EXCAVATION KIT

I DIG IT! DINOS

3D T. REX

THAMES & KOSMOS

Contents

1st Edition 2017

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- **1. 3D fossil of a *T. rex* with skeleton parts inside**
- **2. Hammer**
- **3. Chisel**
- **4. Sponge**

You will also need newspaper, water, a small bowl, and paper towels.

If any parts are missing or defective, please contact Thames & Kosmos customer service:
US: techsupport@thamesandkosmos.com
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657550-02-241017

Dear Parents!

Please provide your child with assistance and support when excavating the dinosaur skeleton from the plaster block. Before starting the experiments, read through the manual together and be sure to follow it. That way, nothing will stand in the way of a successful dig. Please be careful not to let any parts of the kit get into the hands of small children, especially the plaster pieces that are left over after excavating. These can be disposed of in the household trash.

Safety Notes

WARNING. Not suitable for children under 7 years. For use under adult supervision. Read the instructions before use, follow them and keep them for reference.

This kit contains functional sharp edges or points. Do not injure yourself!

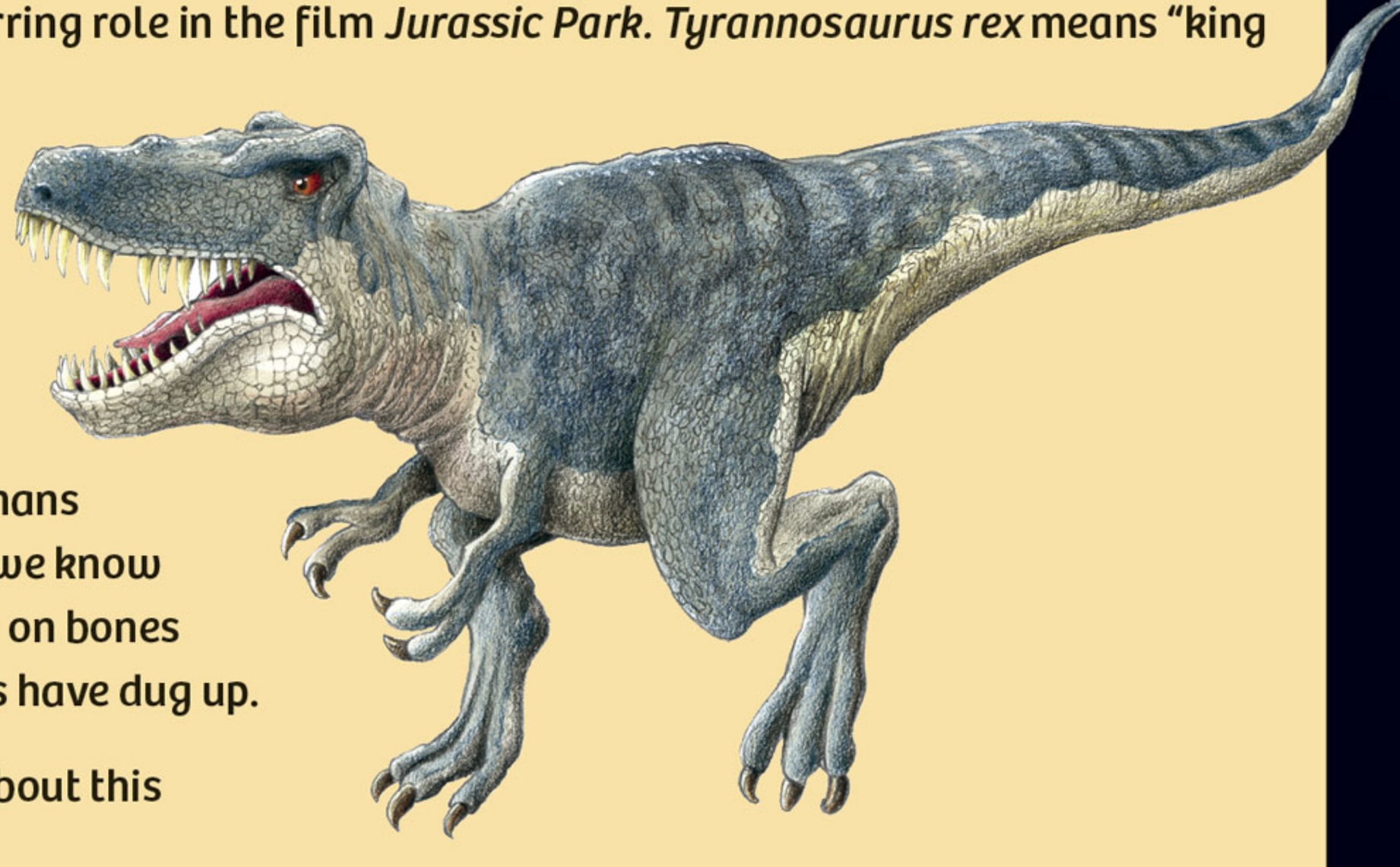
WARNING. Not suitable for children under 3 years. Choking hazard — small parts may be swallowed or inhaled.

Follow the instruction manual when performing the excavation. Keep small children and animals away from the experiment area. Do not eat or drink at the experiment area. Process the plaster block slowly and moisten it to prevent the formation of chips and dust. Do not place the plaster material in mouth or eyes. Clean all equipment and the work area after use. Wash your hands after the experiment.

Keep the packaging and instructions as they contain important information.

Calling All Dinosaur Researchers!

This kit will teach you what it's like to be a prehistoric animal researcher. A scientist who does this is also known as a paleontologist (pronounced "pay-lee-un-TAH-luh-just"). You will be using the tools included in the kit to excavate a *Tyrannosaurus rex* skeleton. *T. rex* is without a doubt the most famous dinosaur of all, partly due to its starring role in the film *Jurassic Park*. *Tyrannosaurus rex* means "king of the tyrant lizards."



Nobody has ever seen a living *Tyrannosaurus* since they died out long before any humans existed. Everything we know about them is based on bones that paleontologists have dug up.

Have fun learning about this fascinating giant!

