

CURRICULUM SUPPLEMENT

EMBRYONIC ILLUMINATION

AN EGG CANDELING ACTIVITY

For use with the **Center** section of *Eyes on Eiders*

Overview: Students will discover that a ordinary light can be a valuable scientific tool when it comes to determining the health of a Steller's Eider (or any bird actually) egg. Thru comparison of data students will determine the health of a Steller's Eider egg. Then they will candle their own eggs and make observations, comparing their results with those of the class.

Learning Objectives:

The student will:

- *Understand and be able to explain how **candeling is a simple yet powerful tool for researchers, and husbandry staff** to help them determine the health of an egg.*
- ***Build a candeling box to use in the illumination of their egg specimens.***

Standards Addressed:

Alaska Science GLES :

<https://education.alaska.gov/akstandards/standards/standards.pdf>

5th: SA1.1, SA1.2, SA3.1

6th: SA1.1, SA1.2, SA3.1

7th: SA1.1, SA1.2, SA3.1

8th: SA1.1, SA1.2, SA3.1

Next Generation Science Standards:

<https://education.alaska.gov/akstandards/standards/standards.pdf>

There are no direct standards for hands on use of an apparatus. However due to the way in which the NGSS is constructed this activity is supported by the theme of several standards.

Materials/Location Needed:

- *This lesson encompasses two activities; both of which can be done in the classroom or lab setting.*
- *Enough chicken eggs for each student or group (if you have a local connection and can obtain fertilized eggs we recommend you do so!) otherwise unfertilized eggs from the grocer's will suffice.*
- *Bright light source such as an old overhead projector.*
- *Enough black construction paper, shoe boxes, glue/tap for each student or group.*
- *Copies of "Steller's Eider Egg Candeling" composite photo found on page 4 of this lesson, either printed for each group or displayed on board for entire class to consult.*
- *Copies of "Steller's Eider Incubating Health Information" composite photo found on page 5 of this lesson, either printed for each group or displayed on board for entire class to consult.*
- *Copies of individual candeled eggs found starting on page 6 of this lesson. One photo per student or group.*
- *Student worksheet found on page 10 of this lesson. Clipboards and pencils.*

Teaching Time: 45 minutes.

Preparation Time: 30 minutes.



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Background:

The researchers on the Steller's Eider Team use the technique of candeling to measure the health of eggs, just like poultry farmers have done for hundreds of years. This simple yet effective peek past the outer shell and into the world of the duck embryo seems almost magical, and yet can be accomplished by simply applying a bright light source against the egg's outer shell. Everything from embryo development, bacterial infection, to malformation can be sensed by candeling.

Directions:

Activity 1

1. After completing the **Center** section of *Eyes on Eiders*, explain to your class that they are going to collect some data to determine the health of their very own eggs.
2. Just as they saw Nathan doing in the video they will be candeling their eggs, but first they are going to take a look at some data collected by Nathan and his colleagues.
3. Either display or pass out the "Steller's Eider Egg Candeling" composite photo. Explain that this is the record of a healthy Steller's Eider duckling who hatched at the Alaska SeaLife Center and was named Solo.
4. Next distribute to the students a copy of the individual candeled eggs. One per student or group they are going to make comparisons between their photo and the series on the "Steller's Eider Egg Candeling" photo.
5. Finally, show them the "Steller's Eider Incubating Health Information" composite photo either as a handout or projected alongside the "Steller's Eider Egg Candeling" photo.
 - a. Explain that these are photos of Steller's Eider eggs that did not hatch due to problems with the egg or embryo inside
6. By comparing their photo to these two large composite photos students can record on their worksheets the approximate age of their egg photo and the relative health.

Activity 2

1. Advise your students that next they will be building their own devices to candle eggs with.
2. Have students gather the material needed to build their candeling boxes.
 - a. Black construction paper
 - b. Shoe box
 - c. Glue/tape
 - d. Scissors
3. If using an overhead projector as your light source students can remove the lid from their shoe boxes, turn the box upside down, cover with black construction paper, and finally cut an approximate $\frac{1}{2}$ " hole in the center of the box.
 - a. Students will place the box atop the overhead projector (which you should prep prior to the activity with black construction paper to block out almost the entire top surface / covering most of the light).



