The environment may change, but the microbiome of queen bees does not

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The queen bee in this image is marked with a green dot. Credit: David Tarpy

Researchers from North Carolina State University, Indiana University and Wellesley College have characterized the gut microbiome of honey bee queens. This is the first thorough census of the gut microbiome - which consists of all the microorganisms that live in the gut of the

organism - in queen bees.

"We found that the microbiome changes as the queen matures, but the microbiomes of different queens are very similar - regardless of the environment each queen is in," says Dr. David Tarpy, a professor of entomology at NC State and co-author of a paper describing the work.

The research evaluated the gut fauna found in honey bee (*Apis mellifera*) queens at every point in their development, from the larval stage through their emergence as adults capable of reproduction. The researchers also assessed the gut microbiome of worker bees in each queen's colony to see if there was any relationship between the microbiome of the workers and the microbiome of the queens.

"There are large, commercial operations that produce thousands of queens each year for sale to professional and amateur beekeepers," Tarpy says. "Up until now, nobody has really asked whether a queen's microbiome changes when the queen is introduced into a new environment.

"It doesn't - and that's a good thing. Our findings tell us that beekeepers who replace their queens aren't disrupting the microbiome of either the queen or the colony."

The finding also opens the door to new areas of study - such as whether a queen's microbiome could be manipulated to improve her health or reproductive success.

Researchers used a painted dot to track queen bees. Credit: David R. Tarpy

"Now that we know placing a queen in a new colony doesn't change her microbiome, it makes sense to see if there is anything we can do to the microbiome to improve the queen's chances of success," says Dr. Heather Mattila, Knafel Assistant Professor of Natural Sciences at Wellesley College and a co-author of the paper.

The paper, "Characterization of the Honey Bee Microbiome Throughout the Queen-Rearing Process," is published online in the journal *Applied and Environmental Microbiology*. The paper was also co-authored by Dr. Irene Newton of Indiana.

More information: *Applied and Environmental Microbiology*, aem.asm.org/content/early/2015 … EM.00307-15.abstract

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