Lesson Topic: Embryological Evidence

Objective:
Students will be able to:

1. Identify the similarities in animals based on embryological evidence.
2. Describe similarities between two vertebrates based on their adult and embryological appearance.
3. Identify and create a common ancestor tree.
4. Present and research animal embryological evidence between two animals.

Time Required: 90 minutes

Materials Needed:

- Teacher computer with internet access
- Projector/Smartboard
- 1 computer/laptop/iPad per student with internet access
- Embryological Evidence handout (attached)
- Animal Images (attached)
- Animal Embryo Images (attached)

Teacher Preparation:

- Assign a Legends of Learning Instructional Quick Play playlist for the day(s) you will be teaching the lesson.
    - Instructional - Middle School - Embryological Evidence
- Assign a Legends of Learning Content Review Quick Play playlist for the day(s) you will be teaching the lesson.
    - Content Review - Middle School - Embryological Evidence
- Assign students a blank Google Doc template.
- Make copies of Embryological Evidence Worksheet (1 per student)
- Print animal images (1 per group)
- Cut and separate Embryo images

Engage (10 minutes):

1. Put students in groups.
2. Give each group one animal image and a copy of the Embryological Evidence handout.
3. Tell students “In your groups, I want you to look at your animal image. In your handout, write the name of the animal at the top. Then, describe the animal with as much detail as you can.”
4. Have one person from each group stand up and show their image to the class.
5. Ask students “what do these animals have in common?”
    a. With such diverse animals, it will be difficult to pinpoint specific similarities:
        i. Possible answers: they are all animals, they are all vertebrates, etc.
6. Tell students “Today we are going to dive deeper and see that these animals may be more similar than we think.”

Explore (20 minutes):

1. Have your students sign in to Legends of Learning. Instruct students to complete the Instructional playlist.
2. Assist students as needed during game play, pause playlist if you need to address content or questions to the entire class.

Explain (20 minutes):

1. Put students back into the same groups as they were in for the Engage activity.
2. Give each group the Animal Embryo image (be sure to give groups the same animal as earlier in the lesson, so students can see the connection).
3. Again, have students write and describe what the image looks like on their handout.
4. Tell students “This image is the animal when it is still growing in their mother’s stomach. It is called an embryo.”
5. Have one person from each group bring their Embryo image to the board.
6. Tape all images to the board.
7. Ask students “What similarities do you see between all the embryo images?”
    a. Students should be able to see many more similarities.
    b. Possible answers: they all have large eyes, they all have tails, they have webbed feet, etc.
8. Ask students “As we already mentioned, the adult animals are not very similar. However, judging by the look of the embryos, they have a lot of similarities. With your groups, discuss the following question: What does it mean if all of these diverse animals have some embryological similarities?”
    a. Answer: A long time ago, all of these animals shared a similar ancestor that has since gone extinct.
9. Show students an example of a common ancestor tree.
    a. Tell students “This is an example of a common ancestor tree. This line shows that there was some common ancestor species and all of these different species branched off at some time or another to create the species we know today. This of course was millions of years in the making.
    b. The fact that we can see the similarities in the embryos of these animals is evidence of a common ancestor.”
10. On the board, draw a simplified common ancestor tree that includes all the animals that students looked at today.
    a. Have students copy it down in their handout.

Elaborate (30 minutes):

1. Have students choose two vertebrates to research.
2. Tell students, “Think of any two animals that have vertebrates (backbone). If you are unsure if an animal has a backbone, it is fairly safe to choose from one of the 5 vertebrate categories list on your handout: mammals, birds, reptiles, amphibians, fishes (there are always exceptions, so double check during research).
3. Research these two animals and create a Google Doc/poster and include the information on the poster:
    a. An image of each animal as an adult (label each animal)
    b. An image of each animal as an embryo (label each animal)
    c. Three similarities and three differences

    d. Sources
4. Tell students “On your paper handout, draw a common ancestor tree like the one on the board.”
    a. Include a line labeled “common ancestor” and then two branches, one for each of the animals you researched.
5. When students finish, put them back into their groups to present their Google Doc posters to each other and reveal what they’ve learned.

Evaluate (10 minutes):

1. Have your students sign in to Legends of Learning. Instruct students to complete the Content Review playlist.
2. Analyze student results to determine what concepts need to be a focus for reteaching.

Additional Lesson Strategies:

- To use Legends for additional instruction, create a custom playlist with an instructional game and pre and post assessment.
- To use Legends for a quick formative assessment, create a 5-question assessment in a playlist.
- To use Legends for a student-directed experience, create a targeted freeplay playlist.
- Encourage students to play on their own at home in Legends of Learning: Awakening for a student-driven experience including avatars, battling, and quests all centered around topics they are covering in class.