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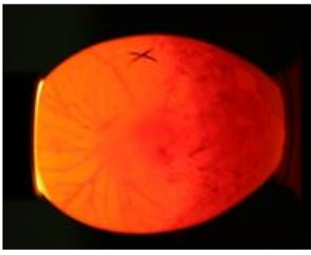
- b. If you are using an alternate light source just have the students modify their boxes so that there is a hole for light to come in. This may require an additional hole and the use of the lid.
4. Pass out one egg to each student or group (this might be a good idea to mention to your students that they should take care with their eggs and not damage them as they will be using these same eggs for the next lesson also).
5. Next darken your room and students will then, one at a time, place their egg on the hole they cut into the box.
 - a. Ask your students to make observations about what they see on their worksheets. (If using store purchased eggs there will not be much to see but there may be notable differences between the eggs)
 - b. Ask your students to make comparisons between their eggs from both activities and record their observations on their worksheet.

Assessment:

Students can be assessed on participation in many aspects of the activity and/or their success at completion of the worksheet.



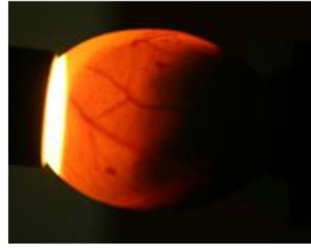
STELLER'S EIDER EGG CANDELING



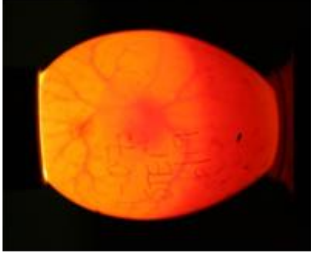
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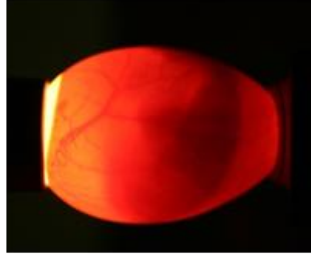
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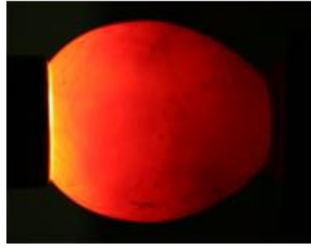
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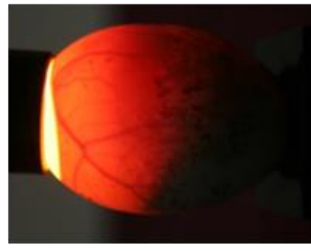
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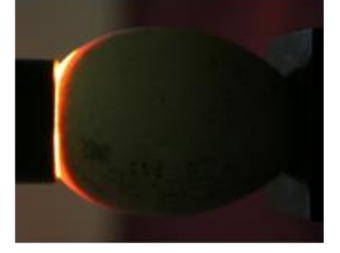
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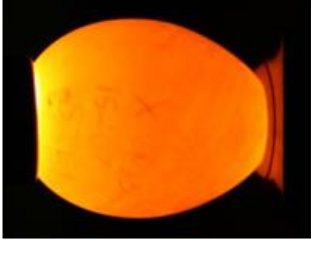
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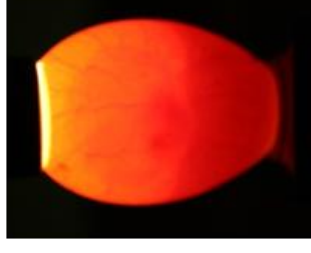
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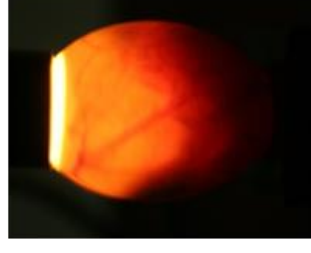
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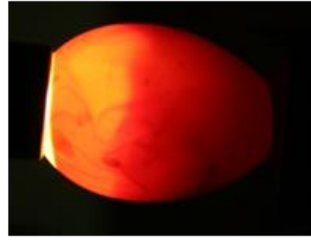
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Steller's Eider Incubating Health Information

