

An orchid that never blooms

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Figure 1: *L. nigricans* in Iwata, Nishimuro County, Wakayama prefecture. The flowers never bloom, but the plant still fruits . Credit: Kobe University

A flower identified as *Lecanorchis nigricans* has been revealed to be a different identity, *Lecanorchis nigricans* var. *patipetala*. Both species are self-pollinating, but the flowers of the true *L. nigricans* never open.

The findings were made by Associate Professor SUETSUGU Kenji (Kobe University), FUKUNAGA Hirokazu (independent botanical researcher), SHIMAOKA Chie and Professor SAWA Shinichiro (both Kumamoto University). The research was published in the online edition of *Phytokeys* on January 10.

Some [plants](#) have evolved to be parasites, feeding off host fungi. These plants are known as mycoheterotrophs. They don't photosynthesize, so they only show themselves above ground for brief periods when fruiting or in flower. This makes them hard to find and classify, and the true identities of many species remain a mystery. Professor Suetsugu works with other researchers to document mycoheterotrophic plants in Japan.

Professor Suetsugu's research team noticed that *L. nigricans* (found in Japan's Miyagi prefecture and Kochi prefecture) bears fruit without blooming at all. The flower has spatula-shaped purple-tipped petals that don't branch. From these characteristics the team were able to identify it as *L. nigricans* or a close relative. However, the species known as *L. nigricans* is documented as having [flowers](#) that fully open. This open-flower (chasmogamous) *L. nigricans* is found in many parts of Japan.



Figure 2: *L. nigricans* var. *patipetala* in Kochi city, Haruno. The flowers open fully. Credit: Kobe University

L. nigricans was first discovered in 1931 by HONDA Masatsugu in

Japan's Wakayama prefecture. In the plant description, he wrote "The flowers are not open, and the petals are connected to form a cylindrical tube." From this description, it seems that the original *L. nigricans* did not bloom (cleistogamous). Professor Suetsugu's team went to the place where *L. nigricans* was first discovered and verified that the species of *L. nigricans* in this region never opens its flowers (fig. 1). In other words, the original *L. nigricans* is the variety that does not bloom. After further examination, the team found that this variety has other features that distinguish it from the open-flower *L. nigricans*: the closed-flower variety has smaller flowers, the colored area of the petals is larger, and the hairs at the end of the petals are branched.

So what should we call the more common open-flower variety, if it is not *L. nigricans*? In 1981, SAWA Yutaka presented the open-flowering variety found in Kochi prefecture as *L. nigricans* var. *patipetala*. However, his description of the plant was very brief, and it was hard to go against the general assumption that *L. nigricans* is an open-flowering plant.

L. nigricans var. *patipetala* is generally the more common variety in Japan (in Kochi prefecture the closed-flower *L. nigricans* is more common). This may have led to the widely-held misconception that the *L. nigricans* var. *patipetala* is *L. nigricans*. It is now clear that the species discovered by SAWA Yutaka is the same as the open-flower *L. nigricans* in other locations (see fig. 2).

As well as abandoning photosynthesis, the *L. nigricans* also self-pollinates – its flowers remain buds until they fall. Non-photosynthesizing plants such as *L. nigricans* often grow on the dark forest floor, an environment that bees and butterflies rarely visit. Because of this, *L. nigricans* and *L. nigricans* var. *patipetala* are both self-pollinating species. *L. nigricans* may have stopped opening its flowers because this used up too many resources. Similar evolutionary patterns

are occurring in other mycoheterotrophic plants.

"When plants give up photosynthesis, this changes their relationship with other organisms, such as the insects who may pollinate them," comments Professor Suetsugu. "Through taxonomic and ecological research on mycoheterotrophs, I will continue to study the changes that take place when plants make the extreme decision to abandon photosynthesis."

More information: Kenji Suetsugu et al. The taxonomic identity of three varieties of *Lecanorchis nigricans* (Vanilleae, Vanilloideae, Orchidaceae) in Japan, *PhytoKeys* (2018). [DOI: 10.3897/phytokeys.92.21657](https://doi.org/10.3897/phytokeys.92.21657)

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