Book Reviews

Social Behaviour in Animals

N. Tinbergen
Chapman & Hall, London, 1988
150 pages

This is a reprint of the second edition (1964) of a book first published in 1953. In the foreword G.P. Baerends comments that Tinbergen himself, shortly before his death in 1988, was uncertain whether this book should be reprinted, since some of the interpretations of behaviour no longer reflected his own views or those of modern workers. While this is true, everyone with an interest in animal behaviour will gain something from reading or re-reading this work.

Social behaviour is defined here as any interactions between two or more animals. Using examples familiar to European naturalists, though to most southern African readers known only from the literature, Tinbergen discusses mating, family and group life, and fighting. Primates are hardly mentioned, but of course in 1953 they had scarcely been studied. Later chapters provide some analysis of the behaviour patterns, and here the text may seem dated to the modern reader. Interspecific interactions, and the development of social behaviour in the life of an individual and in evolution are also dealt with. Thus in eight short chapters all the important issues in social behaviour are touched on, and we are still trying to answer many of the questions which he posed.

Tinbergen's style of research was to observe, ask questions, and then try to find answers, often by means of experiments in the field. His approach to his investigations remains a valuable guide to any student of behaviour, and the concluding chapter on 'hints for research' is a reminder of how often the basic precepts are still neglected. Tinbergen stressed the importance of the written account of any piece of research, and advised that 'Simplicity and straightforwardness of language are essential; not only to the reader but also to the author;'. He certainly followed these rules, and all who read scientific papers, especially editors, will wish that more authors would follow his example. Above all, Tinbergen reminds us of the fascination with living animals which leads people to become zoologists. I must let him have the final word: 'The animals themselves are always more important than the books that have been written about them'.

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Plankton Ecology. Succession in plankton communities

Edited by U. Sommer
Springer-Verlag, New York, 1989
x + 369 pages
Price: DM 198

One seldom gets the opportunity to review a book dealing precisely with one's particular interest in a speciality field. I was therefore delighted to receive this volume, which far exceeded my initial expectations of coverage and penetration. Its emphasis almost throughout is analytical rather than descriptive, as it attempts a detailed and comprehensive coverage of causal mechanisms involved in plankton succession, broadly following the trophic cascade through phytoplankton, zooplankton and bacterioplankton. Inclusion of the latter is particularly welcome: bacteria have been disregarded not only in treatments of plankton succession, but more generally as constituents of the plankton. Although the editor's short preface states that the book is written for limnologists, marine biologists, and general ecologists, it also acknowledges that the book was written by limnologists. The treatment and emphasis accordingly is principally but not exclusively freshwater; reference to marine plankton is rather stronger for phytoplankton than zooplankton.

The volume begins with a short introductory chapter ('Toward a Darwinian ecology of plankton'), in which the editor sets the background to and perspective for the volume. This is followed by eight chapters by prominent established or emerging plankton ecology experts, each dealing with particular attributes of the successional phenomenon. References are cited for each chapter, and the volume closes with a short index. Conclusions are given for most individual chapters, but these understandably do not substitute for an overall integrated synthesis, which unfortunately is not attempted.

Chapter 2, 'Physical determinants of phytoplankton succession', by C.S. Reynolds, is a masterful and terse synthesis and analytical treatment of the physical properties of the aquatic environment. In less than 50 pages, Reynolds accomplishes a rigorous mathematical description and assessment of relevant abiotic influences, incorporating many recent advances in hydrodynamic understanding. In my view, as a mathematically-intimidated limnologist, this chapter provides a remarkable (almost quantum leap) improvement in mathematical tractability and consequent formal predictability of the nature and strength of influence of a wide array of abiotic variables which determine phytoplankton succession. The chapter clearly reveals the predictive rigour which has entered this scientific discipline, and holds out considerable promise for more and better analysis of complex interactions, at least at the physical and biological interface of limnology or oceanography. Chapter 3, by U. Sommer, addresses 'The role of competition for resources in phytoplankton succession'. Here too, the subject matter is treated in a strongly analytical manner, and incorporates predictive models. R.W. Sterner considers 'The role of grazers in phytoplankton succession' in Chapter 4, which deals with both direct and indirect effects of predation on planktonic algae. Mathematical models which explore the effect of grazer mediated nutrient regeneration on phytoplankton growth provide important new perspectives in regard to indirect effects. E. Van Donk reviews 'The role of fungal parasites in phytoplankton succession' in Chapter 5. Traditionally, this factor has been ignored or disregarded in favour of physicochemical and predatory influences. Thus an information deficiency exists in regard to its

influence. Despite the inherent difficulties in quantifying its effect, fungal parasitism is revealed to exert a significant selective mortality on planktonic algae, and thus successional change.

