Notes from the Lab:

The Latest Bee Science Distilled

by Scott McArt

While there may be some fluffy white stuff on the ground outside your house right now, astute beekeepers know that spring is just around the corner. And each spring, I often hear two things from beekeepers regarding the new bees they hope to acquire: 1) they hope to catch a swarm from a feral colony, and 2) they hope their new queen was mated by many drones.

So what is it about feral colonies that's so special? And why do we want promiscuous queens? These are the topics of our third "Notes from the Lab", where we highlight ***"Higher immunocompetence is associated with higher genetic diversity in feral honey bee colonies (Apis mellifera)"***, written by Margarita Lopez-Uribe and colleagues and published in the journal **Conservation Genetics [18: 659-666 (2017)].**

The authors collected foragers from 35 honey bee colonies (14 feral and 21 managed) in North Carolina and looked at their genetics and immunocompetence (essentially, how good they are at combatting disease). What they found was really interesting. The bees from feral colonies – the ones inhabiting tree cavities – were genetically different from the bees in managed hives, but the managed bees were genetically more diverse (i.e. the queens had mated with more drones). Yet despite being more genetically diverse, the bees from managed hives were less capable of mounting a good immune response when challenged with disease compared to the bees from feral colonies.

So the bees from feral colonies are different than the bees I manage in my hives?

Sort of. While the authors found they were slightly different, the magnitude of difference was small. In other words, drones and queens from the feral colonies are mating with each other, but they're also mating a bit with the drones and queens from managed hives that are in your apiaries, and vice versa.

This interbreeding may be interesting to consider when choosing where to obtain your bees, whether it's a package from Florida, your local nuc producer, or the swarm you find in your neighbor's yard. It turns out some of the genes from your new bees are likely to spread into the feral bee population in your neighborhood, which in turn will be spread back into your hives when you make splits, etc. So choose your bees well if you care about having good genes in your neighborhood!

Promiscuous queens and genetic diversity… why should I care?

Some excellent work has been done on this topic over the past couple decades and it mostly boils down to this: When virgin queens go on their mating flight(s), they mate with anywhere between a few and a few dozen drones. If it's only a few drones, her colony is likely to be more susceptible to disease, have a smaller worker population, forage over a smaller area, build less comb, store less food (in-

Entrance to a feral honey bee hive. Photo by Margarita Lopez-Uribe.

cluding honey), be less able to maintain nest temperature, and less likely to survive winter compared to if she mated with a dozen or more drones. In other words, you should care a great deal about the promiscuity of your queen and genetic diversity of your colony!

Wait, the bees from feral colonies are less genetically diverse but better able to ward off disease than the bees I manage in my hives? What gives?

One major difference between feral and managed colonies is of course management. This means that weak feral colonies will die in nature when there's lots of disease, but weak managed hives can be hobbled along with good disease management in your apiary. Thus, natural selection will settle on strong disease-resistant feral colony genetics, whereas our interference can allow weak managed colony genetics to persist in our apiaries. So managed colonies might have greater genetic diversity (as the authors found in this study), but if the genes are crummy to begin with, it won't matter.

BUT WAIT… before you set off and decide to mismanage your hives so "only the strong survive," please know that as those weak colonies become sick and fail, your bees are spreading disease to the whole neighborhood of honey bees and wild native bees. A lot of work is being done on this topic currently and the results are pretty scary… But that's a topic for another Notes from the Lab.

Until next time, bee well and do good work,

Scott McArt

Reference:

Lopez-Uribe, M. M., R. H. Appler, E. Youngsteadt, R. R. Dunn, S. D. Frank and D. R. Tarpy. 2017. Higher immunocompetence is associated with higher genetic diversity in feral honey bee colonies (*Apis mellifera*). Conservation Genetics 18:659-666.

Scott McArt, an Assistant Professor of Pollinator Health, helps run the Dyce Lab for Honey Bee Studies at Cornell University in Ithaca, New York. He is particularly interested in scientific research that can inform management decisions by beekeepers, growers and the public.

Email: shm33@cornell.edu
Lab website: blogs.cornell.edu/mcartlab
Pollinator Network: pollinator.cals.cornell.edu
Facebook: facebook.com/dycelab