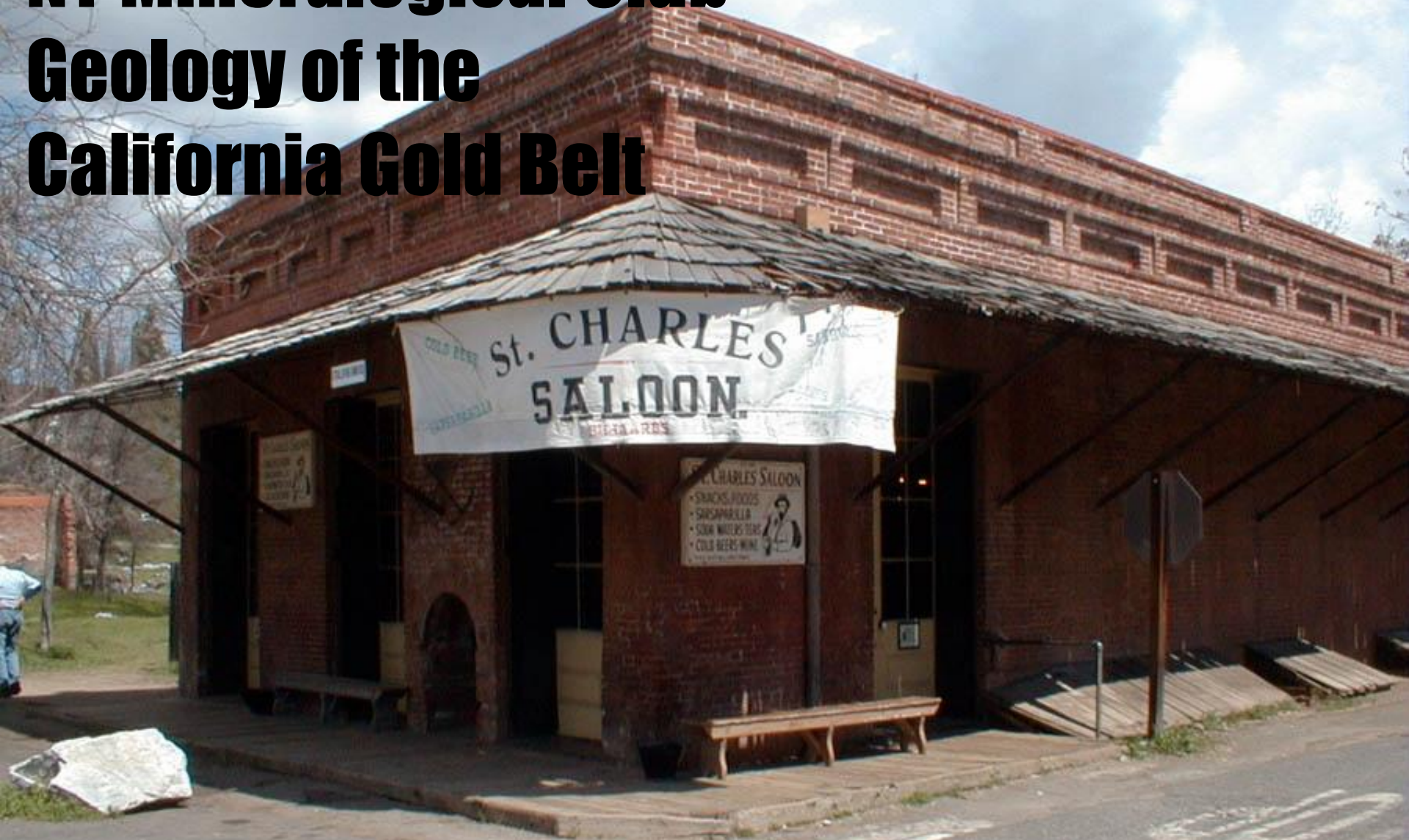


# NY Mineralogical Club Geology of the California Gold Belt



© 2004 Charles Merguerian









# EARLY MEDIAL ORDOVICIAN

(Early Chazyan)