Chapter 6 by W.R. DeMott considers 'The role of competition in zooplankton succession'. The significance and even existence of competition among zooplankton has been contentious. DeMott assembles and analyses a wealth of disparate and often contradictory evidence, which is objectively and analytically assessed in regard to competition theory. The dynamic, seasonal environments which are the home of most plankton assemblages, ensure that assessments of competition both in phytoplankton (by Sommer) and zooplankton (by DeMott) are especially relevant to wider, general considerations of this ecological process in non-equilibrium conditions. Accordingly, the evidence assembled here from plankton studies is especially helpful in the wider ecological debate. Z.M. Gliwicz and J. Pijanowska deal with 'The role of predation in zooplankton succession' in Chapter 7, which provides a succinct and perceptive account of both visual and tactile predation in successional changes, and considers both direct and indirect effects.

The final chapters of the volume deal with bacteria. Chapter 8 by C. Pedrós-Alió, entitled 'Toward an autecology of bacterioplankton' approaches the issue of ecological succession with reference to bacterioplankton guilds, rather than taxonomic species, the routine identification of which presently poses intractable difficulties in mixed natural assemblages. This novel approach underscores the functional diversity and thus importance of bacteria in plankton communities, and clearly justifies the utility of this non-taxonomic treatment in providing a first assessment of successional events and their regulation among these prokaryotes. The final chapter by H. Güde considers 'The role of grazing on bacteria in plankton succession'. This chapter, like its predecessor, deals with ecological events or processes which mostly have been discerned or quantified only with the introduction of new methodologies. While the treatment of bacterioplankton is thus in its scientific infancy relative to corresponding studies of phytoplankton and zooplankton, both chapters reveal how far the ecological understanding of plankton has matured into a quantitative analytical discipline.

The volume is a sequel of sorts to the international Plankton Ecology Group's successional model published in 1986. The authorship of the present volume includes only Sommer and Gliwicz among the original 33 named contributors to the PEG model. The 'old' and 'new' authors have undoubtedly produced a volume that succeeds in its objective of emphasizing mechanisms rather than mere descriptions of successional sequences, and provides a good quantitative and wider predictive capability of such events. Objective scrutiny of the volume leads to the inevitable conclusion that organization of plankton communities cannot be envisaged exclusively in terms of top-down (predator-driven) or bottom-up (resource availablilty) controls, as has unfortunately become fashionable among certain 'biomanipulation' schools. The role of direct and indirect influences, and their interaction, are furthermore revealed as mutual determinants of the population and community ecology of plankton organisms. The volume exposes the wealth of dynamic, quantitative and experimental data which are available from plankton studies, and which are clearly in need of more general integration into modern ecology. Accordingly, I unreservedly recommend the volume to all plankton ecologists, and further believe that it that should find relevance and appeal to a wider spectrum of ecologists, despite its seemingly specialized nature.

On the whole the book is well produced, and by contemporary standards, reasonably priced. Typographical errors are regrettably quite numerous, however, but on the whole do not seriously impact the book's comprehensibility. Several citations are omitted from respective chapter reference lists (e.g. Chapter 1). Figure quality is somewhat variable, with a curious duplication of Figure 7.4 as Figure 7.11. But these are minor detractions from the volume as a whole, which is enormously rich in up-to-date factual information and synthesis, which for the most part is clearly and well presented by the contributors, who collectively with the editor merit commendation. Despite its seeming speciality, there is much in the volume for serious senior undergraduate and Honours level students. I am certainly greatly pleased to add this volume to my shelves, and expect to use it frequently.

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Intrazooplankton Predation

Edited by H.J. Dumont, J.G. Tundisi & K. Roche
Kluwer Academic Publishers, Dordrecht, 1990
242 pages
Price: US $150.00

In keeping with the Developments in Hydrobiology Series which comprise hardbound reprints of selected thematic issues of the journal Hydrobiologia, this 60th volume in the Series is a reprint of Hydrobiologia Volume 198, based on the proceedings of a conference on intrazooplankton predation in fresh waters, held in Brasil in mid 1989. The volume starts with a brief editorial preface, and closes with an epilogue summarizing final round-table discussions. A concise subject and systematic index is included. The bulk of the volume comprises contributed (and according to the editors, some invited) papers, which are arranged into six sections. The first, a General Articles section of five papers deals with mixed predator impacts and effects on communities, and other general topics. The remaining five sections are devoted to predatory issues associated with defined taxonomic assemblages: Flatworms (four papers); Branchiopods (two papers); Copepods (six papers); *Chaoborus* (two papers); and Water Mites (one paper).

