

FERN CATAPULTS

Flagellate plants have existed on our planet for a long time (~300 million years) and include approximately 30,000 species of bryophytes, lycophytes, ferns, and gymnosperms. These plants offer some important clues on how plants evolve and adapt. There are several ways to classify flagellate plants based on their genetic and morphological traits but one of their most unique features is the absence of flowers.

This activity was developed as an informal learning experience for 2nd grade students who participated in an optional afterschool enrichment activity offered by the school. It uses a standard activity available on the internet – popsicle stick catapults – and provides context for students to learn about plant reproduction and how ferns get their spores to appropriate habitats.

GRADE LEVEL

- Elementary (K-2)

DURATION

- 45-60 minutes

LEARNING OBJECTIVES

- Discuss the importance of ferns and plants to humankind
- Explore the reproductive strategy of ferns
- Design and test a simple catapult

CURRICULAR CONNECTIONS

- Biology (plant reproductive strategies)
- Physics (force)
- History/anthropology (history of catapults)
- Mathematics (measurement)

INTRODUCTION

- Show a picture of a fern to the students
- Invite the students to explore the school premises in search of a fern
- Ask students to look underneath the leaves to identify the fern spores
- Discuss how plants get to new habitats: plants with flowers often have animals move their pollen from place to place, but ferns don't do that. Because they don't have flowers.

They must get their spores away from the parent plant, to a new location where a new plant can grow, in another way. Use this to transition to the catapult activity.

MATERIALS NEEDED

- Pictures of fern sporangia and catapults (found online)
- Cardstock or construction paper in various shades of brown (to represent soil), green (to represent grass or other plants), and blue (to represent water)
- Individually wrapped, small candies
- Popsicle sticks
- Small rubber bands
- Plastic spoons
- Link to catapult model used here: <https://onelittleproject.com/popsicle-stick-catapult/>

FERN CATAPULT ACTIVITY

- Show a short video about the strategy ferns use to spread their spores so that other ferns can be born: <https://www.youtube.com/watch?v=LlyqzOpyM9U>
- Discuss with the students how ferns use a system that is very similar to a catapult.
- Show pictures of catapults and fern sporangia.
- Ask students to create their own unique catapult using the materials and model/photo provided, and practice using them to through the candies, as ferns do with their spores
- Set out the construction paper out in a quilt-like pattern and have the students sit around the edges. Discuss what good habitats for plants would be – soils that are rich in nutrients (brown paper). Green paper, which represents other plants, may be good, but will have competition present. Water, or blue paper, is not a great place for most plants – although all plants need water, most don't actually want to live completely in it!
- Ask each child to use their catapult to aim their “spores” and try to get them onto “good” habitat on the construction paper.
- Count how many they got in good vs. bad environments.
- Ask students to measure the distance their farthest “spore” fell from the “parent fern”.
- Optional: students can color their catapults to take home.

REFLECTION

Explain that although in reality ferns cannot select a specific location for their spores to fall, it is beneficial for the "baby" fern to grow in a rich soil away from other ferns that would compete for nutrients in the soil.



Model for catapult. Image is from: <https://onelittleproject.com/popsicle-stick-catapult/> and full instructions are available there.



Lower surface of a fern leaf. The very small, round structures are sporangia; they are clustered into larger units called sori. Photo by EB Sessa.

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