Cricket fertility found to improve with age

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Prof Simmons says there are few studies into the importance of seminal fluid proteins in male competitive fertility. Credit: Arthur Chapman

UWA scientists researching the seminal fluid of field crickets (teleogryllus oceanicus) are a step closer to knowing why the insect's competitive fertilisation success increases with age.

The findings could lead to a better understanding of the importance of seminal fluid (semen) and the viability of sperm in other species including humans.

The study by the School of Animal Biology's Centre for Evolutionary Biology determined ontogenetic changes in the seminal fluid chemistry of crickets by looking at protein abundance and gene expression.

Study lead author UWA Winthrop Professor Leigh Simmons says by using quantitative proteomics, the analysis of a sample of proteins to determine their differences, they found 11 proteins that changed in abundance as the cricket aged which may increase its competitive fertility success.

He says the analyses of gene expression of the proteins confirmed the changes in abundance were associated with age.

"There are a number of things we knew about sperm viability in these crickets, firstly that it increases with age, so older males have ejaculates of better quality and we also know that older males have a better competitive fertilisation success," he says.

"We were looking for changes in seminal fluid chemistry as males aged in order to identify proteins that might be important in male competitive fertility.

"After our proteomics work revealed 21 different seminal fluid proteins we wanted to try and narrow down our search for proteins that affect the viability of sperm.

They were able to eliminate 10 proteins and honed in on 11 proteins that changed with age.

"Some of the proteins we found in the crickets were similar proteins based on their amino acid sequence to those found in other animals which had been shown to have effects on female reproductive physiology or effects on male fertility," he says.

Prof Simmons is now trying targeted RNA interference knockdown to stop the expression of the genes they know encode the proteins to find the proteins that are important in sperm viability.

He says there are few studies into the importance of seminal fluid proteins in male competitive fertility.

"Human seminal fluids are known to have hundreds of proteins but we have absolutely no idea of what the functions of many of those proteins are," he says.

"It might be that there's abnormalities in the composition of seminal fluid that's affecting whether or not a male is fertile.

"If we discover what those proteins are and what they do then that could lead to a more effective understanding of what male fertility is."

More information: "Ontogenetic changes in seminal fluid gene expression and the protein composition of cricket seminal fluid." Simmons LW, Beveridge M, Li L, Tan YF, Millar AH. *Evol Dev.* 2014 Mar;16(2):101-9. DOI: 10.1111/ede.12068.

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