

## Book reviews

**Glover, D. M.: Gene Cloning. The Mechanics of DNA Manipulation.** London, New York: Chapman and Hall 1984. viii + 222 pp., several figs. and tabs. Soft bound £ 7.95.

This book, based on a course taught by the author at the Imperial College, London, deals with the mechanics of DNA manipulation and is intended for advanced undergraduate and graduate school courses. For researchers entering this very fruitful area of experimental research, this monograph should also be of particular value. The text is subdivided in 8 chapters and begins with a brief introduction explaining the principles of cloning DNA and recombination and mutagenesis of DNA in vitro. The following sections deal with bacteriophage and bacterial plasmid vectors. Much emphasis is given to expression of cloned DNAs in *E. coli* plasmids and the physical characterization of cloned DNA segments. Gene cloning in fungi and plants and the expression of cloned genes in animal cells are the topics of the final chapters.

At the end of each chapter references are given. The book is clearly written and contains many illustrations. It is a worthwhile addition to the literature of this quickly expanding field of biology.

D. Gröger, Halle/Saale

**Russell, G. E. (ed.): Biotechnology and Genetic Engineering Reviews, Vol. 2.** Newcastle upon Tyne: INTERCEPT 1984. x + 468 pp., several tabs and figs.

In the second volume of this new periodical, as previously seen in volume one, up-to-the-minute reviews of important aspects of biotechnology are presented. In this newest volume the particular emphasis is on gene manipulation. As the editor states in the preface "it is one of the purposes of these reviews to draw out and emphasize the interdisciplinary linkages". The wide spectrum of authors, mainly from English speaking countries or Japan, (a reflection of the composition of the advisory board?) presents the impact of new technologies on vaccine development; plant-cell culture: natural products and industrial application; recombinant DNA technology and genetic control of pest insects; recent research on the development of microbial strains for amino-acid production; genetic engineering in *Bacillus subtilis*; strategies for improvement of wheat-grain quality using molecular genetics; production of pentoses by micro-organisms; interferonsynthesis by micro-organisms.

Naturally these contributions reflect the personal point of view of the authors and consider their specific area or research. However, altogether this volume, albeit of its great diversity, is a very valuable source of information for both, specialists and also, to some extent, for "new-comers" in biotechnology.

K. Esser, Bochum

**Janick, J. (ed.): Horticultural Reviews, Vol. 6.** Westport, Conn.: Avi 1984. xiii + 427 pp., several tabs and figs. Hard bound \$ 45,-.

The series "Horticultural Reviews" provides horticulturists with critical reviews of specific areas in horticulture. These reflect the current status of research in the field and include articles related to the boundaries of the field and applications

of various methods to horticultural problems. "Horticultural Reviews", Volume 6 consists of 10 chapters and presents information on: 1) the biology of the kiwi fruit, the taxonomy and vegetative structure of the kiwi fruit and the structure and development of its flowers and fruit; 2) parthenocarpy of tomato, the sources, genetics, physiology and expression of parthenocarpy and its applications in tomato breeding; 3) origin and improvement of spawn of the cultivated mushrooms *Agaricus brunnescens* peck; 4) acclimatization of indoor foliage plants. This chapter provides a basic understanding of acclimatization and the present "state-of-the-art" procedures for acclimatization by the foliage plant industry are discussed; 5) response of plants to root pruning; 6) watercore – a specific disorder of such fruit as pears and apples, sometimes called glassiness – occurrence, causes and its economic consequences; 7) control and management of vertebrate pests in deciduous orchards of the eastern United States; 8) foliar nutrition of fruit crops. This review focusses on fruit trees. The uptake, metabolism and translocation of foliar nutrition and the technique of foliar nutrition application are discussed; 9) cryopreservation of apical meristems and 10) subzero temperature stress physiology of herbaceous plants. Each reviews provides readers with not only a basic understanding of the respective subject but also with some important applied knowledge concerning horticulture. This is a very practical book and it will interest all horticulturists.

Zhang Hong-qi, Beijing

**Kimura, M.: The Neutral Theory of Molecular Evolution.** Cambridge, London, New York, New Rochelle, Melbourne, Sydney: Cambridge University Press 1983. xv + 367 pp., several figs. and tabs. Soft bound £ 12.50.

Seventeen years ago the neutral theory was proposed by Kimura and later, independently, by King and Jukes. The book under review contains its outline, advocacy and history. Kimura defines the neutral theory as "the theory that at the molecular level evolutionary changes and polymorphisms are mainly due to mutations that are nearly enough neutral with respect to natural selection that their behavior and fate are mainly determined by mutation and random drift" (p. xii).

At the time that Kimura and King and Jukes proposed the neutral theory it evoked a storm of criticism. This was partially due to the phrase "non-Darwinian evolution" used by King and Jukes. However, the neutralists do not doubt the role of Darwinian natural selection in adaptive evolution as the word "non-Darwinian" might indicate. The neutral theory's main thesis is that at the molecular level, i.e. DNA-base composition and protein-amino acid composition, many mutations are neither beneficial nor damaging, but some of these mutations can, nevertheless, be established in populations by genetic drift. Second, it seems that some of the opponents, e.g. Dobzhansky, could not accept that genetic drift plays a major role. This might prove to be an interesting issue for historians and philosophers of science. The thought-provoking and original history of population genetics, presented by Kimura in the first chapter, gives some clues to this.

Now, after 17 years, Kimura notes that his theory has withstood the experimental tests. However, some difficulties

remain. The most important of which is that the number of mutations at the molecular level does not depend on the number of generations as might be expected, but on absolute time.

