

# rock of ages

In canyon country,  
the depths of time are laid bare.

Reflections paint the walls of Clear Creek Canyon in Utah, one of the myriad massive canvases of the Colorado Plateau. Wrought from rock by wind and water since the dawn of the continent, the region is a maze of canyons, pinnacles, and mesas.



With an ominous rumble, a spring squall thunders down on Utah's Arches National Park, delivering a shot of the park's scant 8.5 inches of annual rainfall. Such storms are nature's bulldozers, tossing boulders in flash floods that scour the canyons with deadly force.



Some 180 million years ago, they were massive dunes formed from the sandy sediments of the eroding Appalachians, then repeatedly submerged by inland seas. Today, the sandstone layers of Coyote Buttes offer geologists a history book of the early Jurassic period.



Layers of water and algae curtain the rock face at Lower Calf Creek Falls in Utah. Fed in part by springs tapping a desert aquifer that holds water for decades, the falls persist through droughts. Such oases were critical to the survival of Native Americans and pioneers.

By Mike Edwards

Photographs by Frans Lanting

**In the outback regions of the Colorado Plateau,** time stands nearly still. Year by year, erosion lightly planes the mesas and deepens the canyons; a wet year thickens the sparse grasses and a dry year withers them. But the sea of painted rock covering vast stretches of Utah, Arizona, New Mexico, and Colorado remains much as it was before the pioneers, before the Spanish conquistadores, before the first immigrants to the New World.

Shift your timescale from the human to the geologic, though, and the story of these corrugated rockscapes isn't scant change but vast change, hundreds of millions of years of it. Geologists often speak of deep time, the great spans over which the subtlest forces can remake a landscape. The canyonlands are a textbook of deep time.

During epoch after epoch, the Colorado Plateau grew like a Dagwood sandwich, built with layers of sandstone, limestone, mudstone, and shale. These strata—the time-pressed cargoes of oceans, rivers, and winds—were hoisted, sunk, and twisted by violent tectonic forces. Volcanoes spread lava on them, wind and water attacked them, and one of the world's most readable geology lessons took shape.

Geologists began more than a century ago to trace the score of strata that parade across canyons and mesas and to give them names: Wingate, Summerville, and—among the thickest and most extensive—Navajo sandstone. Some

180 million years old, the Navajo was built layer by layer over 15 million years by wind-deposited sand. It is more than 2,000 feet thick in places, tinged anything from subtle pink to lurid orange by iron oxides and cut by countless canyons.

Where did so much sand come from? Much of it, apparently, from the Appalachian Mountains far to the east. Geologist Jeffrey Rahl and his colleagues found clues to its origin in tiny crystals of zircon embedded in the sandstone. Radioisotopes in Navajo zircons match those in zircons from the Appalachians, which were once as high as the Alps.

Presumably sand eroded from these peaks was borne westward by rivers, then swept by winds into a fantastic sand pile. At the time, the plateau part of North America is reckoned to have been somewhere near central Mexico, chugging north toward its present site at a few millimeters a year.

There's little evidence of life in the Navajo



## Powell's Plateau

Sprawling across four states for 130,000 square miles, the Colorado Plateau is a classic example of erosional geology—a vast expanse of mostly sedimentary rock carved by the Colorado and other rivers. Geologist and explorer John Wesley Powell, who mapped the mazelike landscape, dubbed it the Plateau Province.

sandstone, but around 160 million years ago in the late Jurassic period, a new landscape began to develop—a panorama of forests, rivers, swamps, and inland seas, in which flourished dinosaurs, crocodiles, giant seagoing lizards, and huge sharks. Fossils of these monsters speckle the Morrison, Cedar Mountain, Dakota, Mancos, and Kaiparowits formations, built of sediments such as mud and carbonates.

Beside a road in Utah's Grand Staircase-Escalante National Monument, a gulch reveals the transition from the dry sands to the watery late Jurassic and Cretaceous environments in which life thrived. Atop the sandstone is a coal seam, the relic of a swamp. And above that a strip of hard-packed sand mixed with mud, the shore of an advancing sea. Next: a fossilized

oyster bed—replete with fossil pearls, people say—laid down when the shifting shores had created a bay.

