Our honeybees are dying. Nobody knows why.

what the bee said

LATELY, NEWS STORIES ACROSS THE COUNTRY have been proclaiming that the honeybee is in trouble. Bee habitat has been gobbled up by lawn, pavement and industrial farming. Bees are notoriously sensitive to many pesticides. Beekeeping as a profession has suffered by attrition as beekeepers (with an average age now exceeding 60), retire or give up due to the increased risks and complexities of their livelihood. Trucking colonies across country to pollinate crops stresses the bees and exposes them to epidemics. Accidental introductions of exotic pests (such as the vampire-like varroa mite) have ravaged them. The relentless pressure to make a profit has left the honeybee sapped of much of her resilience. Even prior to the recent and spectacular die-off (dubbed Colony Collapse Disorder), the honeybee has long been in decline in the U.S. Since the late-1940s, the number of managed bee colonies has dropped by about 60 percent.

Faced with a shortage of bees essential for pollination, in 2005 the federal government allowed honeybees to be legally imported from outside the U.S. for the first time in 83 years. Most dramatically, Australia exported untold thousands of

text and photos
by tracy frisch

Gunther Hauk

A spiritual dimension as well as technical expertise informs Gunther Hauk's 33-year practice as a beekeeper. Until July of this year, when he and his wife moved to southern Illinois to establish the 330-acre Spikenard Farm Honeybee Sanctuary, Hauk served as program director at the Pfeifer Center in Chestnut Ridge (Rockland County). He reminds students that the honeybee, like the cow and scarab beetle, was once revered as a sacred animal, a view antithetical to the way domestic livestock are treated today.

Though he teaches alternative approaches to bee care, Hauk also counsels that the environmental crisis we are facing stems from an exploitative worldview, not simply the lack of "appropriate procedures." In a May 2007 *Acres USA* article, "Colony Collapse Disorder: Do we reap what we sow?" Hauk writes, "A return to humility and reverence for the mystery of life and an admission that, clever as we are, we still have much to learn if we are to avoid destroying ourselves, is the first step in a truly effective response." —*TF*

colonies for one-time use in California almond orchards, where rapidly expanding acreage—now amounting to 80 percent of the world crop—has created an insatiable demand for bees. By one account, pollinating the current almond bloom requires 1.2 million bee colonies—half of the hives in the entire country.

In the Hudson Valley, beekeeping is almost entirely practiced as a hobby or sideline enterprise. In good times, even a few hives can produce an abundance of surplus honey to sell, and small-scale beekeepers also contribute essential pollination services needed for growing fruits and vegetables.

Statewide, the count of full-time, large-scale commercial beekeepers is surprisingly low, possibly under 50, and generally these apiculturalists make their home base in other regions, such as along an east-west corridor between Albany and Buffalo, where a limestone belt enhances the summer bloom of alfalfa and clover.

While some Hudson Valley hives are used for pollinating apple orchards, often they are augmented with hives brought in from farther south, where warmer weather and earlier flowers gives the bees a head start in building up the numbers of active foragers in their colonies. Some of these hives, though, are owned by migratory beekeepers from New York.

THE MYSTERIOUS PHENOMENON known as Colony Collapse Disorder was first characterized last November when a Pennsylvania migratory beekeeper named David Hackenberg decided to get to the bottom of a sudden and puzzling die-off of most of his 2,900 colonies in their Florida wintering grounds. The disorder has since been reported in 35 states, five Canadian provinces and several European countries. Large-scale migratory beekeepers seem to be the most heavily affected.

In this devastating disorder, most or all adult bees desert their colony, leaving behind the young, as well as stored honey and pollen. Inexplicably, neither common pests (such as the wax moth and hive beetle) nor other bee colonies immediately rob the abandoned hive.

Theories abound about the nature and cause of Colony Collapse Disorder, but scientists and beekeepers nevertheless remain perplexed. Researchers are investigating infectious organisms, toxic contaminants and immune system deficiency or poor nutrition that would prevent bees from fending off environmental assaults or pest attacks. Autopsies of bees have been inconclusive. Some scientists point to genetically engineered crops, which could affect the bees through the ingested pollen; others suggest the blame rests with corn syrup, a cheap honey substitute fed primarily to bees in migratory hives.

