

The Song of the Mouse

By Cheryl M. Reifsnyder, Ph.D.

It's not easy to hear a mouse's voice. Men have low-pitched voices, and kids have high-pitched voices. But mice make ultrasounds, which are too high-pitched for human ears to hear. When Dr. Tim Holy figured out how to listen to male mice, he made an amazing discovery: they sing!

Holy is a scientist at the Washington University School of Medicine in St. Louis. Other scientists had shown that male mice produce ultrasounds when they catch the scent of a female. Holy hoped that studying those sounds would help him learn how mice detect and respond to odors.

But if Holy wanted to know more about mouse ultrasounds, he needed to change the sounds into some form that he could understand. First he used a computer program to examine "sound pictures." Those pictures looked interesting, with unexpected patterns. He wanted to hear those sounds!



Singing mice . . . and talking elephants! Read "Elephant Talk" on HighlightsKids.com.

Like birds and whales,

Listening to Mice

Holy played recordings of the mouse sounds at slow speed. Slowing the sounds also *lowers* their pitches, changing them from ultrasounds into sounds that human ears can hear. "I joked at the time that they sounded like whale songs," Holy remembered. He wondered: if the recordings were played at normal speed, would the mice be singing?

"I joked . . . that they sounded like whale songs."

He needed a better way to listen to mouse sounds. What if he used a computer to make the mouse sounds low enough to hear without changing their speed? Holy compared this process to the way a musician can sing the same song starting on a high note or a low note.

When Holy played the mouse sounds at their natural speed,

they sounded like birdsong. "It was really cool to hear!" he said.

Holy was surprised, because most singing creatures are birds, not mammals such as mice. The only mammals known to sing the way birds do are bats and whales.

What Is a Song?

Do mice really sing? Lots of animals communicate with sounds, from dogs to crickets to birds. But which animal sounds are true songs? Holy talked to scientists who study birdsong and learned that songs have several things in common.

First, true songs are made up of different types of sounds, or syllables, just as words contain different sounds rather than just one repeated sound. For example, a chickadee's song (*chick-a-dee-dee-dee*) has three different syllables: *chick*, *a*, and *dee*. Do mice make many different types of sounds?

To answer this question, Holy used his computer to draw more sound pictures. He experimented with different ways to compare



The squiggly lines above the white mouse are from one of Dr. Holy's "sound pictures." It shows that a male mouse's sounds are not just a jumble of squeaks. They have a regular pattern.

mice can carry a tune.

the sounds, and finally he found a pattern.

Holy grouped mouse sounds based on how much they jumped in pitch. He identified at least seven different types of syllables—about the same number of syllables as in some birds' songs. He found that mouse sounds contain distinct syllables, the first characteristic of true song.

Songs Have Structure

In true songs, the syllables are arranged with a specific structure, not jumbled together. For example, a word makes sense only if the syllables are in the right order. *Crocodile* means something, while *dile-o-croc* does not.

Once Holy had figured out how to use the computer to identify different syllables, he looked at sound pictures to see how the mice arranged those syllables. "We wanted to know that they weren't just drawing syllables randomly out of a hat," he said.

The result? "Mice tend to repeat themselves with one

syllable type and then they'll move on to another," Holy said. Birds often do the same thing. Mouse sounds show structure, the second characteristic of true song.

Every mouse sings a different song.

Songs Are Unique

Another characteristic of song is that every animal sings a slightly different song. In fact, individual birds can be identified by their songs. Holy wondered if the same was true for mice.


To find out, Holy had to write another computer program. "It gave us a result that I hadn't really expected," he said. He found that different mice preferred to use certain types of syllables. By listening for the syllables, he could identify individual mice by their songs. Mouse sounds are individual, the third characteristic of true song.

Mouse sounds contain different syllables, arranged

in a structure, and each individual male mouse sings his own song. "When they start singing, sometimes they'll sing for 10 minutes," Holy added. Mice really, truly sing.

Understanding Songs

Now Holy and other scientists have a list of other questions about mouse songs. Do male mice sing to attract females? Do female mice sing, too? How do mice learn to sing?

Holy and his lab will try to answer some of these questions. That's his favorite part of science. "You get to spend your time trying to figure out how the world works," he said. "To me, that's the best job there could possibly be." 

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