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The Times For Kids

EDITORS' NOTE: THIS SECTION SHOULD NOT BE READ BY GROWN-UPS

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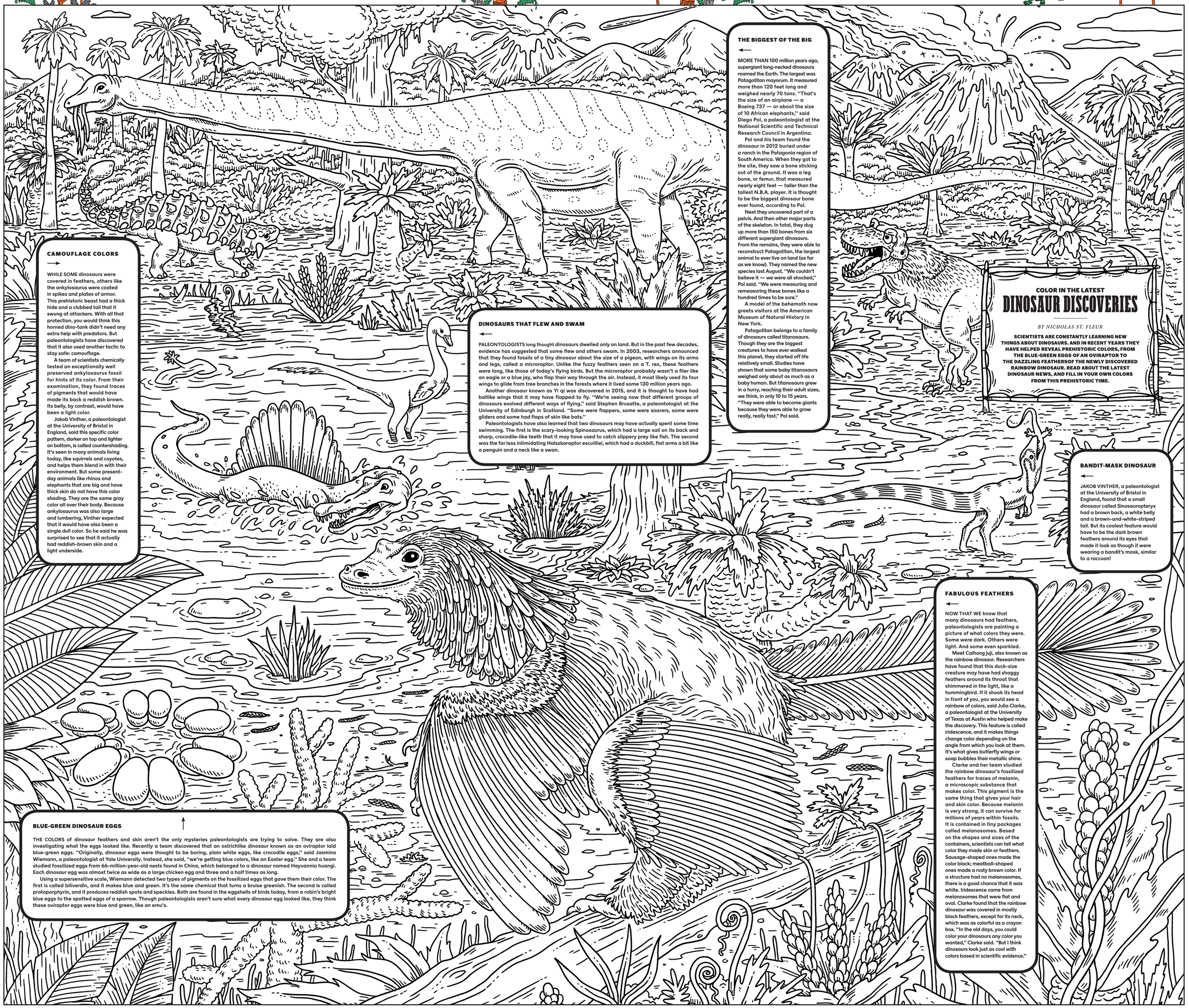
FUZZY FURY!