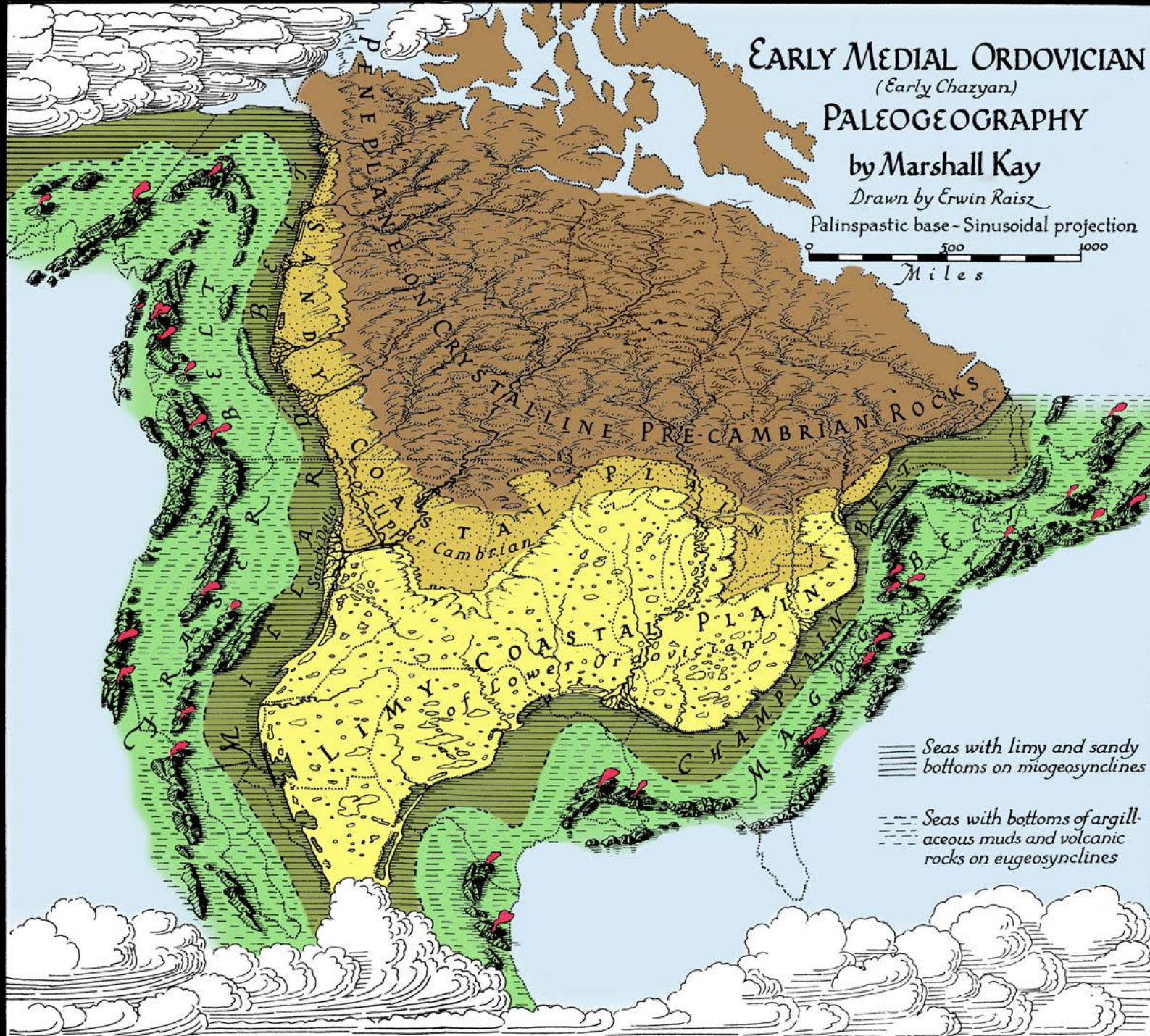
## PALEOGEOGRAPHY

by Marshall Kay

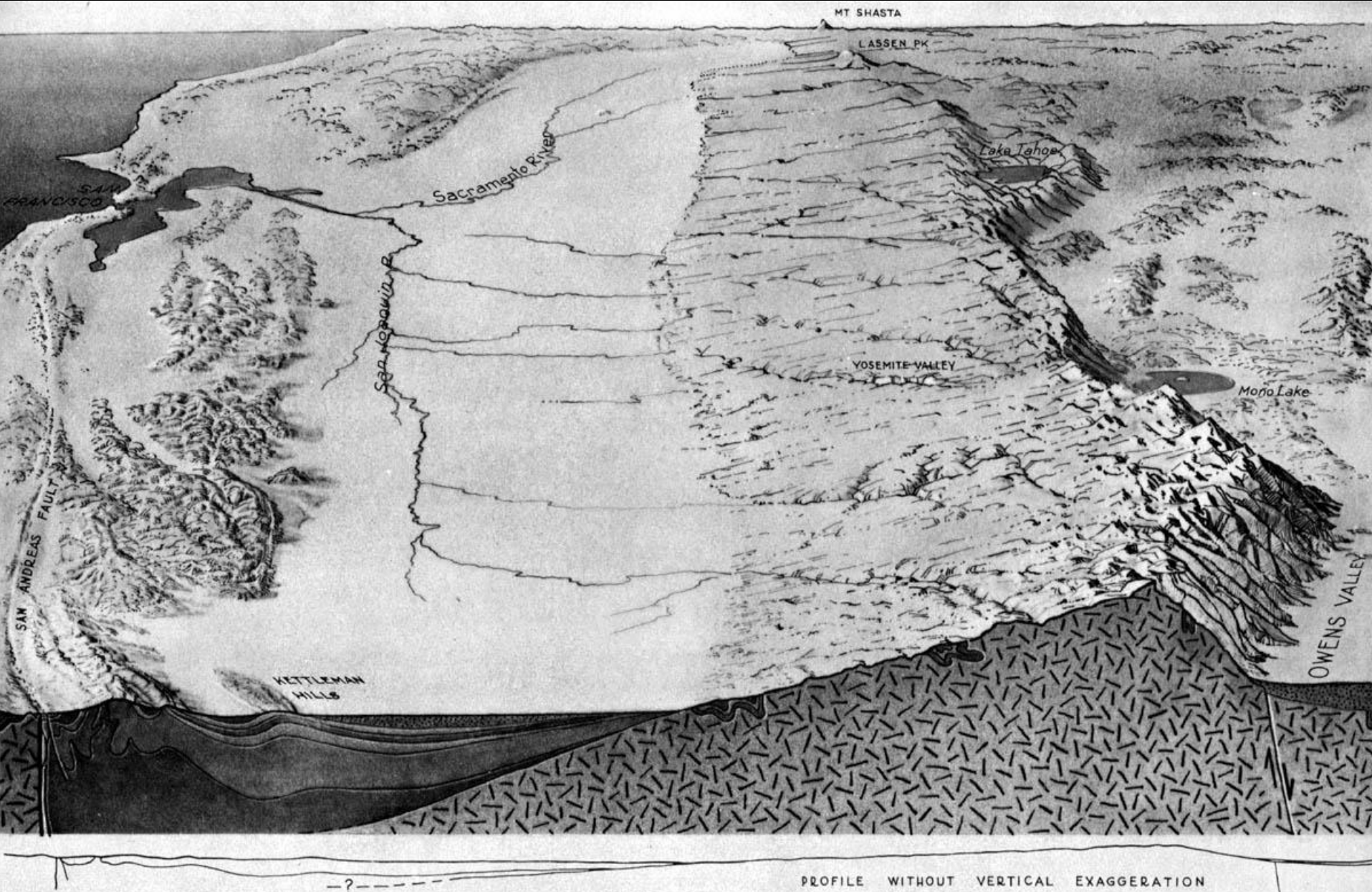
Drawn by Erwin Raisz

Palinspastic base - Sinusoidal projection

0 500 1000  
Miles







PROFILE WITHOUT VERTICAL EXAGGERATION

**Shelton, 1966**







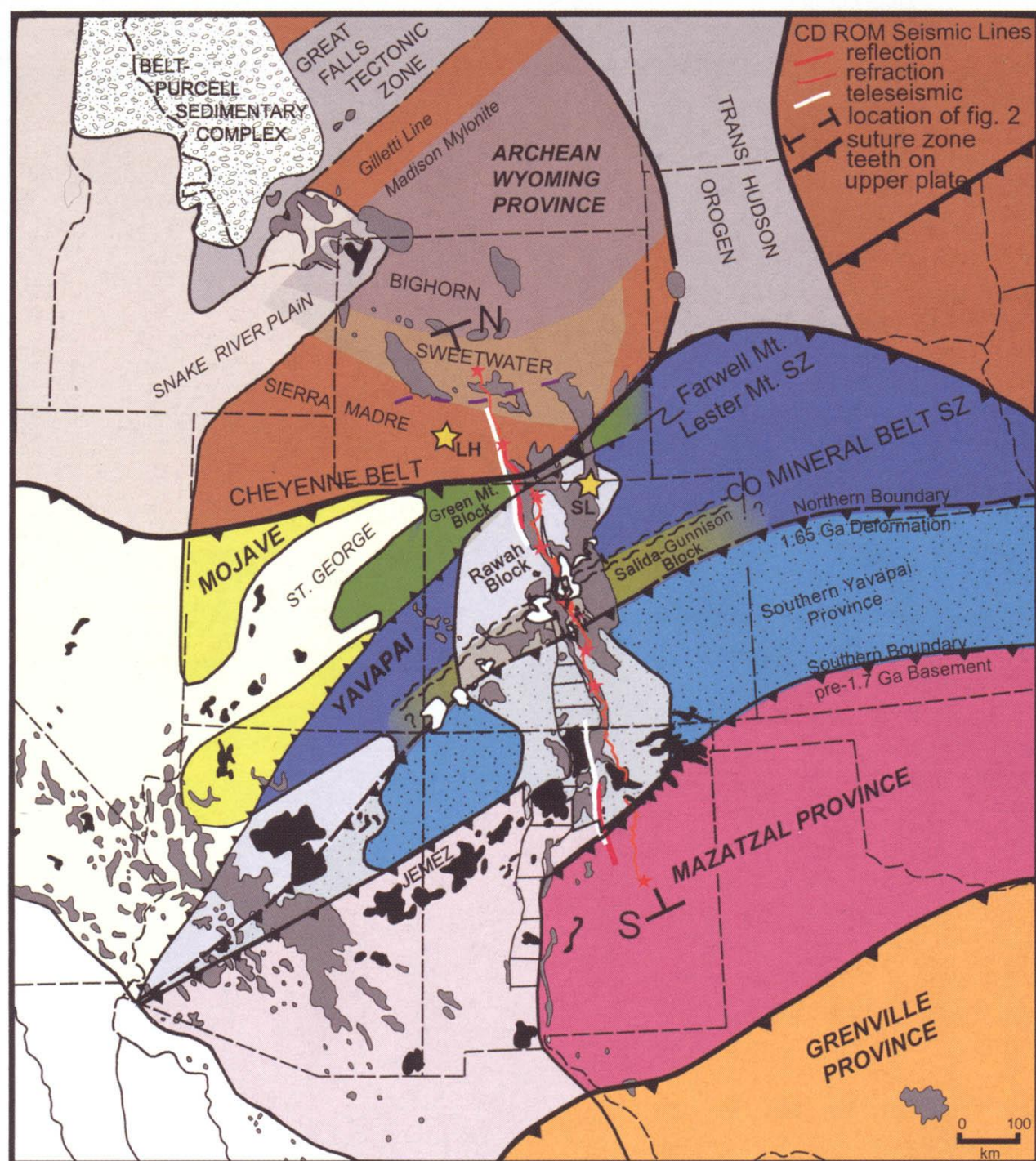
# Tectonics of California



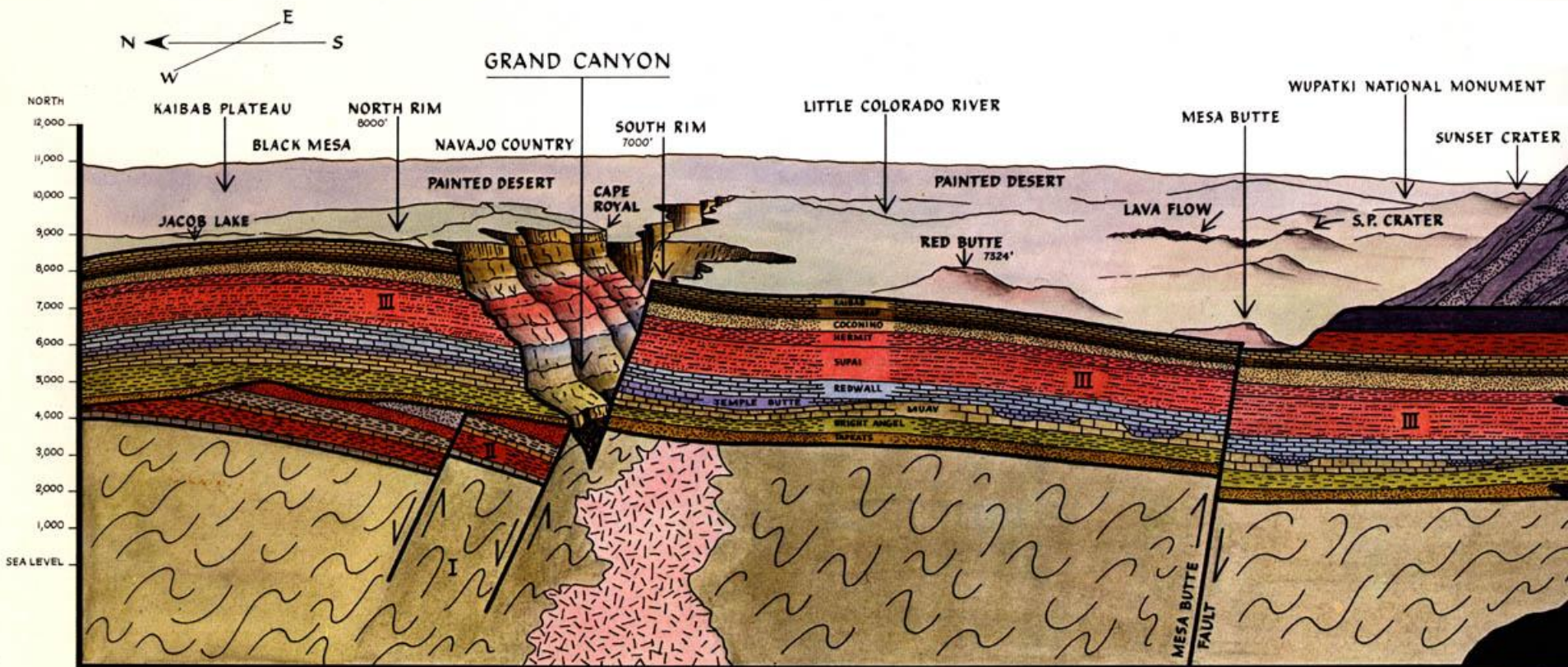




# Cratonic Elements











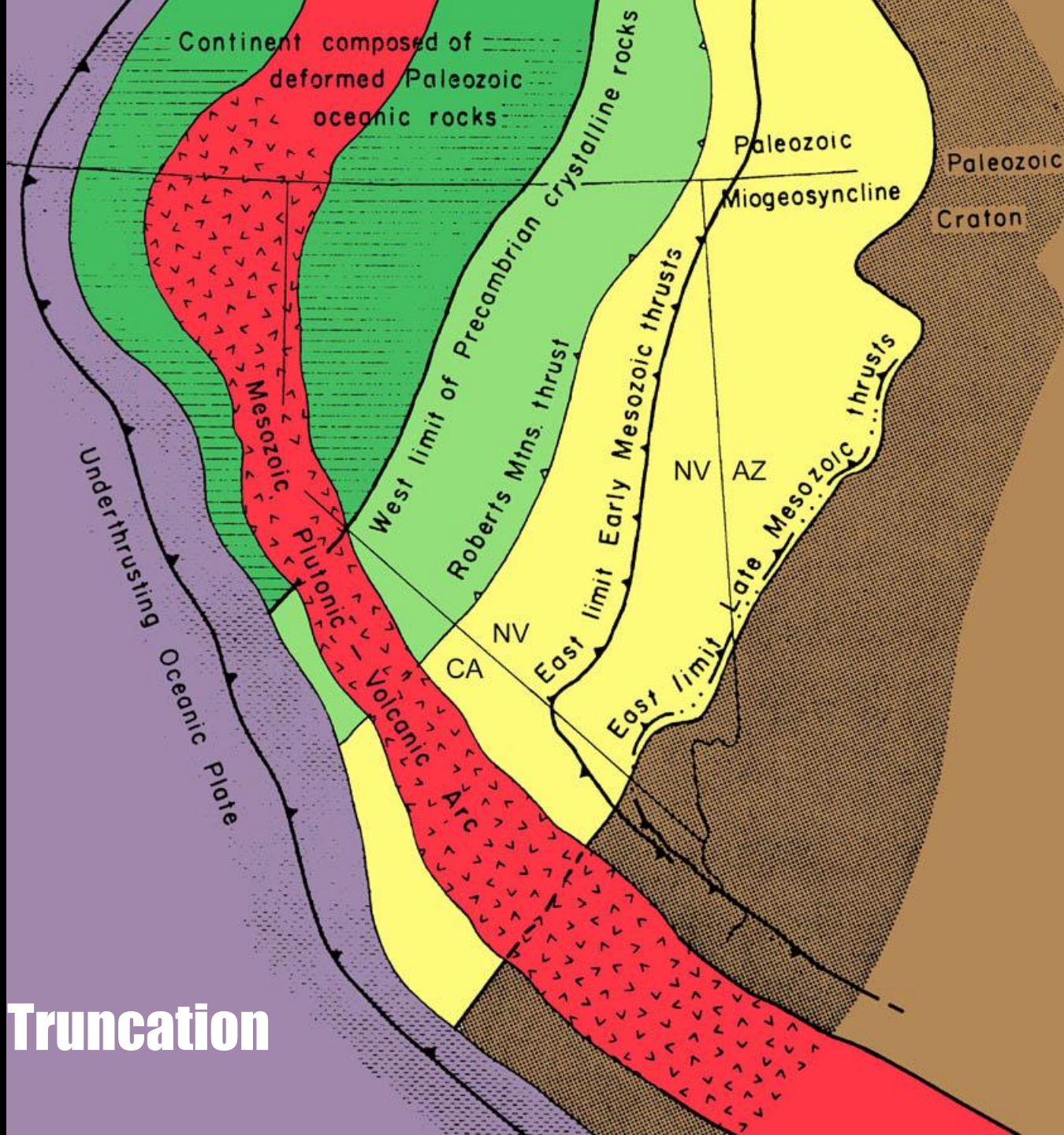
Stop 23





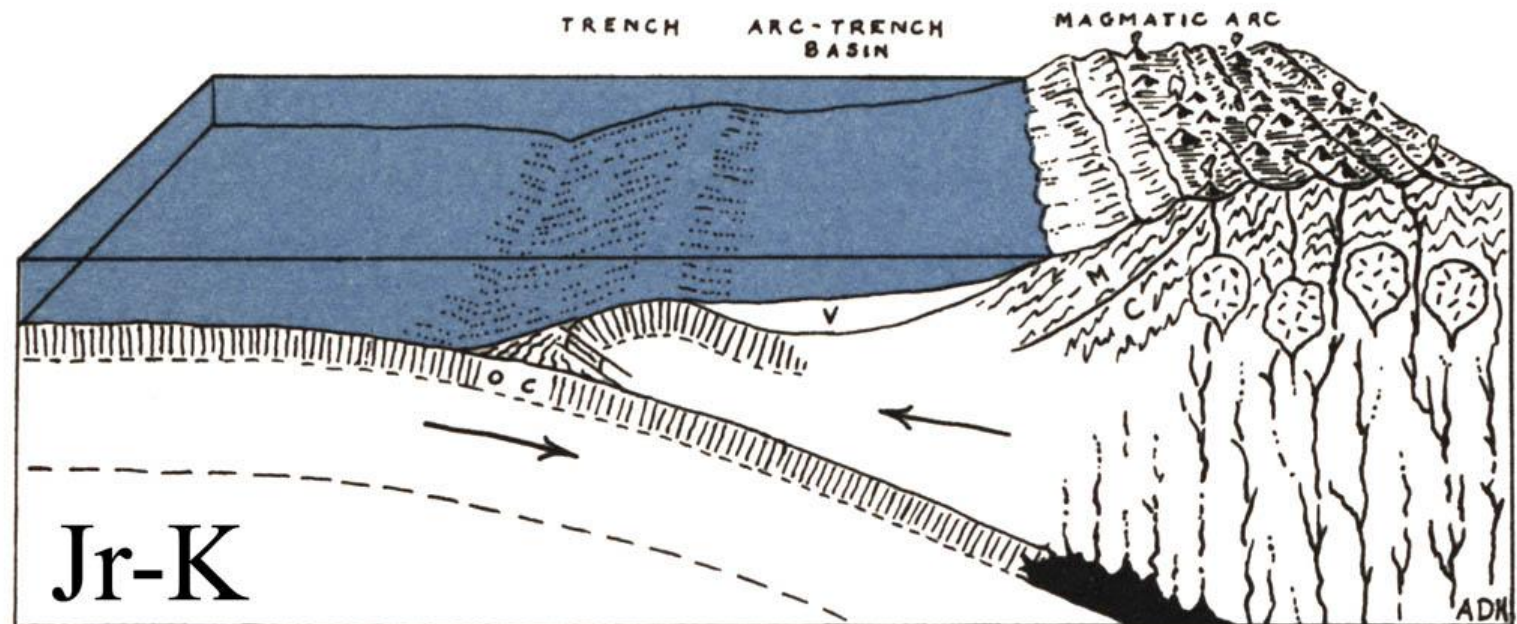
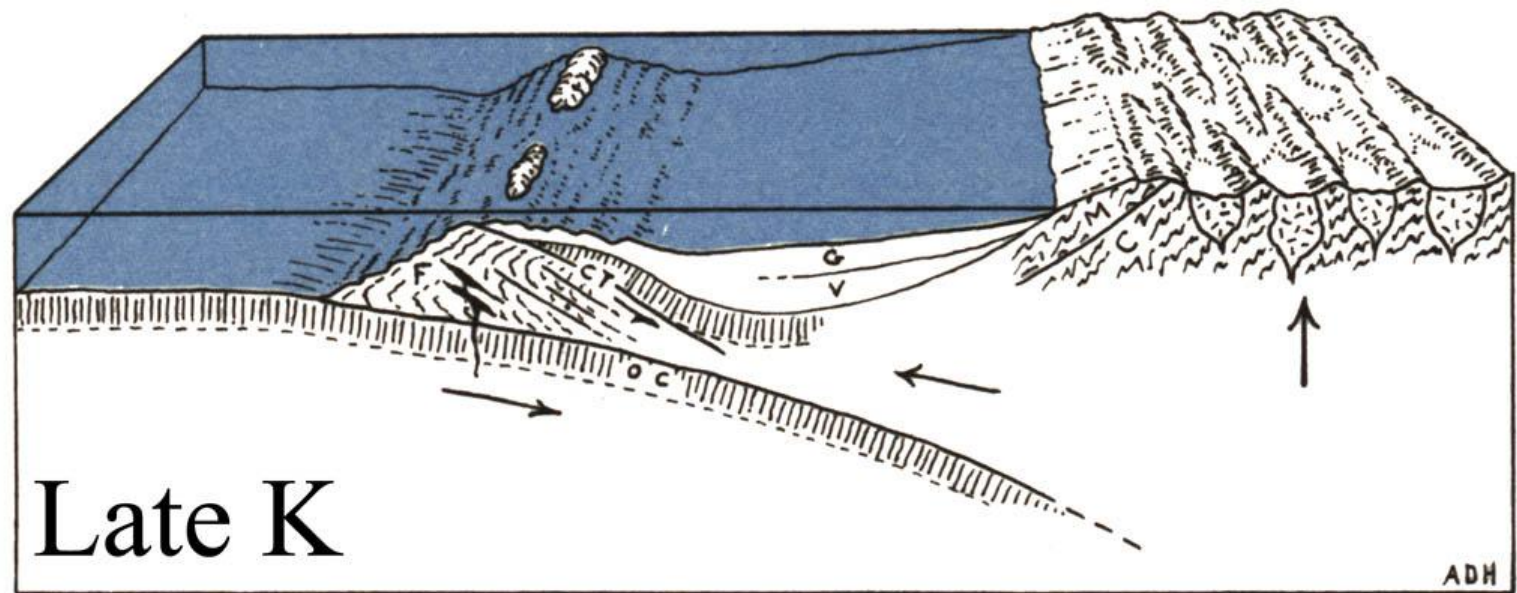
Stop 23





**Late Tr Truncation**







# The Coast Ranges

A photograph of a coastal mountain range. The foreground and middle ground are covered in dense, low-lying shrubs in shades of green and grey. A dirt path winds through the vegetation. In the background, rocky mountain peaks are visible, with the ocean and a hazy horizon in the distance. The sky is overcast.

