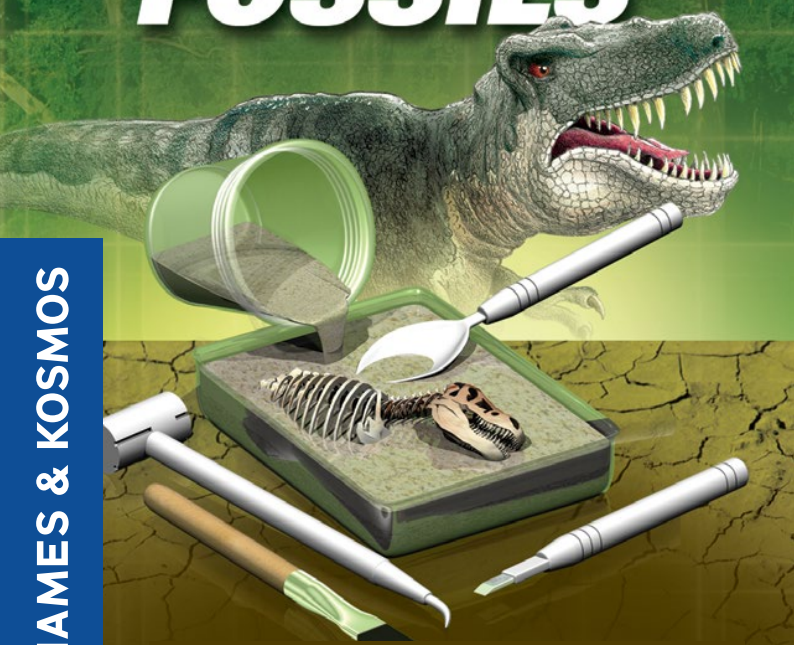
EXPERIMENT MANUAL

IGNITION SERIES

DINOSAUR FOSSILS



THAMES & KOSMOS

Warning! — This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

Information for Parents and Adults

Please give your child assistance with pouring and digging, and be ready to offer your support and company. Read through the manual together before starting the experiments, and follow its instructions. Please be sure that none of the kit parts get into the hands of small children, particularly the plaster pieces that remain behind after digging.

Caution! Individual parts of this kit have points or sharp edges or corners. Do not injure yourself! Use the enclosed safety goggles to protect the eyes from chipped-off particles. Pay attention to the instructions for use on the back page of the manual.

Warning!

Only for the use of children older than 8 years of age. Use only under adult supervision. Read the instructions before use, follow them, and keep them on hand for reference.

- Do not put plaster in mouth or eyes. Do not inhale dust. Do not apply material to skin.
- Pets and children who are younger than the specified age should be kept away from the experiment area.
- Keep the experiment kit out of the reach of young children.
- Wash hands after completing the experiments.
- Clean all equipment immediately after use.
- Do not use any equipment except what is included in the kit or recommended in the instructions.
- Do not eat, drink, or smoke in the experiment area.

First Aid Information

In case of contact with eyes: Rinse the eye with running water while holding it open. Rinse from the nose outward. Seek immediate medical help.
In case of swallowing: Rinse the mouth with water and drink clean water. Do not induce vomiting. Seek immediate medical help.

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Giant of the Past

He is today's most famous dinosaur: *Tyrannosaurus rex.* No human has even seen a living dinosaur. Dinosaurs died out 60 million years before the first prehistoric men appeared. Everything that we know about them has been deduced from fossil remains found by researchers of prehistoric animals, who are known as paleontologists.

The enormous bones of these gigantic animals have been preserved in stone in many locations, where they can be dug up, assembled into a skeleton, and displayed in museums. This kit introduces you to the fascinating work of paleontologists.