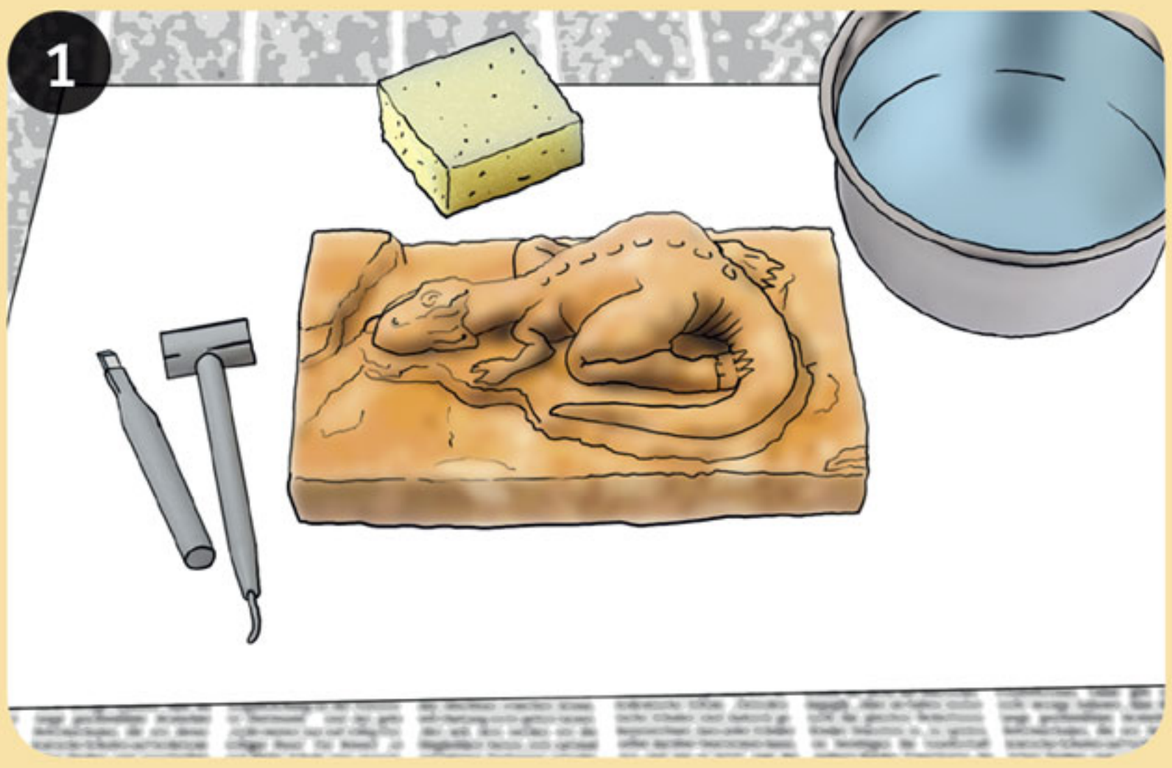
How to Excavate the Fossil

STEP 1

Start by looking for a suitable work place, someplace where it won't matter if a few bits of plaster fall here and there, and that won't be harmed by a little dust and water. If the weather is nice, you can also work outside.

The ideal work surface is a level, sturdy table covered with a few layers of newspaper.

Get the excavation block and tools ready, along with a small bowl of water.

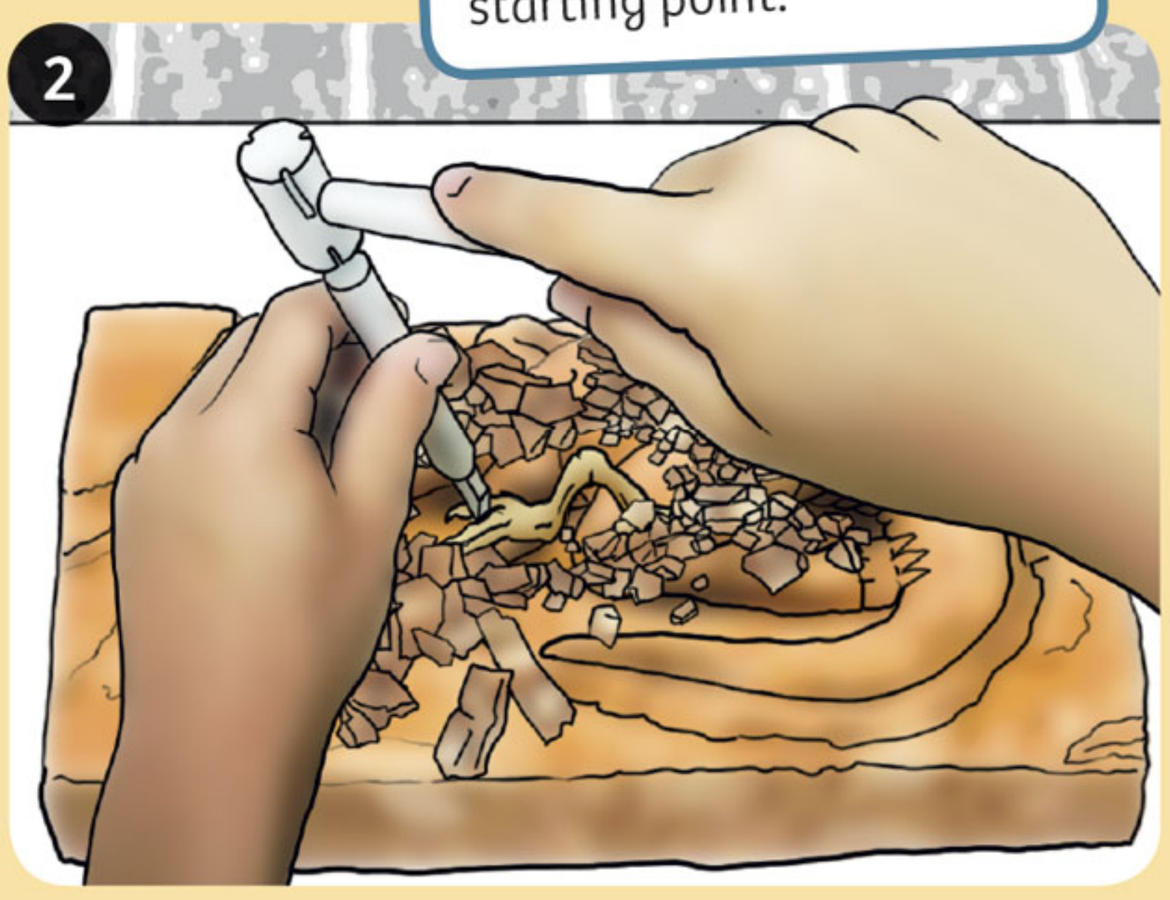


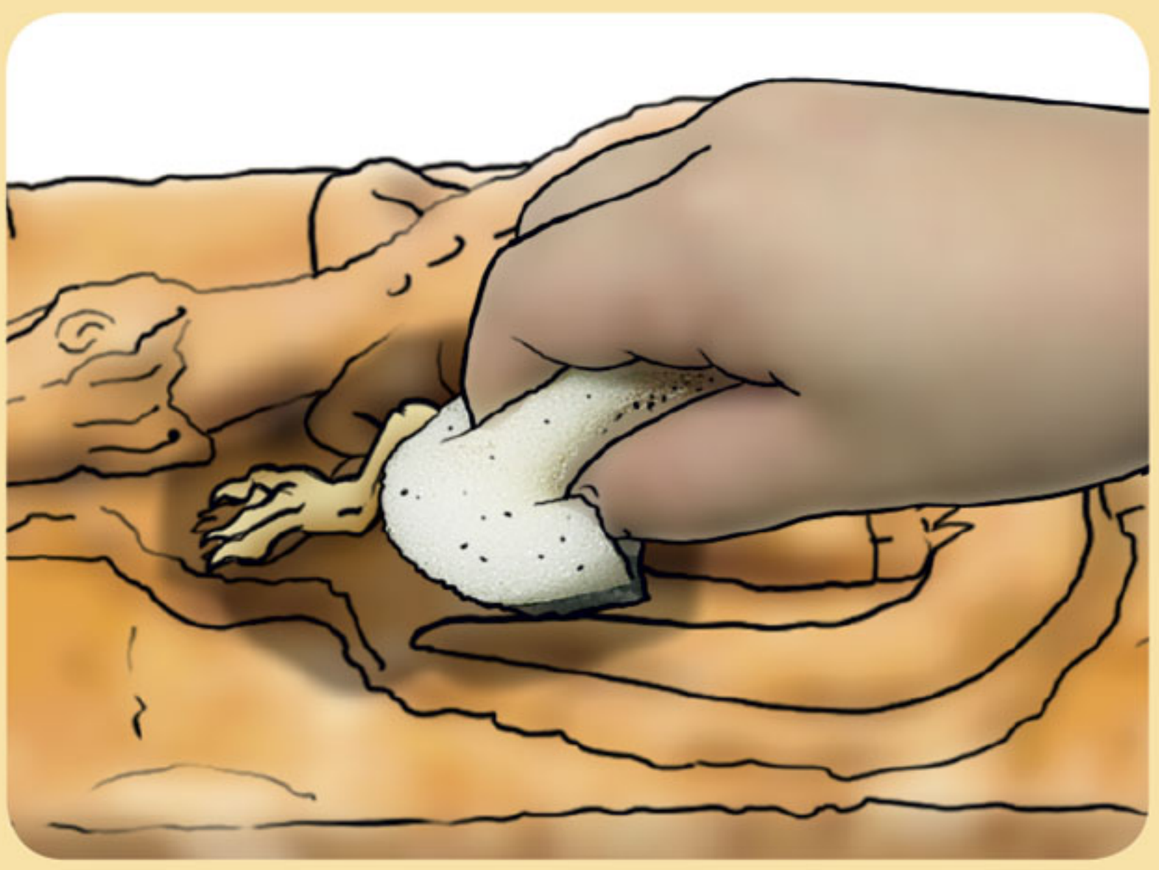
STEP 2

Choose a part of the fossil where you want to start excavating. Thoroughly moisten the spot several times by dipping the sponge into the water and squeezing it carefully onto the chosen spot. Place the chisel onto the spot and push the softened plaster material to the side. If it is hard to excavate at certain sections, carefully hit the hammer onto the chisel.

