

What Did Dinosaurs Hear?

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What did dinosaurs hear? Probably a lot of low frequency sounds, like the heavy footsteps of another dinosaur, if University of Maryland professor Robert Dooling and his colleagues are right. What they likely couldn't hear were the high pitched sounds that birds make.

Yet, it was what Dooling knows about bird hearing that led him and research collaborators Otto Gleich and Geoffrey A. Manley to determine what might have been in the extinct animal's world of sound 65 million years ago. It seems that dinosaurs and their archosaur descendants, including birds and crocodiles, have very similar ear structure. By comparing those structures and applying other rules of hearing, the scientists have devised an idea of the dinosaur's hearing range.

"The best guess is that dinosaurs were probably somewhat similar to some of the very large mammals of today, such as the elephants, but with poorer high frequency hearing than most mammals of today," says Dooling. "As a general rule, animals can hear the sounds they produce. Dinosaurs probably also could hear very well the footsteps of other dinosaurs. Elephants, for instance, are purported to be able to hear, over great distances, the very low frequency infrasound generated by the footsteps of other elephants."

Dooling will present the team's findings at the Acoustical Society of America annual meeting, Tuesday, June 5, in Salt Lake City .

Big and Low

Dooling and his colleagues study the evolution of hearing of living organisms, including pressures their extinct ancestors might have faced. Dooling specializes in bird hearing. Today's birds are the closest living relatives of the dinosaur.

The researchers focused on the part of the inner ear called the basilar membrane to conjecture about dinosaur hearing. Small, lightweight species with a short basilar membrane - a bird, for instance

- can hear higher frequencies than larger species with a longer basilar membrane - a dinosaur.

"As a general rule, large organisms hear best and produce sounds at lower frequencies, while smaller organisms hear best and produce sounds at higher frequencies," Dooling says. "General physical principles suggest that small, lightweight structures for producing sound can be moved at higher frequencies using less energy than can large, heavy structures."

The dinosaur's hearing range probably extended to about the upper frequency limit of a conventional telephone, about 3 kHz. By comparison, says the team's paper, the hearing of "dogs and many other mammals extends to frequencies in the ultrasonic range above 20 kHz, much higher than in humans and archosaurs. The high frequency limit in birds is below that of normal hearing humans, and large dinosaurs have an even more restricted range of high frequency hearing, well below that of humans."

"Interestingly, we sometimes irreverently refer to aging humans as 'dinosaurs,'" says Dooling. "In fact, as humans age in our noisy environment, we begin to lose our hearing at high frequencies. So, in a sense, our hearing becomes more like that of the dinosaurs."

Otto Gleich is a researcher at the University of Regensburg , and Geoffrey Manley is at Technical University of Munich.

Source: University of Maryland

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