Contents

1 Plaster, white
2 Plaster, brown
3 Mold
4 Safety Goggles
5 Chisel
6 Spoon
7 Hammer
8 Paintbrush
9 Sponge
10 Rib cage, right
11 Rib cage, left
12 Tail
13 Leg, left
14 Arm, left
15 Leg, right
16 Arm, right
17 Lower jaw
18 Skull (2-part)

4 Instructions for Embedding the Skeleton in Plaster

You will first embed the dinosaur skeleton in plaster, modeling how a real dinosaur skeleton would have been encased in sedimentary rock over many years.

When pouring the plaster layers that will contain the skeleton, you should choose a place where it's okay for things to get a little wet and dirty. It's also important that your work surface be nice and level. Ideally, first spread out a sheet of plastic and then a few layers of newspaper on top of that. Wear old clothes that can take a bit of a beating, because they may get a little wet and dusty. Be careful not to inhale the dust. The only thing you will need besides the kit contents will be about one half liter of water. So let's get started: First, pour about 1-2 cm of water into the mold. Then, add about

10 spoons of plaster powder. It's up to you whether you start with the white plaster or the brown plaster. Be sure to distribute the plaster powder relatively evenly over the water. It's easiest if you carefully "jiggle" the basin with quick, short movements until it forms an even surface. Just be sure not to slosh any water over the sides.

Now let the plaster settle a little and get your skeleton pieces ready, which you can start to place in your first plaster layer after a few minutes. Press the pieces lightly into the plaster. Think about which pieces you want to place in the bottom layer. It's completely up to you. It would be a good idea, though, to have the two rib cage halves in the very bottom layer so that they don't stick up above the top edge of the mold. You can put the smaller pieces in later, maybe in the second or third layer.

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Once you have made up your mind about how you want to position your skeleton parts, you can start to fill the next plaster layer. Again, it's completely up to your own imagination whether you want to alternate plaster colors or not. You can also vary the amount of plaster that you add to each layer. For thin layers, just add a little less plaster, and add a little more for thicker ones.

Distribute the plaster for the next layer evenly over the mold. Then "jiggle" the basin again, which will help it slip beneath the skeleton pieces and prevent the formation of hollow spaces. Then let the basin sit quietly for about 20 minutes. That will help the plaster harden in the water, and the individual plaster layers will be easier to separate later on when you dig them

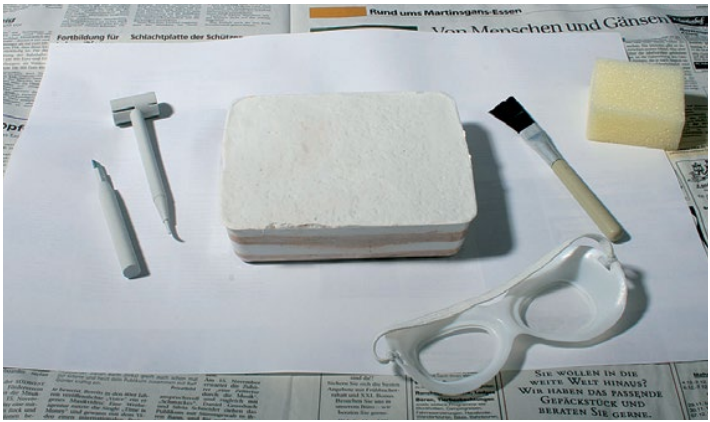
up. After pausing, be sure that the water level stands about 1 cm above the plaster surface before you add more plaster powder. If necessary, add more water. Of course, it shouldn't overflow! And make sure that you have embedded all of the skeleton pieces. You don't want to have any left over.

Continue filling the mold with plaster layers in this manner. When you get to the final layer, it will be unavoidable to have a little water overflow from the basin. Mop this up with some paper towels. Then, smooth the surface of the plaster with the spoon.

Now you have to wait. Before digging up your treasures, you will have to let the plaster harden for at least three days, but the drying time could vary depending on room temperature and humidity.