Mouse

Fish

Tortoise

Chicken

Snake

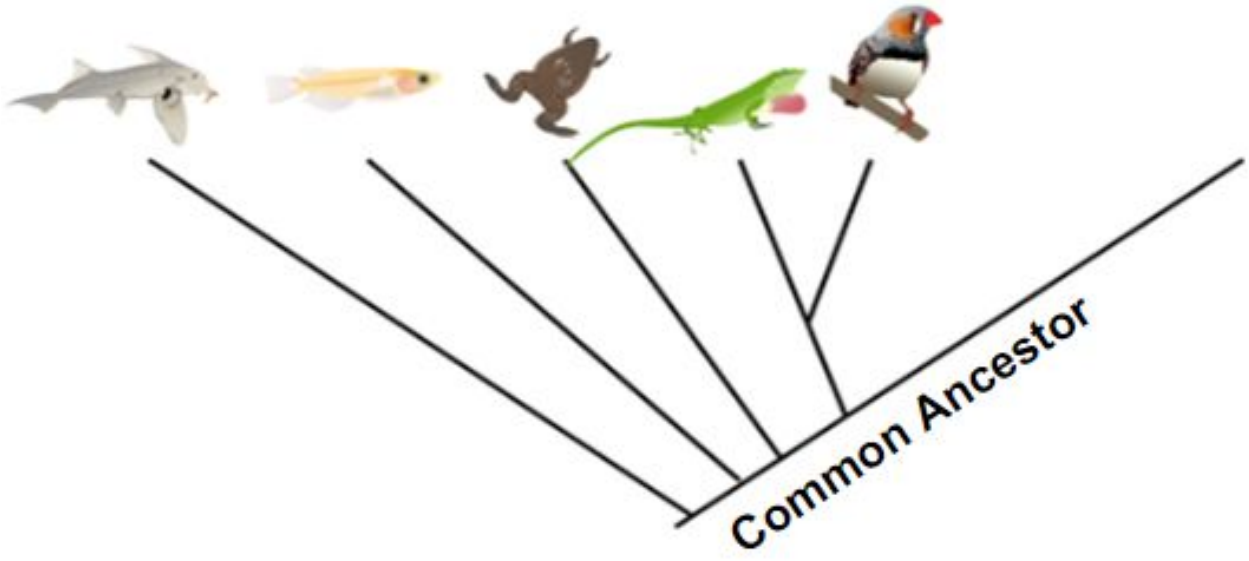
Human

MIcrosoft Creative Commons

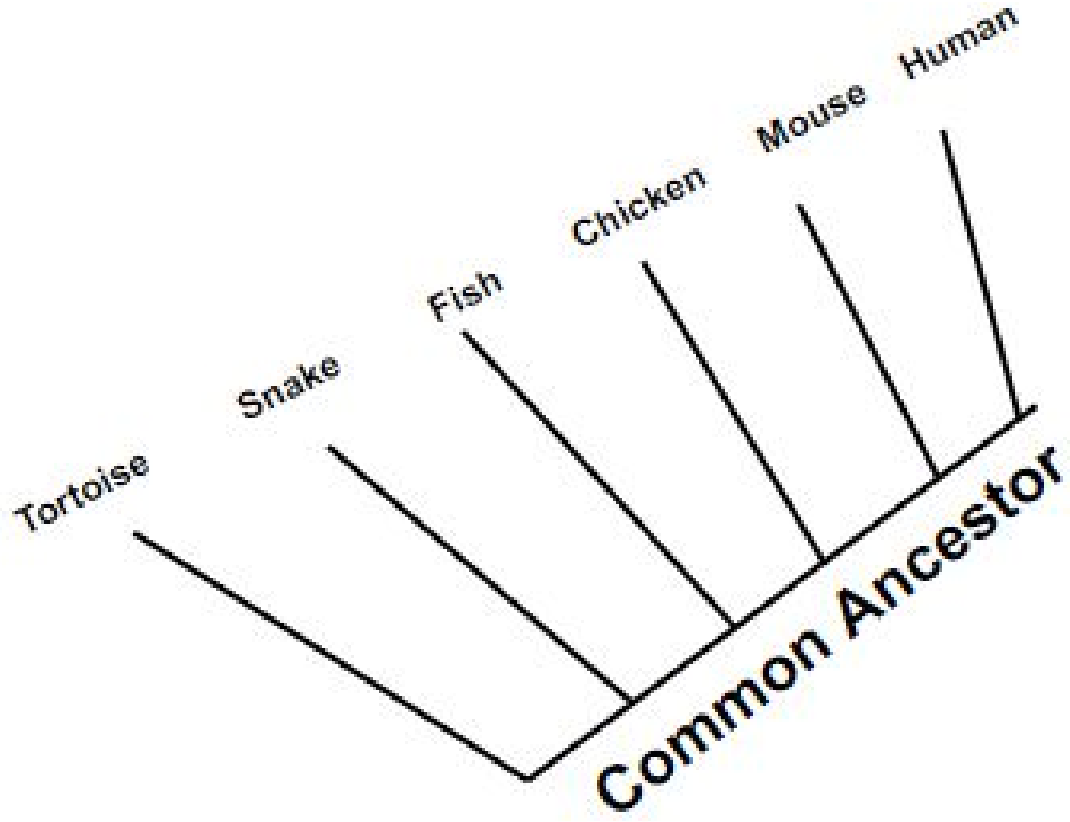
Embryos

https://ib.bioninja.com.au/standard-level/topic-5-evolution-and-biodi/51-evidence-for-evolution/other-evidence.html

Example Common Ancestor Tree



Simplified Common Ancestor Tree KEY



Name: _____

Embryological Evidence

Part 1:
Animal Name: _____

Look at the animal image. Describe the animal as much as you can.

Part 2:
Look at the embryo image. Describe the image as much as you can.

Part 3:

Choose two vertebrates to research. Vertebrates are usually: birds, mammals, reptiles, amphibians, and fish.

Research the animals and create a Google Doc/poster. Include the following on the poster:

a. An image of each animal as an adult (label each animal)
b. An image of each animal as an embryo (label each animal)
c. Three similarities and three differences.
d. Sources

Below, draw an Ancestor Tree showing the two animals and the common ancestor line.