The chemistry of sex games: why do male crickets transfer large amounts of dopamine to females during copulation?

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Dopamine is an important biological molecule that plays a critical role in how behaviors are “punished” or “rewarded”. And while dopamine has been studied with regard to a wide range of behaviors, including memory, diet and addiction, it has not been found previously to be transferred from one individual to another during copulation. However, the ejaculates of male ground crickets (*Allonemobius socius*) can contain up to 100pg of dopamine, which is roughly 10X the normal physiological dose required to modify behavior in insects. So, the question is, why are male crickets transferring so much dopamine to females during sex? There are several alternative hypotheses, derived from sexual selection and sexual conflict theory, which may explain the function of dopamine as an agent of sexual reward or punishment, respectively. Our preliminary data suggest that dopamine acts as a punishment, whereby the greater the amount of dopamine transferred to the female, the longer it takes for the female to re-mate. As a consequence, females receiving larger doses of dopamine are likely forced to store and utilize more of that male’s sperm relative to a female who receives smaller amounts of dopamine. This “punishment” effect is particularly strong when a female re-mates with a different male. While further experiments are needed to clarify the role of dopamine in the chemistry of cricket sex, our data suggest that sexual conflict over mating rates may be driving the evolution of dopamine usage as a sexual punishment in this system.

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Presentations given based on this research

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Larry Rodriquez and J.L. Marshall. 2014. The role of dopamine in sex games. Oral presentation, **Ecological Genomics Research Forum**. Manhattan, KS.

Larry Rodriquez and J.L. Marshall. 2014. The role of dopamine in sex games. Poster, **14th Annual Developing Scholars Symposium**. KSU.

Larry Rodriguez and J.L. Marshall. 2013. The chemistry of sex games: why do males transfer large amounts of dopamine to females during copulation? Poster, **Ecological Genomics Symposium**. Kansas City, KS.

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