

Study provides insight into miscarriages in tsetse flies

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Tsetse egg versus pupa. Credit: Sinead English/University of Bristol

Tsetse are biting flies that transmit the parasites causing sleeping sickness in humans and Nagana in animals. Female tsetse flies, which give birth to enormous, adult-sized live young, can experience miscarriages and these are more likely as they get older.

A new study carried out by researchers from the Universities of Bristol,

Oxford, Notre Dame in the U.S., and the Liverpool School of Tropical Medicine, investigated the causes and consequences of these miscarriages (or spontaneous abortions) in tsetse [flies](#). They asked how abortions affected the size and sex of the next offspring produced, and how factors such as the mother's nutrition affect the frequency of miscarriages.

The scientists found that early-stage abortions are initially prevalent in very young female tsetse flies and then gradually increase as tsetse females reach older ages. They did not find evidence that abortions are adaptive strategies, in other words, [tsetse flies](#) that had abortions did not go on to have larger offspring or more females.

Findings from the study, published in *Physiological Entomology*, could feed into predictive modeling of tsetse population dynamics, which could ultimately help predict the spread of tsetse-borne diseases.

Dr. Sinead English from the University of Bristol's School of Biological Studies said, "There is a lot of interest in how miscarriage risk depends on a mother's age and pregnancy stage, but this is difficult to study in part because we lack detailed data on [miscarriages](#) across animals (including humans). Using the tsetse fly as a model we can get new insights into this pregnancy outcome and can also improve our understanding of this fascinating insect."



Aborted larvae at different stages. Credit: Sinead English/University of Bristol

Lee Haines, Honorary Fellow at LSTM and Associate Professor at the University of Notre Dame, added, "This work brought new meaning to looking for a needle in a haystack. Sifting through tsetse poo in search of prematurely expelled eggs may not sound like a rewarding endeavor, but with the help of a microscope, we discovered these eggs could be reliably counted and their frequency could be linked to the age of tsetse mothers. This is something that is impossible to do in natural tsetse habitats.

"Being able to finally visualize and compare the size difference between an egg and a full-sized pupa was astounding when you realize that egg must develop into a full-term baby in just ten days. Think about that—from baby to full adult in ten days. It's astounding."

This study builds on [previous research](#) measuring how tsetse offspring health is influenced by their mothers' age. It was also presented in the mini-documentary entitled "Burrowing for Knowledge."

More information: Shatha Alqurashi et al, Age-dependent changes in reproductive allocation in a facultative ectoparasite, the blowfly *Lucilia sericata* (Meigen) (Calliphoridae), *Physiological Entomology* (2023).

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