

TRANSFORMATION OF PLANT CELLS

Robb Fraley

Molecular Biology of Plant Tumors. Edited by Günter Kahl and Josef S. Schell. Pp. 615. ISBN 0-12-394380-9. (Academic Press: 1982) \$69.50.

In the last decade, perhaps no area in the plant sciences has been the focus of more intensive or more productive research efforts by laboratories around the world than the study of crown gall disease. The many aspects of these studies, which have impacted upon the diverse fields of plant pathology, tissue culture, microbiology, biochemistry, and genetics, are reviewed here by the key investigators whose work has contributed to our current understanding of the *Agrobacterium* Ti plasmid system. The appearance of this book at this time is most appropriate now that these research efforts seem on the verge of making the genetic engineering of plants a reality.

Molecular Biology of Plant Tumors is divided into three sections: abnormal plant growth, crown gall tumors, and potential vectors for genetic engineering in agriculture. The first section includes a discussion of two phenomena—the habituation of cultured plant cells and the formation of genetic tumors in certain intraspecies hybrids—which share striking similarities with crown gall tumors. These are described both in relation to crown gall disease and as unique developmental systems for studying the regulation of gene expression in plants. Also included in this first section are brief descriptions of gall formation induced by insect and viral (Wound Tumor Virus) pathogens; nodule formation resulting from *Rhizobium* infections is discussed as another example of host-pathogen interaction.

The second section begins appropriately with a history of the crown gall problem by Armin C. Braun. His account of the pioneering efforts of Drs. Erwin Smith and Carl Jensen and retracing of the early and controversial experiments with *Agrobacterium* and his insight into the mechanism(s) of transformation are combined in a truly original and introspective overview of the development of this field. The remaining chapters in this section essentially "fill

in" the details starting with a discussion on the role of wounding in the infection process by *Agrobacterium*. The experiments leading to the discoveries of the tumor inducing (Ti) plasmid, and the transformation that results from the transfer of a portion of the Ti plasmid into plant cells, are reviewed in several chapters. It is interesting to note the different perspectives that are placed on these key discoveries by the different authors. The discussion on T-DNA organization, transcription and the relationship between T-DNA genes, tumor morphology, and phytohormone levels serve as a useful introduction in these areas. The several chapters dealing with opine biosynthesis and catabolism and their biological roles in tumorigenesis and bacterial conjugation are well written and serve to illustrate the complexity of the *Agrobacterium*-plant cell interaction. The chapters on tumor cell chromatin and Ti plasmid-coded proteins raise interesting questions regarding the regulation of Ti plasmid genes but, unfortunately, provide little insight into the answers. The section ends with a somewhat theoretical discussion of the Ti plasmid as a vector for plant genetic engineering. Several recent observations relating to the structure of T-DNA genes, the stability of foreign genes in plant cells and the regeneration of plants from crown gall tumors are included in this final chapter which help to update the material and to provide a clear direction for further research on plant transformation.

The final section contains a very brief review of Cauliflower Mosaic

Virus (CAMV) and its possible application as an alternate vector for plant genetic engineering.

This particular chapter and one in the preceding section dealing with transposable genetic elements in bacteria and maize seem out of place in a volume on plant tumors; their inclusion no doubt reflects the strong genetic engineering emphasis that has become associated with the study of crown gall disease. This section also contains a complete discussion of the history and properties of *Rhizobium* plasmids and their involvement in symbiotic nitrogen fixation. Of special interest are experiments involving the transfer and functioning of Ti plasmids in rhizobial strains.

The unique historical and biological perspectives contained in *Molecular Biology of Plant Tumors* will be valuable to anyone interested in this fascinating subject. The molecular aspects of crown gall disease, although dealt with clearly and in adequate detail, are victimized by the rapid rate at which new information has emerged in this area. The overall content of the book is good and excellent references are included which cover the more specialized subjects. Some of the chapters suffer from repetition of information and in several cases, different terms and laboratory jargons are used in the various chapters which may confuse readers not closely associated with this area.

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HOW TO FRACTIONATE PROTEINS

Blaise Fekete

Protein Purification. (Springer Advanced Texts in Chemistry). By Robert K. Scopes. Pp. 282. ISBN 0-387-90726-2 (Springer-Verlag New York, Inc.) \$29.95

This book gives a brief account of the main procedures available in protein and enzyme purification, including some simple theoretical explanations of the procedures used.

The intention of the book is "to guide the newcomer through the range of protein fractionation methods, while pointing out the advantages and disadvantages of each." The nine chapters are dedicated to the basic techniques commonly used in protein purification, i.e. making an extract, separation by precipitation and by adsorption, and separation achieved when the protein is in solution. Several chapters deal with the mainte-