In this way the plaster slowly becomes a crumbly bulk and can be removed. Regularly moisten the spot you are working on with the wet sponge. The plaster should not be worked on when dry to avoid creating a lot of plaster dust, and so you can more easily see where you are digging.

TIP! Don't just dig straight down. Also dig out sideways from your starting point.



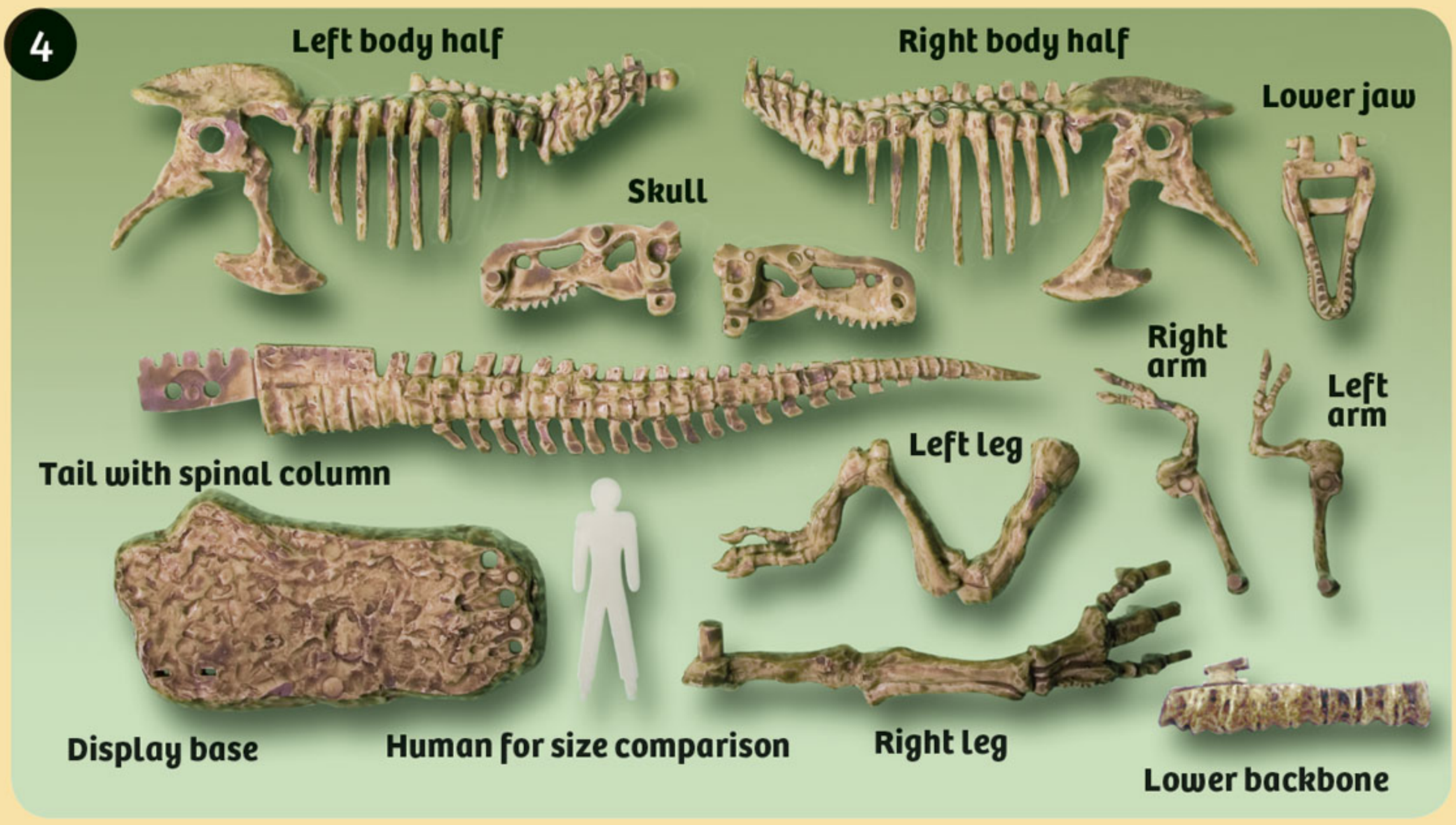


STEP 3

If you hit a bone or a skeleton part, uncover it carefully by removing plaster from all sides. You can also use the slender hook at the rear end of the hammer.

STEP 4

Next, continue step by step in the same manner until you have excavated all the parts of the skeleton. The picture below shows you all the bones hidden inside the block. Use it to figure out which parts you haven't found yet and what they look like.

