Clones on task serve greater good, evolutionary study shows

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"Don't ever change" isn't just a romantic platitude. It's a solid evolutionary strategy. At least if you're among the creatures that produce scads of genetically identical offspring – like microbes, plants or water fleas. These creatures provide a chance to wonder about the clones raised in near-identical environments that turn out differently than their kin.

In this week's *Proceedings of the National Academy of Sciences*, a Michigan State University zoologist joins others in reporting how the greater good of a genetic pool of identical organisms is affected when a few individuals break from the developmental pack.

Ian Dworkin, an assistant professor of zoology, worked with a on the paper "Genetics of Microenvironmental Canalization in Arabidopsis Thaliana" the group tackled the question of canalization -- a measure of the ability of a genotype to produce the same traits regardless of variability of its environment.

As Dworkin puts it, "Canalization is the robustness, because in many cases it's better to just shake off the minor fluctuations in the environment because in evolution, there are optimal traits to have, a place you want to be. Canalization prevents you from the minor screw ups along the way – eating wrong, getting too much sun. It keeps you in the zone."

The group studied different cloned offspring of the Arabadopsis, a plant

of the mustard family commonly used to test genetic questions. Arabadopsis can have many offspring that are genetically identical. Yet, just like human twins, these identical plants still have subtle individual differences. The question: Does an individual jumping on an extra bit of sunshine or rain shower to grow taller affect the group's overall reproductive health" Dworkin paints a hypothetical family tale of two Arabadopsis families.

All the offspring of plant "A" can grow up in near-identical environments, with pretty much the same water, sunshine and soil. But even in that stable home, little variations occur. One plant in the "A" family might get a few more minutes of sunshine a day, another might get more water, but they pretty much grow up to be just like their parent. The identical offspring of Plant "B" grow up the same way, except more of the plants in the "B" family go crazy with those environmental changes. Some get taller than their parents, some are stunted by those little environmental hiccoughs.

The scientific intrigue comes when scientists call a big family reunion, and discover that the "A" family all look close to alike, despite those subtle environmental differences. Family "B," however, clearly didn't follow the family genetic rules, with some towering over the group, and others being vertically challenged.

And like family reunions, the competition is decided as everyone compares pictures of the grandchildren. In Arabadopsis's case, the solid Family A produces more "children" – or flowers, than the erratic Family B. "As it turns out, and perhaps not surprisingly, those genotypes that tended in general to vary more, tended to not produce as many flowers (and thus were less likely to reproduce successfully)," Dworkin said. "There definitely are costs to variation." In addition, this study provides preliminary evidence that a well known plant development gene ERECTA may be in part responsible for some of the change in some

genotypes. However, Dworkin said this conclusion requires further study.

Source: Michigan State University