Book Reviews

Ciba Foundation Symposium, Vol. 179, The Molecular Basis of Smell and Taste Transduction; from a symposium, Edited by D. Chadwick, J. Marsh and J. Goode, Wiley and Sons; Chichester, 1993; ix + 287 pages. £45.00. ISBN 0471-93946-3.

This Ciba Foundation Symposium volume follows the pattern of the series in presenting not only the papers presented at the meeting, but also the often more interesting resulting discussions. This meeting and volume are especially timely in that the development of single channel recording and molecular techniques in the last decade has produced an explosion of information on the mechanisms underlying chemosensory transduction. This work centers not only on the molecular and genetic issues revolving around transduction itself, but also the intriguing question of how potential chemical stimuli in the environment gain access to the site of transduction when the sensory cells are covered by mucus or other fluid layers. This volume presents interesting glimpses into the current state of research in the area and should be of interest to those studying transduction in other biological systems as well as to other researchers in the field of chemical senses.

The molecular biology of olfactory receptors is explored in four chapters spread within the first half of the volume. Dr. Linda Buck reviews her work, with R. Axel, on the multigene family of presumed odorant receptor genes cloned from various rodents. These presomed odorant receptor genes were identified on the basis of their being structurally similar to seven-transmembrane G protein-coupled receptors in other systems, yet being unique to the olfactory receptor cells. A later chapter by D. Lancet and co-workers describes the genomic structure and organization of the putative olfactory receptor genes within their site of residence on human chromosome 17. The discussion of these and subsequent papers points out that despite much presumptive evidence that the Buck and Axel seven-transmembrane putative odorant receptors are responsible for olfactory transduction, virtually no functional studies have confirmed this claim. The possibility is raised that some olfactory receptors may be direct ligand-gated ion channels, and therefore not included in the Buck and Axel seven-transmembrane class.

Regulation of unique olfactory receptor cell genes is explored in the papers by F.L. Margolis et al. and M. Wang and R. Reed. Over three decades have passed since F. Margolis' original description of olfactory marker protein (OMP), a cytoplasmic protein nearly unique to olfactory receptor cells. Although OMP represents a sizeable percentage of the total protein in a receptor cell, and despite elucidation of its primary structure, the function of OMP remains enigmatic. Recent advances in molecular techniques have permitted identification of a putative transcription factor, olf-1, responsible for the regulation of this olfactory-specific protein. The possible role of olf-1 in regulating the restricted patterns of expression of putative odorant receptors is discussed.

Prereceptor events are summarized in the chapter by T. Getchell and co-workers. A problem for any chemosensory system is how a potential stimulus molecule gains access to the receptor cell. In the case of olfaction, an air-borne molecule must traverse a mucus barrier to reach the cilia of an olfactory receptor neuron. This chapter discusses the composition of mucus and how proteins within the mucus layer may play a role in odorant conveyance or clearance. A parallel chapter by Schmale et al. in the latter half of the book describes the potential role of salivary proteins in taste.

Olfactory receptor second messenger systems and their subsequent effect on membrane potentials are discussed respectively in chapters by Breer and by Firestein and Zufall. The discussions relate these findings to a central theme of whether an olfactory receptor cell expresses one or more than one putative olfactory receptor molecule. An interesting chapter by M. Lerner and co-workers describes a melanophore-based system for investigating G protein-coupled receptors. But as of the date of the meeting, this system had not been used successfully to study the Buck and Axel presumed odorant receptors.

Two chapters, by Carlson, Sengupta and colleagues, describe progress in the genetics of olfaction in invertebrates. While these chapters are definitely worthwhile, a curious omission from both the text and discussion is the point that the so-called olfactory system of these invertebrates does not have phyletic continuity with the olfactory system of vertebrates. Thus, these invertebrate systems may provide interesting information about how chemosensory transduction occurs in these animals, but the findings may not be generalizable to olfaction in the vertebrate lineage. Of course the power of the invertebrate systems, *Drosophila* and *Caenorhabditis*, lies in the limited number of neurons in the system and in the possibility of correlating genetic defects with specific behavioral changes.

The final section of this volume centers on taste, ranging from perireceptor events through the details of ionic flow through the gustatory epithelium. Taste receptor cells rely on diverse mechanisms to accomplish transduction including, direct interaction of taste stimuli with ion channels, ligand-gated channels and second messenger systems. Dr. S. Kinnamon describes how sour, or salivary proton concentration, is detected via two different ion channels in different species. Dr. S. McLaughlin and co-workers present data on two G proteins, transducin and gustducin, involved presumably in transduction of bitter taste. In the third chapter dealing directly with taste transduction, J. DeSimone et al. describe how sodium conductance of the entire lingual epithelium, not just the taste receptor cells, is important in understanding transduction of sodium salt taste. In the final chapter on taste, L. Bartoshuk demonstrates how the chemosensory component and tactile sensation are combined in our perception of taste. Further, she relates how taste thresholds and perception can have genetic and morphological correlates.

Overall, this succinct book presents insights into the substantial progress made in our understanding of chemosensory transduction. Readers will appreciate not only the concise overviews presented in each chapter, but should appreciate the feeling of participation offered by the interesting discussions.

Thomas E. Finger

Conjugation–deconjugation Reactions in Drug Metabolism and Toxicity. Handbook of Experimental Pharmacology, Vol. 112; Edited by F.C. Kauffman, Springer-Verlag; Berlin, Heidelberg, 1994; x + 530 pages. DM 486.00. ISBN 3-540-571221-1.

This book provides a modern and integrated overview on the main enzymes and metabolic pathways involved in phase II biotransformation of the highly reactive products formed under the catalysis of Cytochrome P450 mono-oxygenases in phase I reactions. The importance of transferases and hydrolases in the activation of drugs or carcinogens is stressed, in contrast to the more commonly

---

Information about books for review in FEBS Letters should be sent to: Professor J.E. Celis, Department of Medical Biochemistry. Ole Worms Allé, Building 170, University Park, Aarhus University, DK-8000 Aarhus, Denmark.

SSDI 0014-5793(95)00276-6