Hip, Hip, Hooray!

Comparative Anatomy Coloring

Purpose:

- This activity shows students how comparative anatomy can be used as a tool for better understanding of evolutionary and modern relationships.

Appropriate Grade Level: MS-HS

Time Required: 45 minutes - 1 hour

NGSS:

MS-LS1-3:

Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

MS-LS4-2:

Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between model and fossil organisms to infer evolutionary relationships.

HS-LS4-1:

Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.

Objective:

- Students will compare and contrast human and bird skeletal anatomy using coloring worksheets.
- Students will explain how similarities and differences between bird and human anatomy indicate evolutionary relationships.

Materials:

Provided:

- PowerPoint Presentation (*on flash drive*)
- Worksheet (*copy provided in teacher binder*)
- Worksheet Key (*copy provided in teacher binder*)

Not Provided:

- Colored pencils, markers or crayons

Activity:

Introduction	● Provide students with the following background information using the PowerPoint titled “Hip, Hip, Hooray!”, which can be found on the flash drive. ○ Comparative anatomy studies indicate that birds and humans share a common ancestor and developed unique anatomic

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	characteristics to adapt to their environment. Humans and birds share similar bones, they're just shaped differently. ○ Bird skeletons have adapted for flight, which drove them to develop in a different way over time. ○ Birds bones are comprised of the same cells as human bones, but they have some significant structural differences. ○ The attachment of muscles is one of the most important factors in determining a bones size and shape. ● Prior to showing students the presentation, reviewing vocabulary found in the Glossary section may be helpful.
Body	● Use the provided PowerPoint and have students answer the questions in the slides as you go. You may have students think-pair-share or work in small groups to answer the questions. ● After the last slide, give students the provided coloring worksheet. Have them complete the worksheets by coloring the corresponding letters on each diagram the same color (ex: "A" on the bird diagram and "A" on the human diagram should both be green). They may work alone or in small groups to complete their coloring and answer the questions on the worksheet.
Closure	● Following completion of the worksheet, have students cooperate in a discussion. ● Sample Discussion Questions: ○ What are some general similarities and differences you noticed between the human and bird skeletons? ○ How can our adaptations (bipedalism, flight, etc.) explain these similarities and differences? ○ Did you notice any significant differences between the bones in the skeleton (hint: the birds sternum is significantly larger and has a crest)? How can you explain these differences? ○ What do the similarities and differences between our skeletons tell us about our evolutionary history? ● A key for the worksheet is available, should you wish to explore the anatomy aspect of the lesson further.

Modifications:

- **Elementary:**
  - Have students complete the coloring worksheet after a brief introduction about how organisms adapt to their environment differently. Invite students to engage in a discussion about why they think we may look anatomically similar to, and different from, birds.

Glossary:

Bipedal: An organism that walks upright on two legs as its primary mode of locomotion.
Adaptation: An alteration in the structure or function of an organism that results in the organism becoming better fitted to survive and multiply in its environment.
Environment: The external factors (air, water, minerals, organisms) surrounding and affecting a given organism at any time.
Evolution: A change in genotypic frequency over time.
Common Ancestor: An individual from which organisms are directly descended.
Cladogram: A branching diagram showing the relationship between species.