**Lesson: Darwin's Orchid**

**Grade Level:** Fourth Grade, Life Sciences

**Overview:** Students will learn about the importance of studying plant structures to understand how it grows. Students will learn the study of plants, **Botany**. The class will learn about the naturalist, Charles Darwin and his study of the Star Orchid. They will learn that Darwin was able to determine that the only pollinator able to drink nectar from this plant was the Wallance's Sphinx Moth, known for its extremely long tongue. Darwin was able to predict this pollinator by investigating in a flower dissection of the Star Orchid. Students will model similar duties of a botanist by investigating in their own flower dissection. In a science journal, students will illustrate, label, and describe their given flower. Students will also predict what possible pollinator(s) would visit their flower based on the plant's internal and external structures.

**Science standards:**
 **4-LS1-1:** Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

**Science Practices:**
**APPENDIX F – Science and Engineering Practices in the NGSS www.nextgenscience.org**
> **Practice 1  Asking Questions and Defining Problems**
> - Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships.
>
> **Practice 6  Constructing Explanations and Designing Solutions**
> - Construct an explanation of observed relationships (e.g., the distribution of plants in the backyard).

**Science Content:**
> **Life Sciences-**
>> **From Molecules to Organisms: Structures and Processes**

**ELA Standards:**
**CC.1.4.4.C:** Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic; include illustrations and multimedia when useful to aid comprehension.

**ELA Practices:**
**PENNSYLVANIA CORE STANDARDS English Language Arts Grade Pre K–5**
> **Standard 4:** Writing develops the skills of informational, argumentative, and narrative writing, as well as the ability to engage in evidence based analysis of text and research.

**ELA Content:**
**Informative & Eplainatory:** 1.4 Writing Students write for different purposes and audiences. Students write clear and focused text to convey a well-defined perspective and appropriate content.

**Science & ELA Connection:**
**Relationships and Convergences Found in the Common Core State Standards in Mathematics (practices), Common Core State Standards in ELA/Literacy\*(student portraits), and A Framework for K-12 Science Education (science & engineering practices)** *Venn Diagram NSTA Science, Math, & ELA*
- **E2.** Build a strong base of knowledge through content rich texts
- **E5**. Read, write, and speak grounded in evidence
- **M3 and E4.** Construct viable arguments & critique reasoning of others
- **S7**. Engage in argument from evidence

**Materials:**
- Flowers and/or plants
- Scissors
- Tweezers
- Paper Plates
- Markers and/or coloring pencils
- Tape

**Resources:**
- Read a-loud, *"POLLEN: Darwin's 130-Year Prediction"* By: Darcy Pattison
  https://www.amazon.com/Pollen-Darwins-Prediction-Moments-Science/dp/1629441201
- Student video resource, *"Look inside a Flower!"* https://youtu.be/R9sn7HZM7uY
- Flower Dissection worksheet Pdf
- Extension activity, Penn State Extension-
  https://sites.psu.edu/augmentedlearning/files/2019/09/Plants_v5_9_20_2019.pdf

**Learning Objectives:**
- Students will learn about how dissections help scientists understand how things work or made, (Dawin's Orchid story).
- Students will learn about the structures of a plant and/or flower.
- Students will dissect to investigate and understand the structure of a plant and/or flower.
- Students will take observation notes and illustrate the parts of the plant/or flower.
- Students will create predictions and/or hypotheses about the pollination of the plant and/or flower based on what they learned from the dissection.

**Procedure:**
- The teacher will guide students into a read aloud, *"POLLEN: Darwin's 130-Year Prediction"* By: Darcy Pattison.
- Students will then observe and watch a short student video, "Look inside a Flower!".
- The teacher will then prep and guide students into the flower dissection worksheet. (Teacher discretion: to use flowers and/or plants that are native to the area OR purchase flowers at the store.)
- Students will work individually or in small groups to complete the dissection.
- After dissection, teacher will will guide students in whole group discussion using the following guided questions;
  - What did you learn about your flower and/or plant?
  - What kind of pollinators do you think visit your flower and/or plant?
  - Why do you think that pollinators are attracted to your flower and/or plant?

