



# How EGG-ceptional Are We? (Middle School)

## Evolution: Embryonic Development



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|--------------------|-----------------|-------------------|-------------------|
| <b>Grade Level</b> | 7th – 8th Grade | <b>Time Frame</b> | 150 minutes       |
| <b>Subject</b>     | Science         | <b>Duration</b>   | 2-3 class periods |
| <b>Course</b>      | Biology I       |                   |                   |

### Essential Question

How do we decide what to believe about evolutionary claims?

### Summary

Students will investigate the similarity of reproduction, embryonic development, and DNA sequences to illustrate the indirect evidence for evolution. This lesson is adapted for a middle school class.

### Snapshot

#### Engage

Students listen to the storybook *An Egg Is Quiet* then discuss observations from the book.

#### Explore

Students attempt to sort embryo images into similar groups.

#### Explain

Students use a second card sort and analysis questions to draw conclusions.

#### Extend

Students analyze a graph to draw conclusions about similarities between organisms.

#### Evaluate

Students answer open response questions to collect their thoughts and ideas.

## Standards

Oklahoma Academic Standards (8th Grade)

**8.ESS1:** Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.

**8.LS4.3.1:** Comparison of embryological development of different species also reveals similarities that show relationships not evident in the fully-formed anatomy.

## Attachments

- [Analysis-Questions-How-EGG-ceptional-Are-We - Spanish.docx](#)
- [Analysis-Questions-How-EGG-ceptional-Are-We - Spanish.pdf](#)
- [Analysis-Questions-How-EGG-ceptional-Are-We.docx](#)
- [Analysis-Questions-How-EGG-ceptional-Are-We.pdf](#)
- [Animal-Embryo-Development-Graph-How-EGG-ceptional-Are-We - Spanish.docx](#)
- [Animal-Embryo-Development-Graph-How-EGG-ceptional-Are-We - Spanish.pdf](#)
- [Animal-Embryo-Development-Graph-How-EGG-ceptional-Are-We.docx](#)
- [Animal-Embryo-Development-Graph-How-EGG-ceptional-Are-We.pdf](#)
- [Explain-Card-Sorts-How-EGG-ceptional-Are-We - Spanish.docx](#)
- [Explain-Card-Sorts-How-EGG-ceptional-Are-We - Spanish.pdf](#)
- [Explain-Card-Sorts-How-EGG-ceptional-Are-We.docx](#)
- [Explain-Card-Sorts-How-EGG-ceptional-Are-We.pdf](#)
- [I-Used-to-Think-Now-I-Know-Worksheet-How-EGG-ceptional-Are-We - Spanish.docx](#)
- [I-Used-to-Think-Now-I-Know-Worksheet-How-EGG-ceptional-Are-We - Spanish.pdf](#)
- [I-Used-to-Think-Now-I-Know-Worksheet-How-EGG-ceptional-Are-We.docx](#)
- [I-Used-to-Think-Now-I-Know-Worksheet-How-EGG-ceptional-Are-We.pdf](#)
- [Lesson-Slides-How-EGG-ceptional-Are-We.pptx](#)
- [Student-Version-Embryo-Cards-How-EGG-ceptional-Are-We - Spanish.docx](#)
- [Student-Version-Embryo-Cards-How-EGG-ceptional-Are-We - Spanish.pdf](#)
- [Student-Version-Embryo-Cards-How-EGG-ceptional-Are-We.docx](#)
- [Student-Version-Embryo-Cards-How-EGG-ceptional-Are-We.pdf](#)
- [Teacher-Version-Embryo-Cards-How-EGG-ceptional-Are-We.docx](#)
- [Teacher-Version-Embryo-Cards-How-EGG-ceptional-Are-We.pdf](#)

## Materials

- *An Egg Is Quiet* by Dianna Aston
- Lesson Slides (attached)
- Student Version Embryo Card Sort (attached, one per group of 2-3, cut out)
- Teacher Version Embryo Card Sort (attached)
- Explain Card Sort (attached, one per group of 2-3, cut out)
- Analysis Questions (attached; one half-sheet per student)
- Animal Embryo Development Graph (attached; one per student)
- I Used to Think, but Now I Know Handout (attached; one half-sheet per student)
- Sticky notes

# Engage

Open the attached **Lesson Slides**. Go to **slide 3** to introduce the essential questions and then to **slide 4** to introduce the objectives to students.

Go to **slide 5**. Read the picture book *An Egg Is Quiet* by Dianna Aston to students. If you do not have access to the book, show students the following "[An Egg Is Quiet](#)" read-aloud video on YouTube. While you read, students should use the [Notice/I Wonder strategy](#) to write down observations, important details, and questions they think about as the teacher reads.

## Embedded video

<https://youtube.com/watch?v=KgVaNbrCayU>

## Teacher's Note: Read a Picture Book? To Middle Schoolers?

Yes, that is the Engage, and yes, middle schoolers can be engaged by a picture book. Humans rely on sight observations more than any of us would like to admit, and picture books capitalize on that. It'll be nostalgic for them, and can be a break from the seriousness of getting older.

Allow students to look back through the book if they need to revisit it. In pairs, have students share what they've written and revisit the book (or copies of pages of the book) to either reinforce the observations they made or to revise them. Also, use this time for students to discuss the questions they wrote and see if rereading the book answers the questions or if further investigation is needed.

