

# TREX

SPEAKER	NARRATION
NARRATOR	<i>At the tail end of the dinosaur age, a region in the Rocky Mountain West of North America would come to be known as Hell Creek.</i>
NARRATOR	<i>A forested realm of giants.</i>
NARRATOR	<i>A world of horns, teeth and feathers...</i>
NARRATOR	<i>...and curious hungry egg thieves.</i>
NARRATOR	<i>Anzu, nicknamed chicken from hell, was known to brood its own eggs. But as an omnivore, it may have raided other dino nests. For an egg entree.</i>
NARRATOR	<i>But in these Hell Creek forests...there was also a king.</i>
NARRATOR	<i>A TYRANT KING.</i>

NARRATOR	<i>The border of Montana and North Dakota is a landscape of prairies and jagged badlands, punctuated by rocky buttes.</i>
NARRATOR	<i>A region of native American heritage, ranches and cultural history.</i>
NARRATOR	<i><b>This</b> is oil country...</i>
NARRATOR	<i>...cowboy country...</i>
NARRATOR	<i>and <b>dinosaur</b> country.</i>
NARRATOR	<i>Dr. Tyler Lyson is a paleontologist from the Denver Museum of Nature and Science, but he grew up in the nearby town of Marmarth, North Dakota – population 97.</i>
TYLER	For a child that was obsessed with dinosaurs, growing up here was amazing. We're right in the middle of the Hell Creek Formation, which is one of the best places in the world to find dinosaur skeletons.
TYLER	This is where you find the heavyweights – like triceratops, ankylosaurs and even T. rex.
TYLER	I got a job collecting fossils really when I was in sixth grade. I found my first dinosaur when I was about eight or nine years old. A jawbone from a duckbill. And I was really inspired by the scientists that I met here every summer, that were visiting my home town to dig in these same hills.
TYLER	They encouraged me to pursue this as a career and I know for a fact that I wouldn't be a scientist today without those mentors.
TYLER	I got a very interesting text from a friend I went to high school with, and it was a photo of this dinosaur that three kids found, his two boys and a nephew. I loved when I got this picture because I could tell immediately that they had found a pretty spectacular dinosaur.

TYLER                    We're thinking it's probably a duckbill.

NARRATOR            *Much like Tyler, brothers Jessin and Liam and their cousin, Kaiden, spend summer days exploring the badlands, turning over rocks and hunting prehistoric bones.*

LIAM                    So, we were walking on the grass and I spotted a white thing. Me and my dad went up there, and then dad yelled, Jessin and Kaiden, get over here!

JESSIN                  When we found it, I was like, that has to be a dinosaur.

NARRATOR            *The boys and Tyler meet up at the discovery site to see what they have.*

TYLER                    Looks like you've got part of a leg over there. We have the hips of the dinosaur right here, and we have some of the vertebrae right here.

TYLER                    Are you guys ready to dig up this dinosaur?

KIDS                    Yeah!

LIAM                    We don't really know how to dig.

TYLER                    You're gonna know after we get done digging this one though.

TYLER                    I can certainly see myself in them. It's a kind of the full circle where I was doing it, now they're finding awesome fossils and I'm able to hopefully help them out along their path and I hope maybe one of them turns into a paleontologist.

NARRATOR            *As awesome as it is that the boys have found a big dinosaur, the hills in these parts are full of bones. This rocky and rolling landscape is part of an exposed patchwork called the Hell Creek Formation...dating back to the very end of the Age of Dinosaurs.*

NARRATOR            *But 67 million years ago this was a very different place. In the east lay the ancient Appalachians, and to the west the newborn Rocky Mountains on the continent of Laramidia, divided by the Western Interior Seaway.*

NARRATOR            *Hell Creek was a lush and biodiverse wilderness along Laramidia's eastern shore...*

NARRATOR            *.... home to giants.*

NARRATOR            *Quetzalcoatlus, one the largest animals ever to take flight. A flying reptile taller than T rex, with a wingspan of a small airplane. King of the Hell skies.*

NARRATOR            *The coastal environment was a world of estuaries and swamplands. Crocodilian-like champsosaurs lurked in the rivers and lakes.*

NARRATOR            *Alongside more familiar snakes, frogs and turtles.*

NARRATOR            *But most famously, Hell was home to dinosaurs.*

NARRATOR            *Triceratops, the three-horned devil of Hell Creek.*

NARRATOR            *The nemesis prey for the ultimate predator. T-rex's legendary herbivorous foe.*

NARRATOR            *And the duck-billed Edmontosaurs. These large, herding plant-eaters were abundant in this ecosystem, accounting for many of the fossils finds in the region today.*

NARRATOR            *Tyler has assembled a Denver-based team of Bone Diggers for the expedition, made up of scientists and museum volunteers. Of course, Jessin, Kaiden and Liam will be helping out at every step.*

**TYLER** Think of all the fossils you're gonna have discovered by the time you get to be my age, Jessin. I am so excited for you.

