Theor Appl Genet (1993) 86:795–796

THEORETICAL AND APPLIED GENETICS

Book review

Davies, K. E., and Tilghman, S. M. (eds.): Genome Analysis Vol. 1: Genetic and Physical Mapping. Cold Spring Harbor Laboratory Press, New York 1990. 189 pp.

Modern genetic tools endeavor to examine the laws of storage, transmission, and realization of genetic information for the development and function of living organisms. The identification and mapping of genes, analysis of their structures, and elucidation of the functions they encode are cornerstones of experimental biology. *Genome analysis: Genetic and physical mapping* constitutes volume 1 in the series of books devoted to reviews of mapping genomes. Consisting of five authoritative chapters, this volume discusses some of the most significant advances in mammalian gene mapping, arrangement, and function.

Some of the superb techniques developed recently and described in this book have dramatically transformed the study of human gene mapping, and molecular, and clinical cytogenetics. The implications of these developments in diagnosing and understanding human diseases are phenomenal. To a plant cytogeneticist like myself, these advances are mind boggling because as late as 1956 even the correct chromosome number of man was not known; two plant cytologists, Jo Hin Tjio and Albert Levan, unequivocally demonstrated the chromosome number to be 46 (Tjio and Levan 1956), a discovery that had immediate and major implications. Soon afterwards, some of the most common clinical disorders, trisomies for chromosomes 21, 13 and 18 and sex chromosome abnormalities XO, XXX, XXY, and XYY, were characterized. The development of Giemsa/trypsin banding and Q banding with 4,6-diamidino-2-phenylindole dihydrochloride (DAPI), and simultaneous visualization of bands with hybridization signals by two-color fluorescence have added new dimensions to our ability to identify whole chromosomes as well as parts of chromosomes.

In situ hybridization procedures that link cytological and molecular information have had a major impact on human gene mapping and clinical cytogenetics. The chapter on fluorescence in situ hybridization by J. B. Lawrence describes in detail the current state of the art and the potential of high-sensitivity fluorescence in situ hybridization technology and discusses its applicability in human gene mapping and analysis of cytogenetic aberrations. The role of this technique in characterizing aneuploidy, specific translocations linked with particular types of cancer, and small deletions is clearly outlined. Even submicroscopic deletions of a few kilobases of DNA can be uncovered. The article on hybridization fingerprinting by Lehrach et al. outlines an integrated approach to extracting genetic information from entire genomes. It discusses how the efficiency of mapping and sequencing could be significantly increased by faster data acquisition by parallel clone analysis systems, the use of highly informative probes, and a reference library system able to integrate different types of biological information.

Heiter et al.'s chapter on yeast artificial chromosomes (YAC) gives an excellent account of the development and application of YAC cloning methods in the construction of physical genome maps and functional analysis of specific genes. This information could help understand genetic bases of normal and abnormal biological processes, leading to a better knowledge of gene function and regulation. In their article on germ-line deletion mutations in the mouse, Rinchik and Russell describe the usefulness of deletion mutations in mammalian genome analysis. The authors illustrate how the analyses of particular regions of the mouse genome could provide insights into the physical and functional complexities of the mammalian genome. The last chapter by James Weber deals with human DNA polymorphisms based on the simple-sequence tandem repeats. Microsatellite polymorphisms could help construct linkage maps, which, in turn, could contribute to physical mapping.

This book is very well written. The editors have done an admirable job of getting together excellent articles from authorities in various fields. Continued multidisciplinary approach to human genome mapping could help unravel polygenic disorders such as diabetes, and several other human diseases including cancer. It should be a useful reference for mammalian cytogeneticists, clinicians, molecular biologists, and biotechnologists.

Tjio JH, Levan A (1956) The chromosome number of man. Hereditas 42:1–6.

Prem P. Jauhar, Fargo, North Dakota

Neuhoff V., Friend J. (eds.): Cell to Cell Signals in Plants and Animals. Springer-Verlag, Berlin Heidelberg 1991. 385 pp.

There are several biological and cellular functions associated with life, the complexity of which varies with the position of the living organism on the evolutionary scale and the stage of its development. Cell to cell signals are the most elementary, but yet the most sophisticated, signs of life. A thorough understanding of these signals is a challenging task of a theoretical biologist. *Cell to cell signals in plants and animals* gives a detailed, almost encyclopedic review of these signals at various stages of development and in response to various external stimuli. The editors, Volker Neuhoff and John Friend, have assembled 24 excellent articles on various facets. The authors of these articles have done a commendable job.

The 24 articles have been logically organized into four sections:

1. Recognition in Parasitic and Symbiotic Systems
2. Cell to Cell Recognition and Differentiation
3. Plasticity in Cell to Cell Communication
4. Plasticity, Recognition and Differentiation in Cellular Systems.

The first topic, comprising four articles, deals with the molecular biology and genetics of resistance and susceptibility of plants to various pathogens, parasites, and symbionts. The relevant topics, phytotoxins in relation to plant pathogenesis, plant-microbe interactions, signalling between plants and viruses, and the mechanism of recognition of these signals are nicely covered. The second topic consists of seven interesting articles which address the questions as to how systems of positional information are generated in pattern information, especially short-range cell to cell communications at the molecular level. Thus, worthwhile efforts have been made to gain insights into some crucial morphogenetic events, viz., cellular differentiation, mechanism of fertilization in higher eukaryotes, synapses and synaptic contacts, and erythropoietic organization, among others.

The third topic, comprising seven fascinating articles (dealing with cellular networks, phytochrome properties, synaptic transmission, neuronal functions, physiology and pathology of brain aging, and molecular action of steroids in human breast tumor cells) seeks to explain how plasticity in cell to cell communications plays an important role in cell differentiation and function. Several signals have been identified, although their mode of action is not fully understood. The underlying mechanisms need to be elucidated at the molecular level.

The last topic on plasticity, recognition and differentiation in cellular systems consists of six well written articles which outline theoretical models for cell to cell signalling, and discuss, among other things, morphogenetic changes in response to signal reception in higher plants, and neuronal communications. Advances made in these areas are lucidly discussed and unanswered problems highlighted.

This book is very well written and logically organized. A few typographical errors (e.g. on p. viii, 'symbiontic' should be 'symbiotic') are bound to appear in a book this size. It should be an invaluable reference book for researchers interested in theoretical biology, plant morphogenesis, clinical medicine, neurosciences, and carcinogenesis. At 188 DM the book offers a good value for the money.

Prem P. Jauhar, Fargo