BOOK REVIEWS

thing, because it renders land more scarce, and, thus, more valuable and worthy of investment. So long as there are market opportunities available and reasonable security of land claims, then demographic growth might produce a virtuous circle of improvement and of intensification.

Tarkana Herders of the Dry Savannah

Mainguet's book straddles the two. Through much of the text, the changing water levels in Lake Chad gets too tough, with the poorer and marginal households regularly being 'sloughed off' in years of crisis, but they are rarely able to come back. Aridity: Droughts and Human Development takes a much broader view of drylandss

Aridity: Droughts and Human Development

Much is made of the damage done by 'overgrazing' around bore-holes, but the evidence is produced which shows that, in Senegal, grassland productivity is highest in areas

and the trampling of soils by herds. Mainguet's book straddles the two. Through much of the text, the changing water levels in Lake Chad has demonstrated the great capacity of Sahelian farmers and herders to respond to improved profit margins. The translation from the French leaves much to be desired, there are numerous errors with technical terms and many cumbersome sentences.

I was really looking forward to the section called 'What is really happening?', which I hoped was going to bring me up-to-date with evidence on the incidence and rate of degra-
dation in different dryland regions of the world. However, this section merely repro-
duced much of the United Nations Environ-
ment Programme (UNEP) statistics on areas suffering from different forms of degradation, which have come in for detailed and justifi-
able criticism. With an appetite whetted by the interesting questions posed at the start of the book, I was left rather unassuaged at the end. Thus, these books provide contrasting perspectives on dryland peoples and their prospects, and demonstrate the difficulties of making general statements about the diverse settings, processes and people who try to make a living in these challenging environments. The Tarkana study will probably be of most interest to an aca-
demic audience, keen to untangle the com-
plex relationships between environment, health and patterns of socio-economic organization. But, its detailed approach would be difficult to replicate in other dry-
land areas. Aridity will be of value to those

physical geographers who want a survey of the main geomorphological processes under way in arid areas of the world. How-
ever, the book demonstrates the dangers of trying to make generalizations about highly
diverse situations.

Camilla Toummin

Gender and Sexual Dimorphism in

Flowering Plants

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gender dimorphism is a major theme of the book. Another topic that receives considerable attention is the evolution of dioecy. Theoretical models indicate that to understand the evolution of separate sexes from combined sexes requires an understanding of several key factors, of which the fitness consequences of selling and outcrossing, the sexual system is probably the most important, and the optimal allocation of resources to the two sex functions are most important. Several chapters review progress made in determining the pathways by which dioecy has evolved, the selective mechanisms involved and the ecological correlates of gender dimorphism.

The main strength of this book lies in the extensive literature that is reviewed, and in the diversity of approaches brought to bear on how and why gender dimorphism has evolved in plants. Two chapters deal exclusively with theoretical models on the evolution of dioecy and sexual dimorphism (D. Charlesworth, M. Geber, respectively), while eight others review empirical data and observations on biogeography and phylogeny (A. Saka and S. Weiler), evolutionary pathways (C. Webb), ecology (V. Eckhart; L. Delph, and J. Agren et al.), physiology (T. Dawson and M. Geber) and genetics (S. Grant; T. Meagher). Most chapters provide a thorough synthesis of the literature, but few present original experimental data or significant new ideas not already in the primary research literature. However, this is not necessarily a bad thing because information on plant gender is remarkably scattered among diverse journals and having it available in one source is a major benefit of this work.

Are there any important topics that are not covered in this volume? In general the editors have done an excellent job in providing broad coverage, however, a few areas could have been strengthened. One conspicuous omission is the complete absence of phylogenetic trees depicting the evolutionary history of gender dimorphism and traits associated with its evolution. To an outsider this might appear surprising given the plethora of trees appearing in the plant literature and considering the fact that dioecy was one of the first traits that was ever subjected to a thorough historical analysis in Donoghue’s important paper on evolutionary sequences published over a decade ago. Several chapters sing the praises of the phylogenetic approach, but without providing much solid evidence that reconstructing history has as yet provided many insights that were not already evident from microevolutionary investigations. Part of the problem here lies in the uncertainties in tree construction, the lack of resolution in molecular trees at the species level and problems with character mapping. Perhaps in another decade, phylogeny will have fulfilled the early promises of its staunchest advocates.

A related topic that is not covered in much depth is the issue of how often dioecy evolves via the monoecious versus gynodioecious pathways. Here, phylogenetic information has proven useful. A recent analysis of the monoecy/dioecy/monoecious challenges an earlier claim that because monocious and dioecious are often associated within genera the shift from monoecy to dioecy is probably made by a route by which dioecy evolves. How distinct the pathways to dioecy always are and how often changes in gender are governed by major versus minor genes are central to resolving this issue. It is also significant that, in this book, sparse attention is paid to the role of nuclear–cytoplasmic interactions in controlling gender expression given their importance. A large effort has been made by French and Dutch workers over the past two decades in understanding these interactions in Thymus and Plantago, respectively. Little of this work is discussed in this volume or in more recent studies on the role of meta-population dynamics in the maintenance of these sexual systems.

Plants provide experimental biologists with outstanding opportunities for field studies through the use of clonal material, the experimental manipulation of sex phenotypes and the application of genetic markers for measuring mating parameters. Much of the empirical data reviewed in this volume come from correlative studies and it seems probable that future research will involve a greater emphasis on testing theoretical models through the use of manipulative field experiments. Fortunately, one of the strengths of this book is that it provides plenty of guidance on the important questions that need to be addressed and guarantees that plants with gender dimorphism will continue to attract an disproportionate amount of attention in spite of their relatively low frequency among flowering plants.

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Fish and chips
Quantitative Fish Dynamics by T.J. Quinn, II and R.B. Deriso
Oxford University Press, 1999. 570+50 index (xxv + 542 pages) ISBN 0 19 507633 1

Modelling of fish population dynamics has advanced and diversified immensely in the past few decades. In both theoretical and practical applications, model complexity has increased, to a large extent spatially and temporally. Traditionally, fisheries management has often been based on empirical observation and experience, with limited empirical data and a few exceptions. More recently, sophisticated mathematical models and computer simulations have been applied to estimate fish population parameters by incorporating more diverse types of data, and by accounting for differing error structures and uncertainty in models and data. Methods of quantitative decision analysis have also been applied to account, more rigorously, for uncertainty in the use of models and data for the provision of management advice. The advances represent syntheses of diverse theory, methods and data, and have fuelled increasing sophistication in the application of population modelling within fishery management settings. Quantitative Fish Dynamics should provide additional, valuable syntheses of diverse theory and methods, deepening our understanding of their properties and enabling rigorous applications of the management models. The book covers a broad spectrum of the recent developments in quantitative fish dynamics, provides considerable theoretical and mathematical depth, and provides an excellent synthesis for many of these diverse developments. However, with its high level of mathematical detail the book might not be for the numerically lant-hearty.

In other recent books dealing with quantitative fish dynamics, many of the general theories and methodologies have been reasonably well covered. These books have provided relatively simple conceptual descriptions of the key models and the most elementary parameter estimation methods (e.g. linear regression and least squares for non-age-structured, delay-difference and age-structured models). However, several major advances are poorly covered by previous books, especially advances in surplus production models, age- and size-structured models, spatially explicit models and methods for parameter estimation. For example, one recent book’s Suppose and misinterprets some of the models in the Popper-Tomlinson model, a well-known generalised surplus production equation.