Common Ancestry

LESSON OBJECTIVE
- Students will explore the diversity of animals and trace animals to common ancestors

GRADE
- 8

STANDARDS
- Life Science

TIME REQUIRED
- 45-60 min

VOCABULARY
- Anatomy
- Ancestor
- Extinct
- Origin
- Theory
- Homologous Structures

MATERIALS
- This packet
- Internet to play the video

RECOMMENDED ASSESSMENT
- Student worksheet (last page)

introduction

Students will look at homologous structures across animal species to understand common ancestry between them.

State Standards

MS-LS4-2: Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.
MS-LS4-3: 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.

Lesson Plan

Background Knowledge –

- *Anatomy*: bodily structure of humans, animals, and other living organisms
- *Ancestor*: someone you descended from
- *Extinct*: died out, no longer living
- *Origin*: a point or place where something began
- *Theory*: an explanation of all the known facts and observations
- *Homologous Structures*: physical similarities that show that two organisms are related through a common ancestor

Activity –

1. Notice and Wonder Exercise
    a. Put the following headings on the board (leave a line above them):
        i. What do you notice?
        ii. What do you wonder?
        iii. What are these bones?
    b. Show image #1 of what looks like the bones of a hand. Give students some time to look at it on their own before talking to others. Ask students what they notice and are wondering. Take notes on the board.
    c. When students make their guesses on what the bones are, ask "What do you SEE that makes you say that?" in order to draw out visual details that students are using to make inferences.
    d. Above your previous headings, add:
        i. Observations/Evidence (above "What do you notice?")
        ii. Questions (above "What do you wonder?")
        iii. Hypothesis (above "What are these bones?")

e. This is to have the students think like scientists and try to explain what they see by using evidence. Ask the students if there is any information you can give them that would be helpful for them to identify the bones. What can they say these bones are NOT from?
f. Show image #2 of a man standing next to the bones on a wall. Ask students: what do you notice? What new evidence do we have? What do you see that makes you say that?
g. As you show images #3 and #4, have students add to their evidence charts.
h. Show them image #5. Did they guess that the bones came from a whale? Many animals have bone structures that are similar to our hands. We'll delve more into this idea.

2. Pass out the student worksheet. Students will identify "arm" bones individually and then discuss with a partner. Give students time to work and then share the answers.
    a. Show students the diagram of a human arm (image #6) with the bones labelled. What do they notice? They should see that birds, crocodiles, bats, moles, whales, and humans all have similar bones even though there may be some difference in appearance.
    b. On the back side of the worksheet, students should write down as many animals as they can think of that have a similar bone structure in their forelimbs. Some examples include lizards, cats, frogs, mice, horses, hippos, etc.
    c. The phrase of the day is *homologous structures.* Write this term on the board. Students should write it on their worksheet on the blank.
        i. Human hands, whale flippers, bat wings, and mole feet are examples of homologous structures. What do they think that means?
        ii. *Homologous Structures: physical similarities that show that two organisms are related through a common ancestor.*
        iii. *Homologous structures may not perform the same function, but they share common ancestry, meaning they evolved from a common ancestor.*
        iv. Ask students to explain how homologous structures could possibly lead to the idea of evolution from a common ancestor. Have them write this explanation in the blank space of their worksheet.

3. Watch Stated Clearly video (up until 7:13): https://www.statedclearly.com//videos/what-is-the-evidence-for-evolution/
    a. What are the two claims made by biological evolution?
        i. All living things on earth are related. They evolved from a common ancestor.
        ii. The evolution of living things is powered by natural processes, things which can be studied and understood.
    b. What are four pieces of evidence that support the idea that whales are related to land mammals?
        i. Whales, just like land mammals but unlike fish, have placentas and give live birth.
        ii. They feed milk to their young.
        iii. They are warm blooded (which is extremely rare for a fish).
        iv. Whales do not have gills, but instead breathe air with 2 fully developed lungs.

v. Their blowhole appears to be a highly modified mammal nose.
vi. Many whales have hair, just like land mammals.
vii. Whales have arm, wrist, hand, and finger bones inside their front flippers.
viii. Dolphin and human embryos both have leg buds, which in humans grow into legs and in dolphins seem to fade away as it grows.

c. What is a possible reason for the small leg-like bones in whales' skeletons?
   i. The presence of intermediate species like Maiacetus (species in the fossil record between land mammals and modern whales) show leg bones diminishing over time.
   ii. The hip bones of Maiacetus do seem sturdy enough to walk on land, but this animal is considered to be a whale because their skeletons have all been found among fossils of sea creatures and their short legs combined with long flat fingers and toes suggest they were strong swimmers with webbed hands and feet.
   iii. Modern whales have these left-over hip bones from when they used to be land mammals.