A substantial body of evidence, however, implicates a fairly new type of neurotoxic insecticide called neo-nicotinoids. Used to treat major crops such as corn (a wind-pollinated crop), neo-nicotinoids are systemically absorbed and distributed throughout the plant, including the pollen that bees carry back to the hive. Though the doses are too small to kill them, bees' homing and foraging

activities are affected; experimentally, bees exposed to the pesticide have become so disoriented that they failed to return to their hives. France banned one of these insecticides following an outcry by beekeepers.

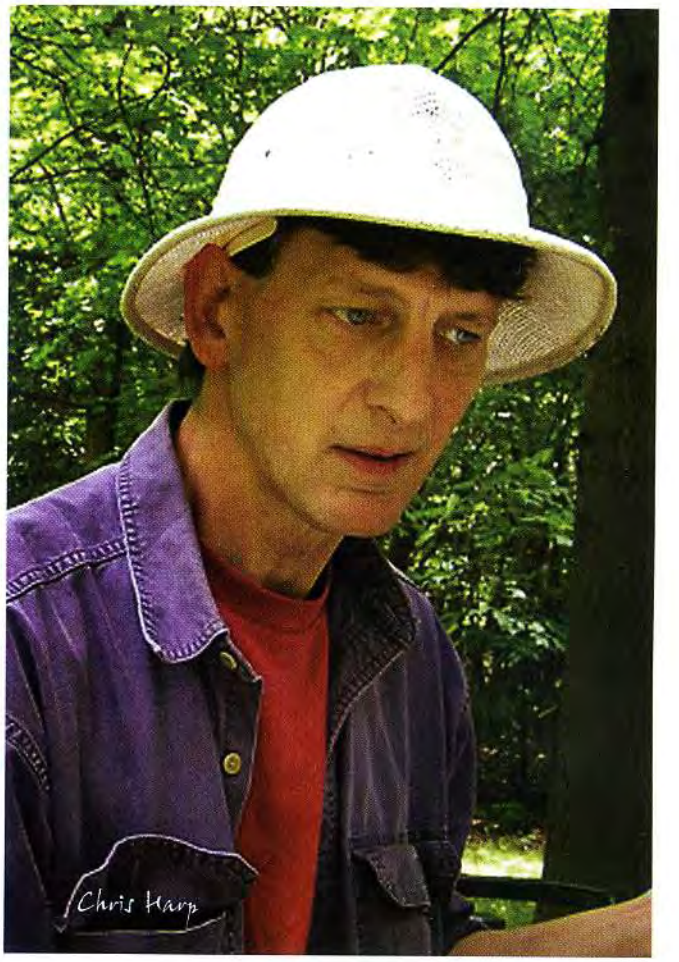
New Paltz beekeeper Chris Harp, 46, rejects the notion that a single agent is the cause of this epidemic. Rather, he believes a multitude of elements are responsible for the honeybee decline and that this is a wakeup call we cannot afford to ignore.

Harp, a beekeeper with more than 16 years' experience, calls himself a "naturalistic bee doctor," but he also is an educator, mentor and detective. As a complement to teaching beginning and advanced beekeeping classes, he helps novice beekeepers establish and manage honeybee colonies and troubleshoots for other beekeepers when things go awry. He also tends dozens of colonies for individual clients from New Jersey to Vermont. He is critical of conventional beekeeping, which he views as part of the deeply flawed system of industrial agriculture. Bees are in trouble, Harp claims, because they are constantly pushed to produce more while their keepers stifle their instincts. Beekeepers trying to cope with the vulnerability of their colonies are stuck on a treadmill—they continue to attack symptoms without realizing that their whole approach is a large part of the problem.

At the heart of Harp's unusual approach to beekeeping are the teachings of Rudolf Steiner, the early-twentieth century German innovator and spiritual philosopher best known as the creator of biodynamic agriculture and the system of Waldorf education. Harp's relationship to his colonies is based on a deceptively simple Steiner precept: Treat the honeybee as a living creature and not a profit-making device.

