

**The following interview with
KATHARINE PAYNE
was conducted by the Library of Congress
on April 7, 2017.**



Katharine Payne

Library of Congress: After beginning your research with whales, when and why did you decide to switch to these other mammals?

Katharine Payne: It was circumstance, coincidence. I was out on the west coast in 1983, attending a symposium on non-human mammals and their cultures. And I had heard tell of a baby elephant just born in the Portland zoo and I got permission to go and spend a week at the zoo. I wasn't sure what I was going to find but I had an interest in large-brained social mammals.

So, I sat next to the cage for about a week and a couple of times, though I saw nothing, I got this *feeling*, a throbbing in the air, and it reminded me of a sensation I had experienced when I was 13 and in the Sage Chapel choir at Cornell. My mother and I were singing in the chorus of Bach's St. Matthew Passion. I stood in front of a large pipe organ, which was capable of lower pitches than most instruments. In the middle of the oratorio there is a chorus that opens with a huge organ prelude with a descending bass line. When the lowest notes were played, the air around the organ throbbed--we could better feel than hear them. The experience in the zoo, more than 30 years later, reminded me of that.

So then I thought, Who's to say that there are no animals calls lower than what humans can hear? Maybe what I was feeling was some sort of communication among elephants.

Back at Cornell, I spoke with two acoustic biologists, Carl Hopkins and Bob Capranica. And they said, "We haven't thought about infrasonic communication. But we have the equipment to measure it, if it exists. Take it and go back to the zoo!"

So we—my friends, Elizabeth Marshall Thomas and Bill Langbauer, and I—went back to the zoo with the borrowed equipment. We stayed for about a month, recording continuously and keeping notes on behaviors. Every now and then, we felt the throbbing and occasionally noticed something interesting happening. One day there were several elephants in the exhibit hall: a young calf and two or three females, one of whom seemed to be the "matriarch" of that group although none of them were related to each other.

Her name was "Rosie," and Rosie, that day, walked the 90 foot length of the hall until she was facing an outer wall that was at least a foot thick. As she walked, she slapped her ears against

her neck. Liz ran outdoors and saw that the male elephant Tunga, who had been roaming about in a large outdoor yard, was now standing close to the wall. He and Rosie were facing each other with a foot-thick wall between them.

The two sound recordings in the Library collection document that event. The first clip is what we heard in real time--all the sounds of this very noisy zoo with the heating fan being turned off and Bill's voice counting, to help us when analyzing the tape later to align the zoo noises with the elephants's visible behavior. Then we heard: slap, slap, slap. Rosie slapping her ears against her neck as she walked to the far end of the hall. Then a whooshing sound as she blew air out of her trunk. Then more zoo noise.

The second clip is a copy of that same recording, but this time it's played ten times faster. Speeding up the tape ten times raises the pitch of all recorded sounds by about 2 ½ octaves, bringing the lowest sounds into the range of human hearing. Now the ear-flapping sounds like a series of rapid clicks. In addition there is a long exchange of animal calls, rather cow-like, one voice higher than the other. These are Mickey-Mouse versions of an elephant conversation, presumably, between Tonga and Rosie.

LOC: What sort of equipment did you use in your research?

KP: A Nagra tape recorder with B & K microphones--an elegant and accurate but cumbersome machine. Nowadays, DAT recorders provide a more practical way to pick up infrasound.

LOC: Did you know at that time that something big had occurred? Did you have an epiphany?

KP: The epiphany actually came later, when I returned to Ithaca. I visited Carl Hopkins in his lab on the evening of Thanksgiving. He had a machine called a spectrograph that allows you to see and measure sound. A spectrogram of the zoo recordings confirmed that we had recorded an exchange of infrasonic animal sounds.

This was very exciting! At first, it was even more exciting for Carl than for me. He's a professional biologist with a specialty in animal communication and he immediately saw that because low-frequency sound travels better than higher sound infrasonic communication offered a channel for long-distance communication.

In the field, elephants were being studied, by others, in Kenya. Both Cynthia Moss and Iain Douglas-Hamilton were doing research in Kenya, and had independently noted that elephants seem to coordinate their movements with other elephants from far away.

