Books

Patchy communities in North America

Savannas, barrens and rock outcrop plant communities of North America

Ed. by Roger C. Anderson, James S. Fralish and Jerry M. Baskin.
470 pages. Cambridge, UK : Cambridge University Press, 1999. £70.00 h/b. ISBN 0 521 57322 X.

Begin with North America's native terrestrial vegetation. Then take away forest, prairie, desert, tundra, and most of the other large continuous communities that are considered the dominant types in their climatic zones. Then, roughly speaking, you are left with the subject matter of this unusual book. Each of its 26 chapters describes one of the continent's unusual plant communities, whose distribution is governed by some combination of a specialized microclimate, fire dependence, or a distinctive substrate such as sand deposits, limestone, shale, granite or serpentine. Except for some of the western savanna types that are more climate-determined and less strongly dependent on fire or substrate, the plant communities described in this book are united by being patchy in space and/or discontinuous in time.

Each chapter gives a thorough description that includes distribution, floristics and structure, parent geology and soils, historical development, fire and other ecosystem processes, fauna, and conservation status. Verbal descriptions are complemented by maps, data tables, and lists of characteristic and endemic species. Primary literature is abundantly referenced, and includes much obscure material that would be difficult for a newcomer to find. Although the emphasis is strongly descriptive, the information is placed in relevant conceptual contexts determined by the authors' interests; examples include patch and metapopulation dynamics, community dissimilarity, soil processes, successional models, and adaptation to stressful environments. The authors are clearly authorities on their respective communities, and the chapters are uniformly clearly written and informative.

The 26 communities include ones that are fairly well protected by their low economic value (western serpentines, Appalachian shale barrens), ones so nearly gone that their description is largely a historical exercise (midwestern savannas on deep soils, southeastern pine savannas), and many that are the subject of active conservation efforts (the most intense case being Florida scrub). Fire suppression is second only to habitat conversion as a cause of endangerment for these communities as a whole, and many chapters emphasize fire ecology and management. Exotic species appear to be a surprisingly minor problem in most cases, perhaps reflecting the specialized abiotic conditions that foster these communities. Overall, the book conveys a refreshing sense that the continent still harbors considerable diversity within its less spectacular plant communities.

The editors could perhaps have selected their topics around a theme such as fire or substrate dependence. Why include ponderosa pine woodland and California oak savanna, which are widespread, late-successional, and intergrade with closed forest? Why include eastern shrub communities but not western chaparral? The lack of a conceptual theme makes it hard to envisage teaching a course from this book. But I look forward to having it on my shelf so that whatever region of North America I visit, detailed information on its more interesting plant communities will be easy to find. The book may also benefit researchers looking for patchy plant communities to study.

Susan Harrison
Director, UCD Natural Reserve System,
UC Davis, One Shields Avenue,
Davis, CA 95616, USA
(tel +1 530 752 7110; fax +1 530 752 3350;
e-mail spharrison@ucdavis.edu).

Fungal population biology

Structure and dynamics of fungal populations

Ed. by James J. Worrall.
xii + 348 pages. Dordrecht, The Netherlands: Kluwer Academic Publishers, 1999. £112 h/b. ISBN 0 412 804301 1.

Weir & Weir (1998) state that 'mycology is probably the most challenging hobby we have ever attempted' and, on reading *Structure and dynamics of fungal populations*, the study of fungal populations must be arguably one of mycology's most demanding aspects. Problems in quantifying fungal populations arise partly because of, as James J. Worrall writes (p. 176), 'the mycelial nature of fungi, indeterminate growth and habit of being dispersed and immersed in the substratum'. He continues that most population models were designed for discrete organisms that can be counted relatively easily 'such as deer, thistles and even bacteria'. The potential fungal population biologist should not despair, however. This book shows that it is possible to study fungal populations, depending on the objectives, as numbers of genets, biomass or

numbers of lesions. Rather than population size, mycologists have emphasized the genetic structure and variation of fungal populations, both subjects which are well represented in this book.

