Preface

This volume is a collection of chapters representing the depth and breadth of research that underlies the understanding of the complexity and diversity of vibrational communication in the animal kingdom. The chapters, organized by taxa, are all contributed by specialists in their respective fields. Peggy Hill, whose recent book *Vibrational Communication in Animals* helped set the stage for this volume, has supplied a useful and unifying introduction.

The initial three chapters on invertebrates review the remarkable array of mechanisms employed by crustaceans, spiders and insects to generate and detect vibrations. These chapters address the subtleties of the social contexts in which vibration is used in communication, prey detection and avoidance. Also explored is the influence of the ecology of these organisms on vibration transmission and detection as well as the significance of habitat selection in assuring optimal vibration transmission.

The next five chapters include a review of what is known about vibration generation, propagation and detection in amphibians and snakes as well as in small and large mammals, including humans. They present in detail the anatomy of the various ear (and jaw) structures that process vibrations, tracing the development of the ear from the simpler frog and snake ear to the more derived mammalian ear that incorporates three bones from the jaw. The treatment of the operecularis of the frog, progressing to the jawbones of snakes, then to the hypertrophied middle ear bones found in small rodents and elephants illustrates the depth of the research that has contributed to our understanding in this field. Topics such as vibration production and detection in the particular context of the sender and receiver are reviewed, as well as other anatomic variants relevant to the generation and detection of vibrations, wave architecture and transmission properties of the substrate. The phenomenon of bone conduction adds a separate pathway for detection through the skeleton in mammals, with pressure waves generated by substrate-borne vibrations oscillating the middle-ear bones in the same way as airborne vibrations, which are then processed in the auditory cortex, although having arrived via this alternative pathway.

The penultimate chapter provides a summary of field recording methods that should prove useful for investigators new to this field. It should also be helpful to researchers wishing to compare vibration recording techniques applicable to different species or to learn more about equipment and options for recording vibration transmission properties in different media and soil types. The final chapter presents an overview of what is known about the ability of the largest land mammal, the elephant, to detect and interpret vibrations.

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The Use of Vibrations in Communication: Properties, Mechanisms and Function across Taxa

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