

# Hyenas inherit power from mothers, but it's a privilege they pay dearly for, finds 30-year study

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Silver Nugget, the queen of one hyena clan in the Maasai Mara National Reserve in Kenya. Credit: Jana Woerner

In some monarchies, inherited power offers a ladder that can be

ascended to absolute authority—be it through diplomacy, ruthlessness, or the passing of time. But in hyena monarchies, inherited power is a slippery downward slide. A study from the Max Planck Institute of Animal Behavior examined hyena societies over three decades. They found that the process by which hyenas inherit rank from their mothers—known as maternal inheritance—corrodes the social status of individuals.

According to the study, now published in the journal *Philosophical Transactions of the Royal Society B: Biological Sciences*, every member of a hyena clan, except the highest-ranking queen, suffers downward mobility across their lifetime.

"It paints a pretty bleak picture of hyena societies," says Eli Strauss, a scientist at Max Planck Institute of Animal Behavior and sole author on the paper. "No matter what position you inherit, the only way is down."

Fair or not, [hyenas](#) haven't earned a reputation for regality, yet their societies bear a striking resemblance to human monarchies. Hyena clans are arranged in a linear dominance hierarchy, and offspring inherit their rank below their mother through a monarchy-like process. At the top of the hierarchy is the highest-ranked female—the queen—followed by her young, and then all other females with their young.

A hyena's place in the hierarchy matters a lot. "A lower rank means you have less access to food, you have to travel more to hunt, you are harassed more, you even have less time nursing your babies," says Strauss, who also holds a position at Michigan State University. For Strauss, the raised stakes in turn raised a fascinating question. If hyenas inherit their positions from their mothers, can they break rank and change status? Or, is the quality of a hyena's life pre-destined from birth?

To find out, Strauss tapped a remarkable database from the Mara Hyena Project, which has been studying spotted hyenas in the Maasai Mara National Reserve in Kenya since the late 1980s. Analyzing three decades of data on hyena behavior from four [social groups](#), Strauss discovered that hyenas could indeed move up and down in the hierarchy over time, but they slid down much more often than jumping up. "You wouldn't think this downward mobility was happening if you were just observing the animals in the wild, because the process happens over many years," he says. "It's only by taking an intergenerational view that you realize that a daughter born to the alpha queen has suffered a significant downturn in status throughout the course of her life."

But what was causing the persistent downward trajectory? By digging into the life histories of all individuals, Strauss found that hyenas descended in rank most often because another hyena had joined or left the group. In other words, through simple demographic turnover. "It's tempting to imagine the intrigue and machinations of Game of Thrones, where animals are plotting to overthrow each other," he says. "But in hyena societies, an individual's power is passively eroded as other clan members are born or die."

Drawing on methods used to study [social mobility](#) in [human societies](#), Strauss then created computer simulated hyena societies, where he could turn off various aspects of their biology. This allowed him to pinpoint the specific societal rules that were driving the unusual pattern. The simulation pointed to two sources: the monarchy-like inheritance of hyena societies and the fact that higher-ranking females also give birth to more offspring. These combined traits mean that new group members are not being added randomly.

"They are constantly being added to the top of the hierarchy, under the dominant females, which pushes all other individuals down over time," says Strauss. Of note, only the queen escaped this fate of slow decline in

status over time, because it's not possible for anyone to inherit a position above her.

The work demonstrates how societal features can have an outside influence on individuals, sometimes usurping an animal's own agency in altering the course of its life. Says Strauss, "It seems that no matter what a hyena does, they are going to experience a decline in rank over time. It's hard to fathom that they navigate lives in which everybody, but the queen, suffers a loss in quality. Clearly, they do succeed, so the next question is how."

**More information:** Eli D. Strauss, Demographic turnover can be a leading driver of hierarchy dynamics, and social inheritance modifies its effects, *Philosophical Transactions of the Royal Society B: Biological Sciences* (2023). [DOI: 10.1098/rstb.2022.0308](https://doi.org/10.1098/rstb.2022.0308)

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