

Abstract Submitted
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Sound Localization in Lizards: Functioning of a Pressure-Gradient Receiver¹ J. LEO VAN HEMMEN, Physik Department, TU Muenchen — Because of their small interaural distance, lizards as well as some other animals have developed a special hearing mechanism, the “pressure-gradient receiver”. The lizard peripheral auditory system differs from the mammalian one by a coupling of the two eardrums through the internal mouth cavity. We present a three-dimensional analytical model of the pressure-gradient receiver. The central aspect of the coupling of the membranes through the mouth cavity is realized by means of the boundary conditions. Moreover, the lizard’s middle ear, a simple lever construction called *collellum*, is asymmetrically attached to the tympanic membrane. This has motivated us to solve the problem of how the middle ear influences the spatial-amplitude profile and the frequency distribution of the tympanic membrane vibration. Finally, we show results from numerical simulations of the eigenfunctions and eigenfrequencies in a lizard’s internal mouth cavity bounded by the eardrums. To this end, we have constructed the complex geometry from a cast imprint of the cavity with the help of three-dimensional scans. Our results led to an interesting speculation regarding the neurobiological use of the pressure-gradient system.

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