An Introduction to the Physiology of Hearing, Third Edition
James O. Pickles. United Kingdom: Emerald Group Publishing Limited (2008). 410pp.,$69.95, Orders: books.emeraldinsight.com. ISBN: 978-0-12-088521-3.

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The third edition of this book continues the tradition of excellence set by the first two. As stated in the preface, the 20 years that have elapsed since the publication of the last edition have been crammed with important discoveries and substantial bodies of work in all areas of auditory physiology. This text incorporates a thorough compilation of notable accomplishments in auditory physiology in recent years and thus provides an invaluable updated summary of the workings of the auditory system. I cannot overstate the usefulness of this text for anyone working in the area of audition, either in the laboratory or in a clinical capacity.

This text is highly versatile. Pickles takes sophisticated material and summarizes it in a way as to be understandable to many disciplines. One does not need to be a physiologist or a physicist to gain a working knowledge of the function of the auditory system at all levels. The text is not overly burdened by complicated equations; rather, it is loaded with clear, useful figures that are used to illustrate points and findings. In addition, Pickles is masterful at describing how the function of the auditory system is related to the physiology. The text describes the physiologic basis for many clinical tests and conditions including otoacoustic emissions, evoked potentials, ototoxicity, noise-induced hearing loss, Connexin-related deafness, and others as well as for all manners of auditory functions such as localization, frequency resolution, loudness growth, and others.

The first chapter of the text is a brief summary of acoustics, sufficient to explain concepts that will be needed throughout the book. Again this is an excellent summary for those who need a refresher but does not go into depth. The next chapters move systematically through the major segments of the auditory system from the periphery to the brain. The chapters focus on the outer and middle ear, the cochlea (anatomy and basic physiology), the auditory nerve, the subcortical nuclei of the brainstem and thalamus, and the auditory cortex, and then the centrifugal or efferent pathways are described. The only exception to this organizational scheme is the addition of chapter 5 dedicated to the mechanisms of transduction within the cochlea. The first chapter on the cochlea follows the convention of describing the anatomy in detail and then to describing the cellular physiology. The excellent chapter on transduction describes the intricate workings of the basilar membrane and organ of Corti. The reader can gain a clear understanding of the mechanical and physiologic relationships between the cochlear structures as they transduce mechanical energy to neural impulse. Much of the information in this chapter has been updated since the last edition, and this chapter is rich with the newest, emerging information on mechanical transduction. It is here that concepts such as cochlear nonlinearity are explained and illustrated.

The final two chapters continue to expand on the ties between anatomy, physiology, and function/dysfunction of the auditory system. Chapter 9 focuses on physiologic correlates of auditory psychophysics and performance with sections on frequency resolution, frequency discrimination, intensity and loudness, localization and spatial hearing, and speech perception. The final chapter on sensorineural hearing loss provides a clear summary of the origins of pathophysiology of the cochlea describing the bases of ototoxicity, noise-induced hearing loss, genetic-based hearing disorders, and aging. Consequences of cochlear damage are discussed including tinnitus, loss of frequency resolution, and others. There is significant discussion of treatments beginning with cochlear implantation, and Pickles goes on to describe cellular and gene replacement therapies, concepts of hair cell regeneration, and protective mechanisms.

Each chapter starts with an introduction that describes the information to be presented and how it fits within the context of other chapters. The end of each chapter includes a summary of relevant points as well as directions for further reading. The further reading sections provide the reader with up-to-date citations to explore topics discussed in the chapter in more depth. These features lend themselves to the use of this text in the classroom. In summary, this volume should be on the bookshelf of every academician and clinician involved in the study of the auditory system. I know of no other text that provides such a complete summary of the physiology of the auditory system, and it is thorough and enjoyable to read. It should be made clear that this volume does not cover vestibular physiology. However, it would serve as an excellent textbook for any graduate students studying auditory science or audiology as well as for medical students and otolaryngology or neurology residents. The new edition incorporates essentially all new important areas of auditory physiology in a highly readable volume. I recommend this text highly to those in need of a comprehensive summary of the auditory system.