

AnimalSmart.org

# JR ANIMAL SCIENTIST

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## Animal fossils and bones!





# Finding clues in ancient bones!

Your skeleton is the strongest part of your body! A skeleton has to be strong to hold up your muscles and organs. A skeleton also has to be strong because it has to protect the soft, squishy parts of your body! Your rib cage protects your heart, lungs, stomach and other organs. The vertebrae in your back protect your spinal cord. Your skull protects your brain!

Thank you, Skeleton!



Photo: iStock / Liliia Krylenko

Animal scientists study the skeletons of both living and dead animals. Studying how the bones grow is very important for making sure pets, livestock and other animals stay healthy. Studying the skeletons of dead animals can teach us about diseases, genetics and more.

Studying skeletons is also a great way to learn about the history of animals! Scientists called **paleontologists** study the remains of ancient animals as a way to learn about what these animals ate, how they protected themselves and how they lived. This field of research is called **natural history**, and the clues that paleontologists uncover are called the **fossil record**!



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# What is a fossil?



Paleontologists must be very careful when handling fossils. Many use brushes to get rid of dirt without hurting the ancient stone. NPS Photo by Jamie Fearon, GIP

A fossil is anything that includes the remains or an “impression” of an ancient plant or animal. That means ancient bones are fossils. Over time, bones from animals that died long ago can go through a process called **mineralization**, where the actual bones are replaced with bits of minerals. This process turns those ancient bones into rock.

This process is pretty rare, which is why you probably haven’t found a dinosaur fossil in your yard! To become a fossil, it helps if the ancient bones are in a safe place and not moved around. Paleontologists often find fossils in areas where the bones were once covered with mud, sand or dirt.

But not all fossils come from bones! Animals throughout history have also left fossilized eggs, footprints and even waste. That’s right! Scientists have found fossilized animal poop. These fossils are called **coprolites**.

Unfortunately, many animals do not leave fossils. Some animals, like jellyfish and insects, do not have bones in their bodies. Other animals have important body parts that don’t have bones. For example, a squid has long, boneless tentacles. Because the tentacles don’t have bones, scientists can’t uncover exactly what ancient squid-like animals looked like!



A fossilized squid left behind this bone! It’s interesting, but it’s certainly not a complete look at a squid. Photo by HansJoachim, iStock



# What can we learn from fossils and bones?

## We can see what animals have in common!

By looking at the skeleton of an animal, we can learn how its body develops. The parts of an animal are called its anatomy. Scientists have found that many animals that look very different have a similar **anatomy** on the inside.

### For example

By looking at the scientists can tell that both these animals are plant eaters just by looking at their skulls. How do they know? They look closely at each animal's teeth. Cattle and elephants both have teeth that are mostly flat with tiny ridges. They use these flat teeth to grind up tough foods, like grasses and leaves.

