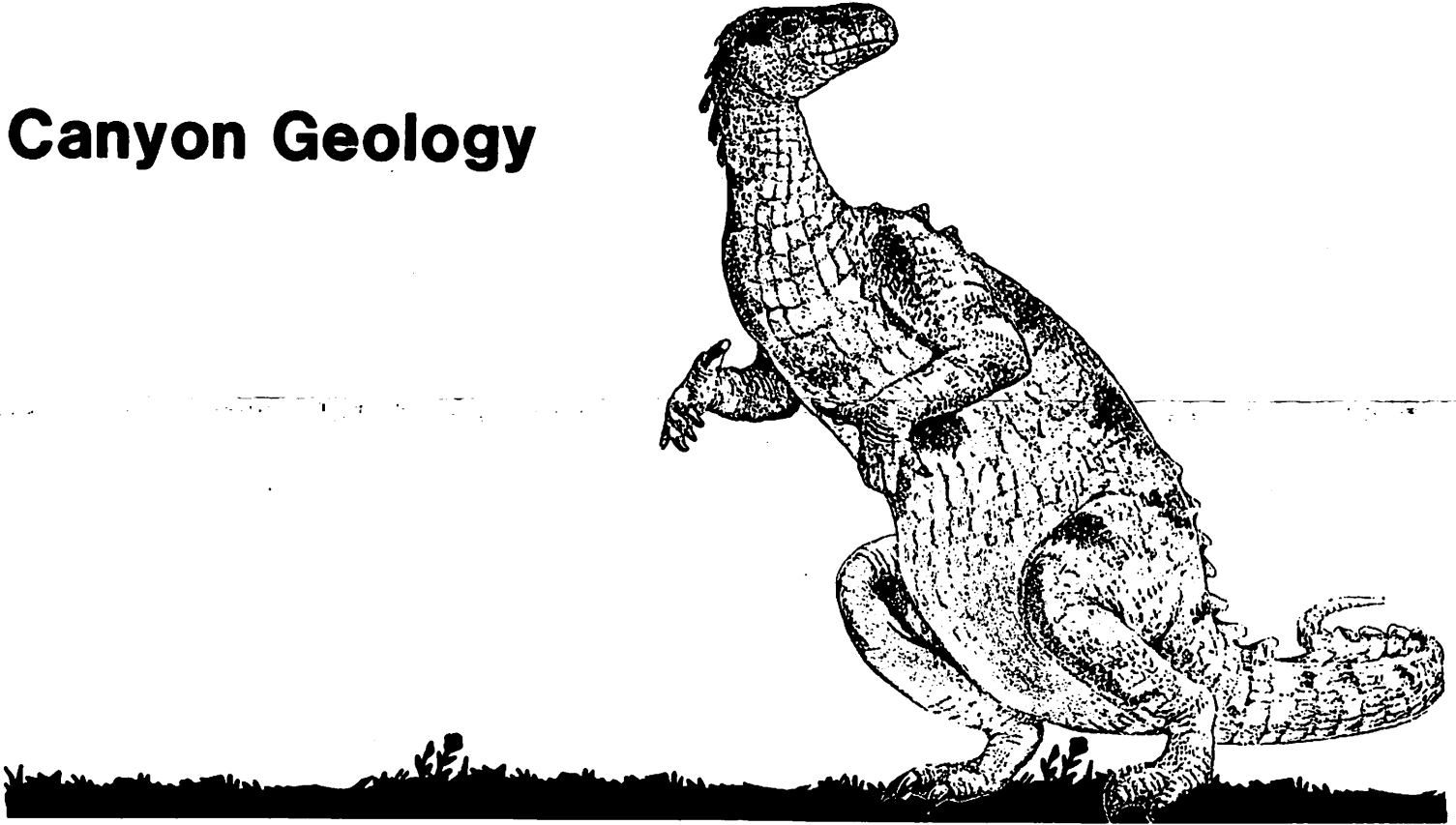


# Canyon de Chelly

National Monument  
National Park Service  
U.S. Department of the Interior

## Canyon Geology

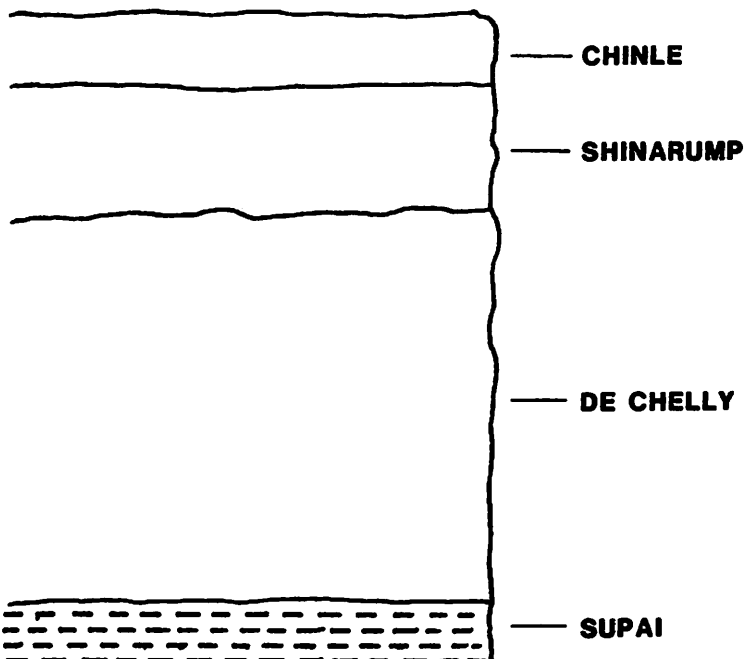


### Landscape

The Southwest landscape is like none other. A land of striking beauty and contrast, visitors from around the world stand in awe as they gaze down deep red rock canyons, up jutting spires, and over table-top mesas. Only in this section of the country will you find a panorama of geologic history that is uniquely Southwest America.

