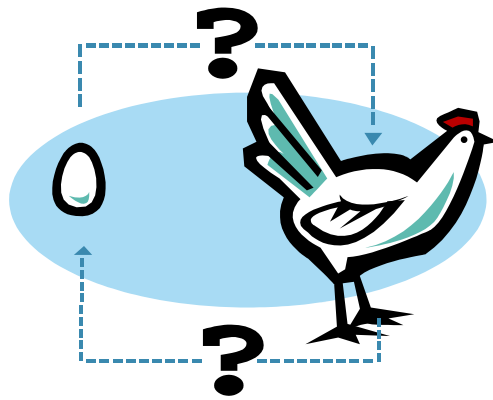


# Egg-citing Egg-Speriments



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## Chick Make-Over

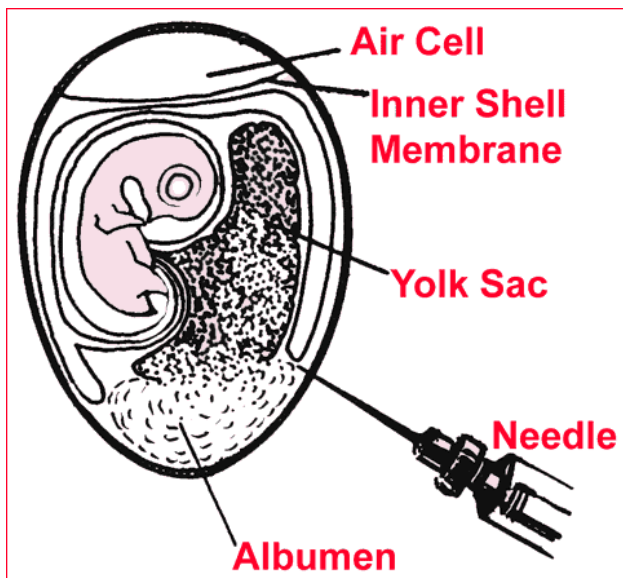
### Supplies Needed:

Eggs that are 11-14 Days into the incubation process  
Regular food dye (not gel)  
3cc syringes (one for each color used)  
25g x 5/8 in needles (one for each egg injected plus a few extras)  
Scotch Tape  
Alcohol Wipes

### Procedure:

Prior to beginning, prepare your syringes with approximately .5-1 cc of dye

1. Candle the eggs you intend to dye and remove any that are not viable.
2. Using the alcohol wipe clean a small area on the small end of the egg
3. Carefully insert the needle into the clean spot and slowly inject the dye.
4. Re-clean the injection area with an alcohol wipe
5. Cover injection hole with Scotch Tape.
6. Replace egg in the incubator.



## Egg-ceptional Egg Strength Tests

### Supplies needed:

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

### Procedures:

To make the egg shells for the book test, carefully remove the small end of the egg by chipping away (tweezers work well for this) at the shell in a circle until the egg will “sit-up” on its end. You will want to dump out the yolk and white and wash the egg out. Try to make six shells of similar heights. (extras are usually a good thing just in case)

### For the Book Test:

Take six of your hollow shells and set them up in two rows of threes. The shells 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. I usually start with a thin encyclopedia and then go from there. Be creative!

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

### For the Stong Man vs. Egg Test:

Take a whole raw egg, 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 not break.

These experiments are good lead into how the egg is one of nature’s strongest architectural designs, the 3-dimensional arch and why the egg needs to be strong.

## **Egg Porosity**

### **Supplies Needed:**

Hard boiled eggs (number depends on your groups)  
Regular Food Dye (not gel)  
Gloves (optional)  
Newspaper  
Paper towels

### **Procedure:**

Have the kids hypothesize about whether or not eggs have holes in them. Ask them to explain why they think the way they do.

Place the hard boiled eggs on the newspaper, have the kids glove up (If wanted), and then have them place drops of food color on the outside of the egg shells. Let the eggs sit for 5-15 mins and then have the students wipe of the excess dye with a paper towel and then peel the eggs. Where their hypotheses correct? Incorrect? Have them discuss what they have observed and why it would be necessary for eggs to be porous.

# Embryo Window

Windowing Chicken Eggs for Developmental Studies

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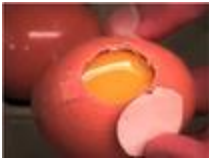
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## Abstract

The study of development has been greatly aided by the use of the chick embryo as an experimental model. The ease of accessibility of the embryo has allowed for experiments to map cell fates using several approaches, including chick quail chimeras and focal dye labeling. In addition, it allows for molecular perturbations of several types, including placement of protein-coated beads and introduction of plasmid DNA using in ovo electroporation. These experiments have yielded important data on the development of the central and peripheral nervous systems. For many of these studies, it is necessary to open the eggshell and reclose it without perturbing the embryo's growth. The embryo can be examined at successive developmental stages by re-opening the eggshell. While there are several excellent methods for opening chicken eggs, in this article we demonstrate one method that has been optimized for long survival times. In this method, the egg rests on its side and a small window is cut in the shell. After the experimental procedure, the shell is used to cover the egg for the duration of its development. Clear plastic tape overlying the eggshell protects the embryo and helps retain hydration during the remainder of the incubation period. This method has been used beginning at two days of incubation and has allowed survival through mature embryonic ages.

