

EXCAVATION KIT

1 DIGIT! DINOS

TYRANNOSAURUS REX

THAMES & KOSMOS



Contents

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Editing: Camille Duhamel and Ted McGuire;
Additional Graphics and Layout: Ashley Greenleaf and Dan Freitas; Translation: David Gamon; Copy editing: Dorothy M. Taguchi, PhD, of The Linguistic Edge
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Printed in Thailand / Imprimé en Thaïland



- › 1. Excavation block with skeleton relief hidden inside
- › 2. Hammer
- › 3. Chisel
- › 4. Brush
- › 5. Sponge

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

If any parts are missing or defective, please contact Thames & Kosmos customer service:
US: techsupport@thamesandkosmos.com
UK: techsupport@thamesandkosmos.co.uk

Dear Parents!

Please provide your child with assistance and support when excavating the dinosaur skeleton relief. 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.

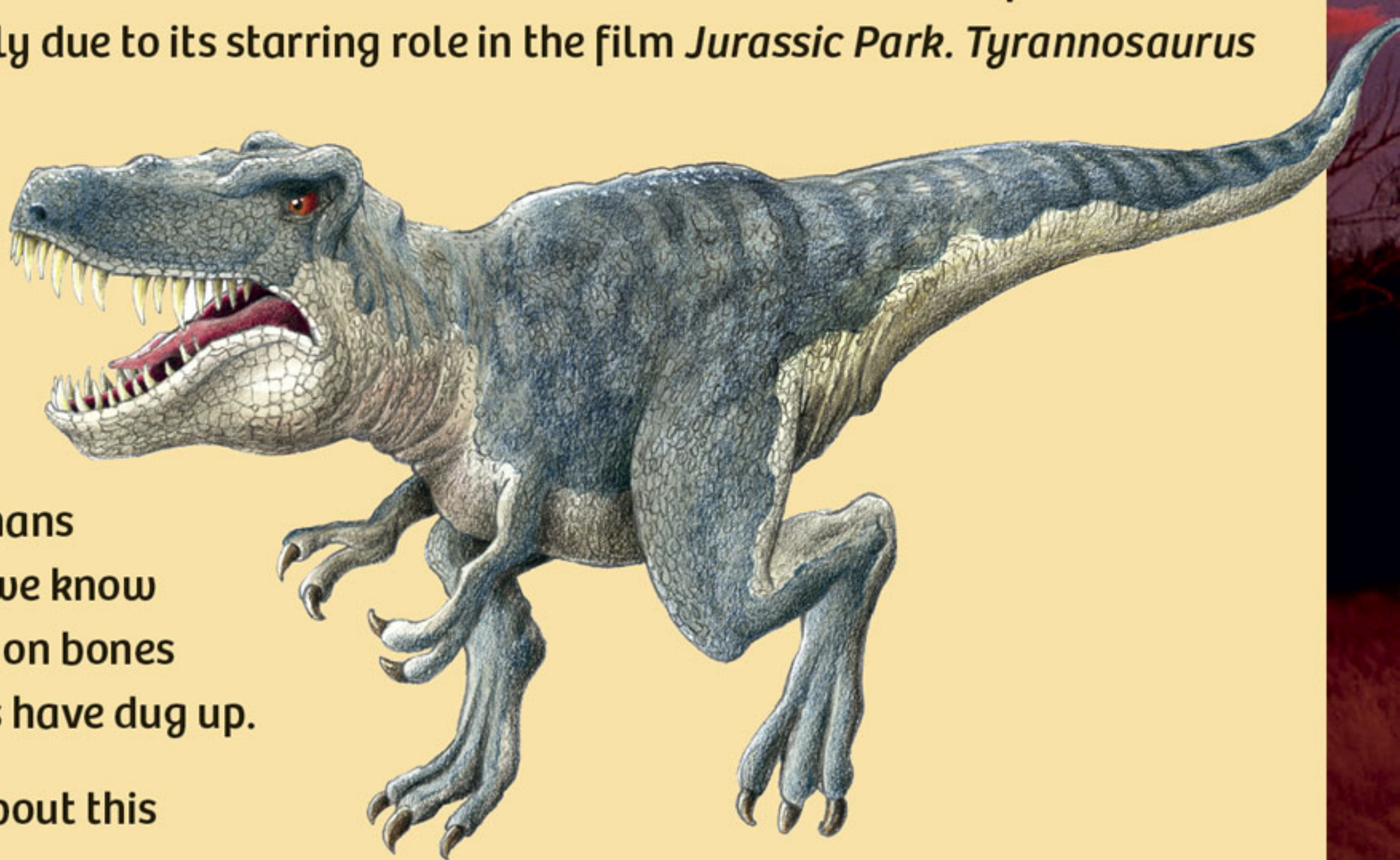
Keep the packaging and instructions as they contain important information.

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 relief of 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

