

Tropical insects 'go the distance' to inform rainforest conservation

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Ambrosia beetles were studied by the research team. The large one is a female, the smaller one a male. As an aside, these beetles mate within individual families only, brothers with sisters. The males are small, flightless and die soon after mating. Credit: Jiri Hulcr, Michigan State University

The long-held belief that plant-eating insects in tropical forests are picky eaters that stay “close to home” – dining only on locale-specific vegetation – is being challenged by new research findings that suggest these insects feast on a broader menu of foliage and can be consistently found across hundreds of miles of tropical forestland.

These findings have significant implications related to the sustainability and conservation of these globally-important areas.

Michigan State University scientist Anthony Cognato and graduate student Jiri Hulcr were part of an international team that conducted this groundbreaking research, the results of which are described in the August 9 online issue of the journal *Nature*. The group included scientists from Australia, the Czech Republic, the United Kingdom, New Guinea and the United States.

“Tropical rain forests are home to a rich diversity of plants, birds, insects and other animals,” said Hulcr, an entomology PhD doctoral student working with Cognato and co-author of the report. “They also play an important role in our global climate and provide aesthetic, recreational and medicinal benefits. For these reasons and others, it is critical that we understand how these forests generate and sustain their diversity and what we can do to help conserve them.”

The study included approximately 500 species of caterpillars, beetles and fruitflies from common plant-eating families and 175 species from four diverse plant groups across 28,950 square miles of contiguous lowland rain forest in Papua, New Guinea.

Cognato and Hulcr were key collaborators on the project because of their expertise related to the biology and ecology of the bark and ambrosia beetle family, a model group of insects comprised of 6,000 species worldwide, and one common to tropical rain forests.

“What we found was that the composition of the community of beetles does not change with distance as long as the environment is stable,” Cognato said. “Even communities hundreds of miles apart are the same. And if there are differences, they seem to be random and not caused by any environmental change.”

Study findings were similar for the butterfly and fruit fly species examined in the study.

“Such knowledge is critical to understanding the roles of ecological processes in maintaining tropical diversity, predicting species extinction and designing the systems of protected natural areas,” Hulcr said.

“Because diversity doesn’t necessarily increase with distance, but animals in small reserves

tend to go extinct, you should plan for one large area instead of having a lot of small and distant areas to manage and conserve.”

Cognato and Hulcr expect similar patterns in other tropical lowland rain forests, as they are typically situated in the extensive low basins of major rivers comparable to the study area in New Guinea. They are currently conducting research in other areas of the tropics – including Borneo, Ecuador, Guyana, Ghana and Thailand – to confirm the New Guinea findings.

“If we want the stability of these forests, especially given how much they are threatened now, we need to understand how to best set up conservation areas,” said Cognato said. “And it’s not just about the flashy species; it’s about the whole thing.”

Hulcr agrees.

“This and additional research will allow conservation managers and policy makers to base decisions on data rather than on theory so that we can preserve as much diversity as possible,” Hulcr said. “We are excited to be part of the ongoing, international effort to add to the extensive data necessary for the understanding, analysis and conservation of complex tropical forest ecosystems.”

Source: Michigan State University

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