Texas A&M AgriLife Extension

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Egg to Chick: Classroom Experiments

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One of the best ways to help students to understand and remember information and concepts is to give them hands-on involvement in what you're teaching them. When teaching life sciences, this can be difficult because science projects that excite students are sometimes scarce. However, incubating and hatching chicken eggs can be made into projects that are as simple or as elaborate as you need them to be. Activities such as candling to observe the embryo grow, examining embryos at different stages of growth, and observing a beating heart are just a few aspects of incubation projects. Eggs can also be used to teach scientific principles such as air pressure, inertia, and osmosis.

You can vary the complexity of egg and embryo projects to teach scientific principles and techniques to students from kindergarten to grade twelve. Classroom experiments with chicken embryos can lay the foundation for understanding broad subjects such as nutrition and the circulatory system, or the basics of data measurement, collection, and analysis. These projects can expand biological literacy, introduce complex concepts, and develop an appreciation for life and life science. For students in urban environments, these types of classroom experiences are increasingly rare.

Not all eggs are created equal

Supplies needed:

- 1 to 3 whole raw grocery store eggs
- 1 to 3 fertilized eggs
- Magnifying glasses
- Petri dishes

Procedure:

Ask the students to discuss what they think is the difference between a fertilized egg and an unfertilized egg. This is a good time to go over the parts of the egg. Then carefully open the eggs and place them in the petri dishes and have the students observe the differences.

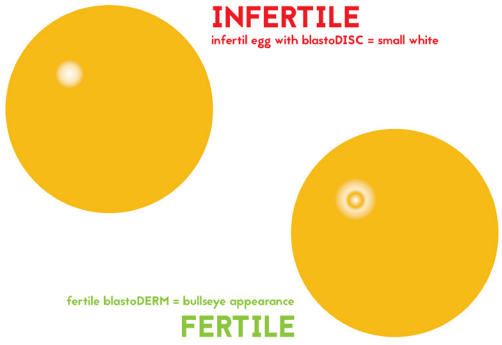

Image: Reington May

Egg strength test: Book test

Supplies needed:

- At least six whole egg shells
- Books of varying sizes and weights
- 12 raw eggs
- Saran wrap
- Trashcan
- Tweezers

Procedure:

To prepare the egg shells for the book test, use the tweezers to carefully chip a small circle from the small end of the egg until the egg will "sit-up" on its end. Dump out the yolk and white and rinse the inside of the egg. Try to make six shells of similar heights—it is usually good to have a few extras.

Set 6 of your shells up in two rows of three. The shells in each row should be about an inch apart and the rows roughly the same. Have the students make a hypothesis about how many books the shells will hold or what type of books they will hold. Then slowly start stacking books on the shells. You can start with a thin encyclopedia and add from there. Be creative.

Another book test you can do is to take 6 raw eggs, wrap them in plastic wrap, and ask for another hypothesis about the number of books the whole eggs will hold. Then repeat the experiment described above.

Egg strength test: Strong man

Select a whole raw egg and make sure it does not have any cracks. Ask students if they think the egg will break if it is squeezed between your hands. Then, over a trash can (just in case) place the ends of the egg in your palms, lace your fingers and start to squeeze. The egg will (usually) not break.

These experiments demonstrate that the egg has one of nature's strongest architectural designs, the 3-dimensional arch. You can then explain why the egg needs to be strong.

Egg porosity

Supplies needed:

- Hard boiled eggs (number depends on your group)
- Liquid food coloring (not gel)
- Gloves (optional)
- Newspaper
- Paper towels

Procedure:

Have the students hypothesize about whether eggs have holes in them. Ask them to explain what their hypothesis is based on.

Place the hard boiled eggs on the newspaper, have the students put on gloves (optional) and then have them place drops of food color on the outside of the egg shells. Let the eggs sit for 5 to 15 minutes and then have the students wipe of the excess dye with a paper towel and then peel the eggs.

Were their hypotheses correct or incorrect?

Have them discuss what they have observed and why it would be necessary for eggs to be porous.

Chick tracker

Supplies needed:

- 21 plastic (openable) eggs (may need a few sets)
- Paper
- Pencils, map pencils, etc.

Procedure:

Have the students draw on small egg-shaped pieces of paper what the embryo looks like on each day

of incubation and then place it in one of the plastic eggs.

This activity reinforces how the embryo changes each day.

Image: Remington May

The incredible shrinking egg

Supplies needed:

- Small scale
- Eggs in incubation
- Spreadsheet

Procedure:

Label all of the eggs in the incubator. Letters or numbers work well for this. Use either a wax or graphite pencil. Have the students pick five random eggs and weigh each of them every day from the day they start incubation until they hatch. Have the students hypothesize whether the eggs will gain or lose weight as the embryo grows. Have them chart the eggs weight and notice any weight changes. You can weigh and track all of the eggs if you would like.