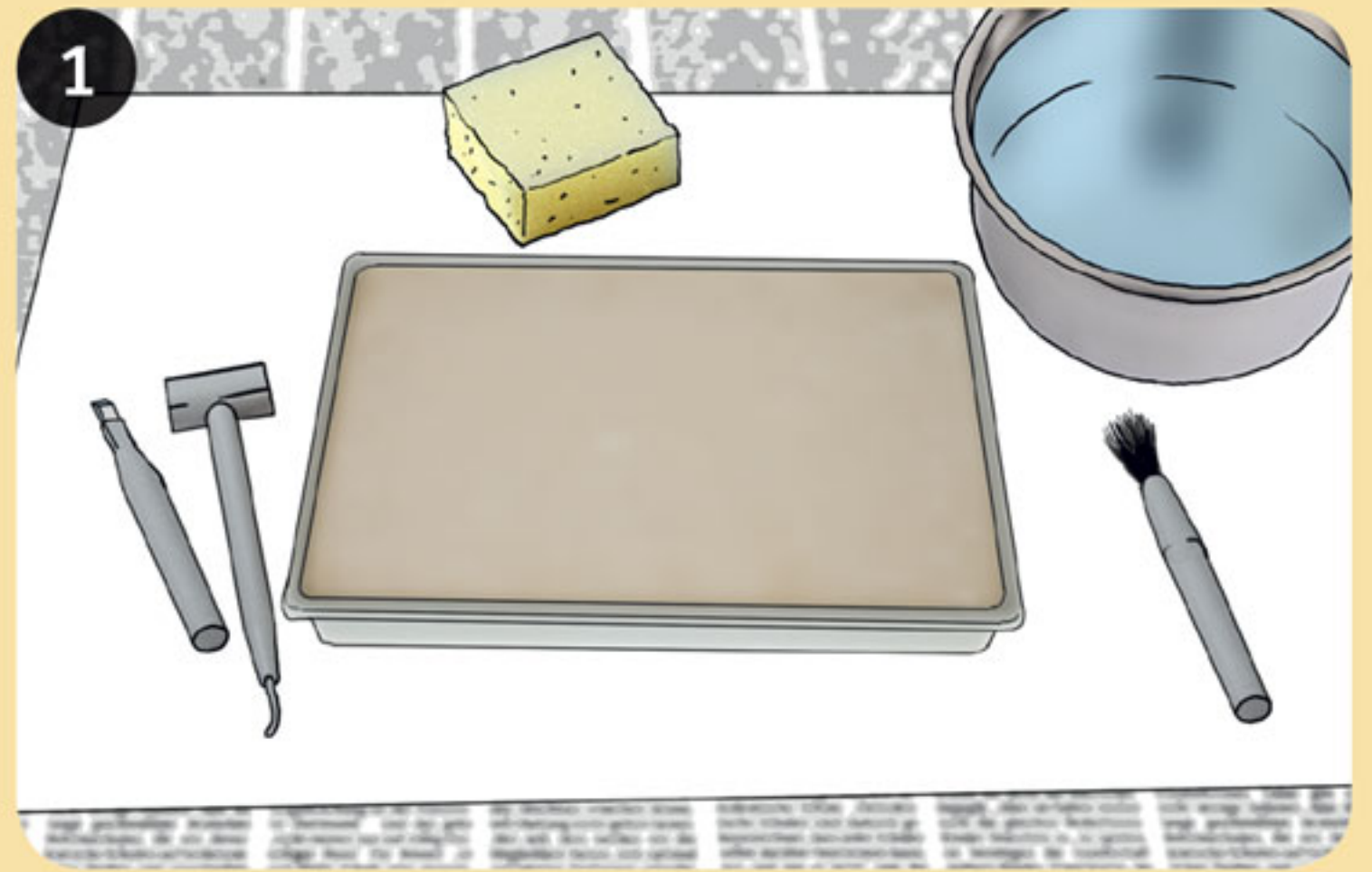


STEP 1

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.

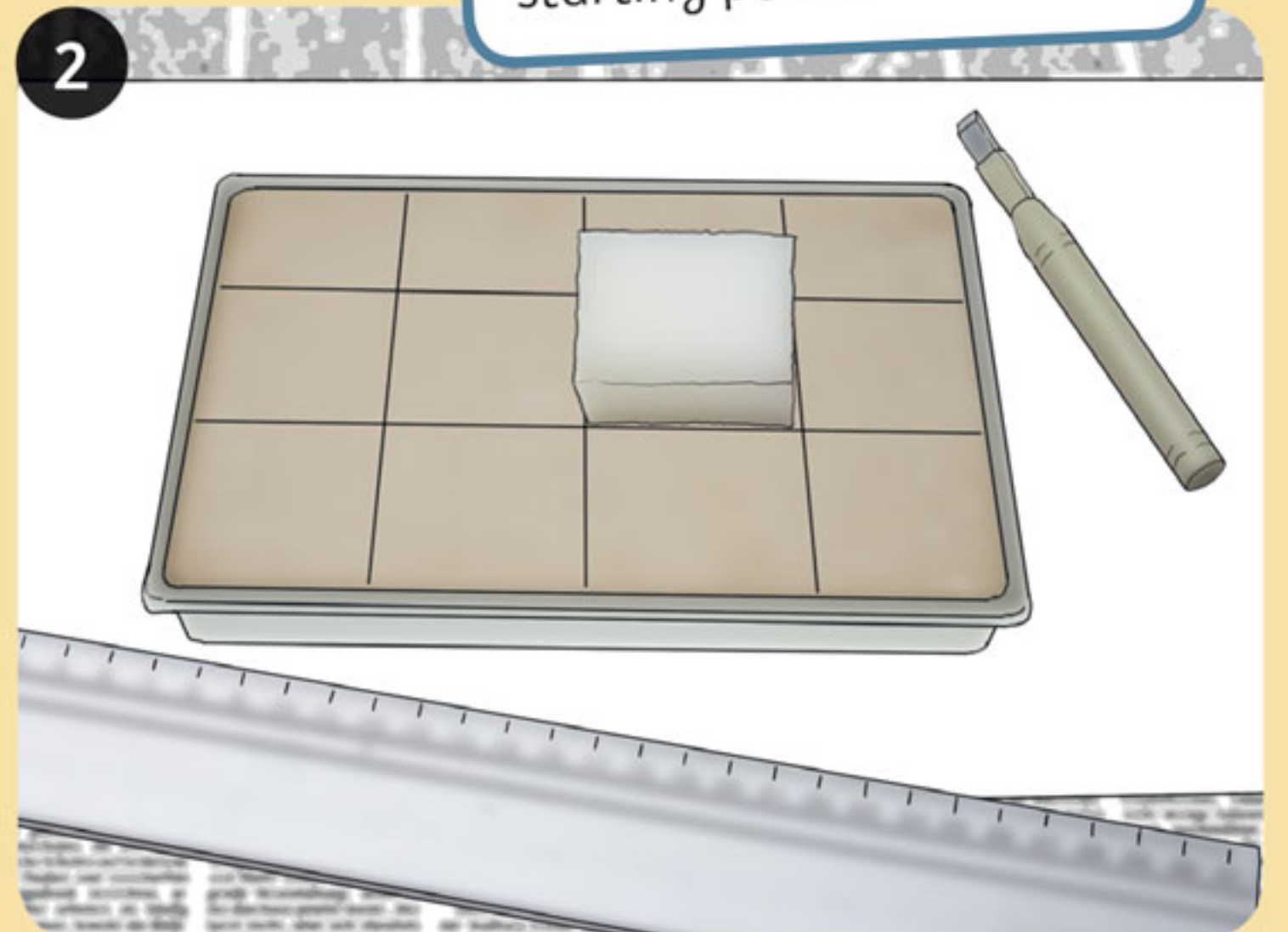
Get the excavation block and tools ready, along with a small bowl of water.



