

The Home Forum®

How to get started in acoustic research

YOU can be an acoustic researcher, too. All you need is a place to go, such as your backyard or a park, and your eyes and ears. Don't forget your powers of observation. And remember: You can hear a lot farther than you can see.

Let's assume you want to learn more about birds. First, learn to recognize different bird sounds. Find out which bird is making what sound by zeroing in on the sound. Watch the bird. Track it. Become familiar with its songs and calls. Use a field guide to identify the bird. (Ask at your local library.)

Watch what the bird is doing as it makes particular sounds. Is a squirrel coming too close to the nest, perhaps? Is a baby bird hungry? As you observe more, can you tell what the birds are doing just by listening?

"You don't need anything special to learn sounds," says Greg Budney, curator of the Macaulay Library of Natural Sounds (MLNS) at Cornell University in Ithaca, N.Y. "Think about when you answer the telephone: Within a couple of words, you can recognize if the caller is someone you know. And you can do the same thing with an animal."

Once you figure out the sounds in your backyard, take a tape recorder and try to capture some of the sounds on tape.

Serious sound recordists use tape recorders with microphones attached to parabolas. A parabola looks like a satellite dish. Its shape makes it act like an amplifier, increasing the power of your microphone hundreds of times. The parabola also lets you direct the microphone to a particular sound. You can pinpoint a sound and almost completely eliminate other background noises.

R.J.D.

WEB RESOURCES

www.birds.cornell.edu/bow Here's the "bird of the week."

www.birds.cornell.edu/sow And the "sound of the week." Both are from Cornell University's Laboratory of Ornithology.

www.birds.cornell.edu/lms/howto/howtoproductions_index.html Links to more animal sounds.

www.npr.org/programs/morning/features/2001/dec/animals/index.html Hear a National Public Radio story on the "Diversity of Animal Sounds" CD by the MLNS. Site includes 11 animal-sound samples.

www.ulala.org/P_Pigeon/IvoryBill/IBW.html Watch a video of the only movie of ivory-billed woodpeckers, shot by Arthur Allen in 1935.



CORNELL LAB OF ORNITHOLOGY

The nature of sound

SCIENTISTS LISTEN CLOSELY TO HEAR WHAT ANIMALS SAY

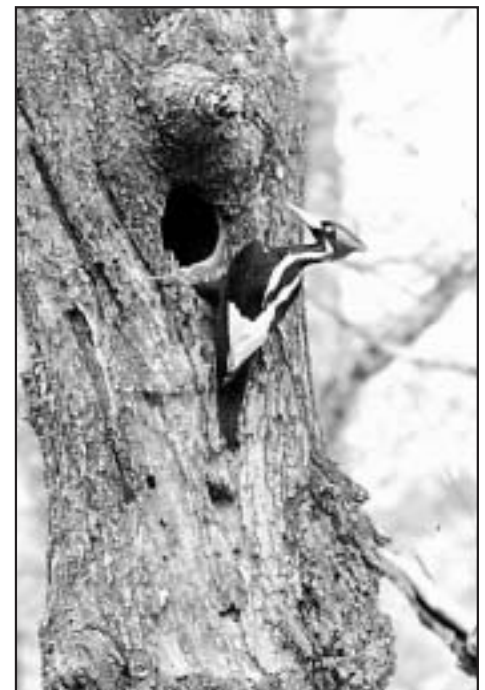
WHAT do the yellow buffalo treehopper, great potoo, African lion, and humpback whale have in common? They all make sounds, and you can find recordings of them in the Macaulay Library of Natural Sounds (MLNS) at Cornell University in Ithaca, N.Y. The library has the largest collection of natural sounds in the world: more than 150,000 recordings represent-

ing 6,700 species of birds and 500 species of amphibians, mammals, and insects.

Why do animals make all these sounds? Usually for the same reason you do: They have something to say. When you're in bed and you're thirsty, do you ever yell for your mom to bring you a glass of water? Your mother knows what you want because she understands your sounds (words). But when a bird sings or a deer snorts, what does it mean? Scientists are finding out.

"As scientists," says Jack Bradbury, director of MLNS, "we want to learn how animals behave with each other and how this is different from people." Dr. Bradbury is also a professor of ornithology (the study of birds). "Communication is the glue that holds animal societies together," he continues. Sound is extremely important to animals. It is the

HOW'S THAT AGAIN?: Staffers from the Macaulay Library of Natural Sounds use lightweight, modern, recording equipment.



