

Book review

S. E. SMITH & D. J. READ: Mycorrhizal Symbiosis (second edition).

Academic Press, Inc., 525 B Street, Suite 1900, San Diego, California 92101-4495, USA, 1997, 605 pp., ISBN 0-12-652840-3.

More than one hundred years is the term symbiosis (developed by de Bary) used for mutually beneficial associations between dissimilar organisms and in this sense it is used in this book. Importance of symbioses between different prokaryotes in evolution of eukaryotic cells are now generally accepted by scientists.

The mycorrhizal symbiosis is important ecologically as well as economically because fungi are often members of symbioses. Mycorrhizal symbioses and associations which result are lichens form large symbiotic spectrum in nature. It is reason why reedition of this book is so important.

Text of this book is divided into five sections. First section is dedicated to vesicular-arbuscular mycorrhizas (types of symbionts, colonisation of roots and their anatomy, genetics and molecular interactions, growth and carbon economy, mineral nutrition, heavy metal accumulation etc.). Second section is focused on biology of ectomycorrhizas and ectendomycorrhizas. Special types of mycorrhizas (mycorrhizas in the Ericales and orchids) are reviewed in third and fourth sections.

In fifth section general themes such as uptake, translocation and transfer of nutrients in mycorrhizal symbioses, their roles in ecosystems, economical importance (e.g. forest production and agriculture) are discussed.

"Mycorrhizal symbiosis" is valuable book not only for mycologists but for all people in the plant sciences.

M. BAČKOR

Book review

S. L. STEPHENSON & H. STEMPEN: *Myxomycetes: a handbook of slime molds.*

Timber Press, Inc. The Haseltine Building 133 S.W. Second Ave., Suite 450 Portland, Oregon 97204-3527, USA, 1994, 183 pp., ISBN 0-88192-277-3.

Four groups of organisms with naked, protoplasmic stages have traditionally been allied to the fungi: plasmodial slime molds (myxomycota), the cellular slime molds comprising the acrasids (acrasiomycota) and dictyostelids (dictyosteliomycota) and plasmodiophorids (plasmodiophoromycota). They have affinities with some of the protozoa.

As it is shown, the term slime mold has been applied to two rather different groups of organisms. Cellular slime molds are single-celled predators of bacteria and only about 60 species are known to science. Plasmodial slime molds are "true" slime molds and form text of this book (Myxomycetes).

Myxomycetes are a small, relatively homogeneous group of eukaryotic organisms with about seven hundreds species. This book is nice piece of work divided into seven chapters. It can help anyone in study of beauty and diversity of myxomycetes.

Myxomycetes are really little known group of organisms and this book can help us obtain any information from slime mold biology and ecology (e.g. definition of Myxomycetes, their life cycles, types of fruiting bodies and plasmodia, distribution, collection, culture...). It can be used as field guide too. Important part of this book is focused on classification and identification, or descriptions of species respectively.

Colour plates (watercolour portraits), photos, figures are important and valuable part of the book. References, glossary and index complete it.

Although study of myxomycetes is not wide-spread between professional and amateur mycologists, similar books are very important and unfortunately not generally available.

M. BAČKOR

Book reviews

E. HANSEN & G. HARPER [eds.]: Differentially Expressed Genes in Plants: A Bench Manual

Taylor & Francis Publishers, London, 1997, 139 pp., ISBN 0-7484-0421-X.

The manual provides a description of new techniques for cloning of differentially expressed plant genes and is of wide use in many biological areas. The presented techniques are used in order to gain information on how the plant gene expression is regulated during development or how plant cells respond to various endogenous and exogenous stimuli.

The first six chapters describe methods of isolation and identification of genes such as differential screening, subtractive cDNA cloning, differential display of mRNA, the yeast two-hybrid system, T-DNA gene tagging and two dimensional polyacrylamide gel electrophoresis-based analysis. All these chapters contain reliable protocols. The scope and limitations of the presented methods are discussed, and references are supplied. The last chapter brings an overview of strategies and techniques for further analysis of differentially expressed genes.

This book builds on standard molecular biology manuals and provides new techniques extending the possibilities for biologists in academic and commercial institutions. It enables the researches to choose the methodology that best addresses the problem.

E. ČELLÁROVÁ

DOUGLAS J. FUTUYMA: Evolutionary Biology (third edition).

