Snakes Hear in Stereo

May 16 2008

Physicists from the University Munich in Germany and the University of Topeka, Kansas have strong new evidence that snakes can hear through their jaws. Snakes don't have outer ears, leading to the myth that they can't hear at all.

But they do have complete inner ear systems, including functional cochlea, which are carefully connected to and stimulated by their lower jaw. Resting on the ground, a snake's jaw can detect vibrations as small as an angstrom in amplitude (a motion roughly as large the diameter of a single atom), which act like sound waves to the inner ear.

The physicists performed a geometric study of the anatomy of horned desert vipers as well as the ground waves created by the footfalls of their prey. They showed mathematically that the jaw-to-cochlea system is sensitive to the frequencies of the prey's ground vibrations. From their analysis, the physicists also found that the snake's notorious ability to unhinge their jaws and swallow their prey whole means that the right and left side of their jaws can receive vibrations independently, and the snakes hear in stereo.

The paper provides data supporting the theory that as the cochlea is stimulated, the snake’s auditory neurons create a topological map of its environment. Thus, as experiments have shown, some snakes can catch their prey using only vibration cues.

The physicists believe their study shows that ground vibrations to the lower jaw should be regarded as a significant source of sensory input for

the snakes, and that this finding strongly supports the idea of the auditory stimulation creating a neural map.

The scientists report their finding in the upcoming issue of *Physical Review Letters*.

Source: American Physical Society