

FABULOUS FOSSILS 2

FROM OUR NATIONAL FORESTS AND GRASSLANDS



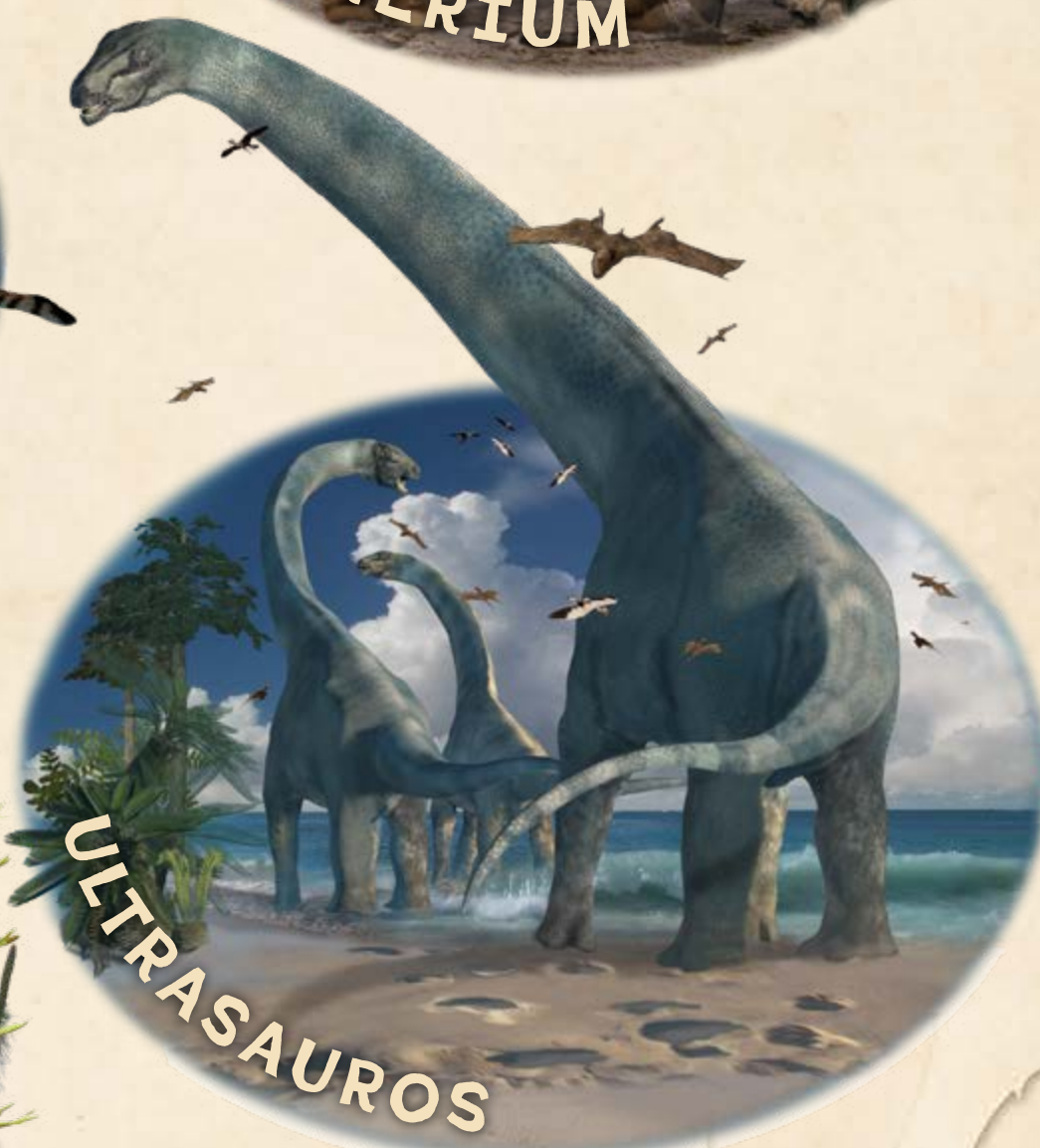
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MIRACINONYX



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FABULOUS FOSSILS 2

A fossil is evidence of past life. Paleontologists study fossils to learn about the history of life on Earth. Fossils can be traces, like footprints in stone, or the shells, bones, and teeth of ancient animals.

