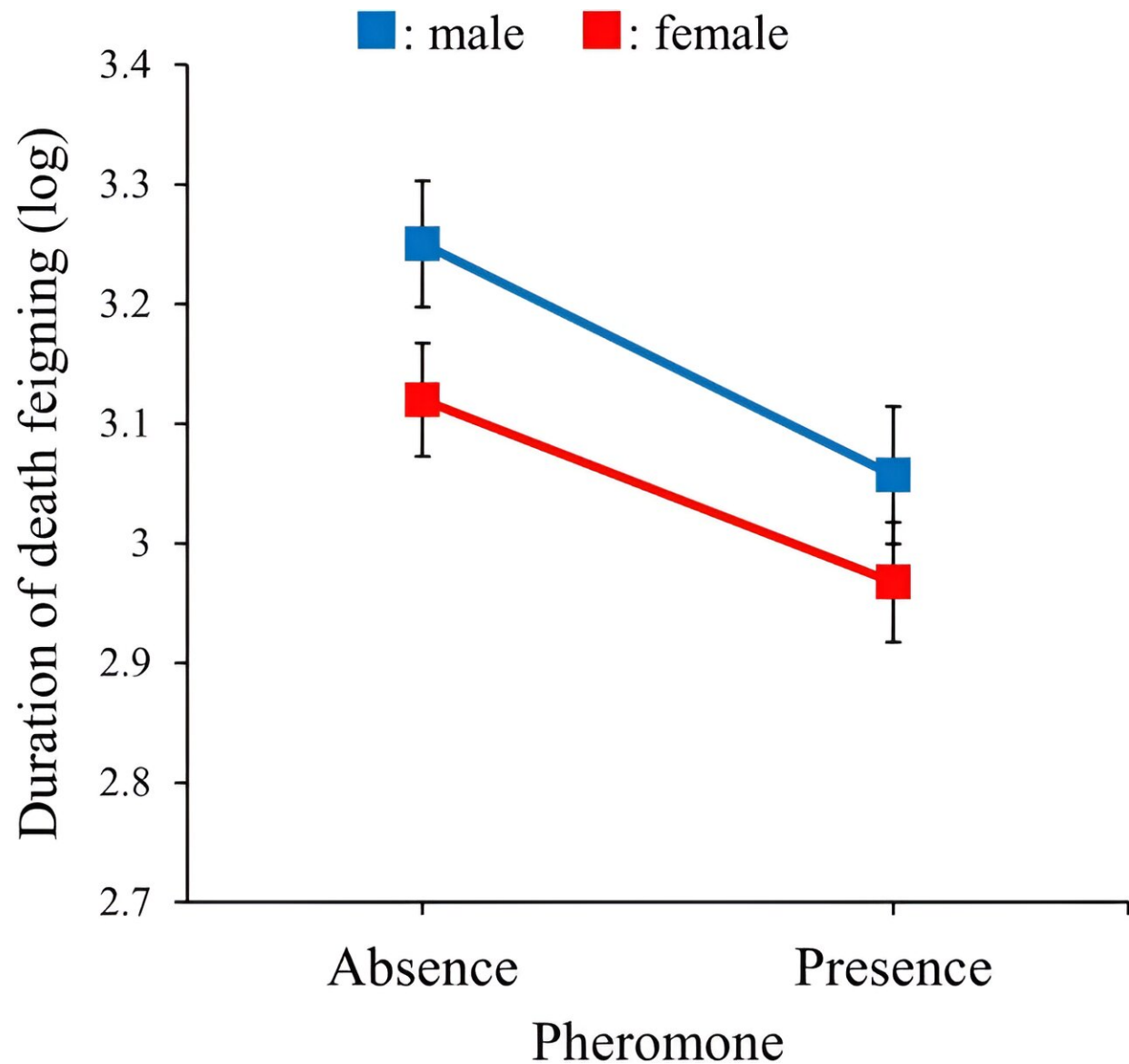


# Pheromones found to influence death feigning behavior in beetles

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The duration of death-feigning in *T. castaneum* shows a decrease in the presence

of DMD. Blue and red symbols represent male and female data, respectively. Error bars depict standard error. Credit: Takahisa Miyatake, Okayama University

Predation is a driving force in the evolution of anti-predator strategies, and death feigning, characterized by immobility in response to threats, is a common defensive mechanism across various animal species. While this behavior can enhance an individual's survival prospects by reducing a predator's interest, it also carries costs, such as limited opportunities for feeding and reproduction.

Recently, researchers from Okayama University, Japan, investigated how pheromones, important chemical signals that affect foraging and reproduction, might influence death-feigning behavior in the [red flour beetle](#), *Tribolium castaneum*.

"Male beetles release an aggregation pheromone called 4,8-dimethyldecanal (DMD), which attracts both males and females, aiding in successful foraging and mating. However, it remained unclear whether this pheromone could affect the duration of death feigning in these beetles," says Professor Takahisa Miyatake from the Graduate School of Environmental, Life, Natural Science and Technology, Okayama University, Japan, who led the study. Prof. Miyatake collaborated with colleagues Motoya Ishikawa and Kentarou Matsumura from the same department on this study.

Their findings were [published in the \*Journal of Ethnology\*](#).

The team used a population of *T. castaneum* that had undergone artificial selection for death-feigning duration for more than 40 generations. The study encompassed two distinct experimental

schedules. In the first, beetles were initially exposed to the pheromone, following which their death-feigning duration was measured.

In the second schedule, beetles were first evaluated for their death-feigning duration without the presence of the pheromone, and subsequently, the duration was measured with the pheromone introduced. In both scenarios, the researchers meticulously compared the death-feigning durations between the treatments.

The team found that *T. castaneum* beetles exposed to the DMD pheromone exhibited significantly shorter durations of death feigning compared to their counterparts that were not exposed to the pheromone. This discovery suggests that the mere presence of the aggregation pheromone played a pivotal role in shaping the behavior of these beetles, causing them to curtail their protracted death feigning.

Interestingly, while previous research has primarily focused on the triggers for initiating death feigning, little has been known so far about what cues awaken individuals from this state. The study suggests that aggregation pheromones, like DMD, may serve as one of these awakening factors. This adaptive response allows individuals to save precious time and increase their chances of survival when predators lose interest.

Furthermore, the study brought to light the potential sex-related differences in death-feigning behavior. Previous studies had already indicated that both male and female adult [red flour beetles](#) exhibit a strong attraction to DMD, with males even intensifying DMD release upon sensing it. Remarkably, during this investigation, researchers noted that males tended to have a longer duration of death feigning when compared to females.

This observation raises intriguing questions about how the sexes allocate

their time and energy, particularly in the context of dispersal and reproductive activities.

"Our study suggests that *T. castaneum* possesses the capacity to adapt its death-feigning duration when it detects the presence of an aggregation [pheromone](#). This represents a remarkable example of behavioral plasticity in response to external chemical cues, as shown by previous studies. This may offer valuable insights into the intricate world of animal instincts, potentially paving the way for further exploration in the future," concludes Prof. Miyatake.

Red flour beetles are known pests. They commonly forage on food products such as flour, grains, cereal, and stored goods. Therefore, studying how they respond to pheromones such as DMD could have enormous agricultural significance.

**More information:** Motoya Ishikawa et al, Aggregation pheromone interrupts death feigning in the red flour beetle *Tribolium castaneum*, *Journal of Ethology* (2023). [DOI: 10.1007/s10164-023-00793-2](https://doi.org/10.1007/s10164-023-00793-2)

Provided by Okayama University

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