This is a multi-authored volume, commissioned as volume 25 in the Population and Community Biology Series, comprising a preface and thirteen chapters. The first chapter, entitled 'Brief introduction to fungi' is by the Editor and outlines fungal growth-form and life cycles, including the importance of asexual reproduction and parasexuality. Worrall, in writing 'in most true fungi meiosis is zygotic and the somatic thallus is haploid' (p. 12), contrasts the persistence of haploidy in fungi with the somatic nuclear conditions of most other eukaryotes, a point also made by Mark Ramsdale in Chapter 7 ('Genomic conflict in fungal mycelia'). The authors of Chapters 2–4 tackle some of the current large questions in biology with particular relevance to fungi: what are the benefits of indeterminate growth? ('Defining individual fungal boundaries' by Alan D. M. Rayner *et al.*); what is a species? ('Defining species in the fungi' by Thomas C. Harrington and David M. Rizzo); what is the evolutionary advantage of sex, particularly, why do fungi not have sex more often? ('The evolution of sex and recombination in fungi' by James K. M. Brown). Chapter 5 is 'Gene flow in fungi' by Scott O. Rogers and Mary A. M. Rogers.

I was particularly interested in Chapter 6, 'Somatic incompatibility in fungi' by Mary Malik and Rytas Vilgalys. The authors highlight several gaps in current research just waiting to be examined, including the relationship between somatic incompatibility (SI) and laccase and peroxidase activity (p. 127), and the hypothesis that prevalence of SI should be greater in K-selected fungi than r-selected species if SI enables strains to restrict the area of resource colonized by incompatible genotypes (p. 133). I also enjoyed reading that the visible lesions of *Rhytisma* species probably represent discrete genets (Chapter 8, 'Fungal demography – mushrooming populations' by James J. Worrall), allowing application of the logistic equation of population growth to such data commonly collected in plant pathology, as used previously by van der Plank (1963). In Chapter 8 too, the matrix models used to simulate some of the population dynamics of a typical woodland polypore and the effect of harvesting fruit–bodies on the mycelia and basidiospores of *Cantharellus formosus* were informative.

Subsequently the book moves to the population structure of specific taxa. Chapter 9 by André Drenth and Stephen B. Goodwin, 'Population structure of Oomycetes' is concerned with a group historically studied by mycologists but now placed in the Kingdom Stramenopila (Berbee & Taylor, 1999). James C. Correll and Thomas R. Gordon in 'Population structure of Ascomycetes and Deuteromycetes' use as examples the anamorph of *Magnaporthe grisea*, *Fusarium oxysporum* and *Colletotrichum* species. Everett M. Hansen and Richard C. Hamelin, the authors of 'Population structure of Basidiomycetes', use mainly pathogenic wood-colonizing Homobasidiomycetes and rust fungi as representatives of very different genetic population structures within the Basidiomycota. The penultimate chapter, by Michael M. Milgroom, concerns fungal viruses which have profound effects on the phenotypes of their hosts. Finally, 'Fitness, continuous variation and selection in fungal populations: an ecological perspective' is by Clive M. Brasier. This is a very readable and thought-provoking account of the importance in fungal population studies of assaying continuous characters, such as hyphal growth rate, in order to integrate these measurements with the range of precise genetic markers (e.g. isozymes, RAPDs, virulence or resistance genes) to understand aspects of fitness and selection. On this basis, Brasier writes (p. 311) that 'the remarkable fungal growth process' (which has been cited by others as one of the handicaps in fungal population biology) 'is…a gift to the fungal population biologist'. This statement should further inspire the potential fungal population researcher.

In summary, this is a somewhat eclectic collection of chapters, but this may be inevitable, since the book attempts to integrate from the allele to systems models, using examples taken mainly from plant pathology and wood-decomposing fungi. The Editor has fulfilled his aim to relate aspects of fungal population biology to biology as a whole. This book would be useful to a wide range of readers, from researchers in mycology or population biology to the motivated undergraduate; it is quite expensive, but perhaps this is the price one has to pay to be presented with high-quality review chapters. After all, few books deal specifically with fungal population biology and this one definitely repays close study.

