

International review of cytology. Volume 13. Edited by J. F. Danielli. Academic Press, 1984. Pp. vii + 196. Price £27.50, \$36.50(US).

This volume contains an arbitrary collection of five review articles. As the title is Nuclear Genetics the papers, by definition, deal mainly with eukaryotes. The contributions are on (i) nitrate assimilation; (ii) endocytosis and exocytosis in animal cells; (iii) stability of the cellular translation process; (iv) chromosome and DNA-mediated gene transfer in cultured mammalian cells; and (v) DNA methylation. There is no common theme and no obvious reason to group these papers under the title which is used. But as this is the last volume in this series to be edited by J. F. Danielli, who died on April 22 1984, this detail can be overlooked.

The first paper reviews the current state of knowledge on nitrate assimilation in plants and fungi—there being no nitrate assimilation by animal cells. There is a section dealing with the biochemistry of nitrate assimilation, a large section on genetic regulation of assimilation in fungi, and some useful summary tables on nitrate reductase structural gene mutants and molybdenum cofactor mutants in plants. The article concludes on an optimistic note by suggesting that this field of research is wide open to the activity of molecular biologists and genetic engineers who wish to further “understand the metabolic potentialities in eukaryotic cells” and to “enhance plant productivity through the application of recombinant DNA technology”.

The paper on endocytosis and exocytosis is concerned with understanding how animal cells transport molecules from their surrounding environment into their interior, and from internal compartments out to the cell surface. It describes the various organelles involved in this molecular traffic and the underlying biochemical mechanisms which are involved. The presentation is highly readable and brings this field of work well within the grasp of the nonspecialist.

The review on the cellular translation process is a well-written and philosophical account of genetic translation. It presents the generalised theory of error propagation in the flow of genetic information into proteins, covers the evolutionary origins of translation and gives an in-depth discussion on the error catastrophe theory of aging. While it is now well established that error feedback does occur, it is apparently unknown at present whether the level of this error is so small as to be unimportant or whether it may actually be the primary mechanism of cellular aging.

Gene transfer in cultured mammalian cells reminds us yet again how far the state of the science has advanced in animal tissue culture systems, and how far behind we are at present in any comparable work with plants. It reminds us too how these studies have been concentrated on a relatively small number of particular cell systems, how low is the rate of transformation and how much yet remains to be learned of the details of the gene transfer process. At the same time the authors point out how such work holds out great promise for applications

in terms of gene mapping, gene isolation and studies on the regulation of eukaryotic gene expression.

The contribution on DNA methylation deals exclusively with animal cells. The main concepts covered are (i) that DNA methylation is a “gene silencing mechanism”, (ii) the tissue specific patterns of methylation are established in the embryo and (iii) the formation of the patterns is brought about by levels of DNA methylase and the interplay between rates of replication and transcription of DNA.

Each of the articles comes complete with a full and extensive list of references and there is a general index covering all of the contributions. The volume is produced to the usual high standard we have come to associate with this series and it should find a useful place in the personal library of many of us who are engaged in teaching and research in genetics.

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Family studies in genetic disorders. A. J. Krush and K. A. Evans. C. C. Thomas, Springfield, Illinois, 1985. Pp. xi + 242. Price £28.50.

Over the last 15 years, “family studies” have become widespread in medical research. Due to this rapid growth, there have been inexperienced practitioners, resulting in studies which were, at best, ineffective. In area so vitally dependent upon the goodwill of its subjects, the unfortunate consequences of ill-planned studies can be far-reaching. In this text the authors have combined a wealth of experience in the practical organisation and conduct of family studies on both sides of the Atlantic, and presented it in a coherent and readable form.

The reader should not, however, rely on this book to provide methods of design and analysis. While the different approaches of “Type I” and “Type II” studies are usefully and clearly explained, few actual studies can be so neatly categorised. Such statements as “[for a recessive condition] . . . 60 probands would probably be a sufficient number” are at best controversial, and at worst misleading. One fears lest “unbiased ascertainment includes progeny of proband, progeny of sibs of proband, and of sibs of all on the ancestral list” become the accepted dogma of uncritical students understanding neither bias nor ascertainment, and be used to justify all manner of statistical aberrations. The first four chapters on the more theoretical aspects of family studies are useful only as a general guide to terminology and ideas. As such, however, they are useful, and may serve both to convince those coordinating studies that they need statistical advice, and those working directly with families that there is a known framework for the analysis of their results.

