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Emission of sound from the mammalian inner ear[1] TOBIAS REICHENBACH, ALEKSANDRA STEFANOVIC, The Rockefeller University, FUMIAKI NIN, Niigata University, A.J. HUDSPETH, The Rockefeller University — The mammalian inner ear, or cochlea, not only acts as a detector of sound but can also produce tones itself. These otoacoustic emissions are a striking manifestation of the mechanical active process that sensitizes the cochlea and sharpens its frequency discrimination. It remains uncertain how these signals propagate back to the middle ear, from which they are emitted as sound. Although reverse propagation might occur through waves on the cochlear basilar membrane, experiments suggest the existence of a second component in otoacoustic emissions. We have combined theoretical and experimental studies to show that mechanical signals can also be transmitted by waves on Reissner's membrane, a second elastic structure within the cochea [1]. We have developed a theoretical description of wave propagation on the parallel Reissner's and basilar membranes and its role in the emission of distortion products. By scanning laser interferometry we have measured traveling waves on Reissner's membrane in the gerbil, guinea pig, and chinchilla. The results accord with the theory and thus support a role for Reissner's membrane in otoacoustic emission.

[1] T. Reichenbach, A. Stefanovic, F. Nin, A. J. Hudspeth, Waves on Reissner's membrane: a mechanism for the propagation of otoacous

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