Through close observation borne of curiosity, Harp says he has gained a feel for what makes a bee colony healthy and resilient. When something goes wrong, rather than prescribing a chemical fix, he seeks deeper for the root causes. Harp also is intuitive in his dealings with bees, applying what he understands to be true even if he cannot fully explain it.

Like many beekeepers, Harp talks fondly about the bees' social structure and their miraculous products. In his view, a bee colony is a single organism; like human society, it has structure and hierarchy—except bees don't have egos. Rather than fearing their sting, Harp accepts that individual bees protect their group. His relationship with his colonies is symbiotic, he says, rather than one of domination. Honeybees are perfectly capable of living on their own, he acknowledges—as domesticated colonies they grant us food and we reciprocate. This empathy may be Harp's most noticeable quality as a beekeeper. Every one of his common-sense practices respects his "girls" and their nature. (That's not a sexist comment. Harp's reference is totally appropriate: All worker bees are female. They feed the young larval bees, serve as attendants to the queen and, when they get older, gather nectar and pollen.)



We have turned bees into a machine . . . We've ripped out their soul.

—chris harp

When we look at animals, we see their material body. Historical Native Americans, still clairvoyant, 'saw' that spiritual entity that governs the animal's life instincts with complete wisdom. They called this spiritual being the 'Great Bear' or 'Great Buffalo.' We would suggest that when the Great Bee experiences all these destructive forces, she withdraws from the physical entity. When the spiritual center of the colony is thus weakened, the individual bee flies out and does not come back. There is really nothing to come back to. The Great Bee, which might be called the group soul, cannot maintain the integrity of the colony.

—Gunther Hauk

Harp's initial adventure with bees was unfortunate. His property on the outskirts of New Paltz came with a former chicken coop that he wanted to convert into a workshop. In the process, the roofer found a bee colony living in a wall. Though he tried mightily, Harp could not persuade a beekeeper to come and remove the bees. He was forced to hire an exterminator, who sprayed the bees with a lethal insecticide. When Harp opened the wall to remove the mess, he found tens of thousands of dead bees and hundreds of pounds of contaminated, useless honey. Of the carnage, he says, "I was sick to my stomach."

The following year, Harp made amends by buying his first hive. He admits he knew nothing about beekeeping and for years followed a Cornell handbook, used pesticides to knock down pests and disease and wore a "moon suit," sealing the sleeves and pant legs with rubber bands.

Eventually, with confidence and with a radical change in perspective, Harp has discarded his veil and most of the other protective paraphernalia. The turning point came around seven years ago when, he says, a weekend workshop taught by famed biodynamic beekeeper Gunther Hauk, in Spring Valley, shifted his thinking about bees "180 degrees." He now uses only a hat to keep bees from getting tangled in his hair.

Embracing Hauk's vision, Harp kept returning to the weekend course every year. Eventually, Hauk invited him to co-teach, and Harp continues to help instruct the workshop, a role he describes as an "immense honor." Though humble, Harp also exudes a certainty about his still-unfolding path, and a determination to influence others. He attributes his conviction that he has important work to do to a brush with mortality over two decades ago. In July 1985, living in Stockton, New Jersey, and working in sales at IBM, Harp had a near-fatal motorcycle accident. Declared dead by the police but saved by an alert emergency medical technician, Harp awoke from a coma several weeks later with a traumatic brain injury that required more than a year of intensive rehabilitation. He had to relearn cognitive skills, including how to talk, read and write.

In rethinking virtually every element of the beekeeper's repertoire of methods and options, Harp has been attentive to the questions that Hauk posed for reflection: "What practices only serve my comfort and economic return but thwart the honeybee's life instincts? What do I do that weakens and stresses the colony, and thereby adds to a lowering of the immune system, leaving the animal susceptible [to disease and parasites]?"

All beekeepers want their colonies to be strong, populous and productive. As their caretaker, Harp strives to assure his bee colonies have adequate food that meets their nutrition needs, access to clean water, and a sunny, well-drained site.

Having a good environment would appear to be a given, but, Harp points out, professional beekeepers routinely weaken their charges in a number of ways.

