



## Indicator Species of the Everglades: How is an egg like a pig frog in the Everglades?

A pig frog is an **indicator species**. An indicator species is defined as a species whose abundance in any given area is believed to indicate certain environmental or ecological conditions or suitable conditions for a group of other species (American Heritage Dictionary, 2011). For example, a high concentration of pig frogs in an area, like the Everglades, indicates that the wetland ecosystem has good water quality and an overall healthy system. The pig frog has semi-permeable skin allowing some of the water to pass through in order for it to breathe and hydrate. If the water is full of toxins and pollutants, then the toxins can pass through the pig frog's skin and negatively affects the health of the pig frog. Pig frogs are animals that scientists use to check on the wellness of the Everglades ecosystem. If something is wrong with these animals, then it is a good chance that there is a bigger problem that needs to be fixed in the ecosystem.

Like the pig frog skin, the egg has a semi-permeable membrane. It lets some water pass through it while trying to keep the bacteria out.

Let us demonstrate this with a little experiment that can be done at home.

**Standards:** SC.4.L.17.4, SC.5.L.15.1, SC.5.L.17.1, SC.6.N.1.5, SC.8.P.9.2

[Student sheet:](#) (attached below)

**Safety Warning:** Advise students to always wash their hands well with soap and water after handling raw eggs. Some raw eggs contain salmonella bacteria that can make them sick! Always recommend adult supervision when doing at home experiments.

**Egg-speriment Demonstration:** [\(Video Available\)](#)

**Materials:** You will need: 1 raw egg, white distilled vinegar, 2 small glass containers, water, and food coloring.

**Directions:** Place one whole raw egg into a small glass container. Pour enough vinegar into the container to cover the egg. Record your observations. What do you notice? Bubbles are forming around the egg. This is an example of a chemical reaction. How does it work? An eggshell is made primarily composed of calcium carbonate ( $\text{CaCO}_3$ ). Vinegar is an acid. The vinegar reacts to the calcium carbonate and starts to break down the shell. Can you predict what will happen after 24-48 hours? Record your predictions.

Let it sit for 24-48 hours. What do you observe? You now have a shell-less egg. The shell has disappeared, actually dissolved and the egg looks like it has gotten a little bigger. The egg anatomy includes 2 membranes, the outer and the inner, that lay between an eggshell and the egg white. The job of the membrane is to protect the egg against a bacterial invasion. The outer shell is a semi-permeable membrane, which means that liquid can pass through its pores. The egg is a little bigger because household vinegar contains approximately 96% water giving it the right solution to pass through the membrane and into the egg making it expand. This flow of water through a **semipermeable membrane** is called **osmosis**.

**Take it a step farther:**

Fill another glass container with approximately 1 cup of water (enough to cover the shell-less egg). Add a few drops of food coloring, and mix. Insert the shell-less egg into the colored water and leave it covered overnight in the refrigerator. Record your observations the next day. What happened? Because the colored water solution in the container has a higher concentration of water than the egg, water also passed through the membrane of the egg, thus changing its color. In this experiment, the egg membranes are also semi-permeable allowing the colored water to pass through it.

Watch this short video clip to see what other cool things scientists are learning about pig frogs in the Everglades:

<https://www.pbslearningmedia.org/resource/vtl07.la.rv.text.everglades/everglades-pig-frog-wild-tv/>

**Can you find out what other indicator species are in the Everglades?** Hint: It has feathers and its scientific name is *Mycteria americana*. (*Wood Stork*)

**Everglades Literacy Lesson Connection:**

Grade 3 Lesson 1: Classifying Everglades Animals and their Habitats

<https://www.evergladesliteracy.org/third-grade>

-Students will learn that animals can be classified into six major animal groups and become familiar with representative Everglades animals from all the major groups and with five different habitats of the Everglades where these animals live

**References:**

Steve Spangler of Science Naked Egg Video Experiment

<https://www.youtube.com/watch?v=vyOnGA0cmp0&feature=youtu.be>



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### Materials Needed:

1 Raw egg  
White distilled vinegar  
2 small glass containers  
Water  
Food coloring

### Student Procedures

Place one whole raw egg into a small glass container.  
Pour enough vinegar into the container to cover the egg.  
Record your observations.  
What do you notice? \_\_\_\_\_

Bubbles are forming around the egg. This is an example of a chemical reaction.  
How does it work? An eggshell is made primarily composed of calcium carbonate ( $\text{CaCO}_3$ ).  
Vinegar is an acid. The vinegar reacts to the calcium carbonate and starts to break down the shell.  
Can you predict what will happen after 24-48 hours? Record your predictions. \_\_\_\_\_

Let it sit for 24-48 hours. What do you observe? \_\_\_\_\_

You now have a shell-less egg. The shell has disappeared, actually dissolved and the egg looks like it has gotten a little bigger. The egg anatomy includes 2 membranes, the outer and the inner, that lay between an eggshell and the egg white. The job of the membrane is to protect the egg against a bacterial invasion. The outer shell is a semi-permeable membrane, which means that liquid can pass through its pores. The egg is a little bigger because household vinegar contains approximately 96% water giving it the right solution to pass through the membrane and into the egg making it expand. This flow of water through a **semipermeable membrane** is called **osmosis**.

### Take it a step farther:

Fill another glass container with approximately 1 cup of water (enough to cover the shell-less egg). Add a few drops of food coloring, and mix. Insert the shell-less egg into the colored water and leave it covered overnight in the refrigerator.

Record your observations the next day. What happened? \_\_\_\_\_

Because the colored water solution in the container has a higher concentration of water than the egg, water also passed through the membrane of the egg, thus changing its color. In this experiment, the egg membranes are also semi-permeable allowing the colored water to pass through it.

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#### References:

Steve Spangler of Science Naked Egg Video Experiment

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indicator species. (n.d.) *American Heritage® Dictionary of the English Language, Fifth Edition*. (2011).

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