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**T. REX: THE ULTIMATE PREDATOR OPENS AT
THE AMERICAN MUSEUM OF NATURAL HISTORY**

**FROM FLUFFY HATCHLING TO MASSIVE KILLING MACHINE: NEW EXHIBITION EXPLORES
THE LIFE HISTORY, REMARKABLE ABILITIES, AND ANCIENT RELATIVES OF *TYRANNOSAURUS REX***

FEATURING MOST SCIENTIFICALLY ACCURATE MODEL OF *T. REX* EVER

**OPENS MARCH 11, 2019
PREVIEW DAYS FOR MEMBERS BEGIN MARCH 8**

Everyone knows *Tyrannosaurus rex*. But did you know that *T. rex* hatchlings were fluffy and gangly, more like turkeys than the massive killing machines they grew up to be? Or that *T. rex* evolved from a large group of dinosaurs that were, for the most part, small, and fast? Or how about that the mega-predator had the rare ability to pulverize and digest bones? [*T. rex: The Ultimate Predator*](#), the first major exhibition of the American Museum of Natural History's **150th anniversary celebration**, will introduce you to the entire tyrannosaur family and reveal the amazing story of the most iconic dinosaur in the world through **life-sized models – including the most scientifically accurate representation of *T. rex* to date – fossils and casts, engaging interactives, and the Museum's first multiplayer virtual reality experience.**

Founded in 1869, the Museum has a long and celebrated history of international exploration and research in paleontology dating back to the 1890s, with an outsized influence in a field that sits at the intersection of cutting-edge science and the popular imagination. The Museum also has a special relationship to *T. rex* in particular, having discovered and mounted the first *T. rex* on display anywhere, making *T. rex: The Ultimate Predator* a natural launching point for the 150th anniversary programming, which is inspired by a legacy of scientific exploration and bringing the latest science to the public.

(more)

The first *T. rex* skeleton was discovered in 1902 by the Museum’s legendary paleontologist and fossil hunter, Barnum Brown, and the Museum boasts one of the few original specimens of *T. rex* on public display in the Hall of Saurischian Dinosaurs. With more than 120 years of dinosaur research and discovery, the Museum continues to be a leader in this field. Its paleontology collection is one of the largest and most diverse in the world, with specimens that have led to amazing discoveries, including the identification of the first dinosaur eggs and early evidence of dinosaur feathers. A number of recent discoveries about the tyrannosaur group are highlighted in this exhibition.

“Dinosaurs, and *Tyrannosaurus rex* in particular, are such an important and iconic part of the Museum and have been throughout our history,” said Ellen V. Futter, President of the American Museum of Natural History. “So it seems fitting to launch the Museum’s 150th Anniversary celebrations with a major new exhibition on the ever-intriguing King of Dinosaurs. This exciting and fascinating exhibition will do what the Museum has done throughout its history and continues to do today: share the latest scientific breakthroughs with the public, introduce visitors to the researchers on the cutting-edge of discovery, shed new light on the great story of life on Earth, and inspire wonder and curiosity in visitors of all ages.”

Visitors to *T. rex: The Ultimate Predator* will encounter a **massive life-sized model of a *T. rex* with patches of feathers – the definitive representation of this prehistoric predator**. The exhibition will also include **reconstructions of several *T. rex* hatchlings and a four-year-old juvenile *T. rex***; a “**roar mixer**” where visitors can imagine what *T. rex* may have sounded like by blending sounds from other animals; a **shadow theater featuring a floor projection of an adult *T. rex* skeleton coming to life**; and a **life-sized animation of *T. rex* in a Cretaceous environment that responds to visitors’ movements**. At a **tabletop “Investigation Station,”** visitors can explore a variety of fossil casts ranging from coprolite (fossilized feces) to a gigantic femur, with virtual tools including a CT scanner, measuring tape, and a microscope to learn more about what such specimens can reveal to scientists about the biology and behavior of *T. rex*.

