

# Are tiny microbes outwitting us to steal our food?

March 31 2014

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It's long been known that microbes are to blame for food going off and becoming rotten but in the late 1970's, Dan Janzen of the University of Pennsylvania, and a winner of ecology's version of the Nobel Prize, suggested that making something rotten may be to the advantage of the microbes living in our food.

Now, Liverpool John Moores University's Dr Dave Wilkinson and his long-time collaborator Tom Sherratt along with two other colleagues, Graeme Ruxton from St Andrews and Martin Schaefer at the University

of Freiburg, Germany, have had another go at working out mathematically how Janzen's idea might work and the results have just been published in the *Proceedings of The Royal Society B*.

Janzen's idea, which he says came to him after accidentally buying a rotten avocado, was that over time [microbes](#) had evolved chemicals especially to make [food](#) disgusting to animals – including humans – to stop us eating food the microbes wanted for themselves!

However, there is a difficulty with this neat idea that Janzen himself spotted, namely that any microbe that didn't make these chemicals would still benefit from chemicals made by other microbes and so over time any system like this would break down as the cheating microbes became more common and eventually all microbes became scroungers that relied on others rather than doing the work of making these chemicals themselves.

In 2006 Dave Wilkinson, of the School of Natural Sciences and Psychology, working with Tom Sherratt and Rod Bain at Carleton University in Canada, had a go at turning Janzen's ideas into mathematics to see if they could find a way round this 'cheating' problem and make his ideas work. However, they couldn't find a way and it looked like Janzen's intriguing idea just didn't describe what happens in the real world.

But this new 2014 study managed to find ways of making the idea work.

As Wilkinson explains: "By comparing the results of our 2006 maths with our 2014 version we can see what the differences are and what they might mean for real microbes.

"It looks like Janzen's idea may be able to work if microbes colonize a food patch, such as a windfall apple or a dead animal, slowly enough that

not all types of microbes can get there in time to use the food. In such a situation our maths suggests that microbes could evolve to produce chemicals that put off many of the animals that might want to eat the food.

"So one of the reasons that food goes off may indeed be that it stops animals eating food that the microbes want for themselves – although other reasons are probably involved too."

Wilkinson adds: "Next time you throw away rotten food consider that you may have just been outwitted by tiny microbes!"

Provided by Liverpool John Moores University

Citation: Are tiny microbes outwitting us to steal our food? (2014, March 31) retrieved 23 April 2024 from <https://phys.org/news/2014-03-tiny-microbes-outwitting-food.html>

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