**Knockers**



# Franciscan Complex





# Chert and Shale





# Serpentinite



24 May 2004

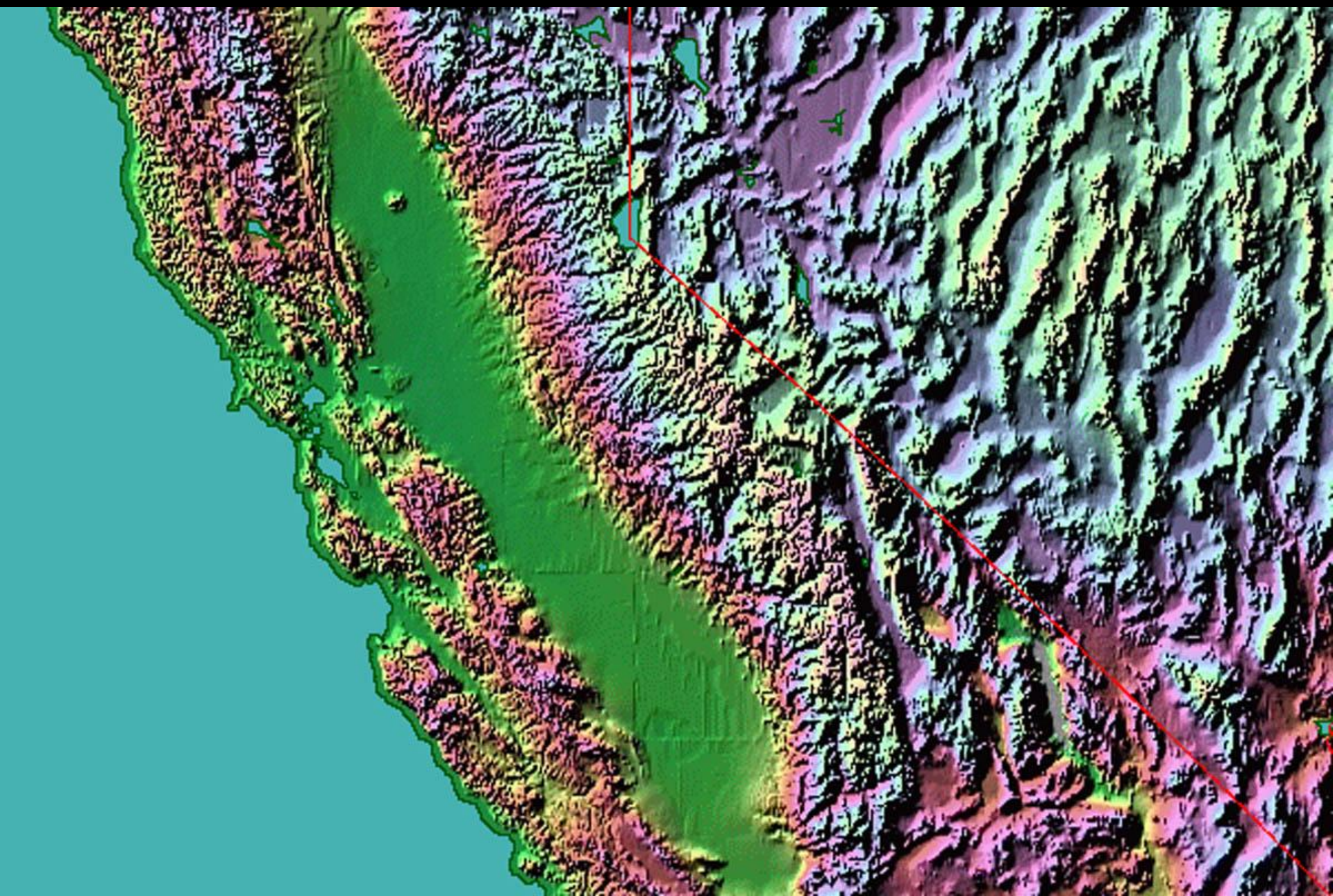




**Serpentine**



# The Great Valley



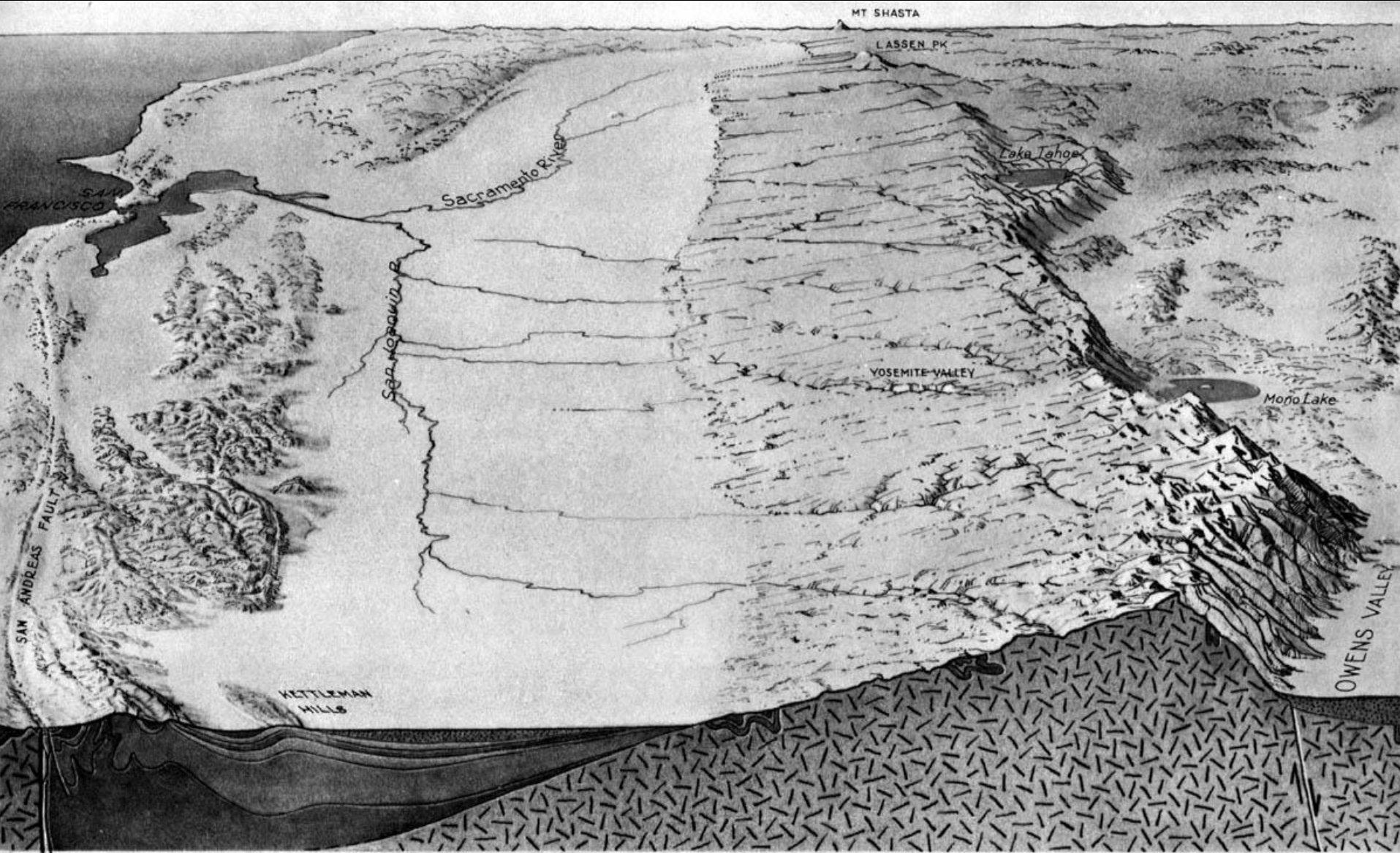




**Mt. Shasta**

**Williams, 1934**





--?--

PROFILE WITHOUT VERTICAL EXAGGERATION

Shelton, 1966



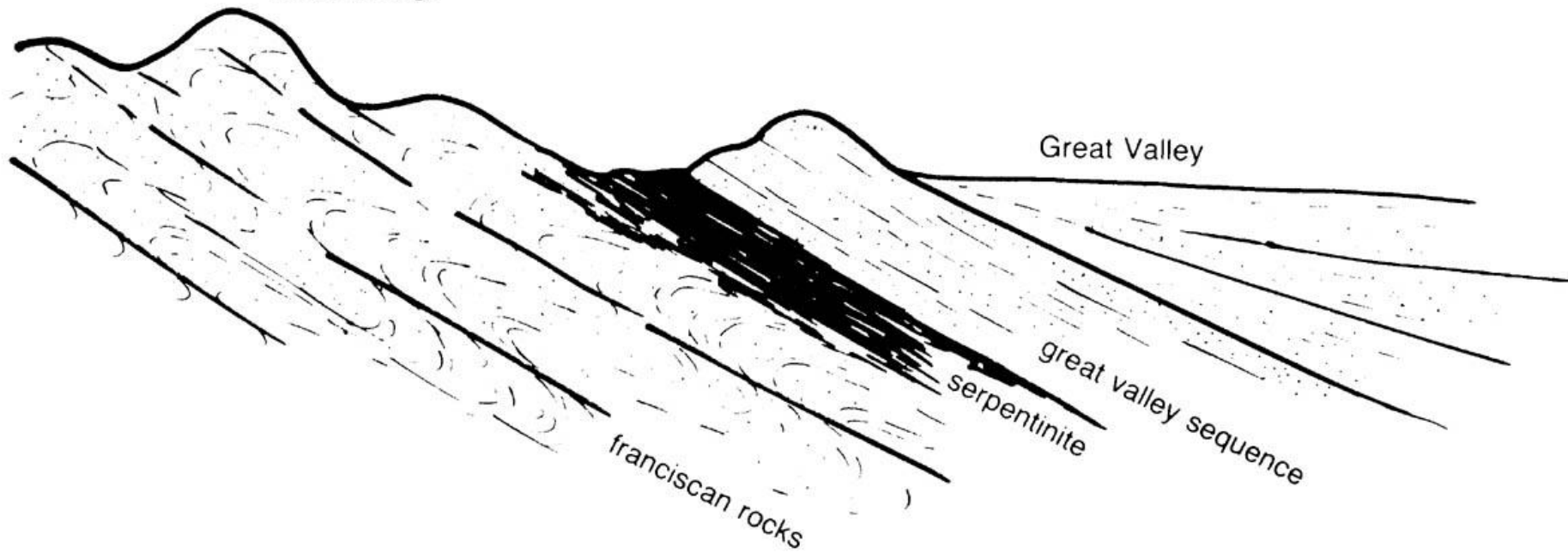
Coast Range

Great Valley

franciscan rocks

serpentinite

great valley sequence







**Great Valley Sequence, Lake Berryessa**

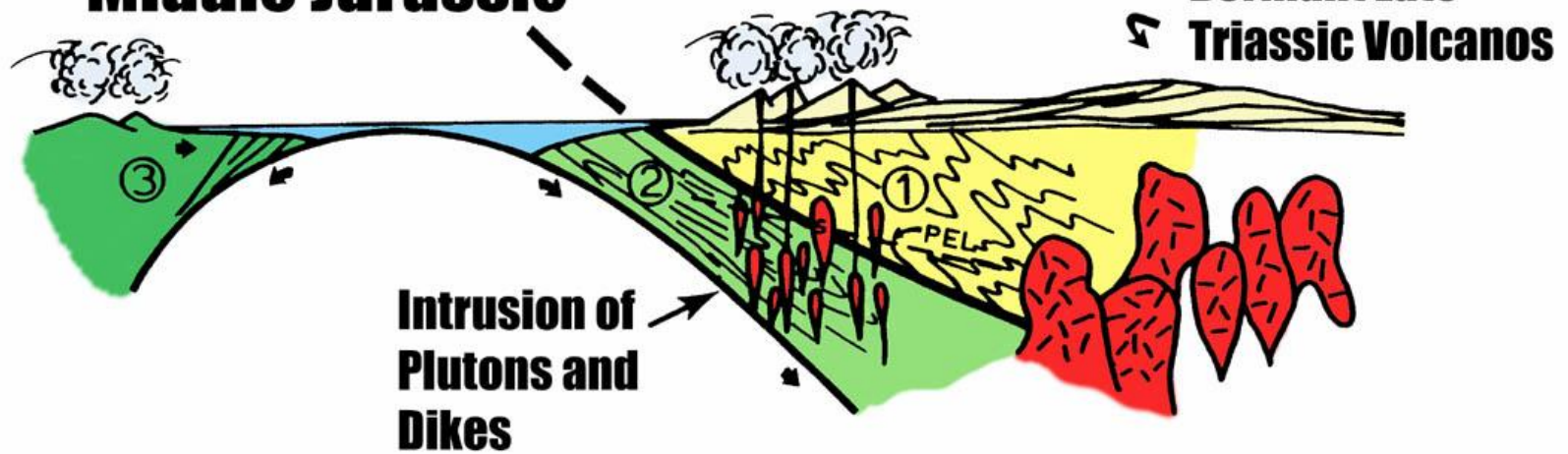


# **Foothills Metamorphic Belt of the Sierra Nevada**

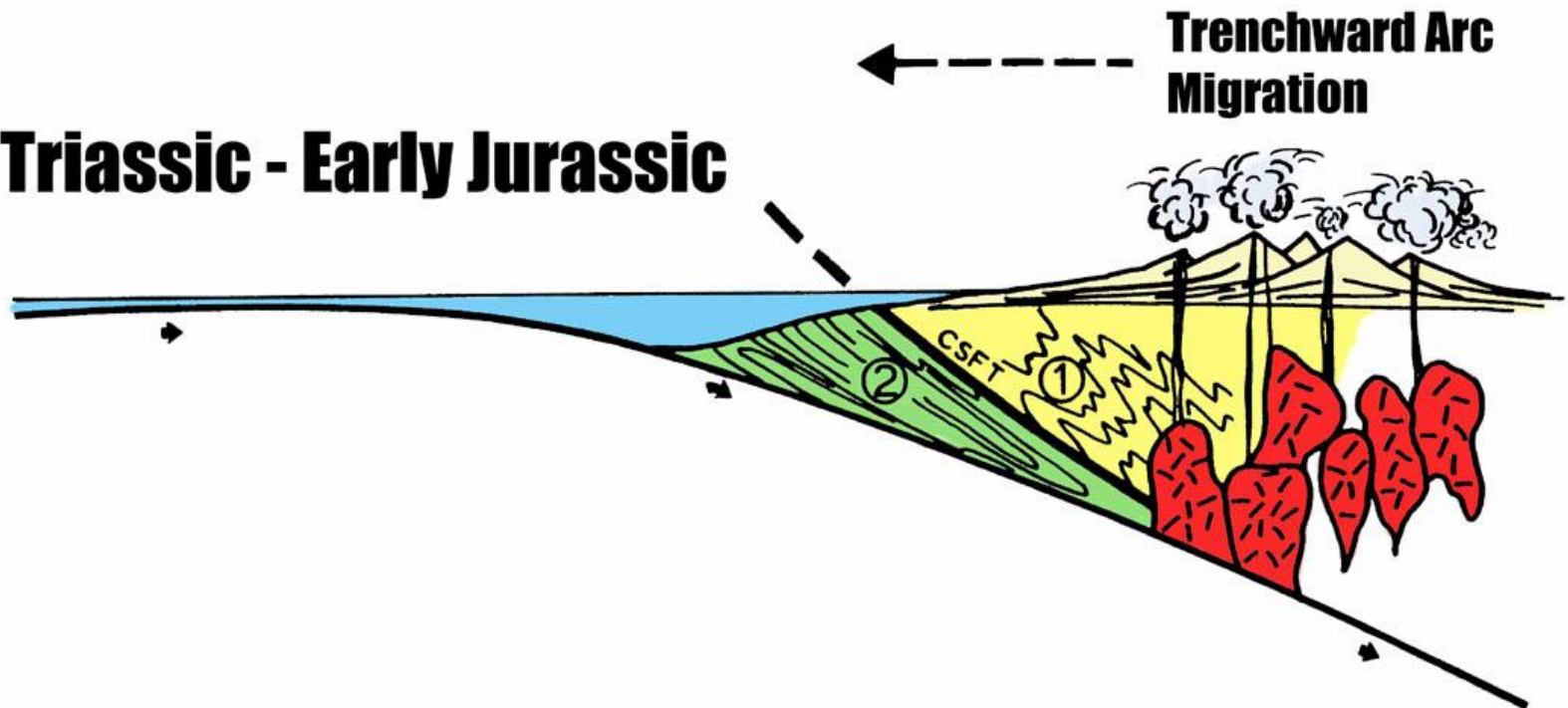




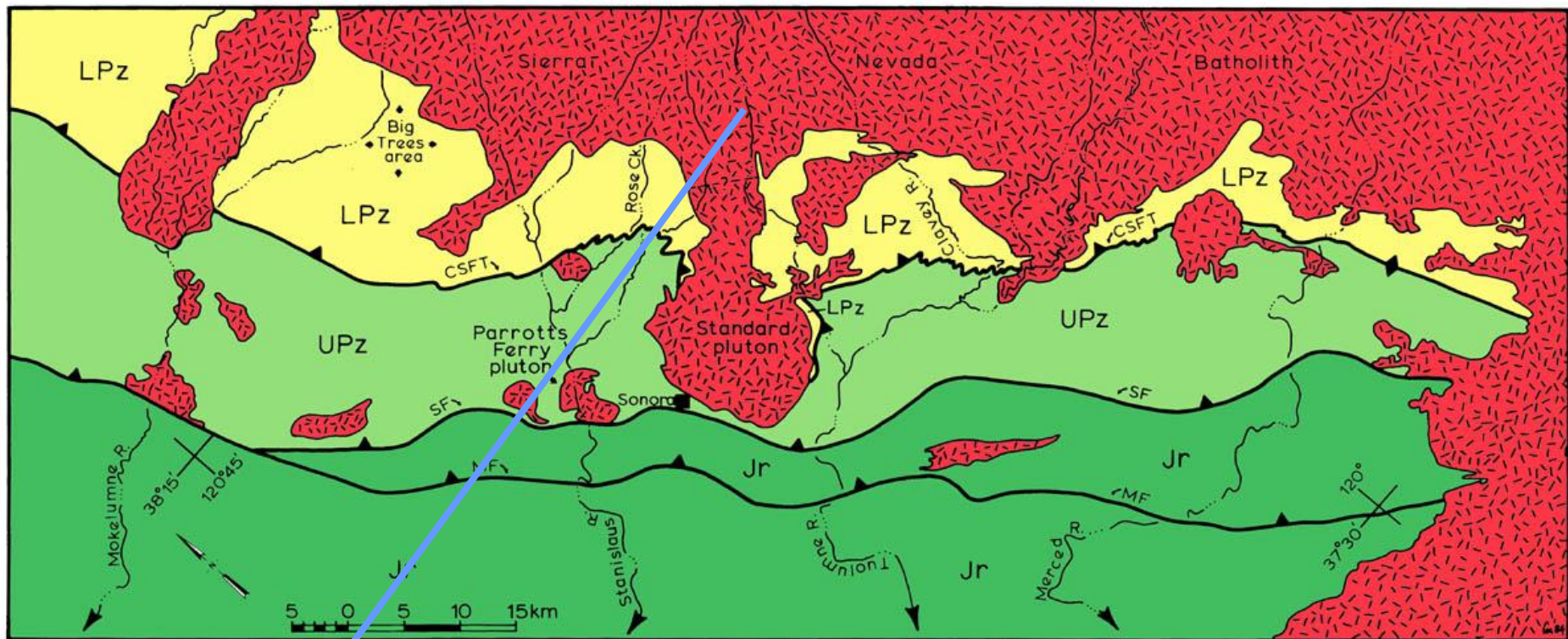
## Middle Jurassic



## Late Triassic - Early Jurassic







Mesozoic plutonic and volcanic rocks



Upper Paleozoic Calaveras Complex



Juro-Triassic eugeosynclinal rocks



Lower Paleozoic Shoo Fly Complex



= Calaveras-Shoo Fly thrust

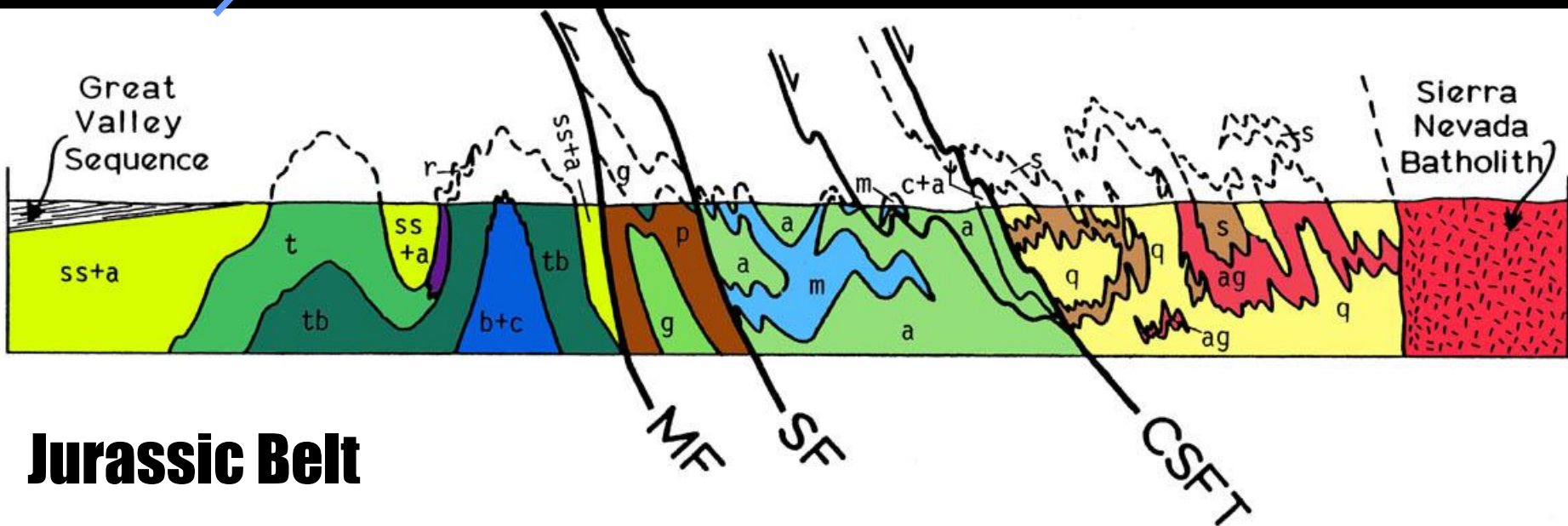
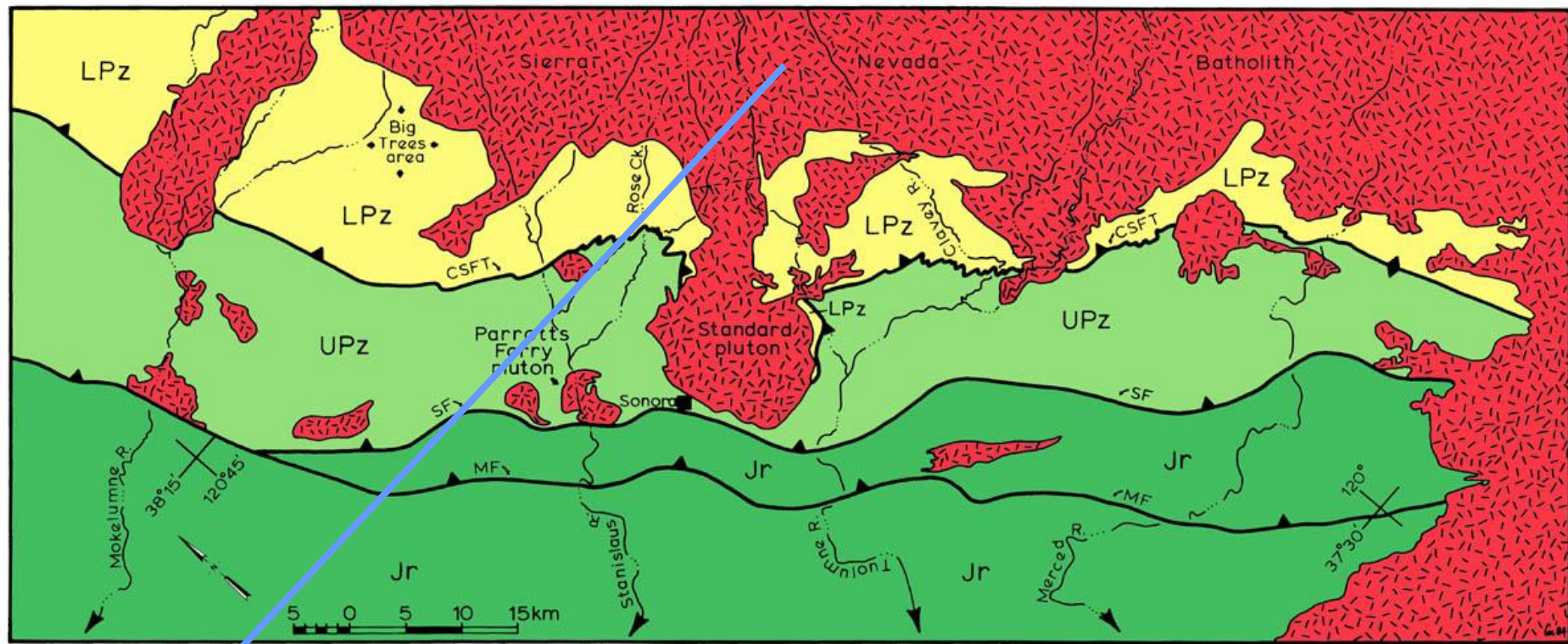


= Sonora fault



= Melones fault





**Jurassic Belt**



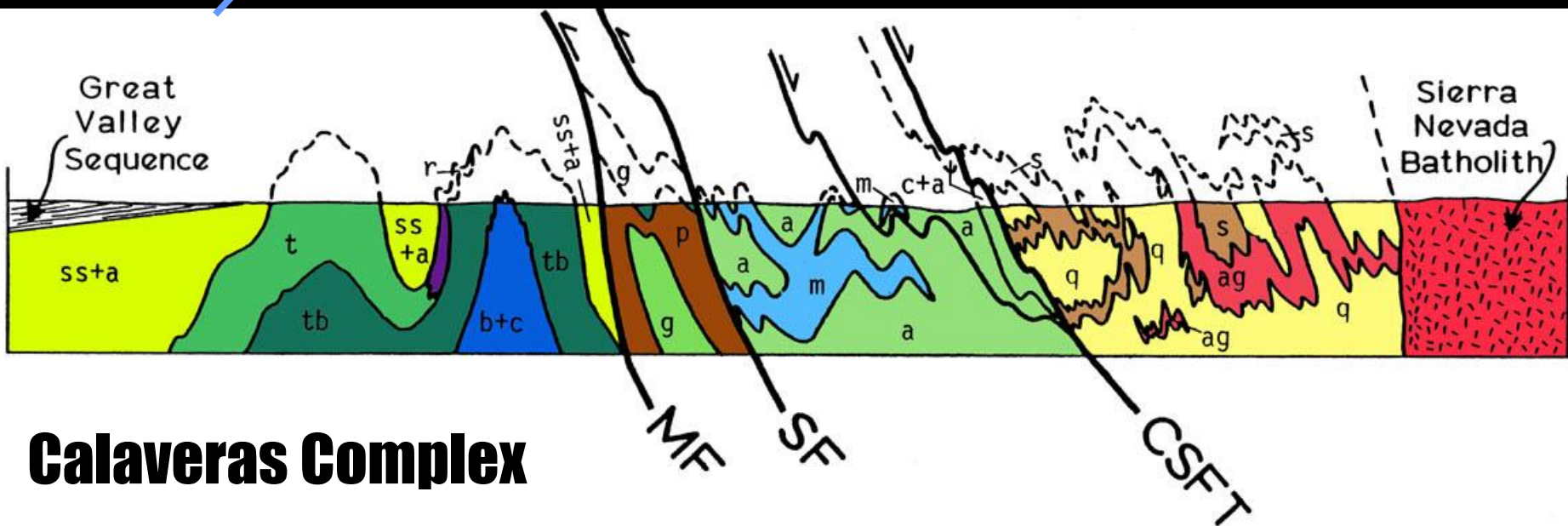
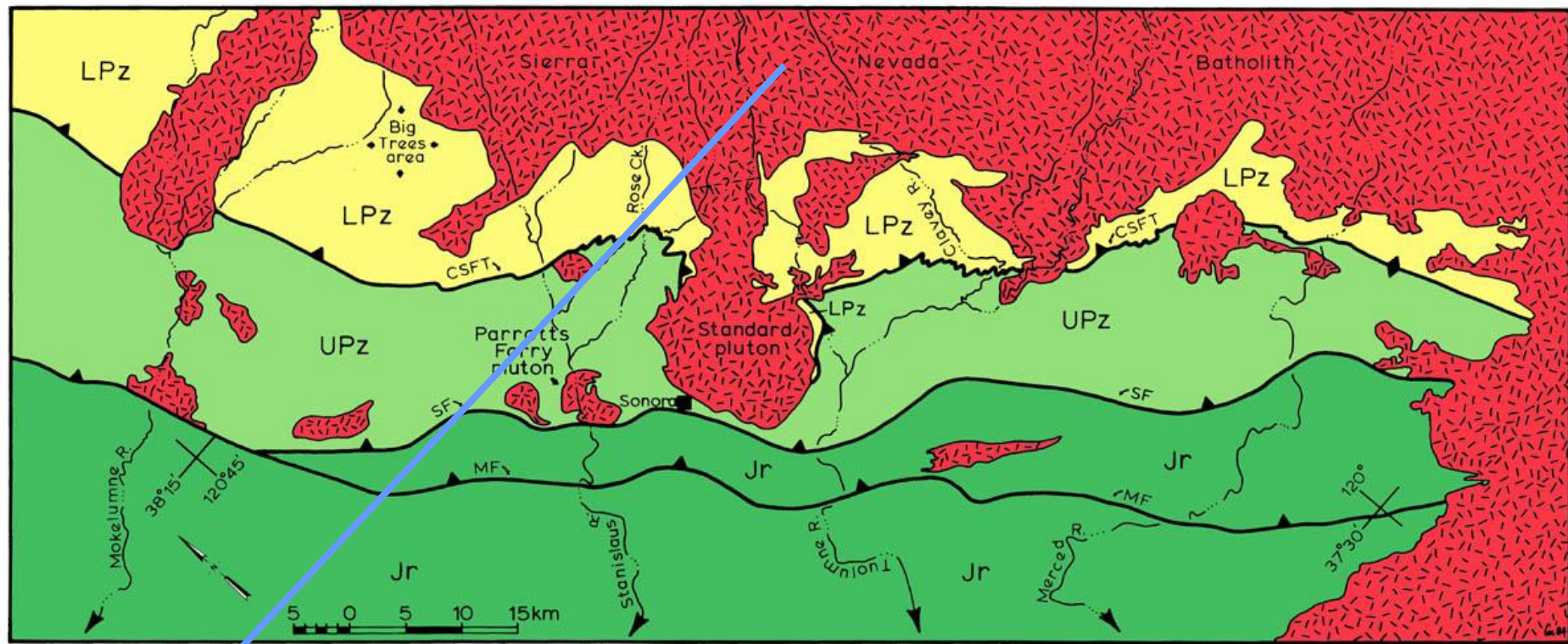






**Foothills Serpentinite**





**Calaveras Complex**





**Calaveras Complex, Murphys, CA**





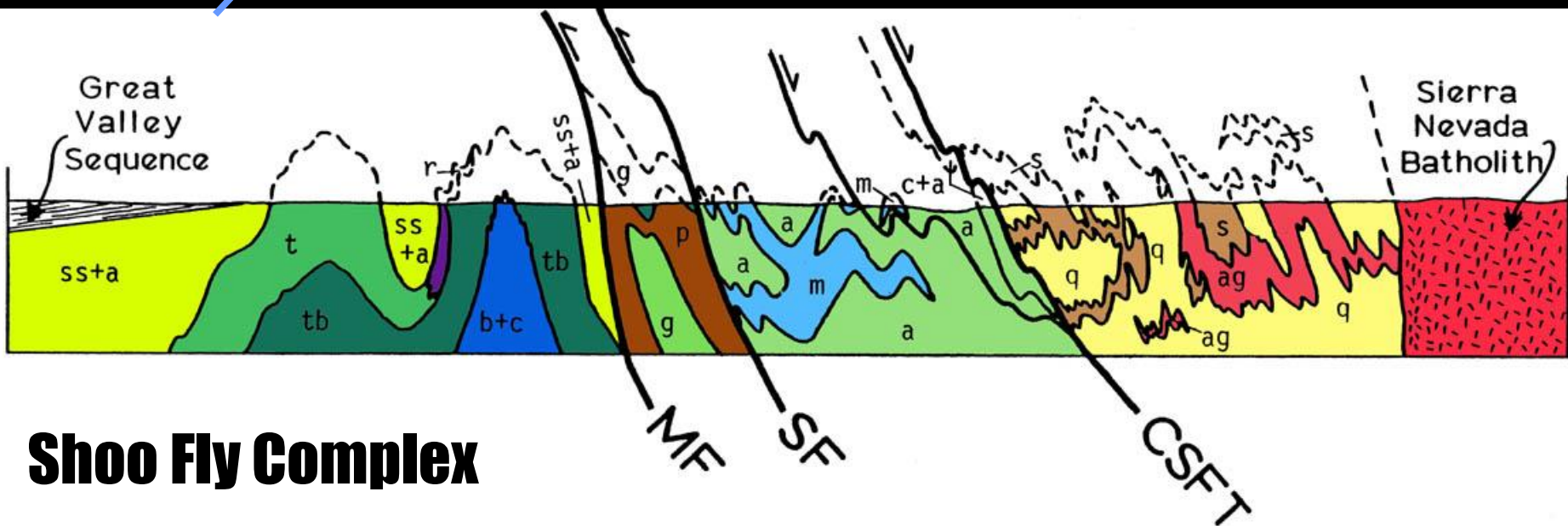
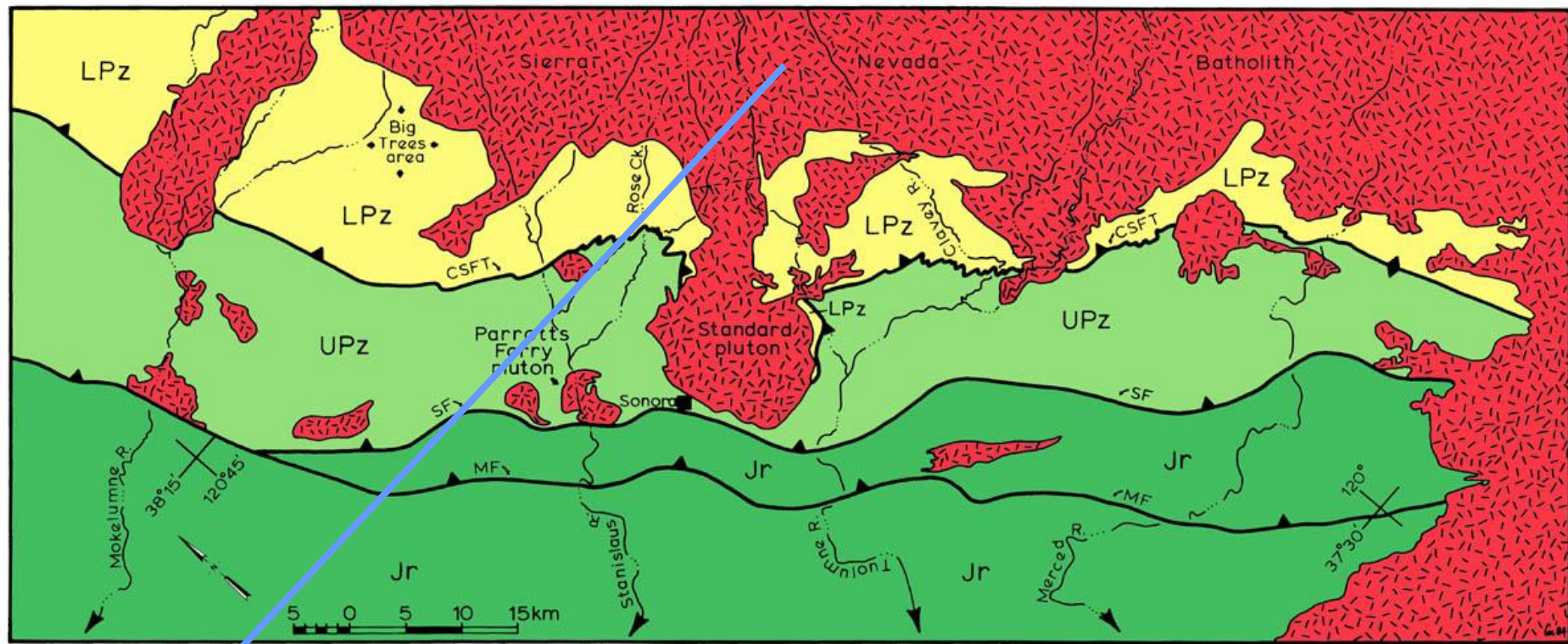
**Columbia Marble, Mid Fork Stanislaus Drainage, CA**