The fossil animals shown on this poster lived in ancient environments from thousands to hundreds of millions of years ago in areas that today are national forests and grasslands of the United States.

MIRACINONYX

VIRGINIA, GEORGE WASHINGTON & JEFFERSON NATIONAL FOREST

A large cheetah-like cat died thousands of years ago deep in a cave on today’s George Washington & Jefferson National Forest. When discovered in 2016, the bones were covered by mineral deposits that had dripped from cave stalactites. Nicknamed “Petra” by its discoverers, the skeleton is virtually complete with all bones in place (fully articulated), even to the smallest toe bones.

This discovery is so new that Petra has not yet been precisely identified, but paleontologists believe it may be an American cheetah, called *Miracinonyx* (mih-rah-sin-ah-nix). Petra’s striking similarity to African cheetahs is an example of convergent evolution, when distantly related animals look very similar because they adapted to similar life styles. Petra’s long tail rules out a close relationship with other large cats like the Ice Age American lion or saber-toothed cat, and its long legs most closely resemble those of *Miracinonyx*.

ARCHAEOTHERIUM

WASHINGTON, OKANOGAN-WENATCHEE NATIONAL FOREST

Geologic deposits from the middle of the Cenozoic Era (Age of Mammals, roughly 35 million years ago) can be found on several national forests and grasslands. The Okanogan-Wenatchee National Forest in Washington contains abundant fossilized mammals, including *Archaeotherium*.

Archaeotherium belongs to a group of pig-like mammals called entelodonts, sometimes referred to as “hell-pigs” for their fearsome appearance. Entelodonts had huge heads with extremely wide cheek bones, knobby lower jaws, and massive teeth, including large canines and crushing molars. *Archaeotherium* was among the largest mammals on the mid-Cenozoic landscape and was likely an active hunter, although like modern pigs it probably also foraged on plants and scavenged dead animals.

TYRANNOSAURUS

NORTH DAKOTA, DAKOTA PRAIRIE GRASSLANDS

Fossils of the most famous dinosaur of all time, *Tyrannosaurus rex*, have been found on several national forests and grasslands. *T. rex* is among the largest carnivorous dinosaurs (theropods), recognized for its small arms and huge skull, counter-balanced by a long, heavy tail. An adult *T. rex* could grow over 40 feet long and weigh up to 11 tons (22,000 pounds)—and could bite down with a force of 5 tons!

T. Rex bones and teeth have been discovered on the Dakota Prairie Grasslands in the late Cretaceous (68–66 million years ago) Hell Creek Formation. The Cretaceous climate was humid and supported subtropical forests and wetlands, and the rock layers contain fossils of crocodiles, insects, fish, flowering plants, and small mammals. Other famous dinosaurs found here include duck-billed hadrosaurs, horned ceratopsians, dome-headed pachycephalosaurs, and armored ankylosaurs.

ULTRASAUROS

COLORADO, UNCOMPAHGRE NATIONAL FOREST

Many forests and grasslands in Colorado and Utah have multicolored rock exposures from the late Jurassic Period (150 million years ago) called the Morrison Formation. These rocks come from sediments deposited before the Rocky Mountains rose, when many rivers coursed through pine forests, leaving behind floodplain deposits rich with dinosaur bones and footprints.

