Gut bacteria make key amino acids dispensable, expanding food options for invasive flies

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Drosophila sp fly. Credit: Muhammad Mahdi Karim / Wikipedia. GNU Free Documentation License, Version 1.2

Fruit flies fed antibiotics to supress their gut microbiome are forced to avoid the best food patches if they lack vital amino acids, according to a study by Boaz Yuval from The Hebrew University of Jerusalem in Israel and Chang-Ying Nui from Huazhong Agricultural University in China,

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Symbiotic gut bacteria have been found to influence insect metabolism, immunity and reproduction, but the mechanisms underpinning these connections are poorly understood. The researchers observed the response of oriental fruit flies (*Bactrocera dorsalis*) to a laboratory foraging arena. Half of the 60 flies were first fed antibiotic-laced sugar to eliminate their resident gut microbes—which are able to produce nitrogen from non-essential amino acids. The team then starved the flies of protein for 24 hours and then offered them a selection of food droplets of different sizes consisting of sugar, minerals, and either a full complement of 18 amino acids, or just 8 non-essential amino acids, which are a poor source of nitrogen.

They found that flies lacking gut bacteria landed and started feeding faster, spent longer feeding, and consumed more droplets of food than flies that still possessed a normal gut microbiome. Flies with a functioning microbiome chose to feed on larger droplets, regardless of their nutritional composition, whereas flies that had been fed antibiotics were constrained to feeding on droplets containing essential amino acids like arginine and leucine. Oriental fruit flies are highly invasive pests of crops across Asia, capable of attacking over 350 plant species. Understanding how gut bacteria influence the insects' feeding behaviour could help scientists develop improved strategies to control or eradicate them.

The authors add: "Foraging for food is a costly and potentially dangerous activity. Oriental fruit flies that lack nutritionally important bacteria are compelled to invest more time foraging for essential nutrients."

More information: Akami M, Andongma AA, Zhengzhong C, Nan J, Khaeso K, Jurkevitch E, et al. (2019) Intestinal bacteria modulate the foraging behavior of the oriental fruit fly Bactrocera dorsalis (Diptera:

Tephritidae). *PLoS ONE* 14(1): e0210109.
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