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This Caterpillar Could Aid in Ridding the World of Plastic Waste

A chance observation by a researcher in Spain could help humans reduce the ecological damage caused by polyethylene-based packaging.

BY JOHN DYER
APRIL 24, 2017
12:00 PM EDT

Five years ago, Federica Bertocchini was cleaning out her beehives at home in Santander in Northern Spain, including sweeping out wax worms — common pests that eat into honeycombs.

Shortly after, the biologist at the Instituto de Biomedicina y Biotecnología de Cantabria noticed that holes were forming in the plastic bags where she had put the squirmy little critters.

In that incident, Bertocchini had unintentionally come upon a discovery that could someday address one of the greatest dilemmas of modern living.

"We have found that the larva of a common insect, Galleria mellonella, is able to biodegrade one of the toughest, most resilient, and most used plastics: polyethylene," said Bertocchini, who published her research on April 24 in *Current Biology* with co-authors Paolo Bombelli and Chris Howe of Cambridge University.

Notably, advancing other recent research that found that some bacteria can break down plastic bottles and meal worms can consume Styrofoam, wax worms can eat plastic bags quickly, the researchers found. Very quickly.

Whereas mealworms eat Styrofoam at a rate of 0.13 milligrams per square centimeter per hour, the wax worms degrade plastic bags at 0.23 milligrams at the same rate, said Bertocchini.

“If you put the worm into the plastic bag, in 20 minutes it comes out,” said Bertocchini. “The timing is just so fast.”

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Wax worms eat beeswax, which like plastic is a polymer — a material composed of many bonded substances. Honeycombs and plastic have similar chemical makeups, too. So it makes sense they would feed on plastic, she added.

Interestingly, the worms produce ethylene glycol as a byproduct when they eat plastic. That’s a primary component of polyester fabrics and antifreeze.

Bertocchini admitted more work was to be done.

They are not sure if the worms produce chemicals in their salivary glands that break down polyethylene or if bacteria in their guts might be doing the work for them. They also aren’t sure of the potential downsides (or industrial uses) of the excess ethylene glycol.

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Eventually the scientists want to isolate the molecule that breaks down plastic, then mass produce it to help eliminate the excess plastic that’s polluting the planet.

Last year, the World Economic Forum found that plastic in the ocean will outweigh fish by 2050 unless humans curbed their wasteful habits.

Woods Hole Oceanographic Institution associated scientist Tracy John Mincer had a mixed reaction to the group’s claims.

“Although this is an amazing natural history story and wonderful academic exercise, it is not a solution for disposing of polyethylene,” he wrote in an e-mail.

Recycled polyethylene can fetch as much as $500 per metric ton, or around 2,200 pounds, noted Mincer. Foregoing recycling was a waste of money, he argued.

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Scientists also needed to do more research to make sure bacteria, mealworms and waxworms weren't still passing out infinitesimal plastic particles that researchers hadn't found on first blush, Mincer added. Those tiny particles could cause other unforeseen problems.

But waiting until the world recycles plastic properly shouldn't delay research into how to degrade the excess stuff that's hanging in tree branches and floating in the waves now, Bertocchini countered.

She envisioned a molecule plucked from a wax worm degrading plastic in a network of clean tech facilities around the world.

"Getting rid of plastic in our landfill sites; a plastic free ocean," she mused. "It would be utopia."

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