- Bees benefit from a rich habitat with a good variety of flowering trees and weeds within their two-mile flying range, Harp explains. Many plants commonly labeled as weeds possess important healing properties and are rich in

nutrients. But in the interest of maximizing production—and crop pollination—mainstream agriculture long ago developed an aversion to such diversity.

- Today, most commercial beekeepers find renting hives for pollination services to be their profit center. This business also subsidizes less-lucrative honey sales. But trucking hives cross-country is stressful and substantial numbers of bees perish during the forced migrations. Once in the crop—typically a bee-dependent monoculture like citrus, almonds, blueberries, apples, melons or pumpkins—the bees are often forced to subsist on a single type of nectar and pollen that they might find neither particularly appealing nor nutritious. This deprivation is a far cry from the honeybee's naturally diverse and balanced diet.

- Most beekeepers harvest honey from their colonies in the late summer. But the bees put away this honey for the colder months of scarcity. So as not to compete with the bees for their survival stores, Harp instead removes surplus honey that his colonies have left after winter. He harvests in spring or early summer, when a multitude of plants are in flower and the nectar flow is most abundant. (And honey is not just a tasty, healthful food. It is the only thing Harp uses to treat a wound. It releases hydrogen peroxide, killing bacteria, and also enhances tissue regeneration, he says.) Overzealous honey robbing has given rise to the practice of feeding bees sugar syrup or high-fructose corn syrup over the long winter and in cross-country transit for pollination services. From a bee's standpoint, these honey substitutes are inferior foodstuffs lacking the complex enzymes and minerals present in raw honey. Hauk teaches that honeybees must expend much more energy to metabolize these sweeteners than honey. The low cost of corn syrup has gained it preference over sugar.

- Like honey, pollen is a required staple in the honeybee diet. Bees make this protein-rich food into a "bread" for their rapidly growing larvae. Many beekeepers collect some pollen from their hives for sale. Harp has no objection to this practice in moderation. Substantial amounts of pollen can easily be left for the bees by using a pollen trap only on alternate days. But some beekeepers try to extract all possible profit from their hive by stealing all their bees' pollen, substituting protein patties made from soy protein and other foreign foods.

- Royal jelly is another marketable product whose harvest is exploitative. Some beekeepers go so far as to raise and then kill immature queens for the sole purpose of stealing their unique source of nourishment, fed to them throughout their lives by their attendants.

Given the lack of financial return for honey producers selling on the commodity market, it is no wonder that beekeepers have become ever more rapacious with their apiaries. In the U.S., honey production is not subsidized. Free-trade policies have allowed inexpensive honey imports from China and elsewhere to flood the domestic market. The purity and composition of these products is not policed.

Housing for his bees offers Harp other occasions for experimentation. For instance, he has modified the standard Langstroth hive, an 1852 invention whose multiple, removable frames revolutionized beekeeping. The workers in Harp's modified hives construct connecting "tunnels and hallways" between the frames of honeycomb. This allows for greater communication, something precluded by the traditional layout. Harp claims this improved design results in stronger colonies.

Almost all beekeepers today provide their colonies with prefabricated grids of hexagonal cells, called foundation, to give the bees a template for their brood chambers and honeycomb. Harp, on the other hand, believes that bees should be able to exercise their natural behavior. Instead of readymade foundation, he provides his bees with a narrow starter strip. "I let them build everything," he says. "When you stick a piece of foundation in, you've taken away their will to live."

Historically, the hive box and frames have been wooden and the foundations were made of beeswax. But for the last 15 or 20 years, plastic has been displacing natural materials. The recommended beginner's package in a catalogue of a major northeast beekeeping supply house consists of a

polystyrene hive box with all-plastic components. Harp and his mentor both find this use of plastic appalling. Commenting on the use of plastic foundation for the cells in which the bees' young are raised, Hauk writes, "Perhaps humans will have plastic inserts in their wombs in the future and call it progress." Unable to completely reject a plastic foundation, sometimes bees minimize their contact with it by a novel design: They build little pillars over the plastic and then place their comb on top of it.

