membrane channels).

Next comes a useful treatment of energy-linked transport processes in microorganisms, mitochondria and chloroplasts, punctuated by a discussion of ATP-driven transport (mainly of Na^+ and K^+). The latter part of this chapter is marred by terminological confusion: in particular, "counter-transport" is used to mean "antiport", a usage different from that earlier in the book.

Finally, there are discussions of algal ion transport and of Na^+ /organic solute cotransport (symport): these are designed to illustrate and integrate the concepts offered earlier. They do effectively round off the book in a physiological sense, but neither system yet gives much information on the membrane events involved in transport.

As the authors point out, their book will only work if students can integrate its parts into a coherent intellectual whole. My fear is that the authors' incomplete synthesis will only allow further successful integration by the brightest of students. This may be partly

because the book deals exclusively with ion transport, rather than with all types of solute transport through membranes. Even within ion transport, there are no detailed treatments of some of the systems that are most fully characterised in molecular terms (for example, sarcoplasmic reticulum Ca^{2+} -transport ATPase and the erythrocyte anion transporter). A possible problem throughout the book is the use of mol m^{-3} as the unit of concentration: although strictly correct, it will initially be alien to most readers and it therefore needs some introductory comment.

In summary, the need for a student text on transport is to some extent satisfied both by Hall and Baker (new and expensive) and by Davies (older but cheaper), but neither has really achieved the desired broad synthesis of current biochemical, biophysical and physiological ideas.

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Developmental biology

Tissue Interactions and Development. By N. K. Wessells. Pp. 276. (W. A. Benjamin/Addison-Wesley: Menlo Park, California, 1977.) Hardback \$14.95; paperback \$9.95.

SINCE this book enters a competitive field, it needs something special to succeed, and it certainly has unique features. It's short: only about 100 of its 276 pages are generously spaced text, the rest being index, glossary, references (at the end of each chapter), summaries, diagrams and some beautiful scanning electron micrographs. After four introductory chapters, there follow fourteen on tissue interaction examples and mechanisms—limbs, skin, hormones, nerves, branching, cell contact, and so on.

It is intended to be read straight through. Different aspects of a system are treated at various points, and the lack of an overview can create difficulties. For example, limbs (including most mutants) are in chapter 6, with no hint of a role for cell movement. Then, in chapter 13, is Ede and Flint's *talpid*³ work, not put into the limb context nor listed in the index under limbs. The reference lists are unsystematic too, including only work that Wessells considers accessible and suitable as entries to a field. References are given with comments on usefulness, not titles; these seem to be well chosen, though a trifle daunting to junior students (a complete Cold Spring Harbor symposium!). This approach can be frustrating: for example, a student following up mention of nutrient effects on limb mesenchymal differentiation (p74) will find no reference

to Caplan.

The writing is often loose, creating misleading impressions: *Archaeopteryx* surely had fingers or digits on its wings, not toes (p67); mouse dermis and chick cornea together form feather buds, not feathers (p55); only *part* of amphibian mesoderm derives from gray crescent (p25); "molecules called intramembranous particles" (p183)?; gap junctions allow "rapid diffusion" and make "cells freely permeable" (p232)?; and so on.

I noticed few clear errors: Ede and Flint (not just Ede) suggest *talpid*³ cells are *more* adhesive than normals, not less (p193); the reference to Goss should, I think, be with chapter 12, not 16; and, a notable piece of self-effacement, a reference to Grainger and Wilt should be to Wessells. However, Wessells is often carried away by one side of an argument—on the interpretation of nuclear transplantation results, on the stability of the differentiated state, on the mechanisms of growth control and contact inhibition, on genetic restriction and expression as separate processes, and so on—though the references give access to other viewpoints.

The book has at least one serious omission: it clearly identifies the cell surface as a major site of cell interactions, but has nothing on lectins, glycosyltransferases, surface modulation or differential adhesion.

Despite the criticisms, I found the book lively. Its questioning approach should make it a stimulating supplement to standard texts.

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Photosynthesis from the biochemical viewpoint

Biochemistry of Photosynthesis. (Second edition.) By R. P. F. Gregory. Pp. 221. (Wiley: London, New York and Toronto, 1977.) £8.50; \$16.50.

THIS is an up-dated and modified version of a book first published five years ago. In its original form it was unique: although there were other excellent text books on photosynthesis available there were none which tackled this subject from a biochemical viewpoint. The second edition enhances the earlier efforts of the author. He has made considerable changes, bringing the text in line with recent developments, and has deleted some of the superfluous material.

The book keeps the same basic format as the first edition. Part I concentrates on basic principles and concepts. This part of the book is composed of five chapters which essentially cover all aspects of photosynthesis presented, using a time-scale as a guide. That is, the first three chapters deal with the properties of light, its absorption by pigments, and its transfer to specialised photochemical reaction centres. The following chapters then outline the essential features of the energy conversion processes both at the electron transport level and at the subsequent carbon fixation stage.

The second part of the book serves to supplement and extend the fundamental and general concepts presented in the first five chapters. Here the author presents evidence for the Z scheme, covers chlorophyll and chloroplast organisation, and provides detailed and up-to-date discussions of electron transport and phosphorylation both for oxygen-evolving organisms and photosynthetic bacteria. The final chapter (chapter 10) deals with carbon metabolism and biochemistry of intact chloroplasts. For example, there is description of the role of the chloroplast envelope in controlling movements of substances into and out of the stroma as well as discussion about chloroplast autonomy.

This well presented and very readable book was written for undergraduate courses and I think it has greatly benefited from the changes which have been made. I thoroughly recommend the book and congratulate the author for producing a very worthwhile contribution to the teaching of this important and key biological subject. His inclusion of some numerical problems and questions, key references and an appendix of physical constants and formulae is valuable.

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