The remaining six chapters deal with the practicalities of approaching families, conducting questionnaires, obtaining a response, follow-up on interviews,

the general recording and organisation of data, and the responsibilities of researchers towards their subjects and in the publication of results. Here the authors are at their best. Their experience enables them to draw together a wide variety of problems in the organisation and conduct of family studies and to provide comprehensive advice to would-be researchers. While much of the material is anecdotal, and the problems seldom complex, anyone who has ever been involved in a family study will recognise how helpful this book would have been to them. Recognition of potential difficulties before they arise, and discussion of their solution, go a long way towards ensuring a well-conducted study. Not all the advice will be relevant to every study, and readers may disagree with some of the advice given, but a thorough discussion of these chapters by potential members of a research team would greatly benefit any proposed "family study".

The text concludes with a substantial body of appendices of example letters and forms which could be used in a family study, and brief but adequate glossary, references and index. Again, these examples could form the starting point in the design of letters to be used in a study: they cover many points that might well be overlooked by more inexperienced researchers. In all, the book can be recommended to anyone planning a family study, and to students as a basis for discussions of the responsibilities and problems that such studies entail. It is background reading rather than the definitive solution, but it provides background information that it could be important to have.

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Genes involved in microbe-plant interactions. D. P. S. Verma and Th. Hohn (eds). Springer-Verlag, Vienna. 1984. Pp. xiv + 393. Price DM 148.00; \$53.90 (US).

This book is the first in a new series concerned with the fundamentals and applications of plant gene research. The past 10 years have seen dramatic developments in plant cell and molecular biology, not only in the application of recombinant DNA technology, but also in tissue culture techniques, somatic embryogenesis, protoplast fusion and anther cultures. The developments of disarmed Ti plasmid vectors and methods of direct gene transfer mean that cloned genes can now be stably introduced into a variety of dicotyledonous plants; the same will probably be true for monocotyledonous plants before very long. These developments, together with the their considerable agricultural and biotechnological potential, have combined to make plant cell biology, biochemistry, molecular genetics and molecular biology particularly exciting and active areas of research. There is no doubt of the need for a series of books of this type.

The interactions between plants and microbial symbionts and parasites are extremely complex and, at first sight, may seem a surprising choice for the first volume of the series. However examination of the contents reveals that the book is dominated by *Rhizobium* and *Agrobacterium* and their plasmids, about which a remarkable amount of information has accumulated in recent years. These topics set the scene and point the way forward for other areas in which progress at the molecular genetical level is much more limited.

The first section of the book is concerned with recognition and consists of two chapters, one on host specificity in *Rhizobium*-legume interactions and the other on interaction of *Agrobacterium tumefaciens* with the plant cell surface. These are interestingly written, but one is left with the impression that there is very little definitely proved in these areas, particularly with regard to the lectin recognition hypothesis. Other aspects of recognition, for systems which do not justify separate chapters, are dealt with elsewhere.

The second section is one of the main strengths of the book. There are excellent chapters on legume-*Rhizobium* symbiosis with an admirable blend of biological, genetical, molecular biological and biochemical treatments. I particularly liked the chapters on nitrogen assimilation and hydrogenase. There is an interesting chapter on the molecular biology of stem nodulation and its potential compared with the more usually studied root nodulation and another on symbiosis and nitrogen fixation in non-leguminous plants. Also in this Section is a chapter on host-fungus specificity in mycorrhizae. The importance of this subject is emphasised by the fact that more than 90 per cent of all plant taxa form associations with mycorrhizal fungi and this justifies inclusion in the book. However there is almost nothing about this subject at the genetical and molecular biological levels and the chapter is therefore largely descriptive.

A further section on plant tumour induction is another major strength of the book. There is a thought-provoking chapter on the "opine concept" or "genetic colonisation theory" that "the overgrowths elicited by pathogenic strains of *Agrobacterium* are ecological niches in which a favourable environment is responsible for the propagation of the pathogen" which makes very interesting reading and may perhaps stimulate the further experimentation needed to obtain unequivocal proof for this concept. This is followed by excellent chapters on the gene organisation of the Ti-plasmid on which an impressive amount of information has now accumulated and on the role of hormones in tumorigenesis by *Agrobacterium tumefaciens* (crown gall), *Pseudomonas syringae* pv. *savastanoi* (olive knot) and *Corynebacterium fasciens* (fasciation and witches broom).

The final section contains two chapters on the genetic and biochemical basis of virulence in plant pathogens and defense responses in plants. These are large subjects on which entire books have been written. However I liked these chapters which contained concise summaries of the relevant material and managed to capture the