

Tiny orchid flowers pollinated by tiny flies

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A close-up of the whorls, and an image of full stalks of *Oberonia japonica*, an orchid species native to Japan. Credit: Sunakawa et al 2024

Researchers Yuta Sunakawa, Ko Mochizuki, and Atsushi Kawakita of the University of Tokyo have discovered the first orchid species pollinated by gall midges, a tiny fly species. This is the first documented case of an orchid species found to be pollinated by gall midges, and it

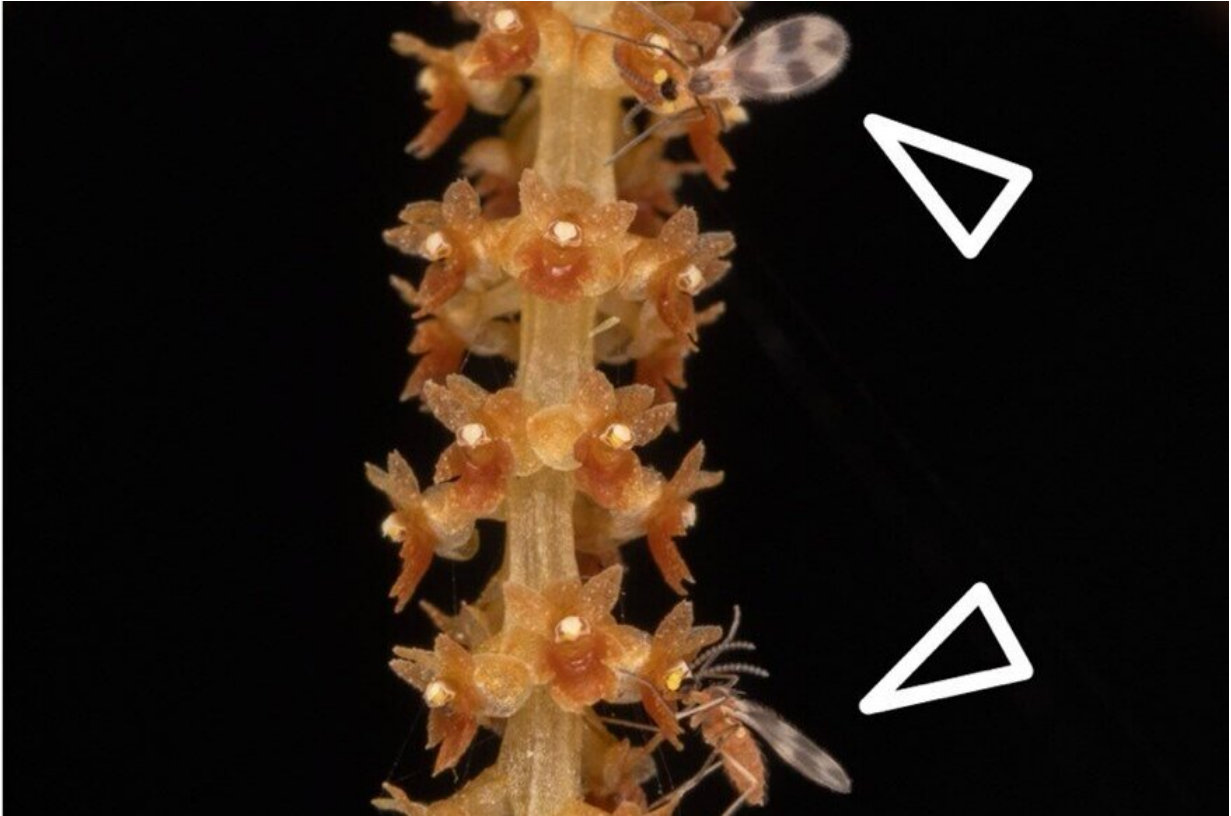
makes the orchids the eleventh such plant family. The findings were published in the journal *Ecology*.

The family of orchids is rich both in numbers and variety. Their range of shapes and sizes is due to having evolved to attract different animal pollinators. However, scientists have only mapped the pollination biology of only about 10% of all orchid species.

The trio of researchers set out to investigate the possible pollinator of *Oberonia japonica*, a species native to Japan and a member of the *Oberonia* genus, one of the genera with the smallest known flowers in the orchid family. This plant's orange flowers are about the size of the tip of a mechanical pencil and are arranged in whorls of five to six. Full flower stalks can contain upwards of a hundred whorls. The team went to Aichi Prefecture to observe and collect "visitors" stuck to the flowers to see what species they were and if they were in fact, pollinating the plants.

"We conducted a field observation of flower visitors on May 11–12 and 14, 2022, in their [natural habitat](#) in Shinshiro, Aichi Prefecture," says Sunakawa.

"Interestingly, these flower [visitors](#) were observed exclusively during the night, from 9 p.m. to 6 a.m. As both the flowers and midges were exceptionally small, initially we could only discern the presence of '[small insects](#).' It was only after capturing an image with a macro lens that we discovered they were gall midges. Photographing a gall midge carrying the orchid's pollinaria, a lump of pollen and accessory structures, was a thrilling experience."



Gall midges on a stalk of *Oberonia japonica*, an orchid species native to Japan.
Credit: Sunakawa et al 2024

However, as one mystery was solved, others popped up in its stead. The gall midges found on the flowers were mostly females with identical external morphologies.

Gall midges live in most habitats around the globe and similar orchid species can be found in the neotropical regions of Polynesia, Asia, and Africa. These two factors suggest that there might be other [orchid species](#) pollinated by gall midges waiting to be discovered. So, Sunakawa explains the next steps for research.

"The reason why only female gall midges are attracted to these flowers

and why they act as if they were transferring pollinaria is still unknown. We are eager to solve this mystery through additional field observations, observations in other locations, and observations of other closely related species."

More information: Pollination of *Oberonia japonica* (Orchidaceae) by gall midges (Cecidomyiidae), *Ecology* (2024). [DOI: 10.1002/ecy.4293](https://doi.org/10.1002/ecy.4293)

Provided by University of Tokyo

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