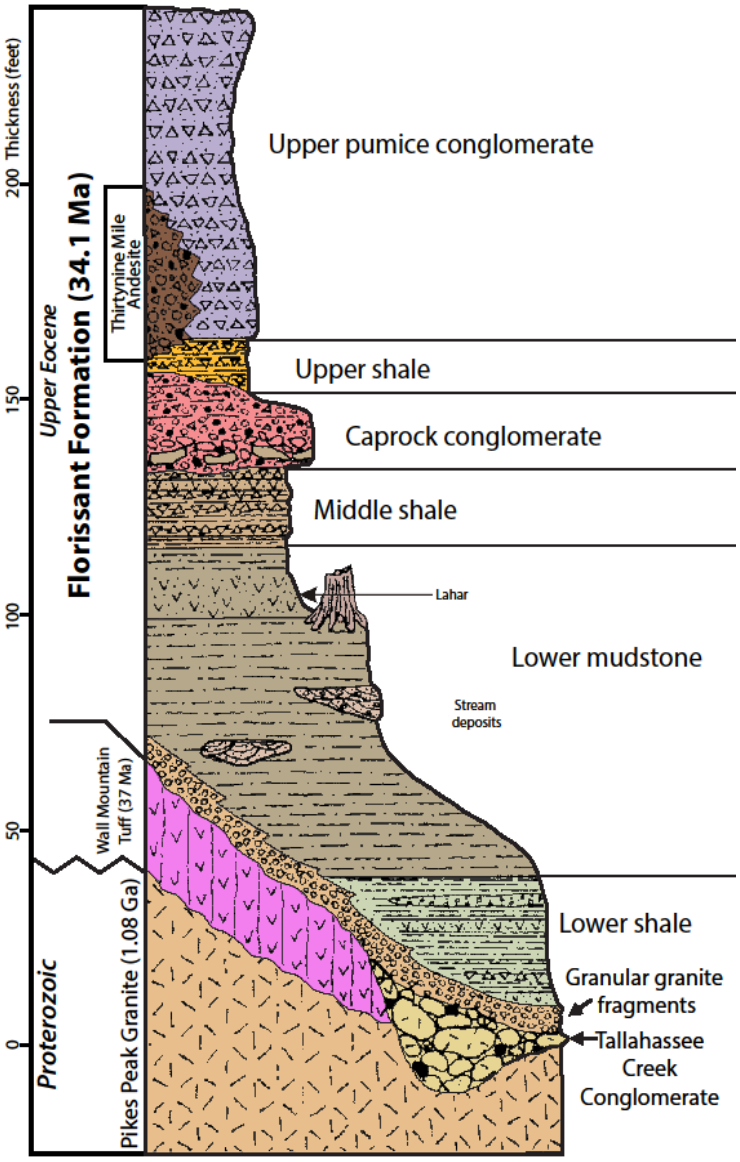
Florissant Fossil Beds
Geologic History of Lake Florissant

National Park Service
U.S. Department of the Interior

Florissant Fossil Beds
National Monument

Stratigraphic Section of Florissant Formation



How did the Florissant Valley Form?

During the Late Cretaceous to early Tertiary (about 70-45 million years ago) the uplift of the Rocky Mountians exposed the one billion year old Pike's Peak Granite and the 1.4 billion year old Cripple Creek Granite to the effects of weathering and erosion. By the late Eocene (37-34 million years ago) the region had become a widespread erosional surface and the Florissant paleovalley had emerged.

