indicates that UV radiation is a component of DVM only among the UV-sensitive daphnids inhabiting highly transparent waters.

The next chapter is on the distribution of *Daphnia*. Experiments are described in the context of ideal free distribution and deep water chlorophyll maximum, but only to suggest future experiments.

The sixth chapter on the parasites of daphnids enumerates a series of bacterial, fungal and protozoan parasites. By sequencing relevant recent information on epidemeiology, prevalence, horizontal and vertical distribution, modes of infection, spore survival, multiple infection, virulence, fitness and defences of the host, etc. the book has not left any area untouched. This chapter may prove useful to aquaculturists interested in the culture of live feed organisms, and traders and policy makers to frame laws for import and export of resting eggs/cysts (e.g. *Artemia*) of live feed organisms.

Most interesting is the chapter concerning dormancy of durable 'resting eggs' in the context of dispersal, colonization, life-history strategies and bed-hedging. The resting eggs of copepods are known to successfully hatch even after 350 years of dormancy, but the hatching success of the daphnids is limited to 50 years only. However, for reasons not yet known, <1% eggs alone hatch for every square metre area of sediments containing 2500 viable, dormant eggs of *Daphnia galeata mendotae* and 5000 eggs of *D. pulicare*. Incidentally, these values for the density (no./m^2) of resting eggs may be compared to 4000 and 122,000 eggs reported for the marine cladocerans *Podon polyphemoides* and *Penilla avirostris* respectively[1]. That the DNA can be extracted from the dormant eggs of *Daphnia* and that its 200-yr-old epihippia can be used to trace environmental and anthropogenic changes induced on climate, acidification, eutrophication, pollution, etc. open totally new avenues for fascinating research.

The last chapter on the genomic future informs the availability of complete genome of *Daphnia pulex* and sequencing of *D. magna*, which is in progress. It is heartening to know about the participation of 375 researchers from 19 countries in the *Daphnia* Genomics Consortium. With the ongoing interest in environmental genomics, the cladocerans have a lion's share of 8% in the nearly 500,000 references in the ECOTOX database. With these developments, *Daphnia* shall certainly become a smart model organism for research in ecology and evolution.

Lampert needs to be complimented for having comprehensively summarized relevant information citing 568 references from publications widely scattered in 120 journals, and 60-odd books. Yet a glaring omission is the total negligence/ignorance of publications concerning tropical daphnids. It is rather unthinkable of a book, which neglects the Japanese contribution; Miyakawa *et al*. (2010) is the only Japanese publication cited in the book. Lampert could have much benefitted, had he referred to at least one review dedicated to O. Kinne on his 70th birthday[2]. In keeping up with the excellent tradition of the series edited by Kinne, the book is a useful addition to biologists, limnologists and aquaculturists.

1. Onbe, In Proceedings of the Symposium on Warm Water Zooplankton, NIO, Goa, 1977, vol. 1, pp. 383–398.
2. Pandian, T. J., In *Reproductive Biology of Invertebrates* (eds Adiyodi, K. G. and Adiyodi, R. G.), Oxford & IBH Publishers, New Delhi, 1994, vol. VI, pp. 39–166.

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This volume is a collection of several comprehensive, critical and readable reviews on a wide variety of topics such as stem cells, membrane transport, cell migration, chromatin remodelling, novel cellular imaging techniques, systems biology, etc. The book begins with a perspective chapter by John Gerhart, who has made pioneering contributions in the areas of enzyme regulation, early amphibian development and evolutionary biology. Gerhart and his colleagues had analysed the feedback inhibition of aspartate transcarbamoylase, the first enzyme of the pyrimidine biosynthesis pathway, which served as a model of allosteric regulation. Later on he studied the axis formation in early development using *Xenopus* egg as model system. His work described cortical rotation, a 30° movement of the egg's cortex over tracks of microtubules.

One of the most exciting topics of research is stem cells which draws the attention of researchers from a wide variety of backgrounds. This excitement in stem cell research is due to the perception that these cells have the potential to generate desired tissues under appropriate conditions which could possibly be used to treat patients who have permanently damaged tissues. Three articles in this book deal with different aspects of stem cells.

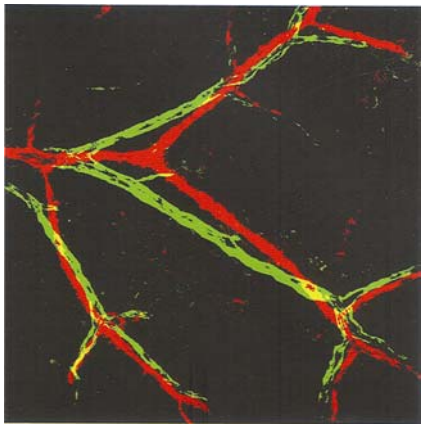
The main feature of embryonic stem cells is that they possess the potential for self-renewal as well as the ability to generate all cell types (pluripotency). In contrast to embryonic stem cells, the tissue stem cells have more limited potential for self-renewal and development (multipotency). A combination of some transcription factors (Oct 4, Nanog, Sox 2, c-Myc) can induce a state resembling pluripotency in cells derived from adults. During the last 5 years, impressive progress has been made in understanding molecular mechanisms underlying pluripotency. Lessard and Crabtree provide an excellent review on 'Chromatin regulatory mechanisms involved in pluripotency'. A combination of several approaches such as genome-wide analysis, proteomics and genetics has advanced our understanding of the molecular mechanisms of pluripotency, which is a heritable and stable state. Chromatin remodelling plays an important role in this process and the role of various chromatin-remodelling complexes in pluripotency is reviewed in this article.

