| Photo source NTU Singapore

CAN ARTIFICIAL WORM GUTS TACKLE OUR PLASTIC PROBLEM?

SCIENCE

Researchers tested the 'guts' on three types of common plastic waste

Spotted: The world produces around 350 million metric tonnes of plastic waste each year, and this rubbish can take between 20 and 500 years to decompose, breaking down into harmful microplastics in the process. But now, a team of scientists from Nanyang Technological University in Singapore (NTU) has developed an artificial 'worm gut' that could help to break down plastics.

Past research had already shown that *Zophobus atratus* worms, which are larvae commonly sold as nutritious pet food, can exist on a diet of plastic, with bacteria in their gut breaking down common types of the material. However, this takes too long to process plastics in a practical and impactful way.

Inspired by this process but wanting to make it faster, the NTU team isolated the worm's gut bacteria, meaning plastics can be broken down without the need for large-scale worm farms. To do this, the researchers fed groups of worms three different types of common plastics – High-density polyethylene, Polypropylene, and Polystyrene – for 30 days. Then, the team extracted microbiomes from the worms' guts and incubated these bacteria in flasks with nutrients and various plastic waste to create a simulated worm gut that was left to grow for six weeks.

Compared with the control group, flasks with plastic-fed microbiomes showed significant growth in plastic-eating bacteria. The microbial communities were also found to be simpler and more targeted to the plastic in the flask than those found directly in the

plastic-fed worms, meaning the potential to break down plastic more efficiently is much greater.

The team intends to delve deeper into the mechanisms underlying the process, exploring the interactions among different bacteria and their various roles. At the molecular level, the team plans to extend their study to the plastic-degrading genes and enzymes. With this additional information, it's hoped that more novel solutions for plastic bioprocessing will be revealed.

Springwise has spotted similar innovations using microbes and insects to tackle plastic pollution, like using caterpillars to help reduce plastic waste or harnessing microbes to create sustainable products.

Written By: Anam Alam and Matilda Cox

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Email: SCELSE-Enquiries@ntu.edu.sg
Website: ntu.edu.sg
Contact: ntu.edu.sg/contact-us

Takeaway:

Plastics are the largest, most harmful, and persistent contributor to marine litter, accounting for around 85 per cent of marine waste. According to the UN Environment Programme, the world needs three market shifts to tackle plastic pollution: reuse, recycle, and reorient and diversify. In essence, this means drastically reducing plastic generation in the first place, but action will still be required to manage existing plastic waste that isn't getting reused. The artificial worm guts created by NTU researchers could offer a creative and efficient way to tackle our plastic problem, and as the scientists broaden their understanding of the process, the potential for the systems to combat plastic pollution at scale grows too.