**Columbia Marble, Columbia, CA**





**Shoo Fly Complex**





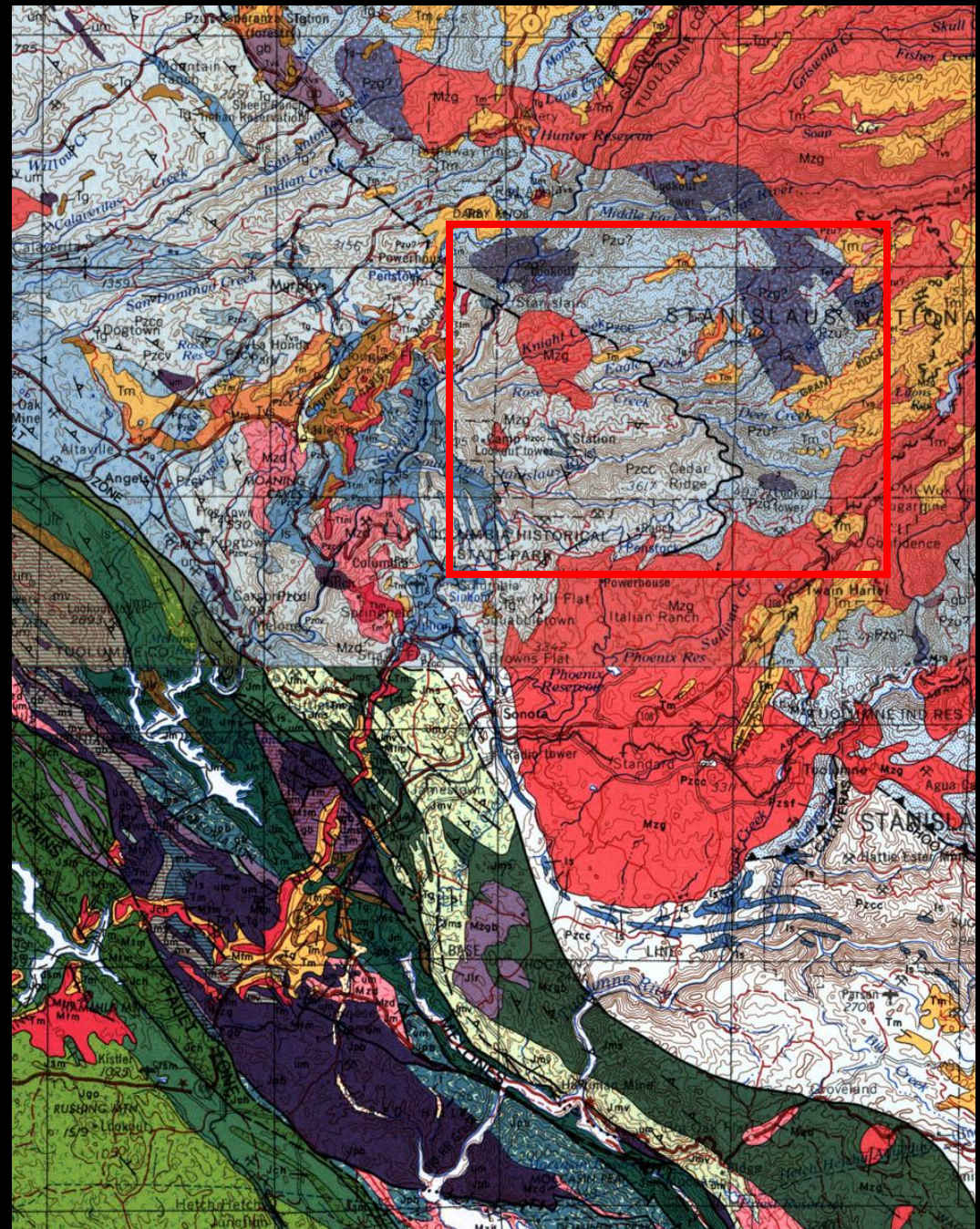
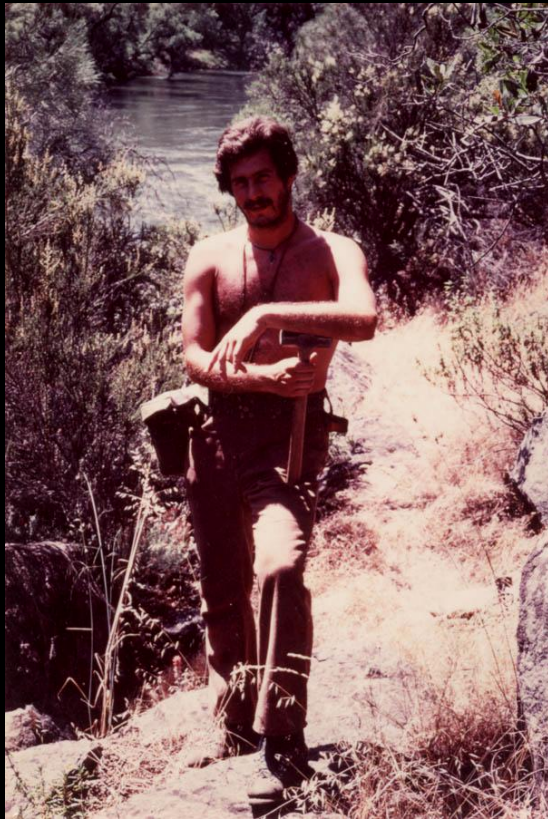
**Shoo Fly Complex, Merced River Drainage**



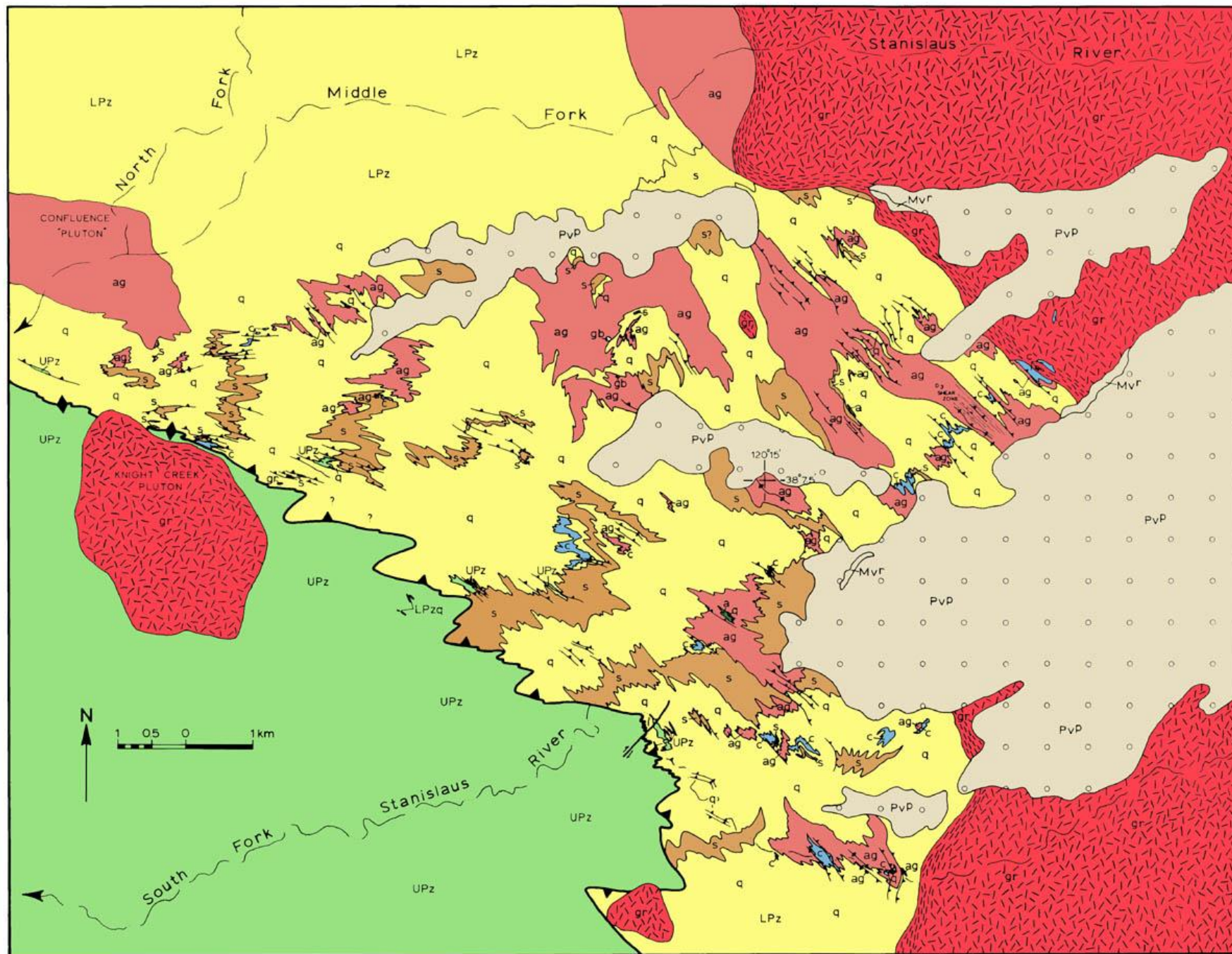
# Geologic Mapping

## Shoo Fly Complex

### 1978-1981









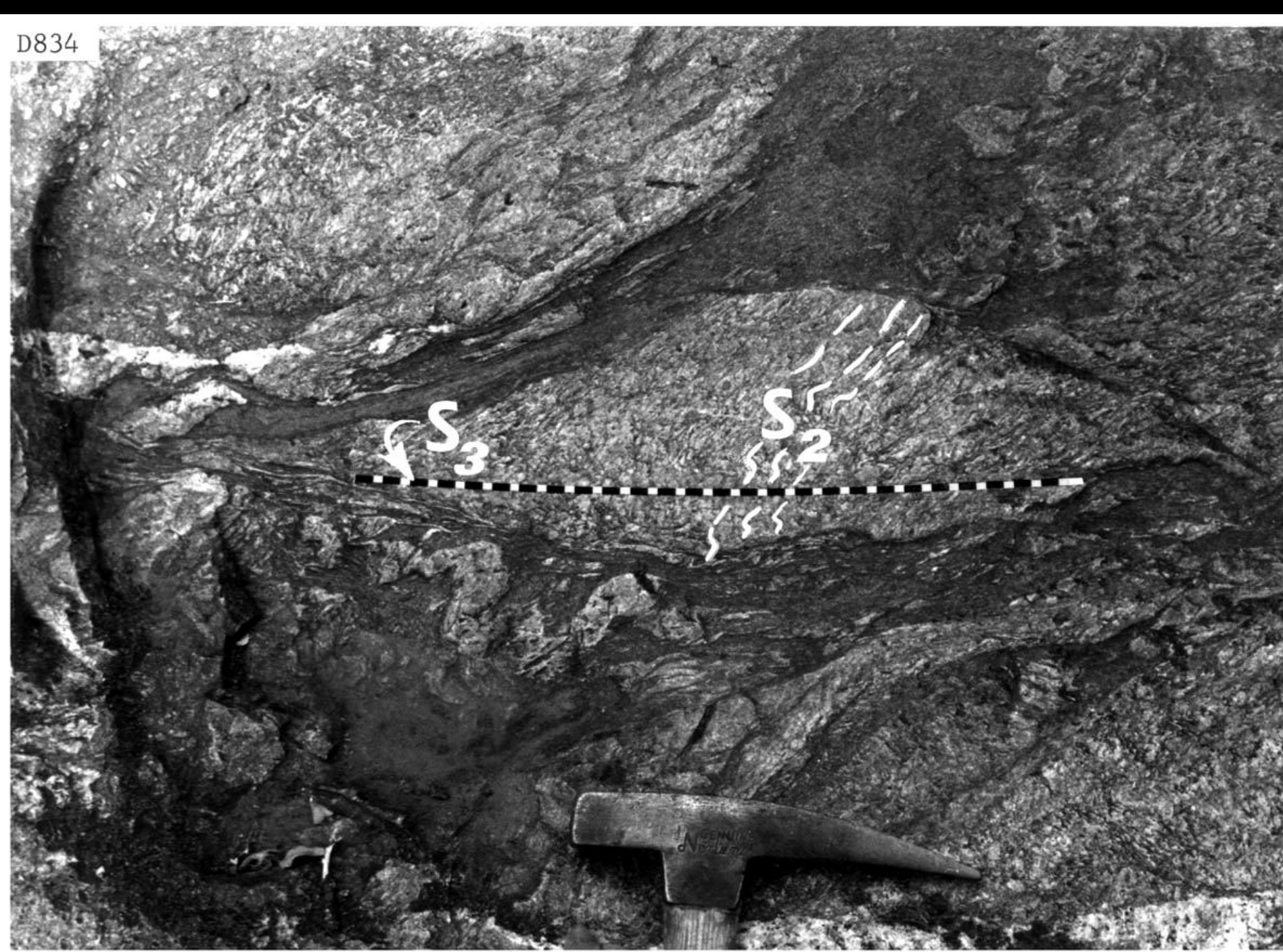
SF809.

$S_3$

LPzq



D834







**Shoo Fly Complex, Merced River Drainage**



# The High Sierra









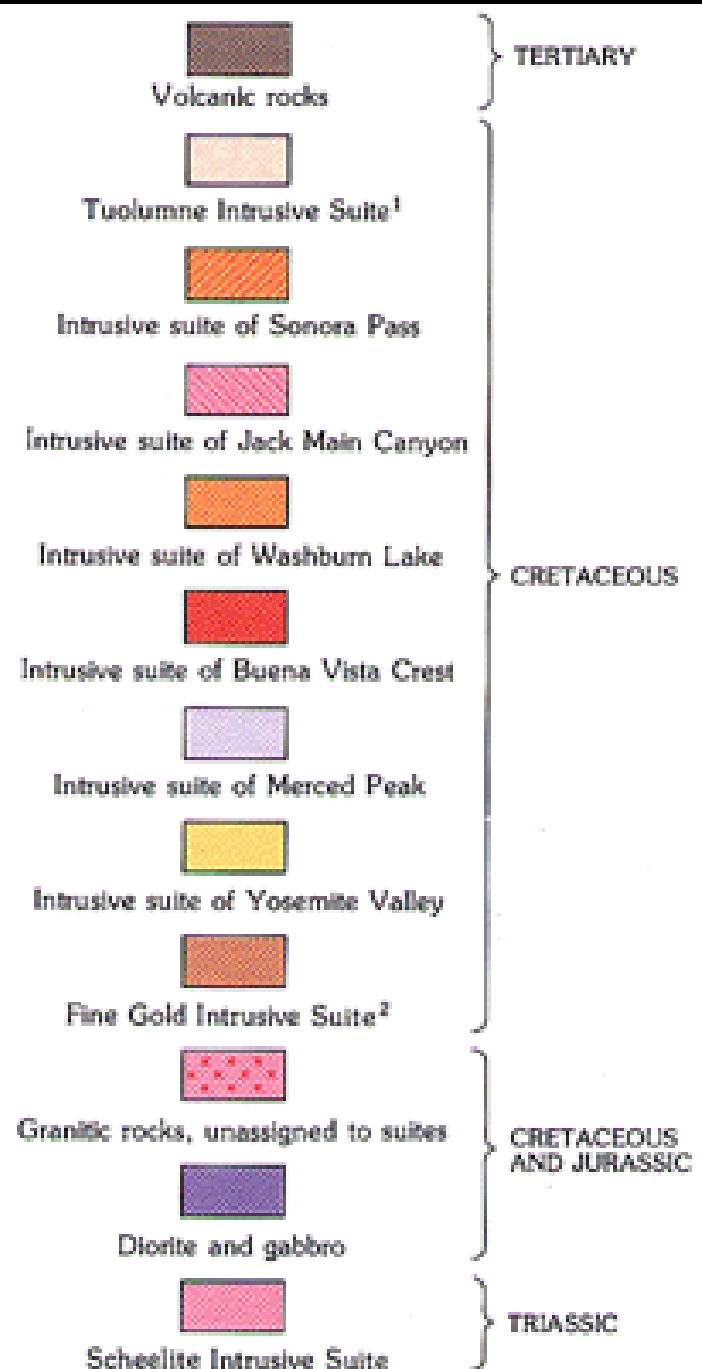
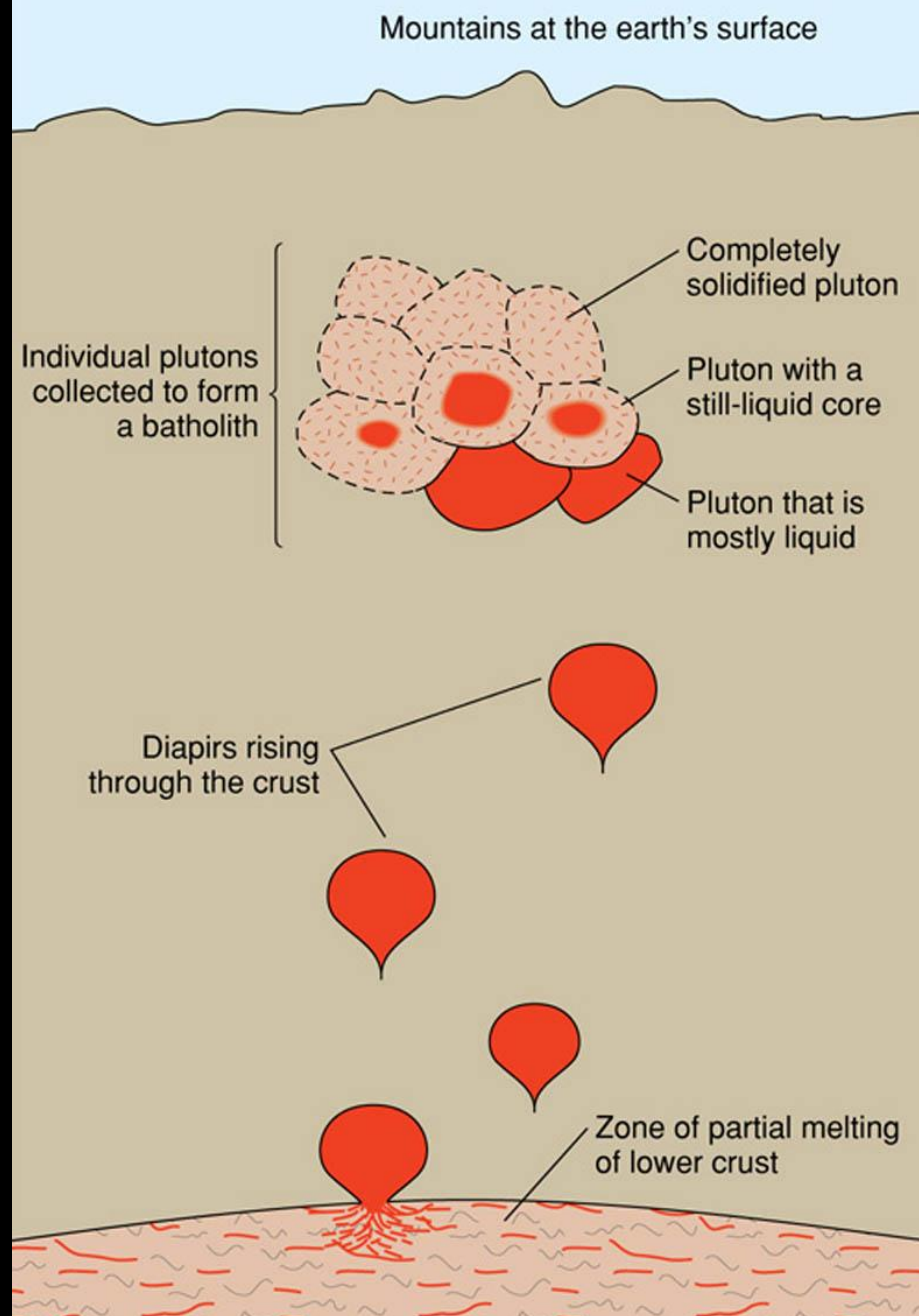
**Yosemite Falls**



