A new role is hatched for female fruit flies

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A team of New York University biologists has uncovered a previously unknown role for a set of cells within the female reproductive tract of fruit flies that affects the functioning of sperm and hence fertility. Their discovery, which is published November 8 in the online, open-access journal *PloS Biology*, adds to our understanding of how insects reproduce and may provide a means to manipulate reproductive behaviour in other insects.

The researchers studied spermathecal secretory cells (SSCs)—a set of cells in the female reproductive tract whose existence had previously been determined but whose function was unknown.

To explore the role of SSCs, the NYU researchers studied female *Drosophila melanogaster*, a fruit fly. Fruit flies have a rapid developmental time, allowing biologists to examine genetic and physical changes over a relatively short period. In addition, many of the genetic processes identified in flies are conserved in humans. Earlier pioneering fly research has led to many of the key discoveries of the molecular mechanisms underlying developmental processes in complex animals.

In order to isolate the role SSCs play, the researchers used a genetic technique to specifically eliminate SSCs in a sample of flies and monitored how their reproductive process was affected. The results indicated that SSCs have two fundamental roles in the reproductive process: they are necessary for moving fertlized eggs through the reproductive tract, and they assist in storing sperm.

Normal female fruit flies store sperm in two different organs—the seminal receptacle and two mushroom-shaped spermathecae. However, in flies lacking SSCs, sperm never reached the spermathecae, and those that reached the seminal receptacle subsequently lost their motility—that is, they stopped swimming. Without SSCs, the fly loses its ability to move fertilized eggs through the reproductive tract and as a result will hatch eggs internally—in utero—rather than outside the body. This may suggest that ovoviviparity—the ability to give birth to live young—can evolve more easily than previously thought.

"We are excited to see whether our findings apply to insects that are important to human health or agriculture," said Mark Siegal, the study's senior author and a professor of biology at NYU. "For instance, future work could explore boosting the reproduction of honeybees or, conversely, curbing this same process in disease-transmitting insects such as mosquitoes."

More information: Schnakenberg SL, Matias WR, Siegal ML (2011) Sperm-Storage Defects and Live Birth in Drosophila Females Lacking Spermathecal Secretory Cells. PLoS Biol 9(11): e1001192. doi:10.1371/journal.pbio.1001192