CORNELL LAB OF ORNITHOLOGY

BIG SCIENCE: Top, Peter Kellogg (l.) and Albert Brand needed a truckload of recording equipment in the 1930s. One prize: an ivory-billed woodpecker (above).

most widely used form of communication, particularly among vertebrates (animals with backbones) and insects.

If an animal has a way to make noise, it will make noise. For many species, how the sound is made is obvious: You see a bird open its beak, and out comes a song. You see a deer stamp the ground and hear the thump of its hooves. But what about ants or lobsters or treehoppers?

Scientists have discovered that when an ant is mistakenly buried in an anthill, it will make vibrations to help his fellow ants locate him and dig him out. Lobsters and
Continued on next page



CORNELL LAB OF ORNITHOLOGY

Continued from previous page

related animals rub parts of their hard exoskeleton (shell) together to make buzzes, clicks, and raspy noises. They also make sounds by rubbing their antennae together (think of a tiny violin).

A graduate student at Cornell was observing treehoppers (a type of insect) one day and noticed that they seemed to be moving in unison. But how were they communicating? On a hunch, he attached an old phonograph needle to the plant the treehoppers were on and then wired it up to an amplifier and a tape recorder. When he played the tape, he heard the tiny drumming noises the insects were using to "talk" among themselves.

Cornell researcher Katy Payne has been working at the other end of the size spectrum. She noticed something odd about a group of African elephants she was studying. They were behaving as though they were responding to messages being sent a long distance by other elephants. She couldn't hear anything, though. Then she began to monitor very low-frequency sounds – sounds too low-pitched for humans to hear. Sure enough, the elephants were "talking" in very low voices.

Recording birdsongs from a mule cart

The oldest recording in the MLNS is a rose-breasted grosbeak recorded on movie film in 1929. The Fox-Case Movie-tone Corporation had come to Cornell Lab of Ornithology founder Arthur A. "Doc" Allen and asked him to help them record some birdsongs for one of their movies.

Over the next decade, Doc Allen and his colleague Peter Paul Kellogg made two cross-country expeditions to record and photograph birds. This was before tape recorders were invented. At the time, movie sound equipment made better recordings than that used to make phonograph records. So they hauled movie cameras and sound equipment in a large truck or, in some cases, in a cart pulled by a mule. They made the first and only recording of an ivory-billed woodpecker in a Louisiana swamp in 1935. The bird is now thought to be extinct, though a team is scouring the 35,000-acre Pearl River region of Louisiana for signs of it. (You can see a video of the 1935 film on the Web. See "web resources" on the facing page.)

Drs. Allen and Kellogg's research popularized the world of animal sounds. This led to research in interpreting what the sounds meant. People started studying birdsong and observing bird behavior and trying to piece together the "language." The birds and other animals were using sound for a variety of purposes: attracting and courting mates, defending territories, repelling rivals, warning about predators, begging for food, and so on. In other words, animals make sounds for a reason.

The tape recorder was developed in Germany during World War II. Portable models became widely available in the 1950s. Now, researchers could go farther afield. By the 1960s, the k-spectrograph was developed. It measures the frequencies, duration, and volume of sounds and displays them on a graph. Now sounds could be analyzed and compared.

Sound researchers have reached a new



ROBERT HARBISON - STAFF

PAINTED STORK: The Waterbird Sanctuary near Bharatpur, India, is home to dozens of swamp-dwelling bird species year-round.

threshold today: digitizing the recordings of the MLNS collection. Until three years ago, everything in the MLNS was stored on regular analog tape. But tape is difficult to access. It's hard to find quickly what you want on a tape. When you make a copy of a tape, you tend to lose the very high and very low frequencies. So the entire sound collection is being digitized and put onto DVDs to be stored on giant "jukeboxes." This allows the sound to be saved in a super high-resolution format. Sounds will be easier to find. Eventually, all the sounds will be available by computer.

What good are animal noises?

"Birds, bats, and frogs are the three best indicators of the health of the environment," Dr. Bradbury says. They all make noise, too. So researchers can take an "acoustic census" of an area. They can find out what animals are there by the sounds they make.

South America has more than 3,100 species of birds, but the rate of habitat destruction is outpacing the ability of scientists to study them. An acoustic census of an area provides important "baseline" data. Scientists know what birds should be there, and recordings show what birds actually are there. Scientists can't always see and count the birds accurately in a rainforest. But they can "see" them by the sounds they make.