Beekeepers have even manipulated the diameter of the cells in the honeycomb where larvae are reared. Harp says the concept is simple. "If you keep a goldfish in a little fishbowl, it will stay small. Throw it into a pond and it becomes a carp." This practice, begun over a century ago, indeed results in bigger larvae, which become bigger adults that can carry more nectar, make more honey and yield higher profits. Today's mass-produced foundation has cells with one-tenth to one-third more capacity than the cells bees would build naturally.

In the 1990s Ed and Dee Lusby, fourth-generation commercial beekeepers from Tucson, Arizona, took a contrary approach, pioneering smaller cells for better colony vigor. After their own experience demonstrated that decreasing cell size can significantly reduce disease and mite infestations, they mapped optimal natural cell size by latitude. Larvae raised in smaller cells develop slightly faster, giving parasites less time to mature and reproduce. Harp, too, has come to prefer the smaller cells for his hives.

Beekeepers typically finish wooden hive boxes with store-bought paint. Once again Harp follows the bees' lead by staining his with a weatherproofing mixture he makes from propolis (the glue-like substance bees produce from tree sap and resin) dissolved in alcohol. Bees use it to coat and sanitize the inside of their chambers. Harp says propolis has antibacterial properties. Other hints of Harp's considerateness are evident when he works with his colonies. Before opening up a hive, he "knocks on the door" with the smoke to let the bees know he's there. "I give them the sense that a fire is coming. It switches their attention," he says. He is also cautious about opening up a hive because the colony is accustomed to darkness.

Using flower buds from staghorn or smooth sumac as fuel in his smoker is another of Harp's idiosyncratic practices. He is partial to sumac because its smoke is less annoying to bees than wood shavings, twine, burlap, or any number of other materials beekeepers burn in their smokers. Harp also favors sumac because it is easy on his own eyes and nose. A single cluster burns for 30 minutes. Harp instructs his students to use sumac but otherwise he personally knows no other beekeepers who use it.

Another example of Harp's intuitive approach to bees is his understanding of drones. These are the bees that develop from unfertilized eggs. Making up just a small percentage of a colony's population, drones are the honeybee's only males and the queen's only mates.

Because they don't make honey and, apart from fertilizing the queen, they have no obvious role, many beekeepers regard the bulk of drones as expendable. Another strike against drones is that their three-day-longer larval stage allows for a full life cycle of the varroa mite. This tiny, tick-like arthropod kills or weakens both young and adult honeybees by sucking the body fluids like a vampire. Since drones develop in larger cells than workers, some beekeepers destroy what they deem excessive drone larvae. The genetic diversity that comes from having numerous drones does not play into their assessment. The Working Group on Colony Collapse Disorder, a scientific and academic group, has identified reduced genetic diversity in the honeybee as one of its research priorities.

Harp takes a different view. He considers this class of bees "the shamans and clerics of the hive." He says drones guard the hive and also determine which bees stay and which go when a colony swarms. Beekeeping books recommend suppressing swarms, Harp says, because the loss of many bees is seen as a blow to profitability. But Harp says swarms are an integral part of a colony's life cycle. A bee colony, like an amoeba, procreates by dividing—stopping their procreation, Harp asserts, kills their spirit and adds to their stress. Harp welcomes swarms as "wonderful" and tries to manage them. (He caught three swarms on one recent day. Each swarm can yield another box of bees, he says.) Since only colonies with multiple queens will swarm, most beekeepers destroy new queen cells as soon as the colony makes them. Distinctively shaped like peanuts and a good deal bigger than worker cells, queen cells are conspicuous.

Not surprisingly, in the world of commercial beekeeping, queens are mass-produced by specialized breeders, and then "grafted" onto existing colonies. Hauk writes, "Queens are bred artificially and exchanged like batteries in a cell phone, with one important difference: The rate of exchange is much faster." Conventional beekeeping has even perfected artificial insemination. A queen is immobilized in a special device and injected with semen.

Regarding the various arthropods and diseases that beekeepers have learned to fear, Harp is convinced that healthy colonies, endowed with a strong workforce and good nutrition, are more capable of fending off predatory organisms. Refraining from what he considers to be deleterious beekeeping methods is his first line of defense.

