



Paleontology in the White River Badlands



Welcome to a place of the past - and the future. Badlands National Park is a world resource for the study of the past. You are invited to explore over 243,000 acres of protected prairie and buttes that protect some of the richest mammal fossil beds known. When you explore this park or any place with a paleontological past, you have a great gift and a great power – the power to choose how you will be remembered. Keep in mind that it is illegal - punishable by a fine at minimum - to remove even the smallest fossil from this place. Climbing on buttes increases the erosion rate, resulting in changed formations and unnatural exposure of fossil resources. The past is being pieced together but the future rests in the choices we make - today. How do you want to be remembered? How do you want your visit recorded in this place? How aware are you of the science of paleontology and the work of its scientists?

What Is Paleontology?

Simply put, paleontology is the study of ancient life. In Badlands National Park, the scientists who conduct field research are primarily “vertebrate paleontologists,” meaning they study ancient animals with backbones. However, invertebrates, such as ancient mollusks, and plant remnants are also found here.

Fossils are the primary tools used by paleontologists to puzzle out the mysteries of past ecosystems and animals. A fossil is any remains of past life that has been acted upon by natural chemicals, resulting in a mineralized object. Bones typically come to mind when we think of fossilized remains. However, the imprints of leaves, feathers, and footprints can also become fossilized. Even ancient feces can become a fossil to provide clues to ancient diets. Fossils are the meeting place between geology and biology - life turned to stone.

Where Did Paleontology Come From?

Humans have spun fantastic tales for centuries about the origins of fossils. As early as 570 BC, Greek philosophers mused that they were the remains of organisms no longer living. Aristotle believed that life had generated spontaneously from mud and that fossils represented unsuccessful forms of life. As Christianity became popular in Europe, fossils were explained as being the victims of Noah’s flood. In 1664, Danish scholar Nicolaus Steno theorized that the deepest rocks on the Earth were formed first and were therefore the oldest. This “Principle of Superposition,” as it is now called, is a basic principle in both the sciences of geology and paleontology.

French scientist Baron Cuvier is considered by many to be the “Father of Paleontology.” Using his skills in anatomy and biology, he identified a fossilized jaw belonging to a sea-dwelling, fish-eating lizard and named it *Mosausaurus*. Cuvier noticed that the deeper a fossil was found, the less it looked like anything familiar still living. He also observed the alternating layers of marine and land fossils. This led him to believe that many of the species he found in the deepest rocks were extinct.

Paleontology is an amalgam of many sciences: biology, geology, ecology, and related studies. It is frequently confused with archaeology (the study of signs of past human life). Archaeology is directly related to human’s and past lifeways. In contrast, paleontology studies prehistoric animals, plants, and ecosystems, typically well before the appearance of humans.

The White River Badlands: A Scientific Cradle

The White River Badlands lie primarily in South Dakota but extend through northwest Nebraska and eastern Wyoming. Scientists have studied specimens from this region since the 1840s. The area now included in Badlands National Park is considered to be the birthplace of vertebrate paleontology in North America. The first specimen, described by Dr. Hiram Prout of St. Louis, Missouri, was a jaw of a large creature he called *Paleotherium*. This first Badlands specimen is now a part of the National Museum of Natural History at the Smithsonian Institution in Washington, D.C.

Fossil Roots Run Deep

Oral traditions within the Oglala Lakota Nation note the discovery of large fossilized bones and turtle shells. They also found fossilized sea shells and correctly deduced that this area had once been underwater. European interest in the area started with the trappers and traders who explored the area, travelling from Fort Pierre in the Dakota Territory to Fort Laramie in Wyoming during the 1830s.

By the mid 1800s, 84 distinct species of animals had been identified in the North American fossil record - 77 of which were found in the White River Badlands. Institutions such as Yale University and the American Academy of Sciences began sending regular trips to the region to extract fossils for reassembly in the great museums on the East Coast. No natural history museum was complete without the skeleton of a large prehistoric creature in or near its great hall. The longest relationship between the Badlands and academia is the century long exploration of the area by the South Dakota School of Mines (now the South Dakota School of Mines and Technology, or SDSMT). This tradition continues today as SDSMT students provide the daily expertise to excavate the Big Pig Dig, discovered in 1993 by park visitors.

A Passionate Profession

Studying fossils tends to be an all consuming passion for those who have the commitment. Although not all fossil fans choose to make their living from fieldwork, it is an interest that makes amateurs and professionals alike feel compelled to explore and learn more. Keep in mind that field work is only the tip of a paleontologist’s work. In general, for every hour of field work done, there will be at least twelve hours of preparation completed in a laboratory, typically far removed from the fieldwork. The study of all fossilized animal remains helps us understand how different types of animals respond to climate change. In these days of global warming, the key to human survival could be locked in the fossil past.

“If there are so many fossils, it won’t hurt if I take just one.” Has this thought ever crossed your mind? It is a basic human response but one that has a destructive - and illegal - result. When you find a fossil, you are taking a peek into the past. It is highly likely that you are the first human being to ever see that specimen. Permit others this sense of discovery and allow that fossil to remain in its place in history. Never underestimate the value of the smallest piece of the past.