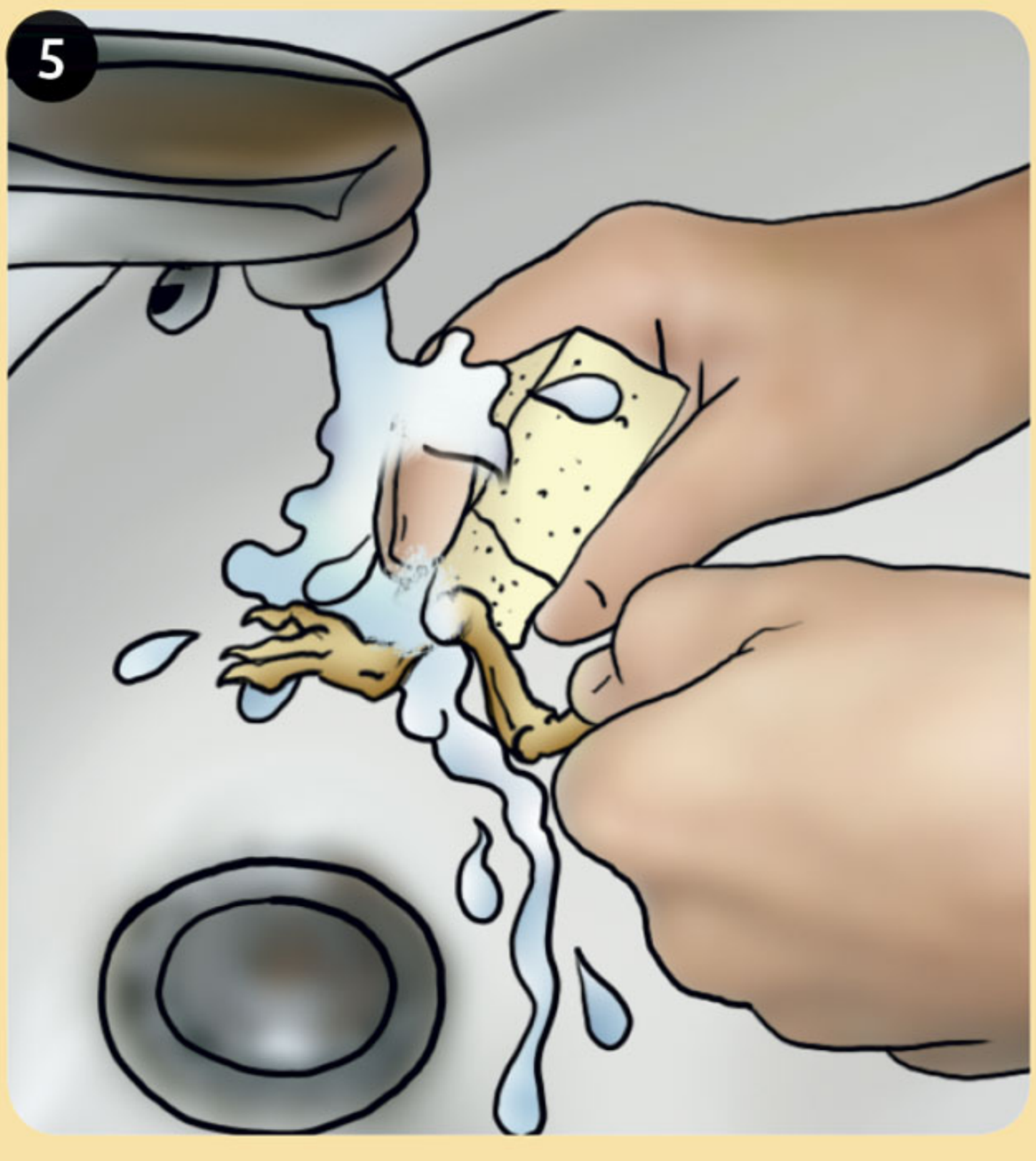


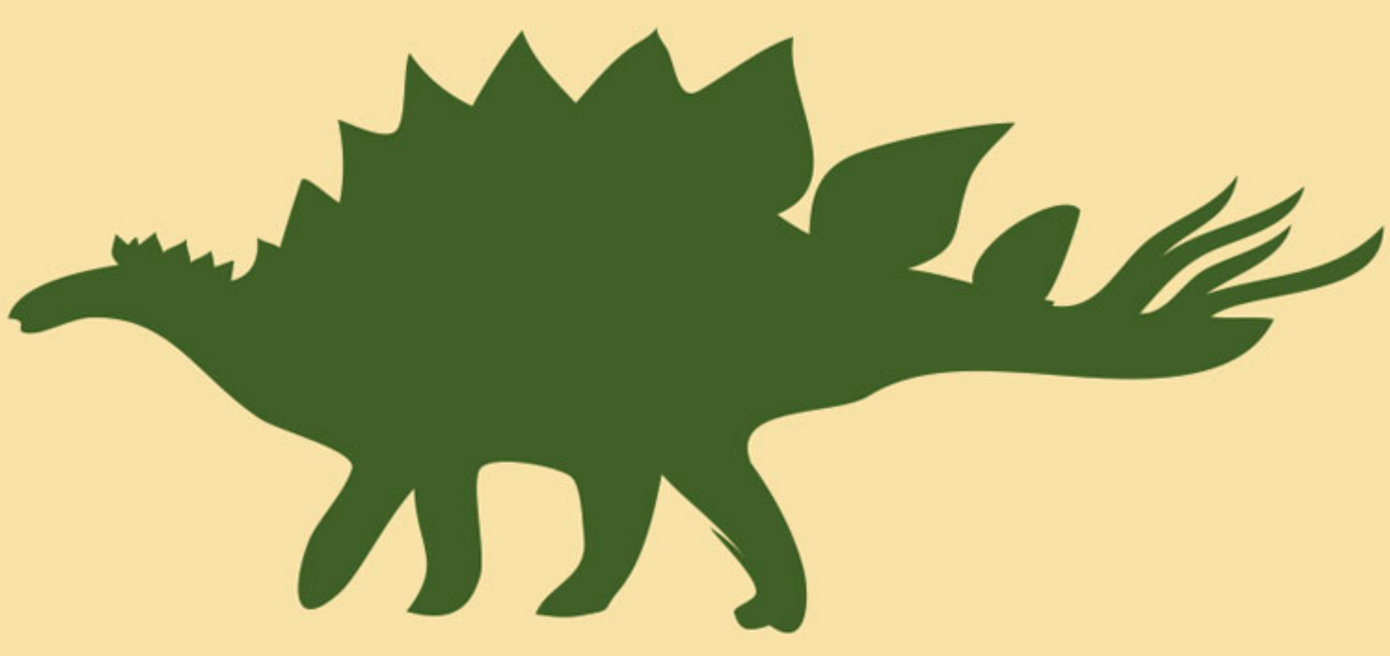
STEP 5

Finally, clean any remaining plaster from the skeleton. It's easiest to do this under running water using the sponge.

TIP! Put the stopper in the drain so you don't lose any pieces.

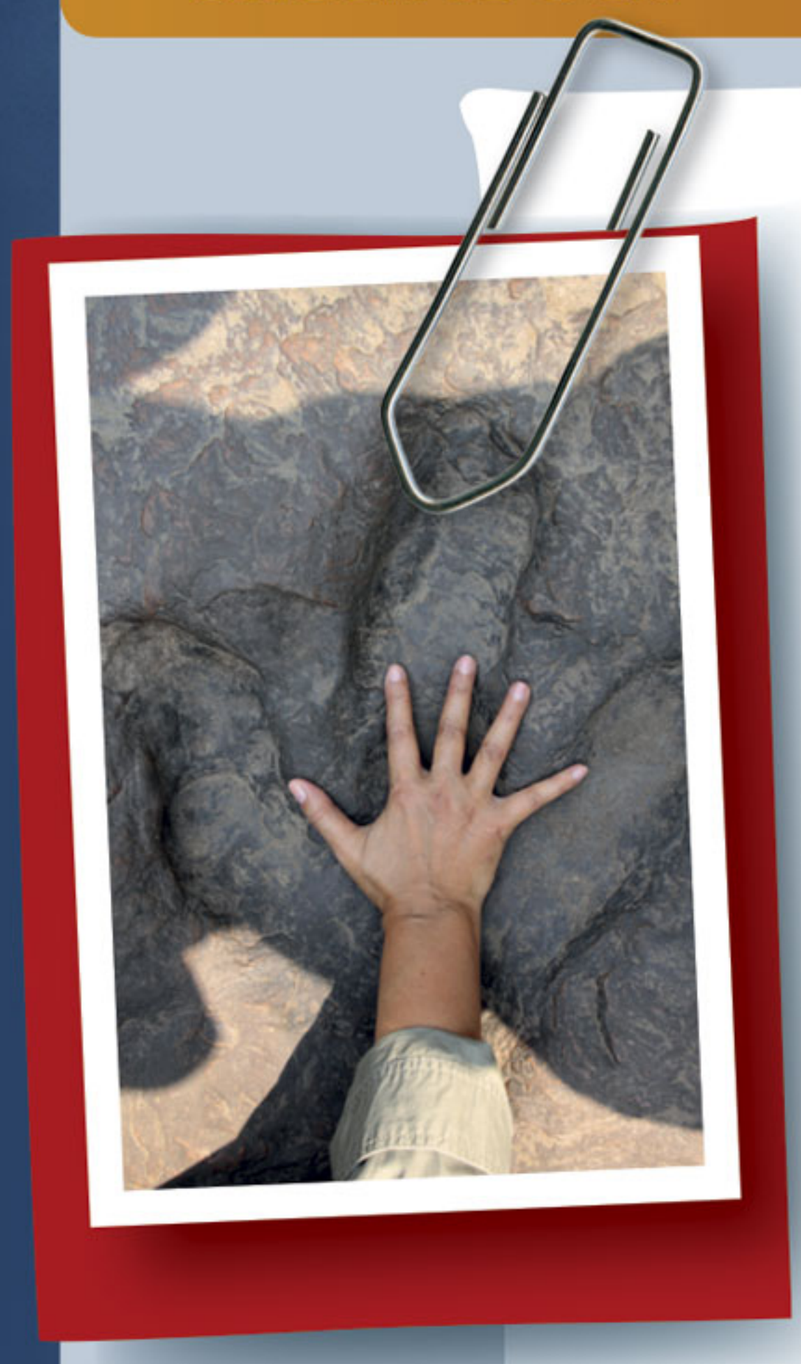
Then, let all the bones dry on a paper towel before assembling them.