COMPARED TO THE GEOLOGIC record, the recent jottings of humankind in the plateau country seem faint indeed. Some of the bravest sagas, just a century or so ago, left hardly a trace. There was, for example, the party of Mormons, some 250 men, women, and children, who pushed into southeastern Utah in the snowy winter of 1879-1880, building a road along high ridges as they went.

Above the Colorado River at Glen Canyon they used ropes and chains to lower their 83 wagons down a skinny crevice they named Hole-in-the-Rock. Then, 1,800 feet below, they had to get their wagons and cattle across the icy river—300 feet wide there—and surmount a high cliff on the far side. They lost not a wagon in that crossing, and during the almost six-month odyssey their roster increased by three newborn babies.

Then came the hard part: farming and ranching the desert. Today some of the towns that pioneers raised in the plateau country have vanished and others look withered, affirming the observation of Wallace Stegner, peerless Western historian, who knew the Colorado Plateau well. "It is scenically the most spectacular and humanly the least usable of all our regions," he pronounced.

The forbidding rock itself beckoned during the years after World War II. Scattered in the formations were pockets of carnotite and pitchblende, uranium ores wanted for building Cold War arsenals and fueling nuclear power plants. Some of the uranium prospectors struck it rich; most didn't. Just about all of them melted away after the demand for uranium peaked during the 1970s, leaving a scatter of ramshackle

cabins, an occasional rusting truck, and piles of slightly radioactive tailings in melancholy testimonial to their quest.

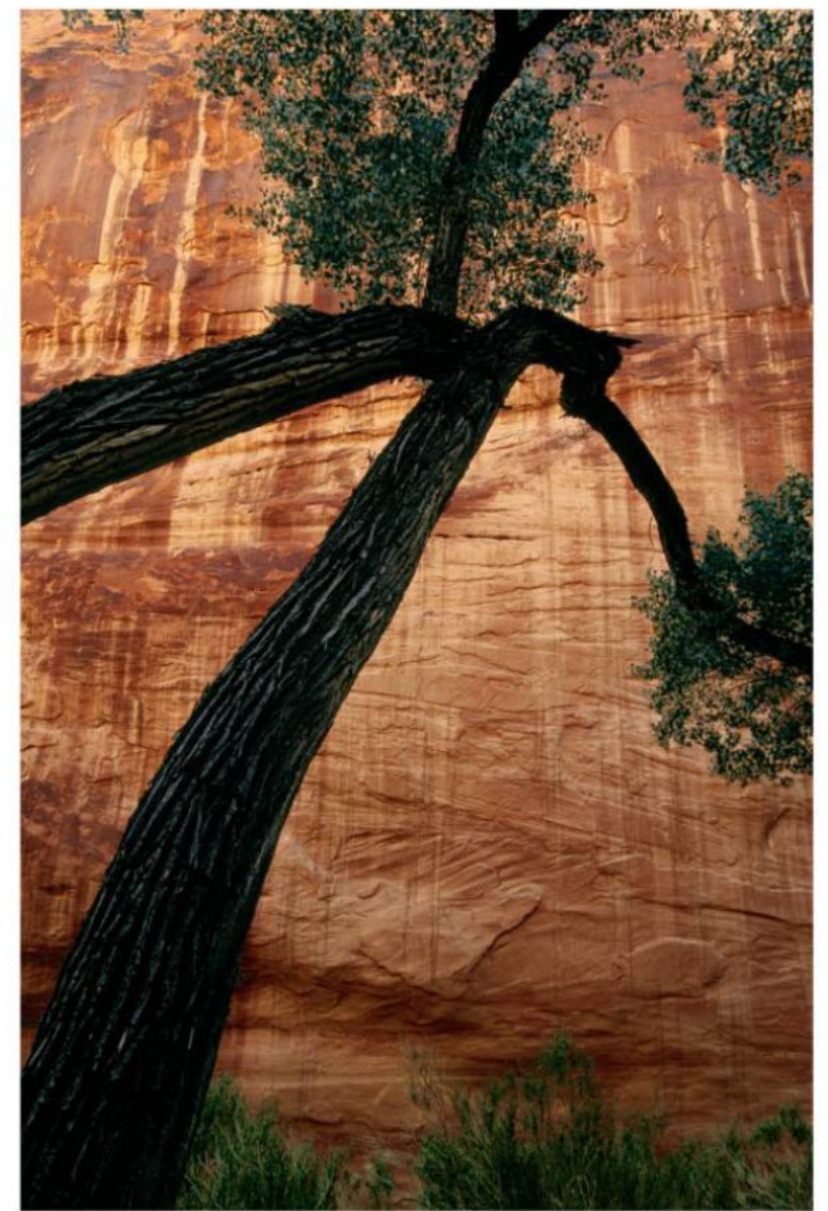
Indians, too, left a record, including a pictorial one that can unnerve. Sometimes a hiker trekking beside a wall of sandstone feels a prickly sensation: Someone's watching. Then he sees a figure like a sentinel, painted on rock in ochreous red. And another. "What are you doing here?" they seem to say. "We were here first."