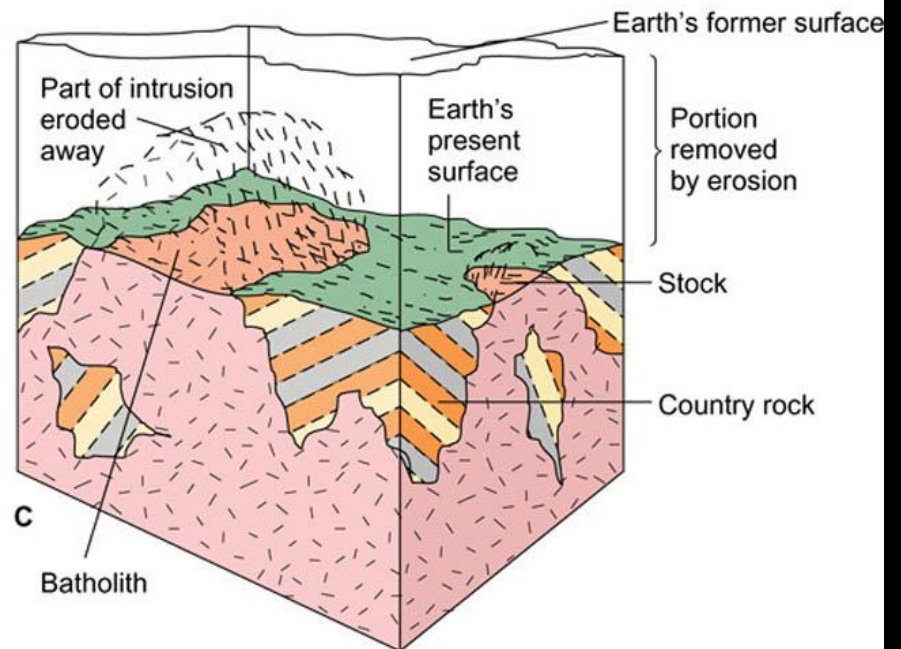
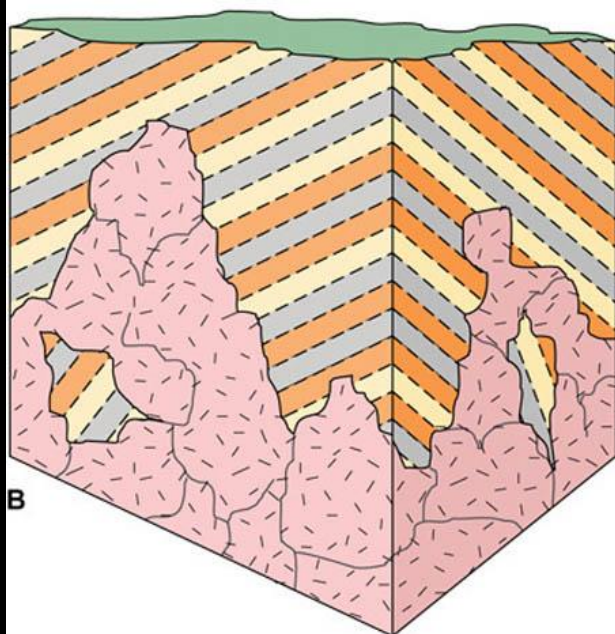
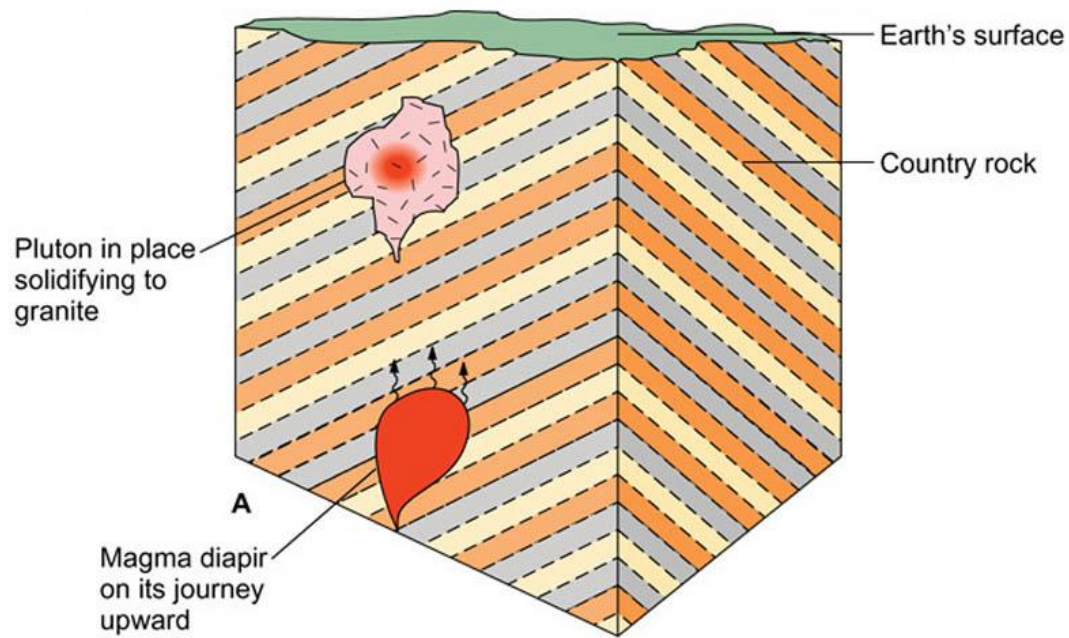
**Near View of the YO-SEMITE FALLS,  
2,500 FEET IN HEIGHT.**

*[From a Photograph by C. L. WEED.]*



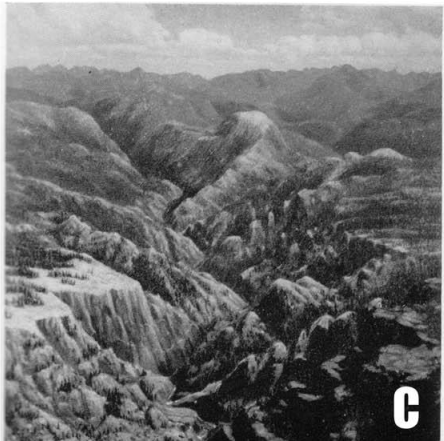
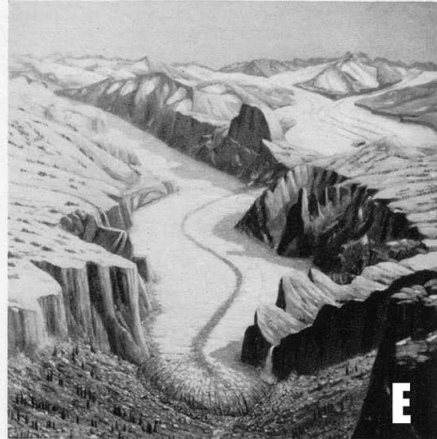
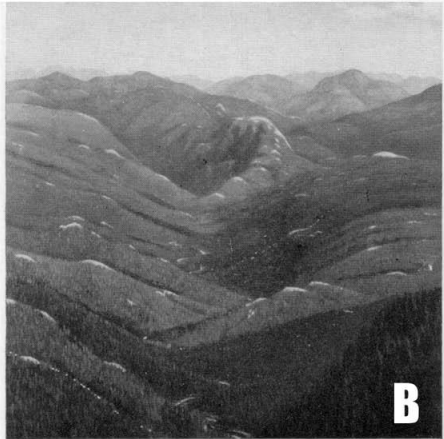
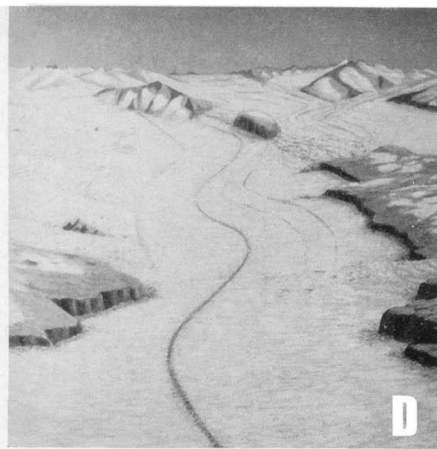
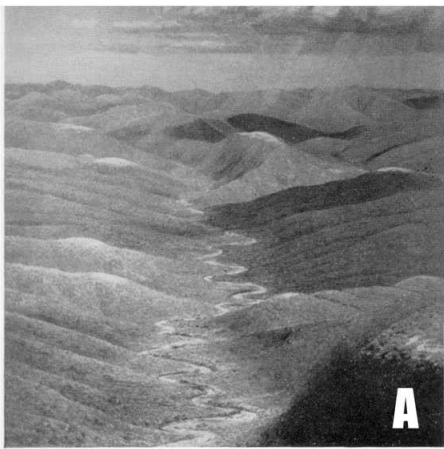








# The Development of Yosemite Valley



Matthes, 1956





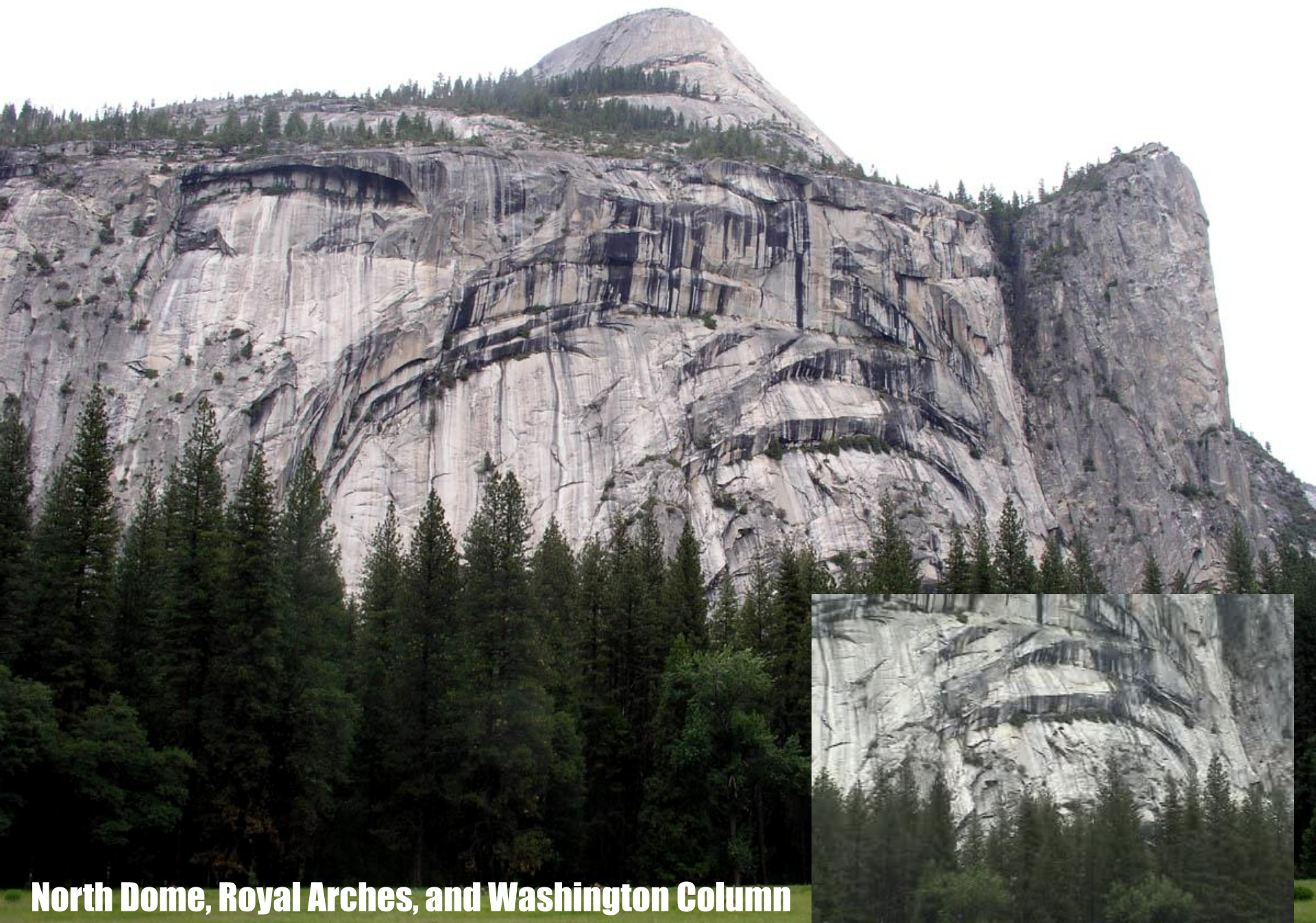
**Half Dome Yosemite**





**Yosemite Valley**





**North Dome, Royal Arches, and Washington Column**





**Royal Arches**





**Half Dome**





# **Gold Mining in California**

**Charles Merquerian**



# **SOME EARLY GOLD DATES**

**Early 1500's** – To the early Spaniards, California was linked to legends of fabulous golden riches yet efforts to exploit these potential riches were not explored. Indeed, the world would have been a different place had the Spanish exploited these rich deposits.

**1753** – Ponce de Leon lands in Florida with spanish contingent and is told of Indian tribes with much gold. Indians cry out “There goes the neighborhood”.



**1799** – A 28-pound gold nugget was found in Reed, North Carolina, starting the first American “gold rush”. Thomas Jefferson reports on a gold+quartz specimen found in the Rappahannock River. From 1793 to 1828, Appalachian gold mining produced from North Carolina totaled a meager \$110,000.

**1825** – Jedediah Smith discovers gold near Mono Lake, CA while leading a trapping party for the American Fur Company. He returned with a mining party the next year (1826) but the entire party was killed by Indians. The American Fur Company stopped all mineral exploration because of this calamity.



**1826** – Beginning of argonauts (adventurous trappers and frontiersmen) a thin trickle of inhabitants “discovered” California. These hardy folk included Jedediah Smith, Joseph Walker, Sylvester Pattie, Benjamin Wilson, Peter Lassen, and Kit Carson. Their arrival disturbed the Mexican inhabitants who thought the Sierran peaks impervious to emigration. American sovereignty was established after the Bear Flag Revolt, establishment of the short-lived California Republic, and the Mexican War.

**1829** – Gold discovered in Virginia and by 1983 the Belzoro mine opened a few miles from Richmond. Mine operated for many years and after the Civil War was publicized as the site for most important mineral wealth within the country.



**1829** – Gold rushes in Georgia and Alabama results in establishment of United States Mints in Charlotte (NC), Dahlonega (GA), and in New Orleans (LA).

From **1804 to 1866** the Appalachian production amounted to \$20,000,000, far exceeding earlier production reported from North Carolina. Eastern miners were paramount in exporting techniques and equipment to California when gold was eventually discovered there.



**1839** – John Sutter, a Swiss immigrant, settled in northern California and from a land grant provided by the Russians, created a small empire. He later purchased all Russian holdings at Fort Ross including ships, cattle, and farm implements and even an arsenal captured by the Russians during Napoleon's 1813 retreat from Moscow. All of these materials were moved to Sutter's Fort near Sacramento, CA.





**1842** – Gold placer deposit found in San Francisquito Canyon near the San Fernando Jesuit Mission. This and earlier reports of gold to Jesuit fathers were largely ignored. This deposit was not rich enough to last beyond a few years but gold was sent to the Philadelphia Mint for coinage purposes.

The American government did not publicize the discovery as anticipation of a change of ownership of the region was planned. When the region became American, the discovery was announced to assist in populating the area.



**1844** – John Bidwell (an employee of John A. Marshall) lost his chance at fame when a Mexican worker informed him that gold was to be found in the Sierra Nevada. Mexicans came from Sonora in Old Mexico, a region with a deep mining history. The worker asked for a “batea” in order to prove the richness of California gold but Bidwell thought he required an exotic implement of some kind. Thus, the worker’s request for a batea (wooden bowl) was overlooked and faded into insignificance when James W. Marshall “discovered” gold in Coloma, CA in **1848**.



**~19 January 1848** – Four or five pieces of gold found in tail race of John A. Sutter's sawmill in Coloma, CA on the south fork of the American River by James W. Marshall (who was building the sawmill for Sutter). A few days later, a few ounces of gold were delivered to John Sutter whereupon the discovery was acknowledged and announced **(1/24/48)**. Despite earlier indications of gold, this discovery initiates California gold rush and opens the west. The minor incursion of argonauts transformed into a flood of adventurers after this important discovery. The famous Oregon- and Humboldt trails became useful routes to the eastern foothills of the Sierra. Spring weather permitting, the use of Donner and Carson passes brought settlers across the high Sierra into the gold region.



