It has a precisely documented subject index for easy browsing of the book. The book will be an invaluable resource for researchers, teachers and students in the field of plant pathology.

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Annual Review of Plant Biology, Vol. 56. S. Merchant *et al.* (eds). Annual Reviews, 4139 El Camino Way, P.O. Box 10139. Palo Alto, California 94303-0139, USA. 2005. 515 pp. Price not mentioned.

The *Annual Review of Plant Biology* (2005) edited by S. Merchant *et al.*, is as expected a collection of reviews summarizing recent advances in some exciting areas. The various articles are representative of current research in the area of genetic and epigenetic regulators of developmental fate; metabolic pathways; membrane dynamics and functions; interaction between plants and the environment. I summarize here some of the excellent reviews as examples of the resources in this volume. In addition to these research reviews is an interesting article by Peter Starlinger entitled 'Fifty good years', that chronicles the exciting decades of bacterial and phage genetics in the early days of The Cologne Institute of Genetics. He gives a vivid account of the transition of their research on bacterial IS elements to their pioneering work on the Sh-locus of maize that led to the co-discovery of the plant transposable element Ds. He touches on the active engagement between his laboratory and other maize geneticists that opened the way to study maize genes and transposable elements – a subject that captivated his attention until retirement. His commitment to teaching as a University Professor is evident from the importance he gave to teaching genetics, and 'Spring Meetings' organized to capture recent research progresses. He voices his opinion on the need for dialogue and debate between scientists and society that could shape the opinion of educated public. All in all, an engaging, insightful and inspirational article.

There are about eight articles in the general area of developmental and cellular aspects of plant architecture. Leyser and Steen review the diversity of axillary meristem branching in dicots and monocots, highlighting the contribution of regulatory factors. Axillary meristem initiation, its outgrowth, its dormancy, and the role of auxin are topics of discussion, where advances made in *Arabidopsis* and tomato are summarized. By studying markers for apical meristematic cells, like *STM*, in wild type and mutants that lack axillary meristems, the origins of these meristems are being understood. The role of dynamic auxin fluxes that pattern organ initiation at the shoot apex is discussed with regard to axillary meristem development. Studies on bud outgrowth are reviewed, where it is evident that auxin action recruits yet another hormone, cytokinin as second messenger. New components of the auxin signalling pathway controlling bud morphogenesis were identified as the *Arabidopsis* MAX 1, 3, 4 genes whose homologues in pea and tomato are also involved in regulation of branch development. The article also provides an excellent review of the similarities and differences in axillary meristem development between monocot and dicots. The authors discuss regulatory factors controlling branching during vegetative growth and inflorescence development in model grasses such as maize and rice. Of interest are their discussions on factors like MOC1 that act as expected in vegetative axillary meristem initiation and outgrowth, in addition to acquiring a monocot-specific role in inflorescence branching. The genetic regulators of the branched inflorescence of maize and rice are well summarized. The authors point out that the interactions between these transcription factors and signalling molecules like auxin and cytokinin are unknown and are areas of future work. In summary, the article lucidly draws out the parallels between monocots and dicots and not surprisingly, discusses the several monocot-specific factors that could underlie the large diversity seen in monocot axillary meristem development. Fischer and colleagues discuss chromatin structure and epigenetic factors influencing gene expression, the maintenance of chromatin states through mitosis and chromatin modulation during plant development. This area finds parallels to several recent discoveries in animal development, where maintenance of the body plan requires the activity of chromatin modifiers. The article summarizes the discovery and functions for ATP-dependent remodelling complexes as known in yeast. Several of these factors, in *Arabidopsis*, control shoot development, flowering time, carpel development and transgene silencing. The role of histone modification – acetylation and deacetylation, methylation, the functions for Histone protein variants, DNA methylation, and RNAi-dependent changes in chromatin dynamics are reviewed and well outlined. The new roles for DNA glycosylases and DNA methylases in gene imprinting are discussed. The accompanying review by Sung and Amasino, adds greatly to our molecular understanding of how plants remember past encounters with winter. They succinctly review how exposure to a prolonged cold winter promotes the competence to flower in *Arabidopsis*. The genetic network controlling expression of *FLC*, a repressor of flowering, involving the VRN1, VRN2 and VIN3 chromatin remodelling factors are well outlined. The review also provides information on loci in other plants, particularly wheat, barley and *Brassica*. Despite these revealing molecular details, mechanisms that measure the duration of cold are not known. They outline the challenges that remain in this field – how are the chromatin remodelling complexes targetted to flowering repressors? Does this system operate in other flowering plants? And importantly, what is the clock that measures duration of cold exposure? Hong Ma provides in his article, an in-depth review of the genetics of stamen and pollen development. The review begins with the molecular control of stamen primordia specification summarizing the importance of Class *B* and *C* genes in specifying male reproductive organs in both angiosperms and gymnosperms. The article then reviews the recent reports analysing anther and pollen differentiation. The role of the *Arabidopsis SPL* gene in early aspects of anther cell differentiation and some genetically identified candidate targets for SPL acting to specify meiocytes and the tapetal cell layers are summarized. The article also reviews the genetic control of meiosis in *Arabidopsis*, where recent studies have gained advantage from prior knowledge on budding yeast. The article also reviews the literature of genes that act gametophytically, to control pollen de-

velopment, where recent studies have uncovered aspects of cell-division control. Finally, the roles of regulatory factors and hormones in anther dehiscence are discussed.

Takayama and Isogai discuss recent studies on pollen–pistil interactions that drive self-incompatibility (SI) in many species. The SI system represents a collection of divergent mechanisms – those operating in Brassicaceae, Solanaceae and Papaveraceae are best understood. In Brassicaceae, the SRK receptor on the female stigmatic papilla, when bound by incompatible pollen expressing the SP11 male determinant, drives a signalling cascade. Other stigmatic factors act as positive mediators of signalling. The downstream aspects of this cascade are not well characterized, but the current data suggest a role for ubiquitination-triggered degradation. An entirely different mechanism operates in Solanaceae, Rosaceae and Scrophulariaceae, where the female determinant is a S-RNAse, similar to the fungal T2 ribonucleases. Pollen specificity is conferred by hyper variable regions. The pollen-borne determinant was recently identified through genomic studies in Petunia, tomato and Antirrhinum, and was termed SLF/SFB which encodes a F-box factor that is, usually an adaptor for E3-ubiquitin ligases. The mechanistic details of how these RNAses trigger haplotype-specific pollen degradation are still not understood. Data from Papaveraceae species show the female determinant to be a secreted protein, whose interactions with an assumed pollen-haplotype-specific receptor trigger a Ca^{++} signalling pathway. The authors bring out the point that all of these different SI systems support the view that SI evolved independently, multiple times, possibly by recruiting genes involved in cell–cell communication in other pathways.

Jurgens and colleagues review recent studies on membrane and cytoskeleton dynamics that occur during somatic cytokinesis. Here the coordinated delivery of membrane vesicles to the centre of the cell division plate generates a transient membrane compartment – cell plate (phragmoplast). They discuss reports indicating that these membrane vesicles arise from Golgi stacks and they also review data that show an endosomal origin for these vesicles. The authors detail studies on mutants like *knolle* (syntaxin), *keule* and *gnom*, the reverse genetic analysis of factors predicted to act in vesicle dynamics, recent studies using electron tomographic analysis of somatic cell plate formation, role of cytoskeleton in formation and stability of the cell plate. These together give us a better understanding of this essential cellular process.

In a related review Peer and colleagues discuss plasma membrane protein internalization and recycling mechanisms, where they bring out features common to plants and other organisms. They discuss the literature on the identification and characterization of *Arabidopsis* Adaptin, ARFs, dynamins, Rab GTPases, and SNAREs. Their discussion on endocytosis and the role in auxin transport is extensive and increases our current understanding of the functions played by PIN proteins as auxin efflux carrier proteins. Pharmacological studies on factors like the GNOM (ARF-GEF) are well reviewed and enhance our understanding of polarity establishment and dynamics in plant cells. The area of chromatin structure dynamics and its effects on developmental gene expression is reviewed in two related articles.

Wobus and colleagues in their article on legume seed development, elucidate this system as an example for investigations on tissue-specific progression of differentiation. The review focuses on aspects of metabolic and hormonal regulation to highlight new studies that show a network of signalling molecules, ABA, sugars, and SnRK1 kinases to control specific programmes in seed development. The authors discuss data implicating a role for sucrose signalling molecule that affects transcriptional and post-transcriptional processes to affect carbon fluxes.

The current excitement in the area of plant metabolism and signalling is reflected in the articles that review the role of calmodulin-binding proteins (Fromm and colleagues), calcium oxalate and its function (Franceschi and Nakata), starch degradation (Smith and colleagues), and Redox regulation (Buchanan and Balmer). Each one of these extensive reviews provides a wealth of information, which are all up to date and well illustrated. For example, Nambara and Marion-Poll review the biosynthesis and catabolism of abscisic acid. Recent genomic approaches in *Arabidopsis*, identified ABA-8′-hydroxylases as the first commitment step in ABA catabolism, and these are well summarized. Transcriptional regulation of ABA metabolism by external (dehydration, osmotic stress) and endogenous signals (GA and brassinolide) and some emerging data showing post-transcriptional regulation are presented. The review ends with a perspective on the evolution of these metabolic pathways. Some aspects of plant interaction with the environment are reviewed in articles on evolution of scents and flavours (Gang), carbon dioxide concentrating mechanisms (Raven and colleagues), phytoremediation (Pilon-Smits) and pathogen interactions (Mudgett). The article by Mudgett provides an insight into the functions of Type III effectors from phytopathogenic bacteria that allows the colonization of plant tissues. New studies that dissect the molecular and biochemical action of TTSS effectors are the main focus. The papers discussed highlight how these factors suppress the innate immunity system of plants by interfering with the activation of resistance proteins, MAPK signalling and execution of programmed cell death. In many instances sequenced genomes, protein structure prediction programmes and discovery of catalytic domains in effector proteins proved critical in this field. The review also outlines key outstanding issues – most important of which is how TTSS effectors contribute to co-evolution of bacteria–plant interactions.

The volume is thus a collection of well-written articles on diverse areas of plant biology.

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Himalayan Snow and Glaciers, Associated Environmental Problems, Progress and Prospects. Jagdish Bahadur. Concept Publishing Company, New Delhi. 2004. 164 pp. Price: Rs 300.

The book under review is Series No. 7 on *Discovering Himalayas* and perhaps the first of its kind on Himalayan snow and glaciers in recent times. This short book attempts to provide the reader an introductory overview of Himalayan snow, glaciers, ice ages, process of glaciation, and outlines the status of international efforts for the study of Himalayan glaciers