A Cow



Photo: iStock / Gerald Corsi

An African elephant



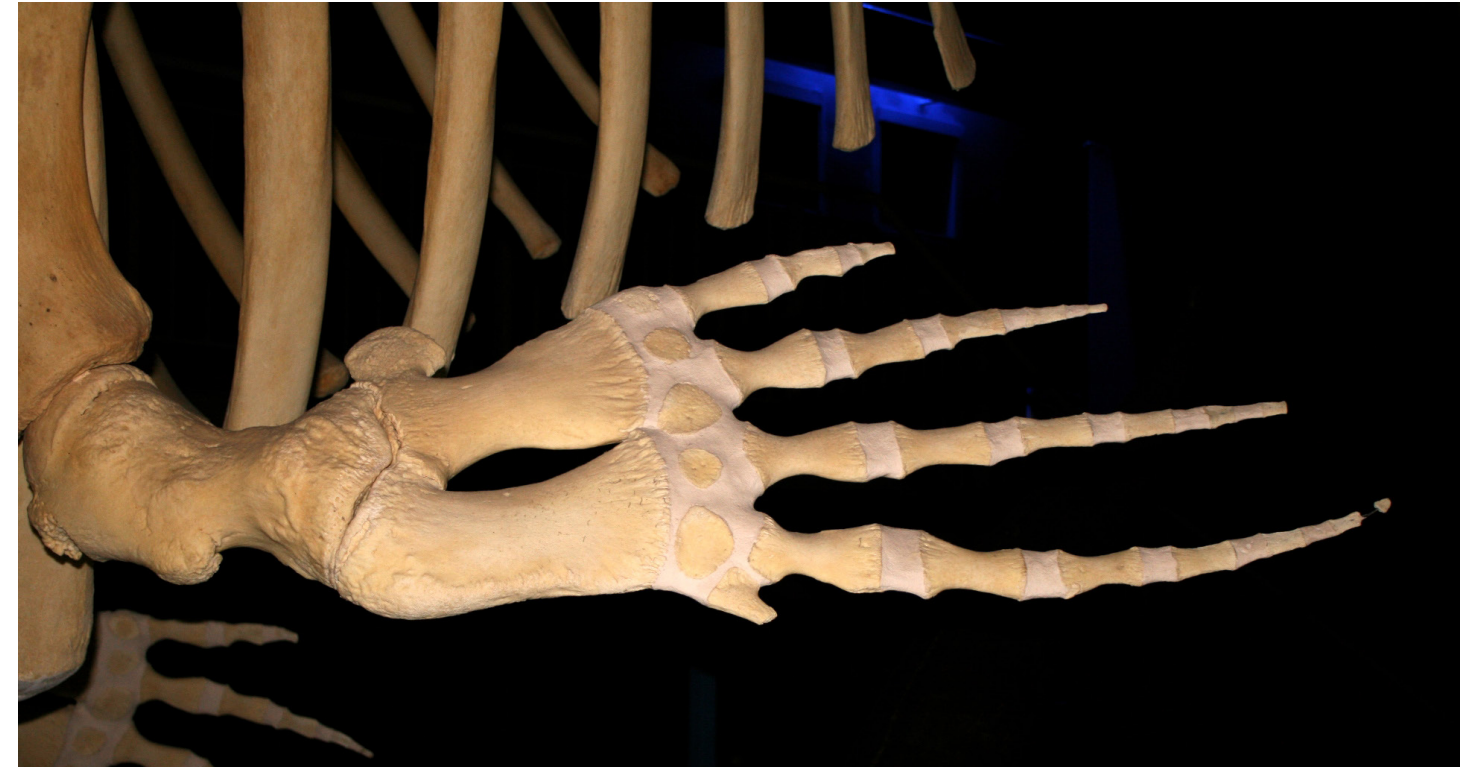
Photo: iStock / Gerald Corsi

## We can learn about extinct animals!

Do these teeth from a mammoth remind you of anything? You probably noticed that these teeth are also flat with tiny ridges. That means the mammoth was a plant eater too! You can also compare these mammoth teeth to the elephant teeth. The teeth look very similar, and there's a reason for that! Mammoths were ancient relatives of modern-day elephants!



Photo: iStock / Buradaki



The bones inside of a whale's flipper. Photo by Straide, iStock

## We can learn how animals have changed!

Many animals have changed as they've adapted to live in different environments on Earth! Scientists can look at skeletons and fossils to learn how animals have adapted. For example, the whales that live in the oceans today are relatives of large animals that lived on land millions of years ago. These goat-like or seal-like relatives had feet with bones in their toes. Today, scientists can spot small toe bones in whale flippers. These toe bones are clues to how whales have changed over time.

## FUN FACT!

Plants can be fossilized too! Remains of plants like this fossilized fern can tell us what kind of plants were around for ancient animals to eat. Scientists who specialize in studying ancient plants are called paleobotanists!



Photo: iStock / Michel VIARD



# Growing healthy bones

To raise healthy animals, we need to make sure they have healthy bones! Animal scientists have found three main ways that we help livestock have strong skeletons:

## Genetics

Genetics is the study of the molecules inside animals that help them grow. These molecules are called **DNA**. An animal's cells hold this DNA, which works like instructions for animal development. Animals get their DNA from their parents, so animal scientists and livestock producers try to breed animals who have good **genetic traits**, like strong bones.