NOTE! After excavating and cleaning the skeleton, wash your hands thoroughly and clean the work area. Dispose of the newspaper along with any bits of plaster in the household trash.

Check It Out

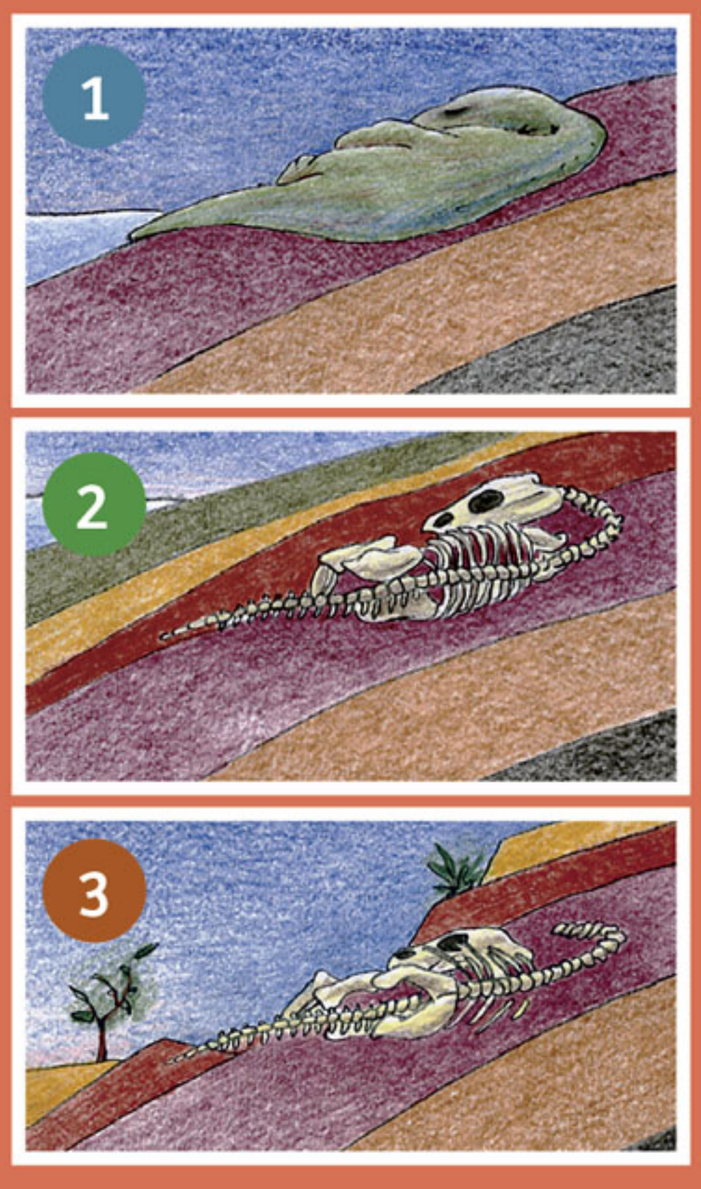


HOW DO WE KNOW SO MUCH ABOUT DINOSAURS?

A long time ago, there were many animals and plants that no longer exist today. The dinosaurs became **extinct** millions of years ago. But some remains of their bodies have been preserved. When that has happened, bones, skin impressions, or footprints — in other words, **fossils** — may show up in stone.

Researchers dig up these discoveries, study them, and compare them to others. In this way **scientists** figured out about 200 years ago that some of these fossil remains came from enormous animals. Before then, people had thought they were the remains of human-like giants!

HOW FOSSILS ARE CREATED



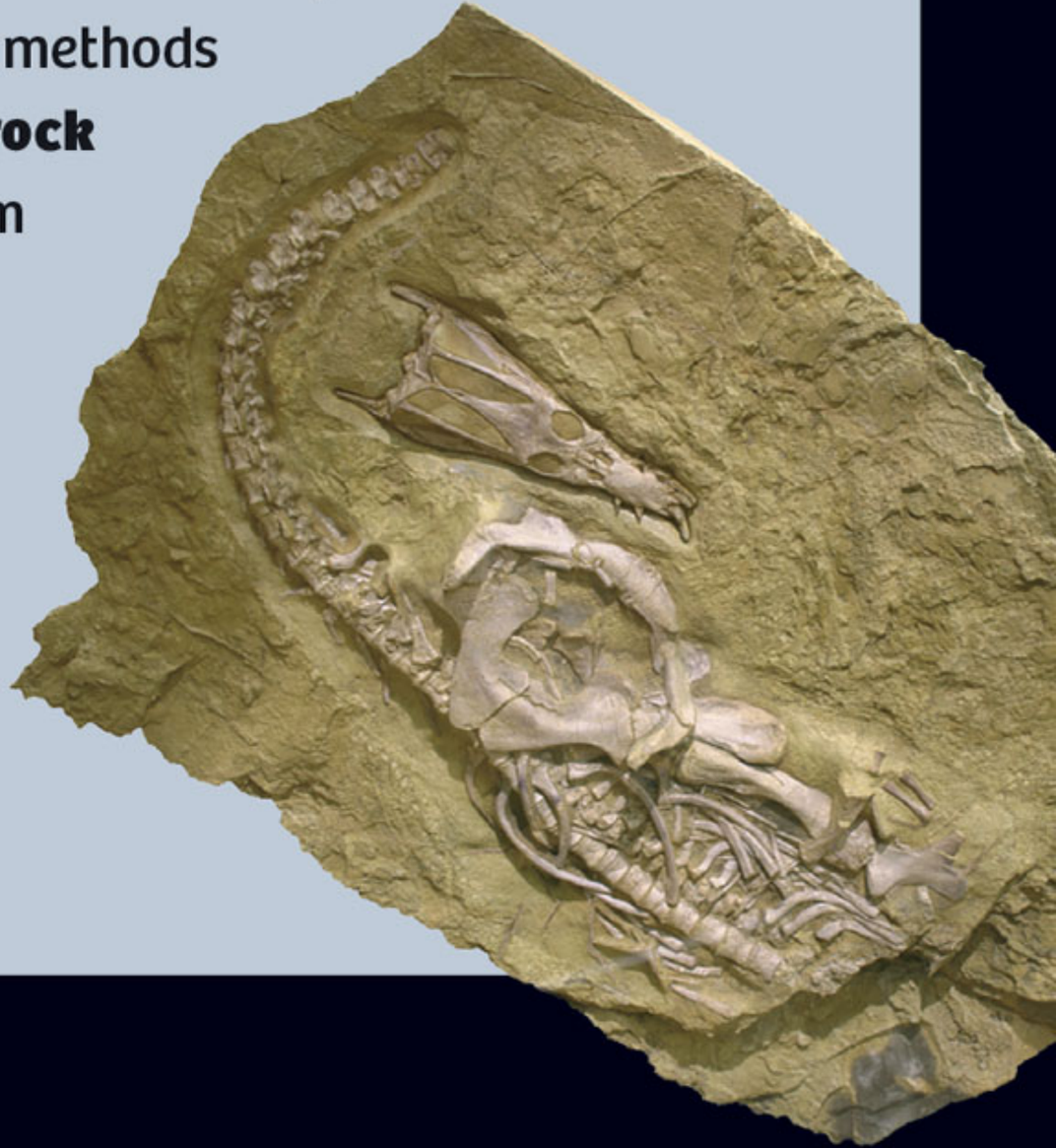
1 When animals die, scavengers eat their remains or they decay over time. Only in very rare cases are their **bones** or **imprints** saved. This may happen, for example, when they become embedded in sludge, which can preserve the remains due to its low oxygen content.

