# Can seminal fluid proteins be honest signals of sperm availability?

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**Résumé**

Seminal fluid proteins (Sfps) are produced by males yet, they have significant effects on female physiology and behaviour. Despite many studies identifying their varied effects and their molecular underpinnings, the ways males and females use Sfps remain unclear. For a long time, Sfps have been viewed as a mechanism for males to manipulate female reproductive behaviours to their own benefit, thereby, potentially leading to sexual conflicts. I will present how we explored the possibility that females may use Sfps as molecular signals to measure the quantity of sperm they are storing. Using a biologically informed mathematical model based on the extensive literature from *Drosophila melanogaster*, we studied how Sfps can provide information about sperm storage and allow female to adjust her reproductive effort. In *D. melanogaster*, the sex peptide (SP, Acp70A) impacts egg production, oviposition, sperm usage and remating. By binding to sperm and continuously detaching, SP can influence females for days after mating. In contrast, ovulin (Acp26Aa), is a free peptide with only short-term effects on ovulation. I will show how absence of signals can lead to a trade-off between egg production, speed of reproduction and egg wastage, which constrain fitness to reach its maximal potential in both sexes. Then, I will show how Sfps could provide information that alleviates the constraints observed in the absence of signals and that allows for synchronization of sperm and egg release. We propose that exhaustion of SP may be the key signal to down-regulate egg production that allows to reduce egg wastage by the female. Finally, I will discuss how, although sexual conflict over the function of Sfps is generally limited, it may arise in the context of multiple matings.

**Mots-Clés:** seminal fluid proteins, sex peptide, reproduction, trade, offs, mating signals

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