Many scientists have investigated the genetics of bone strength. In a 2017 study, scientists actually found the exact parts of the DNA code that leads to strong bones in chickens!

## Exercise

Bones are so interesting! They can't actually stay strong unless you use them! Animals (and humans) can strengthen their bones through exercise. The best exercises are **high impact exercises** that put pressure on the bones. Running, dancing and jumping are all high impact exercises.

Exercise is especially important for race horse health! Animal scientists have found that exercise is the best way to get race horses to grow new **osteoblasts**. Osteoblasts are cartilage cells that eventually turn into strong bone.

## Nutrition

An animal may be born with the DNA code to develop strong bones, but it can't develop good bones without good nutrition too! Researchers have found that a diet that includes protein, calcium, phosphorus, copper, manganese, selenium, zinc, and vitamins A, D, and E is the key to bone strength.

Animal scientists have found that eating nutritious food is especially important for pregnant animals. A cow given a diet with calcium and other nutrients has a better chance of giving birth to a calf with healthy bones.

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## FUN FACT

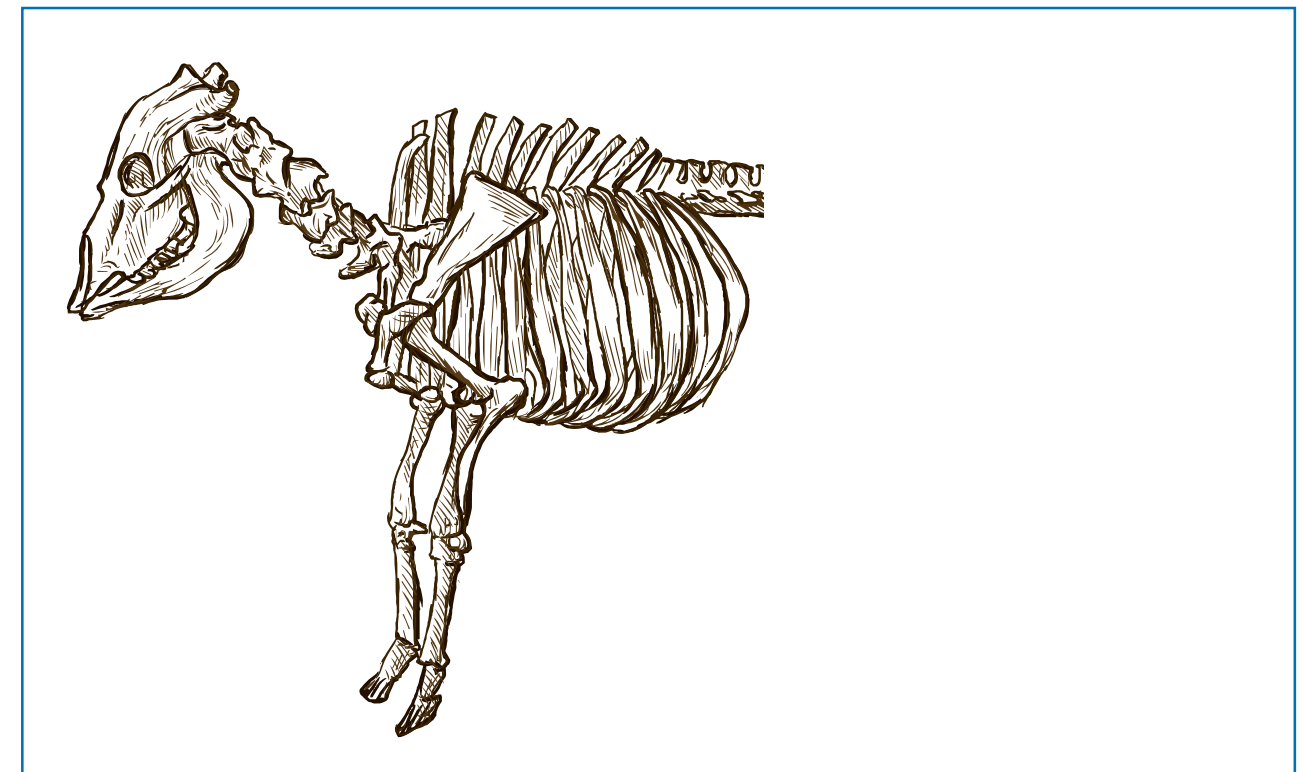
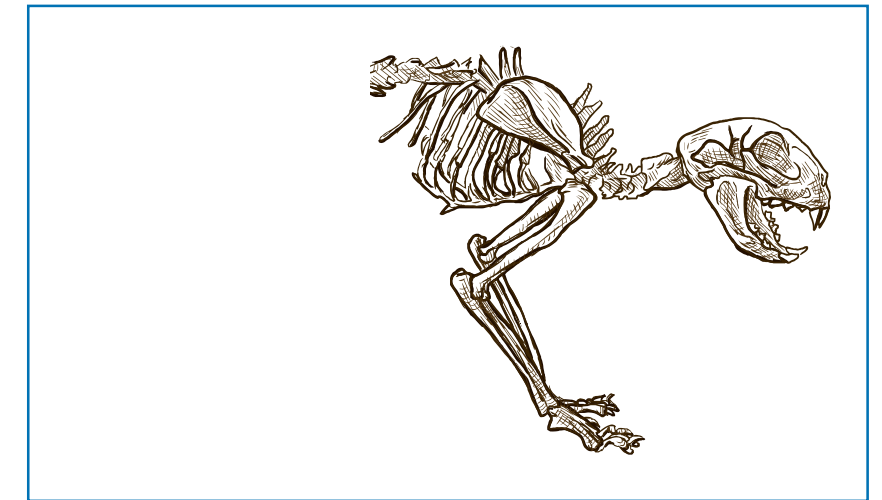
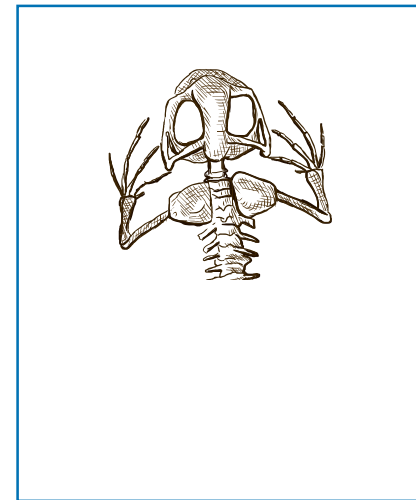
Drinking milk and eating dairy products such as cheese and yogurt are great ways to get a vitamin called calcium, which your body needs for growing strong bones. You can get extra calcium by eating dark green vegetables like spinach and bok choy!

