



Notes

from the Lab:

The Latest Bee Science Distilled

by Scott McArt

It's December, which means flu season is starting to kick into high gear. What do you crave when you're sick? Chicken soup? Echinacea tea? Across the animal kingdom, there's growing evidence that you're not alone – caterpillars and moose and even bees seek out dietary items that can potentially make them healthier. This is the topic for our thirteenth “Notes from the Lab,” where we highlight “**Extracts of polypore mushroom mycelia reduce viruses in honey bees,**” written by Paul Stamets and colleagues and published in the journal *Scientific Reports* [8:13936 (2018)].

Highlighting the importance of simply observing bees in nature (as we all do – it's a major joy of beekeeping, right?), Stamets noticed something

interesting when he was watering his Garden Giant mushroom patch one day. Honey bees were visiting the mushrooms. Paul Stamets has devoted a good portion of his life to finding myriad uses for mushrooms, including making fungal extracts for human health purposes (for more information, check out his business, called *Fungi Perfecti*: <https://fungi.com/>). So, it probably shouldn't come as a surprise that he decided to test whether the mushrooms had medicinal properties when consumed by bees.

Stamets and colleagues decided to culture and make extracts of several species of fungi, then feed them to sick bees. Specifically, they cultured four polypore fungi – *Fomes fomentarius*, *Ganoderma applanatum*, *G. resinaceum* and *Trametes versicolor*. These fungi are found in forests in either the eastern United States and Canada or the Pacific Northwest. Once they'd cultured enough of each species, they created extracts and fed them to sick bees in laboratory cage trials, testing whether deformed wing virus (DWV) and Lake Sinai virus (LSV) loads in the bees improved, or not, compared to bees from cages that were fed sugar syrup as a control. For the cultures that appeared most promising in cage trials, the authors assessed them further in field trials, again testing whether the bees had reduced loads of DWV and LSV after treatment.

So, what did they find? Did the mushroom extracts help the sick bees? In the laboratory cage trials, Stamets and colleagues found that two of the four fungal extracts sig-

nificantly reduced DWV and LSV in the bees. And importantly, the magnitude of the effect was quite large. The 1% *F. fomentarius* extract reduced DWV levels over 800-fold and the 1% *G. applanatum* extract reduced LSV levels nearly 500-fold. Because these extracts showed great promise, the authors then made larger batches and fed them to 5-frame nucs in the field. Low and behold, they found similar results. Twelve days after receiving a 3-liter treatment of either 1% *F. fomentarius* or *G. applanatum*, DWV levels decreased up to 150-fold and LSV levels decreased up to 45,000-fold compared to bees that received sugar syrup controls.

Wow, this sounds great. Can these mushrooms help me and my bees?



5-frame nucs set up for trials.



Large scale field trials to test extracts.



The fungal extracts worked both in the lab and in the field to reduce viral loads.

Remember those colonies of yours that you didn't quite get around to treating for varroa this fall? Well, similar to how we feel when we get the flu, they're probably starting to feel the effects of varroa-transmitted viruses such as DWV and LSV that are building up to high levels. Many of those colonies will be overrun by viruses and perish this winter. But what if we could give them medicine that reduced viral loads, such as polypore mushroom extracts? Would that make a difference?

Currently, all we know is that the extracts can reduce viral loads in honey bees. But clearly there's further research to be done on this topic, especially looking beyond viral loads and testing whether the extracts improve the health, productivity, and/or survival of colonies that are challenged with viruses. If such results are found, it could give beekeepers an important tool to combat the var-



Collecting samples for analysis.



Feeding fungal extracts to test colonies.



Measuring out appropriate amounts of the fungal extracts for treatments.



roa problem, this time focusing on the devastating viruses instead of the mite itself. Such a product could add a highly complementary tool to beekeepers' varroa control repertoire.

While Stamets and colleagues currently do not have a product for sale, there's clear interest from beekeepers and researchers alike. And perhaps this is just the tip of the anti-viral iceberg. For those of us who are beekeepers and also have kids in elementary school, here's to hoping Stamets and colleagues also find some polypore fungal extracts that combat the flu.

Until next time, bee well and do good work,

Scott McArt

REFERENCE:

Stamets, P. E., N. L. Naeger, J. D. Evans, J. O. Han, B. K. Hopkins, D. Lopez, H. M. Moershel, R. Nally, D. Sumerlin, A. W. Taylor, L. M. Carris and W. S. Sheppard. 2018. Extracts of polypore mushroom mycelia reduce viruses in honey bees. *Scientific Reports* 8:13936.

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