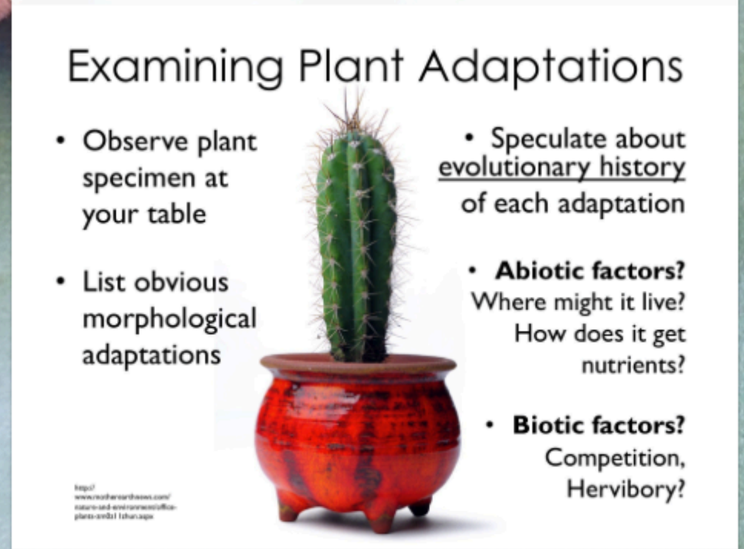
Plant Adaptations: Homology, Convergence, and Coevolution

Using self-gathered evidence to support a case for homology or convergence in plants.

The Basis of the Laboratory: Student Activity #1

Describe obvious plant adaptations and speculate about their evolutionary history. Students examined six plants in total.



Student Activity #2: Argue for Homology or Convergence

Choose two plants that appear related. Construct and present an argument to explain their morphological similarity as the result of either inheritance from a common ancestor or convergent evolution (similarity due to evolution in similar environments).

9. Where was student learning lacking?

Some groups felt lost constructing an argument, while others, during their argument presentations, lacked sufficient evolutionary reasoning to explain the adaptations described. A few groups showed theoretical, but not practical understanding of convergent evolution.

In conclusion . . .

Overall, the lab was a success!
Students realized the collaborative nature of science and the importance of supporting claims with evidence. I will continue this lab in the future!

Student Activity #3: Some Last Lab Fun

Examine coevolution (evolution of reciprocal adaptations) of flowering plants and animal pollinators through sculpture with Model Magic.

7. Science Processes Under Focus

NGSS Practices 7 & 8

1. Engaging in Argument from Evidence
2. Obtaining, Evaluating, and Communicating Information

10. Future Changes

1. Provide more time for comparison of plants and construction of arguments, so that less prepared students have time to process and relate theoretical concepts to examination of actual plants.
2. Offer more scaffolding, such as a comprehensive set of guidelines, complete with examples, for structuring arguments.
3. Move the pollination activity to an earlier lab. Despite the fun factor, Plant Adaptations was the last lab of the semester and students were eager to finish quickly. As a result, the pollination activity, which was designed to introduce the concept of coevolution, fell short of this goal. Instead, focusing only on convergent evolution and the practices of gathering evidence and constructing arguments may more deeply engage students in science processes.

4. Learning Objectives

The goals I presented to my students are as follows:

- Examine convergent evolution and shared common ancestry
- Explain morphological adaptations in plants using knowledge of natural selection
- Support a case for common ancestry or convergent evolution between two groups of plants using morphological evidence
- Examine coevolution of plants and pollinators

5. Primary Performance Expectation under Focus

LS4-4
Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

6. Expectation Successfully Addressed?

Yes!
During the initial examination of plant specimens, students logically explained observed morphological adaptations in evolutionary terms.

8. Practices Engaged Successfully?

For the most part.

Most homology or convergence arguments were supported with photos, evolutionary rationale, and occasionally, online research. Here's one group's comparison of perceived homologous structures in agave and *Aloe vera*.