**Sutters Mill, 1850s**





# Sutter's Mill Replica

Coloma, CA





# Argonauts



1850s



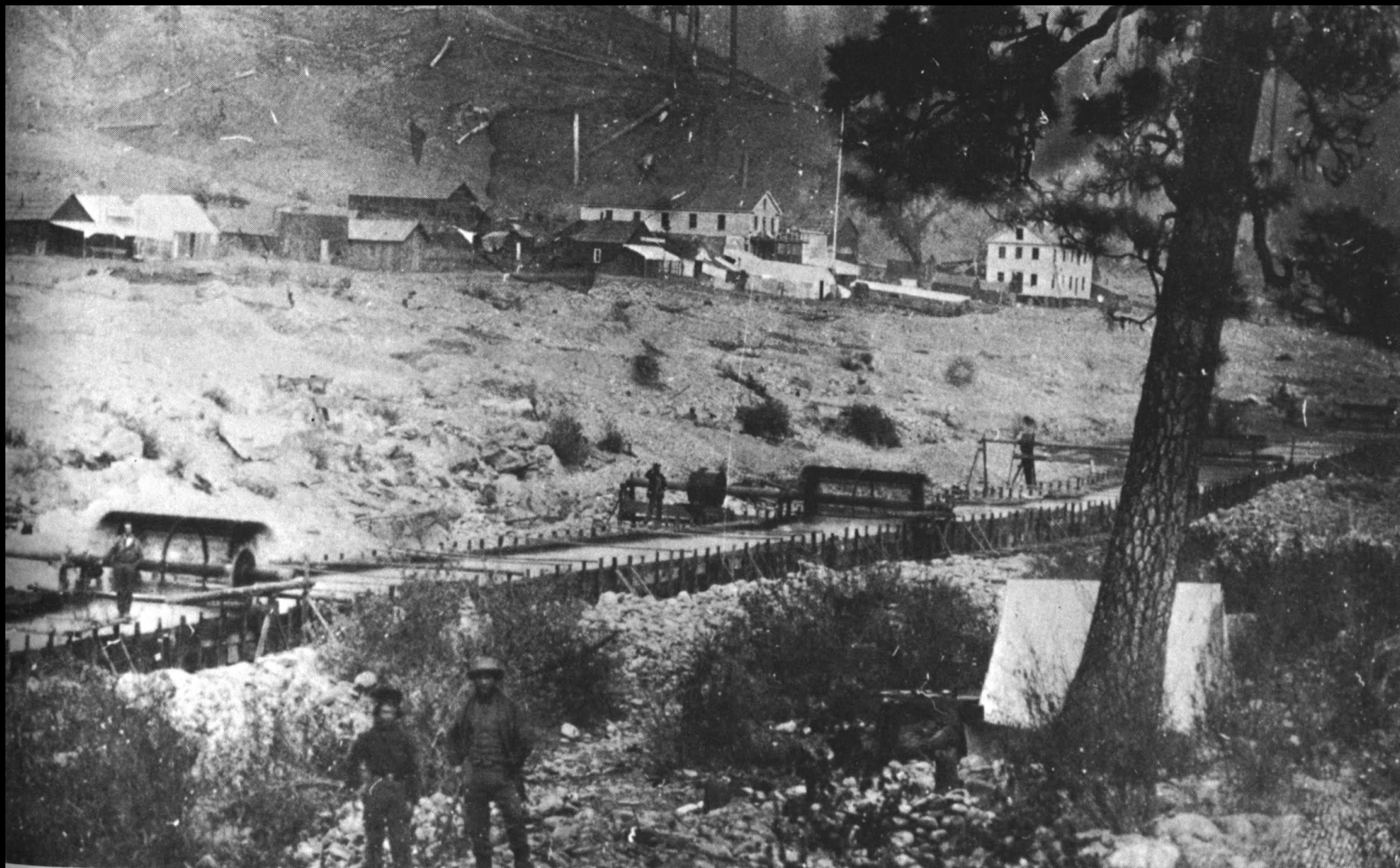
2004





**Central Mines, 1856**





**Grizzly Flat District, 1850's**



# Two Principle Mining Methods

## 1) Surface Mining

Panning

Cradle

Sluice

Placer

## 2) Hard Rock Mining

So, tell  
them  
about the  
Mining





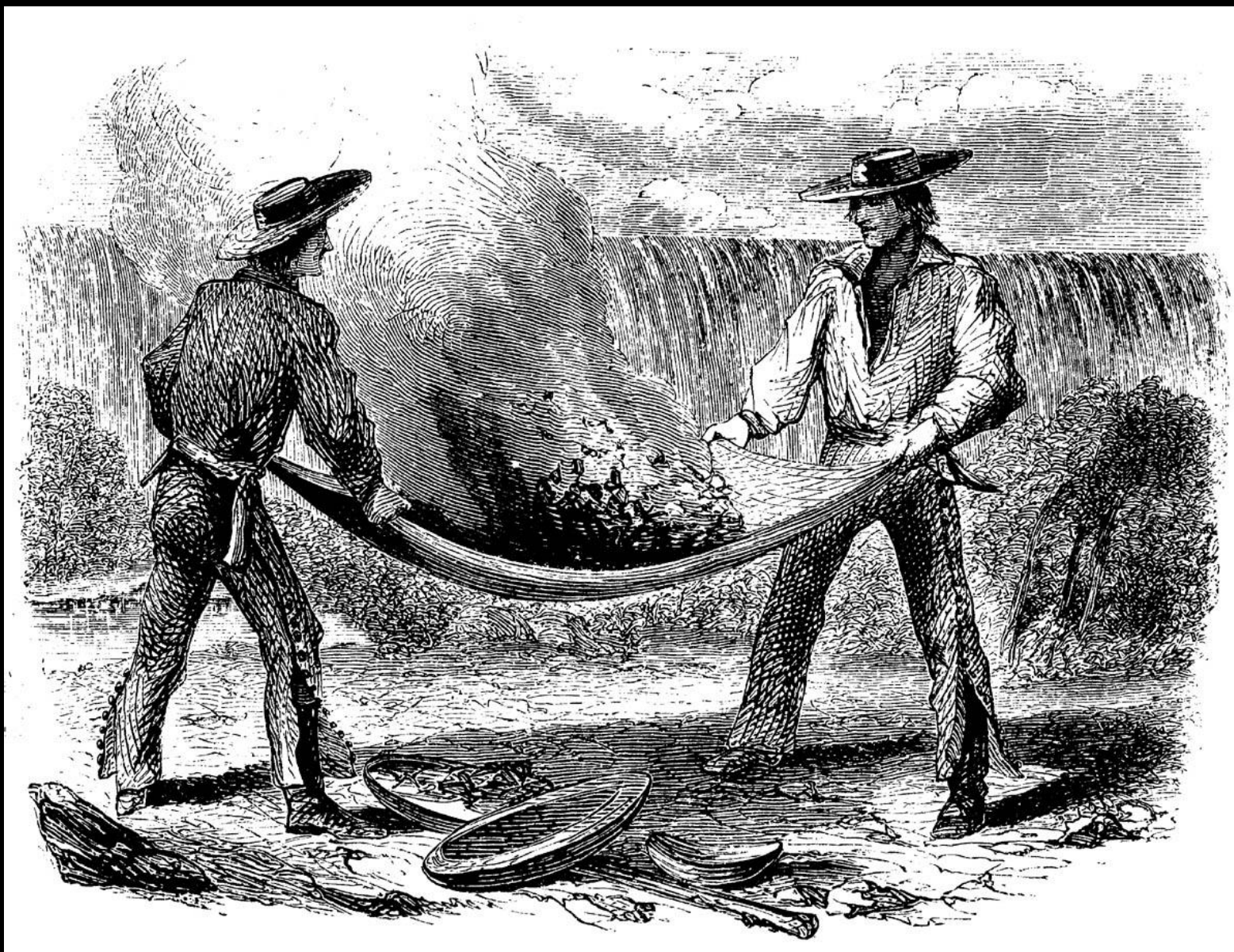
# Sonorans Washing Gold











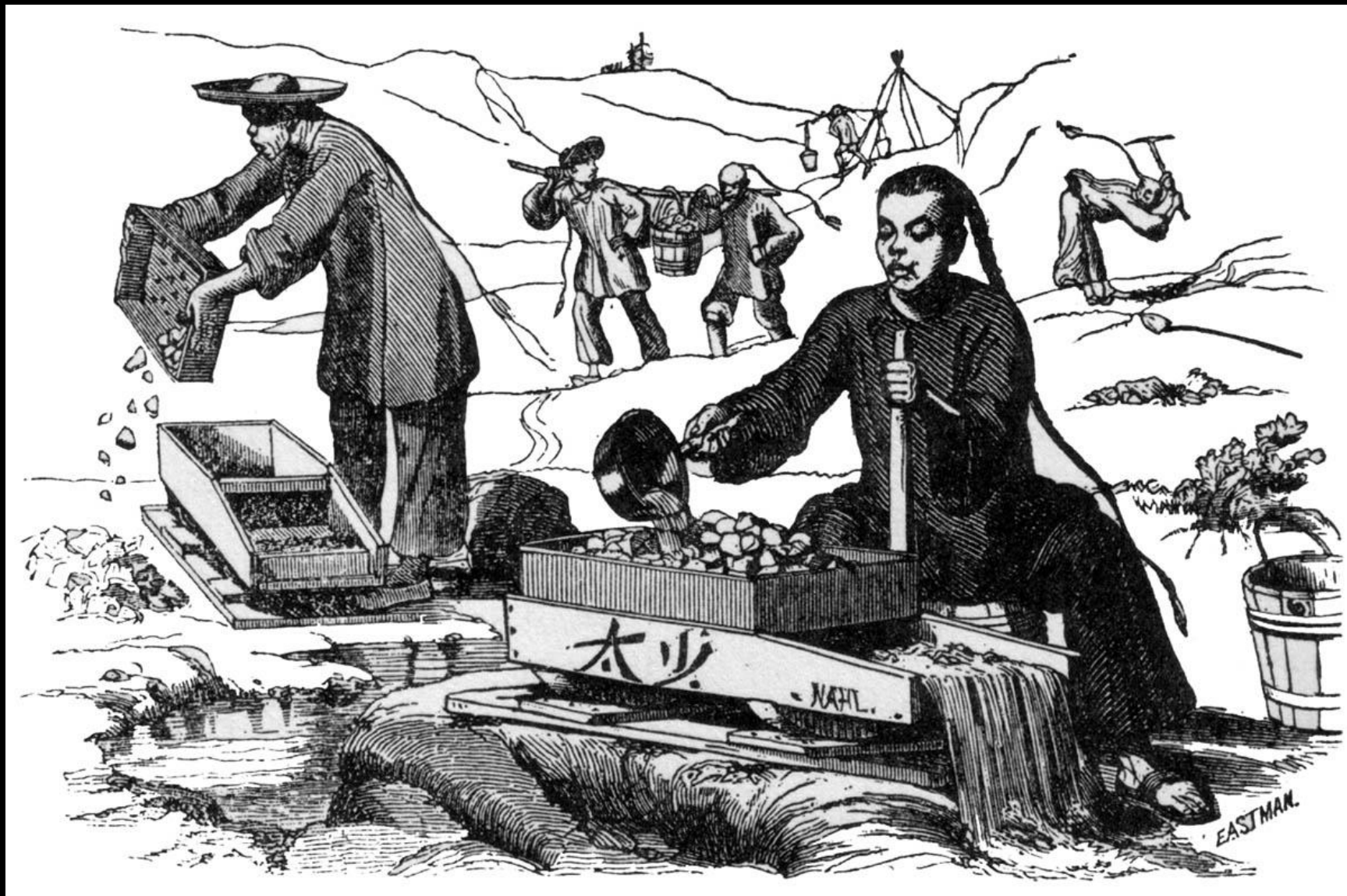
**Winnowing Gold Chinese Camp**





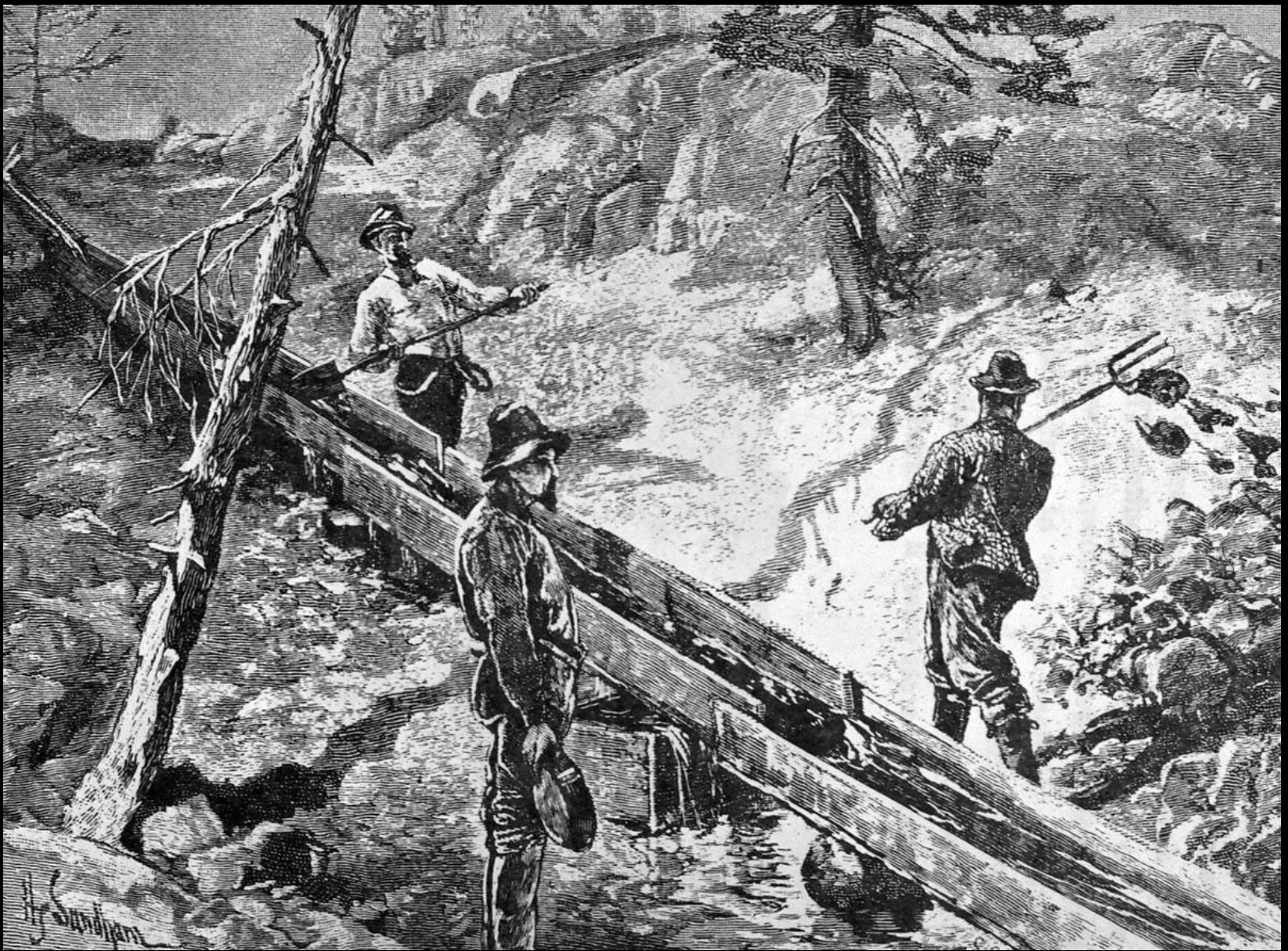
**Chinese in Mariposa Creek, 1867**





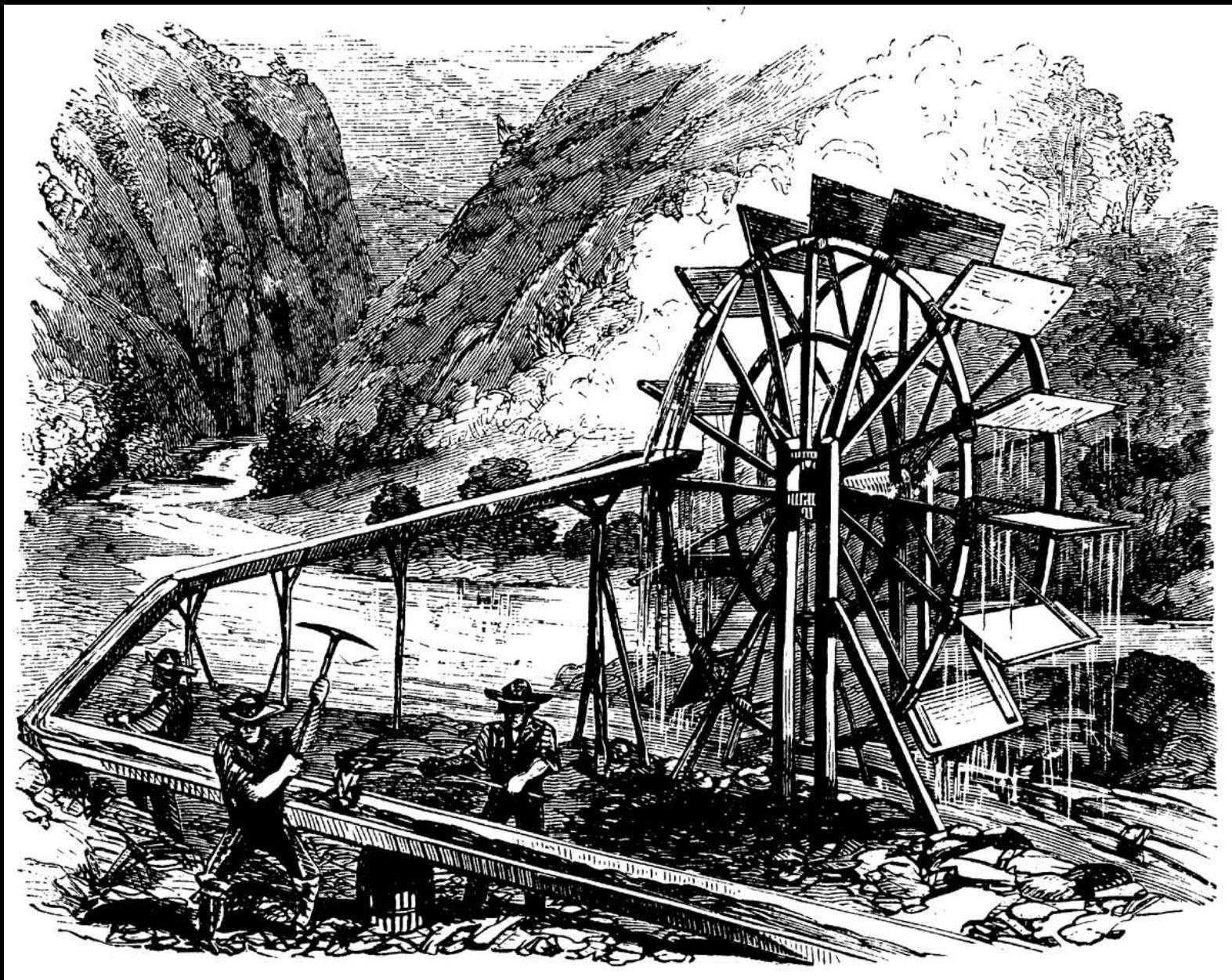
**The Cradle**





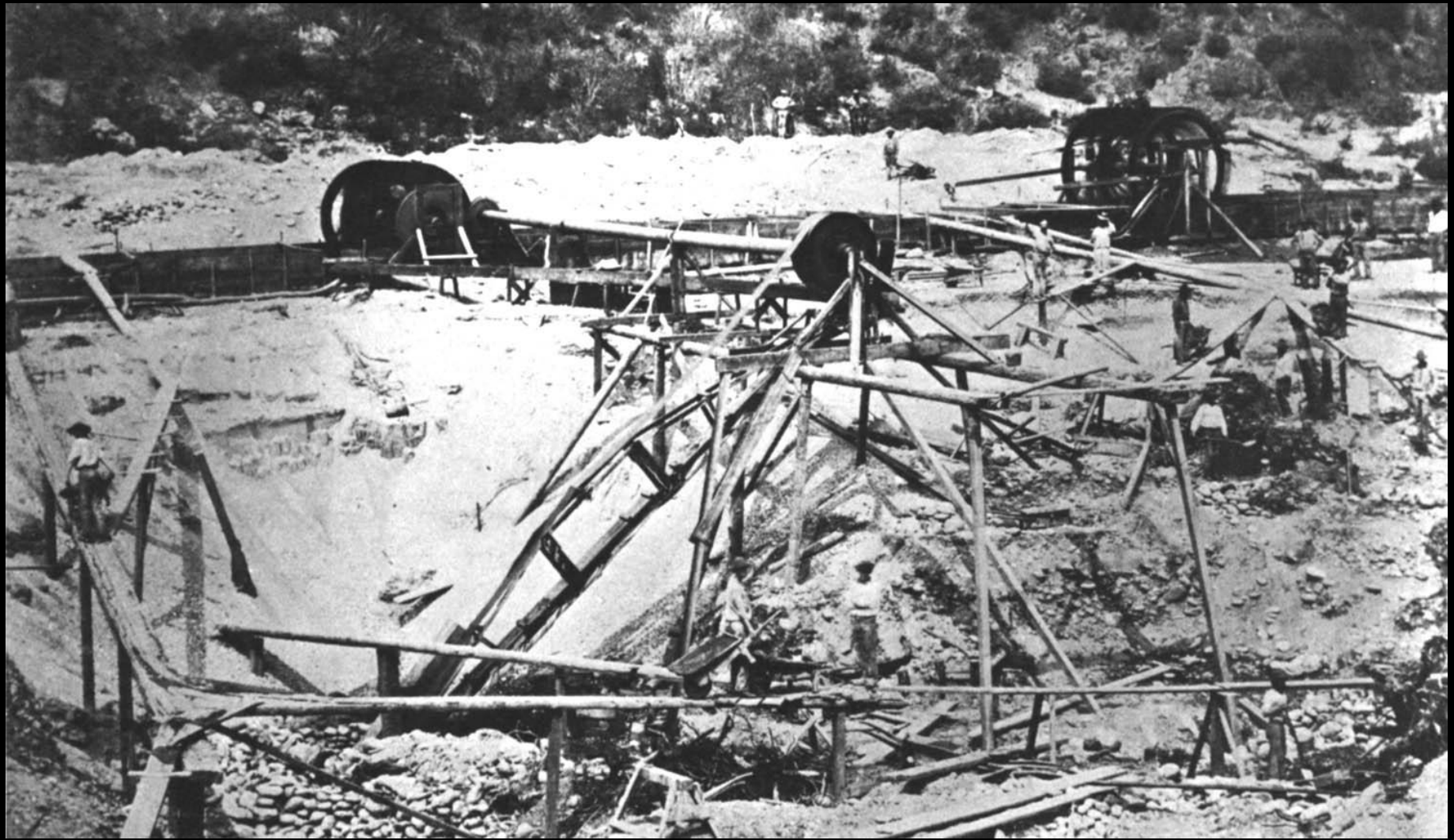
**The Sluice**





**Water Power**





**Water Power**





**Placerville, 1849**



# Placerville, CA (Hangtown)







**Placer Mining Columbia, CA**





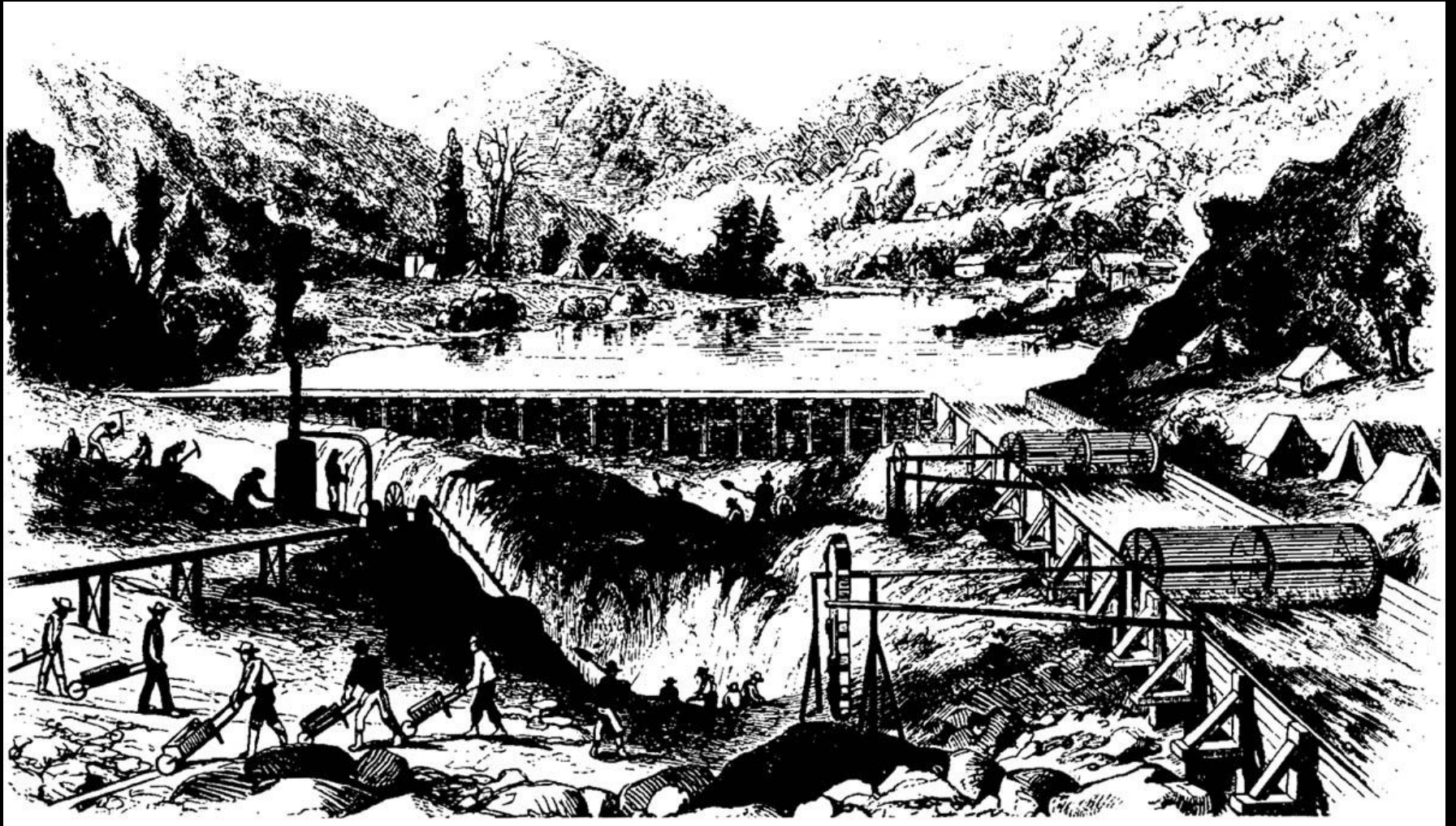
**Columbia, CA**





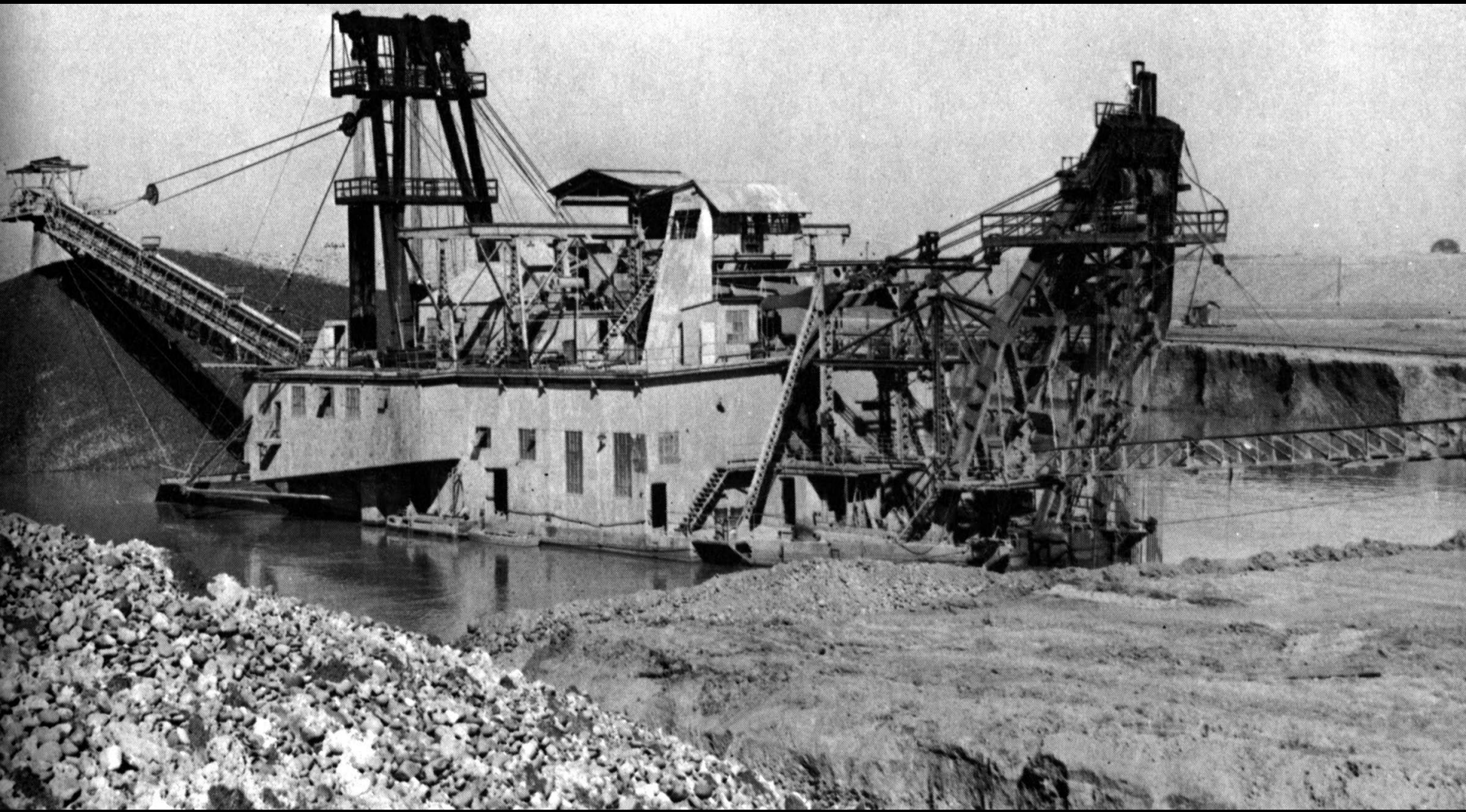