“Dinosaur fossils, like other echoes of ancient life, are discoveries of the science of paleontology. But dinosaurs have a special status that transcends their importance to science – they fascinate and inspire the masses like few other animals – living or extinct – can,” said Michael Novacek, the Museum’s senior vice president and provost for science. “Chief among them is *T. rex*, perhaps the most famous and celebrated dinosaur that ever lived.”

T. rex: The Ultimate Predator is curated by Mark Norell, who joined the Museum in 1989. Norell, who is the Macaulay Curator in the Museum's Division of Paleontology and its chair, has led and participated in a number of scientific investigations into the biology and evolutionary history of tyrannosaurs and other theropods – the group of dinosaurs most closely related to modern birds. His work includes the first discovery of a feathered tyrannosaur, *Dilong paradoxus*, in China in 2004. In addition to *Dilong*, many of the species studied by Norell and his colleagues and former students, and recent research findings, are featured in the new exhibition.

“In the last 30 years, we've seen a huge increase in both the number of tyrannosaur fossil discoveries as well as the availability of technology that lets us explore complex questions about these charismatic animals,” Norell said. “I never would have imagined that one day we'd be able to look at the shape of *T. rex's* brain, analyze the tiny daily growth lines on their massive teeth to determine how quickly they put on weight, or use advanced biomechanical modeling to figure out the force of its bite.”

MEET THE SUPERFAMILY

T. rex may have been a mega-predator, but it evolved from humble origins. The full tyrannosaur story includes more than two dozen different species and spans more than 100 million years of evolution, with *T. rex* appearing only at the very end of that period, between 66 and 68 million years ago. Most dinosaurs in the superfamily Tyrannosauoidea were not giants like *T. rex*, which, fully grown, weighed between 6 and 9 tons. Early species were small and fast, likely avoiding confrontations with larger dinosaurs.

Exhibition visitors will come face to face with **life-size models of a number of tyrannosaurs, including: *Proceratosaurus bradleyi***, the earliest known tyrannosaur that lived about 167 million years ago and was about the size of a wolf with a crest on its snout; ***Dilong paradoxus***, which like many early tyrannosaurs, had arms that were relatively long and capable of seizing small prey, and was the first tyrannosaur found with fossilized feathers (discovered by exhibition curator Mark Norell and his colleagues in China); and ***Xiongguanlong baimoensis***, a mid-sized tyrannosaur that, when it was discovered in 2009, offered a rare glimpse of a transitional species between the smaller early tyrannosaurs and the later giants.

Visitors will be tasked with **placing various tyrannosaur family members in the correct time period on a magnetic wall** and will be able to **experiment with a praxinoscope** that animates the difference between walking and running – *T. rex* could only truly run when it was

young. A **hands-on interactive** lets visitors **attach the right size tail to a *T. rex* torso** to create a balanced posture.

GETTING BIG

How did *T. rex* get so big when its ancestors were so small? And how did a young *T. rex* the size of a turkey grow to the size of a truck? The simple answer: by growing *very* quickly. *T. rex* reached full size by its early 20s – about as fast as a human does – but it put on much more weight in that time, gaining up to 140 pounds (65 kg) per month. The exhibition will explore *T. rex* in early developmental stages, showing how the dinosaur transformed from a vulnerable hatchling with a more than 60 percent chance of succumbing to predators, accidents, disease, and failure to find food in its first year of life, to a gargantuan predator at the top of the food chain.

Visitors will see a **life-size model of a four-year-old *T. rex***, which although not yet the “king” it would become in adulthood, would have weighed about five times more than a four-year-old boy and was as large as any other predatory dinosaur in its habitat. Fully covered in feathers for warmth and camouflage, this juvenile *T. rex* had relatively long arms (unlike its adult counterparts), a slim body, and bladelike teeth that could cut through flesh but were not yet capable of crushing bone.

