The Outside Story

Good News for Wild Bees?

By: Joe Rankin

The honey bee is an introduced species in North America. It's only been here about 400 years, brought by English colonists who found none after stumbling ashore and then promptly put in an order with their backers back home.

The honey bee, more properly known as the European honey bee, took to its new home, spreading across the continent faster than its keepers. Thomas Jefferson, an astute observer of nature if there ever was one, wrote that Native Americans called them "the white man's fly."

Bee colonies thrived in hollow trees as well as in hollow logs called "bee gums" (later bee hives) kept by beekeepers. Thrived, that is, until recently, when wild honeybee populations crashed. Of several contributing factors, the main one is undoubtedly *Varroa destructor*, a bloodsucking mite native to Asia. Like a tiny eight-legged vampire, the pencil point-sized red mite latches onto a bee and sucks its hemolymph (the bee version of blood) while spreading debilitating viruses. The mite's introduction in the mid-1990s caused a crisis in American beekeeping and swept wild colonies from the woods.

By the time the new century ticked over, conventional wisdom among beekeepers had it that wild colonies were history, and that the beloved insect that helped satisfy our sweet tooth and pollinate our crops could only survive in our care and with the help of our chemical miticides.

It is true that the population of wild honey bee colonies did take a nosedive and mites have contributed significantly to that decline. But these days the wild honey bee is thriving, at least in some areas, and scientists are hoping that these colonies have a lot to teach us about how we can breed mite resistant bees and better work with the bees we have now.

Cornell University biology professor Thomas Seeley is one of the nation's pre-eminent honey bee researchers and the author of the new book *Following the Wild Bees: The Craft and Science of Bee Hunting.* He's studied wild bees for decades. He finds it great fun to "line" bees, which involves trapping a honey bee nuzzling a flower in a box, feeding it sugar syrup, taking a compass bearing on its beeline, and following it to its hollow--tree home.

In the late 1970s Seeley studied and sampled the wild honey bee colonies in Cornell's 4,075-acre Arnot Teaching and Research Forest south of New York's Finger Lakes. Fast forward a couple of decades and Seeley found himself questioning the idea that wild bees were history. Back to the Arnot Forest he went.

"I went back to the forest in 2002 and found the same density of wild colonies I did in 1978," Seeley said. "That was a surprise." Especially when he determined that these wild colonies are infested with varroa mites, but that the mite populations do not reach lethal levels.

And the Arnot Forest isn't the only place he has found wild honey bee colonies. "Wherever I go bee hunting I find wild colonies. It's not hard. I've done it in Maine. I've done it in Connecticut. I've done it in Massachusetts," Seeley said.

Seeley's researches turned up a lot of interesting things.

DNA sequencing on Seeley's Arnot honeybees from 1977 and some from 2010 showed that they had gone through a "genetic bottleneck" — indicative of a population collapse — and emerged with their genome changed. "We found 634 sites across the genome that had been changed very strongly through natural selection. Genetic drift couldn't account for the high level of change at these sites," said Seeley. Testing also showed significant differences between the wild Arnot Forest honey bees he sampled in 2010 and managed bees kept in apiaries several miles away.

The question, of course, is whether the bees' altered genome is helping them deal with varroa mites. Seeley thinks it's probably a combination of genetic resistance and how the bees live. The wild honey bees live in smaller colonies — up to 20,000 bees versus up to 50,000 in managed hives. Their nests are fairly far apart, about a half mile on average. And they swarm frequently.

Seeley's research also suggests that the primary bee-killing virus carried by mites — deformed wing virus — is not virulent in wild bees, while it spreads rapidly in hives managed by humans. That might be a result of differences in colony density: a half a mile or more apart versus crowded in a beeyard.

Seeley and his colleagues are now trying to unpack the genetic and environmental reasons for the wild colonies' resistance to mites and whether some of those traits can be transferred to our managed colonies. Do the workers have a shorter development cycle that interferes with the mite's reproduction? Are they better at "grooming" mites off their bodies? Are they more assiduous about cleaning their six-sided brood cells of mites? Those are only a few of the questions. Answers still to come.

But Seeley said wild bees already offer guidance for hobbyist beekeepers: keep smaller colonies in smaller hives. Don't locate hives close together. And don't try to prevent swarming. "Let them live as they do in the woods," he said. "You will have a smaller honey crop, but the colonies will have an 80 percent survival rate without mite treatments."

Of course that isn't going to work for migratory beekeepers who truck hundreds of colonies back and forth across the continent on pallets stacked on flatbeds. They're going to have to wait for a silver bullet.

"Things are promising for the wild colonies, but unless we adjust our beekeeping practices I fear we're going to be stuck on a treadmill of chemical treatments for managed colonies," Seeley said.

Joe Rankin is a beekeeper who also writes on forestry and nature. The illustration for this column was drawn by Adelaide Tyrol. The Outside Story is assigned and edited by Northern Woodlands magazine: northernwoodlands.org, and sponsored by the Wellborn Ecology Fund of New Hampshire Charitable Foundation: wellborn@nhcf.org

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