STEP 2

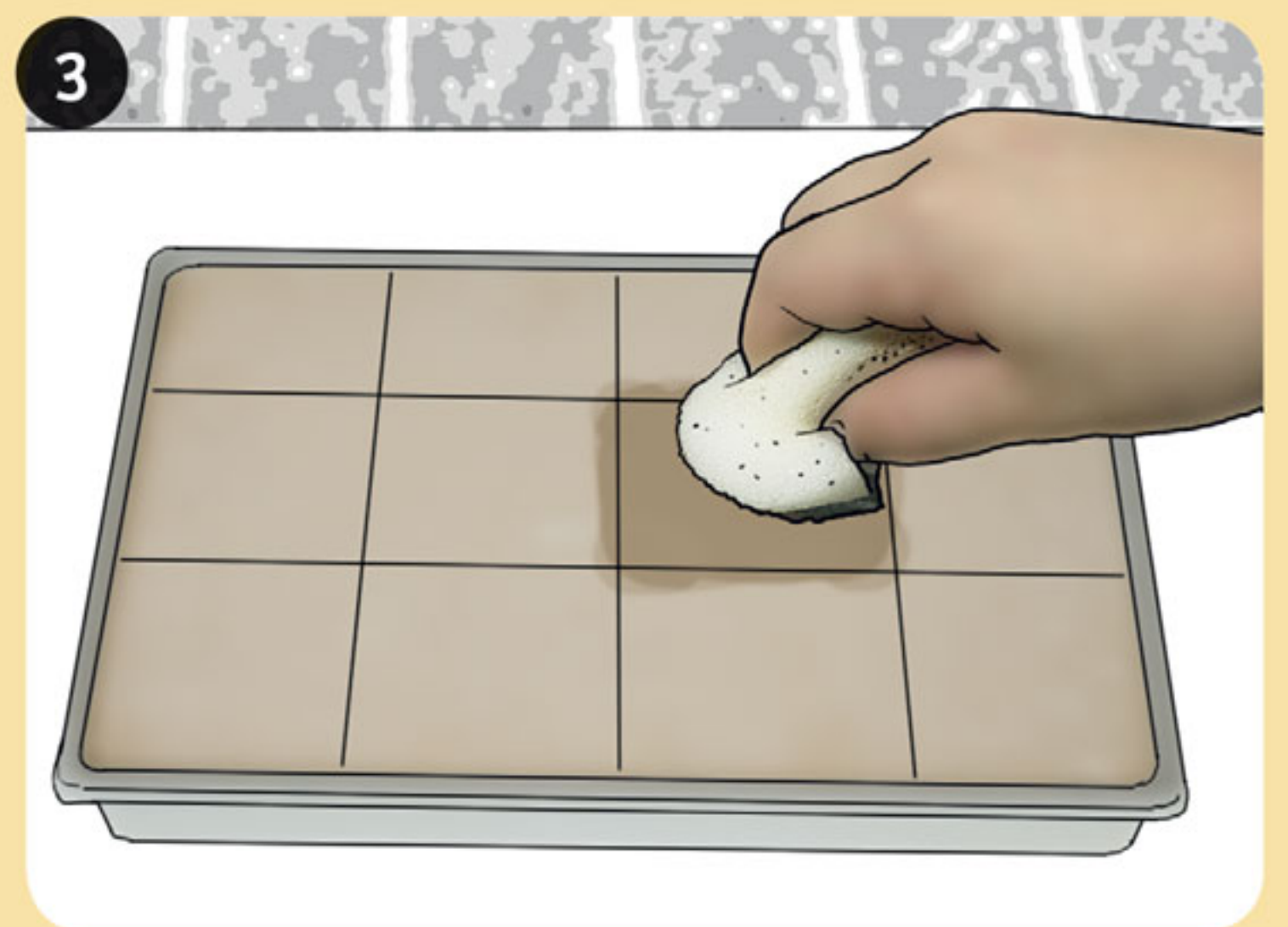
When excavating, proceed like a paleontologist. Divide your fossil site into squares by placing the dry sponge on the plaster block. Use the chisel and ruler to carve a grid pattern into the surface. The individual squares should be about the size of the sponge.

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



STEP 3

Start your excavation in any square that you like. First soak the sponge with water in the bowl. Then place the sponge on a square and carefully squeeze out the water.



STEP 4

The water will turn the plaster in the square quite soft, so you can easily scrape off the surface with the chisel. When you come to harder spots, keep digging carefully with the hammer and chisel. As soon as you come across the skeleton, try digging gently all around it. You can also use the hook at the end of the hammer handle for this.





STEP 5

Next, continue step by step in the same manner with the other squares — until you have excavated the entire *T. rex* skeleton. The photo shows you how the skeleton relief will look.

NOTE! To avoid chips and dust, keep moistening the excavation block with the sponge as you dig.

