

# We're all getting stung

On Tuesday, the Obama administration will announce plans to protect bees, other pollinators and their breeding grounds. Honeybees are critical to our food supply. One of every three bites of our food originates from bees pollinating the flowers that produce many of our fruits, nuts and vegetables. Last June, President Obama established a Pollinator Health Task Force to focus federal efforts to stem pollinator loss. The USDA announced incentives to farmers and ranchers in five states who establish new habitats for honeybees.

BY PATTERSON CLARK

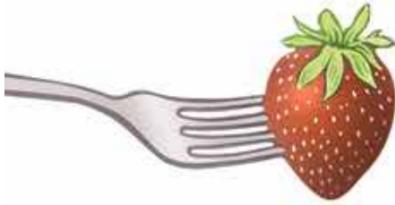
## The symptoms of colony collapse

- The hive suffers a rapid loss of older worker bees.
- Bees avoid supplemental foods provided by the beekeeper.
- The abandoned hive contains an excess of cells holding developing young bees. (Normally when bees leave a hive, they wait until the young emerge.)
- Honeycomb pests, which would normally raid an unguarded comb, delay their entry into the hive.
- The abandoned hive lacks dead bees.

The honeybee population in the United States is now less than half of what it was at the end of World War II. Driven largely by industrial farming practices, that decline was well underway when, in 2006, commercial beekeepers began finding many of their hives suddenly abandoned. Colony collapse appears to be linked to a variety of factors that work in concert to weaken bees.

## Honeybee stressors

Studies show no links between colony collapse and either cellphone-tower radiation or genetically modified crops.



**Crops pollinated by bees** include almonds, apples, apricots, avocados, blueberries, cantaloupes, cashews, coffee, cranberries, cucumbers, eggplants, grapes, kiwis, mangoes, okra, peaches, pears, peppers, strawberries, tangerines, walnuts and watermelons.



**Bumblebees**, which are the main pollinator of tomatoes, are vulnerable to many of the same pesticides, parasites and diseases that affect honeybees.

**GENETIC WEAKNESS, GLOBAL WARMING**

Most queen honeybees in the U.S. come from a limited pool of breeder queens, which has led to poor genetic diversity. That makes them more susceptible to new pests and pathogens. Climate disruption can compound pressure on bee colonies. This year, Australia experienced its hottest summer ever recorded, resulting in a vast drought, which curtailed nectar and pollen production, reducing honey output by half and adding extra stress on hives.

### POISONS

Seeds coated with **neonicotinoid pesticides**, or neonics, sprout into crops laced with the chemicals, which shut down the nervous system of any insect munching on the plant. The chemicals even make their way into nectar and pollen, which can dose bees with enough of the toxin to cause disorientation and a loss of ability to learn and communicate — crucial skills for a social insect.

The poisons can be even stronger when store-shelf insecticides are used by home gardeners. Europe has temporarily banned neonics, the EPA is assessing these insecticides and will finalize regulatory action by the end of 2018.



*Varroa destructor*

Honeybees are the targets of myriad pests, the most damaging of which is the **varroa mite**, a parasite that begins sucking the blood-like hemolymph of young bees soon after they hatch. The mite suppresses bee immune systems and transmits viruses. Honeybees from Africa are less susceptible to varroa, partly because they bite at the mites and try to remove them. Some commercial beekeepers have begun building hives with western honeybee queens that exhibit similar grooming behavior.

A tiny **phorid fly** deposits her eggs inside a bee's abdomen. A week later, the affected bee abandons the hive before a fly larva emerges from the doomed bee's neck.

