Entomologist team discovers reason behind passion-vine butterfly congregation tendencies

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Heliconius hecale - Tiger Longwing, (Central & South America), Monsanto Insectarium, St. Louis Zoo. Image: Wikipedia.

(PhysOrg.com) -- Susan Finkbeiner, entomologist and graduate student at the University of California Irvine and colleagues Adriana Briscoe and Robert Reed have discovered the reason behind the passion-vine butterflies tendency to band together in small groups when they bed down for the night. They say, in their paper published in *Proceedings of the Royal Society B: Biological Sciences*, that it's to ward off predators, not to communicate, as some have speculated.

Finkbeiner, a Young Explorer grantee from the National Geographic Society, used the funds awarded to her to study passion-vine butterflies

(*Heliconius*) in their natural habitats in Panama and Costa Rica. Butterflies are generally loners, wandering aimlessly for the duration of their short lives. The passion-vine butterfly on the other hand, lives a comparatively long six months and joins with others of its kind to from small groups before the sun goes down each night, and stays with them till it comes up again. Previous researchers such as naturalist J. A. Allen who was the first to note their unique behavior in 1867, have been stumped as to why they do so. Some have suggested it's to convey information from older members of the group to younger ones regarding the best places to feed, while others have theorized that it's more likely a way to ward off predators.

Finkbeiner and her team looked at both theories starting with the former. She and her colleagues ventured first to Panama and then to Costa Rica where they watched the butterflies as they left their roosts, following several different specimens over a period of several days. In so doing, they found only one example of a butterfly following another, proving that banding together at night was not a way to share information.

In the next part of their study, the team used artificial passion-vine butterflies constructed out of modeling clay and wax coated paper to count the number of bite marks made by predators. By setting up their models individually and in small, medium and large groups, they were able to see that those butterflies that congregated into medium sized groups (five butterflies) were attacked less often than were individuals or those congregating in large or small groups, clearly indicating that their roosting behavior is tied to protection from predators.

Finkbeiner and her colleagues don't really know why the butterflies are attacked less often if they band into groups but suggest it may have to do with multiplying their color display, which reminds birds that might want to eat them, that their bodies contain a lot of cyanide which they get from their diet, and generally leads to health problems or death in those

that eat them.

More information: The benefit of being a social butterfly: communal roosting deters predation, *Proceedings of the Royal Society B: Biological Sciences*, Published online before print March 21, 2012, doi: 10.1098/rspb.2012.0203

Abstract
Aposematic passion-vine butterflies from the genus Heliconius form communal roosts on a nightly basis. This behaviour has been hypothesized to be beneficial in terms of information sharing and/or anti-predator defence. To better understand the adaptive value of communal roosting, we tested these two hypotheses in field studies. The information-sharing hypothesis was addressed by examining following behaviour of butterflies departing from natural roosts. We found no evidence of roost mates following one another to resources, thus providing no support for this hypothesis. The anti-predator defence hypothesis was tested using avian-indiscriminable Heliconius erato models placed singly and in aggregations at field sites. A significantly higher number of predation attempts were observed on solitary models versus aggregations of models. This relationship between aggregation size and attack rate suggests that communally roosting butterflies enjoy the benefits of both overall decreased attack frequency as well as a prey dilution effect. Communal roosts probably deter predators through collective aposematism in which aggregations of conspicuous, unpalatable prey communicate a more effective repel signal to predators. On the basis of our results, we propose that predation by birds is a key selective pressure maintaining Heliconius communal roosting behaviour.

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