

# Flower's bellows organ blasts pollen at bird pollinators

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A flower of *Axinaea affinis*. The strong visual colour contrast between the yellow, bulbous stamen appendages (bellows organs) and the pink petals becomes clear. The pollen is contained in the anthers, the blackish, elongated structures connected to the bulbous appendages. Credit: *Current Biology*,

Dellinger et al.

A small tree or shrub found in mountainous Central and South American rainforests has a most unusual relationship with the birds that pollinate its flowers, according to a study reported in the journal *Current Biology* on July 3. The plant known as *Axinaea* offers up its male reproductive organs as a tempting and nutritious food source for the birds. As the birds seize those bulbous stamens with their beaks, they are blasted with pollen by the flowers' complex "bellows" organs. The birds then deliver that pollen to receptive female floral organs as they forage on.

"This unique and highly complex pollination system is completely new to science and provides another example of the intricate relationships that have evolved between [flowers](#) and their [pollinators](#)," says Agnes Dellinger of the University of Vienna. "The majority of bird-pollinated flowers offer nectar as a reward, and in the rare known cases involving food bodies, these reward tissues are restricted to the outer, sterile floral organs and are never found on reproductive organs."

Food bodies situated on male [reproductive organs](#) are otherwise only known from beetle-pollinated flowers, Dellinger adds. There is no other known example among plants of such a precise and anatomically distinct bellows organ.

*Axinaea* flowers appear in clusters of a few to more than 20 flowers, with pink, red, yellow, or orange petals that usually don't open completely. The stamens of those flowers stand out based on their contrasting colors and conspicuous, bulbous appendages. Something else about the stamens also piqued the researchers' curiosity: one or more of these stamens was almost always found missing in the flowers the researchers observed in the field or on herbarium specimens.



A Sooty-capped bush tanager (*Chlorospingus pileatus*) holding a freshly removed stamen from *Axinaea costaricensis* in its beak. Flowers of *A. costaricensis* where stamens have been removed are visible in the background Credit: *Current Biology*, Dellinger et al.

The researchers learned what had happened to those stamens—and just how remarkably unusual *Axinaea* flowers actually are—through a combination of pollination experiments, video monitoring, and detailed analyses of stamen structure and composition. They have observed multiple bird species, mostly tanagers, enjoying *Axinaea* food bodies and acting as pollinators in the process.

The findings may hold general lessons about the evolution of plants and their pollinators, the researchers say, noting that the vast majority of *Axinaea*'s close relatives depend on bees for pollination.

"Only about 100 of the 5,000 or so species in the family Melastomataceae are known to produce nectar and to be pollinated by other insects or vertebrates," says Jürg Schönenberger, senior author of the study, also at the University of Vienna. "In the evolution of these species, including *Axinaea*, pollinator shifts in combination with changes in the floral morphology must have occurred."

Those evolutionary shifts may be related in part to growth at higher elevations, a pattern that would seem to support an earlier idea that birds may be more-efficient pollinators than bees at higher altitudes. The researchers say they now plan to study such pollinator shifts and their connection to ecogeographical changes, such as the uplift of the Andes Mountains, in greater detail.

**More information:** *Current Biology*, Dellinger et al.: "A specialized bird pollination system involving a bellows mechanism for pollen transfer and staminal food body rewards." [www.cell.com/current-biology/a ... 0960-9822\(14\)00634-4](http://www.cell.com/current-biology/a ... 0960-9822(14)00634-4)

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