Sexual selection in the sea

June 4 2013

The species can grow up to four centimeters in length and are found around the Spencer Gulf in Southern Australia, with healthy populations in Port Phillip Bay. Credit: Benjamin Wegener, Monash University

Biologists have uncovered new insights into how the male sexual behaviour of the peculiar southern bottletail squid is primed to produce the greatest number of offspring.

Recent studies published in the journals *Biology Letters* and *Behavioral Ecology*, have revealed the female squid ingest the ejaculates of their

mates, a trait never before associated with any species of cephalopod – a group including squid, octopus, cuttlefish and nautilus.

The studies, led by PhD student Benjamin Wegener and Dr Bob Wong from Monash University's School of Biological Sciences, in collaboration with researchers at Melbourne University and Museum Victoria, revealed females used the nutrients from this consumption to aid in the growth of her unfertilized eggs.

This appeared to have implications for how males invest in mating opportunities, particularly as smaller females were found to ingest more of the male's ejaculate than larger females.

Mr Wegener said this could explain why males preferred to mate with larger females in an attempt to minimise ejaculate consumption and better their chances for egg fertilization.

"These squid live for just a year and have only a single breeding season before they die, so it's not surprising that the males can be highly strategic when evaluating potential mates," Mr Wegener said.

"The findings suggest that males who copulate with smaller females could pay a higher price for their ejaculate expenditure."

Both sexes mate from an early stage with females storing sperm from males in an external pouch below their mouth. The male passes sperm packages into the pouch where they are stored for later egg fertilization.

"A male's sperm packages, called spermatophores, take time to produce and he must pass several to the female if he hopes to fertilize her eggs. If she is using the nutrients received from ejaculate consumption to develop her unfertilized eggs, he may even be helping the next male that mates with her"." Mr Wegener said.

"By targeting those larger females less likely to consume their spermatophores, male southern bottletail squid attempt to maximise their chances for egg fertilization."

The studies also found the males were more likely to successfully transfer spermatophores to females already carrying eggs.

"Interestingly, sperm storage appears to last only about three weeks in this species. If females do not lay eggs within this timeframe, they still gain the nutrients from males through spermatophore consumption," Mr Wegener said.

In comparison, males seem to draw the short straw, losing their investments without fertilizing a single egg."

Mr Wegener said science has shown that the ejaculate is a vital adaptation for most sexually reproducing species.

"If a male produces an ejaculate that isn't able to successfully compete in the egg fertilization race, he is essentially an evolutionary dead end," Mr Wegener said.

"Our research has shown how sexual selection, common to all sexually reproducing species, is capable of shaping a species' reproductive strategies in some of the most unexpected ways.

"But it also raises more questions yet to be explored - are females using males as a food source or as a means to assess the quality of her partners? Are males even capable of using this feeding behaviour to manipulate female reproduction? Hopefully future discoveries will uncover the answers."

The species can grow up to 4 centimetres in length and are found around

the Spencer Gulf in Southern Australia, with healthy populations in Port Phillip Bay.

Provided by Monash University