

exhibit cellular differences and preferential fertilization; in species with dimorphic sperm cells, one sperm cell has a greater chance of fusing with the egg. Zygote of plants with uniparental maternal cytoplasmic inheritance are cytoplasmically restrictive and male cytoplasmic organelles are shed by the time the sperms are mature and the male cytoplasm excluded from the egg.

Pathogenesis-related proteins have now been studied for several years in a variety of plants. The low molecular weight and cysteine-rich polypeptides — thionins — may also be involved in the defence against pathogens. In barley, the highest level of thionins is present in the outer cell wall of the epidermal cell layer. As thionins damage the plant protoplasts, it is conceivable that they play a role in the hypersensitive reaction. The cells close to the infection site could collapse forming a necrotic area and thus contain the further spread of the pathogen. Interestingly, several pathogenesis-related genes are also expressed during flowering in healthy plants. A chitinase gene is expressed at significant levels in mature tobacco flowers, β -1, 3-glucanases and endochitinases are also present in flowers of unstressed, uninfected plants. Their exact function is unknown at present but may be directly involved in pollen tube growth or be necessary for protection of the critical floral structures from pathogen attack.

In several crucifers and solanaceous plants, the self-incompatibility is controlled by S-locus. In *Brassica* 60 alleles of this locus are associated with stigmatic glycoproteins. These glycoproteins are basic and expressed maximally at the onset of self-incompatibility in the developing stigma. Now there is strong evidence for the involvement of additional genes in conferring the self-incompatibility phenotype. At the S-locus itself two multigene families may be present; one subset encoding the glycoproteins, while the other putative receptor protein kinases. At least two more S-locus-related genes, but unlinked to it, may also be involved. These genes express at a high level even in self-compatible strains (in which the glycoprotein gene is either non-functional or not expressed) and thus conceivably have an important role in pollination events. The selective expression pattern of the glycoprotein in the stigma has

made it possible to target toxin genes for the ablation of specific tissues of the flower. Using this strategy, new information on the function of stigma and transmitting tissue in the initiation of pollen germination and the growth of pollen tubes has been obtained. A major outcome has been the general availability of a method for the introduction of male sterility experimentally in transgenic plants.

The application of genetics and recombinant DNA techniques continue to profoundly affect the overall field of plant physiology. During development, the specification of the floral whorls seems to be under the regulation by a hierarchy of genes acting in an interactive manner through transcriptional factors.

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One of the most interesting topics covered in this volume is a new look at the current views on evolution. Can environmentally induced or acquired changes in organisms be transmitted to future generations? Does the inheritance of acquired characteristics play a part in evolution? The first of these articles 'The inheritance of acquired characteristics' by O. E. Landman questions the conclusions reached by molecular biologists in the first half of this century that there is no such thing as inheritance of acquired characteristics. The author deals with experimental systems that demonstrate inheritance of acquired characteristics.

The second article 'Ten unorthodox perspectives on evolution prompted by comparative population genetic findings on mitochondrial DNA' by J. C. Avise gives a clear enunciation of these perspectives from experimental data. They have been classified under four headings: genetic transmission, molecular

perspectives, intergenomic interactions and phylogenetic perspectives. The future research directions in this area, including a reexamination of nuclear genomes based on the findings in the area of mitochondrial genetics, are also given in this article.

The third article 'Plant mitochondrial mutations and male sterility' by M. R. Hanson gives an updated account of current knowledge concerning the nature of these mutations and their effects at the molecular, cellular, developmental and physiological levels. A characteristic of cytoplasmic male sterility mutations in plants, in contrast to the single base changes in human mitochondrial mutants is the presence of chimeric genes or chimeric loci; different open reading frames are joined together, or placed in proximal locations and cotranscribed with mitochondrial genes.

A related article 'Segregation distorters' by T. W. Lyttle deals with genetic elements that exhibit the phenomenon of meiotic drive, that is, the mechanics of the meiotic divisions cause one member of a pair of heterozygous alleles or heteromorphic chromosomes to be transmitted to progeny in excess of the expected Mendelian proportion of 50%. The system exists in a wide range of organisms and poses a constant threat to Mendelism.

The article 'Genetic mechanisms for adapting to a changing environment' by D. A. Powers, T. Lauerman, D. Crawford and L. DiMichele discusses the genetic variation uncovered by protein electrophoresis. These protein polymorphisms have been a subject of great debate between 'selectionist' and 'neutralist' groups. The authors demonstrate that a multidisciplinary approach will allow population biologists to resolve fundamental evolutionary questions posed by this phenomenon.

Molecular biologists will find a number of articles in this volume extremely interesting. 'Restriction and modification systems' by G. G. Wilson and N. E. Murray deals with the biology of restriction and modification (RM), the characteristics of RM systems and contrasts and comparisons between restriction-modification systems. A number of methyl-transferases of different specificities have been described and the regulation of the RM systems discussed. Approximately two hundred specificities

have been discovered.

'Different types of messenger RNA editing' by R. Cattaneo discusses six different types of RNA editing and their mechanisms. The most puzzling RNA-editing system is that of plant mitochondria. In fact, four out of the six RNA editing types discussed concern mitochondrial systems.

