

Mysterious river dolphin helps crack the code of marine mammal communication

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Araguaian river dolphin swimming in the Araguaia River near a fish market in the Brazilian town of Mocajuba that the animals regularly visit to be fed by the people shopping there. Normally they are hard to find and study. Researchers from the University of Vermont and University of St. Andrews discovered that the dolphin species, which was thought to be solitary and quiet, can actually make hundreds of different sounds, a finding that could help uncover how communication evolved in marine mammals Credit: Paulo Castro

The Araguaian river dolphin of Brazil is something of a mystery. It was thought to be quite solitary, with little social structure that would require communication. But Laura May Collado, a biologist at the University of Vermont, and her colleagues have discovered that the dolphins can actually make hundreds of different sounds to communicate, a finding that could help uncover how communication evolved in marine mammals.

"We found that they do interact socially and are making more sounds than previously thought," she says. "Their vocal repertoire is very diverse."

The findings of May Collado and her colleagues were published in the journal *PeerJ* on April 18.

The Araguaian dolphins, also called botos, are a difficult animal to study. They are hard to find in the first place, and while the waters of the Araguaia and Tocantins rivers are clear, it is challenging to identify individuals because the dolphins are skittish and hard to approach.

Luckily, Gabriel Melo-Santos, a biologist from the University of St Andrews in Scotland and leader of the project, found a fish market in the Brazilian town of Mocajuba where the botos regularly visit to be fed by people shopping there. The [clear water](#) and regular dolphin visits provided a unique opportunity to get a close look at how the animals behave and interact, and to identify and keep track of various individuals.

The team used underwater cameras and microphones to record sounds and interactions between the dolphins at the market, and took some genetic samples. They identified 237 different types of sounds the

dolphins make, but even with 20 hours of recordings the researchers don't believe they captured the animals' entire acoustic repertoire. The most common sounds were short, two-part calls that baby dolphins made when they were approaching their mothers.

"It's exciting; marine dolphins like the bottlenose use signature whistles for contact, and here we have a different sound used by river dolphins for the same purpose," says May Collado. The river dolphins also made longer calls and whistles, but these were much rarer, and the reasons for them are not yet clear. But there is some indication that whistles serve the opposite purpose than in bottlenose dolphins, with the botos using them to maintain distance rather than for group cohesion.

The acoustic characteristics of the calls are also interesting; they fall somewhere between the low-frequency calls used by [baleen whales](#) to communicate over long distances, and the high-frequency ones used by marine dolphins for short distances. May Collado speculates that the river environment may have shaped those characteristics.

"There are a lot of obstacles like flooded forests and vegetation in their habitat, so this signal could have evolved to avoid echoes from vegetation and improve the communication range of mothers and their calves," she says.

May Collado and her colleagues next want to study whether the same diversity of communication is seen in other populations of Araguaian river dolphins that are less accustomed to humans, and compare them to their relatives elsewhere in South America. The Araguaian dolphins are closely related to two other species, the Bolivian river dolphin and Amazon river dolphin; the Araguaian dolphins were only described as a separate species in 2014, and that classification is still under debate. But there seems to be a large amount of variation in the repertoire of sounds each species makes.

The Amazon dolphins in Ecuador, studied by May Collado in 2005, are generally very quiet. "We need more information on these other species and more populations," she says. "Why is one population chattier than others and how do these differences shape their social structure?"

May Collado says the work could help researchers gain clearer understanding of how communication evolved in marine mammals. Similar calls have been reported in pilot whales and killer whales, for example, and the similarities and differences between different species could help tease out which signals evolved first, and why.

The river dolphins are evolutionary relics, represented by just a few species around the world, and they diverged from other cetaceans much earlier than other dolphins. So these calls may have arisen first in river dolphins, then later evolved in marine dolphins into whistles and calls but in a different social context. Or was there a change in the function of the calls, with this kind of sound being used for group identity in killer whales, and individual identity in river dolphins? The calls may also have other functions in addition to identity, perhaps indicating group identity, or providing information on emotional state.

"We can't say what the evolutionary story is yet until we get to know what sounds are produced by other river dolphins in the Amazon area, and how that relates to what we found," she says. "We now have all these new questions to explore."

Provided by University of Vermont

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