

Strange undertakings: Ant queens bury dead to prevent disease

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Ant queens may bury other queens - a task normally performed by workers - to avoid infection when co-founding a new colony, according to a study published in the open access journal *BMC Evolutionary*

Biology.

Researchers at the Institute of Science and Technology Austria found that in cases where two ant-queens founded a [colony](#) together and one of the queens died before the first workers arrived, the surviving [queen](#) performed "undertaking behaviors" - behaviors directed at dead individuals, such as biting and burying the corpse - possibly to prevent pathogen transmission. The authors found that biting and burial was associated with a seven-fold reduction in the odds of a queen dying.

Christopher Pull, corresponding [author](#) of the study said: "Ant queens usually focus on reproduction and do not engage in any risky or dangerous tasks. That's why we were surprised to find that while ant queens do not avoid founding new colonies with other, sick queens - due mainly to competition for suitable nest sites - they perform undertaking behaviors that may have an impact on their survival. We found that queens that perform these behaviors are actually less likely to contract infections from dead co-founders and are less likely to die compared to those that do not perform undertaking."

Christopher Pull added: "Most previous research on how ant queens fight disease during colony foundation has focused on their immunological responses after infection has occurred. We set out to investigate how queens behave to prevent contracting infections in the first place. Avoiding infection is important for ant queens because they live solely on the breakdown of fat and muscle until their first workers arrive. Having to expend resources on fighting an infection could affect their reproductive success and the success of the overall colony."

Investigating the behavior of queens of the black garden ant - 18% of which co-found colonies, usually in pairs - the authors found that if two queens shared a closed nest with only one chamber and one of them died, 74% of surviving queens would bite the dead queen to dismantle it

and 67% would then bury the pieces. If two co-founding queens shared an open nest with more than one chamber, 78% of surviving queens would remove the dead queen from the nesting chamber, while most of the remaining 22% of queens would bite and bury the corpse.

The authors found that while biting and burial was associated with increased chances of survival, the removal of a dead queen from the nest had no statistically significant effect on mortality. While this may be due to a lack of statistical power because the number of queens not performing the behavior was low, a possible explanation may be that the [ants](#) still interacted with the corpses after removal and subsequently became infected, according to the authors.

To investigate how pathogen exposure may affect an ant queen's choice to co-found colonies and how ant queens might limit disease transmission from infected co-founders, the researchers performed two experiments. In the first experiment, healthy queens could choose to nest alone, with a queen that had been exposed to a fungal pathogen, or with a sham-treated queen (20 ants per study group). The researchers exposed queens to fungal pathogens by pipetting a liquid containing fungal spores to the ants' thoraxes. Sham-exposed ants were treated with a liquid that did not contain [fungal spores](#). The authors found that on average, 65% of queens chose to co-found, and that pathogen exposure did not affect co-founding choice; queens did not avoid co-founding with other, infected queens.

In the second experiment, when a pathogen-exposed queen died, a sham-exposed queen was killed and presented to a surviving queen to test if surviving queens reacted differently to a co-founder that had died from the pathogen and a sham-exposed co-founder. The authors observed no difference: undertaking behaviors were performed towards both.

Christopher Pull said: "This study expands our view about the challenges

facing colony-founding [ant queens](#), and how those challenges shape the evolution of queen behavior, which appears to be far more complex than previously thought. The simplistic view of the founding queen, waiting patiently for her workers to emerge so she can assume the role of egg-producer, is clearly not a comprehensive picture. Understanding how queens achieve behavioral flexibility is a possible avenue for exciting future research."

More information: Co-founding ant queens prevent disease by performing prophylactic undertaking behaviour, Pull and Cremer. *BMC Evolutionary Biology* 2017.

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