Sinauer Associates, Inc., P.O.Box 407, Sunderland, Massachusetts, 01375-0407 U.S.A.
e-mail: publish@sinauer.com

The predecessor of this book were author's lectures for advanced undergraduate and beginning graduate courses. It was found to be useful not only for students but also for biologists in other fields as an entry into the evolutionary literature.

The author has provided simpler but often longer explanations, especially of basic principles; has presented extended examples of observations and experiments that should serve not only to incarnate concepts but also provide detailed evidence and to illustrate the methods of evolutionary science.

The exposition in this edition begins with phylogeny and patterns of historical evolution (part II), turns then to evolutionary processes (part III), and after treating character evolution (part IV), returns to macroevolution considered in the light of the theory of processes (part V).

Several parts of this book (especially chapter 5, 6, 9-16, and 23-25) treat the core of evolutionary biology. Other parts (chapter 7, 8, 17-22, 26) deal with special aspects of evolutionary history and the evolutionary aspects of various biological disciplines such as physiology, ecology, behavior, molecular biology, and human biology.

Very often, in treating a particular topic, the author has first described the theory, and has then provided one or more examples of studies that have been done to test the theory.

The four chapters in part I provide important foundation for studying evolution. Chapter 1 introduces the field of evolutionary biology. It describes the ways in which centuries-old ways of thought were challenged and altered by Darwin's evolutionary theory.

One of the important lessons of evolutionary biology deals with the characteristics of organisms that cannot be fully understood except in the light of their history. The same applies to any field of human endeavor, including the study of evolution. Chapter 2 sketches the history of evolutionary thought. It describes the earlier beliefs against which Darwin and his successors had to contend, alternative evolutionary theories that we now believe are erroneous, and the formulation of modern evolutionary research. It provides a useful summary of the principles of evolutionary theory that were formulated about 50 years ago, principles that form the foundation of most contemporary evolutionary theory research.

All of biology converges in evolutionary biology. Knowledge from all the biological disciplines is relevant to understanding evolution; conversely, evolutionary analyses can illuminate all the fields of biology. Thus some background in all the biological disciplines can be useful in studying evolution. Chapters 3 and 4 provide background on genetics, development and ecology, for some knowledge of these fields is not only useful, but also indispensable, to the study of evolution.

Part II describes major patterns of biological diversity, the evolutionary history that has given rise to these patterns, some of the methods and evidence used to ascertain this history, and many sources of evidence for the historical reality of evolution. Understanding the *causal processes* of evolution that have generated these patterns will

require that we closely examine genetic and other processes within and among populations and species; these processes are the subject of Part III (chapter 9-16).

Part IV deals with character evolution. Mutation, recombination, gene flow and isolation, genetic drift, and various forms of natural selection are subjects of chapters 9-14. Chapters 5, 15 and 16 discuss slightly less general principles of cladogenesis and speciation.

Part V is devoted macroevolution: evolution above the species level.

I regard this excellent book as useful as a foundation for students who expect to draw on evolutionary biology in their professional careers. However, it is also accessible and informative for students who do not expect to become biologist.

P. KUŠNIRIKOVÁ

A. VONSHAK [ed.]: *Spirulina platensis (Arthrospira)* Physiology, cell-biology and biotechnology.

Taylor & Francis Ltd, 1 Gunpowder Square, London EC4A 3DE (UK), 1997, X+233 pp., ISBN 0-7484-0674-3 (cased).

Microalgae can be used as sources of chemicals and biochemicals (e.g. rare polyunsaturated fatty acids) as well as for food industry (e.g. source of proteins).

Spirulina (Arthrospira) story was started in the mid-1960s when botanist Jean Léonard described a blue-green cake sold in the food market of Fort Lamy (Chad, Africa) although Aztecs living in the Valley of Mexico in the capital Tenochtitlan were collecting *Spirulina* ("new food") from the lake in the sixteenth century.

This book is dedicated to all aspects biology of cyanobacterial genus *Spirulina*, which can be used in near future to food industry and probably in much extensive way.

First parts of the book are focused on the physiology, morphology, photosynthesis and genetics of laboratory cultures. The next parts are dedicated on practical uses (e.g. biotechnology, tubular bioreactors, flat plate reactors, farms experience and commercial prospects in future etc.). Every chapter is written by clear style and extensive informations can be probably used by all algologists. Figures and tables are easy to survey. Appendices bring a lot of practical informations. Very useful for all experimental algologists are general methods (e.g. chlorophyll determination, determination of dry weight, protein determination and DNA extraction) but not less important are informations on culture collections where is possible to get *Spirulina* strains, informations on growth media and conditions, popular literature, commercial producers of *Spirulina* and checklists of products.