**LIAM** Tyler, me and Dad are finding fossils over here.

**TYLER** Oh good, we're gonna have the whole thing.

**TYLER** I'm going to borrow a brush and I'm going to come over here.... and do a little exploring.

**TYLER** Oh, oh, there's, hold on.

**JESSIN** What is that?

**NARRATOR** *Within minutes of beginning the dig, Tyler and the brothers make an astonishing discovery.*

**TYLER** No no, don't don't touch it. Don't touch it.

**TYLER** There are two Tyrannosaur teeth right here!!

**LIAM** Is that a Duckbill??

**FEMALE SCIENTIST** No that's a T.rex tooth!

**TYLER** It's a game changer. Holy cow! Pounder.

**LIAM** Tyler, I told you there was gonna be a T. rex!

**TYLER** You did. I think you even pointed to this spot where I was sitting.

**NARRATOR** *It's a once in a lifetime find. Even for veteran paleontologists.*

**TYLER** Today has been one of the most remarkable days of my life. Any time you're uncovering a fossil, it's amazing...

**TYLER** ...you're the first person to have seen that fossil – like you're uncovering it. You're seeing what's there, how complete it is. But, man, when you see *T. rex* teeth poking back out at you. Something I'll remember for the rest of my life.

**NARRATOR** *While only the tiny tip of a big tooth, the team now knows that there's a monster in this hill.*

**NARRATOR** *The exposed fossil is covered for protection as the real fun begins...*

**NATALIE** So we're gonna begin with the big boy pics and shovels. We're going to start at the top of the hill.....

**NARRATOR** *...the removal of tons of rock and earth is necessary to uncover the buried bones.*

**TYLER** This is what we live for!

**TYLER** Usually, you spend a week digging and digging and digging, and you still don't have a lot to show for it. But here we are, day one, we now have a tooth-bearing element, part of a skull. We'll don't know how complete it is, but we'll know more in the coming days. Whoo! Feels good.

**NARRATOR** *The discovery of a rex is exceedingly rare, and a rex discovery by kids is unprecedented. But Hell Creek is Rex Country after all. The boys are now part of a legacy of tyrannosaurus finds in this region.*

**NARRATOR** *Not far from the brothers dig site, in 1905, intrepid paleontologist Barnum Brown blasted the roof off a rocky mound in Eastern Montana, and set eyes on the very first T. rex. Once the skeleton was mounted in New York City, crowds flocked to see this new dinosaur, named Tyrannosaurus rex, meaning Tyrant Lizard King.*

**NARRATOR** *The popularity of what was described as 'the most formidable fighting animal that ever existed' ignited a gold rush by museums to find and display their own tyrant king.*

**NARRATOR** *With the fossils as inspiration, artists would give life to the bones, and a star was born.*

**NARRATOR** *At roughly the same time T. rex was discovered, motion pictures hit the bigtime.*

**NARRATOR** *For as long as we've known about T. rex, it's been ready for its close-up –*

**NARRATOR** *nearly always appearing as a giant, brutish, man-eating baddie.*

**NARRATOR** *As fun and downright hokey as this classic era was, these depictions gave birth to an icon.*

**NARRATOR** *Over the 20th century, rex onscreen mirrored new scientific evidence...evolving from a tail-dragging giant kangaroo-monster...*

**NARRATOR** *To slightly more accurate proportions by the 1960s...like bigger heads, eye horns, though still a tail-dragger with a toothy crocodile smile.*

**NARRATOR** *Eventually fossil footprints showed that T rex carried its tail high to counterbalance that oversized head.*

**NARRATOR** *By the '90s Rex becomes monsterified for the box office, with this horrific shrink-wrapped skin... and a blood-curdling roar.*

**NARRATOR** *Finally, after few decades, we arrive at our current, best depiction, thanks to more fossils and new research techniques. Possibly with lips, and a thicker 'dad-bod'.*

