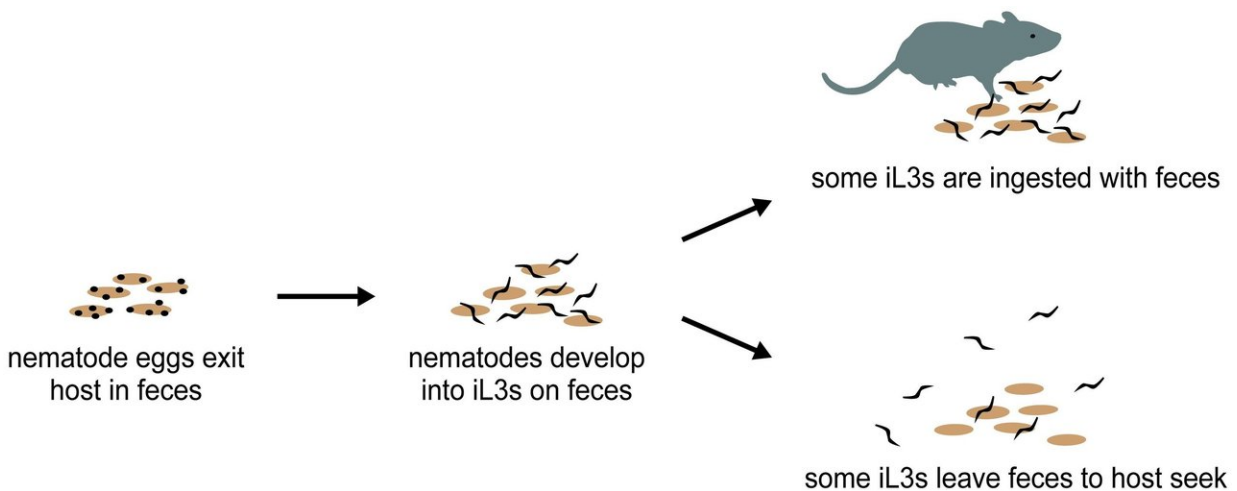


Parasitic worms don't just wait to be swallowed by new hosts

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Model for host-seeking behavior in *H. polygyrus*. Credit: Ruiz F, et al. (2017)

Contrary to widespread assumptions, parasitic nematodes that spread among mice via food may not wait passively to be swallowed. Instead, according to new research published in *PLOS Pathogens*, these tiny worms may use odors from host mice as cues to position themselves where they have a higher chance of being eaten.

Similar species of nematodes can cause severe gastrointestinal distress or death in humans or livestock. Scientists have assumed that because these worms spread through food, they do not actively seek out new hosts. However, in earlier work, Elissa Hallem of the University of California,

Los Angeles, and colleagues found hints of [host-seeking behavior](#) in the ingested ruminant parasite *Haemonchus contortus*.

In the new study, Felicitas Ruiz, Hallem, and their colleagues examined the behaviors of the ingested mouse parasite *Heligmosomoides polygyrus*. First, they observed its movements in the absence of any host cues. They found that this species engaged in the same "cruising" behaviors, such as active crawling, as those used by skin-penetrating parasites that actively navigate towards their hosts.

Then, the team examined how mouse feces influenced *H. polygyrus* movements. They found that the worms were strongly attracted to fresh mouse feces and that worms initially placed on fresh feces migrated away from the feces to navigate their environment. These results suggest that worms excreted by a mouse migrate to new feces that might be eaten by other mice, which are known to eat their droppings.

Further research showed that *H. polygyrus* is strongly attracted to several odorants produced by mammalian skin, feces, or urine. However, whether a worm was attracted to or repulsed by a given odor depended on if it was currently occupying feces or had been removed. This dependency may enable worms on feces to disperse into the environment in search of new hosts, and may encourage off-feces worms to migrate toward a new host or fecal source.

The team also found similar behaviors in the nematode species *H. contortus*, which infects sheep and goats. They found that, when grown on feces, these worms had a neutral response to carbon dioxide, but when cultivated away from feces, they became attracted to the gas. This could encourage the [worms](#) to migrate away from feces and then towards new carbon dioxide-exhaling hosts.

Further work could reveal whether other ingested nematode species that

infect humans and livestock show similar behaviors. If they do, the findings could help guide development of new ways to prevent infection.

"We found that *H. polygyrus* infective larvae do not remain on feces indefinitely, as often assumed, but actually migrate off feces and navigate through their environment," the authors explain. "The larvae then move toward host odors, which we think enables them to position themselves near hosts, where they are likely to be swallowed."

More information: Ruiz F, Castelletto ML, Gang SS, Hallem EA (2017) Experience-dependent olfactory behaviors of the parasitic nematode *Heligmosomoides polygyrus*. *PLoS Pathog* 13(11): e1006709. doi.org/10.1371/journal.ppat.1006709

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