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Zoologger: Don't bite – how the zebra got its stripes

12:56 09 February 2012 by [Wendy Zukerman](#)
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Zoologger is our weekly column highlighting extraordinary animals – and occasionally other organisms – from around the world

Species: *Equus burchelli*, *E. grevyi*, *E. zebra*

Habitat: Open grassland areas and woodlands

Zebras are quite the communists. They graze together, groom each other and stay in packs to protect themselves from predators. And while some herds reportedly contain harems, a [recent study observed peaceful and equal interactions amongst the sexes](#).

But it's not their egalitarian habits that define them, it's their distinctive black and white stripes, which for centuries have puzzled biologists. Now Adam Egri at Eötvös University in Budapest, Hungary, and colleagues have an answer: they believe zebras evolved stripes to protect themselves from blood-sucking insects.

The zebra is completely black as an early embryo, and white stripes only appear in a later embryonic stage, when the production of dark pigmentation is blocked. Each zebra has subtly different stripes, acting like nature's own barcode.

Charles Darwin wondered what purpose they served. A popular theory, both in the 19th century and today, is that zebras evolved striped coats as camouflage in tall grass. But, [as Darwin noted](#), the "stripes cannot afford any protection in the open plains of South Africa".

Social stripes

More recently, biologists have observed that zebras don't attempt to conceal themselves by freezing in response to predators. Zoologist Desmond Morris wrote in his *Animal watching: A field guide to animal behaviour* that "compared to many hoofed animals on the plains of Africa, they are remarkably mobile and noisy and never attempt to hide in cover".

Darwin suggested that zebras developed their unique stripes to recognise each other, which could be particularly important for male and female courtship. "A female zebra would not admit the addresses of a male ass until he was painted so as to resemble a zebra," Darwin wrote.

[Martin How](#) at the University of Queensland, Australia, agrees that the stripes have an obvious social function. "But it's possible they appeared for another reason and the social benefits came later."

How says he has unpublished evidence suggesting that the stripes evolved to confuse predators, giving zebras crucial time to escape. He analysed videos of zebras with a motion detection program that mimics how movement is encoded in the animal brain. Their stripe pattern generated a range of optical illusions which would baffle a predator, he says. This effect was particularly strong when the animals moved together as a herd.

Dark horse

Another suggestion is that the stripes create a visual illusion, which makes the zebra look bigger than it is. Or perhaps the stripes assist with thermoregulation. But there is little evidence to support these claims, so the evolutionary explanation for the zebras' stripes has remained murky.

Egri's team picked up on a theory first proposed in 1930 and backed up in 1981, when it was demonstrated that [biting tsetse flies were least attracted to striped animal models](#), when compared to black or white models.

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Now Egri has taken the research one step further, by showing that horseflies (*tabanids*) also avoid the stripes. Biting insects transmit several equine diseases, such as equine infectious anaemia, as well as leaving painful bites.

Heading to a fly-infested farm in Budapest the team painted trays with different black and white patterns, and filled them with salad oil to trap the horseflies. Trays coated with thick horizontal stripes attracted less flies than diagonal lines, or criss-crosses. Thin black stripes mimicking those of the zebra attracted fewer flies than thick lines.

Insect defence

"The stripes are messing with their heads," says [Justin Marshall](#), a sensory neurobiologist, also at the University of Queensland. "It confuses them and provides an unattractive surface to land on."

According to experiments carried out by Egri's team, the stripes could also disrupt polarised light, making zebras less appealing to the pests. Horseflies are attracted to horizontally polarised light because they detect water through horizontal polarisation. At the watering hole, flies drink, mate and lay eggs.

[Mike Archer](#), an evolutionary biologist at the University of New South Wales, Australia, calls this "a delightfully innovative explanation for something that's long puzzled mammalogists."

"Having been bitten myself many times by tabanids, which really hurt, this new explanation makes a great deal of sense to me," he says.

Journal Reference: [The Journal of Experimental Biology](#), DOI: [10.1242/jeb.065540](#)

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What's Black And White, And Red All Over?

Fri Feb 17 18:23:31 GMT 2012 by [Eric Kvaalen](#)

Saying that "the stripes are messing with their heads" or "It confuses them and provides an unattractive surface to land on" is just begging the question, which is why the stripes have this effect on the flies.

Maybe they get confused because they find White Stripes in the middle of the savannah.

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