2 Over time, extra **layers** may settle on top of them and protect the animals' remains. Although the flesh itself will quickly decay, mineral-rich groundwater may penetrate the spaces that remain behind. This causes the embedded bones to **"turn to stone"**: the bone material is replaced by minerals, with the shape of the bone remaining intact.

3 In some areas, **rain** and **wind** may then carry off the superimposed layers over millions of years, revealing the fossils at the surface, where they can be dug up.

HOW DO WE KNOW HOW OLD A FOSSIL IS?

Of course you would want to know when a given animal species existed — in other words, how old a fossil is. There are several methods for that. For example, you know that if **layers of rock** have been left undisturbed, the ones on the bottom will be older — just like a stack of newspapers in your living room. So that gives you a relative sequence for the fossils embedded in the rock. Also, there are **radioactive** atoms in nature that change into other atoms at a certain rate. Based on the ratio of the two types of atoms, you can determine the age of the fossil or the layer of rock in which it is located.



Assembling the Skeleton

STEP 1

Start with the two large body halves, the tail, and the small lower backbone piece. Insert the tail into one body half where the hip bones are at the rear end of the spinal column.

1

STEP 2

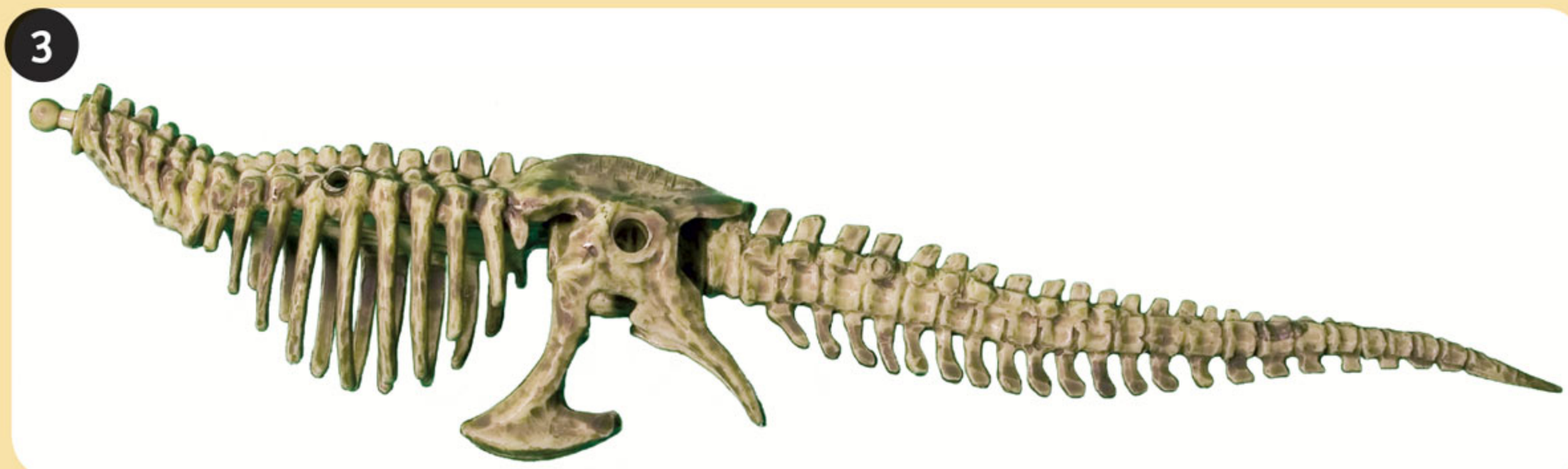
Place the small lower backbone piece against the other body half.

2

STEP 3

Then attach the two body halves together by the plug connectors along the spinal column.

3



STEP 4

Now, attach the rear legs to the hip bones by the plug connectors.

4

STEP 5

Then secure the two small arms to the shoulders.

STEP 6

The head is assembled from the two skull halves and the lower jaw. Before pressing the pieces tightly together, attach the head to the neck by the ball joint.

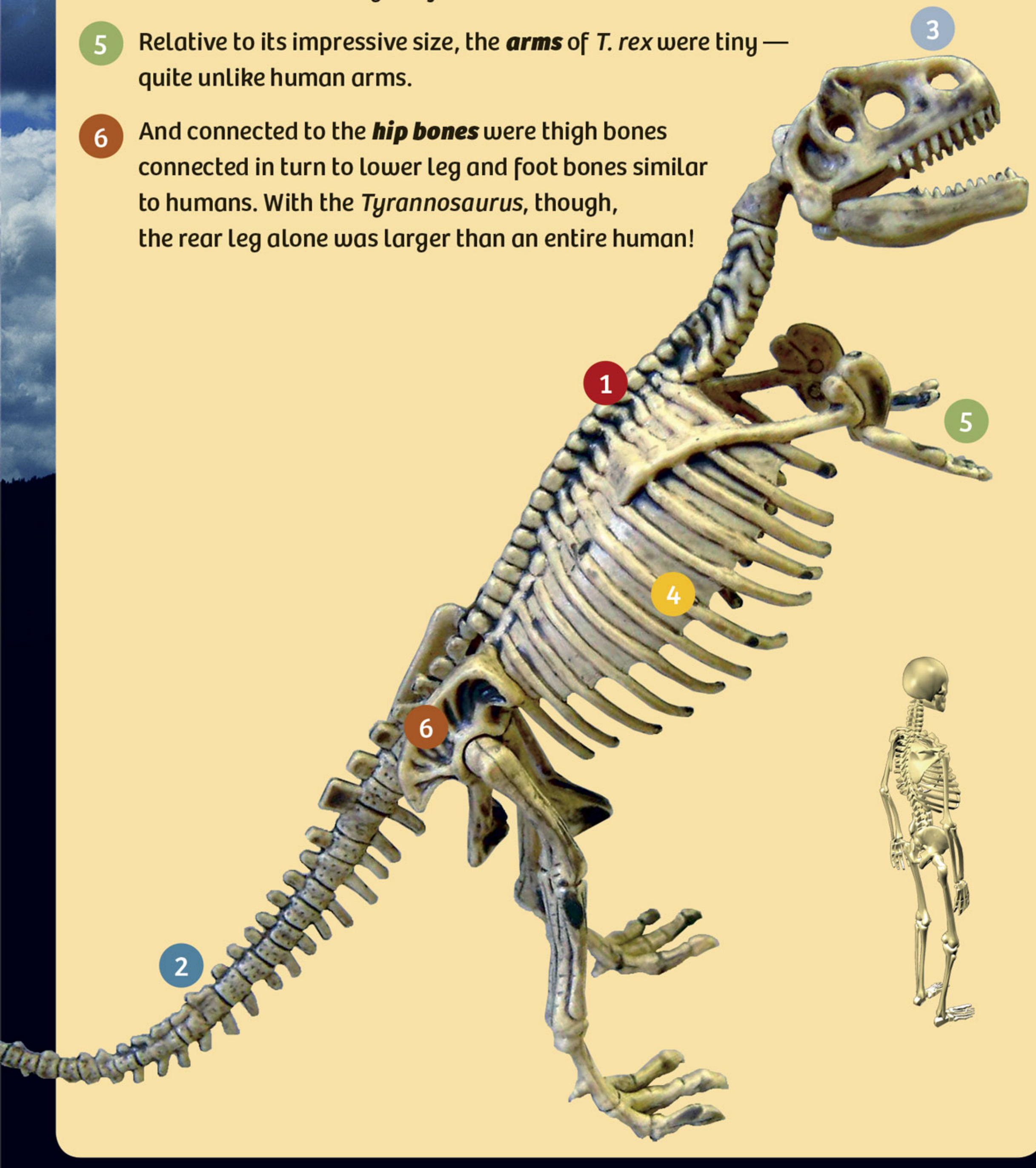
STEP 7

As a final touch, mount the entire skeleton on the mounting base along with the human figure so you can compare their sizes.

