



Marshall Gold Discovery State Historic Park



Why Was There Gold at Sutter's Mill?

The gold found at Sutter's mill site at Marshall Gold Discovery State Historic Park occurred in the sands and gravels of the South Fork of the American River and in stream terrace gravels along the river bank. Concentrations of gold in sand and gravels along rivers and streams, like those at Sutter's mill, are

called placer gold deposits. The term "placer" was probably first used by early Spanish miners in both North and South America to refer to gold deposits in sands and gravels of streams. Originally the term meant "sand bank" or "a place in a stream where gold was deposited."

Gold particles have a high density (high weight per volume) compared to water and to most other minerals and rocks. Gold is seven times heavier than quartz—the main constituent of sand. As a consequence, gold particles require faster moving water to be carried or pushed along in streams and rivers than do particles of other minerals and rocks. This density difference causes gold to concentrate in places where the water speed changes from fast to slow. When the water flow decreases gold drops out sooner than most other sediment particles. Examples of places where water flow slows and gold may accumulate are: along the inside bends of streams or rivers; where eddies (areas of circular water movement to the side of the main current) are present in the water; in small areas behind boulders; at the heads of quiet pools; and behind irregularities (natural riffles) on the bottom of stream or river channels. Gold deposited at these locations usually resides in place. During storms with extremely high rainfall or periods of flooding, gold particles may be transported downstream to new locations. If gold particles get buried by sediments, these sediments may prevent the gold from being moved further downstream during times of higher flow.

Feature/ Processes:

Archeology, geology and hydrology of modern placer gold, and the "gold rush" discovery site

Why it's important:

Although small amounts of gold had been found in other parts of California, it was the gold discovery at Sutter's mill that received world-wide attention in 1848. The discovery caused one of the largest mass-migrations in history, bringing people to California from all over the world. Most prospectors who came did not strike it rich in the gold fields and returned home, but about ten percent stayed in California. Those who stayed contributed to California's rapid commercial, agricultural and industrial development, and hastened



Photo: Public domain

statehood in 1850. These developments prompted dramatic transportation improvements, the most important being the transcontinental railroad. Completed in 1869, it connected California to the eastern U.S. and helped raise the State's agricultural industry to national prominence. The discovery of gold at Sutter's mill started it all.

Most of the gold present in the placer deposit at Sutter's mill probably originated from within the Mother Lode gold belt. The river crosses this belt about five to seven miles upstream from the Sutter's mill site. The Mother Lode gold belt is about one-half mile to one mile in width and 120 miles in length; extending from Georgetown south through Placerville and on to Mariposa. It is associated with the Melones Fault system. Numerous underground gold mines were active for about 100 years along the Mother Lode gold belt.

The Mother Lode gold belt formed about 140 to 150 million years ago. At that time, the geologic setting of the Sierra Nevada was similar to the Andes in South America today. Ocean crust and continental sediments—sliding beneath the edge of the North American continent—were carried deep enough that they melted. The resulting magma (molten rock material) moved upward into older rocks along the edge of North America and solidified, miles below the surface, to form granite rock bodies called batholiths. These granite batholiths are exposed at the surface in many parts of the Sierra Nevada Mountains today. One underlies the sediments at Marshall Gold Discovery State Historic Park, and outcrops of this granite batholith can be seen in portions of the park today. During their final stages of crystallization, some of the fluids (associated with these granitic rocks) consisted of very hot water with dissolved



What you can see: Gold-bearing stream sediment along the South Fork of the American River in the Sierra Nevada foothills

silica, carbon dioxide and gold. These fluids moved into fractures in the older rocks along the Melones Fault zone and solidified, forming gold-bearing quartz veins. The fluids also deposited gold in the rocks along the edges of the fractures. The quartz vein formation and gold deposition occurred several miles below the surface of the ancestral Sierra Nevada, forming the Mother Lode gold belt.

After the Mother Lode gold deposits formed, there was a long period of uplift and erosion which eventually exposed these gold deposits at the earth's surface. Once at the surface, weathering and erosion processes freed gold from Mother Lode deposits and carried it into the streams and rivers that flowed southwestward off the Sierra Nevada. This gold accumulated and formed placer deposits in favorable places along these streams and rivers. Between 33 and 4 million years ago, several vast volcanic eruptions filled the existing stream and river channels with lava flows and ash, burying these placer gold deposits. New streams and river channels eventually formed in response to burial, renewed uplift, and westward tilting of the Sierra Nevada. These now westward flowing streams and rivers eroded through the volcanic cover to re-expose the buried placer gold deposits and the

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Mother Lode gold belt. The present day South Fork of the American River was formed at this time. Its channel eroded deeply enough to intersect the Mother Lode gold belt and expose these gold deposits to renewed surface weathering and erosion. Once again, gold particles were being freed from host quartz veins and rocks but now they were being carried with other sediments down the South Fork of the American River. At favorable locations along the river, gold particles accumulated and formed new placer gold deposits, including one ultimately discovered by James Marshall in 1848.

Final Thoughts

The park provides a sociological case study of how the distribution of earth's mineral resources has influenced the establishment and demographics of societies.

*Written by Ron Churchill, California Geological Survey
Photos: Mike Fuller (except where noted)*