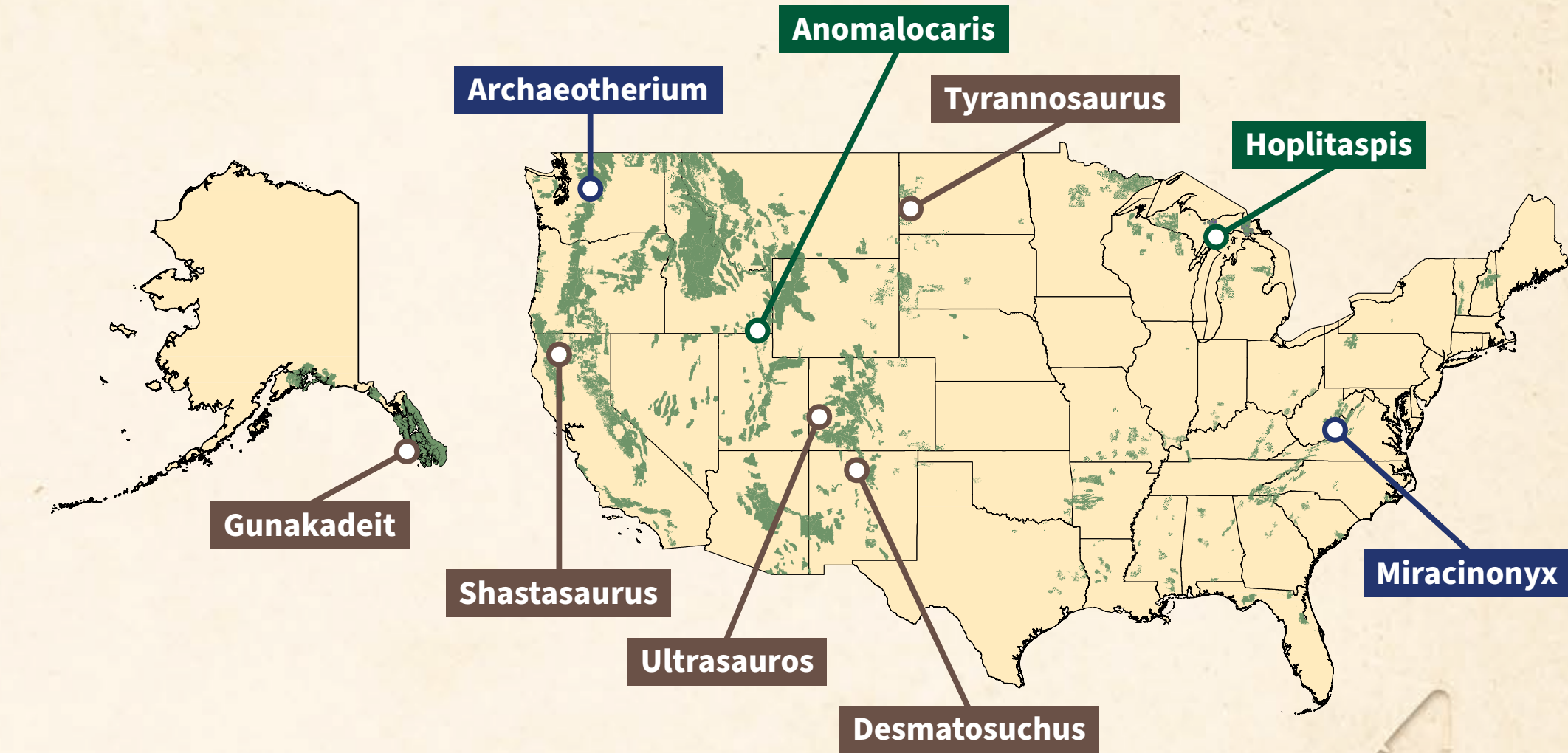
“Ultra” means extreme, and the extremely large *Ultrasauros* (ultra-reptile) is named for an enormous shoulder bone (8 feet, 10 inches long) dug up in 1979 at the Dry Mesa dinosaur quarry on the Uncompahgre National Forest. Like other sauropods, *Ultrasauros* had a long neck with a small head and a massive body with a long tail—it was tall enough to have peered over a three-story building. Sauropods supported their great mass by powerful limbs positioned as vertical columns beneath their body, like elephants. *Ultrasauros* is a brachiosaurid type of sauropod dinosaur, which have longer front legs than rear.

DESMATOSUCHUS

NEW MEXICO, SANTA FE NATIONAL FOREST

National forests in the Southwest United States contain extensive exposures of bright red rocks deposited during the late Triassic Period (around 220 million years ago). Rocks from the Triassic represent many environments: rivers, lakes, streams, and sand dune “seas.” Triassic rock layers deposited in terrestrial environments are often red due to oxidation of iron minerals (like rust formation).

One amazing fossil from these rocks is *Desmatosuchus*, a large reptilian herbivore up to 15 feet long. *Desmatosuchus* belongs to a group of armored reptiles called aetosaurs (a-eat-o-sores). Aetosaurs are more closely related to crocodiles than dinosaurs, and, like crocodiles, have rows of large, interlocking bony plates (osteoderms) covering the head, neck, back, and tail. The large shoulder spikes of *Desmatosuchus* are extensions of its shoulder bones. Armor plates of *Desmatosuchus* are known from the Santa Fe National Forest in New Mexico.



