New research explains orchids' sexual trickery

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A new study reveals the reason why orchids use sexual trickery to lure insect pollinators. The study, published in the January issue of *The American Naturalist,* finds that sexual deception in orchids leads to a more efficient pollinating system.

While most flowering plants reward pollinators with tasty nectar, many orchid species turn to trickery. Some use what's called food deception. They produce flowers that look or smell like they offer food, but offer no edible reward. Other orchids use sexual deception. They produce flowers that look or smell like female insects, usually bees or wasps. Males are drawn to the sexy flowers and attempt to mate with it. In doing so, they accidentally collect pollen on their bodies, which fertilizes the next orchid they visit.

From an evolutionary perspective, the sexual strategy is a bit puzzling. Orchids that offer nectar or mimic food can attract a wide variety of food-seeking pollinators—bees, wasps, flies, ants and so on. But sexual displays are only attractive to the males of a single species—a flower that looks like a female wasp is only going to attract male wasps, not other insects. So in appealing to sex, these orchids limit their potential pollinators, which would seem to be a reproductive disadvantage.

Despite the apparent drawback, sexual deception has evolved several times in different types of orchids. So there must be some selective advantage, and researchers Salvatore Cozzolino and Giovanni Scopece of the University of Naples Federico II, Steven Johnson of University of

KwaZulu-Natal (South Africa) and Florian Schiestl of the University of Zürich appear to have figured out what it is.

Schiestl and his team observed populations of 31 orchid species with varying pollination strategies in Italy and Western Australia. They measured the amount of pollen that was taken from each orchid, and the amount of pollen that made it to its intended destination—another orchid of the same species.

They found that populations of sexually deceptive orchids had higher "pollen transport efficiency" than the species with multiple pollinators. In other words, a higher percentage of the pollen that was taken from sexually deceptive orchids actually made it to another orchid of the same species. The orchids with multiple pollinators had more pollen taken from their flowers, but more of that pollen was lost—dropped to the ground or deposited in flowers of the wrong species.

So it appears that specializing with one pollinator—and appealing to it with sex—makes for a more direct line from one orchid flower to another, with less precious pollen lost in the transport process.

"These results could provide new insights in the understanding of evolutionary shifts between generalized to specialized pollination strategies in flowering plants," says Scopece, "and that sexy orchids do it better!"

More information: Giovanni Scopece, Salvatore Cozzolino, Steven D. Johnson, and Florian P. Schiestl, "Pollination Efficiency and the Evolution of Specialized Deceptive Pollination Systems." *The American Naturalist* 175:1 (January 2010).

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