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Special Species

Why a Zebra Has Stripes — The Mystery Finally Solved?

The question has puzzled researchers for the last century, and many theories have arisen. But new research suggests something totally different may be causing those distinctive stripes.

Reviewed by Dr. Becker

STORY AT-A-GLANCE

- All zebras have stripes, but there are significant pattern variations by region
- New research found temperature had the strongest association with zebra stripe patterns, particularly temperature consistency in the area and average temperature during the coldest months of the year
- The researchers were actually able to predict zebra striping patterns (on zebras not included in the study) based on these two temperature variables
- Zebras living in warmer areas tend to have more stripes
- Habitat loss and competition for water with livestock are among the greatest threats to zebras, although they are also hunted for their skins

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Have you ever wondered why a zebra has stripes? Most animals' hides help them to blend in with their surroundings, but zebras' black and white stripes do just the opposite against the typically drab backdrop of the African savanna.

This question has puzzled researchers for a century, although several plausible theories have been suggested, including to:[1]

- Repel insects
- Provide camouflage through an optical illusion
- Confuse predators
- Reduce body temperature
- Help animals recognize each other

New research published in the journal Royal Society Open Science suggests, however, a different theory entirely — that zebra stripes may be dependent on the temperatures where they reside.

Temperature Can Predict Zebras' Stripe Patterns

All zebras have stripes, but there are significant variations by region. Some have heavy black and white striping over their entire body while others have reduced stripe coverage or thinner and lighter stripes.

Researchers from the University of California, Los Angeles, examined 29 environmental variables, such as rainfall, prevalence of disease-carrying tsetse flies, lion distribution and soil moisture.

They found temperature had the strongest association with the zebra stripe patterns, particularly temperature consistency in the area and average temperature during the coldest months of the year.[2]

The researchers were actually able to predict zebra striping patterns (on zebras not included in the study) based on these two temperature variables. Zebras living in warmer areas tended to have more stripes. As for why temperature may influence a zebra's stripes, two suggestions were given. As reported by National Geographic:[3]

> *"One is the 'cooling eddy' theory. When air hits a zebra, the currents are stronger and faster over the black parts (since black absorbs more heat than white) and slower over the white. At the juncture of these two opposing airflows, little eddies of air may swirl and serve to cool a zebra's skin.*
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> *For instance, [Biologist Brenda] Larison said, there's evidence that heavily striped zebras have 5.4-degree Fahrenheit (3 degrees Celsius) lower skin temperatures than other non-striped mammals in the same area.*
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> *The other idea holds that more stripes may be a barrier against disease, since disease-carrying biting flies, like horseflies, tend to like it hot. Experiments in the field have shown that biting flies don't like landing on striped surfaces."*

Striped Species Tend to Live in Areas Where Biting Flies Are Most Active

The case is far from closed as to why zebras have stripes, but the avoidance of biting insects is a strong leading contender. Research by Tim Caro, a biologist at the University of California, Davis (UC-Davis), and colleagues analyzed striping patterns in horses, asses, zebras, and their subspecies, along with where the stripes occur on the body (such as the face or belly).[4]

They also analyzed where biting flies are found, ranges of predators like lions, distribution of forests, and other factors that might influence the stripes. Using a statistical model, they found the striped species tend to live in areas that overlap where biting flies are most active.[5]

It's unknown why biting flies seem to dislike stripes, but Caro believes the association is sound. "We've 'moved the debate to the next stage — we can discount all [the other] hypotheses pretty conclusively,'" he told National Geographic.[6]

Interestingly, the UC-Davis researchers might have uncovered another intriguing detail about zebras. It seems that unlike other hooved animals native to Africa, zebras have body hair that is shorter than the mouthpart length of biting flies, which would make them particularly vulnerable to the flies. So the stripes may have evolved as a deterrent. Caro told National Geographic:[7]

> *"Diseases carried by horseflies are really nasty… They can hold a lot of diseases like equine influenza, and it's possible that those diseases are going to be more of a problem under warmer, wetter conditions."*

Larison, who authored the featured temperature study, isn't entirely convinced of the biting fly theory, however. "... [T]he story is likely to be much more complex, and this is unlikely to be the last word on the subject," she said.[8] Writing in the Royal Society Open Science Journal, she and colleagues concluded:[9]

> *"In contrast to recent findings, we found no evidence that striping may have evolved to escape predators or avoid biting flies. Instead, we found that temperature successfully predicts a substantial amount of the stripe pattern variation observed in plains zebra.*
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> *As this association between striping and temperature may be indicative of multiple biological processes, we suggest that the selective agents driving zebra striping are probably multifarious and complex."*

Every Zebra Has a Unique Set of Stripes, and Other Fun Zebra Facts

Stripes are to zebras what fingerprints are to humans — a unique pattern to each individual. But despite their unique appearance, zebras are highly social and live in large groups called harems. Typically there will be one stallion and up to six mares (and their young) in one harem, although sometimes groups of zebras (up to 30 animals) will congregate for short periods of time.

Zebras sleep in groups for protection (standing up!), and will bark or whinny to alert others if a predator is spotted. Zebras are born one to a litter after a gestation of 12 to 13 months. As newborns, zebras have brown and white stripes, which change to black and white as the animals mature.[10]

Habitat loss and competition for water with livestock are among the greatest threats to zebras, although they are also hunted for their skins. Plains zebras are currently stable and not endangered, but the mountain zebra is vulnerable and the Grevy's zebra (which are known for their very thin stripes) is endangered. There are thought to be only about 2,000 Grevy's zebras left in the wild.[11]

Sources and References

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