Climate crisis causing male dragonflies to lose wing ‘bling’, study finds

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Black patterns used to attract mates can cause the insects to overheat in hotter climates

An adult male blue dasher perched on a railing in St Louis, Missouri. Photograph: Michael P Moore

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Male dragonflies are losing the “bling” wing decorations that they use to entice the females as climates get hotter, according to new research.

The results have led to the scientists calling for more work on whether this disparate evolution might lead to females no longer recognising males of their own species in the long run.

Many dragonflies have ornamental black patterns on their wings which help them find their mates. New research published in the journal Proceedings of the National Academy of Sciences finds that male dragonflies are evolving to have

less of that “bling” in areas where the climate is hotter, although female dragonflies don’t seem to be following suit.

These findings shine a light on how different organisms adapt to their environments and how a mating-related trait could have many more implications than just mating – but they also raise questions about how dragonflies’ appearance and mating patterns will change as the Earth gets progressively warmer over the years.

“There’s this big question in biology about how animals adapting to different climates shapes the diversity of traits in species,” says Michael Moore, an evolutionary biologist and postdoctoral research associate at Washington University in St Louis who worked on the research. “It turns out, this mating-related trait has these really important consequences for its ability to live in different parts of North America depending on how hot or cold it is.”

Dragonflies have different amounts of black pigments and patterns on their wings that they use to identify potential romantic mates, court them, and scare off rivals who may also be interested. But this dark wing pigmentation can raise the dragonflies’ body temperature by up to 2C, leading to damages in their wing tissue, reduced fighting ability and even death by overheating – so it also affects how some dragonflies react to warmer and warming temperatures.

For this research, the scientists used a database of more than 300 dragonfly species and cross-referenced the wing colours of almost 3,000 dragonflies from different species with information about their location and climate. Then they compared how the colour of the wings of dragonflies from the same species changed according to whether they were born in hotter or colder climates.

They found that male dragonflies nearly always responded to warmer temperatures by evolving less black wing decoration.

“It seems to be a really consistent way that dragonflies adapt to living in different climates,” says Moore. “That’s really exciting because it’s one of the most consistent evolutionary responses that we see to any kind of environment for any sort of mating-related trait, in any kind of animal.”

In fact, although sexually selected traits are typically thought of as aiding in improving reproductive success, says Kasey Fowler-Finn, associate professor at

the department of biology at Saint Louis University, this evidence suggests that they actually may be playing a critical role in adapting to the climate emergency.

The study uses climate heating projections to show that dragonflies' black wing decoration would probably need to shrink even more as the planet heats up. "Our research suggests that this could be a really beneficial way that they could adapt," Moore says, "and that it seems quite plausible that they might continue to evolve in this way."

Dragonfly females aren't responding to changes in climate in the same way, and are not dropping their black decorations in warmer climates. Although the researchers don't yet know why males and females react so differently, this does two things: it reminds scientists that they probably shouldn't be assuming that males and females are going to adapt to the climate emergency in exactly the same way, Moore says, and it poses questions about how dragonfly mating patterns will change with the climate.

It is possible that the changes will lead to females no longer recognising males of their own species: the scientists behind the study have called for more research into this.

The research on this, in fact, is just "really scratching the surface at this point", Moore says. In a hundred years, he said, the Earth is going to look substantially different and scientists need to try to learn as much as they can about how organisms react, in order to do a better job of managing these populations as the world changes around them.