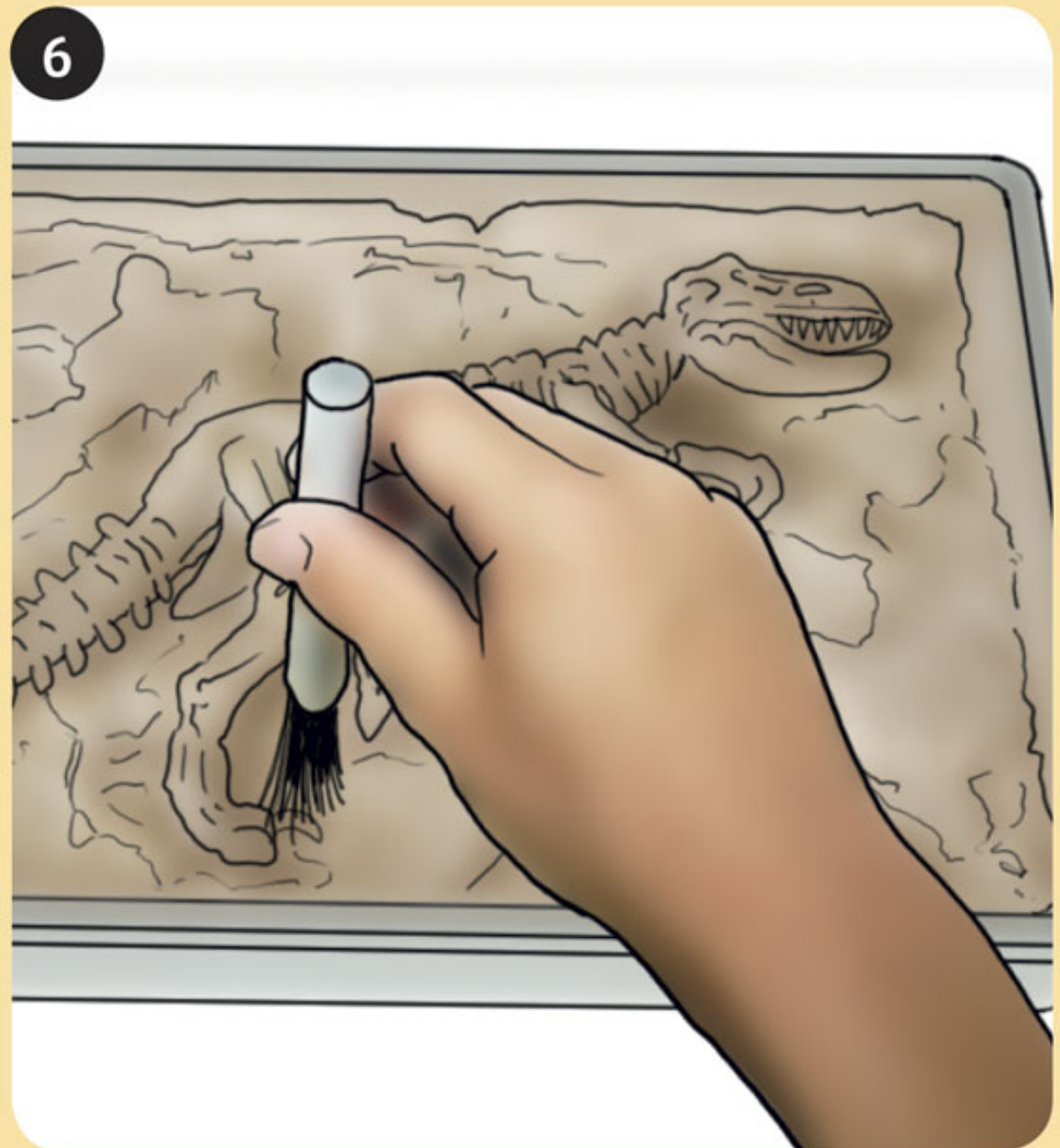


STEP 6

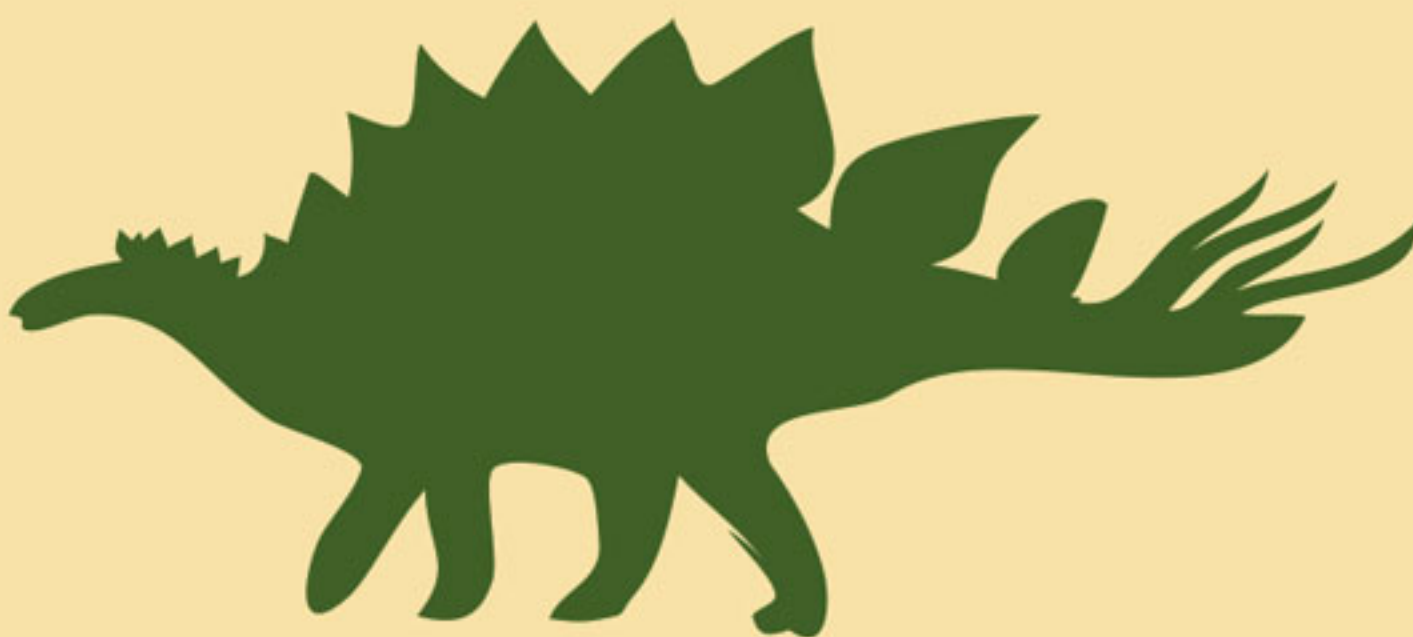
The best way to clean the delicate skeletal structures is by using the brush. That is also what paleontologists do when excavating small specimens.

