

Food forensics: DNA links habitat quality to bat diet

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All night long, bats swoop over our landscape consuming insects, but they do this in secret, hidden from our view. Until recently, scientists have been unable to bring their ecosystem out of the dark but thanks to new genetic techniques, researchers from the University of Bristol and Biodiversity Institute of Ontario, Canada, have been able to reconstruct the environment supporting these elusive creatures.

Working at three sites in Southern Ontario (Canada) the team of students and scientists monitored the diet of little brown [bats](#) (*Myotis lucifugus*) from colonies living on agricultural land and at a conservation site. Guano (bat faeces) was continually collected under each roost from May to August. Back in the lab at the Biodiversity Institute of Ontario in Canada, the team extracted insect DNA from the material and sequenced a "[DNA barcode](#)" which is a small region of DNA that can be used to identify [animal species](#). The team then matched these unknown insect sequences in bat guano to a library of known sequences to identify which insect prey the bats were eating.

"This technology is very new," says lead author Dr Elizabeth Clare of the University of Bristol's School of Biological Sciences. "It gives us an entirely new insight into the bats' behaviour. Instead of just finding they ate a moth or a mayfly, we now know exactly what species of insect it was, providing us with important information on their habitat."

Using this technique, the team found that the bats rely heavily on [insects](#) from aquatic environments. They were also able to identify the exact

species of insect prey, which revealed that different colonies exploit different source water, sometimes rivers and streams, sometimes ponds, depending on the local landscape.

"Some of the insects they eat come from very specific habitats and have specific pollution tolerances.

These 'environmental indicators' allow us to reconstruct exactly what their foraging habitat was like," explains Dr Clare. "It's a very non-invasive way of tracking their behaviour - a bit like looking through someone's rubbish bin to see where they shop."

The bats foraged very locally - travelling only a few hundred meters to catch insect [prey](#). The species they ate changed seasonally and the shifts corresponded to the phases of pregnancy and lactation in the bats.

The researchers also identified that bats in agricultural habitats seemed to have a more restricted diet of fewer insect species than bats in a conservation area even though the source water in all areas was of good quality.

Dr Clare added, "This suggests that even small conservation projects can have an impact on the entire food chain. This site has a small patch of forest, a small pond and a dedicated group of conservation workers. All these components seem to have generated a good environment for the insects and thus the bats they support."

The results of this research are becoming more and more important as this bat species is under serious threat from the spread of a fungal disease called 'white nose syndrome' which may threaten the survival of these populations in North America.

Dr Clare comments: "Understanding how the bats exist within the

ecosystem is vital to our conservation goals."

The research is published today [Thursday 3 March] in the journal *Molecular Ecology*.

Provided by University of Bristol

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