Why sex with a partner is better (w/ Video)

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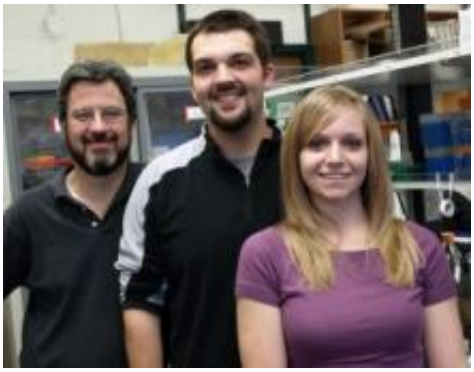

(PhysOrg.com) -- OK, it takes two for human reproduction, and now it seems that plants and animals that can rely on either a partner or go alone by self-fertilization give their offspring a better chance for longer lives when they opt for a mate.

That's the conclusion gleaned from more than 100 mini-evolution experiments involving nematode worms (Caenorhabditis elegans) at the University of Oregon. Reporting online Oct. 21 in advance of regular publication in the journal *Nature*, the UO team found that going it alone increases susceptibility to genetic mutations and reduces that adaptability to changing environments.

Sex with self in the animal and plant world is known as selfing. Offspring born from selfing share all of their genes in common with

their parent, and each is capable of producing another generation of offspring. Offspring from outcrossing share 50-percent of each parent's genes, and some are born males incapable of bearing offspring.

Selfing populations don't have to deal with pesky males for reproduction. Because males do not produce offspring of their own, selfing populations avoid what biologists call "the evolutionary cost of males," which allows them to increase in size at twice the rate of out-crossing populations. In fact, says UO biology professor Patrick C. Phillips, "biologists going all the way back to Charles Darwin have been puzzled why sexual reproduction via outcrossing exists at all."

Patrick turned to two of his students in the UO Center for Ecology and Evolutionary Biology, which he heads, to explore what good comes from these worms having partners.

Graduate student Levi T. Morran and Michelle D. Parmenter, an undergraduate student from Eugene, conducted more than 100 trials in which populations of nematodes -- also known as roundworms -- were adapted to new environments, including to the presence of a bacterial pathogen that eats the worms from the inside out. The students, under Patrick's guidance, genetically engineered the worms, which normally practice a combination of both selfing and outcrossing, to reproduce either just by selfing or just by outcrossing. They tracked the evolution of 60 different populations for 50 generations under different combinations of mutation, mating system and genetic background.

They found that purely selfing populations were much more susceptible to accumulating harmful mutations and were not able adapt to rapidly changing environments. Traditional thinking has suggested that selfing populations are able to purge many of these mutations, but this study found that the ability to sufficiently purge was overwhelmed by slight

increases in mutation rates. That, in turn, threatens the long-term survival of selfing roundworms.

"The inability of selfing populations to adapt to changing environmental conditions helps to explain the observation that selfing populations are much more likely to go extinct than outcrossing populations," said Morran, who was the study's lead author.

While males may be problematic for a wide variety of reasons, from an evolutionary point of view, their benefits outweigh their costs, which helps to explain why having sex with others is the rule rather than the exception within natural populations, Phillips said.

"Many scientists have argued that outcrossing has evolved to avoid the genetic consequences of inbreeding, while others have emphasized the role that outcrossing plays in generating the genetic variation necessary for evolutionary change," he added. "Our work shows that both of these factors are important."

Source: University of Oregon (news : web)