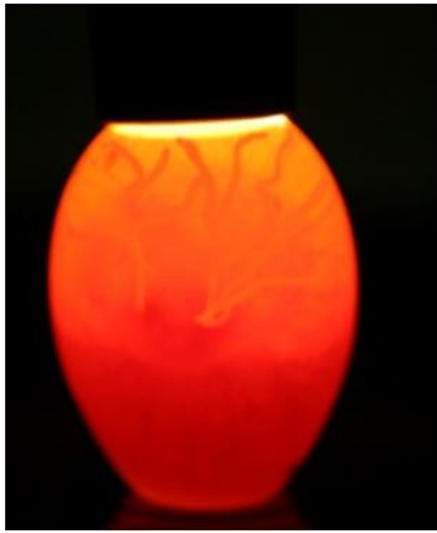
While incubating eggs, candling is an important strategy to record the health and progress of the egg. Below are some ways to tell if an egg is unhealthy.



Spots can indicate bacterial contamination.

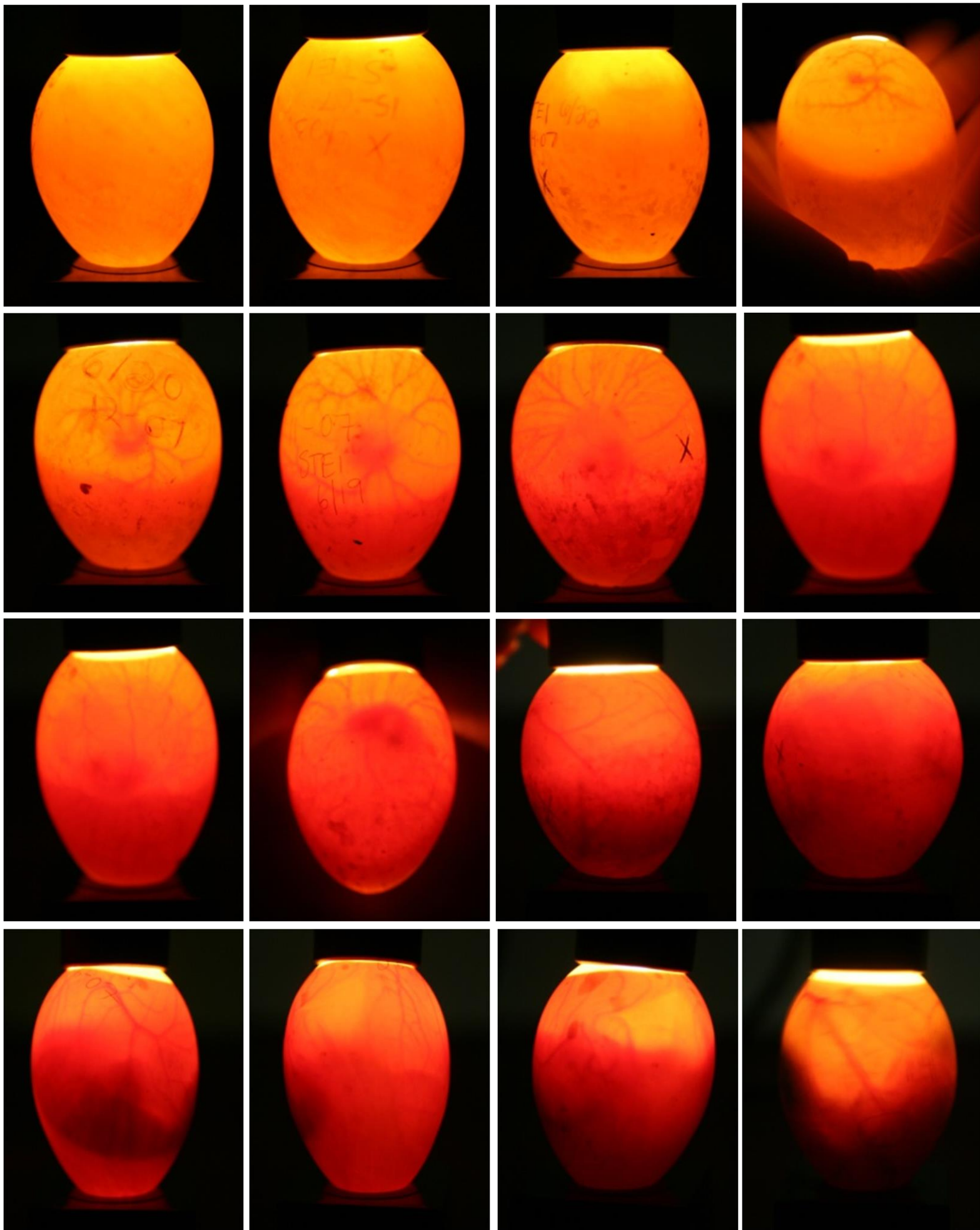


This egg has a blood ring and lack of healthy blood vessels, it is nonviable.