## Teacher's Note: Appropriate Observations

Considering the context of the lesson, it would be ideal for students to get to the point of observing multiple species, with a great amount of diversity, all reproduce through egg/embryonic development. Also, all eggs, even though they are all different in shape, size, and species, function in the same way: protection and nutrition.

## Explore

Go to **slide 6** and pass out the 'Set A' Card Sort embryo cards (letters at the bottom) from the attached **Student Version Embryo Cards** to groups of two or three students. This activity is done using the [Card Sort](#) instructional strategy. Prompt students to group together embryos that they think are similar. There are no duplicates, so each is a unique animal, but possible categories could be mammals, reptiles, amphibians, etc. Some students will think these are similar animals but in different developmental stages. Try to leave it open-ended and leave the prompt as 'group what you think is similar together' if possible. When students are done, have them do a modified [Gallery Walk](#), where students write why their group decided the card groupings on sticky notes as category headings. The groups then rotate and read the other groups' ideas. When a full rotation through has happened, give time for students to decide if they want to change their original groupings or not.

### Teacher's Note: Expect Low Success

This is a very difficult task, which is the point. Let them struggle. A teacher key is included in the Lesson Slides and attachments, but that's for when the task is over and it's time to debrief. These moments of disequilibrium are the gateway towards opening the mind to other thinking.

Taking the idea further, pass out the 'Set B' Card Sort embryo cards from the same document to each group, so that both Set A and Set B are together. Give the prompt again to create groups. Students will probably understand that the idea is to pair the embryo with the developed animal, but try not to give it away.

### Teacher's Note: The Reveal

The answers of what embryo is what animal is included not only as a teacher key but also in the Lesson Slides (**slides 7-15**) to show students when they've struggled enough. At some point reveal the answers, but try to let the struggle happen as long as possible without leaving students too frustrated.

# Explain

Let students keep the Card Sorts for reference during Explain and some of the Extend.

Go to **slide 16** and pass out the attached **Explain Card Sort** cards with a few of the stages of a chicken embryo and a mouse embryo. Either display the prompt or verbally share the prompt: "There are two sets. Separate the two sets, then put each set in order." Allow students to work on this in pairs.

## Teacher's Note: Another Card Sort?

Embryonic similarities are based on visual characteristics that are similar, then different, as the embryo develops. There are multiple card sorts in this lesson so that students receive multiple kinds of pictures and perspectives to be able to draw conclusions from all the evidence. Think of this as adding another layer of understanding, thus another visual example, for students to process.

Once students think they have completed the prompt, distribute the attached **Analysis Questions**. Using the strategy [Inverted Pyramid](#), have students share their answers with partners, creating a shared answer that represents both of their answers. Then, partners join together to make a group of four, sharing again, this time with a focus on the statements generated. Once the groups of four construct a shared statement, each group shares their statements with the whole class, with the teacher writing them on the board for everyone to see. From here, explain to students how all organisms develop in the same stages, called Carnegie Stages, but they go through those stages at different rates and different sizes. Explain how the organ shapes will be different for different animals, but the stages themselves are all the same.

## Teacher's Note: Lesson Slides Assist

In the Lesson Slides, there is a very simplified breakdown of the Carnegie Stages (**slides 17-20**). Using it is optional, but no matter what is used, there needs to be an emphasis on the sameness of the Carnegie Stage progression, but how (especially the later stages) the physical appearance of each organism may look different within the stages.

## Optional Resource

For optional material, consider referencing the following article on chick development: "[A Series of Normal Stages in the Development of the Chick Embryo](#)." It's a long read, but a good one for kids who are interested.

## Extend

Go to **slide 21** and distribute the attached **Animal Embryo Development Graph** to each student. Have them construct the chart and answer the questions. Allow them to use this data to support their products in the Evaluate section.

# Evaluate

Go to **slide 22** and pass out a half sheet from the attached [I Used to Think... But Now I Know](#) document to each student. Give about 5 minutes for students to reflect on what was presented to them and record what they used to think about embryos and fetal development compared with what they now know. Have students share their responses with a partner, then turn their responses in as an [Exit Ticket](#).

## What Are Acceptable Responses?

Most of the time, students will talk about how they didn't realize how babies develop, or make that connection with pregnancy. Students may connect with the information presented, or they may resist it because of other information or what they've been told in other places. Don't force particular statements; otherwise, it may be impossible to tell what a student is or is not retaining. Evaluate doesn't always mean "right" or "wrong"—in this case, it means "What conclusions did students individually come to?"

## Resources

- K20 Center. (n.d.). Bell Ringers and Exit Tickets. Strategies. <https://learn.k20center.ou.edu/strategy/125>
- K20 Center. (n.d.). Card Sort. Strategies. <https://learn.k20center.ou.edu/strategy/147>
- K20 Center. (n.d.). Gallery Walk/Carousel. Strategies. <https://learn.k20center.ou.edu/strategy/118>
- K20 Center. (n.d.). Inverted Pyramid. Strategies. <https://learn.k20center.ou.edu/strategy/173>
- K20 Center. (n.d.). I Notice, I Wonder. Strategies. <https://learn.k20center.ou.edu/strategy/180>
- K20 Center. (n.d.). I Used to Think... But Now I Know. Strategies. <https://learn.k20center.ou.edu/strategy/137>
- Sunshine lemonade. (2016). An egg is quiet [Video of book read-aloud]. YouTube. <https://www.youtube.com/watch?v=KgVaNbrCayU>