You've probably seen a nature documentary on TV. Ninety percent of the animal noises you hear in such films are dubbed in later. Chances are that the film-production companies asked MLNS for the sounds. And those clocks that make birdsongs or animal noises every hour? Those sounds are from MLNS, too.

You may also be interested to learn that filmmaker George Lucas uses the MLNS. His production company takes natural sounds and, by combining and altering them, make sounds that show up in "Star Wars" films: Chewbacca howls with altered walrus calls and other sounds; a TIE fighter's screech is a much-altered elephant's bellow. Pretty neat.

Rachel J. Dickinson

TODAY'S ARTICLE ON CHRISTIAN SCIENCE

Bringing a spiritual perspective to daily life

At first I felt bad for them

ALONG WITH MOST VIEWERS watching the Olympic pairs figure skating last week, I was stunned by the controversial judging decisions of that wonderful performance by Canadians Jamie Sale and David Pelletier. I'm no skating judge, so I don't really have a right to ascertain the appropriateness of everyone's scores, but the tears on Ms. Sale's face showed more than disappointment.

Clearly, those tears were falling because she felt victim to injustice. It was gratifying, however, to see her, her partner, and all of the crowd stand, applauding for their primary competitors, Anton Sikharulidze and Elena Berezhnaya. And it was good to see both sets of competitors finally be awarded gold medals.

No doubt there is not one person reading this who hasn't felt victim to – and even shed tears over – injustice. But there is something that can lift that weight off your life.

There is a law of God that renders injustice impotent. This law is described in the Bible: "All things work together for good to them that love God" (Rom. 8:28).

The first time I learned how this law works was when I was a freshman in high school. My favorite sport was baseball, and although I was not very tall, I played all the time and was constantly bothering my friends to come practice with me. I tried out for our high-school baseball team, and to my great joy, I made the team. I'll never forget standing with all my teammates as our coach handed out the uniforms.

A few days before our first game, one of my former Little League coaches called and asked if I would do a demonstration for some kids. I was happy to do this, but as I was teaching those children, a thrown ball hit my hand and injured my finger. When my high-school baseball coach saw my finger, he said, "Well, from the looks of that injury, I don't think you'll be able to help our team this season. Here, turn in your uniform, and I'll give it to a player who will be able to perform."

After school the next day, I watched the bus leave with all my former teammates on their way to their first game. I felt so bad. The injustice of such an accident really threw me. All I had been doing was trying to help some children.

And now I was off the team. It didn't seem fair.

I remembered reading in the Bible about a person who, even though he was always trying to help people, was confronted with injustice after injustice. This man was Joseph, and after his brothers threw him in a pit, some other people found him and made him a slave.

Even as a slave he tried to help people; yet he was unjustly accused and thrown into prison. I was surprised to read that he even helped people there. A former prisoner who served the king of Egypt told the king about this amazing person, Joseph. When the king needed help, he asked Joseph. And Joseph was able to help the people of Egypt survive during a drought that lasted several years.

I was impressed to see how God's law had operated in Joseph's life. Each instance of injustice only served to

spring Joseph forward. All things worked together for good despite injustice. Why? All things worked together for good, because Joseph loved God, good.

I could see how this same law applied to me.

I was glad to learn that my love for God could help me, too. A few days later, my finger was healed, and I tried out for, and made, a semi-pro baseball team. We traveled all around my state, and I played in many more games than I would have on my school's team.

Mary Baker Eddy, who founded this newspaper, wrote, "The human sigh for peace and love is answered and compensated by divine love" ("Message to The Mother Church for 1900," pg. 11). Whether injustice appears in the form of figure skating judges' controversial decisions or in forms much more insidious, yielding to God's law means that injustice often serves as a springboard to higher and better opportunities to love, accomplish more, and even help the world.

What doth the Lord require of thee, but to do justly, and to love mercy, and to walk humbly with thy God?

Micah 6:8

There is something that can lift the weight of injustice off your life.



Save 25% on a new Monitor subscription!

- 3-month trial \$39 (Regular rate \$49.75)
- 6-month trial \$75 (Regular rate \$99.50)
- Check/money order enclosed. Bill me, please.

Name _____

Address _____

City _____ State _____ Zip _____

Offer available only in the U.S.A.

S02M

Mail to:
The Christian Science Monitor
P.O. Box 98
Boston MA 02117-0098, U.S.A.

Or call toll-free: Daily Edition Only,
New Orders Only.

1-800-456-2220

Mon.-Fri. 9 a.m. to 5 p.m. ET.