Ant reactions to habitat disruptions inform a result of evolution

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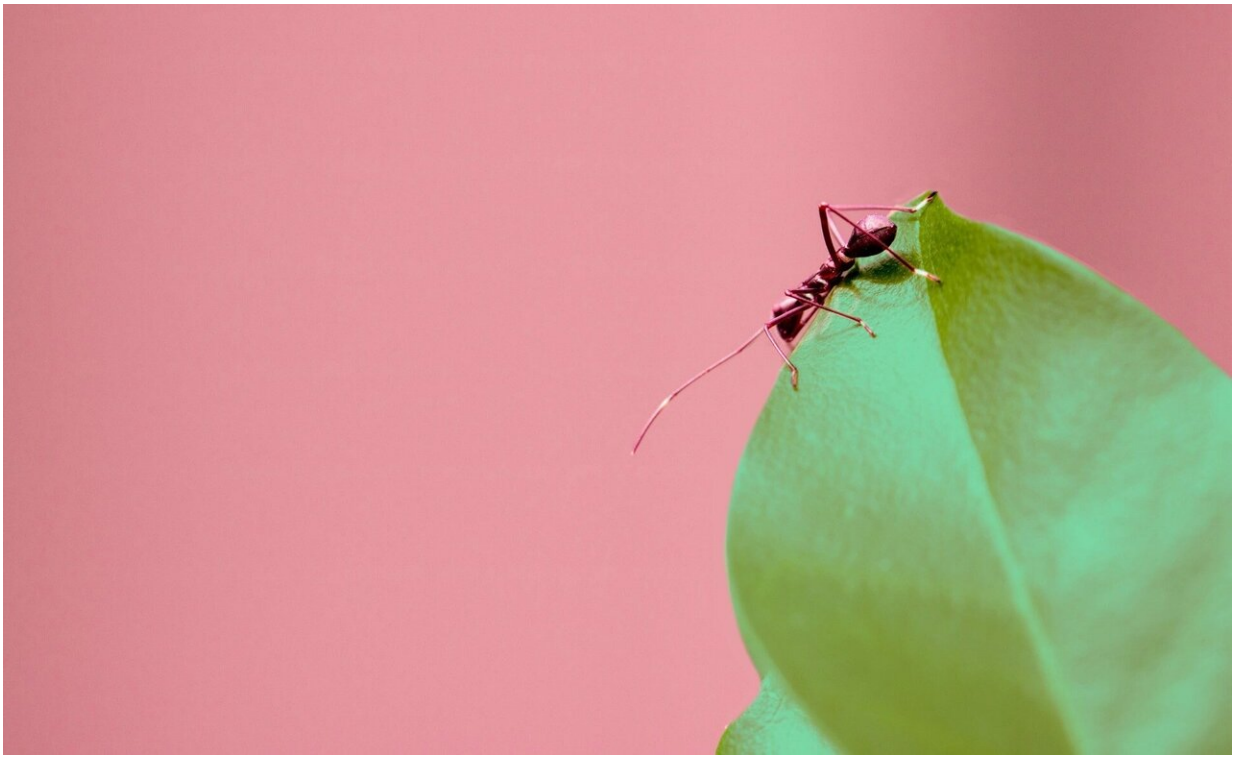

Credit: Sian Cooper/Unsplash

A Concordia biology professor is calling on ant experts to develop a set of common principles that influence the way the insects respond when their habitat undergoes severe disruption.

Writing in the *Journal of Animal Ecology*, Jean-Philippe Lessard

synthesizes the work of Alan Andersen, a leading researcher in the field of ant ecology based at Charles Darwin University in Australia.

Lessard writes that Andersen's system of grouping ant communities along certain criteria is a helpful start, particularly when it comes to how different species respond to disturbances to their environment. But much more work is needed before ant ecologists—known formally as myrmecologists—have an agreed-upon standard framework.

Andersen's groupings provide a base from which researchers can compare changes in the makeup of ant communities around the world. Ants are a highly diverse group of organisms: there are more than 12,000 separate species, found on all continents except Antarctica and in almost all ecosystems, from arctic taiga to arid desert. This makes them easy to sample and identify, says Lessard, and easy to monitor when measuring recovery efforts and response to disturbance.

Biogeographic and evolutionary history

He writes that comparing those responses offers several important insights. For instance, all ant communities around the globe react strongly to habitat openness, or how much vegetation covers the ground, regardless of how that openness comes about.

"Ant communities will not respond so differently to a fire versus the cutting down of a forest versus an outbreak of herbivores eating up biomass," explains Lessard, Concordia University Research Chair in Biodiversity and Ecosystem Functioning.

"They will respond to the openness that these create. It doesn't matter what the actual source of the disturbance is, what matters is whether the canopy is open or closed."

He notes that ant communities' response to disturbance can also be quite heterogeneous. An ant community in the Brazilian savanna, for instance, will react differently to a change in its ecosystem than a colony in the Australian savanna.

This is thanks to millions of years of biogeographic and evolutionary history. Most ant communities in Brazil are evolutionarily adapted to forest habitats, and so the loss of canopy to events like forest fires will have a greater effect on them than a similar event would have on a species adapted to the hot, dry Australian ecosystem.

As Lessard writes, these findings show that their presence over the eons of so-called deep time "has left a signature on contemporary structure of ant communities."

Toward a common framework

As useful and interesting as he finds them, however, Lessard believes Andersen's functional groupings are at least somewhat arbitrary.

"If someone else decided which ants would belong to which groups, how meaningful would that be?" he asks.

Without an existing common framework, ant ecologists are "out of sync" in what functional traits they measure to assess the consequences of man-made disturbances, he argues.

"If someone is trying to measure one trait and someone else is measuring a different trait, we'll never be able to compare how they might facilitate or prevent extinction in the face of a disturbance," Lessard says.

"In the ant world, we really don't have much widespread agreement on which traits would be most useful when it comes to measuring how

communities respond to disturbance and understanding the fundamental process of how species come together in one place."

More information: Jean-Philippe Lessard et al, Ant community response to disturbance: A global synthesis, *Journal of Animal Ecology* (2019). DOI: 10.1111/1365-2656.12958

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