**NARRATOR** *Still a lot of mysteries, though! Like color, vocalization, those teenie arms...and the whole feather thing...*

**NARRATOR** *The earliest tyrannosaurs DID have feathers, so it's certainly possible. Probably a bit more subdued, especially for a huge animal in a warm climate!*

**NARRATOR** *A century of change, thanks to science. And the transformation is certain to continue....as new fossils are unearthed.*

**NARRATOR** *After days of digging, the team has successfully reached the back of the quarry.*

**NATALIE** *Yessss. Ohh, look how pretty!*

**NARRATOR** *Preparator Natalie Toth's job will be to extract the fossil back at the museum, so her oversight is critical throughout this phase of the project.*

**NATALIE** *I think what's pretty remarkable is that we're out here trying to dig up a dinosaur fossil and in the middle of this process we've uncovered this really beautiful leaf layer just above where the vertebrate fossils are that we're here for. We're able to actually identify what some of these are and think about what that means on a greater scale in the whole ecosystem, right. Cause the things that died had to have been eating all these plants that are preserved here at the site.*

**TYLER** *I started to dig just a moment ago and I started to find some of the toes. And so, we have an articulated femur and tibia and go all the way down to the end of the ankle we found these two bones, right here, one, two, and I think they're toe bones. I'm assuming right now that we have part of a foot.*

TYLER I haven't found many dinosaurs in the Hell Creek Formation that have their toes attached. Super stoked. Dig everybody, dig.

TYLER It has been estimated that only one out of every 80 million T. rexes fossilized and since large, meat eaters are always less abundant in any ecosystem, finding a rex fossil is not easy.

TYLER To fill in some knowledge gaps about how this animal lived and grew up, we look to rex cousins and ancestors on the family tree. Hell Creek is the best place to find the last of the tyrannosaurs, but to appreciate how the king earned its crown, we have to go farther back in time, and halfway around the world.

NARRATOR *Every hero – every villain – has an origin story. 90 million years BEFORE T. rex, Jaguar-sized predators called Guanlong branched off within the theropod lineage in the Jurassic forests of China.*

NARRATOR *The first tyrannosaurs.*

NARRATOR *Though tyrants, these were no lizard kings. Lizard hunters more like it.*

NARRATOR *They may have been punky and scrappy, but Guanlong were most certainly NOT the apex predator on the scene.*

NARRATOR *In fact, giant two-legged meat-eaters – with bodies kinda like a T. rex – were stomping around... Like 25-foot long Sinraptors...*

NARRATOR *...probably tyrannosaur-eaters.*

NARRATOR *Guanlong had to watch its back...but they would mark the beginning of a tyrannical lineage.*

NARRATOR *Throughout the Cretaceous the tyrannosaurs diversified, and spread across the northern hemisphere, eventually reaching Hell Creek.*

NARRATOR *While T. rex ancestors may have started small and feathered, its Cretaceous cousins became much more menacing. The names given to this motley crew reads like a band list from a heavy metal lineup.*

NARRATOR *...like, Power Terror Ruler!*

NARRATOR *...or King of Gore!*

NARRATOR *...Death Harvester!*

NARRATOR *...Nanuqsaurus! The polar bear tyrant of the Arctic...*

NARRATOR *...and Teratophoneus, the Murder Monster!*

NARRATOR *But of the thirty-some known species on the tyrannosaurid branch of the family tree, it was the biggest, the baddest, and the last, that earned the title of the true TYRANT KING!*

NARRATOR *Where fossils of T. rex may be lacking, evidence from its cousins help scientists hypothesize about lingering rex mysteries. Like how it grew up.*

NARRATOR *Little is known directly about T. rex hatchlings – rexlings. As scant fossil evidence has been found.*

NARRATOR *But it is estimated that in the first year alone, rexlings would have grown from the size of a house cat to nearly six feet long -- suggesting some parental care and feeding.*

NARRATOR *The instincts of young predators are honed and practiced through play.*

NARRATOR *But in a world of giant reptiles, a young rex was as likely to **become** a meal as to catch one.*

**NARRATOR** *There were once more siblings than this...*

**NARRATOR** *A job for Mom.*

**NARRATOR** *The little ones are learning fast, but have a lot growing yet to do.*

**NATALIE** *So now we're just trying to shape up the block. So, you can see we have a nice front trench but it's really soft rock on the front here. So, we're done, we're taking a pause on the front and today our focus is getting the back trenched.*