'Spontaneous mutation' by J. W. Drake describes selected advances in the analysis of spontaneous mutation and shows the current futility of mispairing schemes postulated in the 1950s. The existence of forces that could power the evolution of spontaneous mutation rates has also been discussed.

An article related to the above is 'Mechanisms and biological effects of mismatch repair' by P. Modrich. Mismatch correction has been divided into two groups: long-patch mismatch correction where the excision repair tracts can be a kilobase or more in length, and short-patch repair of 10 nucleotides or less identified both in bacteria and mammalian cells. The mechanisms of both are different and have been discussed in this article.

Still another related article is 'Modulation of mutagenesis by deoxyribonucleotide levels' by B. A. Kunz and S. E. Kohalmi. In this article the authors have focused on the pools of deoxyribonucleotide (dNTP) pool imbalances and one manifestation of genetic instability, namely, mutagenesis. Perturbations of dNTP levels during DNA replication produces a range of genetic effects associated with aberrant replication or failure to accurately repair DNA, including mutation, recombination, enhanced cellular sensitivity to DNA damaging agents, chromosome rearrangement, breakage and loss and oncogenic transformation.

Talking of oncogenic transformation, an interesting article is 'Loss of constitutional heterozygosity in human cancer' by D. Lasko, W. K. Cavenee and M. Nordenskjold. The article focuses on recessive mutations in retinoblastoma. But the information obtained with this tumour is also likely to be applicable to other tumours where the nature and interaction of genes will be more exciting.

There are two interesting articles on receptors. The first one, 'Transcription and activation by estrogen and progesterone receptors' by H. Gronemeyer,

attempts to explain how the receptor recognizes its target genes, which structures of the receptor are responsible for transcriptional activation, and the roles of agonists and antagonists in these processes. It also discusses aspects of estrogen and progesterone action that are still not fully understood.

The other article 'Molecular and genetic insights into T cell antigen receptor structure and function' by A. Weiss deals with the remarkable complexity of the structure of the eight-chain receptor, which has probably evolved in order for it to efficiently recognize peptide antigen and determinants of the major histocompatibility complex and to transduce signals across the plasma membrane. This review focuses on recent molecular and genetic approaches that have been used to study this complex oligomeric receptor and how such studies may provide insights into its normal function and also of other oligomeric receptors.

An article of general interest is 'Genetic control of cell interactions in nematode development' by E. J. Lambie and J. Kimble. Over the past decade it has become clear that the molecular controls of a nematode like *Caenorhabditis elegans* are similar to those in vertebrates. In this review the authors emphasize those interactions in this nematode which have been best characterized genetically and which have provided experimental accessibility for the analysis of regulatory cell interactions during development.

Plant geneticists would find the articles 'Genetic and developmental control of anthocyanin biosynthesis' by H. K. Dooner, T. P. Robbins and R. A. Jorgenson and 'Phytochrome: a light-activated molecular switch that regulates plant gene expression' by P. H. Quail particularly interesting.

Other articles include: 'Towards a genetic dissection of the basis of triplet decoding, and its natural subversion: programmed reading frame shifts and hops' by J. F. Atkins, R. B. Weiss, S. Thompson and R. F. Gesteland; 'Regulation of bacterial oxidative stress genes' by B. Dimple; 'Regulation of gene expression in fermentative and respiratory systems in *Escherichia coli* and related bacteria' by E. C. C. Lin and S. Iuchi; 'Regulation of expression of the late

genes of bacteriophage T₄' by E. P. Geiduschek, and 'Genetic analysis of yeast phospholipid biosynthesis' by D. M. Nickoloff and S. A. Henry

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Reliability Analysis and Prediction: (A Methodology Oriented Treatment). K. B. Misra. Elsevier Science Publishers B. V., Sara Burgerhartstraat 25, P. O. Box 211, 1000 AE Amsterdam, The Netherlands. 545 Dutch Guilders. 1992.

Apart from some early work on the reliability of the telephone system, emphasis was placed on reliability during the 1940/1945 war, where failure could be disastrous. Over the last 30 years there have been numerous books published on 'reliability' (some 130 are listed in K. B. Misra's book). The vast majority have been largely mathematical and usually specific to one section or aspect of reliability. For many years there has been a need for a comprehensive volume which would collate and summarize all the knowledge which has been accumulated by experience in reliability improvement over this period.

Such a book is now available in K. B. Misra's *Reliability Analysis and Prediction: A Methodology Oriented Treatment*. This book now provides the student, researcher or practical engineer, with all the knowledge he requires for his particular application. As a reviewer who pioneered reliability work in electronics for the Armed Forces in the 1940s; has lectured extensively worldwide and has written numerous papers, including three books on reliability, the reviewer has studied this book extensively and in his opinion it contains the most complete coverage of any book on reliability yet written. This is illustrated by the chapter headings, as follows: Reliability engineering: an overview; Reliability mathematics; Reliability data analysis and management; Reliability prediction from stress-strength Models; System reliability modelling; Reliability evaluation techniques; Maintainability