

# Nectar thieves are damaging rare orchids in North Dakota

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Long-tongued hawk moths such as these are capable of being 'nectar thieves' insects that remove nectar from flowers without offering pollination services. Credit: Kirk Anderson

Robbers and thieves are flying in the fields of southeastern North

Dakota, but these larcenists aren't your typical criminals, prowling around in masks and disguises. They are hawk moths and bumble bees, and according to charges made by researchers in a paper recently published in the *Annals of the Entomological Society of America*, they've been stealing nectar from the federally-listed threatened western prairie fringed orchid (*Platanthera praeclara*).

"Nectar larceny" is the removal of [nectar](#) without providing pollination services. Insect larcenists have two methods for removing nectar.

"Thieves" access it via the natural opening to the tube or spur by using their long tongues, and "robbers" simply cut through the wall of the tube or spur to feed on nectar.

Over the course of 11 years, the researchers deployed net traps and light traps over orchids to capture hawk moth pollinator species, and what they found surprised them. Among the specimens collected were two hawk moth species, *Manduca quinquemaculata* and *Agrius cingulata*, both of which are not common in North Dakota. Furthermore, both species had tongues that were more than twice the length of the spur of the orchids, and none of the collected specimens had pollen on them. The researchers suggest that this shows that the [hawk moths](#) are eating nectar from the orchids but are not providing pollination services. This is known as thievery.

In addition to the hawk moths, eight bumble bee species were captured. Some bumble bee species have mouthparts that cut through the side of a flower's spur, allowing them to steal nectar without being covered in pollen. The researchers also found holes and slits, most likely caused by the bees, in the spurs of many orchid flowers. This form of stealing nectar is known as robbery. The levels of nectar robbery in this case seemed to have the benefit of removing pollen, but the holes and slits ultimately led to the death of the flowers.

The findings of this study are important because nectar larceny, which includes both robbery and thievery, can be a threat to the conservation of rare plants.

"Plant conservation scientists spend most of their time thinking about factors that directly impact rare plants," said Marion Harris, a professor at North Dakota State University and one of the authors. "Typically, this factor is habitat loss. But, for plants that require pollinators for reproduction, you can increase the habitat of the rare plant all you want but fail to save the plant if you ignore the needs of the plant's pollinators. Hawk moth pollinators need larval host plants and nectar for adult reproductive activities. They presumably pay less attention to plants that lack nectar because of nectar robbery or thievery and are harmed by failure to find nectar."

Fortunately, the two long-tongued hawk moth thieves are residents of the southern U.S., and are rarely seen in North Dakota.

"It is not uncommon for hawk moths to be captured far from their breeding range, including captures at sea," the authors wrote. However, "It is unclear whether 'wandering' hawk moths have been blown off course while migrating to more suitable places or if they are testing the boundaries of their distribution."

If the hawk moths' migration pattern is indeed reaching farther north, it could be trouble for the western prairie fringed orchid.

"We propose that nectar larceny will negatively impact the orchid if it occurs at higher levels each year (in the case of robbery) or starts occurring every year due to increased northward migration of long-tongued hawk moths that typically live in the south (in the case of thievery)," Harris said.

"It is interesting to note that places in the south where *P. praeclara* has disappeared or become rare over the past 20 years, e.g., Oklahoma and Missouri, are within the breeding range of two common long-tongued hawk moths, *M. quinquemaculata* and *M. sexta*," the authors wrote.

However, these conclusions still require further research.

"Monitoring of nectar larceny in *P. praeclara* should continue," according to the researchers. "What is really needed is a field experiment to test the hypothesis that effects of nectar larceny on flowers comprising the *P. praeclara* inflorescence are density-dependent, i.e., tolerated or even beneficial when nectar is taken from a small proportion of flowers but harmful when most flowers lose their nectar."

**More information:** *Annals of the Entomological Society of America*, [aesa.oxfordjournals.org/lookup.../10.1093/aesa/sav093](https://aesa.oxfordjournals.org/lookup.../10.1093/aesa/sav093)

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