**PARASITES**

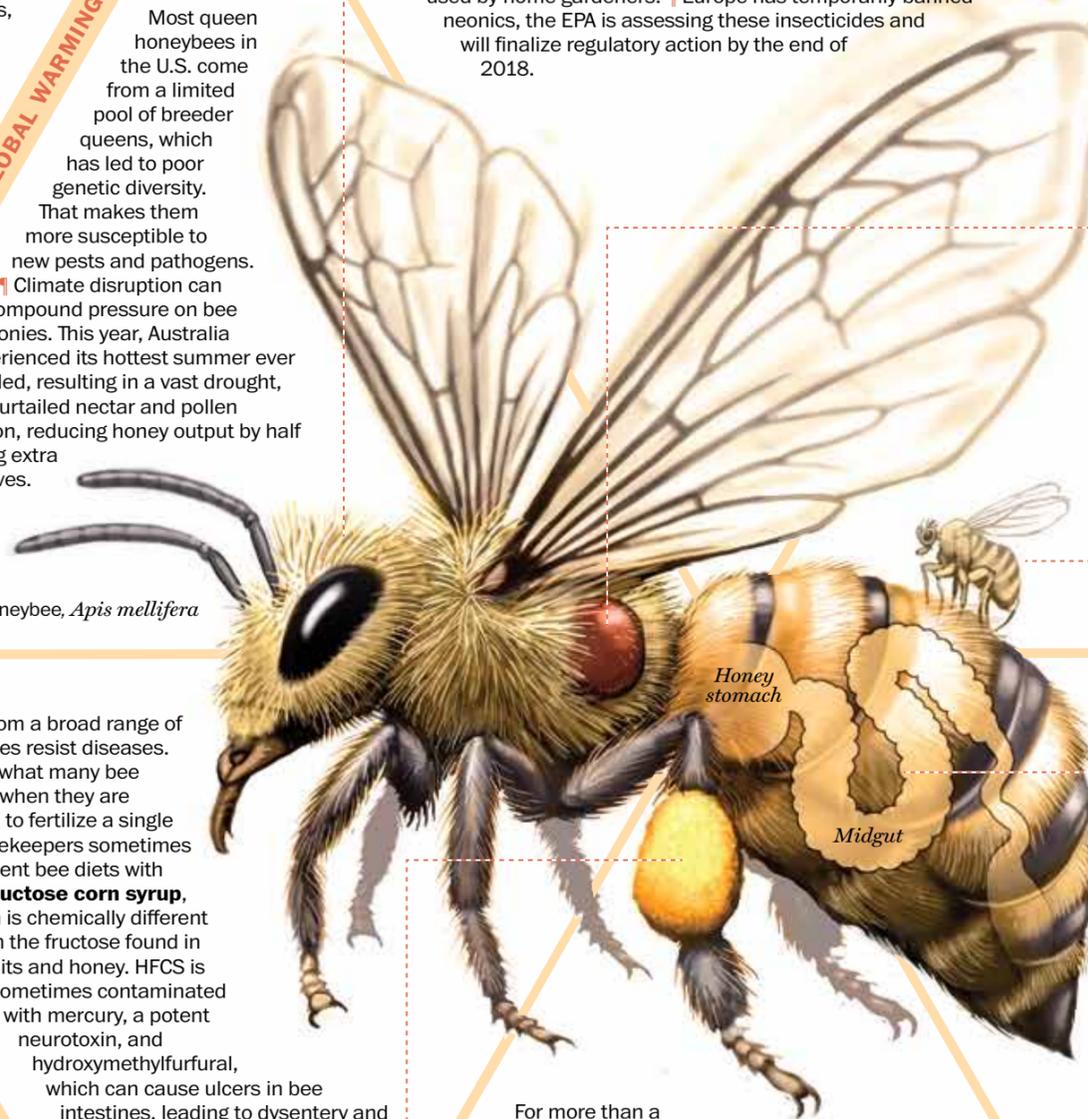
Bees weakened by varroa mites or neonics appear to be more susceptible to a virulent new form of **Nosema**, a single-celled fungus that infects the cells lining the midgut of bees, reducing their ability to digest pollen. Spores are probably spread by bee feces. Infected worker bees abandon the colony, which greatly reduces the ability of the hive to gather food. Some evidence suggests that if bees are also infected with the **invertebrate iridescent virus**, the hive might be at even greater risk of collapsing. Scientists have found a strong correlation between collapsed hives and the presence of **Israeli acute paralysis disease**, a virus that arrived in bees imported to the United States.



*Nosema ceranae* spore

Every year, about one of every three honeybee colonies vanishes.

**PATHOGENS**



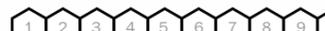
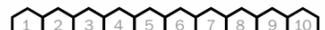
Western honeybee, *Apis mellifera*

A **diverse diet** from a broad range of flowers helps bees resist diseases. But that is not what many bee colonies find when they are transported to fertilize a single crop.

Beekeepers sometimes supplement bee diets with **high fructose corn syrup**, which is chemically different from the fructose found in fruits and honey. HFCS is sometimes contaminated with mercury, a potent neurotoxin, and hydroxymethylfurfural, which can cause ulcers in bee intestines, leading to dysentery and early death. **Pollen**, the sole protein source for bees, has been shown to harbor as many as 46 different pesticides.

For more than a century, beekeepers have used unnaturally large fabricated **honeycomb templates** on which bees build their colonies. Larger comb cells produce bigger bees, but those bees tend to have compromised immune systems and their young bees take slightly longer to develop, which some scientific studies say gives varroa mites more time to infest young bees. A growing number of beekeepers now use smaller, natural-size cells and say that their bees are better able to deal with mites. Some studies back this up, but others say that cell size has no effect on mite infestations.

Natural-size cells are 4.9 mm across.



"Standard-size" cells are 5.4 mm across.

### COMB CELL SIZE

When bees are trucked thousands of miles to pollinate large areas planted in a single crop, they can feed from only one type of flower, which puts them at risk for malnutrition.

**MALNUTRITION**

**Puddles** collect pesticides, dosing bees when they drop by for a drink.



Watermelon flowers need at least eight visits from pollinators before they can develop big, round melons.



## Two ways to help bees

Healthy bees are much better equipped to fight off pests and diseases. How the average person can bolster bees:

- 1 **Plant** a wide variety of bee-friendly flowers, such as bee balm, joe-pye weed, foxglove and red clover; encourage white clover to grow in your lawn.
- 2 **Avoid** using pesticides; eat foods grown without them.

## See a swarm?

Swarming bees may seem scary, but they are actually good news for the bees — even when they gather in a tree outside the Ritz-Carlton in D.C.

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