**Greening the Earth**


*Plant Life* is a concise but incredibly thorough summary of all the major trends at play in the origin and diversification of land plants. This is by no means a straightforward subject, but Frederick Essig does a truly admirable job of condensing huge amounts of information into an easily digestible form. The writing is perhaps more technical than a typical popular science book, but *Plant Life* provides a perfect overview for anyone from the advanced undergraduate level on up—even a committed, nonscientist plant enthusiast.

The origin and diversification of the land plants constitute a compelling tale and a critical component of the evolution of life on Earth. However, as any botanist will tell you, plants often get short shrift in textbooks and are too frequently dismissed as “boring” by young undergraduates. As I have discovered in my own teaching experience, the best way to combat these misconceptions is to present the material as a logical arc, drawing on the diverse, fascinating examples of plant problem solving to punctuate the journey. This is exactly the approach taken by Essig in this lovely book. He covers the entire history of plant diversification in nine compact chapters, leaving almost no stone—or perhaps we should say leaf—unturned.

Essig starts at the ultimate beginning, with the origins of life and the crucial origin of photosynthesis in prokaryotic organisms. He explains the basic functional modules that act in photosynthesis and how they were likely assembled through horizontal gene transfer during the evolution of the free-living ancestor of the chloroplast. From here, he transitions to a consideration of the evolution of eukaryotes and how their capture of photosynthetic prokaryotic organisms led to the derivation of the permanent chloroplast. At the same time, he provides an overview of algal diversity and the critical subject of life-cycle patterns, especially the distinction between haploid-dominant life cycles and the true alternation of generations, which characterizes land plants. In the book’s third chapter, he makes the transition onto land and does an excellent job of contrasting the living representatives of the early land-plant lineages, collectively known as the *bryophytes*, with the more complex fossil history of this period. He also covers the major innovations evolved by these early land plants, specifically desiccation tolerance, the different mechanisms of water transport, and the key modifications of the ancestral algal life cycle. Likewise, in the chapter on vascular plants, Essig gives significant consideration to the origin of major sporophyte characteristics such as roots, leaves, and wood while incorporating a useful discussion of extant versus fossil plants. Next in line is the seed-plant lineage. Explaining the evolution of the seed and how the alternation of generations is expressed in this clade is a tricky business, but Essig manages it quite well. The remainder of the volume is given over to the angiosperms, the dominant group of extant land plants.

Here, the author takes full advantage of fossil and living exemplars to explore the origin of the angiosperms, as well as their morphological, physiological, and ecological diversification. Plant-animal interactions get special attention in a dedicated chapter on adaptations for pollination and seed dispersal, which allows the author an opportunity to explore a wide array of ecological and morphological specializations. I was quite pleased to see that in the separate chapters on dicots and monocots, aspects of functional morphology such as vascular structure and habit (i.e., woody versus herbaceous) receive full coverage. These are crucial traits that often get short shrift in the common focus on seed-plant reproductive biology. Finally, the blunt and somewhat bleak epilogue is nonetheless honest and scientifically accurate. We can only hope that, through the efforts of authors such as Professor Essig, more people will become engaged with the natural world and press for the policy changes that would be necessary to rescue plant biodiversity—and ourselves in the process.
integrated lines of evidence from fossils, extant plants, and modern molecular approaches. On the whole, there is relatively little in-depth coverage of molecular genetics, but relevant information is discussed when appropriate, and the implications of recent molecular work are correctly interpreted. The work is illustrated with a large number of excellent black and white line drawings that are effectively deployed to explain the diverse topics. I might have added a few more phylogenies, but I appreciate that many deeper relationships remain contentious, so that might have had the effect of dating the work in future years.

In terms of the most appropriate audience for the work, I think it should have a relatively broad appeal. I would most strongly recommend it for undergraduates and early graduate students who are trying to grasp the big picture of land-plant diversification. Similarly, advanced students coming from more molecular backgrounds who would like a good introduction to plant evolution would be well advised to start here. I also suggest that instructors at all levels who are looking for good examples of how to approach the teaching of these subjects could get many useful ideas from the book. Honestly, if Essig could be enticed to produce a slightly expanded version with color figures, I would be more than happy to use this as a major text in my Biology of Plants course. I do not mean to discourage nonscientists from tackling the work. Certainly, there are plenty of fascinating points for the amateur botanist, from the different origins of clonal trees to all the possible variations in leaf morphology. It will take some effort to learn the terminology, but that is exactly what the excellent glossary in the back is for.

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A THOROUGH LOOK AT VENOM


Venomous Reptiles and Their Toxins is a thorough review of the topic by the primary researchers in the field. There are 25 chapters and a central section of 30 colored plates that contribute to the reader’s understanding of all of the book’s chapters and enhance its appearance. In addition, tables and black and white figures are embedded in individual chapters. All of the chapters have multiple authors, with between 4 and 30 contributors per chapter; in all, 109 specialists contributed to the volume. The treatment is comprehensive, not only in the inclusiveness of its authorship but also in the extent of its bibliography. A total of 2070 different references are cited. This means that the authors cited most of the relevant literature rather than just a series of review articles; a reader requiring details from the original literature can look them up directly, without having to go through the intermediary of reviews to find primary references. These combined attributes imbue the book with authority.

Although the book deals with a great amount of complex material at a sophisticated level, all terms are defined when first introduced or in the chapter summaries that precede the main text. These definitions may seem superfluous to the specialist, but they provide access to the material for those without prior detailed knowledge of the subject, thereby improving the usefulness of the book and widening its audience.

An early chapter in the book deals with the production and use of antivenoms, including the adverse responses to their use, such as anaphylactic shock and serum sickness, and discusses the pharmacokinetics, absorption, distribution, and elimination of toxins and their antivenoms. These attributes of toxins and their antivenoms must match in order for the antivenom to be effective. The conclusion of the chapter is that antivenom is the only specific therapy that has proven to be effective for the treatment of envenomations.

Next up, the authors evaluate the various traditional and modern techniques that have been used to treat bites from venomous reptiles. Although some botanical remedies may have limited usefulness, most of these—as well as scarification, the mechanical extraction of venom, “black stones,” electric shock, cryotherapy, cauterization, tourniquets, vitamin C, and the drinking of alcohol—are ineffective and contraindicated; their use may delay effective treatment and even be harmful.

The book also features a practical guide to the collection, housing, handling, and care of venomous reptiles in ways that provide safety and comfort both for the animals and the investigator. Every person involved in research on venomous reptiles should have this chapter at hand. There are also sections on permits and codes of practice and on the transport of animals.

Similarly useful is a chapter on the veterinary care of venomous reptiles. It not only includes the prevention and treatment of the most common diseases, such as infections by ecto-parasites and endoparasites—and viral and fungal diseases—but it also advises on techniques used in experimentation, such as anesthesia,