

Angiosperm Reproduction and Coevolution Lesson Teacher Notes

Module Contributors: Anna Monfils, Debra Linton, Elizabeth Ellwood, Molly Phillips, and Tracy Barbaro

Standard Addressed: **NGSS HS LS4-4** Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

Prerequisites: Evolution by natural selection, scientific classification (binomial nomenclature)

Learning Objectives

Upon completion of this lesson, each student should be able to:

- Describe the role of flowers in angiosperm reproduction.
- Identify the parts of a flower.
- Explain the role of pollinators in the life history of angiosperms.
- Define coevolution and identify selection pressures that exist between pollinators and the plants they pollinate.
- Predict pollinator/plant pairs based on morphological traits.
- Collect data from a digitized natural history collection.
- Analyze spatial co-occurrence data for pollinators and the plants they pollinate.

Included in the Packet

- Lesson Plan/Student worksheet
- Matching Cards
- Plant Labels
- Natural History Portal Search Instructions/Example
- Images of bats for Activity D

Other Materials Needed

- Flowers for dissection
- Dissection microscopes (optional)
- Computers connected to the internet

List of Activities: This lesson would work well broken up into two class periods with A, B, C on day one and D and E on day two. Each activity is independent but does rely on knowledge gained from previous sections.

- Introduction to Angiosperm Reproduction** - Text to be read aloud by instructor or read individually by students (*2 minutes*).
- Flower Structure** - Text to be read individually by students followed by one true and false question (*5 minutes*). Flower dissection in pairs followed by a series of short answer questions. Students should also either draw their flower, or label the flower by cutting out the proper terms (see lesson packet for flower part labels). Dissection microscopes are optional but larger flowers should be selected if they are not available (*15 minutes*).

- C. Pollinators and Pollination Syndromes** – Text to be read aloud or individually by students (5 minutes) followed by an interactive matching game. There is also one short answer question and a table for students to fill in (*15 minutes*).
- D. Coevolution Case Study [using Natural History Collection Data]** - Introduction to coevolution and natural history data should be read aloud or individually by students. The introduction is accompanied by three short answer questions and one multiple choice (*10 minutes*). Next is an exploration of the iDigBio data portal followed by a series of questions and two tables to fill out (*20 minutes*).
- E. Conclusion – Minute Paper** – Final activity is a series of three questions that are meant to get the students to reflect on the activity (*5 minutes or could be assigned as homework*).

Educational Videos that correspond with this Activity

- Introduction to Coevolution: <http://www.bozemanscience.com/coevolution>
- Pollination: Trading Food for Fertilization <https://www.youtube.com/watch?v=LiczM-w3V-U>
- People, Plants and Pollinators | Nat Geo Live
https://www.youtube.com/watch?v=rmL_XTrPOMw
- The Strange Link Between Bats and Tequila
<https://www.youtube.com/watch?v=8KYOHNgEVAQ> If you want to de-emphasize tequila you can play the video with the sound off. It has great footage of bats feeding and pollinating agave.