MANIPULATING PLANT EMBRYOS

***Embryogenesis in Angiosperms. A Developmental and Experimental Study.* By V. Raghavan. Pp. 303. $39.50. ISBN 0-521-26771-4. (Cambridge University Press, London: 1986).**

The study of plant embryogenesis has been aided immensely by the ability to grow embryos in isolation, excised from developing ovules and mature seeds and, especially in recent years, to regenerate them *de novo* from plant cells using cell and tissue culture techniques. These can be somatic cells, from vegetative or reproductive parts, and gametic cells, usually the post-meiotic microspores prior to pollen maturation (although development from the female counterpart has also been achieved). The newer techniques of microscopy, biochemistry and molecular biology have been applied with increasing frequency and success to this wealth of embryological material.

Professor Raghavan set himself the task of summarizing what we know now about plant embryogenesis—the information available on normal embryo development and the rapidly accumulating information on somatic and pollen embryos. His wish was to integrate the morphology, ontogeny, biochemistry and genetics. The time was correct for such an approach and the result is wonderful: a small jewel of a volume, packed with information, brimming with concepts and ideas, easy and enjoyable to read.

Professor Raghavan came to this task with considerable experience. He has a long and distinguished record of research in many aspects of plant embryogenesis. Ten years ago, he authored a substantial compendium, *Experimental Embryogenesis in Vascular Plants* (Academic Press, New York, 1976). The current volume concentrates on research emerging over the past ten years and is a natural outgrowth of the previous volume. The two complement each other and readers are directed to the previous volume for discussion of the older literature. The current volume does stand alone and would readily serve as the text for a course in plant embryogenesis or as one of the texts or references for courses in plant development, morphology or physiology. It will find use, I am sure, as a primer for graduate students and new researchers to the field. (The citations alone would justify the price of the book: there are 52 pages of references with the listing of more than 1000 original research articles).

The first chapter describes how the study of plant embryogenesis has changed over the years and focuses on the newer experimental methods employed. The next three chapters explore zygotic embryogenesis, first the morphological and anatomical details of development, then responses at the cellular and biochemical level, and finally, results from experimental manipulation of zygotic embryos. The next two chapters summarize work in somatic and pollen embryogenesis. The final chapters summarize the state of knowledge of gene regulation during plant embryogenesis and various applied aspects.

The book is brimming with information but its strongest virtue is how it analyzes the significance of that information, and puts it into perspective, pointing out what are reasonable conclusions and remaining problems. Not only is each specific question analyzed, but each major area is summarized at the end of the chapter.

Particularly appealing is the clarity of the prose. Even the most complicated research or concept is presented clearly and interestingly. Most remarkable, however, and no doubt accounting for the volume's uniformity and readability, is that it is, like its predecessor (or progenitor), the work of one man. Few people today could command the conceptual and informational breadth to produce such a work.

There is ever increasing interest in the application of plant embryogenesis to biotechnological goals. Each year new, and previously recalcitrant, plants are regenerated in culture via somatic embryogenesis—for example, sugar pine among the conifers—and methods are being developed to rapidly deliver them, such as synthetic seeds. This volume should prove useful in extending the frontiers in plant embryogenesis.

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ILLUSTRATED BIOTECHNOLOGIES

***Biotechnology: Strategies for Life.* By Elizabeth Antébi and David Fishlock. Pp. 227. ISBN 0-262-01089-5. $39.95. (The MIT Press, Cambridge, MA: 1986).**

In this clearly conceived history, Antébi and Fishlock take the view that biotechnology is not really an industry by itself but a set of enabling technologies for a wide range of other industries. And they examine the applications, actual and potential, of gene manipulation and allied techniques in a great many of them.

Several aspects distinguish their survey. For instance, each section contains short articles by important contributors to the field being covered in that section. Nobel-laureate Jean Dausset, for example, offers his unique perspective on immunogenetics, and Irving Johnson describes Eli Lilly's development of recombinant human insulin. Another of this book's distinguishing characteristics is that Antébi and Fishlock themselves write with considerable insight, placing their expositions in a historical and philosophical context that recalls Horace Freeland Judson's *Eighth Day of Creation.*

Finally, the text is skillfully combined with a large number of color illustrations, and presented in a large-format (9 × 12 inch) volume that makes *Biotechnology: Strategies for Life* resemble an expensive, coffee-table art-book more than a serious scientific history. While the beautiful design is welcome, the accompanying price of $40 is not. Yet anyone looking for a book to introduce biotechnology to a noninitiate, to round out his own knowledge of the biological revolution, or to give nieces and nephews at Christmas, would do well to consider this offering. Provided he doesn't have too many nieces and nephews.

Harvey Bialy is the research editor of *Bio/Technology*.