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Book reviews

Wynne-Edwards, V. C.: Evolution Through Group Selection. Oxford: Blackwell Scientific Publ. 1986. 386 pp., 25 figs., 6 tabs. Cloth £ 29.50; Paper £ 15.75.

Group selection has been intensively discussed for many years, and most of the contemporary evolutionary biologists agree to the fact that selection for greater individual fitness cannot be the only valid process in causing evolutionary changes. Co-operation between individuals is an universal phenomenon in animal species, and there are numerous publications demonstrating this. Relevant descriptions like altruism, selfishness, kin-selection, and the popular field of so-called sociobiology are elementary terms for each undergraduate student of biology. The advantages of co-operation between the group members must lead to a selection process between groups. Group selection and individual selection can be concurrent.

The present publication presents and summarizes many fascinating empirical facts and examples revealing that co-operation within a group generally increases the fitness of its members. The book can be divided into three parts: chapters 1–6 give an ecological introduction to animal nutrition, with an emphasis on the results of the research on the red grouse. Chapters 7–13 review the grouse research with its experimental evidence of homeostatic population regulation in relation to fluctuations in the food supply. (1) A generalization of this capability from the red grouse to the whole animal kingdom and (2) a discussion of the genetic advantages resulting by mechanisms of co-operation from the structuring of populations in their occupied habitats constitutes the main content of chapters 14–20.

Each chapter of the first and third parts ends with a summary of the main results and conclusions of the preceding chapter. In the second part, chapter 13 "A review and commentary on the red grouse research" has been written as a general overview of chapters 7–12. These chapter summaries are very extended – in some cases having a size more than 20% of that of the preceding chapter. But, this concept may be highly welcome to the many readers with a more general interest in these evolutionary processes. Omitting many of the details, they can skip their way from summary to summary.

This illuminating book has been excellently written in a very informative and stimulating style. The author has succeeded in formulating complex dependencies in a very clear and concise manner. An immense number of specific facts and examples have been compiled to build up a homogeneous and convincing picture of evolution by group selection.

The text can be read with profit and interest by readers at very different levels. Necessary special results from evolutionary biology as well as details from zoology, quantitative genetics, ecology, population genetics, population dynamics, etc. have been kept to a moderate level. No mathematics and no statistics have been involved at all! But, just this complete lack of any theoretical modelling of the phenomena under discussion may be a crucial point of criticism for all those evolutionary biologists who are mainly interested in a quantitative description of these relations. From their critical point of view, major parts of the book are qualitative rather than quantitative in their argumentation. But, on the other side, it must also be stated that the author has succeeded in handling these phenomena of evolution by group selection without applying any complicated and cumbersome mathematical and statistical formalism.

Nevertheless, in a discussion on the problems of group selection, some of the most fundamental theoretical approaches and results at least have to be mentioned. Although many of these investigations are mainly related to applications with groups of interacting plants, the methodological approaches and results are of a general validity. A milestone are the papers of B. Griffing in his series "Selection in reference to biological groups" I–VI in the Aust J Biol Sci (1967–1969) and in Genetics (1976). These basic papers have not been cited in the present book.

These critical comments are of relevance only for those readers who are interested in the theoretical aspects involved in evolutionary processes by group selection. To all others, we can recommend this publication as a stimulating and worth reading book.

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Cunningham, D. D.; Long, G. L.: Proteases in Biological Control and Biotechnology. UCLA Symposia on Molecular and Cellular Biology, New Series, Vol. 57. New York: Alan R. Liss 1987. XIX + 326 pp., several figs. and tabs. Hard bound $ 100.00.

The UCLA (University of California, Los Angeles) symposia were initiated in 1972 and established very quickly a high reputation as an interdisciplinary forum for scientists working in the new and rapidly emerging areas of basic and applied biological research. Therefore, this volume is undoubtedly of interest to molecular and cellular biologists, microbiologists, biochemists, and molecular geneticists who are directly or indirectly involved in research on one of the many biologically important aspects of proteases. The chapters of the book (most of them are reprints from the Journal of Cellular Biochemistry) are grouped into sections which cover the following fields of research: hemostasis and thrombolytic therapy, evolutionary aspects of structure and function of proteases and their genes, the role of limited proteolytic processing in several biological control processes, the role of proteases in cellular interactions, in protein degradation and turn-over processes, and in human diseases resulting from altered controls on proteolysis. The last two sections focus on the control of protease activity by specific protease inhibitors, and on the genetic engineering of proteases and their inhibitors.

It is striking that not one of the contributions deals with proteases and protease inhibition as seen from a botanical or agronomical point of view, since several endopeptidases like trypsin, chymotrypsin, and elastase, which are important digestive enzymes in animals and microorganisms, are strongly inhibited by small plant proteins. These proteins are produced in tissues of diverse plant species either constitutively or in response to wounding, for instance, by larvae of plague insects or by nematodes. Introduction into crop plants of inhibitor-encoding DNA sequences supplied with, e.g., tissue specific or constitutive regulation signals has been shown to protect transgenic plants. This biotechnological aspect of the proteinase system, which might become important in agronomy, should have been included as a separate section in this volume.

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