Pseudocopulation in Orchids

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Pseudocopulation is a pollination strategy where plants appear as females of insects, most commonly Hymenoptera. Orchids use visual, chemical, and tactile cutes. The morphology of the labellum serves as a visual cue for male insects.

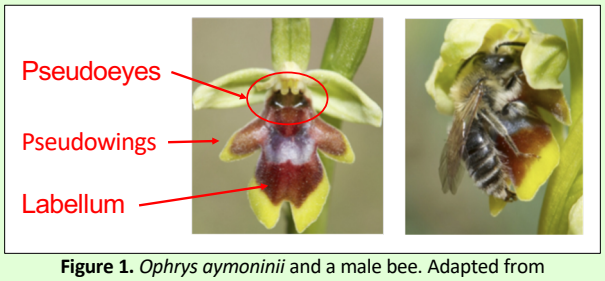

Figure 1. *Ophrys aymoninii* and a male bee. Adapted from Gervasi et al. (2017)

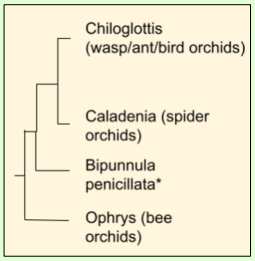

Figure 2. Simplified phylogeny of the subfamily Orchidoideae. In Cranichideae, literature was only found of *B. penicillata.*

Pollen is transferred to the abdomen when a male pollinator attempts to copulate with the orchid. Most orchids that utilize pseudocopulation are in the genus *Ophrys*. The genus has approximately 130 species, which can be divided into 10 macrospecies.

About 1/3 of orchid species offer pollinators no food reward and rely on sexual deception. The male insect may receive no benefit from the orchid they attempt to copulate with.

Figure 3. *Caladenia huegelii* (Grand spider orchid) Photo by @enjosmith on Flickr, CC-BY-NC-SA 4.0

Evolution?

Mimicking the pheromones of female insects appears to be more important than morphological characteristics. Alkene differences result in floral odor that mimics pheromones of different insect species. Pollinator-mediated selection resulted in reproductive isolation and highly evolved/specific pollinator-plant relationships. Speciation of orchids as a result reduces pollinator sharing.

References

Devey, D.S., Bateman, R.M., Fay, M.F., & Hawkins, J.A. (2008). Friends or Relatives? Phylogenetics and Species Delimitation in the Controversial European Orchid Genus Ophrys. Annals of Botany. 101(3):385-402. doi:10.1093/aob/mcm299

Endersby J. (2016). Deceived by orchids: sex, science, fiction and Darwin. The British Journal for the History of Science. 49(2):205-229. doi:10.1017/S0007087416000352

@Enjosmith. (2015). Spider orchid [photograph]. Flickr.https://www.flickr.com/photos/enjosmith/20787554848

Francisco, A. & Ascensão, L. (2013). Structure of the Osmophore and Labellum Micromorphology in the Sexually Deceptive Orchids Ophrys Bombyliflora and Ophrys tenthredinifera(Orchidaceae). International Journal of Plant Sciences. 174(4):619-636. doi:10.1086/669911

Gervasi, D.D.L., Selosse, M., Sauve, M., Francke, W., Vereecken, N. J., Cozzolino, S., & Schiestl, F. P. (2017). Floral scent and species divergence in a pair of sexually deceptive orchids. Ecology and Evolution, 7(15), 6023–6034. https://doi.org/10.1002/ece3.3147

Vereecken, N.J., Cozzolino, S., & Schiestl, F.P. (2010). Hybrid floral scent novelty drives pollinator shift in sexually deceptive orchids. BMC Evolutionary Biology. 2010;10(1):103-103. doi:10.1186/1471-2148-10-103