THE *TYRANNOSAURUS* SKELETON

Even though the *Tyrannosaurus* skeleton looks really different from a human skeleton at first glance, the dinosaur is nevertheless related to us. Both skeletons share some common features.

1. The ***spinal column*** shows that the dinosaurs were vertebrates — just like us. The spinal column supported the body and held the skull, ribs, hip bones, and front and rear legs.
2. At the rear, it ended in a long ***tail,*** of which only a short tailbone remains in humans.
3. Although the *Tyrannosaurus* ***skull*** may have been big, it also resembled a human skull. You will recognize holes for the eyes and nose, the upper jaw, and the movable lower jaw.
4. Their ***ribs*** formed a rib cage, enclosing and protecting sensitive internal organs such as heart and lungs — just as ours do.
5. Relative to its impressive size, the ***arms*** of *T. rex* were tiny — quite unlike human arms.
6. And connected to the ***hip bones*** were thigh bones connected in turn to lower leg and foot bones similar to humans. With the *Tyrannosaurus*, though, the rear leg alone was larger than an entire human!

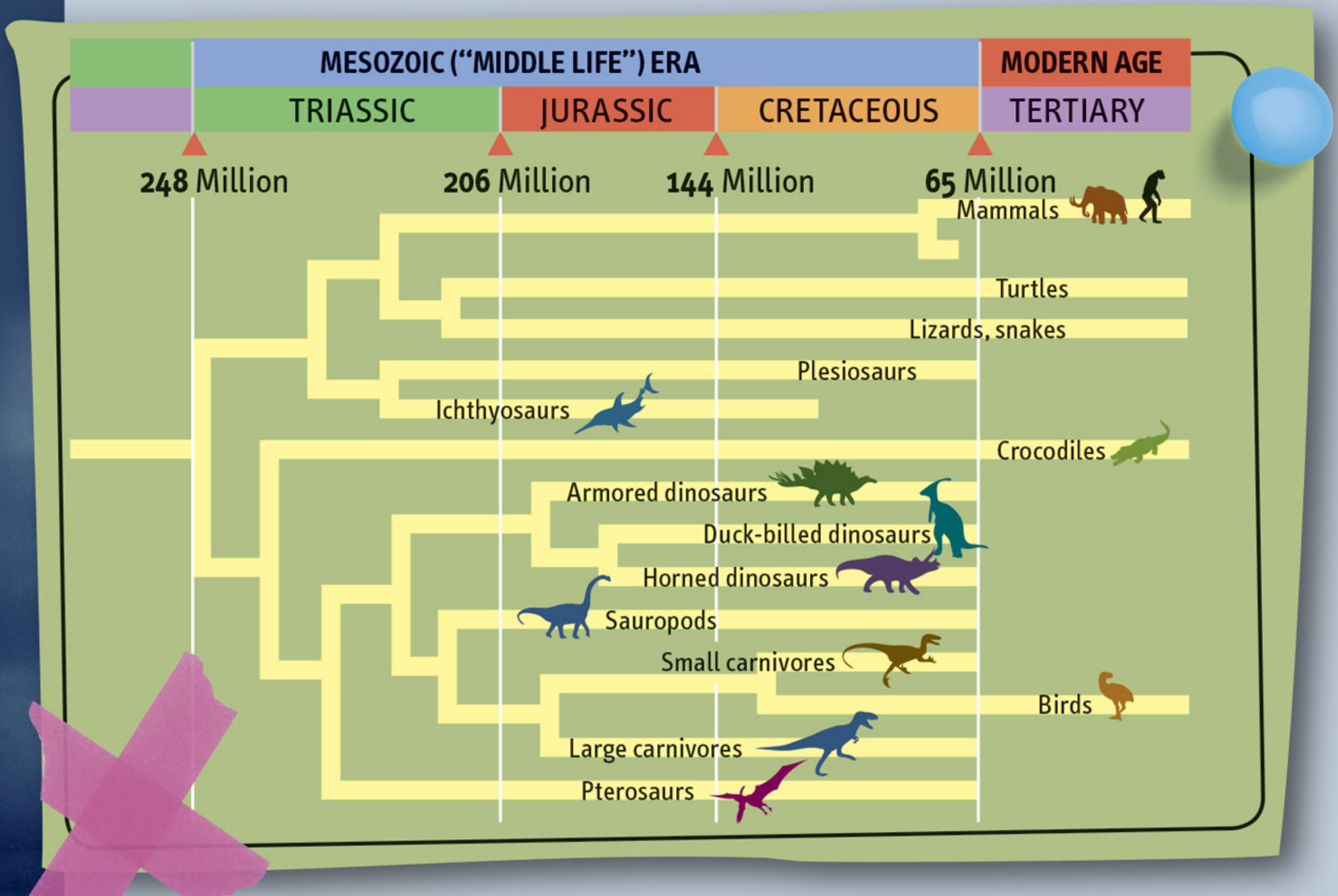


WHEN DID THE DINOSAURS LIVE?

It was **230 million years ago** that the first dinosaurs evolved from reptiles. For over 160 million years after that, they ruled Earth. As a point of comparison, consider that humans of our species have only been around for about 150,000 years.

The time period during which dinosaurs lived is called the **Mesozoic ("Middle Life") era.** The Mesozoic era is divided into three periods: **Triassic, Jurassic,** and **Cretaceous.**

During these periods, many new dinosaur species arose, existed for a few million years, and then died out again. So the many different dinosaurs that we know of by no means lived at the same time.