8 Instructions for Digging Up the Fossil

1. When you excavate your *T. rex* skeleton, you should choose a work area where it's okay if there's a little dust and if a few plaster chunks fall by the wayside. A basement or hobby room would be appropriate, or maybe you can find a suitable area in the kitchen or, of course, you can work outside if the weather is nice. You will need a level table, which ideally you should cover with a few layers of newspaper so you don't scratch the surface. Take the block containing the skeleton, set it flat in front of you, and get your tools ready. Wear old clothes, because you will produce a little dust while excavating. **Be careful not to inhale the dust.** Since some plaster particles might fly off, you should wear the enclosed safety goggles to protect your eyes.



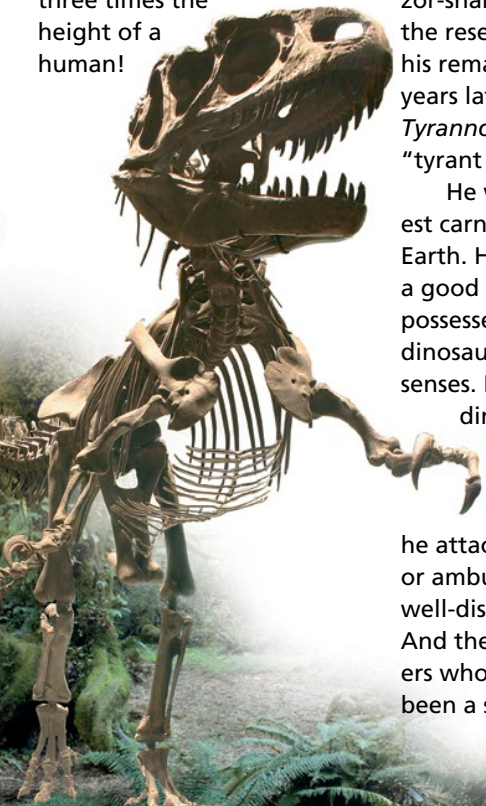
2. You will have to pay attention and work carefully while excavating your fossil, because of course you just want to remove the plaster layers from the fossil without harming the fossil itself. It is best to start in the center of the block, digging cautiously into the plaster layers with hammer and chisel until you come to the skeleton. When you hit a bone or another skeleton part, uncover it carefully by working from all sides. The paintbrush will also be helpful here. Do not try to pull out the bones while they are still attached to the plaster. They can easily break apart!

3. Now you can work through the plaster block piece by piece and uncover all of the skeleton parts. You can consult the picture on page 1 to check if any pieces are still missing.
You will still have to carefully clean the excavated pieces so there isn't any plaster residue stuck to them (including in their hollow spaces). Use the paintbrush and the narrow hook at the rear end of the hammer for this.

4. Finally, clean your fossil skeleton pieces and remove any last dust particles in a bucket or bowl using a sponge and some water. You can also do this under running water. Close the drain of the sink so you don‘t lose anything down the drain! Then it’s best to let the pieces air-dry on a piece of newspaper or paper towel before assembling them. Don‘t forget to clean up your work area and wash your hands (especially before eating or drinking).

12 *T. rex* – The Tyrant Lizard King

Once upon a time, there was an enormous animal stomping around the landscape in what we now call North America. Standing erect, this dinosaur was six meters tall — three times the height of a human!



His entire body reached up to 14 meters long. The powerful skull alone measured about one and a half meters, and the teeth in its mouth were 15 centimeters long and razor-sharp. It's no wonder that the researchers who studied his remains around 68 million years later gave him the name *Tyrannosaurus rex* – meaning "tyrant lizard king" in latin.

He was one of the largest carnivores ever to walk on Earth. He might have been a good hunter, because he possessed a good brain (in dinosaur terms) and capable senses. In contrast to other dinosaurs, he may well have had depth perception. But we don't know whether he attacked his prey openly or ambushed them from a well-disguised hiding place. And there are some researchers who consider him to have been a scavenger — that

is, an animal that lived off of dead animal remains. He could run well on his hind legs in spite of his seven tons of weight. When he did that, he used his tail to keep his balance.

Nobody knows what he used his unusually short arms for. In any case, they did bear sharp claws, so they must have been good for something.