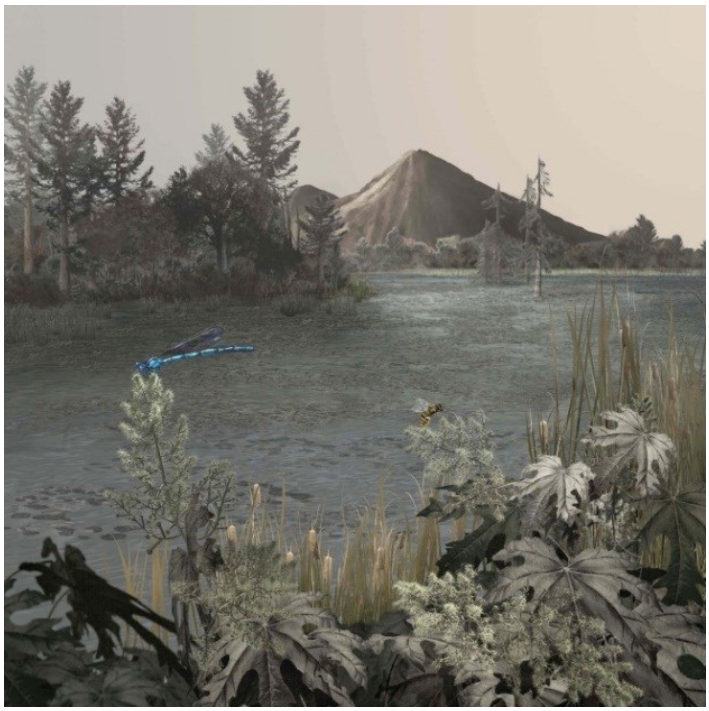
During the late Eocene, volcanoes were a dominant force in the region. A caldera far to the west of the Florissant paleovalley erupted 36.7 million years ago as a part of a volcanic flare-up of the central Colorado volcanic field. A superheated flow of ash and debris, moving at incredible speeds, blanketed the surrounding area for miles. This flow compacted to form a welded tuff called the Wall Mountain Tuff. In the Florissant region, this tuff was then eroded by the stream that flowed through the paleovalley.

The Guffey Volcanic Center

About 18 miles west of the Florissant region are the remains of the Guffey volcanic center. This stratovolcano (similar in volcanic structure to Mt. St. Helen's and Mt. Rainier) was part of the Thirtynine Mile volcanic area. Eruptions sent flows of lava and debris down towards the Florissant paleovalley. One volcanic debris flow, also known as a lahar, intersected the stream of the ancient Florissant paleovalley, damming the flow and creating the first generation of Lake Florissant behind it.

Formation of the First Lake Florissant

Periodic eruptions from the Guffey volcanic center would produce clouds of ash which would cover the paleovalley. This ash would be weathered into clays rich in silica (a common compound of silicon and oxygen) and transported downhill to be deposited in the lake. Over time this clay became lithified as fine layers of shale.



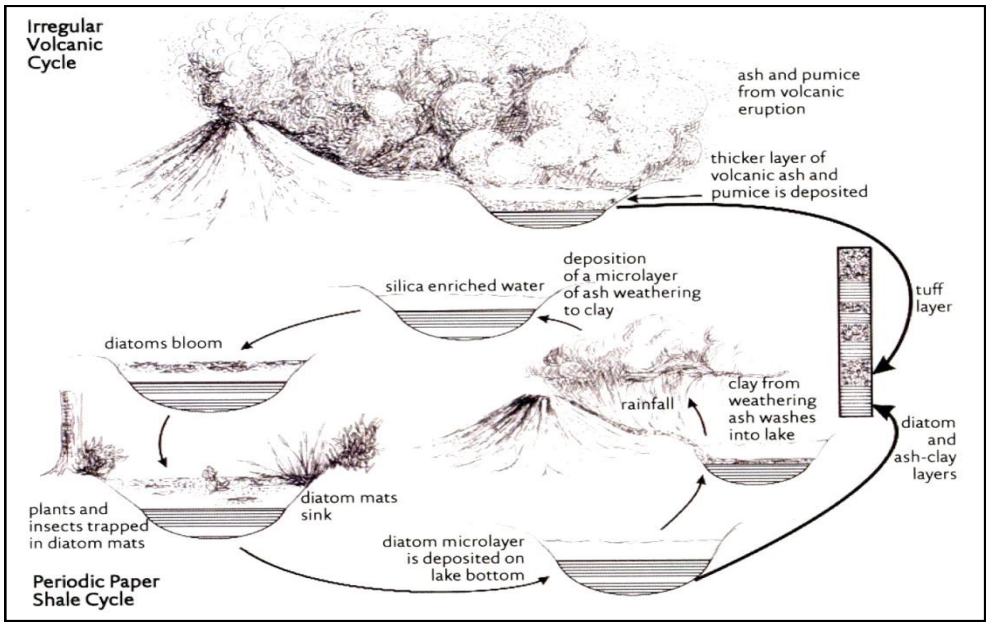
As the influx of this weathered ash enriched the lake water with silica, diatoms (microscopic algae with hard silica "shells") would bloom and then sink to the lake bottom as thin organic mats when they died.

