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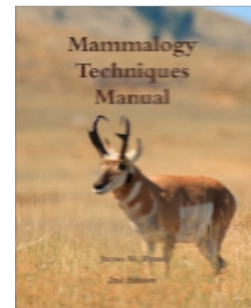
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Hyena Scent Posts Use Symbiotic Microbe Messengers

14 Nov 2013 Filed in: [Carnivora](#) | [Communication](#) | [Behavior](#)

Twitter limits human communication to a mere 140 characters. Animals' scent posts may be equally as short, relatively speaking, yet they convey an encyclopedia of information about the animals that left them.

In the current issue of the *Proceedings of the National Academy of Sciences*, a Michigan State University researcher shows that the detailed scent posts of hyenas (Figure 1) are, in part, products of symbiotic bacteria, microbes that have a mutually beneficial relationship with their hosts.

"When hyenas leave paste deposits on grass, the sour-smelling signals relay reams of information for other animals to read," said Kevin Theis, the paper's lead author and MSU postdoctoral researcher. "Hyenas can leave a quick, detailed message and go. It's like a bulletin board of who's around and how they're doing."

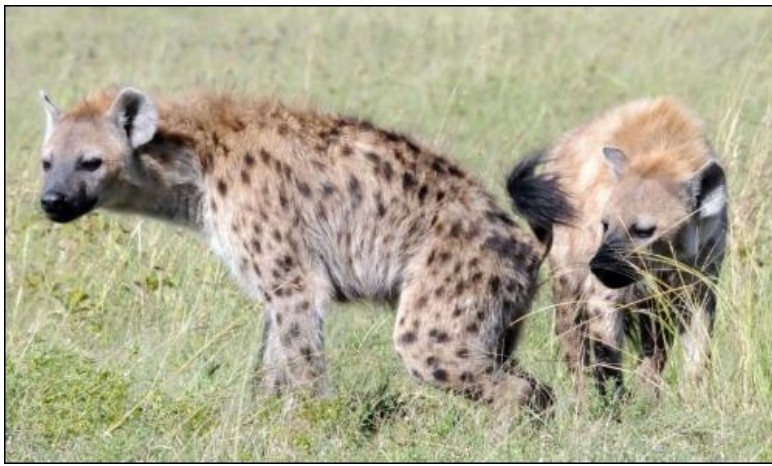


Figure 1. A spotted hyena scent marking. (courtesy of Michigan State University)

Interestingly, it is the bacteria in pastes – more diverse than scientists had imagined – that appear to be doing the yeoman’s job of sending these messages.

“Scent posts are bulletin boards, pastes are business cards, and bacteria are the ink, shaped into letters and words that provide information about the paster to the boards’ visitors,” Thisis said. “Without the ink, there is potentially just a board of blank uninformative cards.”

Thisis, who co-authored the study with Kay Holekamp, MSU zoologist, studied multiple groups of male and female spotted hyenas and striped hyenas in Kenya.

By using molecular surveys, they were afforded unprecedented views of the diversity of microbes inhabiting mammals’ scent glands. The researchers were able to show that the diversity of odor-producing bacteria in spotted hyena scent glands is much greater than historical studies of mammals had suggested (Figure 2).

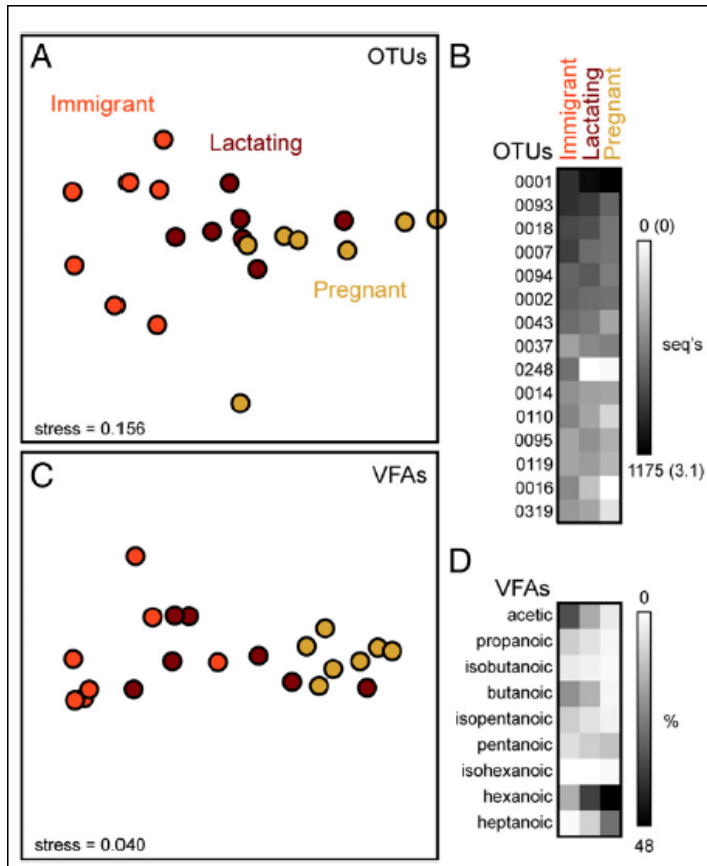


Figure 2. Variation in the bacterial communities and volatile fatty acid (VFA) profiles of the pastes of immigrant male, lactating female, and pregnant female spotted hyenas in the Talek clan. (A and C) A plot showing variation in the structure of paste bacterial communities among Talek clan members. (B) A heat map of the mean abundances of the prominent bacteria in the pastes of Talek hyenas. (D) A heat map of the mean percent abundances of VFAs in the pastes of Talek hyenas. From Thisis et al. 2013)

The diversity, however, still consistently varies between hyena species, and with sex and reproductive state among spotted hyenas, Theis added. Importantly, the variation in scent gland bacterial communities was strongly correlated with variation in the glands' odor profiles, suggesting that bacteria were responsible for the variation in scent.

For the current paper, Theis' team was the first to combine microbial surveys and complementary odor data from wild animals. The studies' findings leave Theis anxious to return to the field.

"Now I just need to get back into the field to test new predictions generated by this study," Theis said. "The next phase of this research will be to manipulate the bacterial communities in hyenas' scent glands to test if their odors change in predictable ways."

Source: Modified from materials provided by Michigan State University.

Reference

Theis KR, Venkataraman A, Dycus JA, Koonter KD, Schmitt-Matzen EN, Wagner AP, Holekamp KE, & Schmidt TM (2013). Symbiotic bacteria appear to mediate hyena social odors. *Proceedings of the National Academy of Sciences of the United States of America* PMID: [24218592](#)



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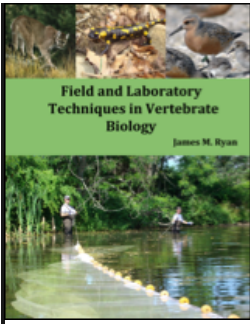
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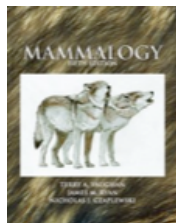
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