

A fecal diet keeps bumblebees healthy

November 16 2011, by Deborah Braconnier



Image credit: Wikipedia.

(PhysOrg.com) -- New research published in the *Proceedings of the National Academy of Science* shows that a diet of bumble feces at the start of a bumblebee's adult life is essential for the protection against parasites.

Bumblebees start their life out as tiny larvae. They spin a cocoon and emerge as a hungry bumblebee ready to face the world. Their first meal is ideally the feces of other bumblebees. This fecal matter contains bacteria that help the bumblebee's immune system.

As humans, we have what is known as "gut bacteria." It is found in our intestinal tract and helps in the breakdown of foods and keeps back bacteria under control. In this same way, bumblebees need this bacteria found in the feces to help protect them from parasites.



During the cocoon process, the larvae is essentially sterilized and all traces of bacteria are removed so the new adult bumblebee emerges with no natural bacterial protection, so researchers believe this is the reasoning behind their first dietary choice.

The researchers, led by Hauke Koch and Paul Schmid-Hempel of the Swiss Federation Institute of Technology have found that these gut bacteria acquired through eating feces acts as a transmissible immune system.

This gut bacteria protects the bees from the parasite Crithidia bombi and can pass from bee to bee quite quickly, affecting the entire colony. Koch and Schmid-Hempel discovered that when a <u>bumblebee</u> is raised in a sterile environment without the opportunity to eat the feces, they are more likely to suffer with the parasite.

The researchers examined the guts of wild bees and found that the <u>gut</u> <u>bacteria</u> Betaproteobacteria provided the best defense against Crithidia and in bees with high levels, the parasite was not present. However, when they looked at <u>bumblebees</u> that came from a sterile environment and had not had the chance to ingest the bacteria, the parasite was built up in their system as much as six times as those with the bacteria.

More information: Socially transmitted gut microbiota protect bumble bees against an intestinal parasite, *PNAS*, Published online before print November 14, 2011, <u>doi: 10.1073/pnas.1110474108</u>

Abstract

Populations of important pollinators, such as bumble bees and honey bees, are declining at alarming rates worldwide. Parasites are likely contributing to this phenomenon. A distinct resident community of bacteria has recently been identified in bumble bees and honey bees that is not shared with related solitary bee species. We now show that the



presence of these microbiota protects bee hosts against a widespread and highly virulent natural parasite (Crithidia bombi) in an experimental setting. We add further support to this antagonistic relationship from patterns found in field data. For the successful establishment of these microbiota and a protective effect, exposure to feces from nest mates was needed after pupal eclosion. Transmission of beneficial gut bacteria could therefore represent an important benefit of sociality. Our results stress the importance of considering the host microbiota as an "extended immune phenotype" in addition to the host immune system itself and provide a unique perspective to understanding bees in health and disease.

© 2011 PhysOrg.com

Citation: A fecal diet keeps bumblebees healthy (2011, November 16) retrieved 28 April 2024 from <u>https://phys.org/news/2011-11-fecal-diet-bumblebees-healthy.html</u>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.