Post Activity –
Think-pair-share: Why might a land creature go into the sea? Possible answers: more food, to escape predators

Discover Further

Extending the Lesson –

- Look at whale evolution charts like the one provided.
- Writing exercise: When scientists first started looking at animal bones, they noticed similarities among various animals. Ask students: If you were a scientist during this time, what might you have noticed? What questions would you have asked yourself when looking at animal skeletons? What conclusions might you have come up with to explain what you noticed?

Learn More –
The evolution of land mammals to whales happened over a relatively short time period of about 8 million years about 50 million years ago. Conversely, some animals have remained relatively unchanged throughout history. These "unchanged" animals are often referred to as "living fossils". The zoo has alligators in the Central Zoo circle, which have remained very similar to their ancestors from 80-240 million years ago. Similarly, the black-headed monitor lizard in the Australian Adventure originated over 90 million years ago. The zoo works to protect these and other species through various conservation projects to help them survive millions more. You can learn more at kidszoo.org/conservation .

Common Ancestry

Resources

Image #1

What Do You Notice?	**What Do You Wonder?**	**What Are These Bones?**

Common Ancestry

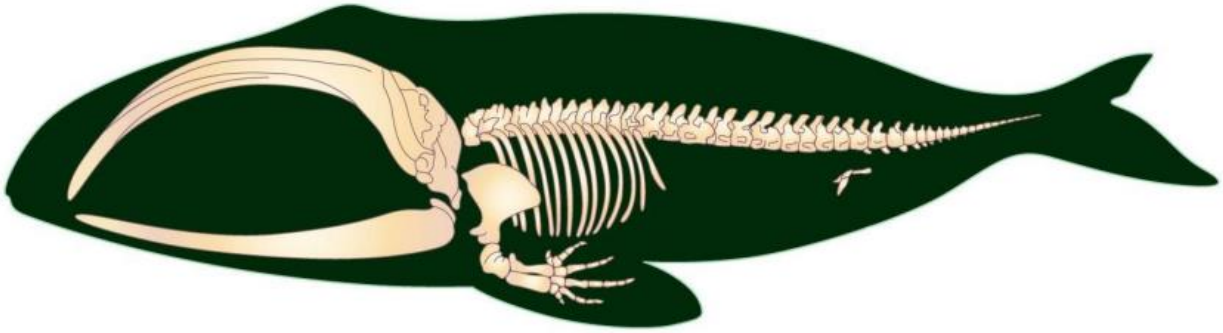
Image #2

Image #3

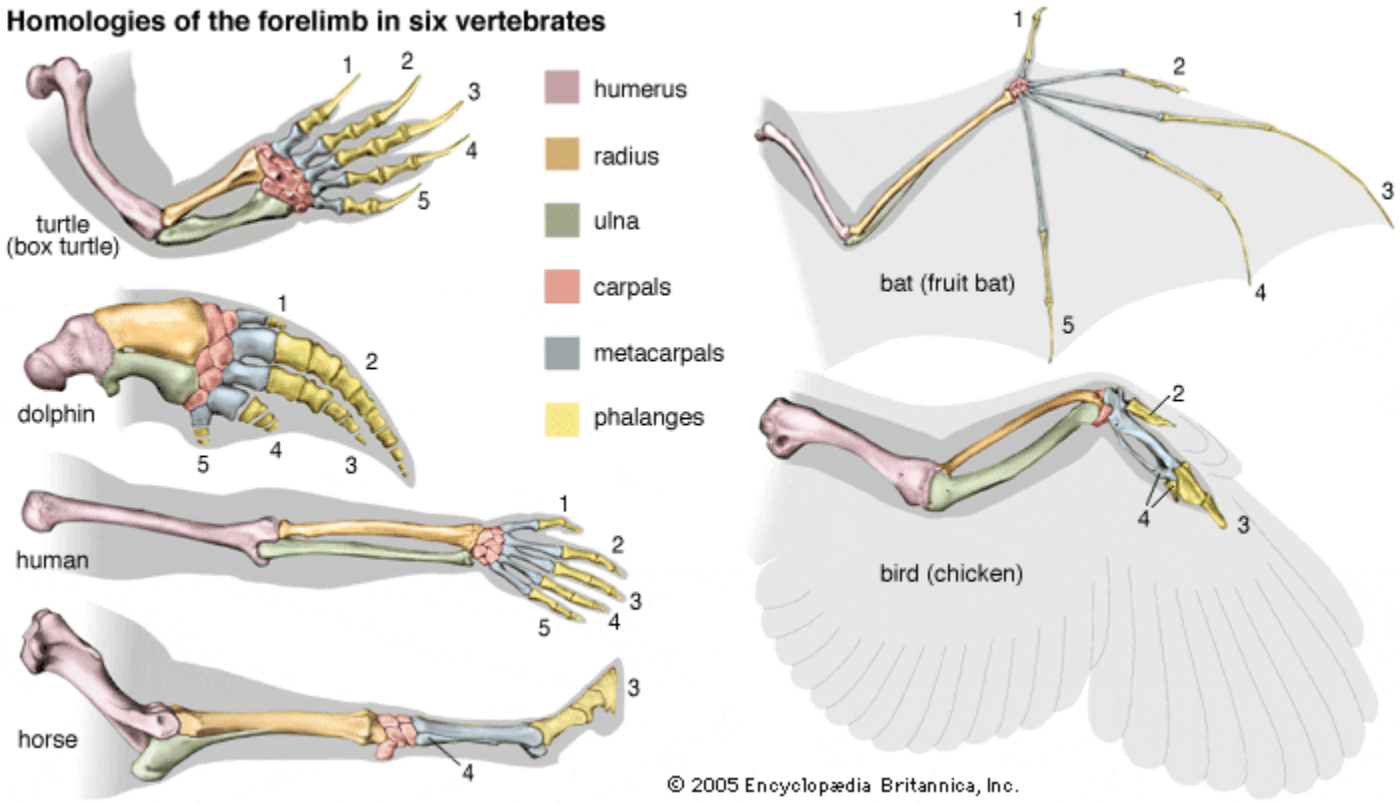
Image #4

Common Ancestry

Image #5

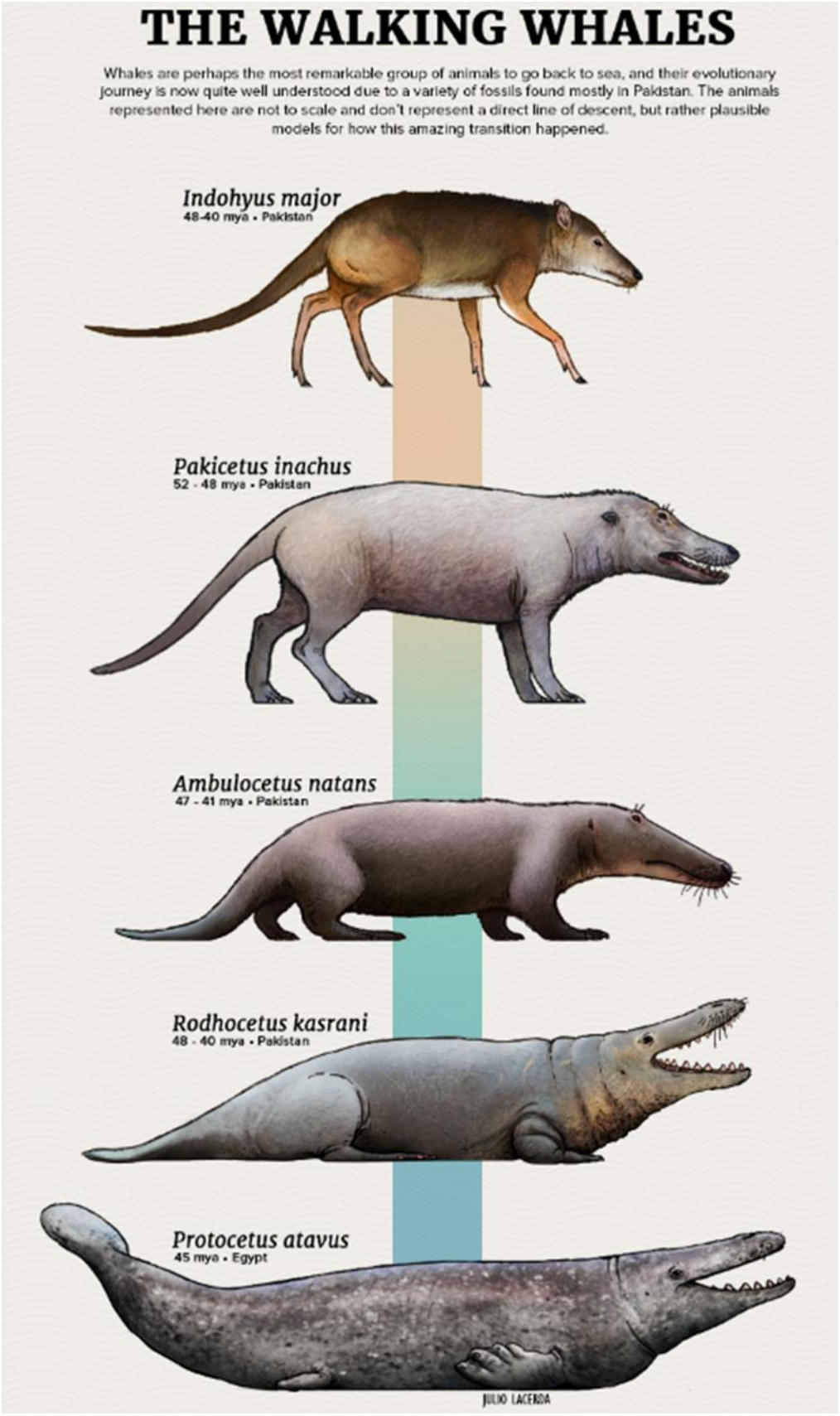


BONES OF THE ARM (Image #6)



fort wayne children's ZOO

Common Ancestry

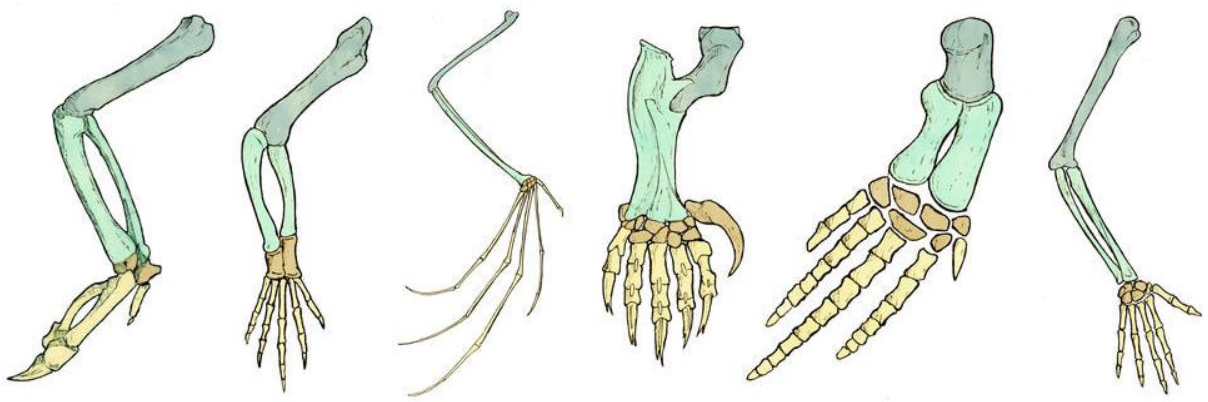


Common Ancestry

STUDENT WORKSHEET

NAME: _____

Can you identify what animal each of these bones are from?



These are examples of _____.

Which of these statements about the evolutionary history of humans and whales is supported by these images?

A. Humans, turtles, dolphins, horses, bats, and birds do not share a common ancestor.
B. Humans, turtles, dolphins, horses, bats, and birds share a common ancestor.