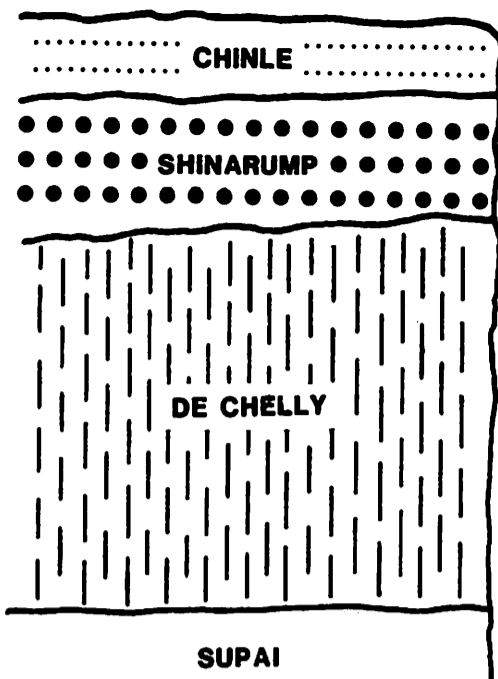
Canyon de Chelly is not the deepest canyon in the Southwest, nor the widest, nor the longest. But its awesome beauty and spectacular scenery rival any other. The canyon walls echo a past of more than 200 million years of geologic history and 2000 years of human history, a past well hidden within the sandstone cliffs of Canyon de Chelly National Monument.

### Layers



### Supai Formation

Try to picture Canyon de Chelly 280 million years ago as a geologist would. At that time the first mammal-like creatures were evolving and dinosaurs had not yet walked the Earth, much less man. There were glaciers near the equator, and northeastern Arizona was subtropical. The oldest layer of rock found in Canyon de Chelly, the Supai Formation, was deposited during this period. Fossil plants found in the mud, silt, and sandstone of the Supai tell us that the climate was hot and moist.



## De Chelly Sandstone

Thirty million years later, 230-250 million years ago (MYA), the de Chelly sandstone was deposited. The climate had changed from subtropical to arid desert, and the de Chelly sandstone, a light red, uniform grain rock, was formed from desert sand dunes. As you travel the rim drives, look for this cross-bedded sandstone that was formed by northerly winds.

## Shinarump Conglomerate

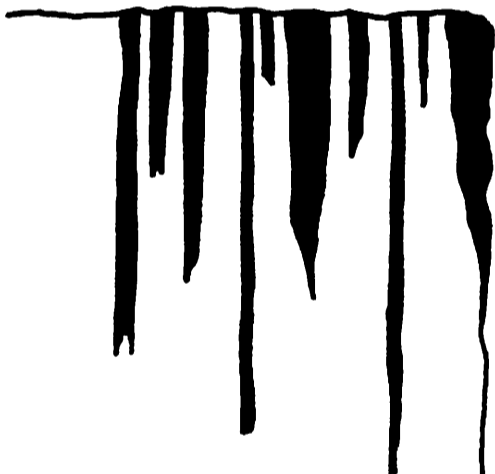
Fifty million years later (approximately 200 MYA), the Chinle Formation was deposited on top of the de Chelly sandstone. Only the base layer, the Shinarump conglomerate, remains, for the other layers have long since eroded away. Look for this stream-deposited conglomerate at the overlooks on the South Rim Drive. This grayish-brown caprock contains sandstone pebbles, quartz, basalt, chert, quartzite, and petrified wood.

As the dinosaurs were facing extinction, two major geologic events took place that created today's canyons. The Defiance Uplift, which took place 63 MYA, and a second uplift of the Colorado Plateau 3 MYA

joined the forces of mountain building and stream cutting. As the plateau and canyon walls rose, surging rivers cut through the rising rock. Millions of years of mountain building, stream cutting, wind, and erosion, have

created today's canyons. Geologists speculate that little has changed geologically in the past 10 000 years, when the last ice age ended and early man inhabited the Earth.

## Desert Varnish



Have you wondered about those dark streaks on the canyon's walls? This streaking is called "desert varnish" because the shiny, thin coating looks like dark paint was spilled over the canyon rims. Simply stated, desert varnish occurs when iron oxide and manganese leach out of the rock after a rainstorm. The darker the varnish, the more oxides have been leached, thus the older the varnish.

## Rocks for Man

For almost 2000 years, people have made these towering walls their home. The Anasazi Indians inhabited Canyon de Chelly for 1000 years and relied upon the rocks for their very survival. Their homes were built of rock fitted into exfoliated alcoves within the canyon walls. Rocks were used to grind food and mix plants for pigments used in rock art. Rocks provided material for tools and

weapons. Ground rock (clay) mixed with water was used for pottery. The sheer cliffs provided warmth from the sun and protection from intruders.

Today, these red rock canyons stand as monuments of great geologic forces and of the lost Anasazi culture whose voices once echoed throughout the canyon walls. Today, a second Native American culture, the Navajo, call these canyons home.

## Continued Reading

The geologic story of Canyon de Chelly is complex, yet fascinating. If you would like more in-depth information, the following books are available for purchase at the park's visitor center.

Canyon Country Geology by F. A. Barnes  
Roadside Geology of Arizona by Halka Chronic  
Scenes of the Plateau Lands by Wm. Lee Stokes