

Studying the social side of carnivores

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The highly social coati has a large frontal cortex -- which regulates social interaction -- compared to other members of the raccoon family, according to research by Michigan State University. Credit: Michigan State University

The part of the brain that makes humans and primates social creatures may play a similar role in carnivores, according to a growing body of research by a Michigan State University neuroscientist.

In studying spotted hyenas, lions and, most recently, the raccoon family, Sharleen Sakai has found a correlation between the size of the animals'

frontal cortex and their social nature.

In her latest study, Sakai examined the digitally recreated brains of three species in the Procyonid family – the raccoon, the coatimundi and the kinkajou – and found the coatimundi had the largest frontal cortex. The frontal cortex is thought to regulate social interaction, and the coatimundi is by far the most social of the three animals, often living in bands of 20 or more.

The study, funded by the National Science Foundation, is published in the research journal *Brain, Behavior and Evolution*.

"Most neuroscience research that looks at how brains evolve has focused primarily on primates, so nobody really knows what the frontal cortex in a carnivore does," said Sakai, professor of psychology. "These findings suggest the frontal cortex is processing social information in [carnivores](#) perhaps similar to what we've seen in monkeys and humans."

Sakai did the most recent study in her neuroscience lab with Bradley Arsznov, a former MSU doctoral student who's now an assistant professor of psychology at Minnesota State University.



Here are three brain endocasts from Michigan State University -- from top to bottom, a lion, a spotted hyena and a coatimundi. Using animal skulls from museums, MSU researchers use CT scans and sophisticated software to digitally "fill in" the areas where the brains would have been. They get the endocasts by printing out the images on a 3-D printer. Credit: Michigan State University

Her latest study was based on the findings from 45 adult Procyonid skulls acquired from university museum collections (17 coatimundis, 14 raccoons and 14 kinkajous). The researchers used computed tomography, or CT scans, and sophisticated software to digitally "fill in" the areas where the brains would have been.

When they analyzed into the findings, they discovered the female coatimundi had the largest anterior cerebrum volume consisting mainly of the frontal cortex, which regulates social activity in primates. This makes sense, Sakai said, since the female coatimundi is highly social while the male coatimundi, once grown, typically lives on its own or with

another male. Also known as the Brazilian armadillo, the coatimundi – or coati – is native to Central and South America.

Raccoons, the most solitary of the three animals, had the smallest [frontal cortex](#). However, raccoons had the largest posterior cerebrum, which contains the sensory area related to forepaw sensation and dexterity – and the raccoon's forepaws are extremely dexterous and highly sensitive.



The raccoon, the most solitary of the three species in the Procyonid family studied by Michigan State University researchers, has the smallest frontal cortex. The study is one of the first to look at brain size and behavior in carnivores. Credit: Michigan State University

The rainforest-dwelling kinkajou had the largest cerebellum and brain stem, areas that regulate motor coordination. This skill is crucial for animals like the kinkajou that live in trees.

Brain size variations in this small family of carnivores appear to be related to differences in behavior including [social interaction](#), Sakai said.

Provided by Michigan State University

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