

# The Mystery of Symmetry

investigating the role symmetry plays in plant-pollinator relationships

Pollinators and flowers have a complex relationship that has lasted for millions of years. **Pollinators** are animals that eat **nectar** and **pollen** from flowers. In doing so, they unintentionally move pollen on their bodies from flower to flower. This **pollinates** flowers, which is necessary for many plants to reproduce.

Scientists are very interested in plant-pollinator relationships. By understanding why pollinators have **preferences** for certain flowers over others, we can plant better gardens for them. Pollinators are extremely important animals to protect, as 90% of flowering plants require animal pollination.



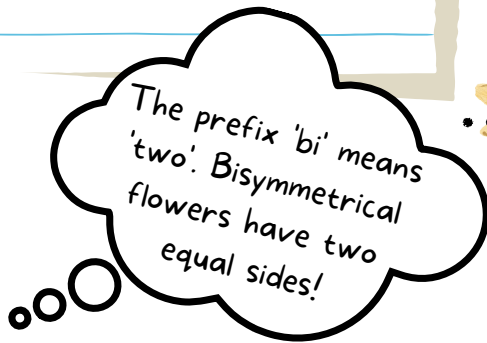
There are many possible features that pollinators consider when deciding whether or not they want to feed from a flower.

**Why do you think pollinators choose to feed from certain plants? Brainstorm four ideas below:**

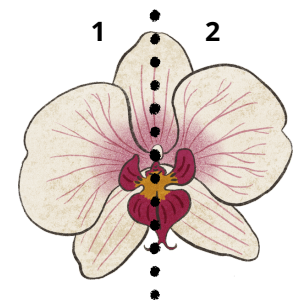
Notes

1.
2.
3.
4.

Some scientists are very interested if **symmetry** plays a role in plant-pollinator relationships. Symmetry is when an object is equal on both sides. **Are pollinators choosing symmetrical flowers over asymmetrical flowers?** Or, are there other factors at play, such as nutrition or color?



Radial Symmetry



Bilateral Symmetry

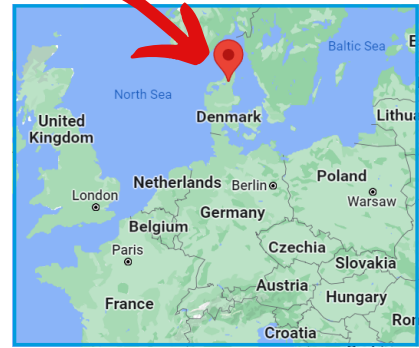


The two main types of symmetry in flowers are **radial** and **bilateral symmetry**. When looking at a flower ask yourself: can you fold the flower in half more than one way and have two sides match? If so, the flower is radially symmetrical. If you can only fold it in half once with matching halves, the flower is bilaterally symmetrical.

**Let's learn how a scientist tested flower symmetry and pollinator flower preferences!**

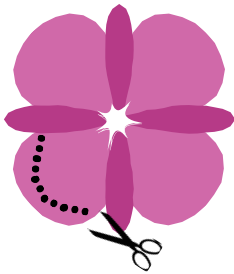


Dr. A P Møller set up an experiment in Kraghede, Denmark to determine if bumble bees were more likely to feed from symmetrical flowers. Møller also wondered if the size of the flower was important to bees.

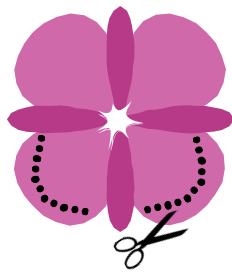


A bilaterally symmetrical flower called Fireweed (*Epilobium angustifolium*) was used in this study. To create **asymmetrical** and different sized versions, Møller simply cut the petals with scissors.

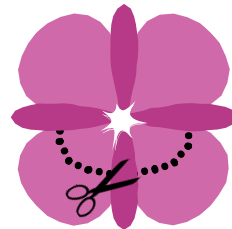
**Asymmetric**



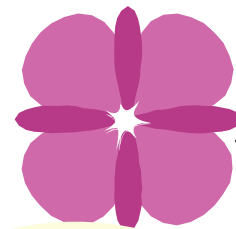
**Symmetric (large)**



**Symmetric (small)**



**Control**



A **control** is an element that remains unchanged. The control is used as a benchmark to compare other test results in an experiment.



