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Final Paper- Mr. Ling



Over the course of the past few years, there has been a rapid decline in the honeybees. You may have noticed this by getting stung less in the summer, or by the increasing price of fruits and other non self-pollinating fruit bearing plants. The disappearance of the honeybees is a much more sinister problem than you would imagine. It is leaving farmers devastated, as well as the beekeepers that rent colonies of bees to the farmers for pollinating their crops. The bees' disappearance has been classified scientifically as CCD, or colony collapse disorder, which was previously known as "Fall Dwindle Disease."

In colony collapse disorder, bees lose 50% - 90% of the whole colony without any reason. This is a huge problem for most life on earth. If CCD spreads worldwide at the same rate it has been spreading, fruit bearing plants will not receive the pollen that essential to their reproduction. That could leave fruit

eating mammals without grains and corn. There isn't much else in the way of self-pollinating fruits for pollinations to sustain them selves on. Losing these plants is like losing the sun; it is cutting off our food chain 1 ½ links away. We could sustain ourselves for a short period of time, but, eventually, we would lose correct volumes of food needed to sustain our population.

### Relying on Bees

Some of the most valuable fruits, vegetables, nuts and field crops depend on insect pollinators, particularly honeybees.

	Crop value in billions 2006	Percentage pollinated by honeybees	Percentage of crop pollinated by ...		
			HONEYBEES	OTHER INSECTS	OTHER
Soybeans	\$19.7	5%			
Cotton	5.2	16			
Grapes	3.2	1			
Almonds	2.2	100			
Apples	2.1	90			
Oranges	1.8	27			
Strawberries	1.5	2			
Peanuts	0.6	2			
Peaches	0.5	48			
Blueberries cultivated	0.5	90			

Besides insects, other means of pollination include birds, wind and rainwater.

Sources: United States Department of Agriculture;  
Roger A. Morse and Nicholas W. Calderone, Cornell University

Beekeepers have been baffled by the disappearances of their stocks. It isn't like anything that they had seen in their lives. With parasites, (which was the main suspected cause) there would be dead bees lying around the hive on the ground. There wasn't a single bee to be found. The hives were just abandoned; like a ghost

town. And on the abandoned hives parasites and insects which would normally have pillaged and stolen much of the hives honey, just left it alone, as if the insects knew that there was something wrong with the whole hive.

CCD has been blamed on many things including pesticides, honeybee imports, parasites, new predators, an HIV like virus in the bee population, and many more. Scientists and experts have eliminated most of the possibilities as to the bee disappearances. They have rested their sights on IAPV, an unclassified dicstro-virus not previously reported in the U.S that is transmitted by the varroa

mite, a common parasite to honeybees. This could have a major impact of honeybee populations.

The effects of the virus could be compounded by new innovations in pesticides, which are more effective on insect populations than ever. These pesticides make the bees lose their senses, and not allowing them to find their way back to their hives. New classes of pesticides used on plants, called neonicotinoids, don't kill bees, but hamper their sense of direction. That leaves them unable to find their way back to their hives. The pesticide program is so advanced, that there is little room for failure. Pesticides come in different formulations: dusts (D), wettable powders (WP), soluble powders (SP), emulsifiable concentrates (EC), solutions (LS), and granulars (G). Solutions, emulsifiable concentrates, and granulates are the deadliest formations to use. They leave no evidence, and like carbon monoxide to humans, you simply fall asleep without realizing that there is something wrong. The bees that do survive, are genetically changed, and have damaged senses of direction, and smell, which is absolutely essential to bees.

A strange coincidence involved with CCD is that the first beekeepers to report losses of bees were all moving colonies, which can be very stressful on bees. Some possible factors to reinforce that CCD afflicts only moving colonies is that bees that are confined have major and constant temperature fluctuations, and possible reduction of egg laying. CCD has taken 30% of infected bee colonies each season. In a three-month season, that is 10% per month. This could be because beekeepers are constantly splitting bee colonies to

compensate for the unimaginable losses of bees. The equipment that is used to transport and house the bees is continually being used and reused without being cleaned. All colonies that have been infected have had some sort of extra stress on the colony two months previously at most to the start of the losses. Whether it is splitting and mixing, or transporting, extra stress is killing bees.

Some of the beekeepers tried some sort of fixing of their colonies. All of them tried to use antibiotics, but that may have weakened the immune function of the bees even more in doing so.



The most mysterious part of the colony collapse disorder is that the worker bees seem to be leaving the hive and not returning. This is evident because they are finding no noticeable dead bees in the hive or at the entrance of the hive. This

literally means that the adult worker bees are leaving the hive and not returning. This means that the bees are not “sick” in the hive and that they are going out on a foraging mission and are getting “sick” on the 15 or 30-minute journey and are not making it back. What is evident to me is the bees are not making it back to the hive because of navigational problems. To think that the bees are getting “sick” in fifteen or twenty minutes seems inconceivable. The navigational strategies of the honeybee are detailed in the book by John Alcock called [\*Animal Behavior: An Evolutionary Approach, Third Edition\*](#). It states: :If a sun compass were the only mechanism available to bees and pigeons their homing abilities

should be severely affected by cloudy weather. But both species can forage and navigate successfully on totally overcast days. Thus these species have more than one compass mechanism, one of which may be sensitivity to the weak lines of magnetic force created by the earth's magnetic field. Both pigeons and honeybees have magnetic compounds concentrated in certain tissues of their bodies; these compounds may be part of a magnetism detector."

The question would be: is this a magnetic disturbance in the earth's magnetic field or perhaps the magnetic interference of the rise in cell phone technology in the past few years. Scientists have found magnetic material in the bodies of the bee that could be disturbed by bee cloning causing a problem in the ability of the bee's mechanism in orientation.

The cloning of bees may be a feasible way to defeat Colony Collapse Disorder; but other actions have been suggested such as introducing another species of bees. The Africanized honeybee has a far lesser reaction to Colony Collapse Disorder. The only problem with Africanized species is that they are much more aggressive as to what they will attack, and there is also the question of introducing a non-native species into the entire world. One feasible way to do this is to keep the bees contained and watched for by the beekeepers. This way the bees would be readily available to farmers, and they wouldn't present as much of a problem to other animals, which would be effected by the presence of an aggressive species of bee.

The disappearance of bees will have a grave effect on the already dwindling farming industry, on the beekeeping industry as well as on the prices of

almost every food that we consume. It will also make trade slow and there is the possibility of the collapse of economies because the country has lost its main export.

So what can we do to stop the constant decline of the honeybee population? We can prevent the further use of pesticides and neonicotinoids; which are even more deadly. We could do more extensive research of all pesticides and neonicotinoids, and their long-term effects on living organisms. We may have missed our opportunity to do this but I remain hopeful that we haven't pushed the honeybee population over the edge into extinction. The consequences of this action are too grave to imagine.

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