You can also clean the entire skeleton relief plate with a damp sponge at the very end.

If you like, you can also cover the entire relief with a clear varnish. Be sure to have an adult help you pick out a suitable varnish and paint it on.



NOTE! After excavating and cleaning your skeleton relief, 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?

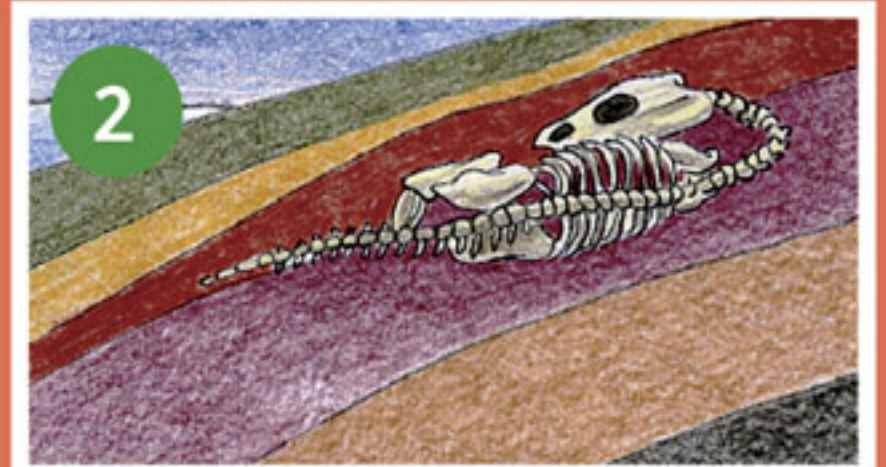
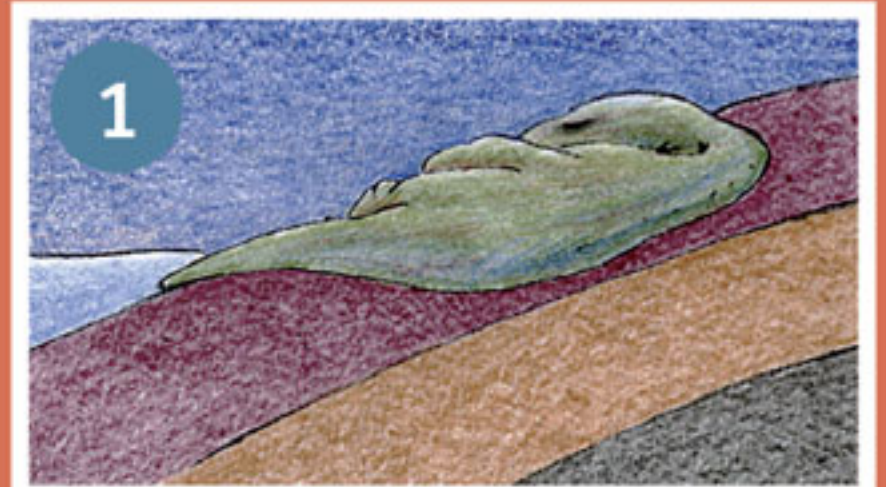
A long time ago, there were many animals and plants that no longer exist today. The dinosaurs became **extinct** millions of years ago. But some remains of their bodies have been preserved. When that has happened, bones, skin impressions, or footprints — in other words, **fossils** — may show up in stone.

