

Citizen Scientists and Bee Populations

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Imidacloprid – a type of [neonicotinoid](#) – changes the way that worker bees interact with the colony’s larvae: they become less social, stop nursing larvae, experience altered social and spatial dynamics within nests, and cease hive insulation construction.

A research team led by James Crall of Harvard University investigated the effects of imidacloprid using a robotic platform for continuous, multicolony monitoring of uniquely identified workers. Their research showed that the behaviours induced by imidacloprid lead to colony collapse.

The team [concluded](#):

“Our results show that neonicotinoids induce widespread disruption of worker behavior within the nest that may contribute to impaired growth, highlighting the potential of automated techniques for characterizing the multifaceted, dynamic impacts of stressors on behavior in bee colonies.”

Neurological and social

Many [media reports](#) characterised the bees in the study as “antisocial and lazy,” but it is crucial that we understand the larger paradigm afoot here.

While there are many studies which speak to the links between neonics and colony collapse, there are [many others](#) that decry this science as a “myth.” There will be yet another onslaught of those who say that that correlation is not causation, in response to the proposition that neonics – or imidacloprid at the very least – have a direct effect upon social behaviours that result in the loss of larvae.

This is logically true, but there is enough science on the links between colony collapse and neonics that it is time to stop reacting in bad faith to the science. Many researchers in Europe are interested to learn more about this link between bees and neonics, following [a near-total ban](#) on neonics in the EU last year.

Dr Richard Gill, a researcher from the Department of Life Sciences at Imperial College London, and his team have explored the relationship between bumble bees and neonicotinoid-treated food. [Their study](#) shows that while at first the bumble bee bees avoided this food, they eventually come to [develop a preference](#) for neonicotinoid-treated foods.

Gill, who has worked in this field for some time, [has demonstrated](#) how neonics bind to synapses in the brains of bees, which in turn causes these bees to have seizures which he

likens to an epileptic seizure. The neonics target the nicotinic acetylcholinesterase receptors in the brain. Hence, there is both a neurological reaction from the neonics as well as a social reaction in relation to them which impacts the propagation of the species.

Citizen science

The end result is the decline of bee populations but also – since [bombus](#) play key roles in the food chain acting as pollinators in temperate ecosystems – many other species have declined across Europe and North America.

The lack of quantitative data has further prevented the collation of data to make more robust conclusions about the contributing factors of colony collapse and the declining bee population.

That is until November of last year when researchers and more than fifty citizen scientists conducted surveys to determine the status of bumble bees throughout Vermont, in the northeastern United States.

From 2012 through 2014 these scientists identified and digitized bumble bee specimens from thirteen public and private collections. Having examined more than 100 years of bumble bee records, these scientists found that almost half of Vermont's bumble bee species have either completely vanished or are in serious decline.

“Our dataset contained 12,319 records, which we separated into historic (1915-1999; n = 1669) and modern (2000-2014; n = 10,650) periods, with our survey contributing 94 percent of modern data. Of 17 species, four were not detected and four showed significant declines.”

Collaborative engineering

These findings are tragic for the ecology and the economy alike, as these bees are the primary pollinators on Vermont's farms.

While the researchers could not state with certainty the cause for this decline, recent studies have reinforced the conclusion that it is a combination of habitat loss, disease, mite infections, parasites, pesticides, urbanisation, and climate change.

The dystopian results of recent studies do not give hope for turning around the damage done to bees, but some scientific projects are afoot which seek to understand — if not remedy — the disaster thus far.

In line with some of last fall's scientific revelations, citizen scientists are coming to the rescue, developing apps to record bumble bee sightings and upload pertinent information such as habitat type, location of sighting, and weather. This information will then be shared with researchers who can analyze the submissions and chart out migration patterns.

Designed by **Dinah Shi, John Salaveria and Luisa San Martin**, in collaboration with environmental non-profit Friends of the Earth Canada, these [software engineering students](#) developed this bumble bee tracking app to enlist Canadians to contribute to helping the bee populations as citizen scientists. The mobile app also teaches users how to

get involved in creating a sustainable environment for bees.

Nanotechnology

More and more research projects focussing on bee populations are enlisting the help of citizen scientists from across the United States.

One [project in Idaho](#) houses the volunteer efforts of anyone with a camera and a computer to record the various species throughout the region. In Washington, researchers are turning bees into [cyborg drones](#), attaching chips onto their bodies tracking their movements in order to gain more insight into their decline.

In fact, with the uptick of [nanotechnology](#) in recent years and the increase of [free website builders](#), scientists today are able to construct research projects extending far beyond their grant limits, involving local and international citizenry in crucial research needed to end the demise of bumble bee populations around the world.

The [Xerces Society](#), for instance, is actively engaged in the [Bumble Bee Watch](#) and is entirely composed of citizen scientists.

We need to consider the risks to our planet in the eventuality that bee populations continue to decline, especially those populations that are responsible for one-third of our food pollination. Why not consider contributing your time and efforts any number of bee studies that are in need of more citizen scientists to help track the declining bee populations across North America and Europe?

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