How do stem cells recognize and process various biochemical and biophysical signals which collectively regulate their function and cell fate? Recent work has shown the importance of solid-phase mechanical and immobilized biochemical signals in tissue development and homeostasis. Various engineered materials and cell-culture systems provide a means of studying the regulatory role of microenvironmental signals in regulating the behaviour of stem cells.

The article by Keung *et al*. 'Presentation counts: Microenvironmental regulation of stem cells by biophysical and material cues', is informative and provides a readable review of recent progress.

Our heart is composed of diverse cell types and this diversity is produced by multipotent cardiovascular progenitors. Multipotent ISL-1 positive cardiovascular progenitors can give rise to cardiac myocytes, smooth muscle and endothelial cells. The article by Kiran Musunuru *et al*. on 'Stem cell models of cardiac development and disease' summarizes recent findings. They suggest 'we have arrived at an era in which patient-specific cell and tissue models are now practical'. The authors also suggest that the key challenge would be to make use of these models to advance our understanding of molecular basis of cardiovascular diseases and to screen for genes and drugs that can benefit a large number of patients worldwide.

Eukaryotic cells contain several intracellular compartments which are bound by membranes. The transport of proteins, lipids and other constituents from one such compartment to another is generally carried out by membrane-bound vesicles or other carriers. These vesicles bud from one compartment and carry the cargo to another compartment, which involves several steps. This vesicle trafficking process is exquisitely specific. Recognition of the specific target compartment by vesicles before their fusion is an important step. In addition to Rab and SNARE proteins, tethering factors play an important role in membrane trafficking. Tethering factors mediate initial connection between trafficking vesicles and their target membranes. Yu and Hughson have provided a nice review on 'Tethering factors as organizers of intracellular vesicle traffic'. Recent work has clearly shown that tethering factors are required for vesicle capture and they may also be involved in vesicle uncoating, SNARE assembly and membrane fusion. William Wickner has provided a review on 'Membrane fusion: Five lipids, four SNAREs, three chaperones, two nucleotides, and a Rab, all dancing in a ring on yeast vacuoles'. The author has given an in-depth account of mechanisms of membrane-fusion events which have been learned from *in vitro* reconstitution experiments. Some other reviews deal with specialized roles of membranes such as 'Trafficking to ciliary membranes: How to get across the periciliary diffusion barrier' by Nachury *et al*. and 'α-Synuclein: Membrane interactions and toxicity in Parkinson's disease'.



Coalignment of nerves and vessels in mouse skin.

Although cell motility and adhesion are not novel topics, the underlying molecular mechanisms of these phenomena are still not completely understood. Gardel *et al*. have reviewed the recent work on 'Mechanical integration of actin and adhesion dynamics in cell migration'. This is followed by an article on 'Cell motility and mechanics in three-dimensional collagen matrices' by Grinnell and Petroll. 'Rolling cell adhesion' by McEver and Zhu provides a review of rolling adhesion on vascular surfaces, which plays a role in the recruitment of circulating cells (leukocytes, hematopoietic progenitors and platelets) to specific organs or to sites of infection or injury. Rolling cell adhesion involves rapid, yet balanced formation and breakdown of adhesive bonds in an environment where blood is flowing. 'Assembly of fibronectin extracellular matrix' by Purva Singh *et al*. describes the molecular and cellular mechanisms involved in the assembly of fibronectin dimers into fibrillar matrix. The extra-cellular matrix is a dynamic structure which is essential for organizing tissues, cellular microenvironments and stem-cell niches.

The nervous and vascular systems of vertebrates show many common features, including anatomical similarities such as highly branched layouts. For example, nerves and blood vessels show an impressive degree of coalignment in mouse skin. Recent work has shown that these similarities are also seen at the molecular level, even though these systems have different anatomical origins. Melani and Weinstein have provided an interesting review on 'Common factors regulating patterning of the nervous and vascular systems'. High metabolic demand of the neuronal system requires close coordination with the vascular system for the supply of nutrients and oxygen. Neurotrophins (nerve growth factor, brain-derived neurotrophic factor) and their receptors play an essential role not only in the survival of neuronal cells, but also in the survival of endothelial cells and angiogenesis. Four major families of proteins (ephrins, semaphorins, netrins and slits) are required for the correct patterning of the nervous system as well as the vascular system.

The term 'paramutation' is used to describe meiotically heritable changes in gene expression that are induced by interactions between homologous chromosomes. The process of paramutation is not associated with alterations in the nucleotide sequence of chromosomal DNA. An example of this process is colour phenotypes of male flowers and leaves of inbred maize plants. An interesting and elegant review by J. B. Hollick on 'Paramutation and development' points out that there are common regulatory mechanisms involved in paramutation and normal plant development. A role for RNA polymerase IV and small RNA in this process is discussed.

There are several other articles of interest in this book and it is not possible to describe all of them. 'A new wave of cellular imaging' by Toomre and Bewersdorf provides an excellent and critical review of recent advances in light microscopic imaging techniques, which is of general interest. Some articles are of specialized interest such as 'Plant nuclear hormone receptors: a role for small molecules in protein-protein interaction', 'Diverse functions of oxysterol binding proteins', etc. This book concludes with a review on 'A decade of systems biology' by Chuang *et al*., which would be useful to many cell and developmental biologists who want to apply systems approaches to their areas of interest.

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