They also will encounter a **real fossil of a *T. rex* toe bone** and a **touchable cast of a *T. rex* thigh bone** to gain a sense of scale for the fully grown giant, which stood about 12 to 13 feet high at the hip and was about 40 to 43 feet long. Fossil casts from a close relative to *T. rex*, *Tarbosaurus bataar*, will illustrate that *T. rex* wasn't the only tyrannosaur that looked and behaved dramatically differently throughout its life. A **cast of the youngest and most complete juvenile tyrannosaur fossil found to date**, a two-year-old *Tarbosaurus*, has a delicate skull with thin bladelike teeth it likely used to catch small vertebrates and insects, while **the cast of the huge adult *Tarbosaurus* skull** indicates that when fully grown, it used its heavy, bone-crushing teeth and jaws to eat large animals.

GETTING BAD

All tyrannosaurs were built to kill, but the biggest and baddest of them all was *T. rex*. With its huge size, sharp claws, and teeth that could bite through bone, it dominated the competition. New research shows that a *T. rex* could bite with about 7,800 pounds of force – equivalent to the weight of three cars. Visitors will see a **fossil of one of these huge, banana-**

shaped teeth, which relied on deep roots to withstand the immense forces during a bite, as well as a **cast of a fossilized *T. rex* lower jaw** demonstrating the constant replacement cycle of its fearsome teeth. **A full-scale reproduction of the *T. rex* fossil skeleton on display in the Museum’s Hall of Saurischian Dinosaurs** – in a different pose – is the subject of the exhibition’s “**shadow theater**,” in which the skeleton’s 40-foot shadow will “come to life” and demonstrate to visitors how the animal moved and interacted with prey and its own kind.

Scientists long suspected *T. rex* could bite through bone, thanks to fossils of its powerful skull and teeth. But now there’s proof in fossilized feces, or coprolites, which contain many tiny chunks of bones eroded by stomach acid. High-tech imaging tools like CT scanners, X-ray fluorescence, and microprobe analysis reveal that *T. rex* was one of the rare species on Earth that could pulverize and digest solid bone. In fact, some *T. rex* coprolites are 30-50 percent crushed bone. The exhibition will feature a **cast of one of these telltale coprolites** as well as a **cast of a tail bone from a duck-bill dinosaur with an embedded *T. rex* tooth** surrounded by new bone growth, indicating that *T. rex* was not just a scavenger but also attacked live prey.

Visitors also will learn about the fierceness of two other top predators in the tyrannosaur subfamily, which lived side by side in Asia about 70 million years ago: *Alioramus* and *Tarbosaurus*. Bulky *Tarbosaurus* and nimble *Alioramus* likely specialized in different prey, much like lions and leopards do today.

SENSITIVE SIDE

We know *T. rex* from fossils – but what was it like in the flesh? **The exhibition’s massive life-size adult *T. rex* model is based on the most up-to-date findings** and represents the most scientifically accurate representation of this pop culture icon to date. New research on this powerful hunter’s senses show that keen vision, smell, and hearing made it very hard for this predator’s prey to avoid detection.

Brain casts indicate that *T. rex* had excellent vision. Its eyes, the size of oranges – some of the largest eyes of any land animal – faced forward like a hawk and were set wider apart than most other dinosaurs, giving it superior depth perception.

How can you tell the shape of an extinct animal’s brain? Soft tissues such as brains rarely fossilize. But fossilized skulls often contain a space where the brain used to be, revealing its precise shape. Scientists use these fossilized brain cases to make a model, or endocast, of the missing brain. They also use CT scanning to make a 3D printout of the brain. The exhibition

includes a **fossilized partial brain case of a *T. rex* as well as the endocast scientists created from it for study.**

By comparing the areas of the brain that are responsible for scent, vision, and hearing in tyrannosaurs' closest living relatives, birds and crocodylians, researchers have determined that the *T. rex* brain had similar regions. For instance, *T. rex* had an unusually large olfactory region for a dinosaur, indicating it had a very good sense of smell. Also like their alligator and crocodile cousins, tyrannosaurs would likely have had highly sensitive faces. **Visitors can inspect the series of tiny holes on a fossilized skull of *Daspletosaurus torosus*, a tyrannosaur that lived between 77 and 74 million years ago.** The holes are nearly identical in number and location to those on an alligator, which have jaws so sensitive to touch that they can gently pick up an egg or tiny hatchling without harming it. Fossils of *T. rex* show similar rough, pitted surfaces, suggesting it also had similar sense organs.

