

with renal failure and the risks and benefits of oestrogen replacement in postmenopausal women.

Fentiman has highlighted a new drug on the horizon which appears to be a good prospect for the prevention of breast cancer, a major killer and one of the common cancers in women. Tamoxifen, originally synthesized for use as an oral contraceptive, has been proved to be as effective as high doses of oestrogens in patients with advanced breast cancer. It neither produces loss of bone density nor hypercholesterolaemia, and evidences suggest that the drug may be effective as a preventive agent.

Syncope and solitary pulmonary nodule are two clinical conditions which pose diagnostic dilemma because of their diverse aetiology and make therapeutic decision-making difficult because of potential serious consequences. Step-wise strategies for clinical evaluation and management of the two problems can be found in this volume.

Surgical topics are not sparse. The factors affecting the prognosis of patients with oesophageal varices and the options for treatment are given. The results of a multiinstitutional clinical trial by a study group in Japan comparing prophylactic portocaval shunt with conventional management as well as the results of metaanalysis of controlled trials comparing sclerotherapy with conservative treatment have been reviewed.

In the field of organ transplantation, the editors have chosen pancreas, lung and kidney transplantation.

Appropriately, pulmonary complications, a major cause of morbidity and mortality in patients who undergo organ transplantation have also been dealt with in a separate article, which emphasizes methods for prevention, diagnosis and management of these complications.

Both the surgeons and anaesthetists would find useful Hinson's informative write-up which gives an excellent description of the pathophysiology of mechanical ventilation along with a profile of commonly available commercial ventilators.

Atkinson, Orenstein and Krugman draw attention to the resurgence of measles in the United States during 1989-90. The authors describe the changing epidemiology of measles, ex-

plore the reasons for the resurgence and discuss potential means for better prevention of measles in the future.

To summarize, as in the past, the *Annual Review of Medicine* contains comprehensive and instructive records on a variety of common clinical problems as well as exciting subjects of current interest. Neurology is perhaps under represented. None of the subjects in dermatology has found a place in this volume. Every year, I miss in *Annual Review of Medicine* the auto-biographical sketch which is a regular feature of *Annual Review of Biochemistry and Annual Review of Microbiology*.

C. C. KARTHA

Division of Pathology
Sree Chitra Tirunal Institute
for Medical Sciences and Technology
Thiruvananthapuram 695 011, India

Annual Review of Plant Physiology and Plant Molecular Biology 1991. Vol. 42, W. R. Briggs, R. L. Jones and V. Walbot, eds. Annual Reviews Inc., Palo Alto, California, 94303, USA, 1991. 762 pp.

This volume contains twenty-five reviews grouped under biochemistry and biophysics, genetics and molecular biology, cell differentiation, tissue, organ and whole plant events and acclimation and adaptation. The prefatory chapter by E. Marré gives a personal glimpse of motivations for research and relationship between plant physiology, biology and the unity of life.

In the field of stress physiology, a far more dynamic communication between root and shoot is emerging. Leaf conductance and extension rate rather than the water potential seem to be more useful indicators of water stress. The association of low stomatal conductance with a high water potential indicates that stomata regulate the leaf water status. There is strong evidence that plants can sense the water status of soil around the root and communicate this information to the shoot through a signalling mechanism. These signals seem to regulate also leaf initiation and its overall development. The signals have yet to be identified but abscisic

acid (ABA) seems to be involved. Its level increases substantially following mild soil drying and in corn the xylem ABA levels correlate well with the soil moisture.

The role of homeotic genes in plant development has now emerged as a very fruitful area of research and it is in this area that major advances will occur in the near future. Teratologies, several of which represented homeotic transformations, were studied and catalogued in the 19th and early 20th centuries but it is only now with the application of molecular genetics to *Antirrhinum* and *Arabidopsis* that useful models of flower development have been proposed. In *Antirrhinum*, the wild-type *floricaula* product regulates the transition between inflorescence and floral meristem and in its absence, flower is replaced by an indeterminate shoot. This class of general mutations has also been identified in alfalfa, tomato, maize and *Arabidopsis*. The analysis of whorl identity mutants, especially those that affect the identities of organs in two adjacent whorls is proving very incisive in formulating models to explain the specification of various whorls. The homeotic genes such as *deficiens*, *agamous* and *floricaula* probably function as transcription activators and their expression is transient and restricted to specific whorls.

The isolation and characterization of organ or tissue-specific genes continues to be a major research activity. Surprisingly there is substantial overlap (60-65%) between the genes expressed in pollen and in vegetative tissue. A thiol endopeptidase (TAS6 gene) may be involved in the degeneration of the connective and stomium prior to another dehiscence. Likewise two genes encoding enzymes for the digestion of extracellular polysaccharide material in the stigma and style have also been identified. The S-gene product in *Nicotiana glauca* has ribonuclease activity and a differential degradation of RNA in elongating pollen tubes may be a critical part of the incompatible response. In higher plants the sperm cells are highly organized and living sperms have been isolated in several species. The sperm cells are connected to one another, physically associated with the vegetative nucleus and transported within the pollen tube as a linked unit termed the male germ unit. The two sperm cells

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.

M. M. JOHRI

*Molecular Biology Unit
Tata Institute of Fundamental Research
Bombay 400 005, India.*

Annual Review of Genetics 1991. Vol. 25. A. Campbell, B. S. Baker and E. W. Jones, eds. Annual Reviews Inc., Palo Alto, California, 94303, USA. 1991, 682 pp. \$ 45.

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