HOW PALEONTOLOGISTS ARE REDRAWING T. REX

FORGET WHAT YOU SAW IN "Jurassic World." Tyrannosaurus rex, the fearsome king of the dinosaurs, probably had fuzzy feathers on its body. That's what some paleontologists now think. And though they have yet to find any T. rex fossils with feathers, scientists have redrawn what the prehistoric beast looked like by studying its shaggy cousins. But with a mouthful of nine-inch-long bone-crushing teeth, it was still one of the largest killing machines to have ever walked the planet. "I think it's actually more terrifying to think that T. rex was this 40-foot, seven-ton Big Bird," said Stephen Brusatte, a paleontologist at the University of Edinburgh in Scotland. • T. rex belonged to a group of dinosaurs called theropods. They were mostly carnivores, which means they feasted on flesh. But it's Yutyrannus huali, a 125-million-year-old family member, that has most prompted paleontologists to rethink what T. rex looked like. Discovered in China in 2012, Yutyrannus was covered in small, simple feathers that might have kept it warm or helped it attract a potential mate. It is the strongest evidence so far that T. rex was similarly fluffy. • Not all paleontologists are convinced, though. In 2017, researchers studying fossilized dinosaur skin belonging to T. rex and its close relatives said they found evidence of only scales, not feathers. Perhaps the dinosaur had a mix of both, Brusatte said. But to him, it's clear that the future for T. rex is fuzzy. "I would be willing to stake a pretty large wager that T. rex was feathered," Brusatte said. "Maybe one day someone will prove it." *Nicholas St. Fleur*

ILLUSTRATION BY R. KIKUO JOHNSON

Science



COLOR IN THE LATEST DINOSAUR DISCOVERIES

BY NICHOLAS ST. FLEUR

SCIENTISTS ARE CONSTANTLY LEARNING NEW THINGS ABOUT DINOSAURS. AND IN RECENT YEARS THEY HAVE HELPED REVEAL PREHISTORIC COLORS, FROM THE BLUE-GREEN EGGS OF AN OVIRAPTOR TO THE DAZZLING FEATHERSOF THE NEWLY DISCOVERED RAINBOW DINOSAUR. READ ABOUT THE LATEST DINOSAUR NEWS, AND FILL IN YOUR OWN COLORS FROM THIS PREHISTORIC TIME.

CAMOUFLAGE COLORS

WHILE SOME dinosaurs were covered in feathers, others like the ankylosaurus were coated in spikes and plates of armor. This prehistoric beast had a thick hide and a clubbed tail that it swung at attackers. With all that protection, you would think this horned dino-tank didn't need any extra help with predators. But paleontologists have discovered that it also used another tactic to stay safe: camouflage.

A team of scientists chemically tested an exceptionally well preserved ankylosaurus fossil for hints of its color. From their examination, they found traces of pigments that would have made its back a reddish brown. Its belly, by contrast, would have been a light color.

Jakob Vinther, a paleontologist at the University of Bristol in England, said this specific color pattern, darker on top and lighter on bottom, is called countershading. It's seen in many animals living today, like squirrels and coyotes, and helps them blend in with their environment. But some present-day animals like rhinos and elephants that are big and have thick skin do not have this color shading. They are the same gray color all over their body. Because ankylosaurus was also large and lumbering, Vinther expected that it would have also been a single dull color. So he said he was surprised to see that it actually had reddish-brown skin and a light underside.

DINOSAURS THAT FLEW AND SWAM

PALEONTOLOGISTS long thought dinosaurs dwelled only on land. But in the past few decades, evidence has suggested that some flew and others swam. In 2003, researchers announced that they found fossils of a tiny dinosaur about the size of a pigeon, with wings on its arms and legs, called a microraptor. Unlike the fuzzy feathers seen on a T. rex, these feathers were long, like those of today's flying birds. But the microraptor probably wasn't a flier like an eagle or a blue jay, who flap their way through the air. Instead, it most likely used its four wings to glide from tree branches in the forests where it lived some 130 million years ago.

Another dinosaur known as Yi qi was discovered in 2015, and it is thought to have had batlike wings that it may have flapped to fly. "We're seeing now that different groups of dinosaurs evolved different ways of flying," said Stephen Brusatte, a paleontologist at the University of Edinburgh in Scotland. "Some were flappers, some were soarers, some were gliders and some had flaps of skin like bats."

Paleontologists have also learned that two dinosaurs may have actually spent some time swimming. The first is the scary-looking Spinosaurus, which had a large sail on its back and sharp, crocodile-like teeth that it may have used to catch slippery prey like fish. The second was the far less intimidating Halszkaraptor escuilliei, which had a duckbill, flat arms a bit like a penguin and a neck like a swan.