- The teacher can extend the lesson by using the following extension activity from Penn State extension.

# Flower Dissection
## What does your plant tell you!

Name: _____
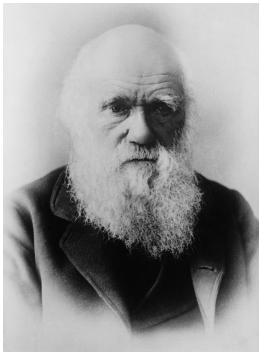
In 1862, naturalist- **Charles Darwin** received the *Angraecum Sesquipedale*, also known as the **White Star Orchid**. A flower native to the island of Madagascar that only produced a delightful fragrance at night. Darwin observed the rare physical characteristics of this orchid. Through a flower dissection, Darwin predicted that the only pollinator who could drink nectar from this rare flower was one with a long tongue and not a bee! For years, Darwin was criticized for his prediction for no one knew of a pollinator with an extremally long tongue! Forty years later, Darwin's prediction was accurate. It was discovered that the **Hawk Moth** was the pollinator of this flower. Darwin's dissection of the White Star Orchid gave him enough evidence to predict this long tongue moth.
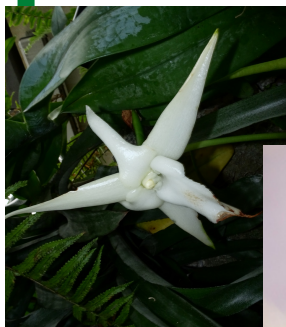
Angraecum Sesquipedale
White Star Orchid

Hawk Moth

**Today**, you will act as a naturalist and participate in a plant dissection. **Flower Dissections** helps us learn about a **plant's traits** and how a plant is able to **grow** and **survive and what insects are attracted to it**.
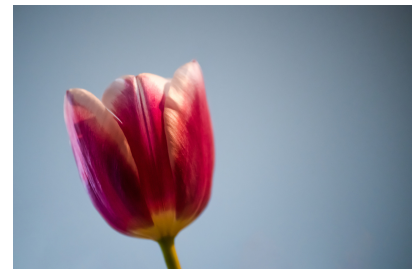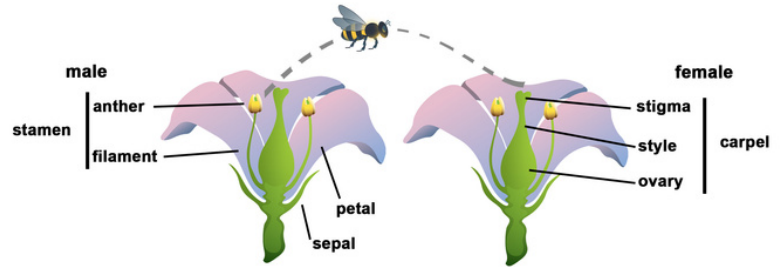
**Example**

Petal

Stamen

Filament

Leaf

Roots

Stem

# Flower Dissection
## What does your plant tell you!

**Direction:** In the blank box, draw your flower. Use the word bank to help you label the parts of your flower. Then answer the following questions about your flower dissection.

Draw Here!



male
stamen — anther
— filament
petal
sepal

female
— stigma
— style — carpel
— ovary

## Word Bank

Filament

Stem

stamen

Petal

Roots

leaf

Flower

**What pollinator(s) do you think would visit your flower?**

_____

# Flower Dissection

I wonder about this part of the flower.....

Direction: Choose **four** different parts of the flower you dissected. Then use the chart below to best describe these parts.

| | Part of Flower | Draw it | What is its function? | I wonder about this part.... |
|---|---|---|---|---|
| **Example** | Petal |  | To protect the inner parts of a flower. | I wonder if the color of the petals are important? |
| | | | | |
| | | | | |
| | | | | |
| | | | | |