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Animal communication in context FREE

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Animal communication in context

Megan McKenna's article "The sounds around us," dealing with animal communication (PHYSICS TODAY, January 2020, page 28), is an informative discussion of the role of sound in the natural world. A somewhat surprising omission is the role of Earth's two dominant fluid systems, the atmosphere and the oceans, in the propagation and detection of sound. Sounds in both depend on the fluid's state.

If the fluid is stratified with a stable vertical density distribution, sound can be trapped and transmitted over unusually long distances. The oceans characteristically exhibit such a layer, the thermocline, near the surface. Whales employ it to communicate over distances of hundreds, or even thousands, of kilometers. Those cetaceans—and multiple species, including dolphins and porpoises—use songs, whistles, and clicks to communicate, to sense their surroundings, and to locate prey through echolocation.[1]

Pervasive atmospheric nocturnal inversions, particularly in dry habitats such as Namibia's Etosha National Park, are used by elephants to communicate over distances of 10 km. Because of their low birth rate of less than one calf in five years, African elephants must use sound to survive. Their ability to find a mate in the dense rain forest where elephants evolved depends on their using long-wave (30 m), low-frequency (15 Hz) sound in an environment where the highest temperatures are at the tops of the trees and the lowest at the forest floor. Low-frequency calls trapped in such a forest inversion of temperature can be heard over an area of roughly 300 km^2, which would likely contain more than one adult male.

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Surprisingly, when the rain forests contracted some 20 million years ago and the elephants migrated to the savannas, similar atmospheric conditions prevailed during early evening and night. In the dry desert-like conditions, the surface cools rapidly just before and after sunset. A strong nocturnal temperature inversion 100 m deep forms rapidly. The inversion traps the elephants' low-frequency calls such that an estrous female may be heard by several male elephants ready to compete for her. Without such a choice, propagation of the species might be in question. Sound in the oceans and the atmosphere is a major part of the ecological story.[2]

References

1. Whale and Dolphin Conservation Inc, webpage "How do dolphins communicate?" (2018); https://us.whales.org/whales-dolphins/how-do-dolphins-communicate.
2. M. Garstang, *Elephant Sense and Sensibility: Behavior and Cognition*, Academic Press (2015), chap. 9.

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I read with interest the article "The sounds around us" by Megan McKenna (PHYSICS TODAY, January 2020, page 28). I wonder if anyone is studying the sounds of animals communicating while they are confined in slaughterhouses or in trucks transporting them to slaughterhouses. Are those sounds different from the ones they make as they join the assembly line during slaughter? And does anyone study the sound of a dairy cow as its newborn calf is taken away? She must communicate a lot.

My take is that communication among nonhuman animals is of no concern to humans when it comes to their taste buds or their pocketbooks.

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