Technology has allowed scientists to uncover a great deal about the inner workings of these gigantic predators, but a number of mysteries remain. For one, what did a *T. rex* sound like? No one knows. But a logical place to start is to study their closest living relatives. In the exhibition, a **"roar mixer"** allows visitors to combine the calls of birds and crocodylians with the sounds of contemporary large animals such as elephants, whales, and bison to create a customized roar that accompanies an animated *T. rex*. And what about its outward appearance? Feathers are very delicate and are rarely preserved, and they haven't been found yet on *T. rex*. But many other dinosaur fossils, including those from other tyrannosaurs and their relatives, preserved feathers, suggesting that *T. rex* had at least some feathers. Many scientists think that *T. rex* hatchlings were probably covered in fuzz, like a duckling – but adults were mostly covered in scales, likely with patches of display feathers concentrated on attention-getting areas such as the head and tail. Nobody knows what color *T. rex* was, and it is often depicted as drab, like a crocodile. But reptiles come in every color of the rainbow, so *T. rex* could have been brightly colored. **Exhibition visitors will have the chance to choose from a wide palette of colors, stripes, and spots to imagine what *T. rex* may have looked like in an engaging interactive experience.**

At the end of the exhibition, visitors will encounter a massive animated projection of a *T. rex* and its offspring in a Cretaceous-age setting. The huge dinosaur will react to visitors, leaving them to wonder, "Did that *T. rex* see me?"

VIRTUAL REALITY

The Museum's science visualization group renders the latest scientific discoveries in paleontology and other fields through the visualization of big data. Using digital technologies, scientists today observe, measure, and reproduce hidden dimensions of the natural world. From the edges of the observable universe to the evolution of life on Earth, researchers are developing a radically new understanding of nature that the Museum strives to communicate to visitors in highly authentic, intuitive, and novel ways. One of these is virtual reality: an experiential tool that uses objects, models, photos, video footage, and other types of physical evidence of life history to engage and excite visitors.

As part of *T. rex: The Ultimate Predator*, the Museum will present *T. rex: Skeleton Crew*, its **first interactive, multi-player virtual reality experience**, created in collaboration with HTC VIVE. The five-minute experience will be offered to visitors ages 12 and up within the exhibition.

"Virtual reality is a magical realm in which our perceptions of time and space are suspended," said Vivian Trakinski, the Museum's director of science visualization. "In virtual reality, nothing is too small, too big, too fast, too slow, too distant, or too long ago to be appreciated. We hope this technology will let our visitors experience the most fantastic and inaccessible realms of nature."

"Through VR, visitors can engage with the subject of the exhibition in an exciting, in-depth way that enriches their knowledge and leaves a lasting memory for years to come," said Victoria Chang, director of HTC VIVE Arts. "VIVE is proud to be a partner with the American Museum of Natural History, one of the world's most innovative and forward-thinking museums. This remarkably engaging VR project harnesses the power of premium VR, bringing visitors closer to the anatomy, scale, and majesty of *T. rex* like never before."

The facilitated experience will "transport" up to three players at a time to a space similar to the Museum's Hall of Saurischian Dinosaurs, where they will team up to build a *T. rex* skeleton bone by bone. Once all of the bones are in place, the players will watch as the *T. rex* comes to life in marshland that is now Montana, its home 66 million years ago.

