

Co-sponsored Meeting Reports

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ACOUSTIC COMMUNICATION BY ANIMALS SYMPOSIUM

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In August, researchers from disparate fields with a common interest in animal bioacoustics met in Ithaca, N.Y., for the 3rd International Symposium on Acoustic Communication by Animals. The conference was hosted by Cornell University's Bioacoustics Research Program and sponsors included the Acoustical Society of America, Office of Naval Research, National Oceanic and Atmospheric Administration, and National Science Foundation.

The meeting began with a keynote talk from Peter Narins of the University of California, Los Angeles. Narins discussed the concave-eared torrent frog, an unusual amphibian that makes its home at the base of Mt. Huangshan in Anhui Province, China. These animals were found living in an environment full of intense, broad spectrum ambient noise from the rushing creek and nearby waterfalls. Recordings of their calls revealed significant energy in the ultrasonic range, and examination of the frogs' anatomy showed a recessed tympanic membrane and a mammalian-like ear canal. It is likely these frogs faced selection pressure from their noisy habitat to increase the frequency of their calls and hearing to communicate effectively. In fact, Narins and his colleagues discovered another frog species in Borneo with similar ultrasonic vocalizations and a depressed tympanic membrane. The two species are not closely related, suggesting they independently evolved those characteristics in response to similar environmental pressures.

Narins' talk highlighted what would be a major theme of the meeting—noise and its effects on animal communication. Rachele Malavasi of the University of Carlo Bo, Italy, presented data that revealed songbirds in stable communities coordinated their chorusing to avoid signal masking. Cornell University's Aaron Rice analyzed automatic recordings of marine acoustic communities off the shore of the southeastern United States and found evidence for acoustic niche partitioning between species that share acoustic space. These animals, and Narins' ultrasonic frogs, have adjusted or evolved solutions so they can still communicate amidst naturally occurring noise.

For other animals, problems arise when the noise is anthropogenic. Sandra Blumenrath (University of Maryland, College Park) explained how reverberant environments com-

promise detection and discrimination of communication sounds in songbird networks, and Jenelle Dowling (Cornell University) discussed how urban development results in structures with hard, impervious surfaces that, to wildlife, have unfamiliar absorptive and reflective properties.

Other researchers are examining the effects of anthropogenic noise on marine mammals. Christopher Clark of Cornell presented analyses showing the acoustic footprint of large shipping vessels was enormous, effectively “bleaching” large areas of endangered right whale habitat and significantly limiting their communication opportunities. The consequences of perturbing an acoustic community are not fully understood, especially in harder-to-observe marine environments. We currently do not know how shipping noise affects right whale movements and communication, but noise of this magnitude has the potential to interfere with foraging efficiency, mating opportunities, and possibly even survival.

Leila Hatch (Stellwagen Bank National Marine Sanctuary) addressed the need for changes in the way we try to abate anthropogenic noise in the ocean. She put forward that current noise management focuses on short-term, transient noise and has a heavy emphasis on marine mammals. Future noise management plans must pay attention to the cumulative noise footprints from multiple sources, consider ecologically relevant scales in both space and time, address chronic lower intensity noise sources, and include all wildlife (fish, invertebrates, etc.). Hatch called for methods for quantifying anthropogenic noise over large spatial and long temporal scales and assessing the effects of this noise on behavior of many species of marine animals, especially movement and communication.

Back on land, the situation is not much better. Kurt Fristrup of the National Park Service demonstrated how even the places humans designate as wild and protected are not immune from noise. The Park Service was established to support goals such as leaving wild areas unimpaired, ensuring superb environmental quality, making certain natural processes predominate, and preserving authentic landscapes. However, transportation noise is a major problem in national parks. Evaluation of the transportation networks within parks revealed motorcycles have a greater than 600 km

acoustic footprint. Many aircraft routes fall over national parks, adding to the pervasive problem. The specific and long-term consequences of increasing transportation noise in national parks remain unknown, but some of the losses are already apparent. The wild inhabitants are losing active space in which to send and receive communication signals. The parks themselves are losing some of their wilderness character. Noise can even affect human visitors to the parks, by interfering with speech or sleep and disrupting those who wish to connect with nature. Fristrup ended his talk with hope, saying noise pollution in national parks could be

“turned off as soon as we have the will to do so, and the benefit will be immediate.”

Narins’ presentation, and those that followed, supported the importance of continuing research into animal sounds. The Symposium provided an opportunity for scientists to gather and discuss why the study of acoustic communication by animals is needed not only to assess the effects of noise and contribute to conservation efforts, but also to learn about animal behavior and physiology, study the distribution and movement of animals, and estimate the density or population of some species.



Mary Bates is a freelance science writer based out of Boston, MA. She received her Ph.D. in psychology from Brown University, where she studied bat echolocation. Her research has appeared in *Science*, *Proceedings of the National Academy of Science*, and other journals. Her writing for popular audiences has been published by the American Association for the Advancement of Science, the Howard Hughes Medical Institute, and Harvard's Focus. You can read more of her work at www.marybatessciencewriter.wordpress.com.