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#### Protocol

##### 1. Remove eggs from incubator

- Maintain at 37°C with relative humidity set above 60%.
- Remove the eggs; turn eggs 90° so that the large base lies horizontal.

##### 2. Swab eggs to sterilize

- Saturate a stack of non-sterile gauze with 70% ethanol.
- Use two to three pieces to swab up to 5 eggs. Discard when the gauze is soiled.

##### 3. Preparing albumen removal site

- Cut and place a 1" x 1" piece of 3M plastic tape just left of the base to protect the area where the albumin will be drawn out.

##### 4. Removal of albumen

- Use the point of a pair of scissors to make a small hole in the middle of the tape.

- Using a 10 cc syringe with an 18-gauge, 1-inch needle, slowly drill the needle through the hole made by the scissors.
- Drive the needle down at a 45° angle towards the bottom of the egg.
- Tilt the needle towards the center and draw up 3 to 4 mL of albumen.

#### 5. Windowing

- Cut a 3" x 3" piece of plastic tape and stretch it to fit on the top of the egg. Extend the corners of the square around the rounded ends of the horizontal surface of the eggs, being careful not to pull too hard. Pull the tape so that it is tight against the surface of the eggs with no folds.
- Using a pair of sharp-straight 4" dissection scissors, twist a hole into the bottom center of the area where the tape was placed. Slowly guide the lower blade of the scissors into the egg being sure to keep the tips up against the inside of the shell. Direct the blade towards the base and slowly begin to cut the shell. Proceed in a counter-clockwise fashion, stopping just before reaching the top center. Remove the scissors and repeat going in the opposite direction until only a small bit of the egg remains attached. Check to be sure the egg is fertilized. Shut the window.

#### 6. Closing, reopening and sealing the egg.

- Cut about a 2-3" long by 1/2" wide plastic tape and shut the window so it fits back into the hole that was cut. Take another 1 x 1" piece of tape and seal the hole from which the egg was drained. Use a pair of forceps to reopen the egg to do any manipulations. When you're ready to return the eggs to the incubator, cut a piece of tape that is large enough to seal the window and cover the entire horizontal surface of the egg.

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2562489/>

## **What does the chick look like today?**

### **Supplies Needed:**

21 plastic (openable) eggs (may need to do a few sets)

Paper

Pencils, map pencils, etc.

### **Procedure:**

Have the kids draw on a small egg-shaped piece of paper what the embryo looks like on each day of incubation and then place it in on of the plastic eggs.

This activity reinforces how the embryo changes each day.



## What's the Difference?

### **Supplies needed:**

1-3 Whole raw grocery store eggs

1-3 Fertilized eggs

Magnifying glasses

Petri dishes

### Procedure:

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

## The Biggest Loser

### Supplies Needed:

Small scale

Eggs in incubation

Spreadsheet

Procedure:

Label all of the eggs in the incubator. Alphabet letters or numbers work well for this. Just use either a wax pencil or a regular pencil. Have the kids pick 5 random eggs to weigh. Weigh each of these eggs everyday from the day they start incubation until they hatch. Have the students hypothesize on whether they think the eggs will gain or lose weight as the embryo grows. Have them chart the eggs progress and notice what the eggs are doing. You can choose to weigh and track all of the eggs if you would like.

Another fun weight activity is to take a raw egg and carefully separate all the parts: shell, yolk, albumen, and weigh each of the parts to see how they make up the weight of the egg.

**References:**

<http://www.kidcraftsmagazine.com/2006/10April2006.shtml>

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2562489/>

<http://chickscope.beckman.uiuc.edu/explore/embryology/>

<http://teachers.net/lessons/posts/2827.html>

**Other Handy Websites etc.:**

<http://www.4-hcurriculum.org/product.aspx?id=1370&c=Embryology> :  
Embryology in Classroom set of 2 books.

**Magic School Bus Cracks a Yolk**

**Discover Streaming**

**or**

<http://www.youtube.com/watch?v=jaSa6qXVQk4>

**How Its Made: Hatchery Video**

<http://www.youtube.com/watch?v=bkuohLV2u0k>

**And when all else fails: GOOGLE**