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## ACTIVITY:

# Finish the skeleton!

These skeletons are incomplete! Can you use your imagination to draw the other half of the animal? Think about whether your animal would have features like wings for flying or flippers for swimming in the sea!



American Society of Animal Science  
PO Box 7410, 201 W. Springfield,  
Champaign, IL 61826-7410

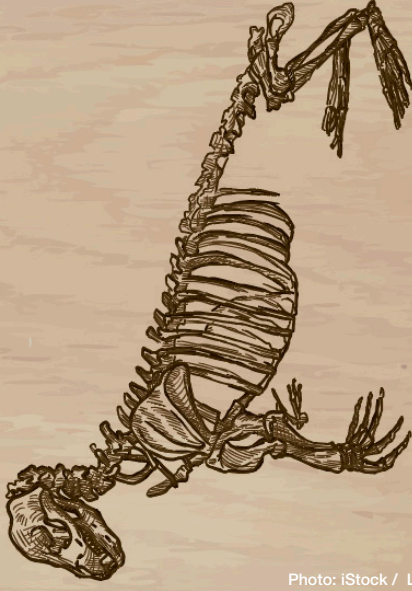


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**CONTRIBUTORS:** ASAS staff.

**DESIGN:** M. Ryan

**CONTACT:** [jranimalscientist@asas.org](mailto:jranimalscientist@asas.org)

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