**River Bed Mining**





**Diversion of Streams, Murderer's Bar**





**Suction Dredge, 1953**





**Eagle Creek Mine**





**Running Tunnel**





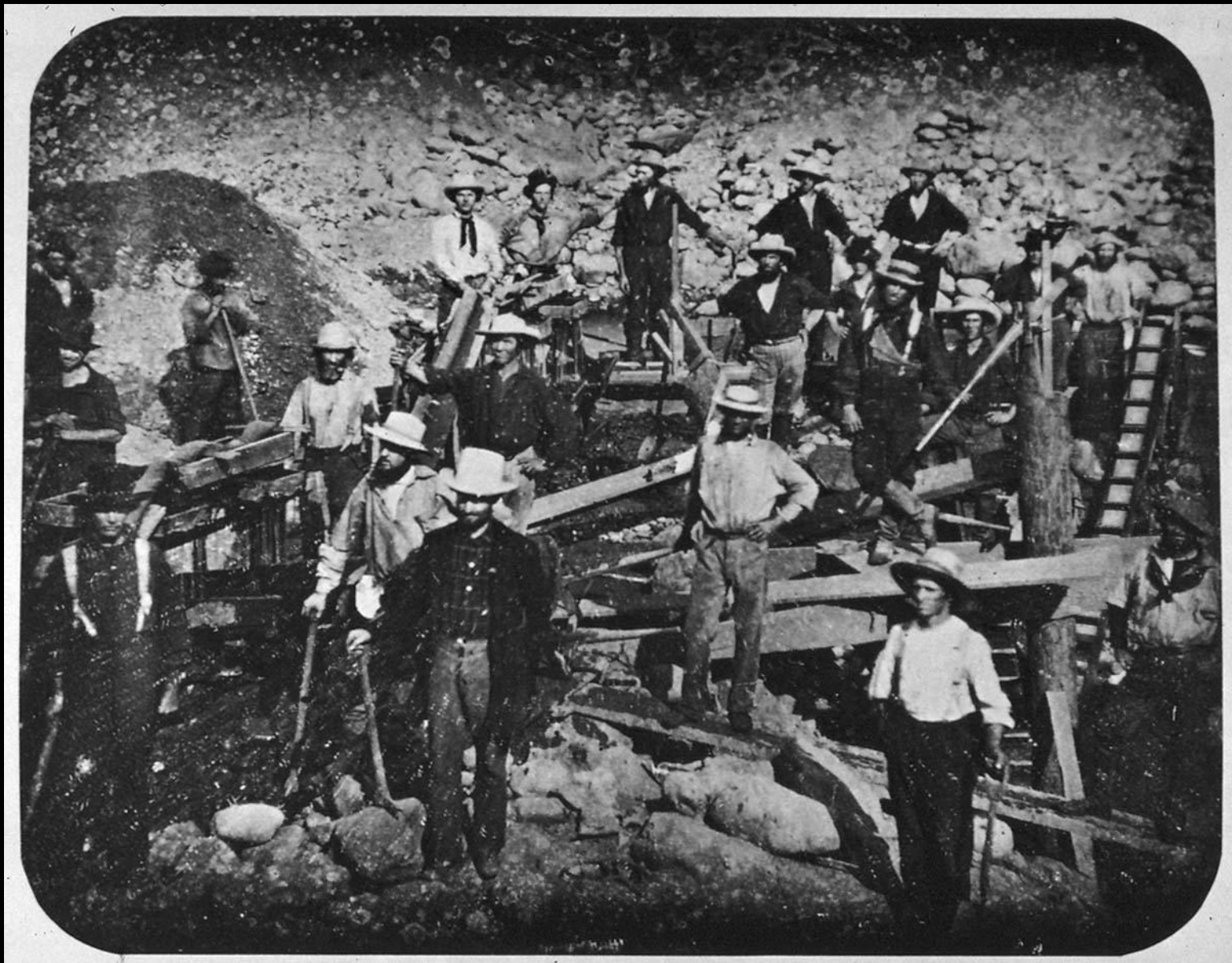
**Empire Mine, Grass Valley, 1900**



**Empire Mine  
Grass Valley  
1900**

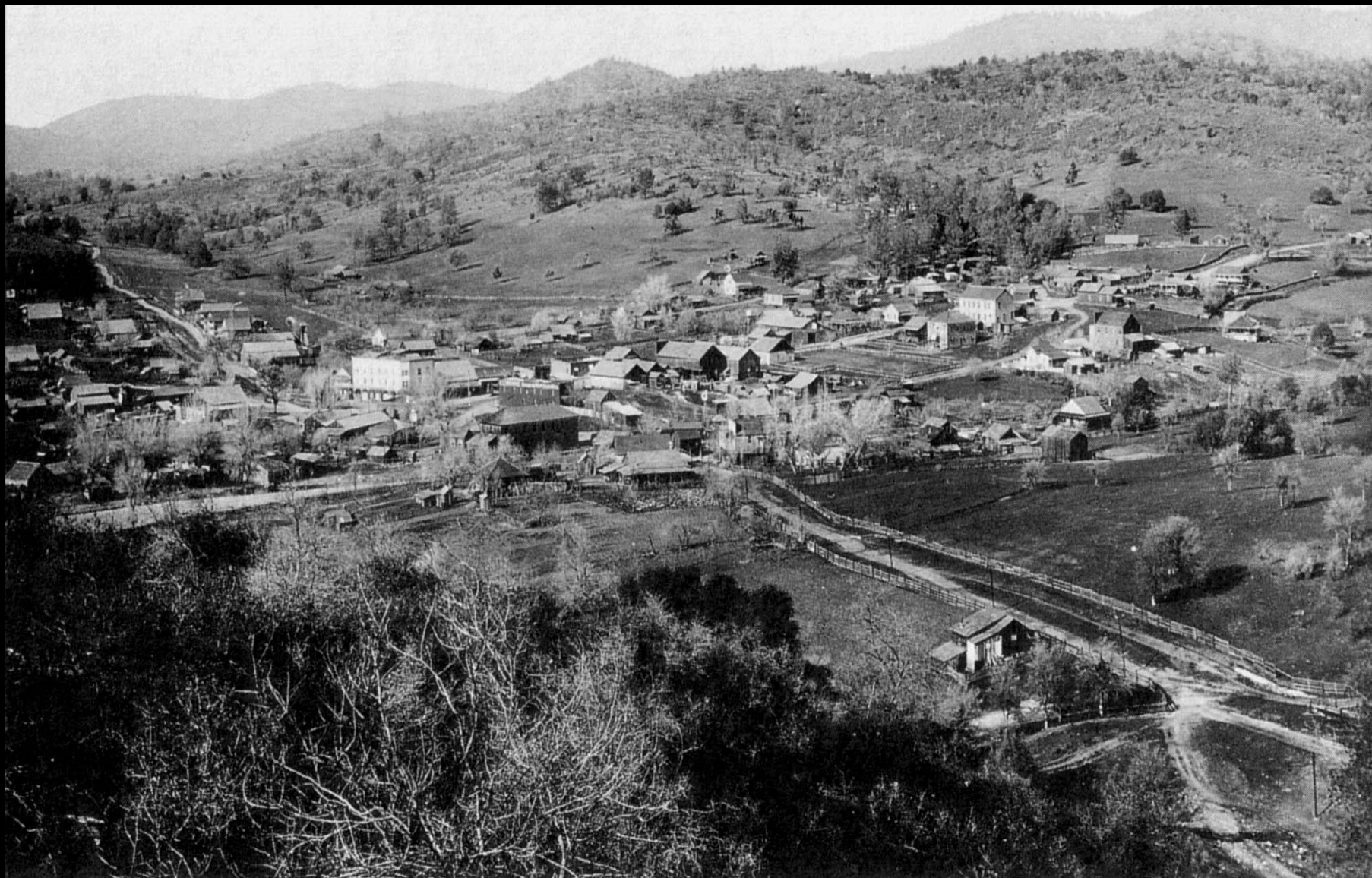






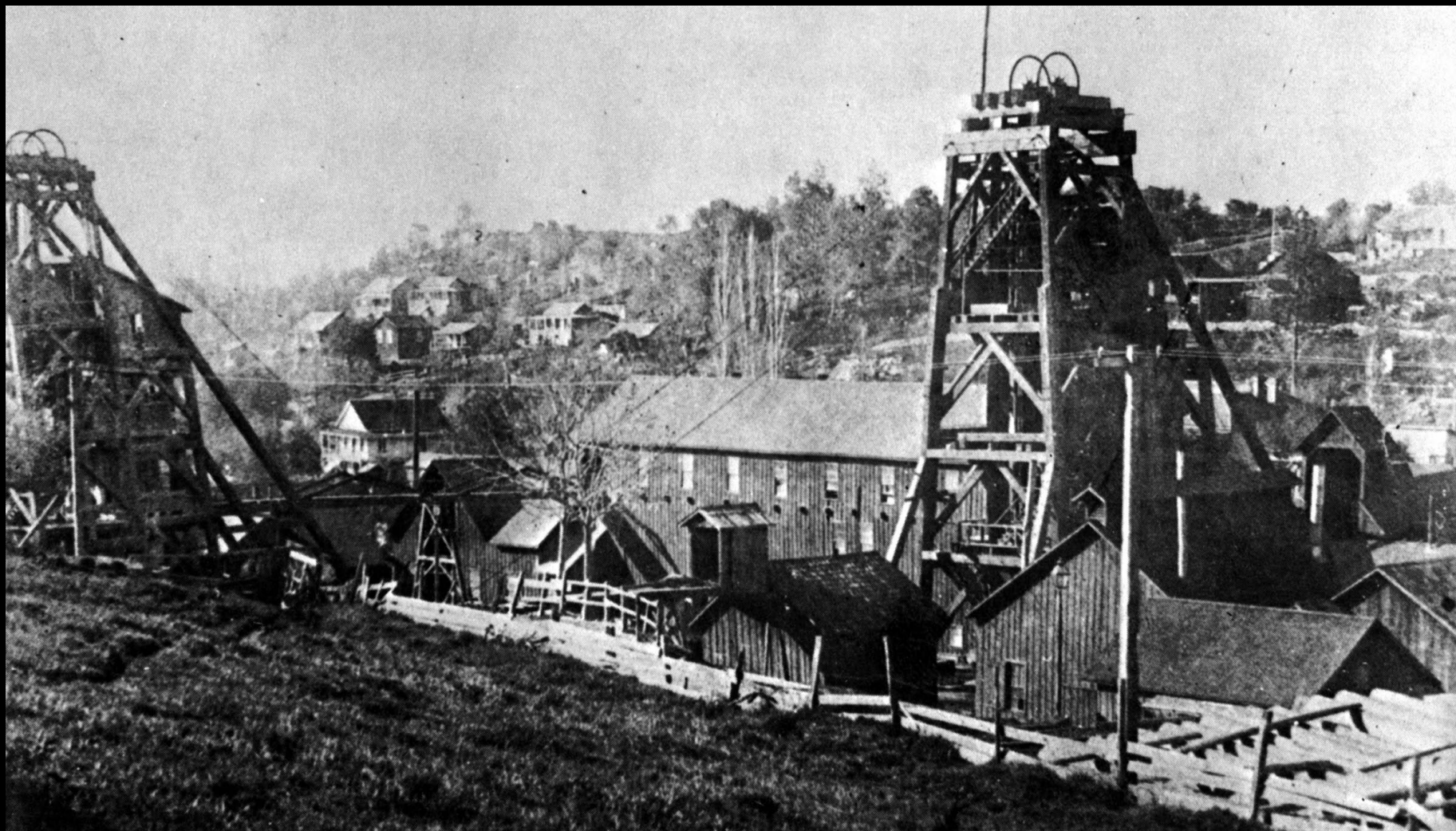
**Rich Diggings = Quick Friends**





**Coulterville, 1890s**





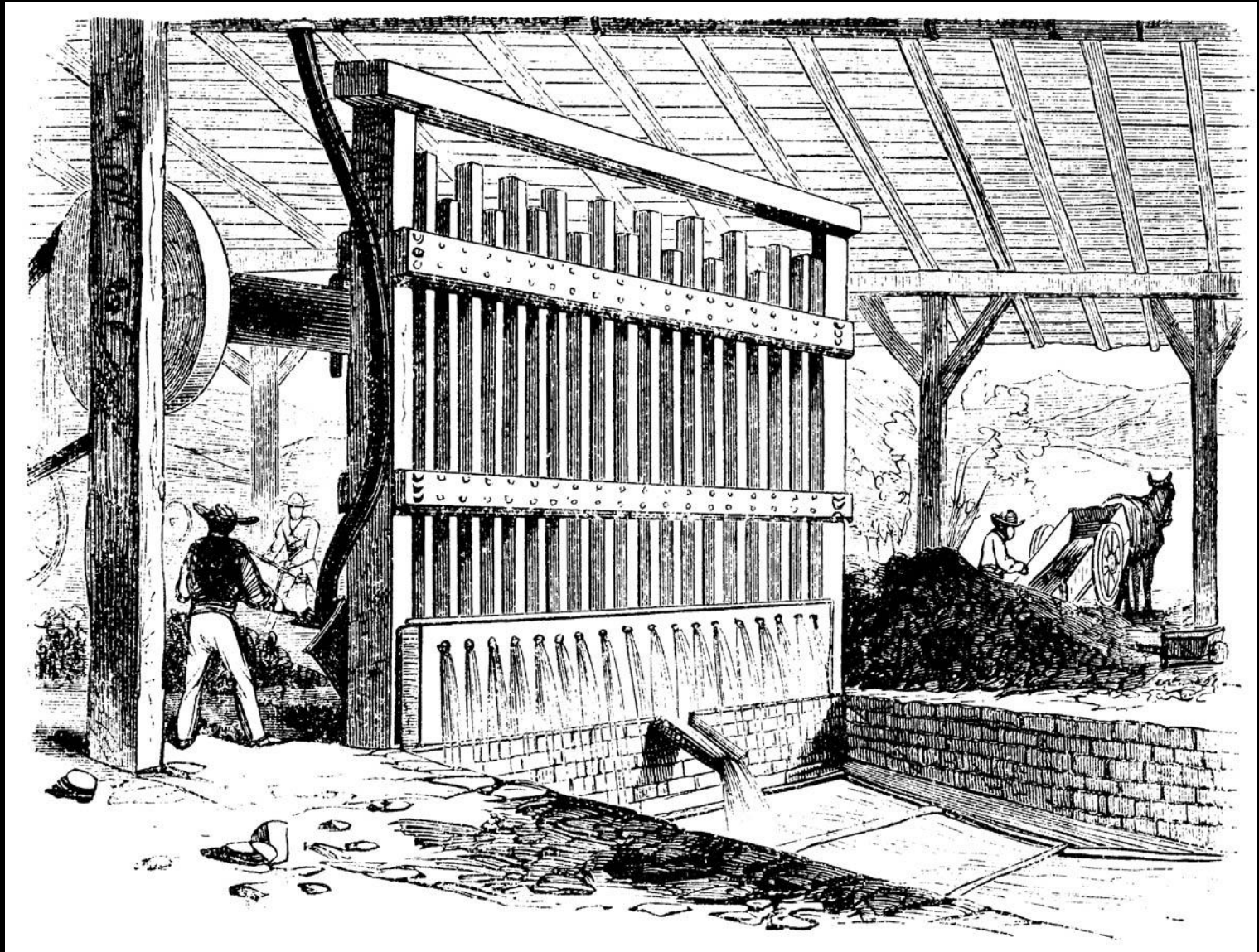
**Utica Mine, Angels District, 1900**





**Young America Mine, Sierra City District, 1885**





**Gold Ore Stamping Mill**





**Coloma, CA**



# Grinding Mill





# Hydraulic Mining



**La Grange Mine  
Weaverville District  
1914**





**Michigan Bar, 1860s**





**Princess Mine Shasta County, 1900**





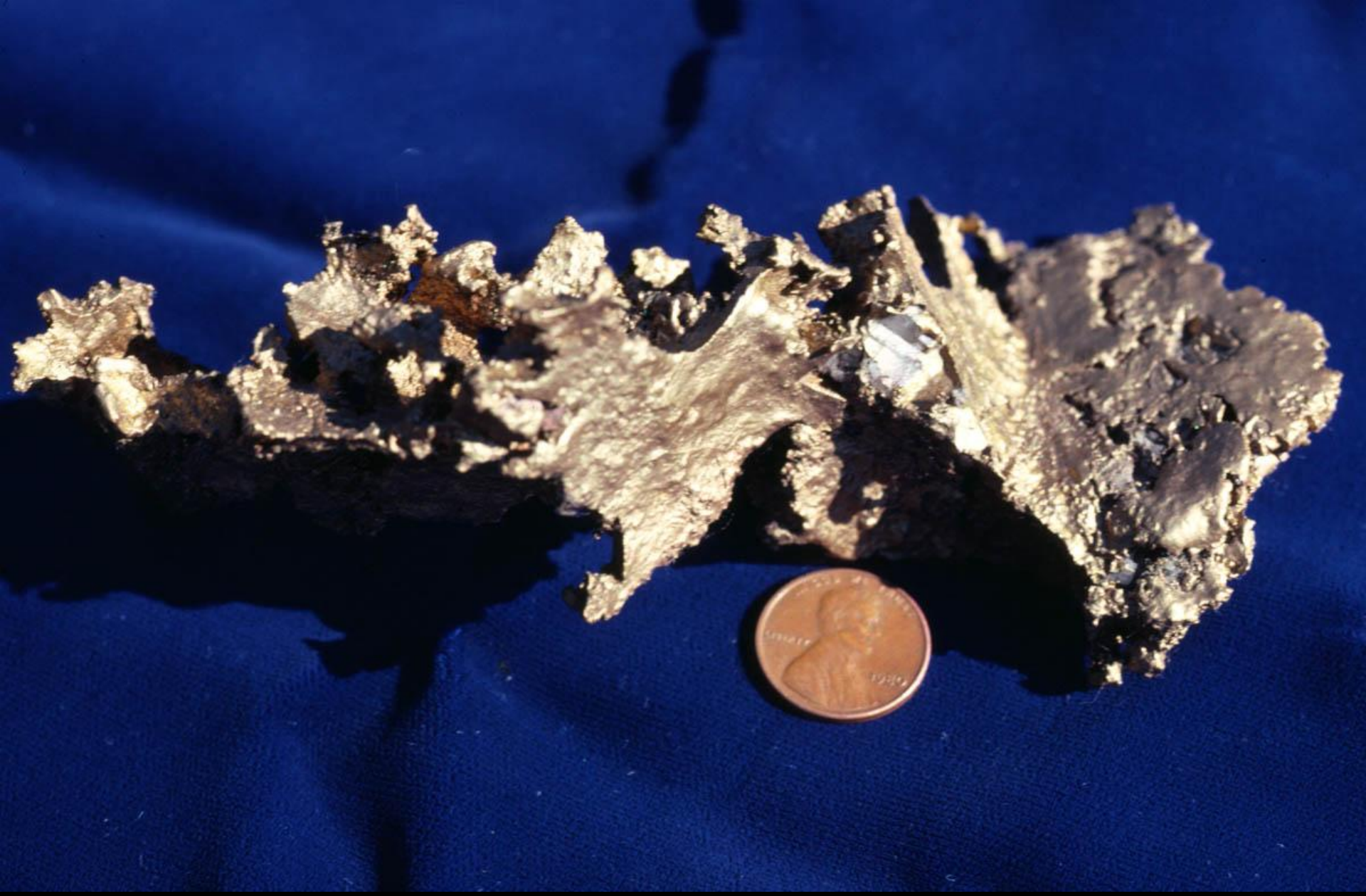