The natural sources of infrasound known at the time were massive movements of air, earth, fire and water: infrasound had been documented in thunder and tidal waves, for instance. But now, we knew that elephants could also make it. It was a BIG event!

LOC: What happened next?

KP: I was invited to Amboseli National Park in Kenya by Joyce Poole, a research partner of Cynthia Moss, who had been studying that elephant population for many years and knew many of them as individuals. My function was to help Joyce add the acoustic dimension to their long-term study of elephants. For six weeks or so, we drove around making vocal recordings with calibrated equipment that was capable of infrasound, while keeping track of whatever behavioral observations we were able to make. Some of our results suggested that the elephants were communicating with each other from as far as a kilometer away.

Meanwhile, I was learning from Joyce about the complexities of elephant social behaviors. We spent a wonderful second season working together in 1986. In 1987, I went, with Bill Langbauer, to Etosha National Park in Namibia, to do playback experiments, with the question: do elephants respond to low frequency sound over long distances?

Two members of our five-person team would drive a Combi van with a huge loudspeakers on the top of it to a destination unknown to the rest of us. We were on an observation tower with video cameras, overlooking a waterhole where elephants often appeared. Then, at some point, chosen by the loudspeaker team but unknown to the tower team, a broadcast would be played. It was a blind test.

The payback came when--every now and then--we'd see, from the tower, changes in the behavior of the elephants we were filming. They'd be drinking water and then they'd lift their heads, spread their ears wide and listen, sometimes turning their bodies to face a certain direction and walking away. Later, when we coordinated information from the two teams, we found that the elephants's movements had coincided with broadcasts of female calls from several kilometers away, and showed that they knew where the broadcast had come from.

LOC: That's extraordinary!

KP: In the next season, two meteorologists from the University of Virginia, David Larom and Mike Garstang, came to Etosha and measured the transmission of sound over the savannah in regard to layers of temperature in the air. They found that on a clear day in the savanna, a loud elephant call could be heard for about 30 square kilometers. But, at night, the same call might be heard in an area as large as 300 square kilometers.

This then begged the question: do elephants mostly call at night because they know it will travel further and better? And how about lions? The plot thickens...

LOC: Later, you traveled to Zimbabwe, correct?

KP: Yes, in Zimbabwe, Bill and I brought a little team to work with another researcher, Rowan Martin, a manager of national parks in Zimbabwe, who had put radio collars on a number of female elephants and observed that certain elephant families, even when not in view of each other, often moved in parallel with each other.

We collared and then radio-tracked 16 female elephants in 13 different family groups. We recorded their vocalizations in hopes of finding out if their vocalizations allowed them to remain in contact with each other. Our data were complicated enough that we didn't get reliable proof but we did learn a good deal about elephants' ranging patterns, and found, as Martin had found, that some elephant families coordinated their movements with each other over distances of several miles.

Finally, after studying captive elephants in a zoo and savanna elephants, I wanted to look into the third species of elephants that live in the central Africa forest; that forest is HUGE. It's the second largest forest in the world and I felt that, here, resources for elephants would not be a limiting factor as is the case for savanna elephants.

Working on a forest clearing called Dzanga, Andrea Turkalo had spent decades watching and identifying the animals in one elephant population. In 1999, she and several of us in the Bioacoustics Research Program of the Lab of Ornithology at Cornell U. founded the Elephant Listening Project.

Our purpose was to find out how acoustic communication functions in a dense forest, and—ultimately—to remotely monitor the forest, not only for elephant communication but also for human activity. In spite of the richness of the resources available to them, the Central African elephants are plagued by poaching.

LOC: Today there is the Elephant Listening Project that largely carries on your work.

KP: The recorders we set out in the forest provide some of the best information on poaching as they pick up the sounds not only of elephant communication but also on the location of poachers's vehicles and gun shots. Thus ELP, under the leadership of Dr. Peter Wrege, since 2006, has become a valuable tool on the political side.

LOC: You're retired now? It couldn't have been easy to step away.

KP: Oh, I help out when I'm needed, and celebrate the folks who are carrying on. It's not hard when you have a wonderful person to replace you. Besides, I have a new hobby. Making violins.

LOC: You make violins!?

KP: Yes, I've always been interested in string instruments. So I'm learning to make them. I've gotten too old to climb a tree if an elephant runs after me!