Clare H. Robinson
Division of Life Sciences, King's College,
University of London,
Franklin-Wilkins Building, 150 Stamford St,
London SE1 8WA, UK
(tel +44 20 7848 4352; fax +44 20 7848 4500;
e-mail clare.robinson@kcl.ac.uk).

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Children's global change

A Leaf in time

By David Walker.
32 pages. London, UK: Portland Press, 1999. Price £6.99 p/b. ISBN 1 85578 097 6.

Nine and three quarters out of ten – a high assessment for this book from Alexander, age 10 years, in the centre of the target audience. *A Leaf in Time* is a lucid account of the contribution that plants make to the global carbon economy, and introduces such concepts as photosynthesis, respiration, fossil fuels and global warming. This is framed in the form of a story – having covered the development of

our present oxygen-rich atmosphere from its beginnings, plants are shown to be the key to future stabilization of that atmosphere in the face of current, massive energy consumption by humans. There is constant referral to the 'real world' of a 'recycle your bottles' nature – exactly what will sustain the interest of children.

The subject matter is serious, and the author and editor do not shy away from difficult concepts and issues. In addressing the 7 to 11 age range successfully, great care has clearly been taken to get the pitch of the text right. Books like this are vital for the future of plant science, in stimulating the interest of young people at a time just before their interest in particular subjects begins to be channelled along different academic streams. It is also an important book for improved public understanding of science and the environment. The message that the book sets out is so well put that, if they would only pick it up, many politicians would find the clarity that the text brings refreshing and informative.

But the book is also fun: returning to that nine-and-three-quarters assessment, highlights included the primeval soup picture, the humorous captions and the useful phonetic pronunciation of scientific terms. The front cover was also popular. As is so frequently the case with children's books, the production values are outstanding. Buy it for your children and they might just become hooked.

Jonathan Ingram
Managing Editor

Techniques in plant virology

Practical plant virology: protocols and exercises

By Jeanne Dijkstra and Cees P. de Jager.
459 pages. Berlin, Germany: Springer Verlag, 1998.
£57.00. ISBN 3 540 63759 1.

There is an increasing number of laboratory manuals, but this is the first since 1973 on plant virology. It is aimed at students and teachers, and research workers in plant virology, plant pathology, plant breeding and microbiology, and covers a comprehensive selection of techniques ranging from biological characterization to molecular characterization of plant viruses. Each chapter (part) and section thereof has a good brief introduction on the theory behind the techniques, followed by a set of protocols and exercises. The protocols deal in detail with the experiment in question and the authors often give tips and troubleshooting pointers. The exercises are for student classes and raise questions for the students to consider. The is a well laid out book, robust enough for class and lab use, with ring binding and a useful cover which can act as a bookmark.

However, I have two reservations about this book. First, safety is of paramount importance in any laboratory. Safety issues are identified at various points but are not at others (e.g. use and disposal of organic solvents such as choloroform and carbon tetrachloride). I would have liked to have seen more emphasis placed on safety issues, especially as this manual should be of great use in developing countries. For it is developing countries which are in the greatest need of the technologies described here, since they urgently need to train people to handle agricultural constraints to their future food security. There is an element of recognition of this need in that several tropical viruses (e.g. rice tungro viruses, tomato yellow leafcurl virus) are included in the protocols, but there is a preponderance of temperate viruses. As well as having difficulty in getting hold of these viruses (especially with quarantine restrictions), teachers and researchers in developing countries more importantly require access to information on the properties of the viruses they might meet. I would have liked to have seen a list of sources of viruses and also of relevant information, especially frequently updated websites. In this age of information technology the computer is an important lab tool.

I recommend this book for teachers and scientists involved in plant virology in both industrialized and developing countries, but I hope that if there is another edition it will include lists of sources of basic information.

Roger Hull
69 The Street, Old Costessey
Norwich NR8 5DD, UK
(tel +44 1603 743 691; fax +44 1603 742 279)