GUNAKADEIT

ALASKA, TONGASS NATIONAL FOREST

The only known fossil of *Gunakadeit* (goo-na-ka-date) was discovered by chance on Hound Island on the Tongass National Forest. Rocks along the island’s shore are only exposed for a few days each year during low tide. The name *Gunakadeit* comes from a traditional Alaskan Tlingit story about a sea monster that brings good luck to those who see it.

Gunakadeit belongs to a group of Triassic crocodile-like marine reptiles called thalattosaurs. Thalattosaurs were only partly adapted to life in the water, because their small limbs were not modified into paddle-like shapes to assist in maneuvering underwater. *Gunakadeit*’s pincer-like jaws may have been best suited to capture soft-bodied animals by probing in cavities and crevices.

SHASTASAURUS

CALIFORNIA, SHASTA-TRINITY NATIONAL FOREST

One of the world’s largest marine reptiles, *Shastasaurus* is named for Mount Shasta on the Shasta-Trinity National Forest in California. Many national forests in the Western United States have marine rock layers of Triassic age (approximately 230 million years ago) that contain fossil skeletons of ichthyosaurs (ick-thee-o-sores). The shastasaur family includes the largest known ichthyosaurs. Some species grew to lengths of 70 feet—almost the size of a blue whale!

“Ichthys” means fish in Greek, and the name ichthyosaur means “fish-lizard.” Ichthyosaurs were dolphin-shaped swimmers with long snouts bearing full rows of teeth and huge eyes to locate prey. Early Triassic ichthyosaurs like *Shastasaurus* have longer, more eel-like bodies and tails than geologically younger ichthyosaurs, which evolved more fish-like appearances, including dorsal fins and tail flukes.

HOPLITASPIS

MICHIGAN, HIAWATHA NATIONAL FOREST

Limestone beds of Ordovician age (430 million years ago) on the Hiawatha National Forest were deposited in a marine lagoon and contain fossilized impressions of soft-bodied creatures, including rarely preserved jellyfish. The bizarre looking *Hoplitaspis hiawathai* is represented by over 50 complete specimens collected from these limestones. *Hoplitaspis* belongs to a group of marine arthropods called chasmataspids (chaz-ma-taz-pid), which are related to eurypterids (“sea scorpions”) and modern horseshoe crabs.

The *Hoplitaspis* fossils from the Hiawatha National Forest are the only complete chasmataspid fossils known anywhere in the world. Growing up to 1 foot in length with large compound eyes and a pair of large grasping claws, *Hoplitaspis* was probably the dominant predator in its environment.

ANOMALOCARIS

UTAH, UINTA-WASATCH-CACHE NATIONAL FOREST

National forests in southern Idaho and northern Utah have rock layers from the Cambrian Period (about 520 million years ago), called the Spence Shale. These rocks contain amazing fossils of primitive animals in the world’s oceans. The Spence Shale formed on an ocean floor with very low oxygen, so soft tissue often did not decay and remarkable details of fossils are preserved.

Anomalocaris was a 2-foot-long apex predator of the Cambrian oceans, with large compound eyes and two large, hook-like grasping organs on the sides of a doughnut-shaped mouth. The abundant trilobites of the Spence Shale, scouring the ocean floor sediments for food, were common prey for the looming *Anomalocaris*. The anatomy of *Anomalocaris* is so strange that before discovery of complete fossils, isolated body parts were thought to be different animals.

MAJOR DIVISIONS OF GEOLOGIC TIME

AGE	PERIOD	FOSSIL RECORD	MILLIONS OF YEARS AGO
Cenozoic	Neogene	Modern humans	23
	Paleogene	Abundant mammals	66
Mesozoic	Cretaceous	Flowering plants, ends with mass extinction of dinosaurs	145
	Jurassic	First birds and mammals, abundant dinosaurs	201
	Triassic	Abundant coniferous trees	252
Paleozoic	Permian	Extinction of nearly 90% of all species	299
	Pennsylvanian	Fern forests, abundant insects, first reptiles	323
	Mississippian	Sharks, large primitive trees	359
	Devonian	Fish and sea life diversify, first amphibians	419
	Silurian	Early plants and animals on land	444
	Ordovician	First fish	486
	Cambrian	Abundant hard-shelled marine invertebrates	541
Precambrian	Proterozoic	Primitive aquatic plants, soft-bodied multicellular organisms	2,500
	Archean	Oldest fossils, bacteria and algae	4,000