The home version of *T. rex: Skeleton Crew* will launch on [VIVEPORT](#), HTC VIVE's global platform and app store, for VIVE owners in summer 2019.

Visitors under the age of 12 can enjoy a 32-foot-long projection at the end of the exhibition in which *T. rex* hatchlings scamper about and a life-size *T. rex* tracks visitors' movements.

T. REX: THE ULTIMATE PREDATOR GIF STICKER PACK

To celebrate the opening of *T. rex: The Ultimate Predator*, the Museum is launching a GIF sticker pack inspired by this iconic species and other Museum icons, available on the [Museum's GIPHY page](#).

T. REX: THE ULTIMATE PREDATOR MEDIA ASSETS

Members of the media can request images, GIFs, and b-roll assets related to *T. rex: The Ultimate Predator* at <https://bit.ly/2GYnljz> or by emailing communications@amnh.org.

EXHIBITION ORGANIZATION

T. rex: The Ultimate Predator is curated by Mark Norell, Macaulay Curator in the Division of Paleontology and the division's chair. Gregory Erickson, professor of anatomy and vertebrate paleontology at Florida State University, is a consultant for the exhibition.

T. rex: The Ultimate Predator will open to the public starting Monday, March 11, 2019. Members will be able to preview the exhibition starting on Friday, March 8, through Sunday, March 10.

The exhibition is designed and produced by the American Museum of Natural History's award-winning Exhibition Department under the direction of Lauri Halderman, vice president for exhibition.

Major funding for *T. rex: The Ultimate Predator* provided by the **Lila Wallace-Reader's Digest Endowment Fund**.

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Virtual reality experience created in collaboration with HTC VIVE.

AMERICAN MUSEUM OF NATURAL HISTORY (AMNH.ORG)

The American Museum of Natural History, founded in 1869, is one of the world's preeminent scientific, educational, and cultural institutions. The Museum encompasses 45 permanent exhibition halls, including those in the Rose Center for Earth and Space and the Hayden Planetarium, as well as galleries for temporary exhibitions. It is home to the Theodore Roosevelt Memorial, New York State's official memorial to its 33rd governor and the nation's 26th president, and a tribute to Roosevelt's enduring legacy of conservation. The Museum's five active research divisions and three cross-disciplinary centers support approximately 200

scientists, whose work draws on a world-class permanent collection of more than 34 million specimens and artifacts, as well as on specialized collections for frozen tissue and genomic and astrophysical data and on one of the largest natural history libraries in the world. Through its Richard Gilder Graduate School, it is the only American museum authorized to grant the Ph.D. degree and also to grant the Master of Arts in Teaching degree. Annual visitation has grown to approximately 5 million, and the Museum's exhibitions and Space Shows are seen by millions more in venues on six continents. The Museum's website, mobile apps, and massive open online courses (MOOCs) extend its scientific research and collections, exhibitions, and educational programs to additional audiences around the globe. Visit amnh.org for more information.

Hours

The Museum is open daily, 10 am–5:45 pm. The Museum is closed on Thanksgiving and Christmas.

Admission

Museum admission is free to all New York City school and camp groups.

Pay-what-you-wish admission is available only at ticket counters, where the amount you pay is up to you.

General Admission, which includes admission to all 45 Museum halls and the Rose Center for Earth and Space but does not include special exhibitions, giant-screen 2D or 3D film, or Space Show, is \$23 (adults), \$18 (students/seniors), and \$13 (children ages 2–12). All prices are subject to change.

General Admission Plus One includes general admission plus one special exhibition, giant-screen 2D or 3D film, or Space Show: \$28 (adults), \$22.50 (students/seniors), \$16.50 (children ages 2–12).

General Admission Plus All includes general admission plus all special exhibitions, giant-screen 2D or 3D film, and Space Show: \$33 (adults), \$27 (students/seniors), \$20 (children ages 2–12).

Public Information

For additional information, the public may call 212-769-5100 or visit the Museum's website at amnh.org.

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