematics.

Inevitably the question arises: what is the purpose of annual reviews? If it is to provide a volume where a

specialist can look for a general appraisal of work in fields related to his own, then the answer must be that the range of *Evolutionary Biology* is too wide. If it is for the general reader, then the articles are too specialized. If it is to cover mainly techniques in the study of evolutionary theory, then only half the articles in this first volume fulfil this criterion. If it is just a place to publish reviews that do not fit anywhere else, then it must be said that the articles could have been published elsewhere.

It must be concluded that each review is interesting but it is of doubtful value to bring them together in one volume.

WILMA GEORGE

## BEWARE OF THE FISH

### Sharks, Skates and Rays

By Perry W. Gilbert, Robert F. Mathewson and David P. Rall. Pp. xv + 624. (Baltimore, Md.: The Johns Hopkins Press; London: Oxford University Press, 1967. Published in co-operation with the American Institute of Biological Sciences.) 142s. 6d.

THIS book consists of thirty-nine of the papers presented at a symposium whose theme was "Current investigations dealing with elasmobranch biology". This would have made a better title; the present one is misleading. Only one of the papers is devoted to skates and rays, and that to their electrical organs. A wide variety of subjects is covered, but there is no unifying theme, except that the evolutionary implications of the data presented are often considered.

Research on elasmobranchs has developed in a peculiar fashion which is reflected in the composition of this book. Much of it has been stimulated by the hazard of shark attacks, and the response to this very small stimulus, about seventy-five attacks each year, is considerable. Most of these attacks are by a few large species of shark, but these are difficult to capture and maintain alive in aquaria, so that research has centred on smaller ones; no fewer than seven of the twelve chapters on osmoregulation, salt and water metabolism have *Squalus acanthias* as the experimental material. Two papers on tagging show that quite large sharks can be handled, although with difficulty.

Osmoregulation takes up a third of the book; this is not surprising, because the retention of urea in the bloodstream of elasmobranchs makes their excretory physiology unique. Of particular interest are those species which migrate into fresh water, and their adaptations to this environment are described. It would be interesting to know why these migrations occur.

Immunology is discussed in two papers. These studies may show how mammalian immune mechanisms developed. Although sharks produce antibodies their response to antigens is dissimilar to that found in either birds or mammals.

Perhaps the most interesting paper to the fisheries scientist is that dealing with population structure. The majority of the sharks studied in any detail show marked segregation by sex and maturity; frequently this is depth-related, and one paper describes this phenomenon for *Geleus asae*, the marbled catshark. Fertilization in all elasmobranchs is internal; either large eggs from which hatch well developed young, or live young are produced. In either case the number is very small compared with teleosts. In those species which have been studied the age at maturity is high and fecundity low. Often the reproductive cycle is very complex. In all cases a close relationship must exist between mature stock and recruitment, although this will become less direct as fecundity increases. Herein may lie a clue to the problem of stock and recruitment which is currently puzzling fisheries biologists, a problem which in this book is considered only in general terms. The numbers of small sharks are probably limited