To boost his bees' immune response, Harp brews a tea of dandelion roots, chamomile and other herbs, sweetens the mix with sugar and adds a dash of sea salt. Often, he will add thyme, which he says repels the varroa mite. He sets out the tea in his bee yard as a free choice drink for the bees; they come to imbibe the decoction from an upside-down jar with holes punched in the lid.

One of the more overwhelming problems faced by beekeepers in recent years has been a tiny, tick-like parasite called the varroa mite *(Varroa jacobsoni)* that feeds on honeybee blood. After arriving from Asia in 1987, the mite quickly spread to every corner of the country by hitchhiking on commercial bee colonies trucked from crop to crop on flatbeds. Exposed to frequent miticide applications, the surviving mites in turn became immune to each chemical

pesticide, and beekeepers despaired as their colonies were wiped out. Finally, beekeepers are beginning to monitor for mite levels rather than routinely zapping them, lessening the evolutionary pressure on the pest to select for resistance.

Because of its dire consequences to a hive, Harp is careful to keep the varroa mite population down. He counts the mites that drop into a special screen at the bottom of each hive and only tries to kill them if he hits the threshold. Then he uses a least-toxic compound like formic acid, a chemical produced by ants, or oxalic acid, the poisonous compound in rhubarb leaves. His starter (or nucleus) colonies come from a breeder who doesn't treat for mites at all, thus selecting for more resistant honeybee stock. Other practices, like using smaller cells and allowing for his bees to express their full range of natural behaviors, minimize the need for chemical interventions.

About other pests, Harp is thoughtful rather than aggressive. When he notices wax moths in a hive, he calls over his hens "rather than ordering wax-moth killer. The only reason they are there is that the colony is weak," he says, noting that they don't kill or hurt the bees. (Hauk goes so far as to embrace some so-called pests as having an ecological purpose. He writes that "their task in nature is to get rid of what is sick," and the infirmity of so many colonies gives them "new opportunities to do their work." Beyond the necessity of a paradigm shift within the practice of beekeeping, Hauk points to environmental assaults beyond the control of individual beekeepers. We must rethink agriculture, he says, eliminating "sterile monocultures" and turning away from dependency on poisons. Some even say bees cannot be managed organically because of their exposure to pesticides and genetically engineered crops within their wide foraging territory.

Another threat to the honeybee is global climate change. Whether from drought or cold, aberrant weather has always caused bee mortality. But greater unpredictability of the weather worries Harp. This past winter, with its unseasonably warm December and January, bees became active in the absence of flowering plants and then died because they had used up their limited lifespan or, as Harp explains it, "their hourglass of life." Consequently, the remaining colony had too few bees to keep it warm during the extended cold stretch that followed in February and March. Had we had a normal winter with such a frigid February, the bees would have been fine. Many Northeast beekeepers lost their bees. "Their girls starved," Harp says.

Despite these challenges, backyard beekeeping is alive and buzzing in the Hudson Valley. Many new people are getting hives, some inspired by Harp's teachings. Increasingly, their practice is informed by an ecological consciousness, according to Grai Rice, Harp's partner. She observes that for some of the new crop of beekeepers, honey production is beside the point; rather, their interest lies in supporting honeybees in their role in the natural world.

Harp and Rice are working with fellow apiculturalists, new and old, to form the Ulster County Beekeepers Association. Interest in the new group—and in using natural methods to maintain the bee population here—is, as they say, blossoming. ✕

***Chris Harp and Grai Rice* run *HoneybeeLives: A Naturalist's Approach to Beekeeping*. Harp teaches introductory and advanced organic beekeeping classes and offers Bee Buzz for Kids, public presentations, demonstrations, and services to individual clients. www.HoneybeeLives.org or (845) 255-6113.**

***The Pfeiffer Center* offers education, research and outreach programs in farming, gardening and beekeeping, with a focus on biodynamics. The center is located at 260 Hungry Hollow Rd., Chestnut Ridge, NY 10977; (845) 352-5020. www.pfeiffercenter.org.**