giving scope for some interesting questions involving evolution of shapes.

The next subject is velocity gradients, and boundary layers are introduced in a simple way laying emphasis on the geometries encountered in biological systems. Vogel captures the essence of boundary layer by saying that 'it is a place to hide from drag'. But, of course, hideouts have disadvantages too, since then there is a barrier to exchange of matter and energy. Consequently, there arise a whole lot of optimal existential problems. Thus, 'there is a price in drag to be paid versus paying in the harder currency of lift' due to their asymmetric shapes, cost of drag to be balanced against being away from the source of food, and penalty to be paid in terms of dispersal of spores for saving on drag, etc.

Then come the important concepts of vorticity, circulation and lift. Common mechanisms by which vorticity is generated are discussed followed by the topics of gliding, soaring, flying, and swimming.

The internal flows occupy the attention of the author in the next few chapters. As usual, the prototypical pipe flow is discussed. Here again the balance between power required to maintain the flow versus the decreased transport rates from wall in the absence of convection is brought to focus. Another problem faced by big organisms is the distribution of nutrient-carrying fluids to various corners of the body. This gives rise to Murray's law with its wide-ranging validity. This is fairly important given that the fraction of the metabolic rate spent on keeping the flow is considerable.

The next topic covers the low Reynolds number external flows. Here the flow is slow and the transfer rates are also low. Diffusion is the source of food, and one would have to work very hard to move in order to enhance the transport rates. Though motility is available, one is perhaps better off waiting, a fact humorously explained by the notion of 'a casual cow who, after eating, just waits for the local grass to regrow'. No discussion of creeping flows is complete without a discussion of terminal velocities. Vogel points out its relevance to survival, by citing the various structures developed by airborne particles – pollen grains, etc. – in order to maximize the dispersal distance, which has a direct bearing on fitness. The long rangedness of low Reynolds number flows is beautifully brought out by showing its relevance to information transfer by flow disturbances in the environment. The creepy games of preys and predators are subject to this feature of the creeping flows. The book ends with a discussion of unsteady flows and effects of interfaces.

Vogel intended this book to be treated, in part, as an argument that the unavoidable imperatives of mechanics of fluids underlie the biological design. He succeeds eminently in his presentation.

Here the interview of G. I. Taylor by G. K. Batchelor comes to my mind (*J. Fluid Mech.*, 1975, **70**, 625). In response to a query about the important areas in fluid mechanics, Taylor mentions the problem 'Why does a tree grow upward?'. What role did Taylor see in this problem for fluid mechanics, and, if he were alive, what would he have done regarding this or other such issues? Great minds are difficult to comprehend but it is easy enough to see that he was wondering about nature and was seeking the role of flow in nature. Taylor would certainly have given beautiful and simple resolutions of some of the issues raised in this book by Vogel.

I recommend Vogel's book to all interested in fluid mechanics. Even conventional courses on fluid mechanics can be enriched and made interesting by choosing elements from it.

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**Annual Review of Neurosciences 1995.** W. Maxwell Cowan. Annual Reviews Inc., 4139 El Camino Way, Palo Alto, P.B. No. 10139, California 94303-0139, USA. Price: USA $ 47, elsewhere $ 52. 607 pp.

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This issue of the *Annual Review of Neurosciences* covers a wide range of interests. The first article by Phillipe Soriano is on the use of embryonic stem cells for making transgenic mice. This powerful technique has been used to develop targeted mouse mutants for specific neuronal receptors. The article deals primarily with the technical advances made in this field, which have been considerable. However, for those of us interested in learning more about the contribution of targeted mice mutants to the understanding of neurobiology, the article serves more as a catalogue. A perspective on fresh neuroscientific insights obtained as a consequence of this method would have been welcome. A number of articles review the recent advances made in the understanding of various human neurobiological diseases. Of these, the article by Suter and Snipes on peripheral neuropathies, has integrated nicely knowledge from basic molecular research on the components of the myelin sheath, with information from genetic and clinical studies. The article by Warren and Ashley Jr on the fragile X syndrome sheds important light on the role of triplet repeats in causing genetic mutations. On reading this review it appears likely that the triplet repeat expansion mechanism may serve as a cause of many, as yet poorly understood, neurological disorders. A suggested role for genomic imprinting during this process makes this mechanism all the more intriguing. The review article on neurobiology of infantile autism (Ciaranello and Ciaranello) highlights the lack of understanding regarding the cause(s) of this human disease. It appears to have a genetic basis and may in some cases be associated with other neurological disorders.

A number of articles in this review have tried to put together recent experiments in understanding the development of the vertebrate central nervous system (CNS). Hatten and Heinz discuss the general principles that have emerged from studies of the development of the cerebellar cortex. This particular brain tissue serves as a good model system since it is relatively less complex and its structure is well-understood. Analysis of its development has been further aided by the presence of mutants in which parts of the cerebellar cortex do not develop properly. Colamarino and Tessier-Lavigne have reviewed the vast array of information implicating molecules in the floor plate as cues for axon guidance in the developing CNS. Many of these molecules still remain to be identified while others such as Netrin-1 and aminin are being studied extensively. Another interesting molecule is agrin, which has been shown to play an important role in the formation of the neuromuscular synapse. Bowe and

Fallon in a concise review have put together much of the new data about agrin and the proposed mechanism by which it causes clustering of acetylcholine receptors at the postsynaptic junction. Current evidence also points strongly to a role for this molecule in synapse formation in the CNS.