Such figures—often larger than life-size—are found in hundreds of Utah sites. Some have no eyes. Some, no arms or legs. Perhaps they were deities. Archaeologists call this ghostly art the Barrier Canyon style, after a major art site in Canyonlands National Park. Little is known about its creators, hunter-gatherer cultures that left behind little but their art and are vaguely called Archaic people.

Minute paint flakes recently collected beneath two sites and subjected to radiocarbon tests indicate that the paintings could be as much as 8,500 years old. If correct, such dates would make this spooky art more than twice as old as most experts had thought. Archaeologists have reacted cautiously to the new dates, however; they generally want multiple datings to be sure.

Elsewhere in the canyon country, hundreds of stone canvases depict not only humans but also bears, deer, serpents, birds, and scorpions. Painted onto the rock or incised or pecked into the surface, they are the handiwork of more recent, better-known cultures, such as the Basket Maker, Fremont, and ancestral Puebloan. (This last is the name that's supplanting offensively Anasazi, which is said to mean "ancient enemies" in Navajo.)

Successive cultures are thought to have viewed



Finding its own angle of repose, a Fremont cottonwood anchors the riparian ecosystem in a tributary of the Escalante River. Cottonwoods play host to hundreds of insect species.

the art they discovered on the canyon walls with wonder or fear. Today, visitors to the region's many parks and monuments regard the land itself with awe. But a few thoughtless jockeys of dirt bikes and all-terrain vehicles carve ruts that will last for decades, even centuries. And sometimes a knife-wielding vandal decides that a precious rock-art panel is incomplete because it doesn't bear his initials.

Meanwhile, the land writes its own story, ever so slowly. Pushed by tectonics, the realm rises a centimeter or so every year, while erosion takes a little off the top. Time marches on in canyon country, taking its own sweet time.



A nearly unbroken barrier almost 50 miles long, the Straight Cliffs tower over a sea of slickrock, sage, piñon, and juniper in Utah's Escalante watershed—a landscape that author Edward Abbey celebrated as "the place where the tangible and the mythical become the same."



Ghostly figures, some nearly seven feet tall, hover along the Great Gallery in a remote corner of Canyonlands National Park. Archaeologists believe hunter-gatherers painted the figures several thousand years ago, making them among the earliest North American art.

Time is the ultimate artist of the Colorado Plateau, its brushstrokes found on the 25-million-year-old volcanic rocks washed down Boulder Mountain (below) and in the tiny pointillistic details of a rock-loving lichen (bottom), perhaps centuries old. The symbiotic marriage of a fungus with algae or cyanobacteria, lichens create a tough, resilient ecosystem unto themselves that persists long enough to date historic earthquakes. Like a Georgia O'Keeffe painting a hundred feet tall, Antelope Canyon (right) is proof of what time, water, and sun—with rock as a medium—can do. □

👉 **Painted Rock Country** Experience the color and sculpted splendor of the Colorado Plateau in our Photo Gallery at [ngm.com/0703](http://ngm.com/0703).

