

What fly guts could reveal about our health

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Fruit flies and gut bacteria in a lab. Credit: University of Sydney/Macquarie University

Increasingly understood to be vital for wellbeing, gut microbiota are the trillion of microorganisms that live in the digestive tract of humans and other animals. Known to affect a range of physiological traits including development, immunity, nutrition and longevity, researchers are now

investigating how manipulating gut microbiota might influence other aspects of health.

Two new studies - from the University of Sydney's multidisciplinary Charles Perkins Centre and School of Life and Environmental Sciences (SOLES) in collaboration with Macquarie University's Department of Biological Sciences - have discovered the [gut microbiota](#) of the common fruit fly has a significant effect on their foraging behaviour and reproductive success, and that its influence can be carried down to the next generation.

Published in the prestigious *Current Biology* today, the study into foraging behaviour manipulated the type and timing of [bacteria](#) individual flies were exposed to, and examined their olfactory-guided preferences to food microbes and nutrients.

In addition to foraging for nutrients to achieve a balanced diet, the researchers found flies also forage for bacteria to populate a healthy gut flora. Responding to smells associated with particular bacteria in foods, the flies showed a distinct preference for more beneficial types of bacteria over less-beneficial types or food lacking the bacteria.

Lead author Dr Adam Wong, who conducted the research while at the University of Sydney and is now based at the University of Florida, said the findings warranted further investigation to determine how other animals interact with [beneficial microbes](#) in foraging.



Fruit flies and gut bacteria in a lab, vertical. Credit: University of Sydney / Macquarie University

"We knew animals foraged for nutrients, in ways that optimise their performance and physiology." he said.

"Understanding they also forage for beneficial microbes opens up a whole new dimension for future research. The symbiotic relationship can shape how animals, including humans, may perceive and prefer different nutrients and microbes for better overall health."

In a separate study, published in *Biology Letters*, researchers inoculated flies with different types of microbes to observe the consequences of changes in the gut bacteria composition of sexually interacting fruit flies.

They found the reproductive investment and success of a mating pair was influenced by gut bacteria, as well as the body mass of offspring.

Lead author Dr Juliano Morimoto, now at Macquarie University, said the findings reveal the effect of gut microbiota on reproduction, but also suggest these effects can be carried over to the next generation.



Fruit flies and gut bacteria with illustration, for *Biology Letters* paper. Credit: University of Sydney / Macquarie University

"Given the importance of the gut microbiota in physiology and health, our findings reveal important and long-lasting effects of gut bacteria on reproduction and offspring traits," he said.

"As understanding of the [gut microbiome](#) and its effect increases, the potential for breakthroughs in understanding broader health impacts increases too."

Professor Stephen Simpson, Academic Director at the Charles Perkins Centre and a co-author on both papers, said the studies provided an exciting illustration of how microbes can influence the behaviour of host

animals, which could be important for understanding gut microbiota and cognitive function in humans in the future.

"With the burgeoning interest in the role of the gut microbiome in health, and cross-talk between the gut and the brain, this demonstration that bacteria in the gut influences foraging and reproductive behaviour is of particular interest for further research," he said.

Dr Fleur Ponton, last author on both studies and based at Macquarie University's Department of Biological Sciences, said the success of this collaboration highlighted the importance of multidisciplinary and inter-institutional research.

"Beyond the biomedical significance of this research, there are potential interesting applications in the context of invasive and pest species control," she added.

More information: *Current Biology* (2017). [DOI: 10.1016/j.cub.2017.07.022](https://doi.org/10.1016/j.cub.2017.07.022)

Provided by University of Sydney

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