

Prehistoric Voices

Summary

This demo explores how scientists reconstruct the sounds of dinosaurs from fossil remains and phylogenetic relationships.

Background

Pop culture has always depicted dinosaurs as ferocious, roaring beasts whose impressive vocalizations could nearly blow the leaves off of the trees they towered over. However, these sounds are more a production of Hollywood spectacle than scientific fact. Sound designers manipulate other sounds, often of common animals such as dogs and elephants, to create the dinosaur roars that have become so well-known.

More accurate reconstructions of dinosaur vocalizations have looked to the connection between dinosaurs and their modern decedents, birds, for answers. Though the extreme unlikeliness of soft tissues to fossilize means that we many never know for sure, dinosaurs likely did not possess the vocal cords humans and other mammals use to make sounds. Instead, they probably had air sacs like birds. Most of the largest birds, such as ostriches or cassaoaries, make particular noises with these air sacs – low, throaty murmurs generated by passing air through the air sac without opening the mouth. These sounds would have been much quitter than the *Jurassic Park* roar, but they still would have allowed dinosaurs to communicate with one another.

Parasaurolophus are a family of dinosaurs distinguished by large, backward sweeping crests on their heads. These bony crests were an extension of their nasal cavity, filled with hollow chambers that allowed them to make complex resonating sounds as they blew air through them. Paleontologists have used CT scans of Parasaurolophus remains to create models of these nasal passages. By inferring the likely position of vocal and nasal soft tissues, they have been able to reconstruct the sounds these dinosaurs might have made with their crests – low, echoing booms. These sounds may have been used to communicate with members of the large herds they lived in or mates, as well as distinguish different species of Parasaurolophus from one another.

Readings

Introductory:

https://www.washingtonpost.com/news/morning-mix/wp/2016/07/12/think-dinosaurs-roared-like-in-jurassic-park-the-truth-new-research-says-is-a-bit-wimpier/?utm_term=.3ea64fa6e3fe

<https://news.utexas.edu/2016/07/11/dinosaurs-may-have-cooed-like-doves>

<https://aeon.co/essays/how-palaeontologists-recreate-the-sounds-of-the-deep-past>

Advanced:

Riede, Tobias, Chad M. Eliason, Edward H. Miller, Franz Goller, and Julia A. Clarke. "Coos, Booms, and Hoots: the Evolution of Closed-Mouth Vocal Behavior in Birds." *Evolution*. 70.8 (2016): 1734-1746. Print.

Materials

- iPad with playlist of sound reconstructions (Jurassic Park clip, scientific reconstruction, bird call, Parasaurolophus sounds)
<https://www.youtube.com/playlist?list=PLtedVgm0ymjtKrnMWJbaF0A4gMk1hrQ8o>
- Flashcards: T. rex, ostrich, baby elephant

The Interaction

The pitch – Do you want to hear what a dinosaur might have sounded like?

Using the materials –

1. Play for visitors three sounds: A Jurassic Park-style T. Rex roar, a modern scientific reconstruction of a dinosaur sound, and an ostrich call. Using the flashcards, have them determine which is the ostrich, which is the manipulated baby elephant sound used as the movie T. Rex roar, and which is the scientific dinosaur sound reconstruction.
2. You can talk about how the roars we often think dinosaurs like T. Rex made are actually just guesses and based more on creating cinematic suspense than scientific study. Other key points might be how scientists go about reconstructing more realistic dinosaur sounds and comparisons between dinosaurs and birds.

Messages

Critical take home: By observing and estimating different anatomical features of fossilized remains and looking at phylogenetic relationships, scientists can reconstruct what extinct organisms may have sounded like.

But wait, there's more: Dinosaurs likely sounded a lot more like their avian descendants than the ferocious, roaring beasts they are often depicted as.

And still more: Reconstructing the sounds of extinct organisms is very difficult because of the complex variables involved in speech production and the fact that soft tissues do not fossilize.

And one more thing: Different anatomical features, such as elaborate nasal crests, allowed dinosaurs to create unique sounds to communicate with one another.

Homework

Tell visitors to listen to the dinosaurs in movies or TV shows and think about how they are portrayed either scientifically accurately or dramatically.

Also suggest they listen closer to the bird calls they hear everyday – it's like listening to a modern-day dinosaur!

Make the Link

This demo is a great linguistics connection with the AMNH Dinosaur exhibit as visitors can put a voice to the dinosaurs they will see in the exhibit.

It is also a good way to take demos like Speech Production, the Ear Model, and the Larynx Model a step further, as they all explore the physical systems that allow the body to produce the sounds it does, which is the basis of this activity.

Animal Sounds would also be a good connection, as it looks at the sounds different modern animals make.

Target Audience

This demo works well with many ages. Older kids, teens, and adults will certainly understand the link between the physiology and sounds of an organism better, but younger children will enjoy hearing the dinosaur sounds and will learn what dinosaurs more realistically sounded like.