Comparative Auditory Biomechanics Probed by Otoacoustic Emissions

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Abstract – Since Kemp's discovery in 1978, otoacoustic emissions (OAEs) have provided valuable scientific and clinical tools for the study of the ear. For example, OAEs can provide objective measures of sensitivity and selectivity over the frequency range of 'active' hearing. Given the universality of OAEs across the kingdom Animalia, comparative studies can reveal how various morphological factors affect peripheral auditory transduction and thereby what information is encoded for higher level cognition. Motivated by the complexity of cochlear mechanics and the many unknowns that currently exist, the present study describes OAEs stemming from two non-mammalian groups whose auditory periphery is relatively simpler than that of mammals: several lizard genera (*Heloderma*, *Tiliqua*, *Agama*, and *Tupinambis*) that exhibit significant relative differences in tectorial membrane structure, and a highly vocal bird species (*Melopsittacus undulatus*). By utilizing recent improvements in OAE measurement and analysis strategies combined with quantitative anatomical measures (e.g., number of hair cells), these data shed new light upon emission generation mechanisms and how such tie back to a given species' ability to encode ecologically relevant sounds. Furthermore, these data serve to inform theoretical models of auditory biophysics by clarifying what roles various morphological features do (or do not) play.

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