

# Yosemite National Park



## Yosemite's Geology

There is no place like Yosemite on earth. The spectacular granite cliffs, cascading waterfalls, clear streams, and giant sequoia groves are only a few of the breathtaking features that make Yosemite unique. None of these would exist without millions of years of geology and continual change.

### Sierra Nevada Uplift

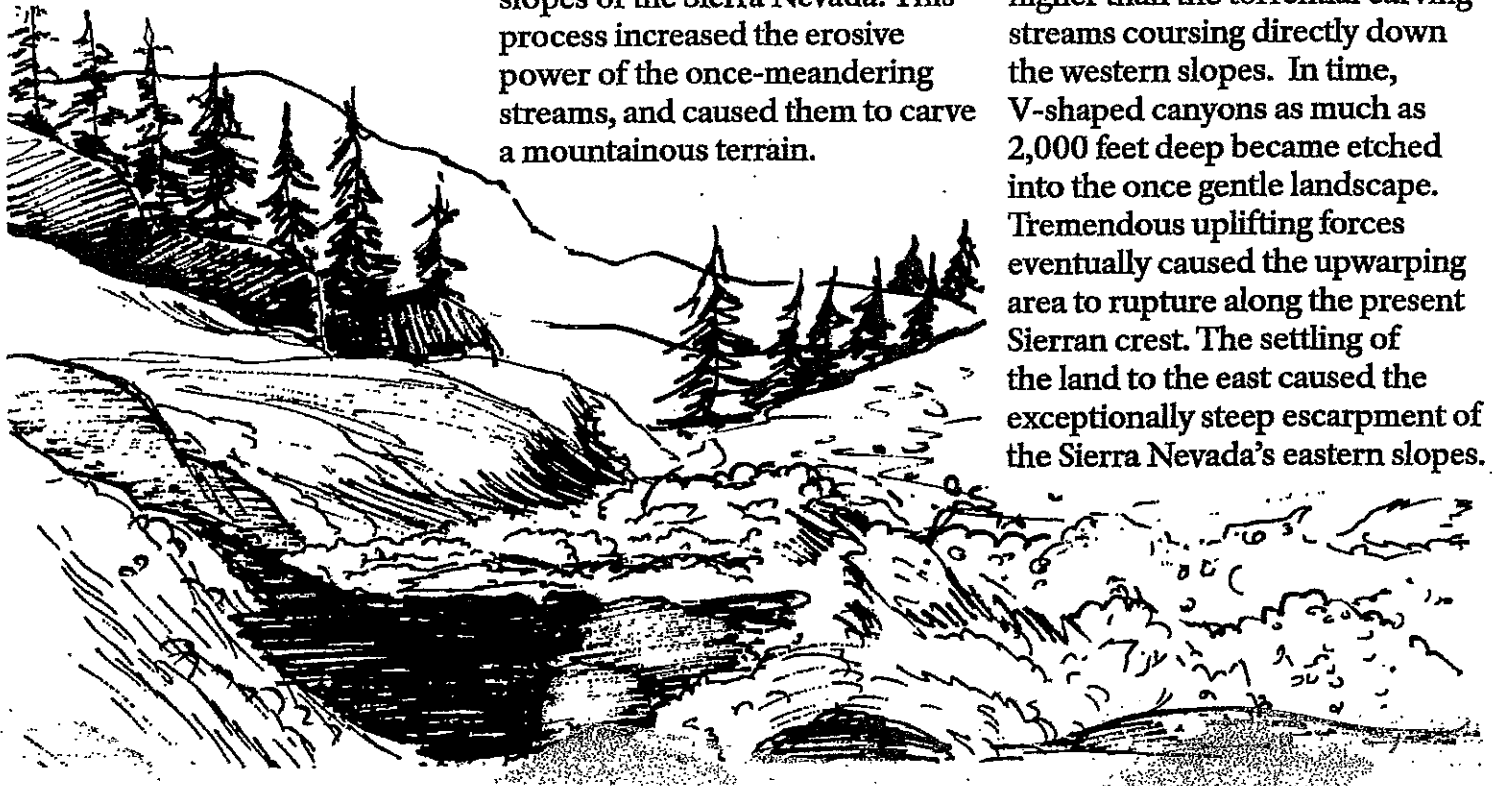
Yosemite's geology is linked to the origin of the Sierra Nevada. What is now the Sierra Nevada and the Great Valley of California was once a vast sea much like the present Gulf of Mexico. Large amounts of sand, silt, and mud eroded from ancient mountain ranges surrounding this sea and settled to the sea floor. Layers of this material accumulated and eventually became rock. Great forces within the earth's crust warped these rock layers,

lifted them above sea level, and flexed them into a folded mountain range extending northeast to southwest. As the mountains rose, molten rock began to form beneath them. It was this embryonic granite that would become the Sierra Nevada. Weathering and water erosion over time stripped away the overlying sedimentary rocks and created a landscape of rolling hills, broad valleys and meandering streams.

### Valley Formation

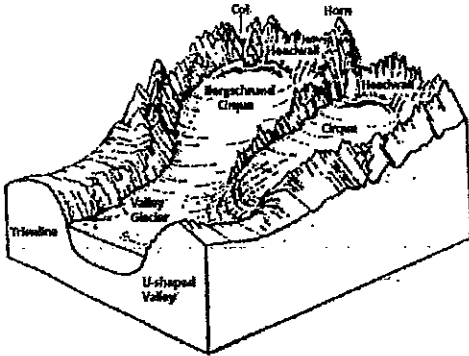
Continued uplift created an enormous upwarping over much of eastern California and western Nevada, steepening the western slopes of the Sierra Nevada. This process increased the erosive power of the once-meandering streams, and caused them to carve a mountainous terrain.

The side streams were unaffected by the tilting and continued to flow at a gentle rate. As a result, these streambed-valleys remained higher than the torrential carving streams coursing directly down the western slopes. In time, V-shaped canyons as much as 2,000 feet deep became etched into the once gentle landscape. Tremendous uplifting forces eventually caused the upwarping area to rupture along the present Sierran crest. The settling of the land to the east caused the exceptionally steep escarpment of the Sierra Nevada's eastern slopes.



# The Coming of the Glaciers

Several million years ago the world's climate changed causing masses of snow and ice to accumulate year-round all over the world. During these ice ages, glaciers formed at the crest of the Sierra at least three different times and advanced down the steep, narrow canyons that had been created by the rivers. In places such as Yosemite Valley, snow and ice accumulated to a depth of 3000 feet.



MOUNTAIN CREST, showing valley glacier and glacial sculpture

The grinding, gouging action of these tremendously heavy glaciers quarried the canyons and valleys, widening and deepening them into U-shaped troughs. Joints and cracks within the granite allowed the glaciers to quarry out blocks of granite and carry them away. In contrast, where the granite was unjointed, the glaciers scraped, buffed, and polished the surface.

As the glaciers receded, they left large lakes behind which would eventually dry up into meadows and then become forests through the process of succession.

Yosemite's domes were also being formed at this time. Sentinel Dome, Half Dome, and the Starr King group were formed by exfoliation, which is the spalling off of rock layers on unjointed granite. Liberty Cap, Fairview Dome, and Lumbert Dome formed as a result of ice overriding granite outcroppings.

The grand beauty of Yosemite is the product of millions of years of geologic change. Today, rocks fall, water sculpts, and fire burns to continue the legacy of beautifying change that defines Yosemite National Park.

## Snapshots in Time of the Evolution of Yosemite Valley

