Insects Hear Like Humans

Written by Administrator Wednesday, 12 December 2012 06:33 -

Insects hear like humans, according to reports in ScienceNOW and *Science* vol. 338 pp968-971, 16 November 2012, DOI: 10.1126/science.1225271. Sound is vibration transmitted through air, but in order to hear them, animals and people must convert the vibrations into electrical signals and transmit these to the brain. The cells that convert vibrations to electrical signals live in fluid, so the air vibrations must be converted to fluid vibrations first. Because of the difference in density of air and water it requires more force to make vibrations in fluid, so a mechanism to enhance the air vibrations is needed. This is the reason for the three-step process of human and animal hearing. Vibrations in air make the eardrum, or tympanic membrane, vibrate, which makes the middle ear bones move back and forth, transmitting the vibrations to the inner ear, which is filled with fluid. The middle ear bones act as a lever system and convert the vibrations of the eardrum into smaller but more forceful vibrations in the fluid of the inner ear. This process is called impedance matching. Within the inner ear receptor cells convert the fluid vibrations into electrical signals. The receptor cells are tuned to respond to different frequencies of sound, and are arranged in an orderly sequence from high pitched to low pitched sounds.

A group of scientists from University of Bristol and University of Lincoln, UK, have studied the ears of the South American rainforest katydid *Copiphora gorgonensis* and found it has the same three step process for hearing – a tympanic membrane, and impedance matching system and an orderly array of sensory cells in a fluid filled inner ear. The research team found the system using high powered CT scans. Insects do not have bones. The katydid's impedance matching system consists of two slivers of cuticle on either side of a cavity behind the tympanic membrane. When the membrane vibrates the slivers wobble and send forceful vibrations into the cavity containing the receptor cells.

Although the insect ear is very small, biophysicist Daniel Robert suggested it is "probably less delicate and more robust", and may help engineers design tiny, but sensitive microphones for scientific devices and hearing aids.

Ronald Hoy, a neurobiologist at Cornell University who specialises on acoustic communication in insects, commented: "What blows me away is the evolutionary convergence between insects and mammals". He is not the only one to say this. The research team entitled their report in *Sci ence*

"Convergent Evolution Between Insect and Mammalian Audition" and stated: "Thus, two phylogenetically remote organisms, katydids and mammals, have evolved a series of convergent solutions to common biophysical problems, despite their reliance on very different morphological substrates". A Perspective article in the same issue of Science states: "The parallelism in anatomy and function is the result of convergent evolution between the ears of

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humans and katydids".

Editorial Comment: "Convergent evolution" is the ultimate evolutionary non-explanation of how similar complex systems came about in living things that are far apart on the evolutionary tree. The extreme silliness of this concept can be seen just by asking: what mysterious forces do they think produced the tympanic membrane, the impedance matching mechanism and the array of sensory receptors, along with the brain to interpret the sounds in each living thing, and encoded the genes to build them? It is obvious that the mere presence of sound in the air is not going to do this for insects or mammals, any more than it will result in microphones and hearing aids appearing by themselves without intelligent engineers to design and build them. The faith of evolutionists in mindless molecules and purposeless physical forces is truly spectacular, but sadly is a reminder of those who called themselves wise, but became fools because they worshipped the creation instead of the Creator. See Romans 1:20-23. (Ref. design, biophysics, technology)

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