



GIVE BEES A CHANCE: The Scary Truth of Colony Collapse Disorder

Hannah Carroll
~ Staff Reporter

What would breakfast be like with pancakes minus the blueberries? No coffee, tea, apple juice, or orange juice? For lunch, how would the BLT taste without its lettuce or tomatoes? How bland would dinner be without rice, potatoes, cassava or peppers? And for dessert, lemon meringue pie without the lemon – topped with vanilla ice cream. Oh, but did I mention, there's no vanilla, milk, or sugar? Approximately 1/3 of the food we eat is pollinated by bees, but the bees are in danger.

Bee disappearances have been happening since the 1880's. They would pop up every now and then, but no big deal. But the bee disappearance in 2006 was nothing short of a crisis. Beekeepers reported losses ranging from 30 to 90 percent of their hives, which is an unusually high amount. And, it only got worse the next year. Scientists began to smell something fishy and coined the disappearance of our favorite pollinator Colony Collapse Disorder, or CCD. But wait, it gets worse. Since the 1940's, the US had five million managed colonies. Today, that number has been almost cut in half. That means bad news for earth's growing population, and the higher demand for produce.

People often underestimate how this affects humanity. But the answer is

easy. No matter who you are, no matter what you do, no matter where you live, as long as you like food, you should care very much about what happens to the bees. Believe it or not, approximately every three bites of food you eat would not exist without the help of bees. Bees assist us by pollinating around 80% of our food, and 90% of the world's nutrition. The supermarket would be nearly empty without bees.

Colony Collapse Disorder is a condition where the hive contains no adult worker bees or very low populations of them. The queen and immature bees are still present though. With no workers, the beekeeper has to resort to feeding them. Another issue is that the bees become reluctant to take any offered food. But the strangest thing is that the dead bodies of the workers are nowhere to be found. Beekeeper Jeff Anderson calls this the "perfect crime."

We are still not exactly sure what causes CCD, but research has concluded that is no 'one cause', and that it is most likely caused by multiple sources. Every case is different, so it could be one (or a few) causes for one beekeeper, but a completely different set of issues for another. One potential factor is management stress on bees. As CCD continues to wreak havoc on the food industry, the human population's demand for fresh produce increases. This means beekeepers have to ship their bees all over the country to help pollinate crops. But the rides to the overcrowded apiaries are hot, long and bumpy. "Everyone will admit, it's stressful on the bees," says Deborah Delaney, an entomology professor at University of

Delaware.

Parasites are also a huge problem. The varroa mite (*Varroa destructor*), arrived in the 1990's, with the first recorded case in the US from North Carolina in 1990. These tiny, tick-like mites feed on the hemolymph, or the blood of bees, to get their nutrition, leaving cuts on the bees and making them vulnerable to viruses and infection. Little is known about whether they carry some of these viruses along with them, similar to how a mosquito carries malaria and fleas carry the plague. We also don't know if there is a direct correlation between CCD and *Varroa destructor*, but it is quite likely there is, as the mites are often found in CCD-stricken hives.

The mite does its dirty work by having a female mite hitch a ride on a worker bee going back to the hive. Later, it will enter the cell of the larvae a few days before it is capped, which is when the larva sends out a wax-like substance to the top of their cell to finish the maturing process. The mites also prefer drones because they take longer to mature, thus giving the mites a better chance at reproduction. Victims that emerge from the brood may be deformed and every victim's life will be shortened and threatened because of the mite.

Another pathogen attacking bees is the Nosema fungus (*Nosema apis* and *Nosema ceranae*), which is a fungus-like parasite that resides in the gut of the bee. Like most fungi, it reproduces via spores that spread through bee waste. Unfortunately for the bee, both species of Nosema will make itself comfortable at the bee's expense to prep for reproduction. *Nosema apis* is most

problematic in the winter and spring. In fact, it almost 'dies off' in summer. However, *Nosema ceranae* is problematic all year, but both species raise threats when there is lack of pollen.

Nosema has been in the United States since 1995, but remained unnoticed until 2007, which is coincidentally around the same time the colony collapse epidemic was recognized. The two may be linked, as both species of Nosema are often found in hives with CCD. Both species cause premature foraging in young bees when workers infected with young spores develop digestive issues and are incapable of providing food for young. Queens who become infected are unable to function and can be replaced, but infected hives can still face queenlessness. For beekeepers, reduced honey yields may happen and overall, infected bees' lifespans can be reduced by about 78%, according to the University of California, Davis.

Bees infected with *Nosema apis* will show symptoms, while victims of *Nosema ceranae* will not. *Nosema apis* causes bees to do their business not only inside the hive, but outside too. Brown spotting on the hive will be visible on the infected hive. *Nosema ceranae* victims show no symptoms, and can really only be detected in a lab. *Nosema ceranae* can also find its way into other parts of the bee's body, and can sadly cause huge and rapid colony decline.

