

# Understanding ancient human ear-orienting system could yield clues to emotions, hearing deficits in infants

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Vestigial organs, such as the wisdom teeth in humans, are those that have become functionless through the course of evolution. Now, a psychologist at the University of Missouri studying vestigial muscles behind the ears in humans has determined that ancient neural circuits responsible for moving the ears, still may be responsive to sounds that attract our attention. Neuroscientists studying auditory function could use these ancient muscles to study positive emotions and infant hearing deficits.

"Everyone has noticed cats or dogs orienting their [ears](#) toward a surprising or otherwise interesting sound; we as humans, of course, don't make ear movements when we focus our attention" said Steven Hackley, an associate professor of psychological sciences in the MU College of Arts and Science. "However, there is a 'cognitive fossil' that lies more or less intact in the human brain and could be more than 25 million years old. Significant changes in the human auditory system began soon after the evolution of dry-nosed primates more than 30 million years ago. Ear size decreased and the associated musculature changed."

Hackley reviewed more than 60 published studies on vestigial ear muscles and noted that research on the muscles dates back more than a century. Scientists discovered that human subjects who shifted their gaze to the left or right weakly activated a [muscle](#) within the posterior wall of the outer ear, or pinna. Later studies measured the weak electrical

activity triggered within vestigial muscles when either interesting or intense sounds were introduced.

Although nonfunctional, pinna musculature activates during standard laboratory tests of attention and that makes it useful to psychologists and neuroscientists studying evolution and the brain. When subjects were presented with novel or task-relevant sounds, reflexes moved the eyes and attempted to move the ears toward the sounds they wanted to hear and see. The reflexes were too weak to cause actual movement of the ears.

"Understanding pinna orientation and the ancient muscles that caused it could help researchers who study auditory attention in humans," Hackley said. "Additionally, the complete isolation of a nonworking motor system offers a new perspective on nature and nurture theories by shedding light on neural development and how this relates to genetic factors. Finally, gaining insight into how the relevant vestigial systems work may assist ongoing efforts to develop tests of hearing deficits in infants and, perhaps surprisingly, objective measures of [positive emotions](#) in adults."

**More information:** Steven A. Hackley. "Evidence for a vestigial pinna-orienting system in humans," *Psychophysiology* (2015). [DOI: 10.1111/psyp.12501](#)

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