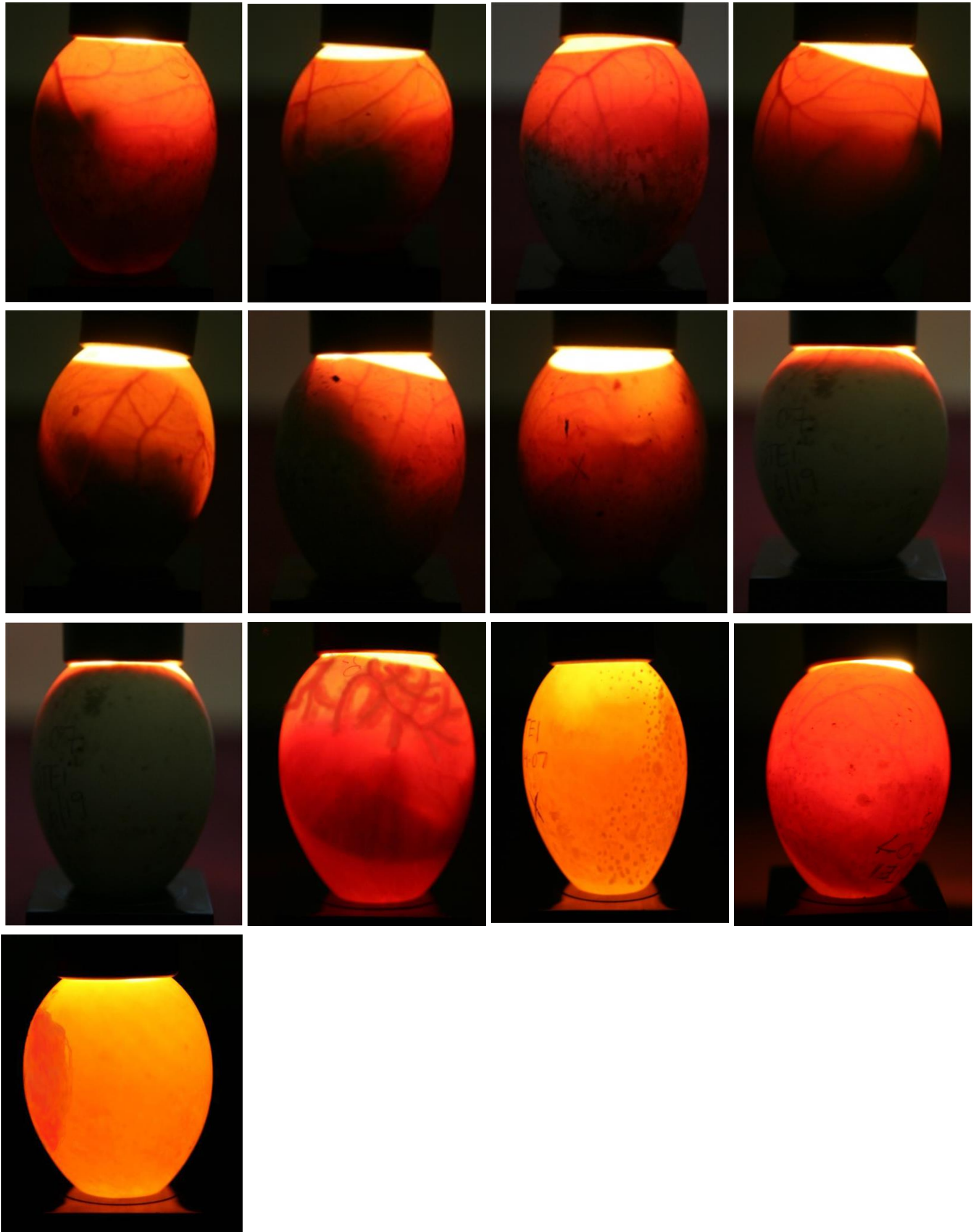


Fuzzy blood vessels are not a healthy sign.

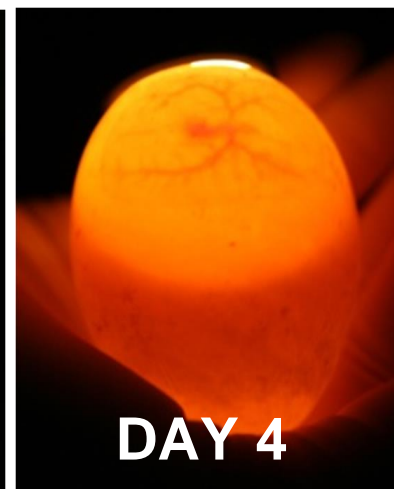
STELLER'S EIDER INDIVIDUAL CANDLED EGGS – CUT THESE OUT!



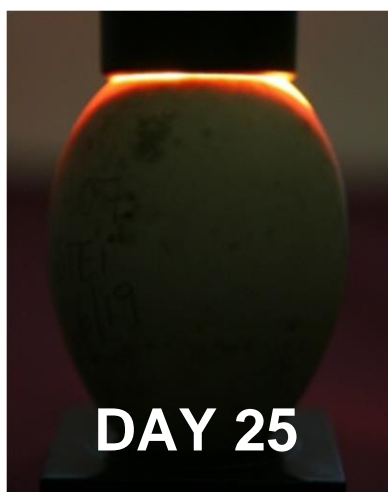
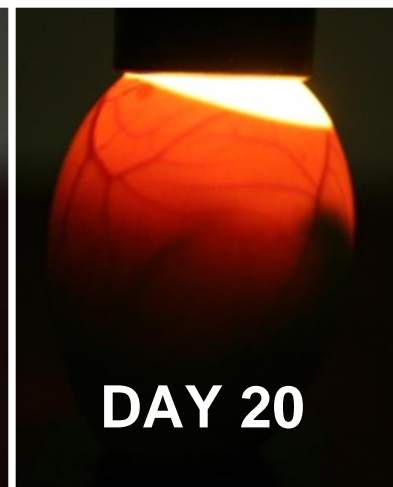
STELLER'S EIDER INDIVIDUAL CANDLED EGGS – CUT THESE OUT!



STELLER'S EIDER INDIVIDUAL CANDLED EGGS – KEY



STELLER'S EIDER INDIVIDUAL CANDLED EGGS – KEY



STUDENT WORKSHEET

Name _____ Date _____ Class _____

Activity #1: Egg Check-up! Compare the photo of your Steller's Eider egg to the two posters your Teacher showed you. Does your photo match one of the eggs on the posters? Can you tell if it is healthy or not? Can you determine how old your egg is? Write your answers below.

1. What other industry or professionals might use egg candeling and why? _____

Activity #2: Light up that egg!

2. Record your observations as you candle your egg here: _____

3. Compare the candled eggs from each activity and record any similarities or differences here:

STUDENT WORKSHEET – TEACHER’S KEY

Name _____ Date _____ Class _____

Activity #1: Egg Check-up! Compare the photo of your Steller’s Eider egg to the two posters your Teacher showed you. Does your photo match one of the eggs on the posters? Can you tell if it is healthy or not? Can you determine how old your egg is? Write your answers below.

4. What other industry or professionals might use egg candeling and why? _____

Activity #2: Light up that egg!

5. Record your observations as you candle your egg here: _____

6. Compare the candled eggs from each activity and record any similarities or differences here:
