has been proposed to postpone/prevent collapse of ancient masonry structures. Exhaustive experimental results on this new technique have been discussed. The bed joint reinforcement technique leads to improved capacity for masonry in resisting lateral strains and stresses, and hence improved performance against creep damage. The experiences of using such techniques have been demonstrated through the discussion on real-life case studies on conservation. The book ends with a chapter on the illustration of simple checks/measures in assessing the health of old structures in order to prevent the collapse of historical masonry structures and a probabilistic model for the assessment of historic buildings. Compiling such a book is not possible without the commendable efforts from the editor and the authors of various chapters.

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Annual Review articles are meant to be written for students and therefore are supposed to focus more on key concepts, discoveries and the nature of the experiment rather than merely being an assembly of facts, and the latest in this series also fulfils the same. Teaching cell and developmental biology is always challenging due to the ever-increasing sophistication of the techniques and complexity of the subject. This treatise undoubtedly proves to be a valuable guide for students and established researchers alike, who wish to learn about the latest discoveries and conceptual developments in cell and developmental biology.

In accordance with the traditional format, the first chapter provides a perspective into the research career of Mary-Lou-Pardue, a pioneer in studies of the *Drosophila* polytene chromosomes and the expression of ribosomal and heat shock genes in fruit fly. Pardue narrates how the development of *in situ* hybridization technique revolutionized our understanding of chromosome function. Initially she exploited on the array-like organization of the polytene chromosomes with well-identified chromatin landmarks to study the distribution as well as the interphase chromatin structure of 'interesting' DNAs that did not code for proteins. Technological revolutions in the past few years have enabled us to answer questions regarding chromosomes at the level of the DNA sequence. However, the regions of repetitive DNA pose problems for sequence assembly and are poorly annotated in currently assembled genome databases. In very early days, Pardue realized the special contribution of repetitive DNAs towards chromosome structure and function. Her work using mouse satellite DNA and *Xenopus laevis* 5S RNA genes suggested that such sequences can affect chromosome structure and in turn their function. Thus, significant part of research in her laboratory was devoted to study various repeats and how their location reflects chromatin structural and functional states, e.g. hetero- and euchromatin. Finally, her group also found that *Drosophila* telomeres consist of and are maintained by special non-LTR retrotransposons.

Early heart formation has been the favourite model for developmental biologists to understand the morphological and molecular events that dictate organ development. However, there have been discrepancies in the literature, giving rise to a confusing picture. The review by Abi-Issa and Kirby makes a concerted effort in discussing ways to explain such discrepancies using available data and offers a comprehensive picture of major events involved in the formation of the heart tube from bilateral progenitor fields using the chick and mouse models. Vascular and neural systems have dominated the studies on developmental programmes. There are a number of reviews describing such systems, including those on the cell biology of semaphorins in axonal guidance, synaptic plasticity, and the three-dimensional complexity of the cerebellum.

Despite the large body of knowledge regarding the cellular basis of wound repair, the primary transcriptional regulators responsible for it have been identified only recently. The review by Schafer and Werner summarizes the knowledge on their regulation and function in the repair process. Wounding affects the expression of multiple transcription factors at the edge of the wound and their post-translational regulation. Interestingly, similarities are found in the signalling pathways and transcription factors that regulate dorsal closure in *Drosophila* embryos and wound healing in adult flies and mice. Evidence for interaction of various transcription factors at the wound site has been obtained very recently and suggests the existence of a complex transcriptionnal network that regulates efficient repair. Understanding such networks will allow the identification of novel targets for the treatment of wound-healing disorders. Another review describes the role of the glucosaminoglycan hyaluronan in tissue injury and repair. Turnover of extracellular matrix components is an important aspect of tissue repair and remodelling. The interactions between matrix component hyaluronan and its signalling receptors such as CD44 initiate inflammatory responses via toll-like receptors, maintain structural integrity of cells, and promote recovery from tissue damage. Much of these events has been studied using acute lung injury as a model and studies with other tissue injury models are awaited.

