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Insects

Baby bugs eat adults' poo for a bacterial boost

Alice Klein

SHORTLY after hatching, young squash bugs go on a mission to find and eat adults' faeces so they can acquire bacteria they need to survive. They are forced to do this because they don't inherit the vital bacteria from their parents.

Squash bugs (*Anasa tristis*) are agricultural pests that commonly attack courgette, also known as zucchini, and pumpkin crops in North and Central America.

The bugs have a symbiotic relationship with *Caballeronia* bacteria, which live in their guts and are crucial for their growth, development and survival.

Other species that require symbiotic bacteria, like stink bugs, get immediate access at birth because their mothers leave bacteria-rich faeces on their eggs.

However, squash bugs aren't left the same inheritance, says Scott Villa at Davidson College in North Carolina. "They basically leave it up to each generation to find it on their own in the environment."

Villa and his colleagues have discovered that newborn squash bugs, also referred to as nymphs, do this by seeking out and feeding on the faeces of adult squash bugs, which are packed with *Caballeronia*.

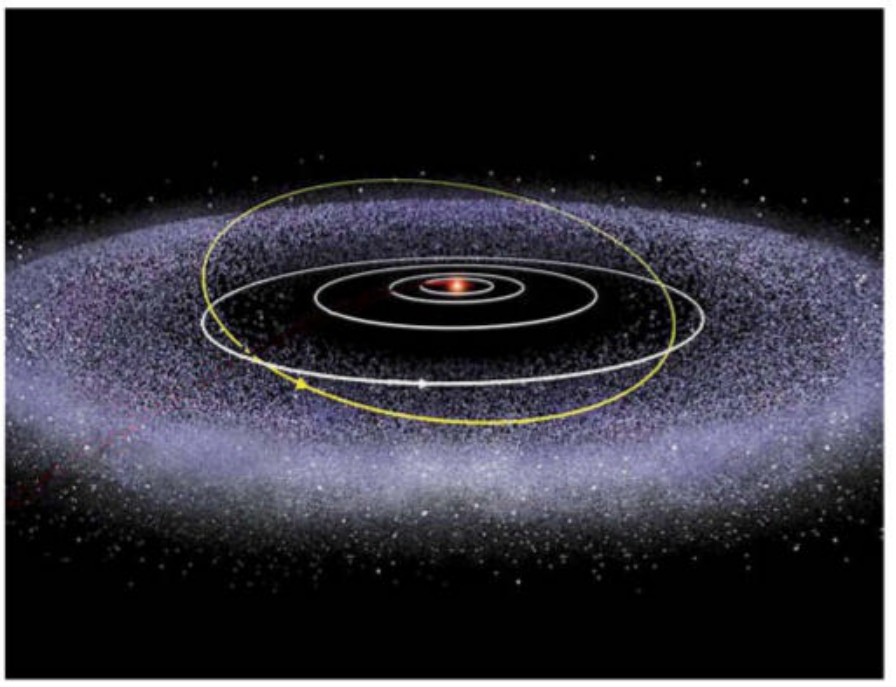
They found that nymphs choose to move towards and eat adult faeces even when provided with ample summer squash to munch on. Only once the nymphs had acquired the *Caballeronia* did they concentrate on eating the squash (*Current Biology*, doi.org/kg2b).

The researchers hope the findings will lead to new strategies for eliminating the pests from crops. "Squash bugs can be a devastating pest, and we now know a key vulnerability in their life cycle," says Villa. If we can somehow break their ability to find their bacteria, we might be able to halt population growth, he says. ▮

Space

Planet the size of Uranus could be hiding in our solar system

Leah Crane



NASA

We know little of what is beyond the doughnut-shaped Kuiper Belt

THE solar system could be hiding an extra planet in its outermost reaches. It is possible that a giant planet lurks in the Oort cloud, which begins hundreds of billions of kilometres beyond dwarf planet Pluto and has typically been considered the domain of comets.

Most multi-planet systems, especially those with giant worlds like our own solar system, undergo what is called a dynamical instability at some point in their lifetime, wherein the planets interact gravitationally and violently swing past one another. Often, this is thought to result in one or more of these worlds being hurled out of the system entirely.

Sean Raymond at the University of Bordeaux in France and his colleagues performed a series of simulations of these instabilities, taking into account the gravity from the galactic environment of the systems.

They found that up to 10 per cent of the exiled planets may actually hang out at the edges of their systems, refusing to be banished altogether. "Unless we don't understand gravity at all, lots of planets should be ejected, and it turns out some of them might not quite be ejected at all," says Raymond.

These planets would follow a strange, elongated orbit, spending most of their time at extraordinary distances from their stars and then plunging briefly inwards.

7%

The probability a world the size of Uranus lurks in the Oort cloud

"Most of the time, it's this frozen ice ball and all you see is stars, and then once in a while one star starts to get brighter and brighter and it gets hotter and hotter and all of a sudden it's roasting," says Raymond. "It would be very dramatic."

The researchers found that given our best models of our solar system's history, the probability of a world like this, about the size of Uranus, in the Oort cloud is about 7 per cent. It is unlikely there would be anything bigger out there, but the probability of a smaller planet is even higher (arXiv, doi.org/gsdn7p).

Unfortunately, confirming the existence of such a world would be tough. Astronomers have already spent a decade looking for a theorised world called Planet 9 or Planet X – which, if it exists, should be about 10 times closer than the nearest possible Oort planet – but without any success because of the huge distances involved.

"I think if you're talking about an Earth-mass planet, it's pretty much impossible that it could ever be observable," says Scott Tremaine at the Institute for Advanced Study in New Jersey. "However, if you're talking about something larger, a Uranus or Neptune, it might be observable with future technology."

Raymond likens such a search to "the hunt for Planet 9, on steroids". If we did find Planet 9, it would rule out the existence of an Oort planet, because each of these possible worlds requires the solar system's major dynamical instability to have happened at a different time.

"This relatively high probability of a currently hidden planet – and one that is completely separate from the theorised Planet 9 – demonstrates how little we know about the furthest reaches of even our own solar system," says Dimitri Veras at the University of Warwick, UK. Such a world would be far closer to us than any of the thousands of exoplanets we have spotted so far – and yet, paradoxically, far harder to find. ▮