Evolution in rainforest flies points to climate change survival

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The test on the Drosophila birch suggests some tropical species may be able to evolve and adapt to the effects of climate change.

Scientists believe some tropical species may be able to evolve and adapt to the effects of climate change.

The new findings published in the journal, *Proceedings of the Royal Society B*, suggests some sensitive rainforest-restricted species may survive climate change and avoid extinction. But only if the change is not too abrupt and dramatically beyond the conditions that a species currently experiences.

Previous research offered a bleak prospect for tropical species' adaptation to climate change, now researchers from Monash University believe the situation may not be quite so hopeless.

One of the lead researchers, Dr Belinda Van Heerwaarden said the impact of climate change on the world's biodiversity is largely unknown.

"Whilst many believe some species have the evolutionary potential to adapt no one really knows for sure, and there are fears that some could become extinct."

Dr Van Heerwaarden and Dr Carla M. Sgrò, from the Faculty of Science extended on an experiment from the 2000s in which tropical flies native to Australian rain forests called Drosophila birchii, were taken out of the damp rainforest and exposed to very dry conditions, mimicking the effects of potential climate change.

In the original experiment the flies died within hours and despite rescuing those that survived longest and allowing them to breed for over 50 generations, the flies were no more resistant, suggesting they didn't have the evolutionary capacity to survive.

In Dr Van Heerwaarden and Dr Sgrò's version they changed the conditions from 10 per cent to 35 per cent humidity.

"The first experiment tested whether the flies could survive in 10 per cent relative humidity. That's an extreme level that's well beyond the changes projected for the wet tropics under climate change scenarios over the next 30 years."

"In our test we decreased the humidity to 35 per cent, which is much more relevant to predictions of how dry the environment will become in the next 30 to 50 years. We discovered that when you change the

environment, you get a totally different answer," Dr Van Heerwaarden said.

Whilst on average most of the flies died after just 12 hours, some survived a little longer than others. By comparing different families of flies, the researchers discovered the difference in the flies' resistance is influenced by their genes.

To test this theory the longest-living flies were rescued and allowed to breed. After just five generations, one species evolved to survive 23 per cent longer in 35 per cent humidity.

As well as looking at the potential impact of climate change, the research also highlights the importance of genetic diversity within species.

Dr Sgrò said this finding suggests there is genetic variation present in these flies, which means they can evolve in response to climate change.

"Tropical species make up the vast majority of the world's biodiversity and climactic models predict these will be most vulnerable to climate change. However these models do not consider the extent to which evolutionary response may buffer the negative impacts of climate change."

"Our research indicates that the genes that help flies temporarily survive extreme dryness are not the same as those that help them resist more moderate conditions. The second set of genes are the ones that enable these flies to adapt," she said.

"We have much work to do but this experiment gives us hope that some tropical species have the capacity to survive climate change," said Dr Sgrò.

The results mean that other species thought to be at serious risk might have some hope of persisting a little longer under climate change than previously thought.

The next phase of the research study will see Dr Van Heerwaarden and Dr Carla M. Sgrò investigate whether the climactic stress tolerated by the tropical flies extends to other species.

Provided by Monash University