

Exploring Color through the Eyes of Bees

Our research

Bees, like humans, have three types of photoreceptors in their eyes that allow them to see color. Bees see ultraviolet (UV) light, blue light, and green light, whereas most humans see red, blue, and green. We developed a methodology¹ to simulate bee vision that can be used to photograph flowers in natural light. We used a full-spectrum adapted camera and specialized filters to capture the blue-green portion of the visible light spectrum, in addition to UV light. Simulating bee vision allows us to glimpse floral colors invisible to humans and to compare bee-visible patterns across flowers.

What we found

Human Vision
(Red, Blue, Green)

Bee Vision
(UV, Blue, Green)

Baby Blue Eyes

Nemophila menziesii

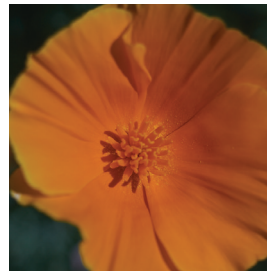
The white center of Baby Blue Eyes as seen in human vision (left) creates a “bull’s eye” pattern in bee vision (right), where the center of the flower contrasts sharply from the tips of the petals. This helps lead pollinators to the reward center of the flower, which may help a flower get pollinated.



California Poppy

Eschscholzia californica

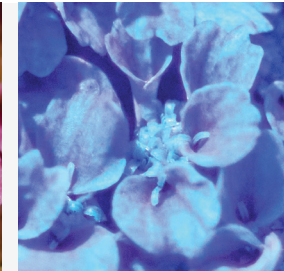
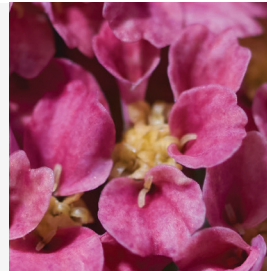
California poppy, which produces no nectar, appears all orange to us (left). In bee vision (right), however, the pollen grains have a different color than the other parts of the flower, which makes it easier for pollinators to find.



Yarrow

Achillea ‘Salmon Beauty’

“Bee-friendly flowers” are often thought to be shades of white, blue, or yellow, but we know that plenty of bees visit pink and purple flowers. In human vision (left), the yellow stigma contrasts against the pink petal. For bees (right), the same contrast exists, but with different colors!



Goldenrod Crab Spider

Misumena vatia

In human vision, it can be hard to detect a white crab spider on a flower (left). In bee vision (right), the coloration of the spider is similar to that of the flower, which actually draws bees in. A flower with a white crab spider is 3x more likely² to be visited by some bees than those without crab spiders!



Photographs by Svea Bruslind



We found a variety of differences in how the colors of flowers (and insect predators) vary between human vision and bee vision. By photographing flowers the way bees see them, we identify floral features that may influence bees foraging among different species of flowers. These comparisons can also help us build and test hypotheses related to how breeding plants for new floral color forms might affect bees and other pollinators.

How does this relate to your garden?

Flower (and foliage!) colors provide more than beauty in a garden. Color is an important signal that can help pollinators locate and collect food (pollen and nectar). As we learn more about how bees see flowers, we can broaden bee-friendly plant palettes beyond blue, yellow, and white. For example, previous research in our lab has shown pink (Farewell-to-Spring: *Clarkia amoena*), purple (Douglas' Aster: *Symphyotrichum subspicatum*), and orange flowers (California poppy) to be highly attractive to bees³. Stay tuned as we continue to deepen our understanding of bee vision. If you would like to learn how to take your own bee vision photos, see Svea Bruslind's 2023 Honors College Thesis.

Additional Information

- ¹Bruslind, S. 2023. Bee's Eye View: Using multispectral photography to simulate bee's view of flowers in natural settings. Oregon State University Honors College Thesis.
- ²Heiling, A., Herberstein, M., Chittka, L. 2003. Crab-spiders manipulate flower signals. *Nature* 421: 334.
- ³Anderson, A., L. Locher, J. Hayes, M. Mead, S. Danler, D. Jones, G. Langellotto. 2022. Native plant picks for bees. EM 9363.

Master Gardener™ Advice

- Contact your local extension office for Master Gardener advice, or look for Master Gardeners at local farmers' markets.
- For more 10-Minute University™ handouts, videos, and the class schedule, visit cmastergardeners.org.

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