

# Whispering bats are 100 times louder than previously thought

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Annemarie Surlykke from the University of Southern Denmark is fascinated by echolocation. She really wants to know how it works. Surlykke equates the ultrasound cries that bats use for echolocation with the beam of light from a torch: you won't see much with the light from a small bulb but you could see several hundred metres with a powerful beam. Surlykke explains that it's the same with echolocating bats.

Some have big powerful calls for perception over a long range, while others are said to whisper; which puzzled Surlykke. How could 'whispering' bats echolocate with puny 70decibel cries that barely carry at all? Teaming up with her long time collaborator Elizabeth Kalko from the Smithsonian Tropical Research Institute and student Signe Brinkløv, Surlykke decided to measure the volume of a pair of whispering bat species' calls to find out how loud the whisperers are. They publish their discovery that whispering bats are really shrieking in *The Journal of Experimental Biology* on 12th December 2008 at <http://jeb.biologists.org>.

Travelling to the Smithsonian Research Institute's Barro Colorado Island in Panama, Surlykke decided to focus on two whispering members of the Phyllostomidae family: *Artibeus jamaicensis* and *Macrophyllum macrophyllum*. According to Surlykke, the Phyllostomidae family of bats are unique because of their remarkably diverse lifestyles and diets. Some feed on fast moving insects while others feast on fruit buried in trees, making them an ideal family to study to find out how echolocation works.

But measuring the volume of the bat's echolocation calls was extremely challenging. If Surlykke was going to get true volume measurements from hunting bats on the wing, she would have to be certain that the bats were facing head on and that she could measure their distance from the microphone that recorded the sound so that she could correct for the volume lost as the call travelled to the microphone. Setting up an array of four microphones, the team recorded 460 cries, which Surlykke eventually whittled down to 31 calls for *M. macrophyllum* and 19 for *A. jamaicensis* that she could use.

Correcting the volume measurements, Surlykke was delighted to find that far from whispering, the bats were shrieking. The tiny insectivore *M. macrophyllum* registered a top volume of 105decibel, while fruit feeding *A. jamaicensis* broke the record at 110decibel, a remarkable 100 times louder than a 70decibel bat whisper and almost twice as loud as *A. jamaicensis*.

Surlykke suspects that she can explain the differences in the animals' volumes by their different lifestyles. She explains that the relatively large *A. jamaicensis* feeds on fruit, which it probably locates through a combination of senses, including smell and short-range echolocation whispers. But the bats have to search over large areas to find fruiting trees, and Surlykke suspects that the bat uses its high volume, well-carrying shrieks for orientation in their complex forest environment.

However, tiny *M. macrophyllum*'s lifestyle is completely different. They hunt for insects over water, scooping them up with their tail. Surlykke says that she suspected that *M. macrophyllum* would be louder because she couldn't see how the animals could locate moving insects with a low intensity echolocation call, but admits that she was amazed that they were so much louder and that they could also adjust the volume to match their prey.

Reference: Brinkløv, S., Kalko, E. K. V. and Surlykke, A. (2009).  
Intense echolocation calls from two 'whispering' bats, *Artibeus jamaicensis* and *Macrophyllum macrophyllum* (Phyllostomidae). *J. Exp. Biol.* 212, 11-20.

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