Invaluable book for researchers and industrialists working not only with this cyanobacteria as biological model, but for algologists in general.

M. BAČKOR

J. W. DEACON: Modern Mycology (third edition)

Blackwell Science Ltd, Osney Mead, Oxford OX2 0EL (UK), 1997, 303 pp., ISBN 0-632-03077-1.

Fungi are a group of fascinating organisms distinct from all others. This book is a fully revised edition of "Modern mycology" first published in 1980s. Although this book is more focused on functional than taxonomic aspects of fungi and related, it is excellent textbook for undergraduate students taking courses in mycology, microbiology and general biology. This extensive text is fully useful for all people in science with interest in fungi.

Fourteen chapters of the book are full of new informations and reflect new approaches in the subject. Textbook is well-arranged and dedicated to all main aspects of mycology (structure and ultrastructure, fungal growth, differentiation, nutrition, metabolism, environmental conditions for growth and tolerance of extremes, genetics, spores, their dormancy and dispersal etc.). Not less interesting are chapters focused on fungal decomposer communities, interactions of fungi. Final chapters are dedicated to fungi as parasites of plants, insects, nematodes and humans. Readers can obtain informations on the use of fungi as biological control agents of pests and pathogens.

Figures, photos and colour plates are first-rate. Third edition of "Modern mycology" is fascinating textbook. Informations are thoroughly updated and "modern" in a narrower limited sense.

M. BAČKOR

CHARLES J. KREBS: Ekologia. Eksperymentalna analiza rozmieszczenia i liczebności. (Ecology. The Experimental Analysis and Distribution.)

Wydawnictwo Naukowe PWN, Warszawa, 1997, 735 pp.

The book is translation of the fourth edition of the monography which consists of four parts. In the part What is ecology the author defines the subject and summarizes history of ecology and relation between ecology and evolution.

The second part Distribution of organisms in space concerns especially with areal theory and with the factors which determine distribution of organisms (humidity, temperature).

The third part entitled Abundance of organisms is dedicated to characteristics and dynamics of populations, relationship of predator and pray, mutual interaction and protection of nature.

The last part named Distribution and abundance: notion of community explains the themes such as characteristics and changes of community, biodiversity, production of ecosystems, biogeochemical cycles.

For completion the book contains the part about practical realization of ecological studies of populations and communities, and matematical methods of ecosystems study.

In my opinion the book is written very attractively, contains many illustrations, and can be served as a good text book for students.

L. PANIGAJ

BRUCE S. WEIR: Genetic data analysis II. Methods for Discrete Population Genetic Data.

Sinauer Associates Inc., 23 Plumtree Road/ P.O. Box 407, Sunderland, MA 01375 USA, fax: 413-549-1118. ISBN 0-87893-902-4, e-mail: publish@sinauer.com

With genetic information affecting more and more of daily life, the need for careful statistical analyses of genetic data has grown. Genetic data analysis is now used in the search for genes affecting human disease or traits of economic importance plants and animals, in prediction of protein structure from amino acid sequence, in the study of molecular evolution and design of pharmaceuticals. Statistical procedures are being developed to detect errors in sequence or linkage data in the Human Genome Project.

Full benefit of the many exciting advances in molecular genetics will be realized only if appropriate statistical analyses are applied to experimental findings.

This book may serve as introduction to methods needed for current types of genetic data and lay a foundation for the new methods that will be needed in the future.

The book is divided into ten chapters. There are many interesting figures, tables and graphs. Each chapter contains a lot of example, that explain the statistical theory. In the end of each chapter are exercises, answer to them are in appendix C.

P. KUŠNIRIKOVÁ

J. G. VINTER & M. GARDNER: Molecular modelling and drug design.

CRC Press Inc. 2000 Corporate Blvd, N. W., Boca Raton, FL33431, USA, ISBN 0-8493-7772-2

Molecular modelling has developed over the last twenty years largely and is now a very broad area. In this book, the authors have attempted to collect together some of the best young talents, with a mandate to report without restriction on what interests them. The resulting collection of broad topics and fresh thinking provides the reader with a taste of the future in drug design and the encouragement to break from the old traditions and probe hitherto unexplored avenues of the modelling tool.

