

Being unique has advantages: 'Rareness' key to some insects being favored by evolution

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As the saying goes- blondes have more fun, but in the world of insects it may actually be the rare 'redheads' that have the last laugh..., at least in terms of evolution.

A new study at the University of Melbourne has discovered that genetic variation in an asexual insect – insects that reproduce by cloning themselves – is maintained by rare clones being chosen for the next generation, a phenomenon known as frequency-dependent selection.

In the study conducted by Dr Andrew Weeks and Prof Ary Hoffmann from the University of Melbourne, the reproduction of a major agricultural pest, the blue oat mite (*Penthaleus major*) was examined.

"We found that although the mites reproduce asexually, essentially by cloning themselves, some genetic differences were occurring via mutation. These new variants or clones, which start off rare, become common because they are favoured by natural selection" says Dr Weeks, from the Centre for Environmental Stress and Adaptation Research (CESAR) in the Department of Genetics at the University of Melbourne.

"Essentially, the rarer you are, the more offspring you will leave in the next generation".

To determine how clones were being selected, they set up a series of enclosed plots in several pasture sites in Victoria. They then introduced unique clones of the mites in varying frequencies into the enclosures.

The clones that were initially rare became common in the next generation, while the common clones produced fewer offspring.

"This can be a cycling process, where the common clones become rare and then they are at an advantage and become common again" says Dr Weeks.

"Our study has revealed new insights into the ability for asexual organisms to maintain genetic variation" says Prof Hoffmann from CESAR, based at the Bio21 institute. "These mites are problematic for farmers to control and this mechanism means that the species can evolve to counter control measures like the application of chemicals or the introduction of predators."

"Controlling pests is like an arms race between us and the pests – normally we don't expect asexuals to do well in this race, but in this case the asexuals might even win out".

The study is published in the current issue of *Proceedings of the National Academy of Sciences of the United States of America (PNAS)*.

Source: University of Melbourne

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