Study finds role for parasites in evolution of sex

July 6 2009

What's so great about sex? From an evolutionary perspective, the answer is not as obvious as one might think. An article published in the July issue of the *American Naturalist* suggests that sex may have evolved in part as a defense against parasites.

Despite its central role in biology, sex is a bit of an evolutionary mystery. Reproducing without sex—like microbes, some plants and even a few reptiles—would seem like a better way to go. Every individual in an asexual species has the ability to reproduce on its own. But in sexual species, two individuals have to combine in order to reproduce one offspring. That gives each generation of asexuals twice the reproductive capacity of sexuals. Why then is sex the dominant strategy when the do-it-yourself approach is so much more efficient?

One hypothesis is that parasites keep asexual organisms from getting too plentiful. When an asexual creature reproduces, it makes clones--exact genetic copies of itself. Since each clone has the same genes, each has the same genetic vulnerabilities to parasites. If a parasite emerges that can exploit those vulnerabilities, it can wipe out the whole population. On the other hand, sexual offspring are genetically unique, often with different parasite vulnerabilities. So a parasite that can destroy some can't necessarily destroy all. That, in theory, should help sexual populations maintain stability, while asexual populations face extinction at the hands of parasites.

The scenario works on mathematical models, but there have been few

attempts to see if it holds in nature.

Enter *Potamopyrgus antipodarum*, a snail common in fresh water lakes in New Zealand. What makes these snails interesting is that there are sexual and asexual versions. They provide scientists with an opportunity to compare the two versions side-by-side in nature.

Jukka Jokela of the Swiss Federal Institute of Aquatic Science and Technology, Mark Dybdahl of the University of Washington and Curtis Lively of Indian University, Bloomington began observing several populations of these snails for ten years starting in 1994. They monitored the number of sexuals, the number asexuals, and the rates of parasite infection for both.

The team found that clones that were plentiful at the beginning of the study became more susceptible to parasites over time. As parasite infections increased, the once plentiful clones dwindled dramatically in number. Some clonal types disappeared entirely. Meanwhile, sexual snail populations remained much more stable over time. This, the authors say, is exactly the pattern predicted by the parasite hypothesis.

"The rise and fall of these female-only lineages was surprisingly fast and consistent with the prediction of the parasite hypothesis for sex," Jokela said. "These results suggest that sexual reproduction provides an evolutionary advantage in parasite rich environments."

So we may well have to thank parasites—in spite of their nasty reputation—for the joy of sex.

Source: University of Chicago (news : web)