The volume is open with a usefully comprehensive overview of the current methods and terminology of modelling. William Wyllie's contribution can serve as a reference chapter for those who need to remind themselves of certain aspects or who are new to modelling techniques and jargon.

Jonathan Goodman has provided a brief and non-comprehensive review of modelling methods, particularly molecular mechanics, and consideration of the strengths and weakness of this approach. David Morley concentrates on the use of molecular-mechanics-based conformational space-searching algorithms, and, in particular, simulated annealing approaches to address problems in conformational analysis.

Andrew Leach comprehensively introduces us to AI in chemistry and Edward Hodgkin puts it into practical perspective. Richard Lewis and Elaine Meng discuss the considerations and approaches to drug design which are expanded and exemplified in the articles by Paul Finn (The calculation, representation and analysis of molecular

fields.), David Manallack (Multivariate QSAR and computational chemistry: a novel receptor model of the D1 agonist binding site) and Catherine Burt (Molecular similarity calculation for the rational design of bioactive molecules.). Finally, Hoard Broughton give us a personal perspective of the area of peptide modelling and its development in the last decade or so.

To end the book, Martin Saunders highlights a number of areas in which computational chemistry falls short of the ideal, and indicates some developments and areas for potential development which could lead to better simulation of experiment.

I recommend this very topical interesting book to all who is involved in the exploration of the interaction of molecules and all who is interested in major advances in molecular modelling.

P. KUŠNIRIKOVÁ

P. J. LUMSDEN & A. J. MILLAR [eds.]: Biological Rhythms and Photoperiodism in Plants.

BIOS Scientific Publishers Ltd, 9, Newtec Place, Magdalen Road, Oxford OX4 1RE, UK, 1988, 288 pp., Hardback, Price £67.50, ISBN 1-85996-216-5 Environmental Plant Biology series

Fundamental internal timekeeping mechanism of organisms is known as the biological clock and capacity to measure daylength of the advancing season as photoperiodism. In the last decade significant advances have been made in studies of circadian rhythms of higher plant at the molecular level in particular. The book was written by 29 contributors from Europe, USA and Japan. Special session „Biological Rhythm and Photoperiodism“ was held at the annual meeting of the Society for Experimental Biology (University of Kent 1997) before the preparation of this volume. Sixteen chapters are divided into two parts: the first part is devoted to circadian rhythms and the second one to photoperiodism.

Circadian rhythms were first discovered in plants, although they are ubiquitous. In the introductory chapter circadian system is described in terms of the underlying oscillator. Knowledge about cellular organization of circadian rhythm confirm the existence of multiple oscillators. Mechanism of rhythm in organ movement and stomatal behaviour are discussed in details. Circadian rhythmicity in *Neurospora crassa* and photoentrainment in animals are characterized in two comparative chapters.

In photoperiodism timekeeping is specifically utilized for the measurement of daylength. Photoperiodic responses such as flowering induction, dormancy, bulbing and tuberization are described in term of the rhythms.

Photoperiodic regulation and sensing mechanism in mutants of *Arabidopsis thaliana* are presented. The circadian basis of photoperiodic timing in insects and birds complete this part of the book.

M. REPČÁK

L. TAIZ & E. ZEIGER : Plant Physiology (second edition).

Sinauer Associates, Inc., Publishers, P.O. Box 407, 23 Plumtree Road, Sunderland, Massachusetts, 01375 U.S.A., 1988, 792 pp., ISBN 0-87893-831-1 (hardcover)

The first edition of this textbook designed for post-graduate students was published in 1991. Due to its conception and particularly the quality of elaboration it has become a well-known and world-wide approved textbook. The second edition was prepared by considerably modified team of 21 principal contributors. The basic division of the book has not changed, it consists, as the previous edition, of introductory Overview of essential concepts and three Units, but the total number of chapters has increased to 25. The book brings the latest information and mechanisms of particular processes are explained on molecular level.

The first chapter brings basic information on the plant kingdom, particularly on anatomy and plant cytology in details. The second chapter of the introductory part is devoted to energy and enzymes, it describes energy flow through living systems and its principles. Structure and function of enzymes, as well as regulation of their activity, is explained in details. Unit I contains 4 chapters and is entitled Transport and translocations of water and solutes. It deals with water relations of plant cell and the whole plant. Mineral nutrition and transport of solutes complete this bioinorganic part of the textbook.

