Eggs, Seeds, and the Avocado Pit
4th Grade

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References:

- See "It's The Pits!" activity from CPS curriculum guide (this is an extension of that activity).

Benchmarks & Objective:

LS-1: Compare the life cycles of different plants including germination, maturity, reproduction and death.

LS-2: Relate plant structures to their specific functions (e.g., growth, survival and reproduction)

SI-5: Record and organize observations (e.g., journals, charts and tables).

SI-6: Communicate scientific findings to others through a variety of methods (e.g., pictures, written, oral and recorded observations).

Objective:

The students will be learning about the seed and comparing its role in plants to the role of the egg in animals.

Materials:

- Avocados (one per student group; also have an additional one for demonstration)
    - Ahead of time, cut the avocados in quarters, but leave the flesh on the pit. The cutting is just meant to make it easier to take the avocado apart during the lesson. Just place four cuts on the four "sides" of the avocado so it can be easily quartered later.
- Toothpicks (at least four per avocado)
- Cups (large enough to fit a avocado pit in)
- 2 Eggs (one hard-boiled)

Target Concept:

- Students will understand that seeds play the role in plants that eggs do in animals. The seed contains what will become a "baby" plant.
- In order to build new tissue, both the egg and the seed provide protein which was manufactured previously by the parent.
- The structure of the egg and the seed are similar, with different layers of protein. However, some seeds (i.e., seeds in fruit) are surrounded by fleshy tissue that is not used by the seed.
- This fleshy stuff is meant to trick animals into spreading seed to allow the plants to reproduce in such a way that it won't overcrowd its local resources with its offspring.

Initial Introduction:

Ask the students about eggs. Ask them what they remember is inside an egg. Crack open the non-boiled egg and verify what they say. Cut open the hard boiled egg as a cross-section to show them the different parts of the egg. With them, identify the function of the egg white and the egg yolk. Explain about protein being needed for growth and the egg providing that protein. Perhaps even make analogies to animals that do not lay eggs but because of that require the mothers to eat much more food in order to build the tissue of the growing offspring inside of them.

Ask the students if plants have eggs. This should motivate the rest of the activity.

Procedure:

After motivating the activity (see the previous section), take apart your demo avocado. Show the students the fleshy outer stuff and the very hard pit underneath. Ask the students if they have ever cooked with avocado or seen someone cook with an avocado. See if you can get them to name foods that have avocado in them (e.g., guacamole). Ask them what part of the avocado gets eaten (the green flesh). What part does not get eaten? What do we do with the pit when we don't eat it? (we throw it away)

Identify the pit as a seed. Show them that the pit has a **soft spot** on its bottom. That soft spot connects to softer tissue in the middle of the pit. The hard outside shell of the pit and the soft inside tissue of the pit is analogous to the protein-filled outer shells of the egg and the pre-chicken inside the yolk. **The pit is a plant egg**. (point out that plants make food with their leaves and seeds have no leaves so they must use food packaged inside them in order to grow a new plant; eventually the new plant will make food for itself)

Make sure the students know that just as not all animals LAY eggs, not all plants drop seeds (later you can talk about how not all seeds have fruity flesh around them; they have to be spread another way; keep that for a future discussion).

Now **ask the students why the avocado plant takes all the extra effort to make that green fleshy fruit that the seed never uses**. To help them figure this out, explain that if seeds are dropped too close to the avocado plant, the children could use up all of the water needed for the parent and they all might not survive, so it is best for the avocado to spread its children far away from it. However, an avocado plant cannot throw seeds as easily as an animal can. Setup a situation where an animal is in a forest. Have them walk through what will happen when the animal comes upon the tasty avocado. You should be able to have them figure out that the animal spreads the seed for the avocado plant without even realizing it. Talk about how birds can spread tiny seeds for miles by eating a fruit and depositing their feces elsewhere. It might be fun to talk about how easy it is to digest watermelon seeds here.

FINALLY **pass out the avocados** to each student group. Have them observe with their eyes and with their hands the shape and size of the avocado. Have them **describe the avocado in their journals**. Have them draw it. Make sure they use descriptive words.

Once they are done with that, **the "It's the Pits!" activity starts**. Have them tear open the pre-cut avocado and get the pit out. Have them stick toothpicks in the avocado's sides in order to balance it on the cup. Fill each cup with water so that it covers the bottom (the part with the soft white center). Let these cups sit for a few weeks. Make observations about the state of the avocado periodically. Be sure they make an initial observation today before setting them aside. It is best to set them in a place away from a lot of direct sunlight. The avocado pits need to be convinced that conditions are right to sprout roots.

Feel free to **introduce vocabulary.** Consider ova, ovum, ovule, ovary, pit, and seed.

Target Observations:

- The students should understand the structure of the avocado, which is very similar to the structure of many other fruits.
- The students should understand that pits are like plant eggs.
- The students should understand how animals play a role in spreading seeds and why that is important to plants.
- The students should understand why plants take all of the extra effort to produce fruit.

Final Target Concept:

- What conclusion students should reach after making observations during the initial introduction and working through the preceding procedure.
- This should be any additional items or reinforced items that experiment demonstrated or could describe additional questions students ask

Summary & Discussion:

Summary of the lesson objectives and the activities the students have completed.
What did the students find? Leading questions to incite further questions and inquiries

Extensions (Optional):

- Related lessons or extended versions