

Series Preface

The following preface is the one that we published in Volume 1 of the *Springer Handbook of Auditory Research* back in 1992. As anyone reading the original preface, or the many users of the series, will note, we have far exceeded our original expectation of eight volumes. Indeed, with books published to date and those in the pipeline, we are now set for over 60 volumes in *SHAR*, and we are still open to new and exciting ideas for additional books.

We are very proud that there seems to be consensus, at least among our friends and colleagues, that *SHAR* has become an important and influential part of the auditory literature. While we have worked hard to develop and maintain the quality and value of *SHAR*, the real value of the books is very much because of the numerous authors who have given their time to write outstanding chapters and to our many coeditors who have provided the intellectual leadership to the individual volumes. We have worked with a remarkable and wonderful group of people, many of whom have become great personal friends to both of us. We also continue to work with a spectacular group of editors at Springer. Indeed, several of our past editors have moved on in the publishing world to become senior executives. To our delight, this includes the current president of Springer USA, Dr. William Curtis.

But the truth is that the series would and could not be possible without the support of our families, and we want to take this opportunity to dedicate all of the *SHAR* books, past and future, to them. Our wives, Catherine Fay and Helen Popper, and our children, Michelle Popper Levit, Melissa Popper Levinsohn, Christian Fay, and Amanda Fay, have been immensely patient as we developed and worked on this series. We thank them and state, without doubt, that this series could not have happened without them. We also dedicate the future of *SHAR* to our next generation of (potential) auditory researchers—our grandchildren—Ethan and Sophie Levinsohn; Emma Levit; and Nathaniel, Evan, and Stella Fay.

Preface 1992

The *Springer Handbook of Auditory Research* presents a series of comprehensive and synthetic reviews of the fundamental topics in modern auditory research. The volumes are aimed at all individuals with interests in hearing research including advanced graduate students, postdoctoral researchers, and clinical investigators. The volumes are intended to introduce new investigators to important aspects of hearing science and to help established investigators to better understand the fundamental theories and data in fields of hearing that they may not normally follow closely.

Each volume presents a particular topic comprehensively, and each serves as a synthetic overview and guide to the literature. As such, the chapters present neither exhaustive data reviews nor original research that has not yet appeared in peer-reviewed journals. The volumes focus on topics that have developed a solid data and conceptual foundation rather than on those for which a literature is only beginning to develop. New research areas will be covered on a timely basis in the series as they begin to mature.

Each volume in the series consists of a few substantial chapters on a particular topic. In some cases, the topics will be ones of traditional interest for which there is a substantial body of data and theory, such as auditory neuroanatomy (Vol. 1) and neurophysiology (Vol. 2). Other volumes in the series deal with topics that have begun to mature more recently, such as development, plasticity, and computational models of neural processing. In many cases, the series editors are joined by a coeditor having special expertise in the topic of the volume.

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Volume Preface

The vast majority of ears on the planet are found on insects. Although these differ substantially in structure from the ears of vertebrates, they have evolved to serve the same functions, namely, detection and localization of predators and prey and communication with conspecifics. Auditory systems, whether insect or vertebrate, must perform a number of basic tasks: capturing mechanical stimuli and transducing these into neural activity, representing the timing and frequency of sound signals, distinguishing between behaviorally relevant signals and other sounds, and localizing sound sources. Studying how these are accomplished in insects offers a valuable comparative view that helps to reveal general principles of auditory function.

In Chapter 1, Mason and Pollack provide an overview of the entire volume and set the context for insect hearing. Next, in Chapter 2 Greenfield discusses the evolutionary origins and diversification of insect hearing. In Chapter 3, Balakrishnan reviews the behavioral ecology of insect hearing, with a focus on signaling strategies in long-range communication.

Hearing and acoustic behavior in the context of predator avoidance and defenses against echolocating bats are the subjects of Chapter 4, by Pollack. In Chapter 5, Yack provides an overview of substrate vibration senses and communication—a modality closely related to hearing. Both modalities are built on a common mechanoreceptor type, and substrate vibration sense functions analogously to hearing but under very different physical constraints. Chapter 6, by Windmill and Jackson, considers the mechanics of insect hearing and reviews the diverse mechanisms by which acoustic energy is converted to movement of specialized structures in insect ears. The cellular mechanisms for transduction of acoustic energy to electrical activity in sensory neurons are reviewed in Chapter 7 by Eberl, Kamikouchi, and Albert.

Next, in Chapter 8 Hedwig and Stumpner discuss the central auditory pathway and neurophysiological mechanisms underlying auditory behavior. In Chapter 9, Ronacher examines auditory processing in terms of information coding, feature detection, and computational algorithms. Finally, Chapter 10, by Kamikouchi and Ishikawa, provides an overview of auditory research in *Drosophila*, serving as a “case study” of a model system in which current research is addressing questions at all levels from the molecular and biophysical basis of transduction to circuit-level organization and behavior.

This volume, as most others in *SHAR*, benefits from earlier books and chapters in the series. In this case, an earlier volume on *Comparative Hearing: Insects* (Vol. 10, edited by Hoy, Popper, and Fay in 1998) provides a great deal of related material as well as a historical context for many of the amazing advances that have been made since then in insect hearing. Insect hearing has also been considered in chapters in several other volumes including a discussion on plasticity by Reinhard Lakes-Harlan in *Plasticity of the Auditory System* (Vol. 23, edited by Parks, Rubel, Fay, and Popper in 2004), insect directional hearing by Daniel Robert in *Sound Source Localization* (Vol. 25, edited by Popper and Fay in 2005), active processes by Martin C. Göpfert and Daniel Robert in *Active Processes and Otoacoustic Emissions* (Vol. 30, edited by Manley, Fay, and Popper in 2008), and transduction by Ryan G. Kavlie and Joerg T. Albert in *Insights from Comparative Hearing Research* (Vol. 49, edited by Köppl, Manley, Popper, and Fay in 2014). Finally, several chapters on hearing by Hoy and Michelsen and Larsen are found in *Perspectives in Auditory Neuroscience* (Vol. 50, edited by Popper and Fay in 2014).

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