

# Bay Area Scientists in Schools Presentation Plan

**Lesson Name** No Bones About It: How Our Skeletons Work

**Presenter(s):** Anatomy Enrichment Program Volunteers

**Grade Level** 3rd

## Current California Standards Connection:

3-LS3 Adaptations in physical structure or behavior can improve an organism's chance for survival.

- a. Students know plants and animals have structures that serve different functions in growth, survival, and reproduction.

## Next Generation Science Standards:

3-LS1 From Molecules to Organisms: Structures and Processes

3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.

3-LS3 Heredity: Inheritance and Variation of Traits

3-LS3-1. Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

3-LS4 Biological Evolution: Unity and Diversity

3-LS4-1. Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p><b>Developing and Using Models</b> Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.</p> <ul style="list-style-type: none"> <li>Develop models to describe phenomena. (3-LS1-1)</li> </ul> <p><b>Engaging in Argument from Evidence</b> Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). Construct an argument with evidence, data, and/or a model. (3-LS2-1)</p>	<p><b>LS3.B: Variation of Traits</b></p> <ul style="list-style-type: none"> <li>Different organisms vary in how they look and function because they have different inherited information. (3-LS3-1)</li> </ul> <p><b>LS4.A: Evidence of Common Ancestry and Diversity</b></p> <ul style="list-style-type: none"> <li>Some kinds of plants and animals that once lived on Earth are no longer found anywhere. (<i>Note: moved from K-2</i>) (3-LS4-1)</li> <li>Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1)</li> </ul> <p><b>LS1.A: Structure and Function</b></p> <ul style="list-style-type: none"> <li>Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)</li> </ul>	<p><b>Patterns</b></p> <ul style="list-style-type: none"> <li>Patterns of change can be used to make predictions. (3-LS1-1)</li> <li>Similarities and differences in patterns can be used to sort and classify natural phenomena. (3-LS3-1)</li> </ul> <p><b>Systems and System Models</b></p> <ul style="list-style-type: none"> <li>A system can be described in terms of its components and their interactions. (3-LS4-4)</li> </ul>



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### Lesson Objectives:

- 1) Students learn that we have bones inside of our body to support us, for muscles to attach to, and to protect some internal organs
- 2) Students understand that these bones all connect together to form a skeletal system
- 3) Students understand that many other animals also have skeletons; the same bones from different animals come in different shapes and sizes as adaptations for different lifestyles and are evidence of our common ancestry
- 4) Students learn how to take care of their skeletons (drinking lots of milk, running/exercising, stretching, wearing protective gear when playing sports)

### Vocabulary/Definitions:

- Skeleton, bones
- Adaptation
- Skull, ribs, vertebrae
- Humerus, radius, ulna (?)
- Femur, tibia, fibula (?)
- Calcium (?)

### Materials:

- Skeleton puzzle and mini articulated skeleton (Station 1)
- X-rays of animal skeletons (Station 1)
- Casts of human bones (Station 2, few for 3)
- Various bones of other animals (Station 3)

### Classroom Set-up:

- Students should be split into 3 groups.
- Tables/desks arranged into 3 groups for 3 stations during the hands-on portion of the lesson.

## Classroom Visit

### 1. Personal Introduction: \_\_\_\_\_ **3** Minutes

We are students from UC Berkeley, who have been studying human anatomy. We want to become doctors and dentists and physical therapists, to help people take care of their bodies.

### Topic Introduction: \_\_\_\_\_ **7** Minutes

Why do we need skeletons at all?? Feel the squishiness of your body; would you be able to stand up or move around at all if you didn't have something hard inside of you? What are bones made of?



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**2. Learning Experience(s):** 30 Minutes

3 Hands-On Stations (10 minutes at each station, students in groups of 6-7):

1. Skeleton puzzle—How do our bones connect to form a skeleton? What do the skeletons of other animals look like?
2. Human bone casts; What do our bones look like? Where does each bone fit in our body?
3. Comparative anatomy—what do the bones of other animals look like? How are they different from our bones? How are they similar? All animals having all the same bones is evidence of what?

**3. Wrap-up: Sharing Experiences** 3 Minutes

Who wants to share something they learned? What is your favorite bone in the body? Why do we have skeletons? Do other animals have skeletons, too? What was your favorite thing we did today?

**4. Connections & Close:** 7 Minutes

How can we take care of our skeletons? We drink lots of milk, wear protective gear when playing sports, stretch, run/exercise

**TOTAL** 50 – 60 Minutes

**Follow-up – After Presentation**

Suggest students write a letter explaining what they learned about bones and the skeletal system.

**Reading Connections:**

- The Complete Human Body by Alice Roberts DK Publishing. 512pp. Trade ISBN 9780756667337, \$50. (6–12) DVD enhanced, this ambitious volume examines human evolution, anatomy, function, reproduction, and disease in an orderly, up-to-the-minute visual format. Glossary, Index. (NHM) IV. Supplemental Material: Virtual labs on cardiology, neurology and other topics (The Howard Hughes Medical Institute) <http://www.nsta.org/recommends/ViewProduct.aspx?ProductID=20606>
- Understanding Your Muscles and Bones: A Guide to What Keeps You Up and about (Usborne Science for Beginners) by Rebecca Treays - Uncovering the frame of the human body, this text takes a close look at the tissues that keep us up and about. It explains the structure of the skeleton and the mechanics of movement. It also examines the importance of involuntary muscles in the smooth working of the human body. The book is part of the "Science for Beginners" series which aims to give clear, simple explanations backed up by diagrams,



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photographs and comic-strip cartoons. <http://www.amazon.com/Understanding-Your-Muscles-Bones-Beginners/dp/0746027397>

- Muscles: Our Muscular System by Seymour Simon <http://www.amazon.com/Muscles-Muscular-System-Seymour-Simon/dp/0688177204/>
- Bones: Our Skeletal System by Seymour Simon <http://www.amazon.com/Bones-Skeletal-System-Seymour-Simon/dp/0688177212/>

### **Mathematics Activity:**

Students can create and solve math problems using the number of parts in their aliens. Also, the number of alien parts (bones, muscles, joins, etc.) can be shown on a bar graph.

### **Other Follow Up Activities:**

Inner Strength (National Space Biomedical Research Institute) In this activity about endoskeletons (page 8 of PDF), learners observe, compare and contrast different kinds of chicken bones, and relate their chicken bone observations to human bones. The bones must be prepared a day ahead of time. Learners also use a poem to identify the major bones of the human body and discuss the importance of bilateral symmetry. This guide includes background information, extensions, and data sheets. [http://www.nsbri.org/default/Documents/EducationAndTraining/Muscles/MB\\_Guide.pdf#page=14](http://www.nsbri.org/default/Documents/EducationAndTraining/Muscles/MB_Guide.pdf#page=14)

Rubber Bones (Children's Museum of Houston) Over 1 or 2 days, learners use vinegar to remove the calcium from a chicken bone. They then explore how the bones have changed. An accompanying video with Mr. O further explores the relationship between cartilage and bone and explains how bones grow. <http://www.cmhoustonblog.org/2011/02/01/rubber-bones/>

Ask a Biologist – Busy Bones Website from (Arizona State University): <http://askabiologist.asu.edu/busy-bones>

Includes online activities, printable activity sheets, and coloring pages related to bones and skeletons.

Crayola Human Skeleton Free Printable Coloring Page

<http://www.crayola.com/free-coloring-pages/print/human-skeleton-coloring-page/>



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# HUMAN SKELETON

Use the words in the box below to identify parts of the skeleton. Each bone in our bodies has a name. There are more than 200 bones in our bodies.

