Sexual reproduction can increase genetic variation but reduce species diversity

March 8 2012

The role of sex in driving genetic variation and generating higher biodiversity has been debated for over a century. Speeding up evolution may increase genetic variation, but surprisingly it can reduce species diversity, according to a study led by Carlos J. Melian from Eawag – Swiss Federal Institute of Aquatic Science and Technology, Switzerland.

"The most intuitive connection," says Dr. Melian, "is that if sex increases genetic variation and speeds up evolution, then ecosystems will have a higher number of species that reproduce sexually. However, the connection between high reproductive speed and a higher number of species is a big jump, because little work has been done on the impact of sex on biodiversity."

To explore the impact of sex on biodiversity, the researchers developed new theoretical models, based on ecological and evolutionary dynamics, to connect the mode of reproduction – whether sexual or asexual – to the origin of species and resulting biodiversity. They found that an increased genetic variation and the rate of generation of new species had little effect on general biodiversity.

The paradox is attributed to extinction, which is higher in sexual populations than in asexual ones, due to the lower population size of new species that sexually reproduce. This results in more frequent extinction of those new species, so the researchers conclude that a high evolutionary rate and high genetic variation may not be required to yield a large number of species in natural ecosystems.

More information: Melian CJ, Alonso D, Allesina S, Condit RS, Etienne RS (2012) Does Sex Speed Up Evolutionary Rate and Increase Biodiversity? *PLoS Comput Biol* 8(3): e1002414. doi:10.1371/journal.pcbi.1002414