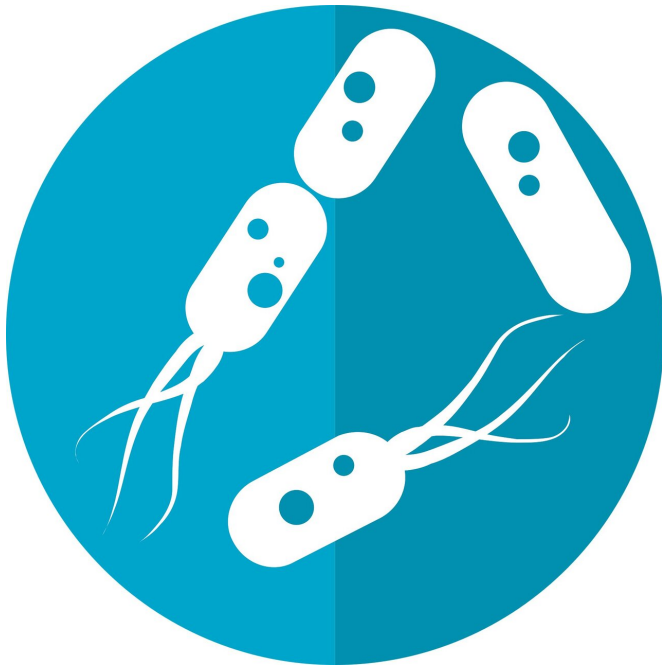


What we're learning about the reproductive microbiome

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Most research has focused on the oral, skin, and gut microbiomes, but bacteria, viruses, and fungi living within our reproductive systems may also affect sperm quality, fertilization, embryo implantation, and other aspects of conception and reproduction. Yet, according to a review published January 14 in the journal *Trends in Ecology & Evolution*, little is known about the reproductive microbiome.

What we do know is that there are examples of microbes affecting [sexual health](#) and fertility across the animal kingdom, and that these impacts seem to have important consequences for reproductive biology and behavior.

- In human men, certain species of bacteria are associated with higher- or lower-quality [sperm](#) samples, while higher quantities of

bacteria are more prevalent in semen samples from infertile than fertile men.

- A study of primates showed that vaginal microbiomes are more diverse in species in which females have more than one sexual partner. Similar findings have been reported in deer mice and in common lizards.
- Male mallards with more colorful bills produce semen better able to kill bacteria, leading researchers to speculate that female mallards sometimes choose partners with more colorful bills to reduce the risk of STDs, minimize disruption to their own microbiome, and ensure they receive high quality sperm.
- Male bedbugs inseminate a female by piercing her abdomen. Recent work indicates that females, which can die from infections caused by microbes on the male copulatory organ, ramp up their immunological defenses ahead of mating.
- In black garden ants, the testes of virgin males appear to favor microbial growth while the sperm-storage organs of virgin females strongly inhibit microbial growth.
- Male red junglefowl, a wild ancestor of the domestic chicken, produce more proteins with antimicrobial effects in their ejaculate over successive matings—possibly to better protect dwindling numbers of sperm.

"Reproductive microbiomes can have significant effects on the reproductive function and performance of both males and females," says senior author Tommaso Pizzari, a zoologist at the University of Oxford. "These studies also shed light on the role of the reproductive microbiome in sexual selection, mating system, and sexual conflict."

While research has begun to link alterations in the vaginal microbiome to adverse pregnancy outcomes in humans, it's unclear how the male reproductive microbiome affects fertility and

reproductive success, says first author Melissa Rowe (@melissah_rowe), an evolutionary ecologist who studies reproductive biology and behavior at the Netherlands Institute of Ecology.

"This is surprising, because research has shown that bacteria can damage sperm form and function, and that damaged sperm can contribute to pregnancy failure" Rowe says.

Many major questions remain. Rowe and Pizzari are intrigued by how some microbes benefit one sex or species while harming another. For example, *Lactobacillus*—associated with a healthy vaginal [microbiome](#) in women and high-quality semen in men—seems to negatively affect sperm-swimming speed in chickens. But the authors say that the combination of sequencing advances, genomic resources, and investigations of host sexual behavior will likely lead to more discoveries soon.

More information: *Trends in Ecology & Evolution*, Rowe et al.: "The Reproductive Microbiome: An Emerging Driver of Sexual Selection, Sexual Conflict, Mating Systems, and Reproductive Isolation"

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