Tyrannosaurus babies crawled out of eggs. Some people suspect that they may have worn a warm down of feathers when they were first born. They presumably grew quite quickly and soon integrated themselves into the pack, which offered them protection and, apparently, help if they got injured. If everything went well, a *T. rex* could live to be 30 years old.

How Fossils Form

When a *Tyrannosaurus* died, its gigantic body soon decayed and even its enormous bones disappeared after a few years. In rare cases, however, the bones didn't disappear — for example, if they were embedded in some mud or sand that prevented decay and preserved them. In time, more layers got added on top of them. Flesh and bone gradually decayed, but subterranean water often crept into the resulting hollow spaces and left solid mineral deposits there. In that way, the embedded bones became "fossilized."

Over the course of millions of years, rain and wind carried away the overlaid rock layers, and the bones were revealed once again. In order to

study the bones and display them, prehistoric researchers first have to scratch away the surrounding rock and "extract" the bones. In other words, they do the exact same thing that you are doing with this kit. The fossilized bones are usually recognizable by their somewhat different color or hardness. But because they can't know ahead of time where in the rock the bones might lie, they have to work very carefully in order not to damage anything — just as you have to work with care as well. Eventually, they will have a collection of bones that then have to be assembled into a skeleton. That involves a bit of detective work, since nobody knows at first what the animal looked like. In fact, sometimes people have made mistakes that were later corrected with the help of new insights. That is why some earlier dinosaur representations differ from those of today.

Test your skills as a bone detective by trying to assemble the skeleton without looking at the manual. Don't worry if it doesn't go very well.

Of course, you do have a model to work from, as paleontologists do as well: the skeletons of animals and people of today.

In fact, *Tyrannosaurus* was related to us, even if only very distantly. You can see that in his skeleton. He was a vertebrate just like us. His spinal column supported his body. At the front of it sat the head with its skull and lower jaw. At the rear, it ended in a tail (which we humans do not have, of course).

In addition, the spinal column held ribs, hip bones, and legs. And like our own, the legs consisted of upper thigh and lower shank bones and foot bones. With the *Tyrannosaurus*, though, each hind leg was larger than an entire human.

Start with the two large halves of the body and the tail. First, insert the tail in one body half at the proper location at the rear end of the spinal column (where the hip bones are).

Then connect the first half of the body to the other half at the sockets along the spinal column.

Now fix the powerful rear legs to the hip bone sockets.

Then attach the small arms to the shoulders.

The head is assembled from its two halves plus the lower jaw. Before pushing it completely together, insert it over the ball joint on the neck.

Instructions for use of the safety goggles

Part No. 052297

USE: The safety goggles are only to be used with the experiment kit. No other type of application is permitted.
Wear the glasses in such a way that the eyes are protected. If necessary, adjust the rubber band to the head circumference of the child.
The safety goggles are to be used together with corrective vision aids (contact lenses). Wearers of corrective glasses need special safety goggles for people who wear glasses.

DURATION OF USE: Always wear the safety goggles when performing the experiments. Not intended for long-term use. They should not be worn longer than the duration of the experiment.

STORAGE: Store safety goggles in at room temperature in a dry room. After the experiment, return them to their place in the experiment kit box in order to protect them from scratches.

CLEANING: Do not clean the safety goggles in a dry state. Clean them with clear water and mild household dishwashing liquid if necessary, and dry them off with a soft cloth.

MAINTENANCE: If the safety goggles are defective or their lenses are scratched, replace them with equivalent goggles.

INSPECTION: Check the safety goggles for damage, and replace them if damaged.

WARNING: With some extremely sensitive individuals, skin contact with certain materials may result in allergic reactions under some conditions.

REPLACEMENT: These safety goggles are available as a replacement part.
The safety goggles have been inspected per EC Directive 89/686/EEC (personal protective equipment), EC Directive 88/378/EEC and EN 71-4.

TESTING SITE: Certification site 0197
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