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

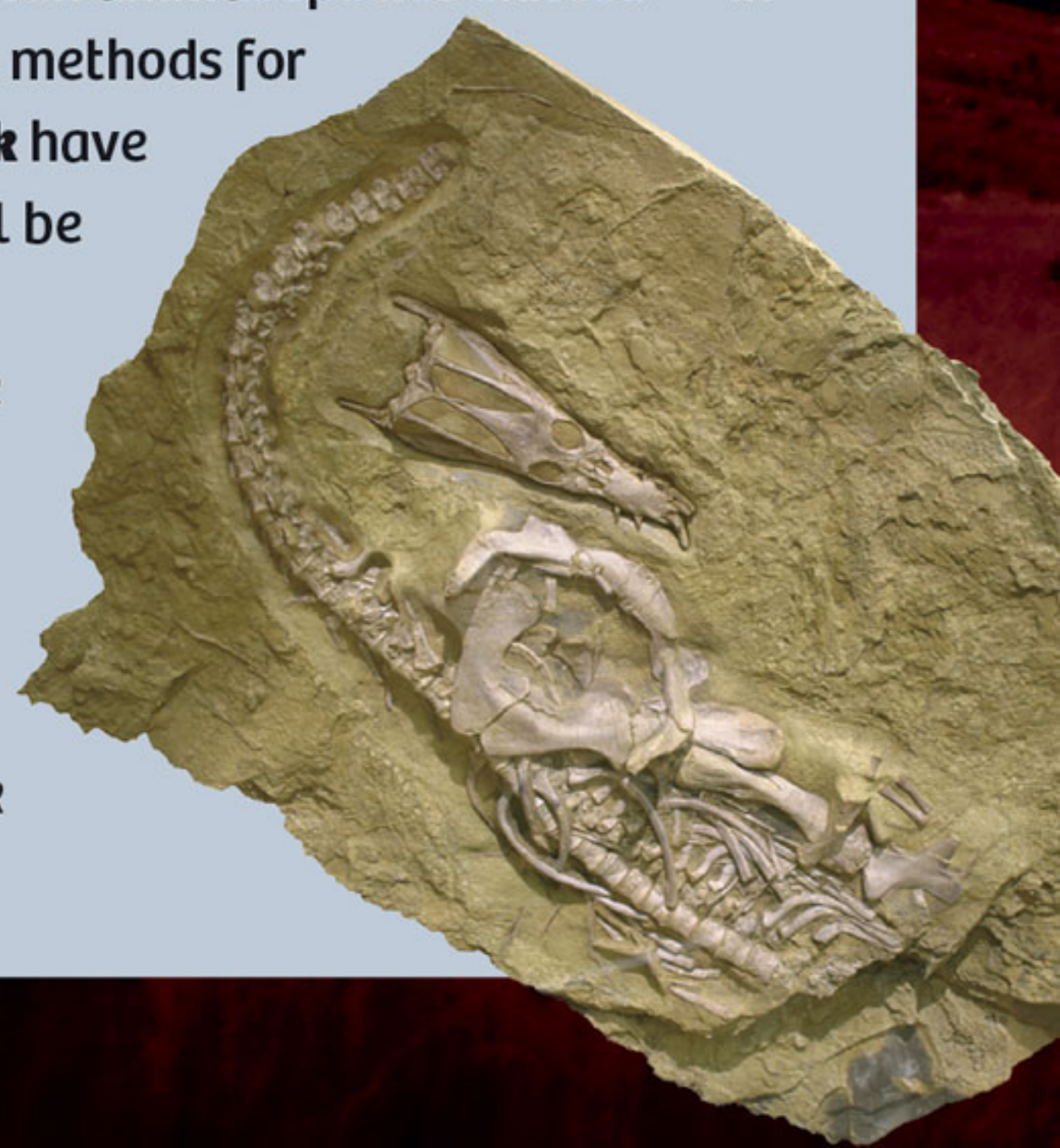
- 1 When animals die, scavengers eat their remains or they decay over time. Only in very rare cases are their **bones** or **imprints** saved. This may happen, for example, when they become embedded in sludge, which can preserve the remains due to its low oxygen content.
- 2 Over time, extra **layers**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

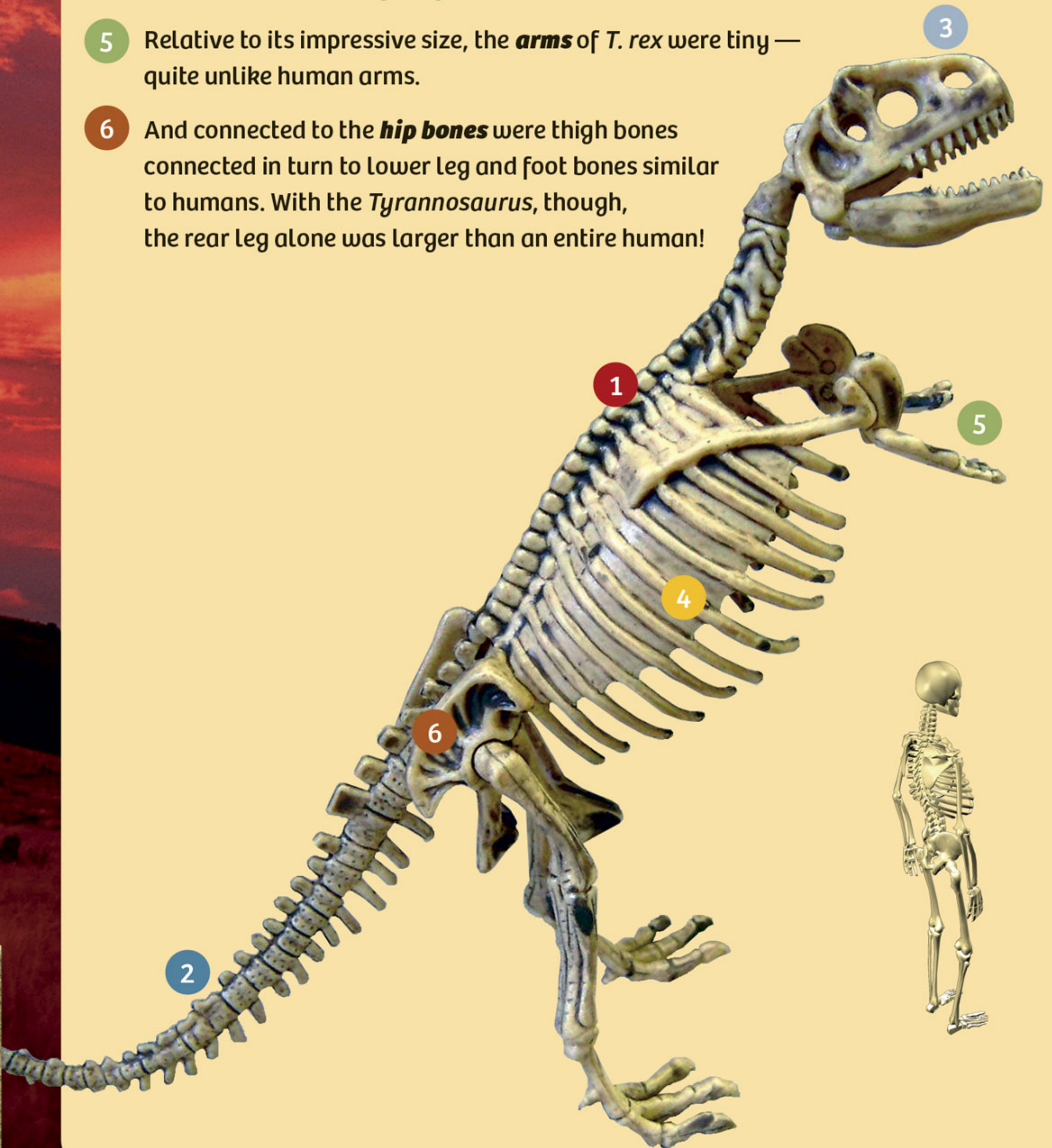




THE *TYRANNOSAURUS* SKELETON

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!