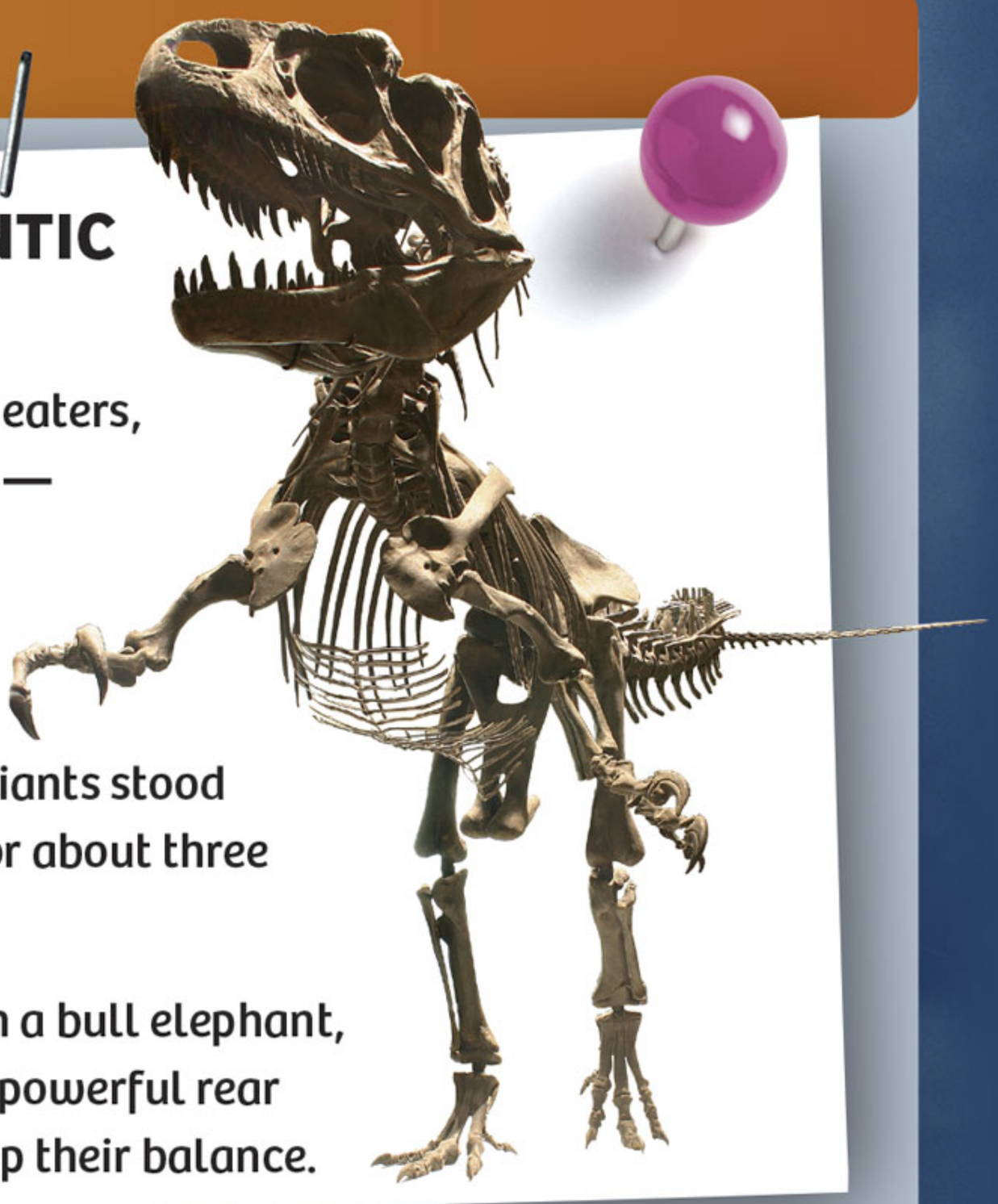


HOW DID THE WORLD LOOK AT THE TIME OF THE DINOSAURS?

There was a much warmer and wetter climate across the entire globe. The plant-eating dinosaurs fed on ferns, conifers, redwoods, and ginkgo trees. Flowering plants and broad-leaved trees did not develop until the end of the dinosaur age.

Even the globe itself looked quite different in the time of the dinosaurs. At the beginning of the dinosaur age, all the land masses lay together in one giant continent, known as **Pangaea.** Later, this supercontinent broke apart, and the pieces became the various **continents** of today. That is also the reason why dinosaur remains can be found on all of today's continents.

TYRANNOSAURUS — AUTHENTIC DINOSAUR RECORDS



These giant dinosaurs were definitely meat eaters, as evidenced by their over **60 pointed teeth** — which were over 20 cm (7.8 in.) long and razor-sharp.

A *T. rex* could reach 13 meters (43 feet), or about the length of four cars. When these giants stood upright, they were **6 meters (20 feet) tall,** or about three times the height of a human.

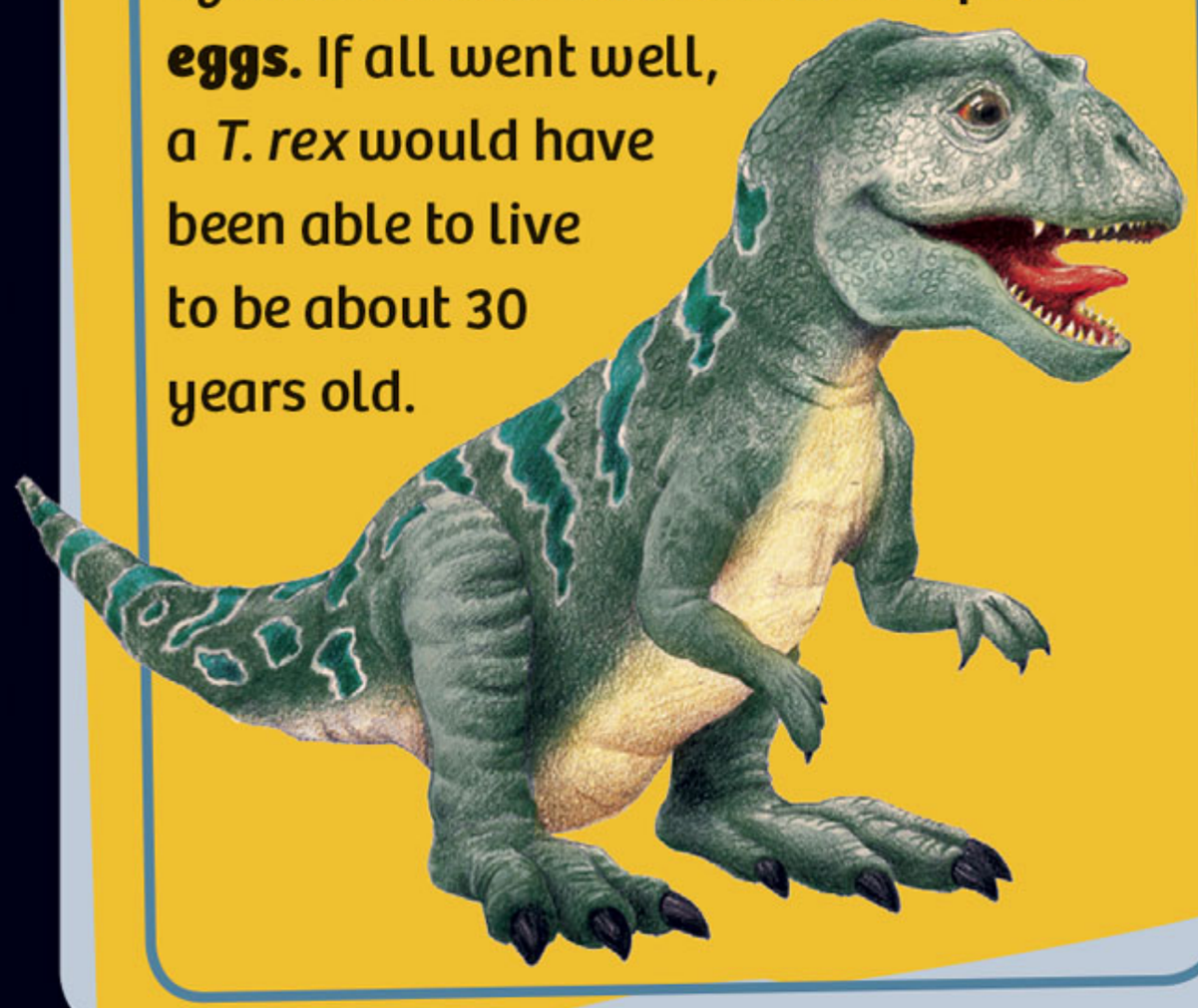
Although they were somewhat heavier than a bull elephant, around **7 tons,** they could run well on their powerful rear legs. They used their mighty tail to help keep their balance.

WHERE AND HOW DID *T. REX* LIVE?

They lived near the end of the dinosaur age in North America. Most researchers believe that they were hunters. Evidence for this is provided by the eyes mounted at the front of their skull, which permitted **depth perception.** Their relatively large brain is also an indication that they hunted since hunting animals have to track down and outsmart their prey.

There was no escape from the meter-long jaws of a *T. rex.* The upper jaw was wider than the lower one. Thanks to this overbite, they were able to tear **huge pieces of flesh** from their prey in a single bite.

Tyrannosaurus babies hatched from **eggs.** If all went well, a *T. rex* would have been able to live to be about 30 years old.



WHY ARE THERE NO MORE DINOSAURS TODAY?

At the end of the Cretaceous period, the last dinosaur species died out. But why?

The most plausible theory is that a meteorite crashed into Earth. A **meteorite** is a solid object from space that does not burn up as it approaches Earth and impacts with the ground. The dinosaurs may have been buried by it, killed by the resulting **tidal wave,** or died from **dust clouds** that covered the sun.

It is also possible that there was a very powerful **volcanic eruption** that changed Earth's climate. Or, new plants and animal species may have evolved so that the dinosaurs could no longer find their usual food.