The combination of these ash layers and diatom mats allowed for the preservation of delicate insects and leaves in layers of paper thin shale. Occasional fish and even birds have also been preserved.

The Lake Does Not Last

The lake began to fill with sediment washed down from the surrounding slopes as the stream slowly breached the dam and eroded it away. The valley once again became a stream valley, rich in plant and animal life. The stream deposits of this time contain fossils of mammals such as brontotheres (a rhinocerous-like animal) and *Mesohippus* (a small horse).

However, another large eruption from the Guffey volcanic center triggered more lahars. One lahar dammed the stream once again while another flowed into the valley, burying and preserving the stumps of the trees that grew there.



Formation of the Second Lake Florissant

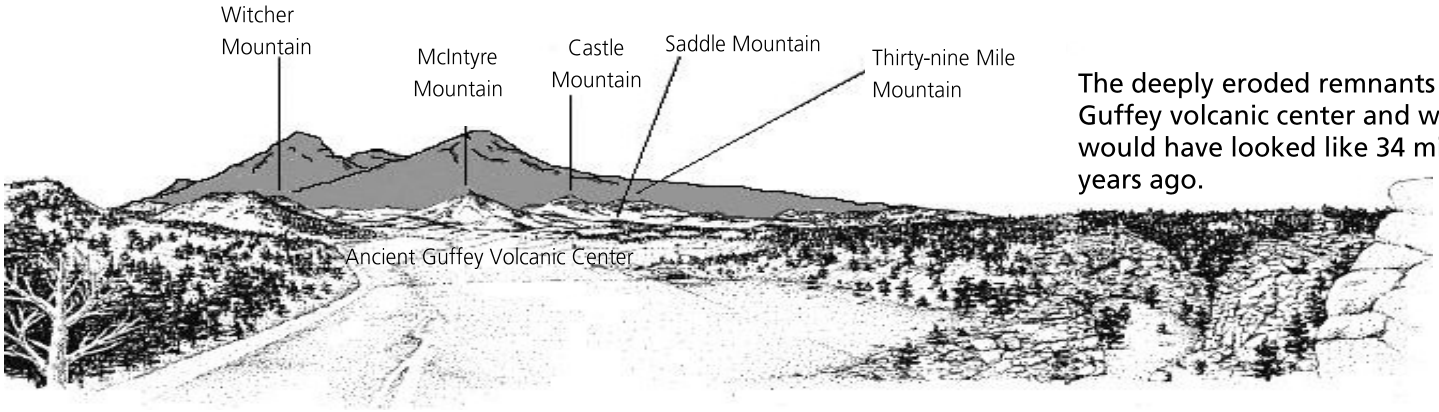
As the valley flooded once again, the cycle of volcanic eruptions depositing layers of ash continued as it had with the first generation of the ancient Lake Florissant. Ash would weather to clay and be deposited as paper thin layers of shale on the lake bottom. Diatoms would bloom with the influx of silica. As they died, they would sink as diatom mats, often bringing trapped insects along with them.

What happened to Lake Florissant?

As layers of paper shale continued to be deposited in the lake bottom, another large eruption from the Guffey volcanic center sent a lahar flowing into the lake, sturring up sediment as it went, and creating a conglomerate that would act as a caprock for the shale below, ending the second depositional period of paper shale where leaves, insects, and rare fish can be found.

The caprock had not filled in the lake, and periodic volcanic eruptions continued to aid in the deposition of shale in the lake until another eruption of pumice led to the end of the Florissant Formation. A cloud of ash and debris flowed into the lake from the west, creating a pumice conglomerate. Any evidence of further eruptions have been erased by erosion.

Since the late Eocene, the Guffey volcanic center has been eroded down along with the rest of the region. The Florissant valley has been covered with sediments from the eroding Pikes Peak Granite as well as the Florissant Formation.



The deeply eroded remnants of the Guffey volcanic center and what it would have looked like 34 million years ago.