Check It Out

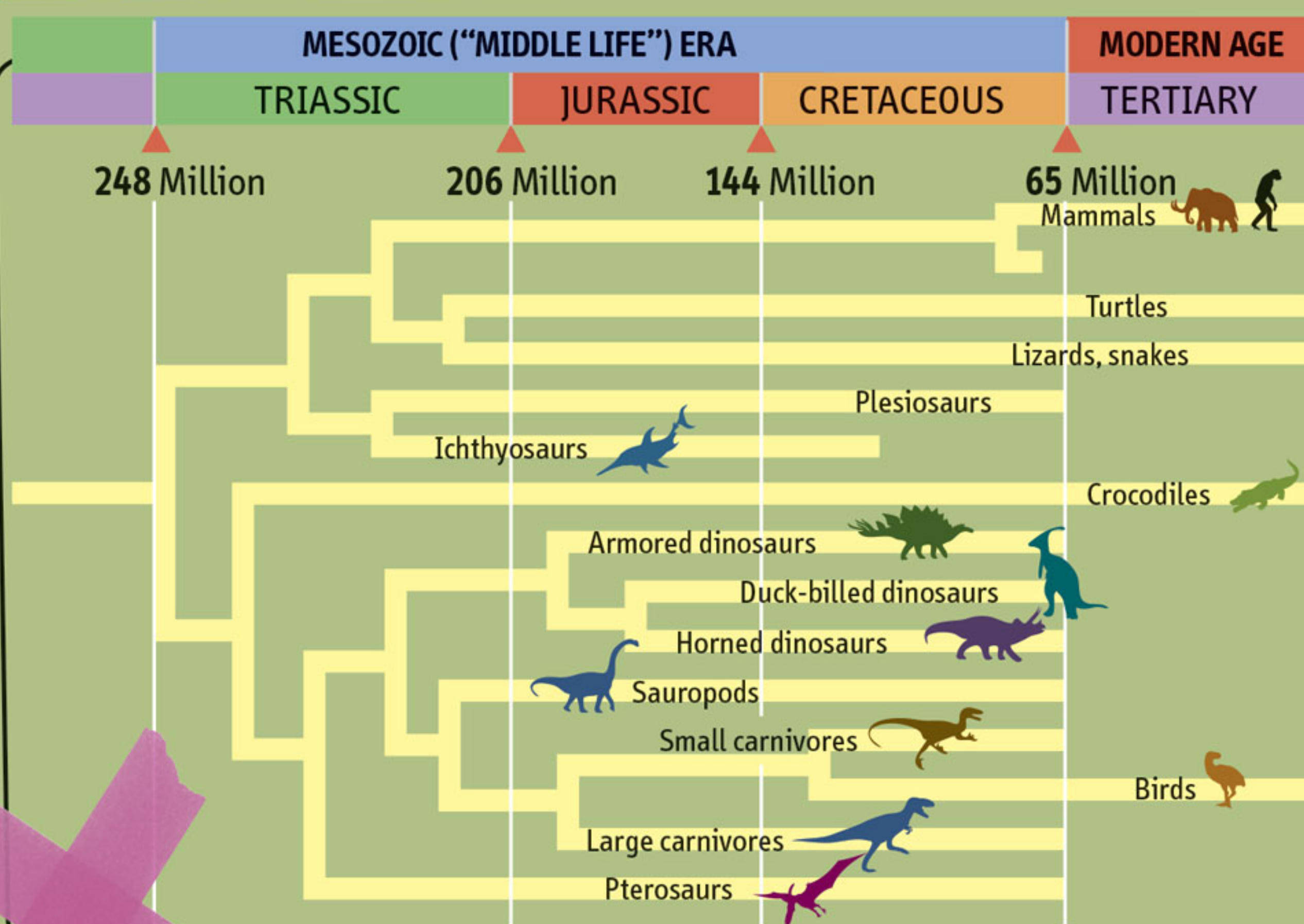


WHEN DID THE DINOSAURS LIVE?

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.



