Science

# Plastic-eating wax worm 'extremely exciting' for global pollution crisis

Plastic is extremely hard to break down CREDIT: PAUL GROVER

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The global plastic bag pollution crisis could be solved by a waxworm capable of eating through

the material at “uniquely high speeds”, scientists have announced.

Researchers have described the tiny caterpillar’s ability to break down even the toughest plastics as “extremely exciting” and said the discovery could be engineered into an environmentally-friendly solution on an industrial scale.

Around a trillion plastic bags are used around the world each year, of which a huge number find their way into the oceans or are discarded into landfill.

“It’s extremely, extremely exciting because breaking down

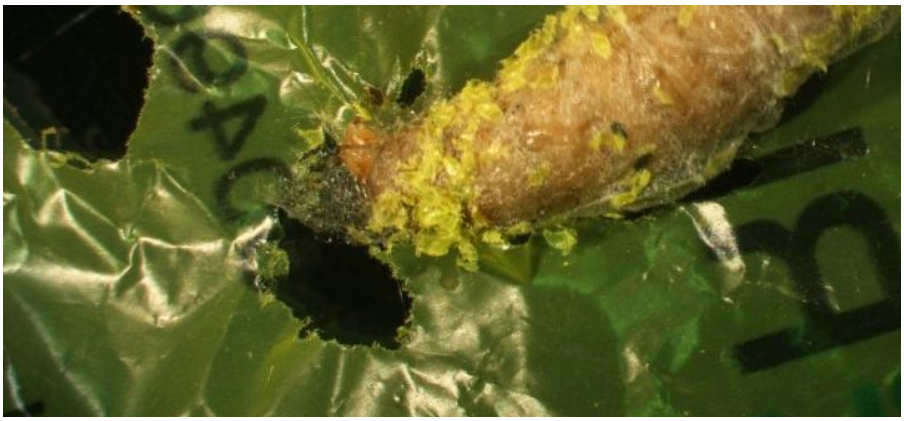
plastic has proved so challenging”

Dr Paolo Bombelli, Cambridge University

Commonly found living in bee hives, or harvested as fishing bait, the waxworm proved it could eat its way through polyethylene, which is notoriously hard to break down, more than 1,400 times faster than other organisms.

Scientists believe the creature has potent enzymes in its saliva or gut which attack plastic’s chemical bonds, in the same way they digest the complex wax found in hives.

The waxworm’s potential was discovered by accident when biologist and amateur beekeeper Federica Bertocchini cleaned out her hives and temporarily placed the parasites in a plastic shopping bag.



The waxworm makes short work of the polyethylene plastic CREDIT: PAOLO BOMBELLI/SWNS

She soon noticed it had become riddled with holes.

To confirm it was not just the caterpillars' chewing mechanism that was degrading the plastic, researchers "mashed up" some of the worms and smeared them on polyethylene bags, which achieved similar results.

"It's extremely, extremely exciting because breaking down plastic has proved so challenging," said Paolo Bombelli from Cambridge University.

"If a single enzyme is responsible for this chemical process, its reproduction on a large scale using

biotechnological methods should be achievable."

He said the most likely scenario was one whereby existing recycling plants could be adapted to biodegrade mass quantities of plastic using the newly discovered enzyme or enzymes.

But he added the enzymes could one day possibly be sprayed directly onto landfill sites or even infused into sea plants in order to degrade plastic already in the environment.

Enzymes in the worms' saliva are thought to be the crucial factorCREDIT: CESAR HERNANDEZ

Polyethlylene is the most common plastic in the world and is primarily

used for plastic bags and packaging.

In tests at Cambridge, 100 waxworms were let loose on plastic bag from a British supermarket, with holes appearing after just 40 minutes.

Over a period of 12 hours, 92mg of plastic had been consumed.

By contrast, previous trials using bacteria had found the microbes could only work through 0.13mg of plastic in 24 hours.

The Cambridge researchers, along with colleagues at the Institute of Biomedicine and Biotechnology of Cantabria (CSIC), used spectroscopic analysis to show the chemical bonds in the plastic were breaking when exposed to the waxworms.

The creatures transformed the polyethylene into an “un-bonded” substance called ethylene glycoll.

Published in the journal Current Biology, the study says it is likely that digesting the beeswax found in hives involves breaking down similar types of chemical bonds.

The beeswax on which the worms grow is composed of a rich diversity of compounds including fats, oils and some hormones.

The plastic was biodegraded by 10 worms in 30 minutes CREDIT: CESAR HERNANDEZ

Dr Bertocchini, who led the research at CSIC , said: “We are planning to implement this finding into a viable way to get rid of plastic waste, working towards a solution to save our oceans, rivers, and all the environment from the unavoidable

consequences of plastic accumulation."

British supermarkets have faced increasing calls in recent months to introduce plastic-free aisles, in a bid to cut down on the amount of plastic exposed to the environment.

The campaign has been spurred by research by the The Ellen MacArthur Foundation which predicts that by 2050 there will be more plastic in the world's oceans by weight than fish.

Dr Bombelli said any initiatives to biodegrade plastic had to come alongside efforts to prevent the use of it in the first place.

The 5p charge which was added to plastic bags in October 2015 has seen use fall by 80 per cent, and the government is currently considering adding a charge of up to 20p to plastic bottles, which can be reclaimed when they are recycled.