**NARRATOR** *The expedition team has made **another** exciting discovery. The length of the exposed bone has revealed that this T. rex is a teenager. Such a rare specimen could fill in some critical knowledge gaps.*

**TYLER** *This dinosaur would have been about 12-14 years old...about 25 feet long, 3,500 to 4,000 pounds, and it's so exciting because it is a juvenile. There's just not that many juveniles known. There's really only three. As cool as it may be to have the biggest, I think scientifically it's more important to have one that we just don't have that many of.*

**TYLER** *Pretty cool that three almost teenagers found a teenaged tyrannosaur.*

**TYLER** *We're going to brush everything off, put some last bit of glue on last places that need glue, and then it's going to be a plaster party.*

**TYLER** *I am so relieved that we're finally plastering this thing because now it's going to be protected. At least it's going to be protected from curious people because we're so close to the road and then to the elements.*

**NARRATOR** *How a young T. rex grew - and adjusted its hunting strategy - has been a major focus of research in recent decades.*

**NARRATOR** *While little is known about T. rex youngsters, there IS evidence that teenagers went through an especially dramatic growth spurt. Six to twenty feet in a handful of years.*

**NARRATOR** *Like all growing teens, a juvenile T. rex needed to eat... A LOT.*

**NARRATOR** *Between the ages of 10-20, it is estimated that Teen Rex needed to pack on 1,700 lbs. per year. Such enormous growth rates suggest these animals were warm-blooded.*

**NARRATOR** *To hit this caloric intake, you can no longer rely on your parents to put food on the table.*

**NARRATOR** *The siblings have stuck together. Now there are three.*

**NARRATOR** *More intelligent than many dino relatives, T. rex teenagers were both smart...and fast. Compared to adults, a juvenile rex functioned almost like a distinct predator in the ecosystem, able to take medium sized or faster prey.*

**NARRATOR** *And Edmontosaurus was on the menu...*

**NARRATOR** *We don't know for sure if T. rex hunted in packs, though footprints around prey fossils do provide some evidence.*

**NARRATOR** *Sibling or social group rivalries for dominance may have included face-biting, as some fossilized T. Rex snouts show teeth marks. If so, a group eating event was surely a violent affair.*

**NARRATOR** *As they start to compete for mates, perhaps our juveniles will soon break up the band, and will each go their own way to seek and establish territory.*

NARRATOR *Going from juvenile rex into a hulking adult was a monumental transformation. In a few years, rex would have gone from a sleek wolf-like design to a bobble-headed monster. 40-feet long, the weight of a bus, with 8-inch, bolt-cutter teeth, and enormous ripping talons.*

NARRATOR *An adult T. rex's iconic skull is a remarkable feat of carnivore evolution - a hunting, eating, compacting machine.*

NARRATOR *The animal had unique, fused and reinforced nasal bones to amplify bite power, unlocking bone-crunching abilities without fracturing its own face.*

NARRATOR *Its serrated steak-knife teeth featured long and sturdy roots. Lethal banana-sized bone-snappers in the rear....and teeny, clustered meat scrapers up front.*

NARRATOR *With nearly 7 tons of bite force, you're not eating salads!*

NARRATOR *Giant olfactory bulbs, for a keen sense of smell, and a long inner ear to hear other rex's.*

NARRATOR *Finally, grapefruit-sized eyeballs spread wide and facing forward for excellent 3D vision...*

NARRATOR *ideal for spotting prey... even...*

NARRATOR *...if standing **perfectly still**.*

NARRATOR *With these huge eyes, banana-chompers and super-senses, a relatively large brain and meat hooks on your fingers and toes, an adult rex must have gone head-to-head, quite literally, with a formidable prey animal indeed.*

NARRATOR *A 30-foot, 10-ton, three-horned hell beast. Triceratops horridus. As rex evolved into the ultimate predator, triceratops evolved some impressive weaponry to defend itself, including its massive bony horns and head shield.*

NARRATOR *In the carnivore corner, T. rex's bone-crushing bite force vs. the mighty triceratops with its three-foot goring instruments. Gladiators of Laramidia. A fight night – for the ages.*

NARRATOR *This bull has lived a long life. But a dominance conflict with a younger male has left it injured, and incapable of keeping up with the herd.*