One of the objectives of the conference was to consider whether aspects of invertebrate predation differed between the tropics and the temperate zone, although only one paper specifically addresses this issue. This is a review by Fernando *et al.* suggesting that both the diversity and abundance of predatory zooplankters is lower in tropical lentic than in temperate waters. This assessment might variously be viewed as courageous, or foolhardily premature, given the limited data available on aquatic invertebrate predators and predation in tropical waters. But to my mind, the resulting exposure of a deep controversy about the nature and diversity of predators, and the factors likely governing this assemblage in tropical waters, is a most significant contribution emerging from the volume. Those involved in limnological studies of tropical and subtropical waters can only capitalize on the investigative opportunities exposed by this controversy. The volume as a whole, and this review and the epilogue in particular, emphasize the need to expand and greatly improve our qualitative and quantitative factual knowledge and understanding of invertebrate predation in fresh waters. Without this, balanced perspectives on the issue of tropical versus temperate predation will not emerge. Yet it is also apparent from the volume that important details of predation are lacking in regard to temperate waters also. For instance, the

revelation by Dumont and co-workers (among others) that Typhloplanid flatworms (unseeming pelagic planktivores), and less unexpectedly, water mites, exert highly significant predatory impacts on aquatic invertebrate communities, exposes a new dimension to the entire field. The possibility that these predators are perhaps more prominent in tropical than temperate waters is very significant, but incidental to the argument at hand. The real issue is the relative immaturity of our understanding about invertebrate predation in planktonic communities generally, if not particularly in tropical waters. If the volume achieves nothing more than to dispell any suggestions that the complex, multifactorial, and interactive issue of aquatic invertebrate predation is adequately understood, I believe it will have served a useful purpose.

The contributed papers essentially comprise three categories — descriptive field studies, laboratory studies, and manipulative outdoor experiments. The volume is, however, short on synthetic reviews, and narrow in coverage of certain issues, such as predator avoidance mechanisms, which are specifically addressed (by title) in only one contribution, but nonetheless feature in several. Such are the almost inevitable limitations of a volume based on offered rather than solicited contributions, of which I could identify only one (Herzig & Auer's analysis of *Leptodora* predation in Neusiedler See).

Quality of the papers is understandably somewhat variable, but on the whole a good standard is maintained, with some elegant analytical approaches to circumscribed problems. The fact that English is not the native tongue of many of the contributors perhaps explains some of the typographical errors such as carapax (for carapace: p. 103). However, introzooplankton, tropixal, and perhaps Lake Baical, are particularly unfortunate oversights in a short (two page) editorial preface, jointly authored by the editor in chief of Hydrobiologia. In subsequent contributed papers, authors' addresses are curiously duplicated (Parejko & Dodson: p. 51), or mis-cited (Canter of Water Resources: p. 91), while several violations of taxonomic conventions came to my attention. Thus high rank taxa are italicized (Rhabdocoela and Cladocera: p. 79), while the genus *Volvox* is not (p. 121). Specific names are capitalized (*Bosmina Coregoni*: p. 163), while *Keratella quadrata* (pp. 170, 172, 174, 180) is repeatedly cited as *Keratella Quadrata* in one of the papers (pp. 153, 157, 160) which also refers to *Ceriodaphnia Quadrangula* (p. 154). A new Q-code, perhaps? Anyhow, this inconsistency also exposed the inadequacy of the systematic indexing, at least in regard to *K. quadrata*, which only 'captured' this taxon at pp. 2, 120 and 121, whereas my superficial scrutiny revealed at least seven additional citations in just two papers. Intelligibility of the volume is not impaired by these errors, but they do collectively suggest that attention to detail is prejudiced in the pressured world we occupy.

Overall, the volume is a useful contribution to the field, and should be consulted by anyone embarking on studies of predation in aquatic environments. It will be a useful companion volume to Zaret's 'Predation and freshwater communities' (1980), and 'Predation: Direct and indirect impacts on aquatic communities' (1987); the latter, under Kerfoot & Sih's editorship was written by a rather different set of contributors to those of the present volume, which thus brings some new perspectives, particularly in regard to austral and tropical issues. However, being a reprint of a widely held journal, I suspect that only few will wish to outlay the not inconsiderable purchase price for this attractive volume.

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