

to growth factor signals which in many respects resembles the changes in gene activity of 'classical' differentiation. Furthermore, as knowledge of growth factor action increases, they also seem to fit nicely into the theoretical framework of signals and interpreters-of-signals developed by pattern formationists, with the advantage of being equipped with a body of understanding on their molecular mechanisms of action.

So where does the embryologist, seeking after knowledge and inspired by these thoughts, turn for information? Unfortunately there are few simple field guides to be recommended to the general reader. This may be because the area is growing so quickly, and encompasses so many diverse aspects that few have had the nerve (or the time) to try. However, *Oncogenes and Growth Control* edited by Kahn and Graf, comes close to fitting the bill. It comprises 46 chapters on diverse aspects of growth factors, oncogenes (now inexorably conjoined), signalling systems and receptors. Each chapter is admirably brief (ideally suited to those, like me, with the attention span of a five year old) and succinctly summarizes a single topic. The reviews are mostly just that, pointing the reader towards the primary data rather than regurgitating it, and generally close with an outline of current preoccupations and likely developments. This fragmentation technique works well, encouraging readers to dip into the book at random and link different topics together for themselves rather than ploughing through a predigested version of somebody else's views. Again, because of the number of chapters, the coverage is generally good, and most of the major topical themes are dealt with. The editors have done a praiseworthy job with that often ugly creature, the multi-author book, as the general standard of each chapter is uniform and good. They exhibit a light touch with their own contributions, which are confined to short overview pieces at the beginning of each section which can be read in their own right. The child-like jacket design is also delightful, and will hopefully find favour as a summary slide (copyright permitting), replacing the 'integrated circuit' design currently fashionable.

The drawbacks? well, as usual, the volume is cunningly priced to discourage a casual individual purchase and, perhaps inevitably, it essentially offers a snapshot of a rapidly moving field and will soon become outdated. Perhaps a paperback second edition will emerge next year?

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Organogenesis of the Kidney

L. Saxen
Cambridge: Cambridge University Press, 1987

It is a great pleasure for me to review this book. As the Preface to the book makes abundantly clear, its writing was a labour of love, summarizing and celebrating a quarter-century of devoted and rewarding study of kidney development by Saxen and his colleagues at the northern end of the European Developmental Axis.

The book is straightforward in its organization and clear in its presentation. There are successive chapters on the ontogenesis of the vertebrate excretory system, the experimental methods used to study kidney development, the important advantages of the kidney for study of morphogenetic tissue interactions, the status of knowledge about experimental tubulogenesis, and the special problem of renal vascularization and glomerular formation. The account will certainly be useful to those interested in the kidney, it is essential reading for those working in the intersecting plane of mechanisms of organogenesis and differentiation in complex developmental systems. Both will appreciate the fact that the volume is clearly and amply illustrated and provides an abundant bibliography.

Chapters 3 and 4 contain a detailed analysis of available information bearing on possible mechanisms of induction of nephric tubules, particularly the distance over which these mechanisms may act. As Saxen notes, interpretation of this information remains problematic and the situation is too complex to be adequately conveyed in a brief review. It is sufficient to say that the author makes available the explanatory options and notes that more than one may be operative.

The options include: free molecular diffusion of the agents involved; diffusion limited in some fashion to short range; interaction of cell-surface-associated molecules; interaction through matrix molecules; and molecular transfer 'through intercellular channels'. In the opinion of the Helsinki group, as I understand it, matrix molecules are likely to be involved but available evidence does not preclude participation of diffusible molecules as well. The uncertainty of the evidence derives from the properties of various filter samples that have been used to block or transmit the inductive stimulus. I add my own view that, given current molecular techniques, more discriminating and precise approaches than filter barriers are called for.

In his concluding remarks (p. 143 onwards), Saxen makes clear that the book is a progress report that summarizes substantial advance but still lacks definitive conclusions. A diagram (Fig. 6.1) depicts 'much of our present knowledge of various molecular and structural events linked to the early, post-inductory development of the secretory nephron – but it is still not easy to find causal relationships within the general framework'. It was, of course, the hope of finding such relationships that generated my own interest in the kidney more than 30 years ago. It submit that hope springs eternal and this book renews it. The kidney remains an unusually favourable target for experimental studies on the detailed mechanisms of organogenesis and the extensive contributions of the Helsinki group have enlarged the foundation for continuing progress.

As to the precise nature of those mechanisms, few today doubt that much of the answer lies in the molecular information at the interface of embryonic tissues of differing developmental history. In what form the critical information exists and over what distances it can be transmitted is still not clear and there are differing interpretations of the available indications. But what is most important to understand is the informational code of the materials in the transitional interspace, particularly in their native combinations and resultant configurations

Nonetheless, information about the nature of these and similar materials in other circumstances is growing apace. Such matrix molecules as the collagens, laminin, and fibronectin are well characterized and others are being steadily added to the list. The concept of intercellular matrix being much more than structural packing no longer needs defense. For those interested in penetrating further into this fundamental biological problem, this book and the developing kidney provide a potentially most rewarding challenge.

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Developmental Biology

Virginia Walbot and Nigel Holder
New York: Random House, 1987

Another new undergraduate biology text, the title of which includes the word 'Development,' has in recent years arrived on my desk every few months. Depending on one's point of view, it either is or is not surprising that each has a distinctive character, a different concept of what the field of development encompasses, a particular flavour. Of course they all share