Another project is to take a raw egg and carefully separate the shell, yolk, and albumen and weigh them separately to see how much each contributes to the total weight of the egg.

Illuminating the embryo

Supplies:

- Small flashlight
- Eggs incubation
- Dark room

Procedure:

In preparing to candle the egg you should turn on the flashlight and turn off all other lights in the room. Place the large end of the egg against the flashlight (candler) and rotate egg in order to see what is inside. Don't shine the light directly into your eyes. The light is harmless but do not hold it close to the egg for long, especially if the bulb is hot.

Carefully hold the egg so as not to crack it. After viewing the egg, place it carefully back into the incubator.

When candling the egg you should look for the air sac and pores in the egg shell. You should also note the yolk and blood vessels or a thin red ring


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around the yolk depending on the stage of incubation.

After a week of incubation you may actually see the embryo move.

Disappearing shell and learning through osmosis

Supplies:

- White vinegar
- Corn syrup
- Water
- Raw egg(s)
- Food coloring
- Gatorade®
- A few cups or glasses
- Small scale

Procedure:

First place the eggs into the vinegar for 48 hours

Weigh each egg after you note the change that has occurred

Fill three glasses with either corn syrup mixed with food coloring, water and food coloring, or Gatorade® and place 1 egg in each.

Leave over night

Check on eggs and see what happened, then weigh the eggs.

So what happened? First the egg shell should have disappeared after soaking 48 hours in vinegar. This happens because vinegar contains acetic acid which reacts with calcium of the egg shell. The

second demonstration shows osmosis. The membrane of an egg is semipermeable allowing certain substances to flow in or out of the egg. Have your students guess what will happen in each solution before you do the experiment.

For a long term experiment, place an egg in a glass of Coca Cola® for a year. This demonstrates what soda can do to your teeth!

Photo: Bill Watson

The specific gravity of the situation

Supplies:

- 3 large glasses or tall containers
- 3 eggs
- Salt

Procedure:

Fill the three glasses with water

Place an egg in each glass. They should sink.

In one glass add salt until the egg floats to the top.

In the second glass add salt slowly until you get the egg to float in the middle.

This experiment demonstrates specific gravity or density of the egg compared to the water. When

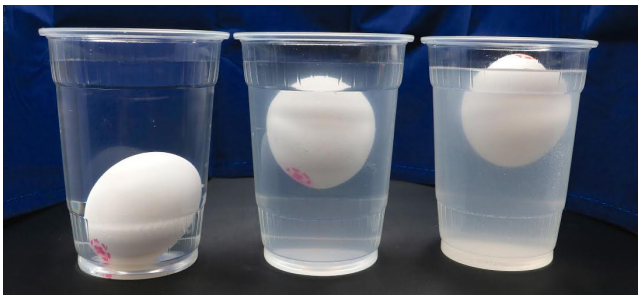

Photo: Bill Watson

the egg floats in the middle it has the same density as the water, when it floats it is less dense and when it sinks it is more dense then the water. Explain to your students that this is why it's easier to float in the ocean than in the pool.

It's all about inertia

Supplies:

- Cardboard toilet paper roll
- Raw eggs
- Water
- Glass
- Pie pan

Procedure:

1. Fill the glass with water
2. Place the pie pan on top of the glass
3. Stand the toilet paper roll in the center of the pan
4. Place the egg on top of the toilet paper roll
5. Now stand back and hit the pie pan from the side off of the glass.

The egg should fall into the glass of water. This demonstrates Isaac Newton's first law of motion, an object at rest tends to stay at rest. The egg was not hit so it stayed at the same spot until gravity acted on it and pulled it down.

Egg in a bottle

Supplies:

Method 1:

- Peeled hardboiled egg
- Plastic bottle with large mouth opening (just too small to fit the egg through)
- Electric tea pot or way to boil water
- Bucket
- Oven mitts

Method 2:

- Peeled hardboiled egg
- Glass milk bottle
- Strips of paper
- Match or lighter

Procedure:

Method 1:

1. Demonstrate that the egg does not fit into the bottle.
2. Boil water.
3. Carefully pour the water into the bottle.
4. Allow to sit for 30 seconds.
5. Pour water out into bucket (wear oven mitts as its hot).
6. Quickly set the bottle down and put the egg on the top.
7. Wait for the egg to get sucked into the bottle.

Method 2:

1. Demonstrate that the egg does not fit into the bottle.
2. Light strip of paper on fire and place into bottle.
3. Quickly put the egg on top of the bottle.
4. See the egg get sucked in.
5. Note you cannot do this twice in a row without getting oxygen into the bottle.

To get the egg out blow into the bottle while sealing it against your face. This experiment demonstrates the effect of air pressure.

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