THE BIGGEST OF THE BIG

MORE THAN 100 million years ago, supergiant long-necked dinosaurs roamed the Earth. The largest was Patagotitan mayorum. It measured more than 120 feet long and weighed nearly 70 tons. "That's the size of an airplane — a Boeing 737 — or about the size of 10 African elephants," said Diego Pol, a paleontologist at the National Scientific and Technical Research Council in Argentina.

Pol and his team found the dinosaur in 2012 buried under a ranch in the Patagonia region of South America. When they got to the site, they saw a bone sticking out of the ground. It was a leg bone, or femur, that measured nearly eight feet — taller than the tallest N.B.A. player. It is thought to be the biggest dinosaur bone ever found, according to Pol.

Next they uncovered part of a pelvis. And then other major parts of the skeleton. In total, they dug up more than 150 bones from six different supergiant dinosaurs. From the remains, they were able to reconstruct Patagotitan, the largest animal to ever live on land (as far as we know). They named the new species last August. "We couldn't believe it — we were all shocked," Pol said. "We were measuring and remeasuring these bones like a hundred times to be sure."

A model of the behemoth now greets visitors at the American Museum of Natural History in New York.

Patagotitan belongs to a family of dinosaurs called titanosaurs. Though they are the biggest creatures to have ever walked this planet, they started off life relatively small. Studies have shown that some baby titanosaurs weighed only about as much as a baby human. But titanosaurs grew in a hurry, reaching their adult sizes, we think, in only 10 to 15 years. "They were able to become giants because they were able to grow really, really fast," Pol said.

BANDIT-MASK DINOSAUR

JAKOB VINTHER, a paleontologist at the University of Bristol in England, found that a small dinosaur called Sinosauropteryx had a brown back, a white belly and a brown-and-white-striped tail. But its coolest feature would have to be the dark brown feathers around its eyes that made it look as though it were wearing a bandit's mask, similar to a raccoon!

FABULOUS FEATHERS

NOW THAT WE know that many dinosaurs had feathers, paleontologists are painting a picture of what colors they were. Some were dark. Others were light. And some even sparkled.

Meet Caihong juji, also known as the rainbow dinosaur. Researchers have found that this duck-size creature may have had shaggy feathers around its throat that shimmered in the light, like a hummingbird. If it shook its head in front of you, you would see a rainbow of colors, said Julia Clarke, a paleontologist at the University of Texas at Austin who helped make the discovery. This feature is called iridescence, and it makes things change color depending on the angle from which you look at them. It's what gives butterfly wings or soap bubbles their metallic shine.

Clarke and her team studied the rainbow dinosaur's fossilized feathers for traces of melanin, a microscopic substance that makes color. This pigment is the same thing that gives your hair and skin color. Because melanin is very strong, it can survive for millions of years within fossils. It is contained in tiny packages called melanosomes. Based on the shapes and sizes of the containers, scientists can tell what color they made skin or feathers. Sausage-shaped ones made the color black; meatball-shaped ones made a rusty brown color. If a structure had no melanosomes, there is a good chance that it was white. Iridescence came from melanosomes that were flat and oval. Clarke found that the rainbow dinosaur was covered in mostly black feathers, except for its neck, which was as colorful as a crayon box. "In the old days, you could color your dinosaurs any color you wanted," Clarke said. "But I think dinosaurs look just as cool with colors based in scientific evidence."

BLUE-GREEN DINOSAUR EGGS

THE COLORS of dinosaur feathers and skin aren't the only mysteries paleontologists are trying to solve. They are also investigating what the eggs looked like. Recently a team discovered that an ostrichlike dinosaur known as an oviraptor laid blue-green eggs. "Originally, dinosaur eggs were thought to be boring, plain white eggs, like crocodile eggs," said Jasmina Wiemann, a paleontologist at Yale University. Instead, she said, "we're getting blue colors, like an Easter egg." She and a team studied fossilized eggs from 66-million-year-old nests found in China, which belonged to a dinosaur named Heyuannia huangi. Each dinosaur egg was almost twice as wide as a large chicken egg and three and a half times as long.

Using a supersensitive scale, Wiemann detected two types of pigments on the fossilized eggs that gave them their color. The first is called biliverdin, and it makes blue and green. It's the same chemical that turns a bruise greenish. The second is called protoporphyrin, and it produces reddish spots and speckles. Both are found in the eggshells of birds today, from a robin's bright blue eggs to the spotted eggs of a sparrow. Though paleontologists aren't sure what every dinosaur egg looked like, they think these oviraptor eggs were blue and green, like an emu's.

ILLUSTRATION BY ANDREW RAE