

Teacher Guide

Homology Structures



All resources at:
<https://shooboxeducation.com/kits/homologystructures>

Welcome to **ShoeBox Education!**
We hope these modeling kits help your students ask lots of curious questions!

MARK

The **Homology Structures** kit includes physical models of the arm bones for a bat, cat, whale and human. Each arm can be separated into the **hand bones**, forearm bones (**radius** and **ulna**), and the **humerus bone**.

Students sort and assemble the arm bones, exploring both the similarities and differences between each species.

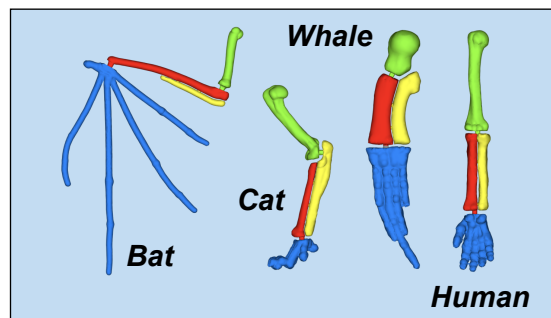
★ Recommended Phenomenon ★

Sometimes the most mundane observations are the most amazing. . . when we slow down enough to ponder them.

Observe your hand. Compare it with another person's hands. How are they the same? How are they different? Do you think we are all related in some way? Are we related to other species?

Phenomenon Video:

<https://shooboxeducation.com/kits/homologystructures/phenomenon>



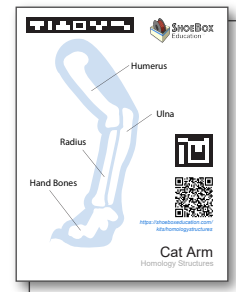
★ Recommended Activities ★

1.) **Sorting and Finding Patterns**

Sort the bones by color and discuss any similarities or differences observed between them. Sort them by species, using the printed **Species Cards** to help if needed, and discuss any similarities or differences observed between them.

Do you think the four species are related? In what way? What might be the cause(s) of their relationship?

Species Cards: <https://shooboxeducation.com/kits/homologystructures/speciescards.pdf>



2.) **Studying Complete Skeletons (using Augmented Reality)**

Assemble the arm bones of the four species and place them on the printed **Species Cards**. Open the **AR webpage** on any mobile device with a camera and scan each **Species Card** to display the full skeleton.

Are there similarities in the leg bones, like there are in the arm bones? Are the skulls similar? Are there differences as well? Why are some parts of the skeletons more similar and others less?

Species Cards: <https://shooboxeducation.com/kits/homologystructures/speciescards.pdf>

AR Webpage: <https://shooboxeducation.com/kits/homologystructures/completeskeletons>

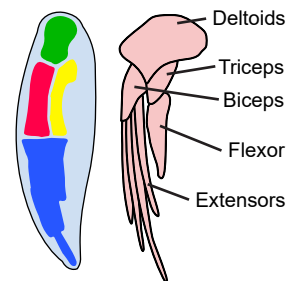
3.) Exploring Muscles (using Augmented Reality)

Assemble the arm bones of the four species and place them on the printed **Species Cards**. Open the **AR webpage** on any mobile device with a camera and scan each **Species Card** to display the arm muscles of that species.

Are there similarities in the muscles, like there are in the bones? Are some muscles larger or smaller in different species? Why are some parts of the muscular system more similar and others less?

Species Cards: <https://shooboxeducation.com/kits/homologystructures/speciescards.pdf>

AR Webpage: <https://shooboxeducation.com/kits/homologystructures/armmuscles>



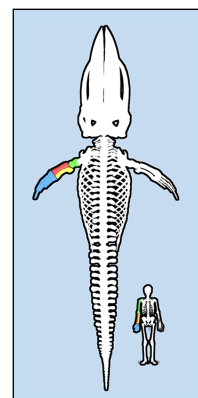
4.) Skeletons to Scale (using Augmented Reality)

The physical models do not accurately capture scale. Open the **AR webpage** on any mobile device with a camera and scan the printed **Scale Card** to display all four species' skeletons at real scale.

How do the sizes of the four species compare? How might their size relate to how the species behaves or what it can do? Why are some species large and others small?

Scale Card: <https://shooboxeducation.com/kits/homologystructures/scalecard.pdf>

AR Webpage: <https://shooboxeducation.com/kits/homologystructures/scale>



5.) Survival of the Fittest

Start by forgetting that these are bones from four real species, and instead picture them simply as an assortment of bones with a range of diverse traits. Combine one hand, forearm, and humerus of your choice to build an arm of an imaginary species.

What advantages might the arm you constructed give your species? What disadvantages might it have? What habitat or conditions might allow it to survive? What habitat or conditions might not let it survive?

★ Additional Resources and Links ★

Free Images for Building Custom activities: <https://shooboxeducation.com/kits/homologystructures/images.zip>

Teacher-developed Activities: <https://shooboxeducation.com/kits/homologystructures/activities>

How to Use Models in Your Classroom: <https://shooboxeducation.com/usemodels>

3D Printing Guide (for purchased digital 3D print files):

<https://shooboxeducation.com/kits/homologystructures/3dprintingguide.pdf>

We cannot overstate our appreciation for the creativity and input of our teacher friends. If you have developed a neat activity for this kit, tell us about it at: <https://shooboxeducation.com/feedback>.