Experiment Manual

DINOSAUR DIG

DOMINION

BLUE, T. REX, AND AMBER



DEAR PARENTS AND ADULT SUPERVISORS

Please provide your child with assistance and support when excavating the dinosaur skeleton and other objects from the plaster block. Before starting the excavation. read through this manual together and be sure to follow it. This 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 INFORMATION

WARNING. Not suitable for children under 6 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 in 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 PALEONTOLOGISTS

This kit will teach you what it's like to be a scientist who studies prehistoric animals. This type of scientist is called a paleontologist (pronounced "pay-lee-un-TAH-luh-just"). You will be using the tools included in the kit to excavate the pieces of a model of a Tyrannosaurus rex skeleton, a mosquito encased in amber, and a figurine of 'Blue,' the velociraptor from Jurassic World. After digging it up, you can assemble the T. rex skeleton and then put these specimens on permanent display in your own dinosaur exhibit.

T. rex is probably the most famous dinosaur of all time, partly due to its starring role in the Jurassic World films. Tyrannosaurus rex means "king of the tyrant lizards." In the Jurassic World stories, InGen scientists recreated T. rex from fossilized remains found around the world. They also created 'Blue' from the remains of prehistoric, velociraptors as well as modern-day birds and lizards. Everything we know about dinosaurs is based on the fossilized remains that paleontologists have dug up. In the Jurassic World stories, the dinosaur DNA used to clone the dinosaurs came from prehistoric mosquitoes trapped in amber. You can find your own model of an amber specimen with a tiny mosquito inside it in this kit. Have fun learning about these fascinating dinosaurs!

EXCAVATION INSTRUCTIONS

1. Start by looking for a suitable workplace, 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 and a sponge or some paper towels.

- 2. When excavating, proceed like a paleontologist. Divide your fossil site into a grid of four squares by three squares. Use the chisel and ruler to carve the grid pattern into the surface. Then cut the sponge to be approximately the size of one of the squares, or fold the paper towels into a square of approximately this size.
- 3. Start your excavation in any square that you like. First soak the sponge (or square of folded paper towels) with water in the bowl. Then place the sponge on a square and carefully squeeze out the water.
- 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. Continue to wet the plaster to soften it. As soon as you come across an object, try digging gently all around it. You can also use the pointed end of the hammer handle for this. Dig very carefully so as to not damage any of the specimen models! Paleontologists must dig very slowly and gently.



EXCAVATION INSTRUCTIONS CONTINUED

5. Continue step by step in the same manner until vou have excavated all of the squares of the grid and found all of the objects. The picture below shows you everything hidden inside the block. Use it to figure out which things you haven't found yet and what they look like.











6. Finally, clean any remaining plaster from the specimen pieces. It's easiest to do this under running water using the sponge or paper towels. Then, let all the pieces dry on a paper towel before assembling them.





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1. Insert the tail into the large body half, matching the small and large tabs on the tail to the small and large slots on the body half.

MUMBER

2. Attach the small body half onto the large body half. Press them together all the way.

3. Attach the left hip to the left side of the body.

position to

your liking.

11. Also assemble the 'Blue' figurine

by inserting the two pegs on the

feet into the holes in the base.

11

4. Attach the right hip to the right side of the body.



HOW DO WE KNOW 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 traces of their bodies, such as bones, skin impressions, and footprints, have been preserved in stone. These are called **fossils**. 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 FORM







When animals die, scavengers eat their remains or they decay over time. Only in very rare cases are their bones or imprints preserved. This can happen, for example, when the remains become embedded in mud, which preserves them due to its low oxygen content. Over time, extra layers of sediment settle on top and further protect the remains. Although the flesh and organic matter itself will guickly decay, mineral-rich groundwater penetrates the empty spaces that are left behind. This causes the embedded bones to essentially be turned to stone: the bone material is replaced by mineral deposits, with the shape of the bone remaining intact. This process is called fossilization. In some areas, rain and wind then erode the surface layers over a long period of time, bringing the fossils closer to the surface where they can be discovered.

MOSQUITO IN AMBER

When a tree is cut, a liquid called **resin** oozes out to seal the tree's wound, much like how blood clots around a cut in skin. Over time, this resin fossilizes, hardening into a vellowish orange, translucent solid, called **amber.** Because amber starts out as a sticky liquid, and becomes a solid, sometimes animal and plant material can be trapped inside. Resin is a natural **polymer**, consisting of very large molecules, which are repeating chains of smaller building-block molecules. Animals preserved in amber do not decompose because they remain untouched by air, mold, or other insects. They can survive for hundreds of millions of years. In the early 1980s, a husband-and-wife team of scientists discovered that a fly preserved in amber still had intact cell structures, meaning that its DNA was also preserved! Michael Crichton, the author of the book Jurassic Park, used this real-life scientific discovery to explain how scientists could recreate dinosaurs from dino DNA found in the bodies of dinosaur-blood-sucking mosquitoes. While it is theoretically possible to find dinosaur DNA in mosquitoes that have been preserved in amber, scientists have not yet found any. And resurrecting an entire creature from this DNA - well that's another

challenge — one that scientists have yet to achieve.

ABOUT TYRANNOSAURUS REX

These giant dinosaurs were meat eaters, as evidenced by their over 60 pointed teeth — which were over 20 centimeters (7.8 inches) 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 six meters (20 feet) tall or about three times the height of a human.

Although they were somewhat heavier than a bull elephant, around eight tons, they could run well on their powerful rear legs. They

> used their mighty tail to help keep their balance. Tyrannosaurus rex 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 were hunters since hunting animals have to track down and outsmart their prey. The bite of T. rex was unparalleled in the animal kingdom. They could open their jaws to 80 degrees and slam them down with a force of around 34,000 Newtons.

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, though the captivity conditions in Isla Nublar mean that the T. rex from Jurassic Park was able to live to be much older.

ABOUT VELOCIRAPTORS

Velociraptor, which means "speedy thief" in Latin, were carnivores who used their intelligence, guickness, and sharp teeth to survive. 'Blue,' a dinosaur in Jurassic World, is a type of velociraptor – or raptor for short. Paleontologists believe velociraptors were roughly the size of turkeys. In the Jurassic World story, InGen scientists engineered 'Blue' by combining velociraptor DNA with that of a larger lizard, the African black-throated monitor lizard, which accounted for her distinctive color. Like other raptors, 'Blue' has long, curved claws on her second toes, which she uses to slash or tackle her prey.

Raptors are from the Dromaeosaurid family, which has a high ratio of brain size to body size, meaning raptors were among the smartest dinosaurs to ever live. Raptors could run at 25 miles per hour, using their long stiff

tails to balance as they hunted. Ancestors to modern day birds, velociraptors are theropods, with three curved claws that are similar in construction to wing bones of birds.