Check It Out

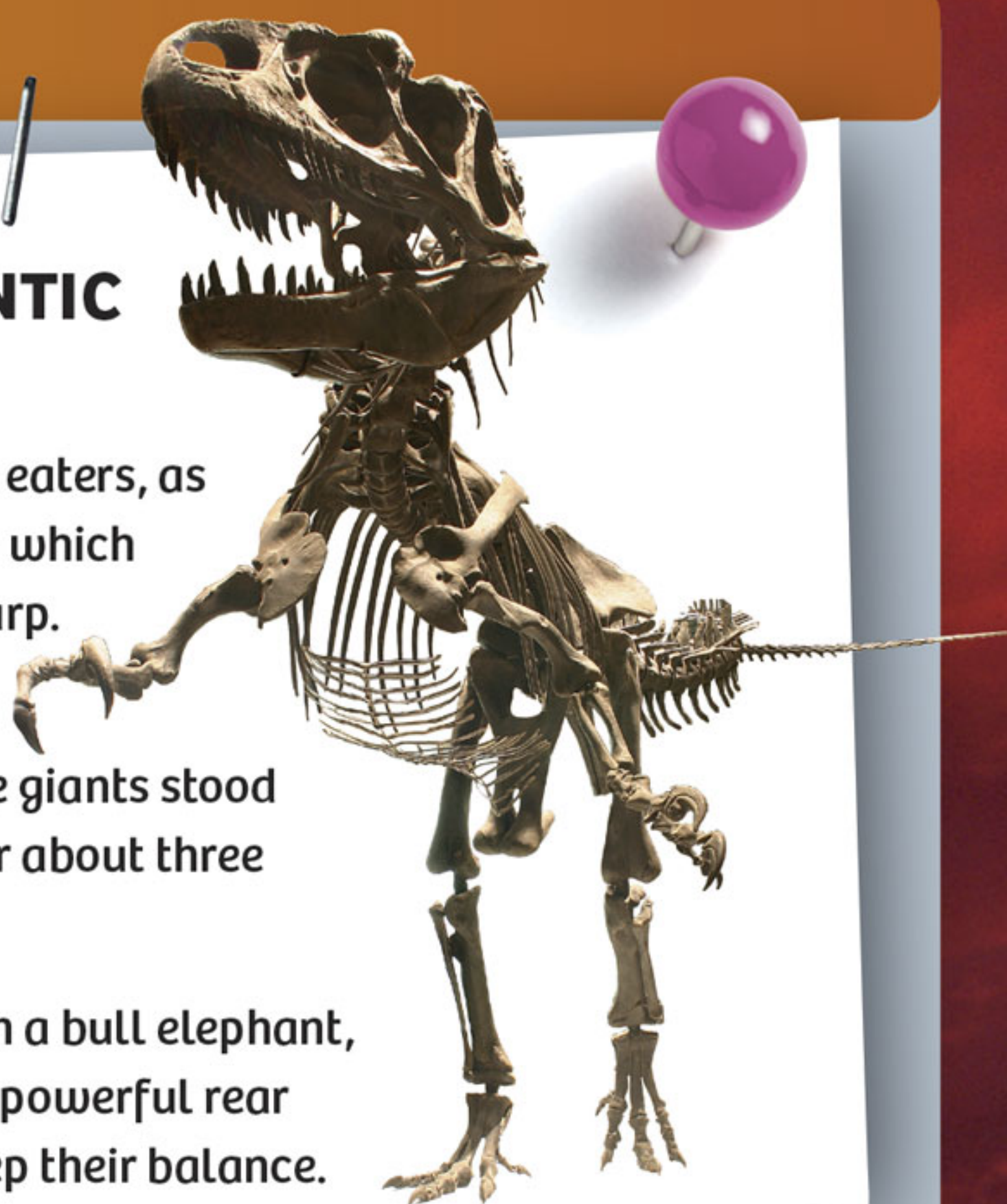


TYRANNOSAURUS — AUTHENTIC DINOSAUR RECORDS

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.

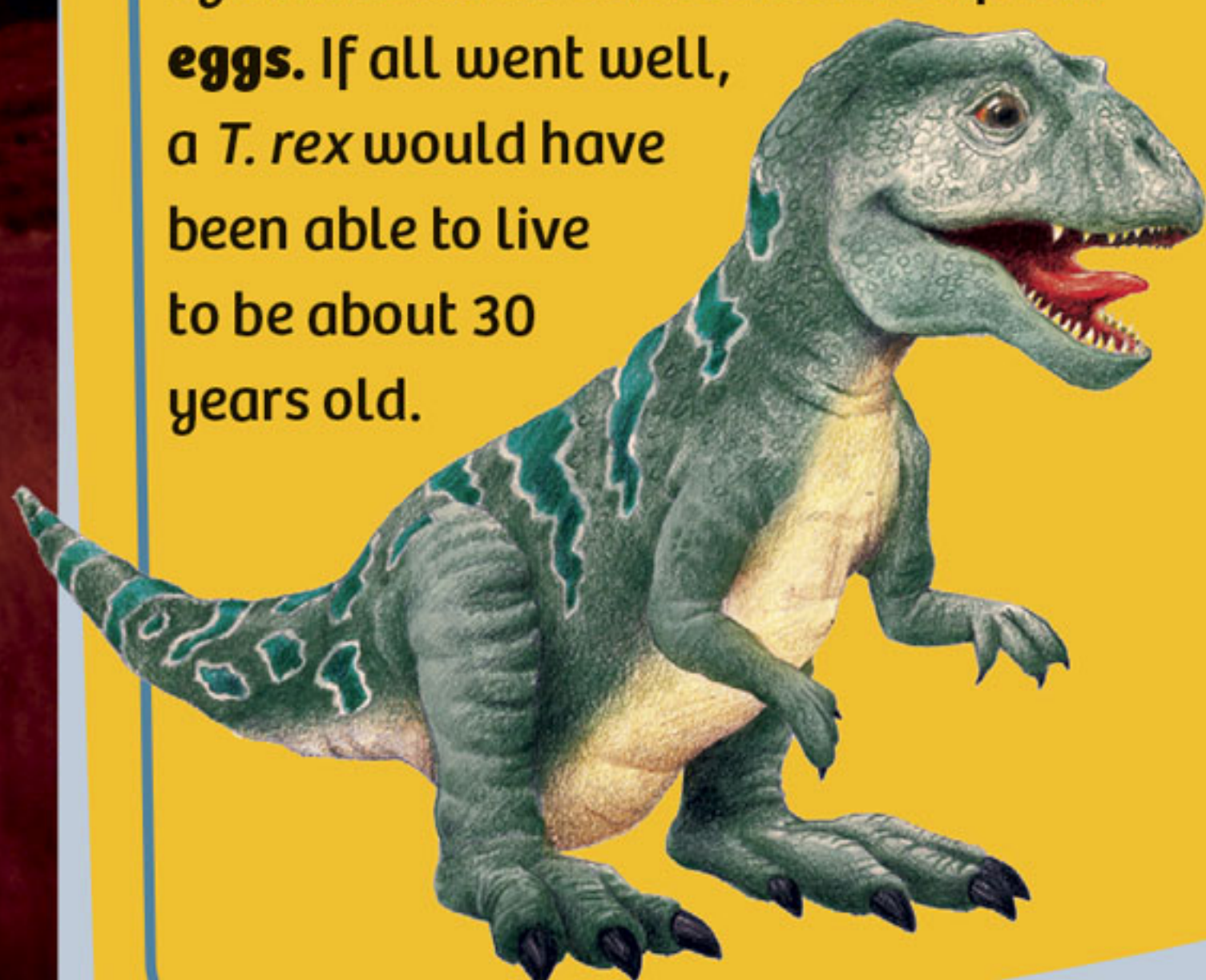


? WHERE AND HOW DID *T. REX* LIVE?

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.