Plant metabolism is the topic of Unit II. Photosynthesis as the key theme of plant physiology is discussed in three chapters concerning light driven redox reactions, carbon assimilation and ecophysiology. Next chapter Translocation in phloem is connected with the previous one, although except for products of assimilation other substances are also transported. Following chapter Respiration and lipid metabolism deals with energetic metabolism. Chapter Assimilation of mineral nutrients is concerned with mechanisms of metabolism of nitrogen, sulphur, phosphorus and cations. Secondary metabolites are compounds which defend plant against herbivores and pathogens. Biosynthesis and functions of isoprenoids, phenolics and alkaloids are explained in one chapter.

Unit III Growth and development is the most extensive, with modern conception. It begins with explanation of gene expression and signal transduction. Chapter Cell walls: structure, biogenesis and expansion is not only about their genesis, but also about their role in defence against pathogen attack. Growth, development and differentiation is the theme of the next part. Extensive information on phytochrome is the subject of a separate chapter. Chapter Blue-light responses: stomatal movements and morphogenesis also deals with photoreceptors. Five chapters are devoted to hormones (Auxins, Gibberelins, Cytokinins, Ethylene and Abscisic acid). They are focused on biosynthesis, transport, physiological effects and molecular mechanisms of hormone action. Control of flowering describes mechanisms of autonomous regulation, biorhythms and photoperiodism, vernalisation and development of floral meristems. The final chapter Stress physiology explains mechanisms of numerous stress responses.

M. REPČAK

R. J. STEVENSON, M. L. BOTHWELL & R. L. LOWE [eds.]: Algal Ecology: freshwater benthic ecosystems.

Academic Press, Inc., A Division of Harcourt Brace & Company 525 B Street, Suite 1900, San Diego, California 92101-4495, 1996, 753 pp., ISBN 0-12-668450-2.

Benthic algae are primary producers and fundamental components in biogeochemical cycles of aquatic ecosystems. This book (covered in Aquatic ecology series) is essential for algologists (professionals and amateurs) as well for students.

Authors of review chapters (everyone is independent part of book) are experts. It is clear demonstrated from first pages to last ones. This monumental book is presented in three sections.

First section "Patterns of benthic algae in aquatic ecosystems" is dedicated to introduction of algal ecology in freshwater benthic habitats, patterns in benthic algae of streams, periphyton patterns in lakes and wetlands.

Second section is focused on factors affecting benthic algae. Very well-grounded chapters can bring to scientists mass of basic information on effects of light, temperature, nutrients, competition and species coexistence, substrata, heterotrophy, grazers etc. Important are reviews on ecotoxicology of inorganic and organic chemical stresses (my congratulation to authors) and acidification effects.

Third section summarises information on the role of benthic algae in freshwater ecosystems with information on modelling benthic algal communities and their use as biological monitors.

This book is a unique source of information and includes hundreds of references. It can be useful for undergraduate students as well as professors at universities. In my opinion the book will be for a long time a great contribution to science.

M. BAČKOR

C. VAN DEN HOEK, D. G. MANN & H. M. JAHNS: Algae: an introduction to phycology.

Cambridge University Press, The Edinburgh Building, Cambridge CB2 2RU, United Kingdom, 1997 (reprinted), 627 pp., ISBN 0 521 31687 1 (paperback).

The primary production of algae is more than half of the total primary production world-wide and all aquatic organisms are on this process more or less dependent. Oceans and seas are (down to a depth around 150 m) full of algal biomass in forms of benthic (attached to the bottom) as well as planktonic species (suspended in water). Not less ecologically important are freshwater, terrestrial and symbiotic species. Algae are also phylogenetically important group of organisms.

The present edition of the book is a completely revised and updated English version of the original German textbook (Thieme, 1978). Revision includes new scientific papers from ultrastructure, taxonomy and molecular-biology of algae. The classification

of Chlorophyta (green algae) is completely revised. Phylogenetic trees (derived from morphological data) are completed by new ultrastructural and molecular genetic data. Important and new sources of informations are nucleotide sequences of ribosomal RNAs or their nuclear and chloroplasts genes.

This book is modern introduction to the cytology, morphology and systematic of the algae. Actual are informations on divisions Prochlorophyta and Glaucophyta as well as division Chlorophyta (with 11 classes). Valuable are phylogenetic reflections on the algae and informations on symbiosis theory.

The textbook is full of well-arranged figures and nice photos. To write this book approximately 2 thousands (!) references were used.

Algae: an introduction to phycology is generally accepted textbook for very long time. Present edition of textbook is invaluable.

M. BAČKOR