Social or stinky? New study reveals how animal defenses evolve

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Skunks are an example of a small carnivore that uses chemical defense against predators, rather than sociality. New work shows that chemical defenses go with noctunality, while day-active animals are more likely to use sociality as a defense against predators. Credit: Jennifer Hunter

When people see a skunk, the reaction usually is "Eww," but when they

see a group of meerkats peering around, they often think "Aww."

Why some animals use noxious scents while others live in social groups to defend themselves against predators is the question that biologists Tim Caro of the University of California, Davis and Theodore Stankowich of California State University, Long Beach and sought to answer through a comprehensive analysis of predator-prey interactions among carnivorous mammals and birds of prey.

Their findings appear in the online edition of the journal *Evolution*.

"The idea is that we're trying to explain why certain antipredator traits evolved in some species but not others," said Stankowich, who noted that this study not only explains why skunks are stinky and why banded mongooses live in groups but also breaks new ground in the methodology of estimating predation risks.

Caro, Stankowich and Paul Haverkamp, a geographer who recently completed his Ph.D. at UC Davis, collected data on 181 species of carnivores, a group in which many species are small and under threat from other animals. They ran a comparison of every possible predator-prey combination, correcting for a variety of natural history factors, to create a potential risk value that estimates the strength of natural selection due to predation from birds and other mammals.

They found that noxious spraying was favored by animals that were nocturnal and mostly at risk from other animals, while sociality was favored by animals that were active during the day and potentially vulnerable to birds of prey.

"Spraying is a good close-range defense in case you get surprised by a predator, so at night when you can't detect things far away, you might be more likely to stumble upon a predator," Stankowich said.

Conversely, small carnivores like mongooses and meerkats usually are active during the day which puts them at risk from birds of prey. Living in a large social group means "more eyes on the sky" in daytime, when threats can be detected further away.

The social animals also use other defenses such as calling out a warning to other members of their group or even mobbing together to bite and scratch an intruder to drive it away.

The project was a major information technology undertaking involving plotting the geographic range overlap of hundreds of mammal and bird species, but will have long-term benefits for ongoing studies. The researchers plan to make their database, nicknamed the "Geography of Fear," available to other researchers.

More information: onlinelibrary.wiley.com/doi/10 … 1/evo.12356/abstract

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