NARRATOR *For days, T. rex has been pursuing the old bull. As an older adult herself, the days of speedy pursuit are behind her, but she is well capable of an ambush...or using legs built for endurance to walk dangerous prey to exhaustion.*

NARRATOR *She'll make her move in the cool of night, under cover of darkness.*

NARRATOR *Rex is triumphant, but at a cost. She has sustained a goring. An injured leg might heal, but could also spell doom.*

NARRATOR *Tyrannosaurs lived violent and difficult lives. Hardships are etched on their bones.*

NARRATOR *Wounds and scarring. Infections. Broken ribs with rough signs of re-healing.*

NARRATOR *Backbones deformed by arthritis.*

NARRATOR *Holes and scars in the jaw, from infections or from battle encounters with other rexes.*

NARRATOR *Even a severed tail.*

NARRATOR *T. rex lived fast and died young. The oldest rexes on record were in their early thirties...but riddled with old age afflictions. It was rough to be a rex.*

**NARRATOR** *In old age, a hard life, cataracts, and the injured leg have made hunting a struggle. And scavenging is barely sustainable for an animal of this mass.*

**NARRATOR** *But she's followed her nose to a lucky find. A mosasaur carcass. She has a short window. Soon other scavengers and opportunistic predators will descend on this feast – including younger, more dominant and aggressive tyrannosaurs.*

**NARRATOR** *An old, broken T. rex would make an added entrée to the menu.*

**NARRATOR** *Her body finds its final resting place by a riverbank, half covered by sediment.*

**NARRATOR** *Under rare and remarkable conditions, swiftly covered by mud or silt, her bones will mineralize – fossilize.*

**NARRATOR** *A 67-million-year odyssey, from a dark earthen tomb....*

**NARRATOR** *... to the sunshine of very different Hell Creek.....*

**NARRATOR** *a world of curious, chattering creatures with picks and plaster.*

**TYLER** Awesome. Thank you, guys, for hauling that heavy thing up here.

**FEMALE SCIENTIST** Aiden, smile for your dad. All the way Aiden, all the way down!

**NARRATOR** *With the frame built and the plaster dry, a long cable is run down to the base of the butte to a truck.*

**NATALIE** Nice, great. I need somebody to be my truck guide.

**TYLER** All right, here we go!

**NARRATOR** *And the team holds their breath as the T. rex somersaults into a helicopter net.*

**TYLER** It's rolling, keep going, keep going, go, go, go, go, stop. Stop, stop, stop!

**TYLER** Wooo, yeah, nicely done! Look at that! That is clean.

**TYLER** Liam, boom! Boom buddy. We netted a T. rex. We netted a T. rex.

**LIAM** We can fly it to heaven!

**TYLER** We'll fly it somewhere.

**NARRATOR** *After a backbreaking two weeks removing the teenage rex fossil, the expedition team, Jessin, Liam and Kaiden are flying high.*

**NARRATOR** *All that's left is for a helicopter to lift the rex off the butte....*

**FEMALE SCIENTIST** A victory carry.

**NARRATOR** *.....to begin its long journey back to the museum for preparation, mounting and years of study.*

**TYLER** For me it's really special to be able to share this with the boys. They remind me of myself when I was that age, running around the badlands and finding fossils. What an awesome story to have. Their very first dinosaur to be an amazing juvenile Tyrannosaurus Rex.

**NATALIE** Cheers! Here here.



**TYLER** I hope that this was a powerful and inspiring experience for them and maybe, someday, they'll be in my shoes, coming back up here and mentoring the next generation.

**TYLER** It's truly been special for me in that way, to be a part of a full circle story. With a *T. rex*, no less!

**NARRATOR** *So, what is it about this ultimate predator, cultural icon, apex attraction? The biggest bite! The coolest name...like a boss from a video game.*

**NARRATOR** *As with all non-bird dinosaurs, Rex would perish in the apocalyptic extinction event 66 million years ago. Witness to the last days of the Dinosaur Age. Cut down at the height of its reign.*

**NARRATOR** *The hunt goes on, in the buttes and badlands of Hell Creek. And while we continue to reimagine the tyrant king with each new discovery....one thing is unlikely to change:*

**NARRATOR** *The greatest of all Tyrants...the GOAT. Tyrannosaurs Rex is – and will forever be - the king.*

**NARRATOR** *Meet the new boss... **same as the old boss.***