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Digest: Anther cones increase pollen release in buzz-pollinated *Solanum* flowers*

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Do anther arrangements in buzz-pollinated species have a functional significance? In this article, Vallejo-Marin et al. investigated this question by comparing pollen release rates in anther cones and free anther conformations in three species of the genus *Solanum*. The authors found that vibration transmission among anthers is greater for anther cones than among freely held conformations, resulting in higher rates of pollen release.

Plant–pollinator interactions often give rise to specialized pollination systems, which may result in similar floral morphologies and functions in nonrelated lineages of plant families (De Luca and Vallejo-Marin 2013). One example of this is buzz pollination, a system in which flowers restrict access to pollen through various floral structures, such as poricidal anthers. These structures ensure that pollen is accessed only by bees that can vibrate the anthers and effectively pollinate the flower.

The spatial arrangement of poricidal anthers within a flower can vary greatly, from loosely held anthers to tightly packed anther cones. Although vibrating the anthers, bees usually vibrate only a few "focal" ones. These vibrations then propagate to the distal anthers in the flower. The pollen release rate for a flower then depends on the vibrations at both the focal anthers and the distal ones. As one might expect, anther architecture can influence the rate of pollen release. This may directly impact the fitness of plants that offer only pollen as a reward. Investigating the functional significance of anther cone arrangements could thus lead to important insights regarding the role that anther arrangements play in buzz-pollinated flowers (Kudo 2003).

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Using three species of flowering plants of the genus *Solanum* with different anther conformations, Vallejo-Marín et al. (2022) investigated this question by testing whether vibration transmission and subsequent pollen release rates differed between conical and free architectures. The researchers measured vibration transmission to distal anthers for flowers in their natural state and in an artificially glued anther state, testing vibration transmission in the cones. Consistent with their hypotheses, their results indicated that nonfocal anthers vibrate at higher amplitudes in anther cones than in loose anther arrangements. Consequently, they noticed increased vibration transmission to distal anthers in the cones and higher rates of pollen release.

This study is the first to document differences in rates of pollen release as a function of anther architecture in buzz-pollinated *Solanum* flowers. Coupling the biomechanics of different anther arrangements provided in this study with behavioral observations of bees could lead to an improved understanding of the factors that determine these arrangements. For example, bee size and effective pollen removal alongside pollination may be correlated to anther arrangement (Solís -Montero and Vallejo-Marín 2017).

Furthermore, analyzing the biomechanics of anther architecture from an evolutionary perspective could provide insights into transitions from nectar to pollen-only rewards in buzz-pollinated

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plants. For example, in some species, cones are associated with nectar producing structures (e.g., *Boraginaceae*) and may be remnants of ancestral states. Conversely, consider heteranthery, in which loosely held anthers have differentiated to perform different functions during buzz pollination, giving rise to new pollination syndromes (Mesquita-Neto et al. 2017; Dellinger et al. 2019). This study will be critical for future research surrounding the ecology and evolution of buzz-pollinated plants.

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