Animal models are preferred for studies on developmental systems and this fact has also reflected in the number of reviews dealing with plant systems. This volume has only two reviews on plant systems – one discussing the role of SNARE-domain proteins in plant biology and the second about embryonic patterning in *Arabidopsis*. Members of the superfamily of *N*-ethylmaleimide-sensitive factor adaptor protein receptor (SNARE)-domain-containing proteins are instrumental for vesicle-associated membrane fusion events during transport processes between individual compartments of the endomembrane system, inclusive of exocytosis and endocytosis. Recent genetic studies have indicated the role of SNAREs in essential developmental processes such as cytokinesis, autophagy and physiological responses such as shoot gravitropism, pathogen defence, symbiosis, and abiotic stress response has been discussed. Interestingly, there is increasing evidence for the existence of lipid rafts in plants and few SNARE isoforms seem to be associated with lipid raft-like plasma membrane microdomains opening exciting new avenues for research in this field.

The contribution of microRNAs (miRNAs), small non-coding RNAs that play an important role in post-transcriptional gene regulation, has been shown to be important for diverse biological processes and diseases in the past few years. Not surprisingly, a detailed review on miRNA functions has found a place in this volume. The review describes the molecular mechanism of miRNA biogenesis and target identification. miRNAs act as developmental switches, helping to fine tune developmental programmes. Intriguingly, the biological roles of miRNAs in development and diseases are seemingly as diverse as their modes of action, indicating that we have only discovered the tip of the iceberg.

T-cell development takes place in the thymus, which receives bone marrow-derived progenitors and supports multistage lineage commitment and differentiation steps to generate mature, self-tolerant and functional T-cells. In a comprehensive review, Ciofani and Zuniga-Pflucker discuss how the thumus functions as an inductive site for T-lymphopoiesis. Although this topic has more to do with immunology, it has found a unique niche in cell and developmental biology owing to the large number of studies pointing at the role of thymic stromal elements, cell migration, cell-to-cell communication and signalling. This review focuses on the early events in T-lymphopoiesis, especially with respect to the nature of thymus-derived signals delivered to T-cell progenitors that support the commitment and differentiation of T-cells. One kind of specialized T-cells called cytotoxic T-lymphocytes (CTLs) play a vital role in the immune system by recognizing and destroying virally infected and tumourigenic cells. Another review focuses on recent advances delineating the molecular basis of polarized secretion from CTLs and the mechanism used by these cells to deliver their lethal punch. This review focuses more on the mechanisms of secretion and use of genetic diseases to identify proteins involved in secretion. Another review article specifically describes multivesicular bodies that are involved in protein degradation.

No treatise on cell and developmental biology can be complete without a discussion on stem cells, especially since stem cell biology has provided an excellent platform to address key questions in cellular and developmental biology. This volume contains reviews on two important issues in stem cell biology – control of germline stem cells using the nematode worm *Caenorhabditis elegans* as a model system, and the biology of cancer stem cells. Controlling the switch between mitosis and meiosis is the key to the life cycle of many lower organisms. In *C. elegans*, the GLP-1/notch signalling pathway is essential for this transition. The sperm/oocyte decision is also controlled by many of the same regulators that are involved in the mitosis/meiosis decision. Using the 'systems' approach towards understanding biological networks and molecular circuitries has provided unprecedented insights on biological phenomena. The regulatory circuitry controlling hermaphroditism in *C. elegans* provides an accessible model for in-depth analyses of network evolution. A major breakthrough in cancer research has been the discovery that cancer stem cells play a major role in tumour heterogeneity. Understanding cellular hierarchy is critical for understanding the role of cancer stem cells in tumourigenesis. Mouse leukaemia models provided the first unequivocal evidence that progenitor cells can give rise to lymphoid stem cells. The review therefore starts with the description of these models and then goes into details of various solid tumour cells. A key to understanding tumour progression is to understand the signalling pathways, and this review also describes master control signalling pathways that regulate cancer stem-cell functions. Finally, the review focuses on clinical implications of cancer stem cells and underscores specific therapeutic targets that can more effectively target and eliminate cancer stem cells and not normal stem cells, and will be less toxic and more effective than current therapies.

Although this volume has few reviews directly dealing with topics in developmental biology, what is striking is how much of cellular and molecular basis is covered in some specific chapters detailing a single well-defined issue. There has been an explosion of knowledge in many of these areas and therefore we find few articles that provide a broad perspective of the field, while most others are narrow in scope. Nonetheless, most of these articles are written well and are also accompanied by useful illustrations as well as a perspective into the future directions. It is heartening to note that multiple chapters describe futuristic strategies for novel target discovery and/or better therapy, providing a clear view of the direction in which the field is moving. This volume of the *Annual Review of Cell and Developmental Biology* is highly recommended to all libraries.

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