More than a billion pounds of inorganic pesticides are sprayed, dusted, and poured onto American farms and lawns every year. Approximately 99% of American agriculture relies on chemical

pesticides. Sure, they make farming easier, but they have side effects. Not only are they carcinogenic for us, but they are lethal to bees and are responsible for many different cases of CCD. Neonicotinoid insecticides ('neonics' for short), affect the central nervous system of a bee, making it so they cannot locate and make it home to the hive. They also interfere with the bee's ability to groom itself, making it prone to infection.

Slowly, but surely, the pesticide problem is seeping into the public's general awareness. In June 2012, shoppers at a Target near Portland, Oregon, witnessed the ill-effects of pesticides on bees firsthand – the parking lot was filled with bumblebees. Most were already dead, but some were staggering around, struggling to survive. An estimated 50,000 bees from 300 different colonies were killed. Nobody told the bees not to collect nectar from the nearby linden trees which were sprayed the previous day with an insecticide to keep aphids away.

But if these pesticides are killing the bees, then why are they still legal? They're not, in the European Union. Europe's CCD rate is also lower than in the United States where only one neonic is considered illegal – Dow's Sulfoxaflor. While this is a start to end CCD in the US, not everyone is happy. Beekeepers and many non-profit groups have sued the EPA about the way pesticides are being treated legally. In the European Union, chemical prohibition is treated in a "look before you leap" kind of approach. In the US, it's done the opposite way. "Chemicals are deemed

innocent until proven guilty, sometimes with disastrous results," says Chris Jordan-Bloch, a reporter from Earthjustice. Sulfoxaflor was the topic of the case on September 10, 2015. The 9th Circuit Court of Appeals discovered the EPA violated federal law when approving the insecticide because they lacked reliable tests and studies on how it would affect bees.

Although most of these companies straight-out deny the effects of the chemicals on bees, and happily continue to manufacture them, one company has made a big, buzzy change. On April 12, 2016, Ortho announced it will be removing all neonicotinoids from its products. The company also hopes other pest control companies will follow in their footsteps.

To help the bees does not mean you have to change your lifestyle dramatically. The easiest way is to purchase organic food and avoid using pesticides and other harmful substances that hurt us, bees, and mother nature in general. How do I find these products, you may ask? Well, most grocery stores have organic sections, but you should also look for the 'USDA Organic' seals when at a conventional grocery store. Local beekeepers care very much about CCD and supporting them by purchasing their honey is very important to the bees. "If we, as consumers, demand fresh, organic produce at a fair price, then that's what's going to keep it supplied on the shelves," says Professor Delaney.

Gardening is another easy way to help. Even a planter box filled with bee-friendly plants is enough. The real struggle here is to know what plants to

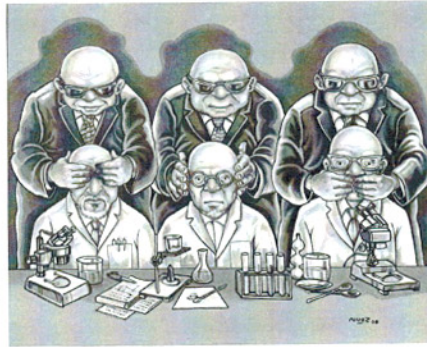
buy and where to get them. Bees enjoy flowers that have a white, yellow, blue, and violet color palette and those that have plenty of nectar and pollen. But not any old flower will do. Make sure the plants are heirloom, organic, and/or minimally bred. Also, most plants you will buy from a Walmart or Home Depot have been treated with neonics, which we've learned, will kill bees. But if you're not thinking about new plants, your yard can also be turned around. Consider letting your lawn grow, as a manicured lawn never helped a pollinator. The weeds that you're plucking out of the yard, could actually help pollinators. Never spray your lawn with chemical pesticides of any kind since there is usually a safe, organic alternative.

"The bees are in an Intensive Care Unit," says Chester County beekeeper Walt Broughton, who's extremely worried for the bees. But are the bees slowly making a comeback? Will conditions ever improve for them? Will people learn to respect bees and help the cause? Broughton warns time is running out: "As Albert Einstein once said, 'If bees die, we would have no more than four years to live.' Even that's an overstatement though."

37 MILLION DEAD BEES

"Once the corn started to get planted our bees died by the millions..."

Europe got the message. When will we?



BEYOND A REASONABLE DOUBT

Rowan Ackerman

~ Staff Reporter

If climate change does not exist, why have the top 16 hottest years since 1880 been in the past 20 years? If vaccines can lead to autism, why have no credible connections been found? If fluoride in public drinking water puts children's I.Q.'s at risk, why isn't there any evidence?

The main question is: why do people doubt science? Aside from faith, the main answer is misinformation. Twenty-five years ago, if you didn't agree with science, you wouldn't have much choice but to pretend you did and go along with it. But now with the internet it is much easier to communicate with people who have the same opinion. If someone doesn't have an opinion, they can get online and get incorrect information by going to blogs and misleading websites.

In the past, Galileo, Scopes, and some other early science supporters were persecuted by the church. Galileo was convicted for believing that the Earth spun on its axis and orbited the Sun. The church had come to the consensus that the Sun revolved around the Earth and that the Earth was the center of the universe. However, scientists had been quite sure that the Earth was not the center of the universe for quite some time. Mr. Scopes was prosecuted for teaching evolution in a school in