The article by Ranganathan, Malicki and Zuker has made a strong case for studying sensory transduction processes in *Drosophila*. The combined genetic and molecular approach, possible in this organism, has helped identify genes required at almost every step of the visual transduction pathway. As stated by the authors, while there is a great deal of similarity in the overall strategy of visual transduction between vertebrates and invertebrates, much of the underlying molecular machinery is different. Another field in which *Drosophila* molecular genetics has had an important contribution is that of circadian rhythms. In his review on the molecular neurobiology of circadian rhythms in mammals, Takahashi tells us how attempts are being made to understand the molecular basis of this behaviour using both physiological and genetic experiments. The review argues for a molecular genetic approach in mouse similar to that taken by Konopka and Benzer twenty years ago in *Drosophila*.

This issue also provides a good introduction to some new and exciting areas in neuroscience. The field of integrative processing is one such topic reviewed by Knudsen and Brainard. It looks at the two better understood stimuli – vision and audition – and their integration in the brain. Principles that emerge from the study of these two stimuli may be useful in studying other integrative processes. Another interesting new area where research is still fairly preliminary is that of plasticity in the adult sensory cortex. This has been reviewed by Weinberger. It is still too early to say what the level of plasticity is in the adult sensory cortex and the suggestion from this review is that both plastic and nonplastic populations of cells may exist. Their relative roles in adult cortical functioning await further research.

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**Textbook of Molecular Biology.** K. Sivarama Sastry, G. Padmanaban and C. Subramanyam. Macmillan India Ltd., 2/10 Ansari Road, New Delhi 110 012. pp. i–xiii + 498. Price: Rs. 168.

Molecular biology is all pervasive in life sciences today. Although it started as a rather narrow field, the commonality of biological information and its application in living systems caused this discipline to break all barriers of specialized fields in biology so that now there is no area in biology which has not been influenced by molecular biology and which has not influenced molecular biology. Therefore, a study of molecular biology is imperative for any student of biology. Since molecular biology spans a very wide canvas, a book on this topic needs to cover a much wider area than most other subjects in biology. In this context, the book by Sastry, Padmanaban and Subramanyam is a welcome addition to the many books available in this general area. However, compared to most of the other books published in India in this area, the present book is more comprehensive and better organized. The authors have done a remarkable job in putting so many different areas together in a relatively simple narrative style which makes it easy reading for young students, to whom it is primarily addressed. Relevant topics from biochemistry, genetics, cell biology, cytology, immunology, cancer biology, genetic engineering, etc., have been amalgamated to produce this book. With so many different topics to be covered, the order of their appearance in the book can be a matter of individual choice, but as the authors point out in their preface to the book, each chapter can also be read as stand-alone since extensive cross-references to different topics help the reader navigate through related topics. Inclusion of references to more extensive books as also to articles on specific topics is very helpful.

With a constraint on the overall volume of the book (presumably to keep the price within reasonable limits), the book provides, in most cases, only the basal information on any given topic without going in for a detailed exposition. This limits the utility of the book for students at different levels of studies and for those interested in certain topics in more detail. Nevertheless, the book can be used by most students and teachers either as a primer for details in other more extensive treatises available or as a summary after having read a given topic in more detail elsewhere. In either case, the book will be useful for the student community.

This book is fairly strong in the biochemical aspects of molecular biology, as may be expected. However, factual and/or conceptual errors exist in the book, particularly in topics that relate to genetics, cell biology and developmental genetics, etc. (these are the ones that I read more carefully due to my own bias). Rather than making an exhaustive listing of these, a few examples may be noted. The $2N$ of *Drosophila melanogaster* is given as 4 instead of 8 (p. 90). The chapter on genome organization includes a brief discussion on X-inactivation in mammals (p. 111); unfortunately, however, this discussion does not make it clear that X-inactivation occurs only in somatic cells of female mammals (also the term 'lyonization' is after 'Mary Lyon' rather than 'Mary Lyons').

While discussing recombination during meiosis, the authors have also considered sister chromatid exchanges and imply that sister chromatid exchanges are central to recombination (p. 353, last para); the description gives an impression as if sister chromatid exchanges and chiasma points in meiosis are similar. While sister chromatid exchanges in mitosis and the homologous recombination during meiosis (which correlates with the cytologically visible chiasma, different from sister chromatid exchange) may share some of the enzymatic pathways, the two are distinctly separate phenomena with very different genetic consequences. In the absence of a more detailed discussion, the reader would remain misinformed on these issues.

Consideration of the genetic control of development in *Drosophila* on pp. 420–424 is rather incomplete and confusing. The classification of segmentation genes into three categories (the gap, pair rule and segment polarity genes) was proposed by Nusslein-Volhard and Wieschaus in 1980 rather than by Gehring, as the book seems to suggest (p. 421). The *fushi-tarazu* gene is not a part of the *Ant-C* complex: although it is physically included in the *Ant-C* complex DNA region, it acts independently as a pair rule gene rather than as a member of the *Ant-C* homeotic gene complex. Another common