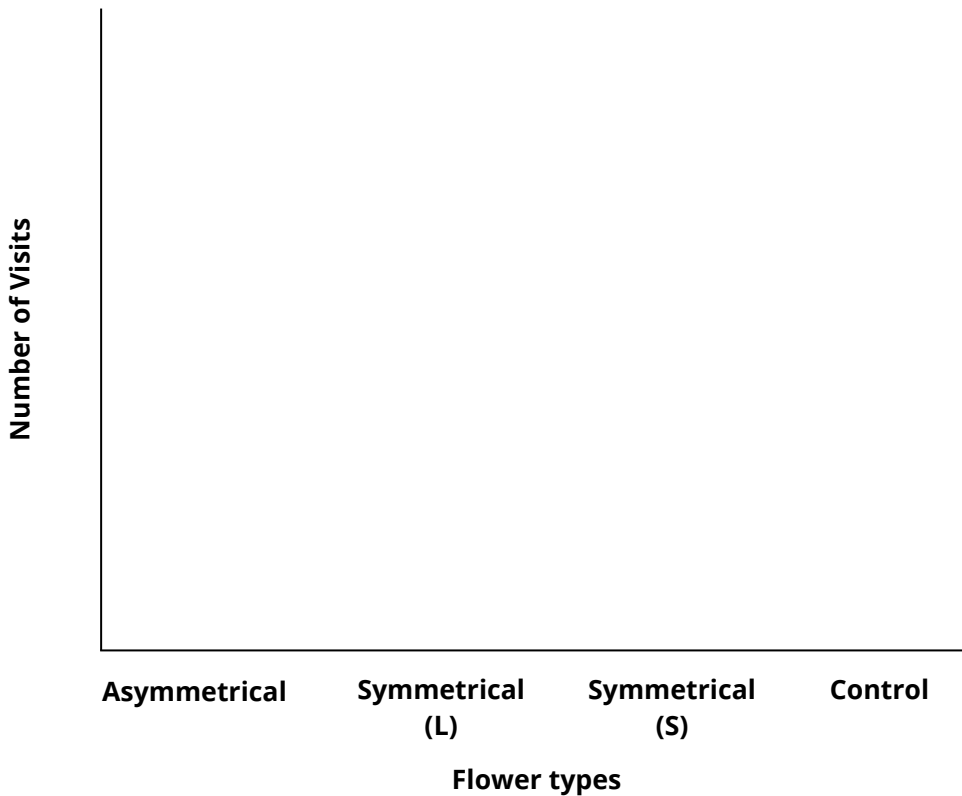
**Which flowers do you think bumble bees preferred?** Or, do you think they have no preference? Create a **hypothesis** and provide a **reason** for your hypothesis.



Dr. Møller noted each time a bumble bee ate from a flower, and recorded the flower type. **Create a bar graph using the data in table one.** Flower types are on the **x-axis** and the 'number of visits' is on the **y-axis**.

Table 1

Time of Visit (AM)	Flower Type
10:00	Control
10:03	Control
10:04	Asymmetric
10:07	Symmetric (L)
10:08	Symmetric (S)
10:12	Control
10:15	Symmetric (L)
10:17	Symmetric (S)
10:18	Control
10:21	Symmetric (L)
10:24	Symmetric (L)
10:26	Control
10:27	Symmetric (S)
10:29	Asymmetric
10:30	Symmetric (S)



1. Study your bar graph. Which type of flower did the bumble bees prefer in this study? Why do you think this flower type was preferred?

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2. Look at the photo of the flower, Fireweed (*Epilobium angustifolium*). Consider what other characteristics of Fireweed could be tested to further our understanding of why pollinators choose to eat from certain flowers over others. **Hint: you can answer this in a form of a question by starting with 'I wonder...'**

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