The book under review is a cheap paperback edition. The hard-bound copy appeared in 1983. Although many readers who are not themselves population geneticists, will find the mathematics sometimes difficult, this book should be on the bookshelves of all those who are interested in evolutionary theory. It marks a milestone in the development of the theory of evolution.

G. J. de Klerk, Canberra

**Gleba, Y. Y.; Stynik, K. M.: Monographs on Theoretical and Applied Genetics, Vol. 8. Protoplast Fusion. Genetic Engineering in Higher Plants.** Berlin, Heidelberg, New York, Tokyo: Springer 1984. x+220 pp., 62 figs. Hard bound DM 148,-.

This monograph is certainly more than "a geneticist's viewpoint on work developed most exclusively by plant physiologists", as the authors claimed. It is, first of all, a useful collection of data produced in the field of plant cell fusion from the initiation of this area of investigation more than twenty years ago. Secondly, the book appears when a retrospective look has become imperative, and the authors – backed up by their remarkable expertise in somatic hybridization – present an exhaustive historical and conceptual coverage of the rapid evolution that has taken place in the culture and fusion of plant protoplasts. To the 508 cited and/or discussed references I shall add just one more (Pelletier et al. 1983: MGG 191, 244). I also suggest that the reader reads this book under review in association with the Proceedings of the very successful Protoplast Symposium (Basel, 1983: Eds Potrykus et al., Birkhäuser); they together substantiate our present transition to more refined and sophisticated approaches (such as those used in animal cell research) to biological processes, among which cell fusion is by now a well established technology.

The authors attempt to clarify a terminology undergoing a constant revision. The text is pertinent, highly critical, speculative, and in places somewhat redundant. The book also has humor, with sometimes "innocent" remarks such as: "novel and important sterile plant forms might be produced". Actually, valuable somatic hybrid lines or plants such as (soybean + *N. glauca*), (barley + soybean), *Arabidobrassica*, (*Datura innoxia* + *Atropa belladonna*), (tomato + potato) etc. are presented and described in great detail ... as being sterile or nonmorphogenic.

Several major conclusions can be drawn from this book concerning the production of parasexual hybrids (cf. chapters 4, 5, and 6).

*1. Stability and fertility of nuclear hybrids.* Somatic hybridization makes possible the crossing of species belonging to distinct genera, tribes, or families. The process of plant regeneration from such somatic hybrids is accompanied by the selection of genotypes with lower nuclear DNA content and formation of asymmetric hybrids. The production of fertile parasexual hybrids is believed to lie in generating highly asymmetric hybrids, by transferring single chromosomes or even chromosome fragments. This area of investigation is of major interest, and the possible question of how competitive (say rather complementary) this could be to vector – mediated gene transfer is certainly irrelevant.

*2. Genetic effects.* From a methodological point of view, available somatic hybrids were produced, rather exclusively, by the fusion of genomic stable cells with unstable (calus or suspension-derived) cells which gave rise to hybrid plants with chromosomal instability. An imbalance generates instability, and further complicates the analysis and understanding of the processes involved in hybrid cell proliferation and asymmetrisation.

In more fundamental terms, hybrids produced by parasexual methods differ in their genetic constitution from the corresponding sexual hybrids. An interesting fact is that in the common "hybrid" nucleus the chromosomes of the two parents are not randomly mixed. The propagation of genetically unstable somatic hybrids between distantly related species is accompanied by a number of genetic processes including genetic recombination, chromosome rearrangements and elimination, mitotic segregation etc. Profound changes are produced in the mitochondrial genome. Hybrid plants with substituted cytoplasm can be produced within one crossing cycle. Such hybrids may contain the nucleus from one species, and cytoplasmic determinants from two other species. Furthermore, availability of a first series of molecular and selectable markers within extranuclear entities made possible the establishment of corresponding linkage groups.

*3. Somatic hybridization – incompatibility barriers – in vitro passage stage (playing with the nature).* Parasexual hybridization is a completely artificial method that bypasses the natural restrictions inherent in sexual crosses. Available data suggest that there are no pronounced incompatibility processes during the first several days (and sometimes longer) of culture of the hybrid cells. The reading of this book strengthened my feeling that parasexual hybrids produced and processed through cell culture exhibit a number of genetic peculiarities not only because they are "unnatural", but also (or even mainly) because of the intrinsic nature of cellular technology and cell manipulation: cultured cells survive and evolve in a permissive and destabilizing (I may even say in a genetically perverse) environment that favours infringements to the otherwise strict regulatory controls acting upon cells within the whole plant.

Are these the new tools for the creation of "forbidden" fruits? A challenge is raised that the authors and many of the readers of this excellent book are ready to take.

Ioan Negrutiu, Basel

**Hoffmann, W.; Hermann, F.H.: Neuromuskuläre Erkrankungen. Diagnostik-Klinik-Therapie-Genetik.** Leipzig: VEB Thieme 1985. 156 pp., 54 figs., 14 tabs. Hard bound DM 80,-.

With the collaboration of W. Meerbach, W. Hochheim and H. Giese the authors give a summary of the most important diagnostic facts for examining patients with muscle diseases. They proceed further, in 12 chapters, to discuss the best-known forms of muscle diseases. Very complete clinical pictures are drawn up on these diseases as well as their causes, so far as is known, and their consequences in terms of genetic as well as paraclinical findings from chemical, genetic and EMG examinations. This is followed by suggested treatments and genetic advice, if possible. At the end they add a chapter of social and rehabilitation measures.

Each chapter is also provided with recent references. This easily read book can be warmly recommended to pediatricians, neurologists and orthopedists. Even those who are interested in human genetics will find valuable data in it.

J. J. Prick, Nijmegen