BEES IN THE FOREST, STILL

Tom Seeley

“I believed that wild colonies of honey bees had vanished.”

“There are some who can live without wild things, and some who cannot.” These words, the opening line of Aldo Leopold’s classic tribute to nature, *A Sand County Almanac*, were on my mind last August as I began hunting in a forest near my home for wild colonies of honey bees. I love the bee colonies that I keep in hives at the university, for they are easily worked and studied, but I am in love with the bee colonies that live wild in the woods. They choose by themselves their tree cavity homes, build as they see fit their beeswax combs, gather all their nourishment from far-flung flowers, and fight without aid every predator and disease that crosses their lives. In short, these wild colonies tap fully that wonderful array of morphological, physiological, and behavioral adaptations we call the biology of honey bees.

Wild colonies of honey bees have lived in the forested regions of the eastern United States for over 300 years, ever since they began to be introduced from Europe in the 1620s. Until the mid 1990s they surely outnumbered the managed colonies of beekeepers in this part of the world. Sadly, the number of wild colonies in the eastern forests has fallen in recent years, due to a bit of human carelessness: the introduction of the parasitic mite of honey bees, *Varroa destructor*. This mite is native to Asia, where it parasitizes, but rarely kills, colonies of the Asian hive bee, *Apis cerana*. Now that it has been spread beyond Asia, this mite also parasitizes colonies of our familiar honey bee, *Apis mellifera*. Most colonies of our bees lack potent defenses against *Varroa*, so unless a human intervenes on the bees’ behalf, an infestation by this mite usually dooms a colony to an early death.

I have no doubt that over the past decade, in the woods around my home, the number of wild colonies has declined. One sign of this appears each spring when the dandelion flowers erupt in every field and lawn: I see few honey bees on these otherwise cheery blossoms. Another sign comes shortly thereafter, during the swarming season: I receive just one or two telephone calls announcing a swarm free for the taking. It used to be that I’d tally 20–30 such calls between May and June. Perhaps the strongest sign of the decline of wild colonies hereabouts is what I witnessed after the Summer of 1994, which is when I first noticed *Varroa* on my bees: nine out of 10 of my colonies perished during the Winter of 1994–1995. I fear the same happened to the colonies under Mother Nature’s care.

Given these experiences, I believed that wild colonies of honey bees had largely, if not completely,
Two of the bee trees found in Arnot Forest. Left, bee tree B; right, bee tree II. An arrow points to one of the entrances. (photo by Jun Nakamura)

Almost always, some of these bees return to the small cornucopia I'm operating and eventually they bring along hive mates. Once the bees have made several trips to the comb, and so have grown accustomed to it, they fly homeward along beelines. With a magnetic compass, I note their vanishing bearings, which tell me the direction to the bees' home. I estimate its distance from the minimum round-trip times of a few bees that I've labeled with a paint mark or two. Often, working from a single flowery clearing, I discover that I've initiated beelines pointing toward two or more colonies. In such cases, I steer my search in the direction of the strongest line. To follow a line to its source, bees visiting the comb are trapped inside the beehive, carried along the beeline a hundred or so yards to another clearing, and there released. Vanishing bearings from this new site are noted, thereby sharpening the arrow pointing to the bees' home. By patiently repeating such moves, I eventually find my way to the stand of trees that is the bees' neighborhood, to the particular tree that is their dwelling place, and ultimately to the one knothole that is their front door.

I began the new census on the

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vanished from the forested hills around my home in Ithaca, New York. And as one who cannot live without wild things, I mourned their passing. I figured that at best there might still be a few wild colonies out in the woods, but each the issue of some cosseted beekeeper's colony that cast a swarm unnoticed, and each the short-lived creation doomed by Varroa's fearful virulence.

Simultaneously, however, the inner voice of curiosity kept posing the question, is it really true that the wild colonies are gone? My busy-body curiosity asks me many questions, far more than I can tend to, so most of them get ignored, but I could not ignore in good conscience this one about the wild bees. Nearly at my doorstep lay a unique opportunity to get a solid answer, at least for my neck of the woods. Cornell University owns a 4,200 acre research forest, called the Arnot Forest, and 24 years ago, long before any live Varroa mite set feet in North America, Kirk Visscher and I censused the wild colonies living in this forest (Visscher and Seeley 1982). We found nine bee trees back in 1978. In repeating this work, how many would I find in 2002?

I took several measures to conduct the new census in a manner as close as possible to the old one. One was to do my bee hunting in the same season as before, from mid-August to late September. Another was to hunt in the same way as before, that is, using the no-nonsense methods described by G. H. Edgell in his peerless book on bee hunting, The Bee Hunter, published in 1949.

I start each hunt for a wild colony by going to a clearing that is good sized (the bigger the better) and well stocked with flowers. An old field sprouting goldenrod is ideal. Next, using a small apparatus called a beehive, I capture bees foraging on the flowers and introduce them to a square of dark, old comb filled with sugar syrup. The bees fill their honeystomachs, groom briefly, and fly slowly home, each one resembling a tiny lantern as her swollen, translucent abdomen glows golden in the sunlight.

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Map of Arnot Forest. Shown are the locations of the bee trees (8) found and of the feeding stations (12) used to establish beelines that led me to the bee trees. Feeding stations are numbered in order of use. The lines radiating from each feeding station depict vanishing bearings of bees leaving the station. Note that most of these lines occur in clusters which point toward one of the bee trees; the clusters that do not are marked with a question mark and evidently indicate an unidentified colony.
not finding rich forage in the flow-ers, mobbed my feeder comb when-ever I dripped it full of sugar syrup.

Altogether, I hunted in the for-est for 117 hours spread over 27 days, during which time I started lines from 12 clearings spread over about two-thirds of the forest). Thus I did not quite complete a forest-wide census, to match the one of 1978. (Back then, I was a freshly minted Ph.D., a so-called “postdoc.”)

This is a stage that most scientists go through, a kind of academic ado-lescence that lasts a few years, when one enjoys freedom from nearly all professional responsibilities except pressing on in your scientific work.) Even though my new census did not survey the whole forest, I did find eight wild colonies of honey bees. Each had taken up residence in a sturdy, live tree: two sugar maple, two white ash, one eastern hemlock, one white pine, one quaking aspen, and one red oak. To have found so many trees occu-pied by bees surprised me, for it shows that there are as many, if not more, wild colonies living in the Arnot Forest in 2002 as there were in 1978.

How can this be, given that Varroa has been in New York State for most of the past decade? One possibility is that these forest-dwelling colonies live in such iso-lation that they have not been ex-posed to Varroa. The fact that few of my bee lines pointed out of the for-est (just those pointing west from sites three, five, and nine, shown in photo) indicates that there are few, if any, managed hives located just outside the boundaries of the Arnot Forest, so perhaps the colo-nies in this forest are not much exposed to Varroa. Another possi-bility is that these wild colonies have been exposed to Varroa and, as usual, will soon be dead. A third possibility, and by far the most in-teresting to me, is that these colo-nies have been exposed to Varroa and have evolved, through natural selection, resistance to this para-site. If so, then the wild colonies in the Arnot Forest may be an im-portant resource in the breeding of a hardy, Varroa-resistant honey bee. Time, plus considerable toil (i.e., further studies of these bees), will tell which possibility is the reality. My hopes are pegged on number three, for I would like these bees to give as much delight to you, in your beekeeping, as they have to me, in my bee hunting.

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References