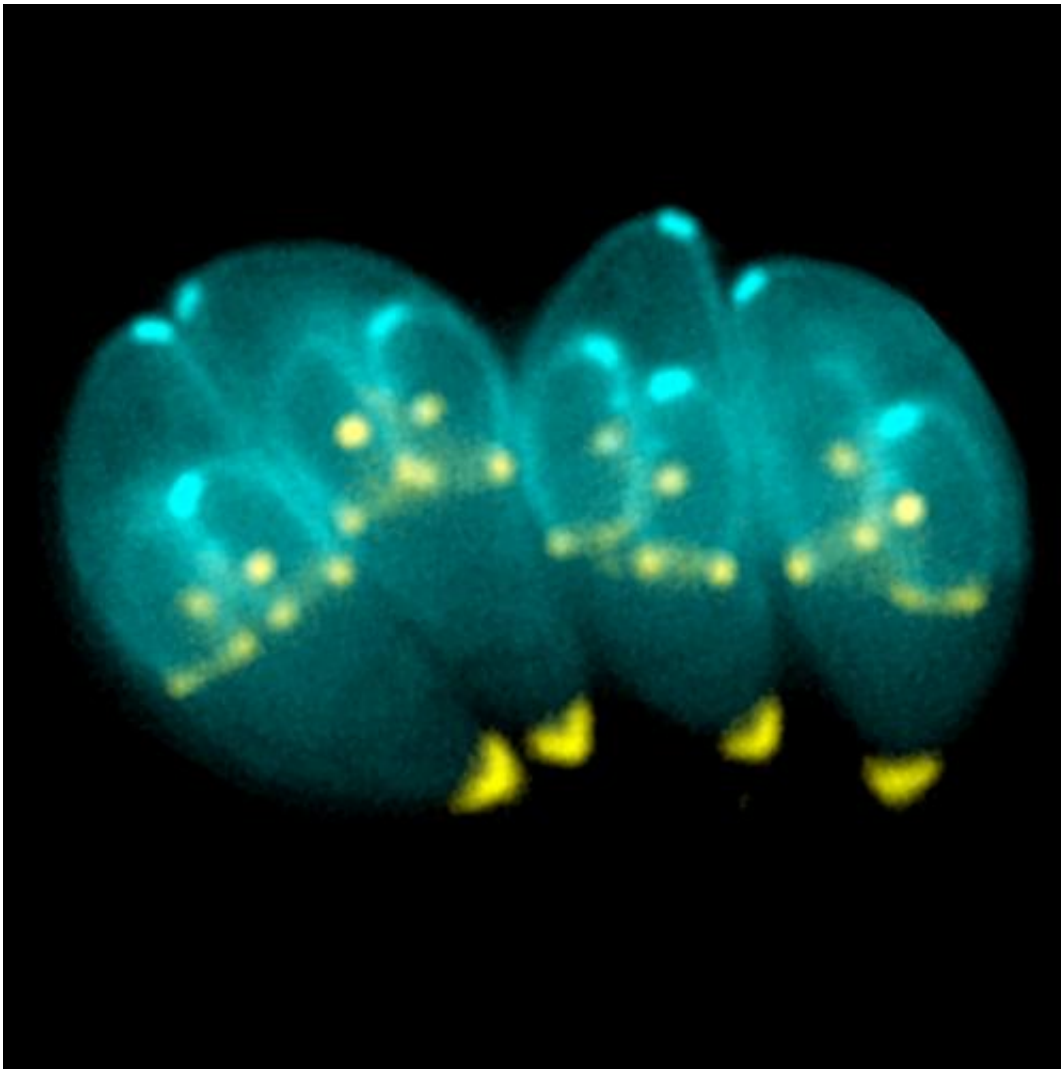


# Parasite needs chemical (lipid/nutrient) in cat intestines for sex

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*Toxoplasma gondii*. Credit: Wikipedia

*Toxoplasma gondii* is a microbial parasite that infect humans and complete its full life cycle only in cats. New research published August 20 in the open-access journal *PLOS Biology* shows why: the sexual phase of the parasite's life cycle requires linoleic acid, a nutrient/lipid found at uniquely high levels in the felines, because cats lack a key enzyme for breaking it down. The finding, from by Bruno Martorelli Di Genova and Laura Knoll of the University of Wisconsin-Madison and colleagues, is likely to help in the development of treatments to reduce spread of the parasite from cats to their human companions. Also, presents an opportunity to avoid using cats for *Toxoplasma* research.

*Toxoplasma* can live asexually in any mammal, including humans. But it forms gametes (sexual cells) only in [cats](#), a restriction that has long been recognized, but whose reason was not understood. The authors suspected something was missing when reproducing the infections in vitro and not observing sexual development. It is known that fungi require [linoleic acid](#) for sexual development. To test *Toxoplasma*'s requirement for the same lipid, they generated cat intestinal organoids—three-dimensional "[test tube](#)" models that share several essential properties with actual intestines—and showed that linoleic acid was required for sexual reproduction of the parasite. Cats lack an enzyme called delta-6-desaturase, which catalyzes the conversion of linoleic acid to arachidonic acid, accounting for the peculiarly high levels of linoleic acid in the cat intestine, but not in other mammals. When the authors supplemented the diet of mice with linoleic acid, and added a specific inhibitor of the enzyme, *Toxoplasma* could complete the sexual phase of its [life cycle](#) in the mouse intestine.

*Toxoplasma* is the leading cause of foodborne illness in the US, according to CDC. The most common route of infection for human is by consumption of contaminated raw or undercooked meat. Cat litter, after 24-48 of being cleaned, can also a source of *Toxoplasma* infection. However, cats can only shed oocysts once in their life time. Pregnant

women are urged to avoid eating raw or undercooked meat, as also avoiding cleaning the litterbox after 48 hours, to prevent *Toxoplasma* infection. Congenital toxoplasmosis can have potentially serious consequences for the unborn child. An improved understanding of the parasite life cycle stemming from this study may lead to production of vaccines that could inhibit *Toxoplasma*'s sexual reproduction or the transmission of *Toxoplasma* to livestock.

**More information:** Bruno Martorelli Di Genova et al, Intestinal delta-6-desaturase activity determines host range for *Toxoplasma* sexual reproduction, *PLOS Biology* (2019). [DOI: 10.1371/journal.pbio.3000364](https://doi.org/10.1371/journal.pbio.3000364)

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