**Denning Mine**



# Mother Lode Gold







**Mid Fork Stanislaus**





**Middle Fork Stanislaus, 1979**





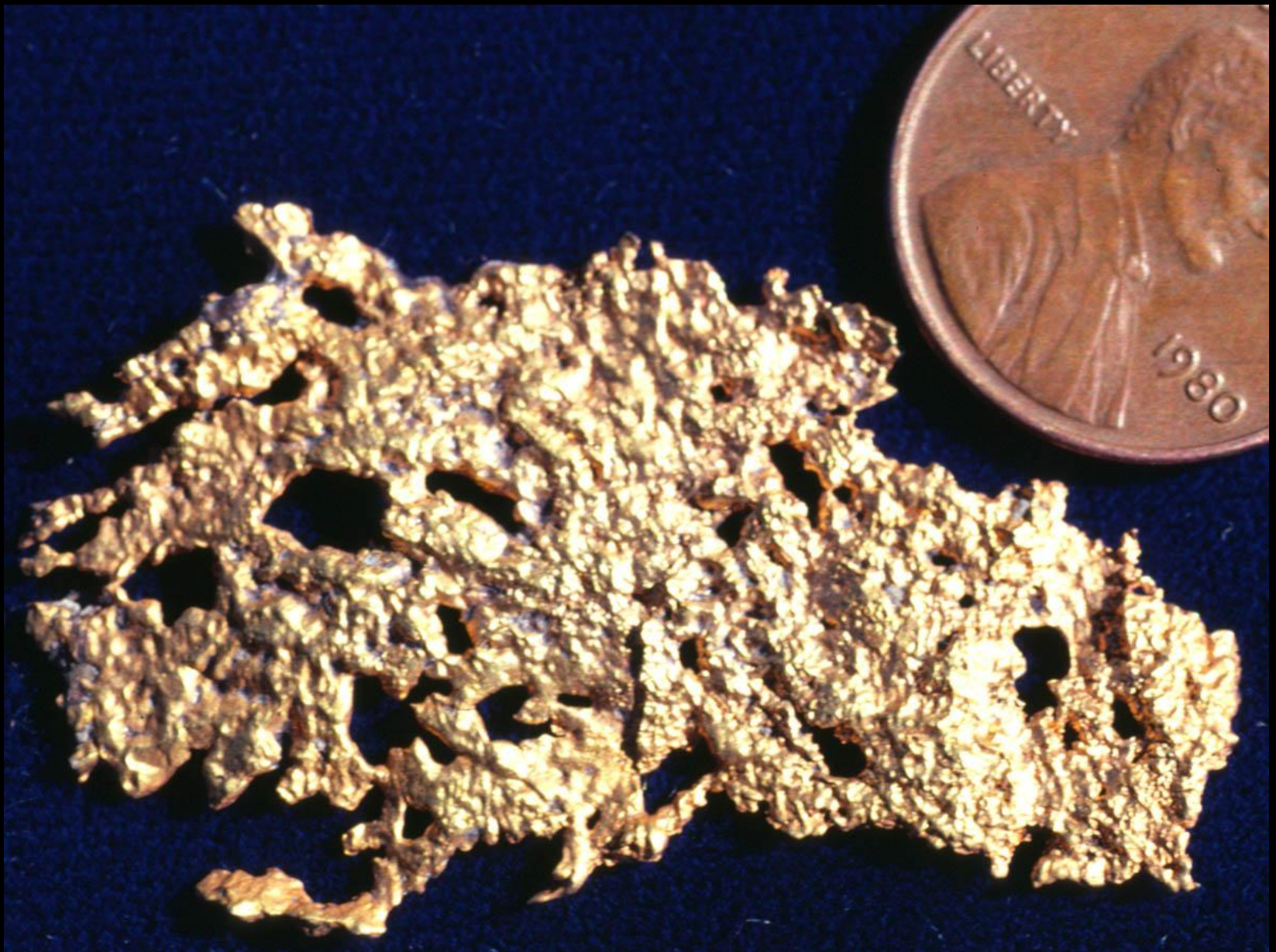
**Ruby Drift Mine, Allegheny District**





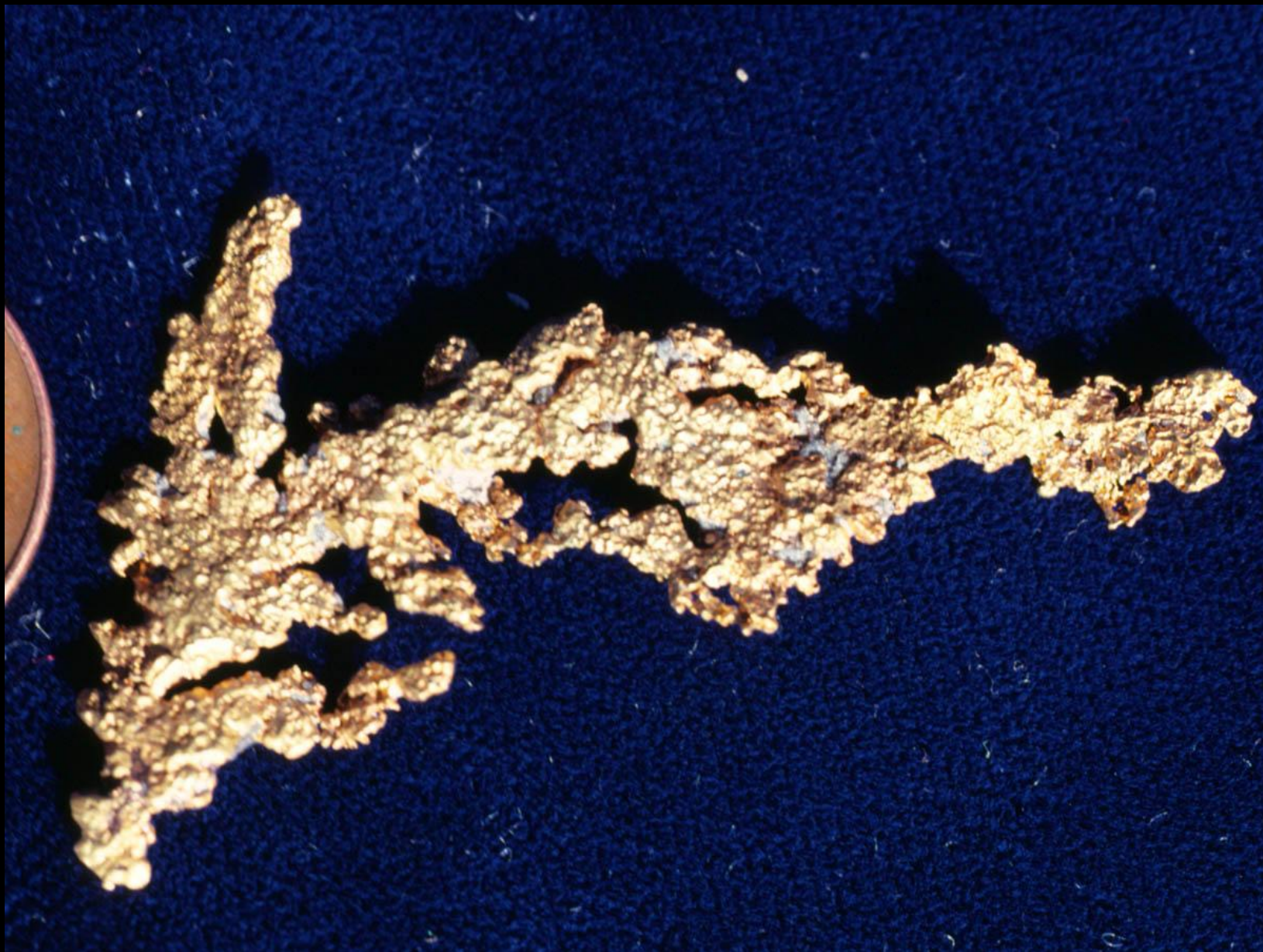
**River Grit, Stanislaus River, 1980**





**Rawhide Flat Road, Gold from Phyllite**





**Rawhide Flat Road, Gold from Phyllite**





**Duchess Mine**





**Marble Quarry Mine, Columbia, CA**





**Marble Quarry Mine, Columbia, CA**





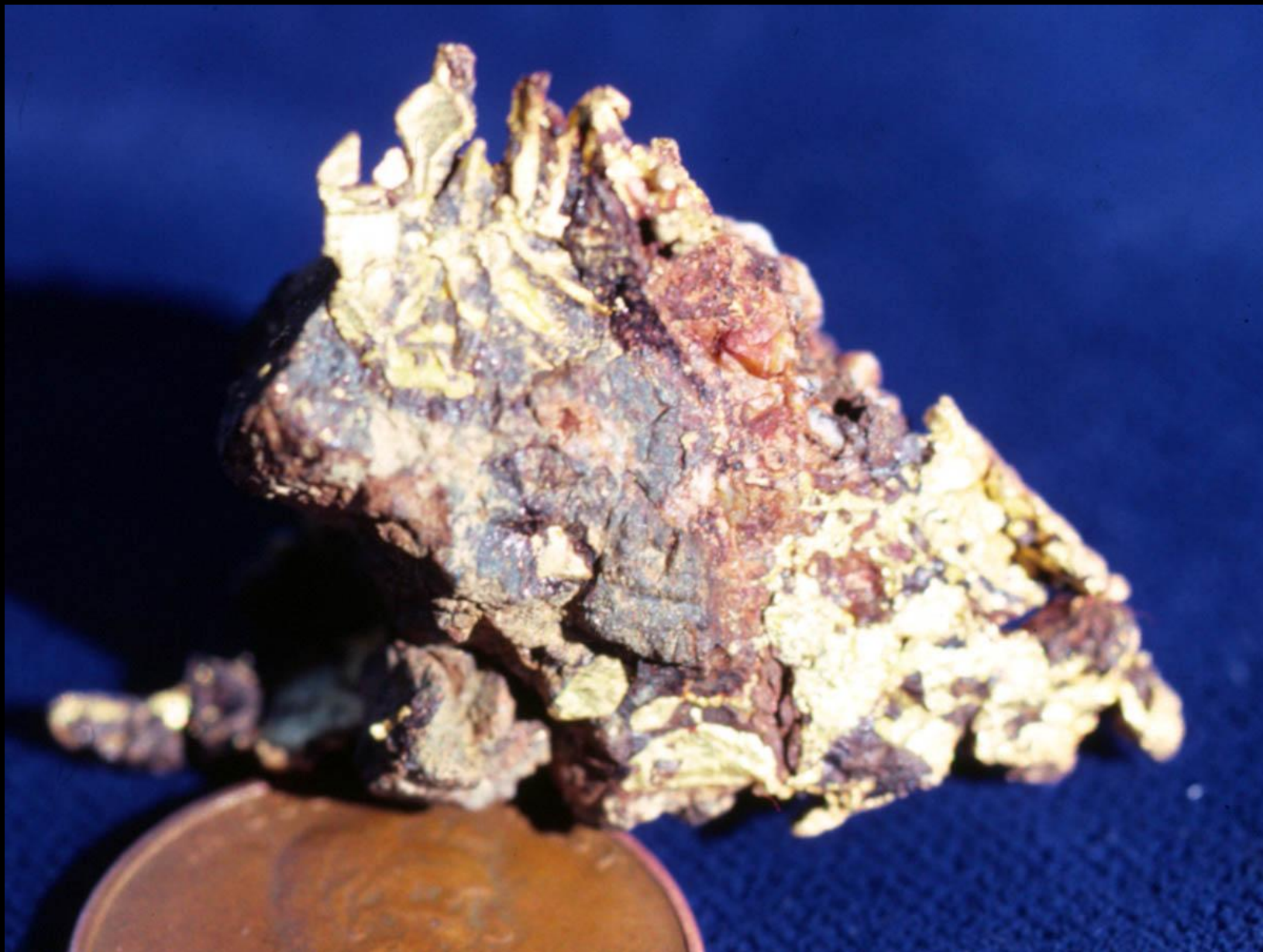
**Coulterville, CA**





**Gold Octahedra, Foothills Belt, CA**





**Vulcan Mine, Tuolumne River**

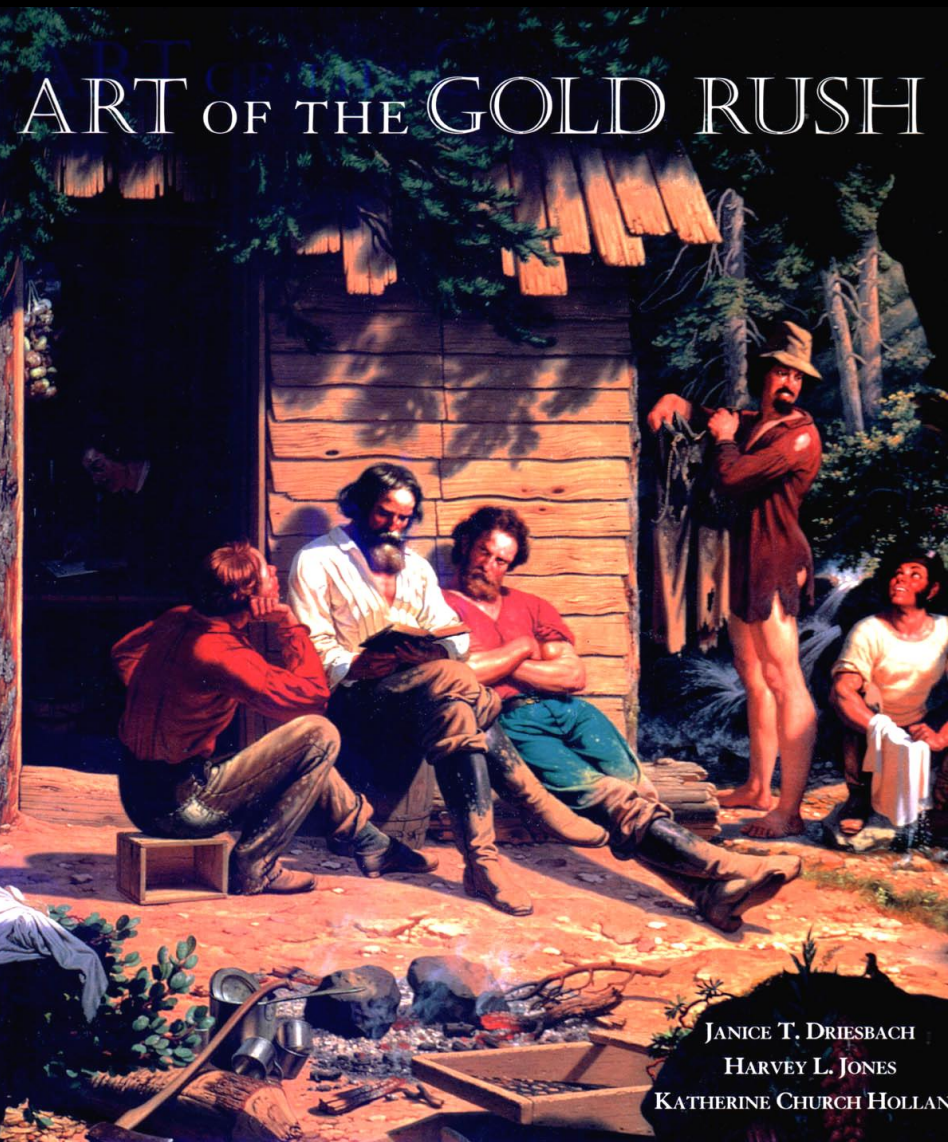


And So



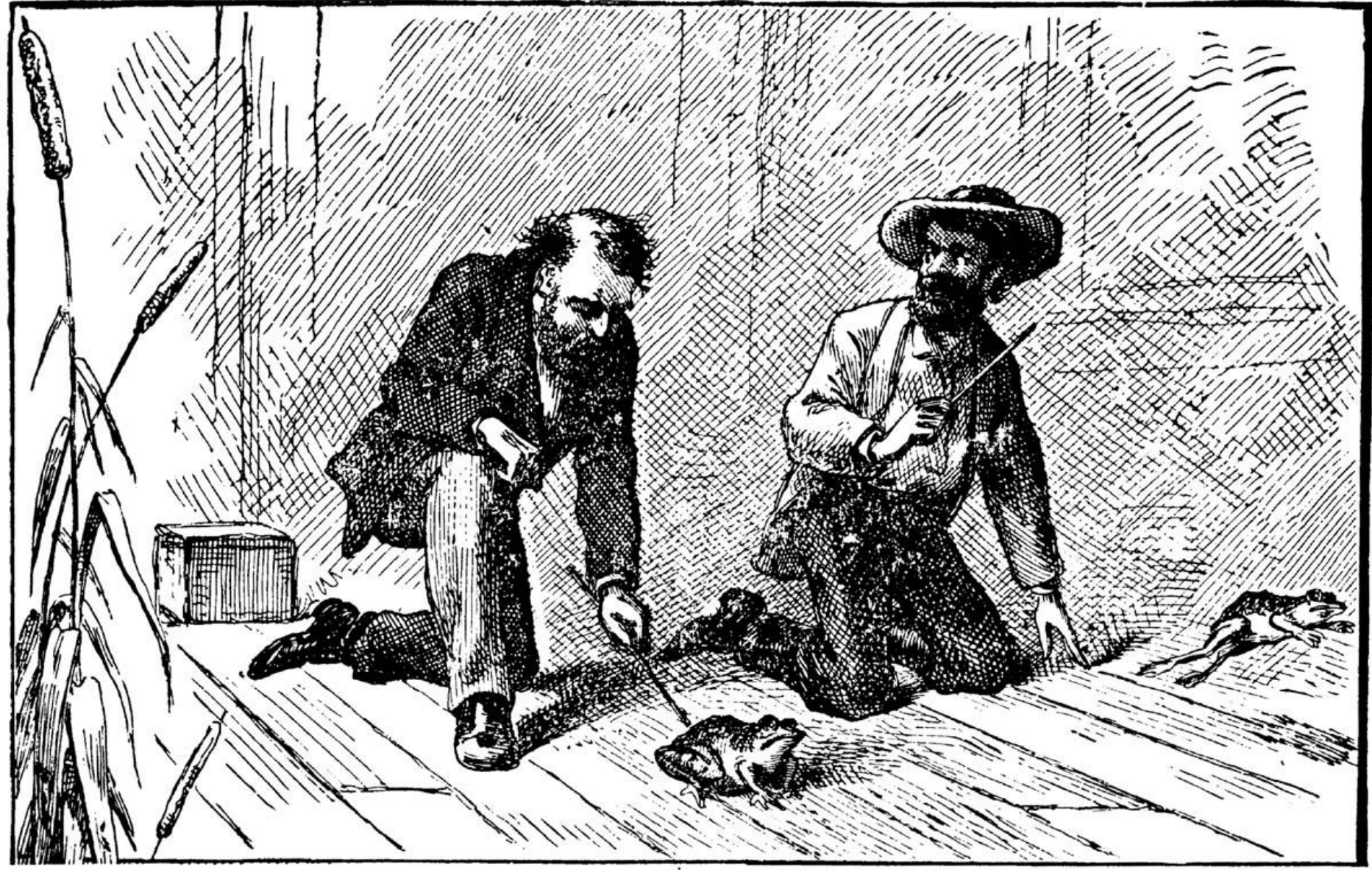


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KATHERINE CHURCH HOLLAND





**Celebrated Jumping Frog of Calaveras County**





**Diversion of Streams**





**A Moment at Rest**





**The Card Players**





**Dead Miner**





**Forest Burial**





**French Gold-Seekers**

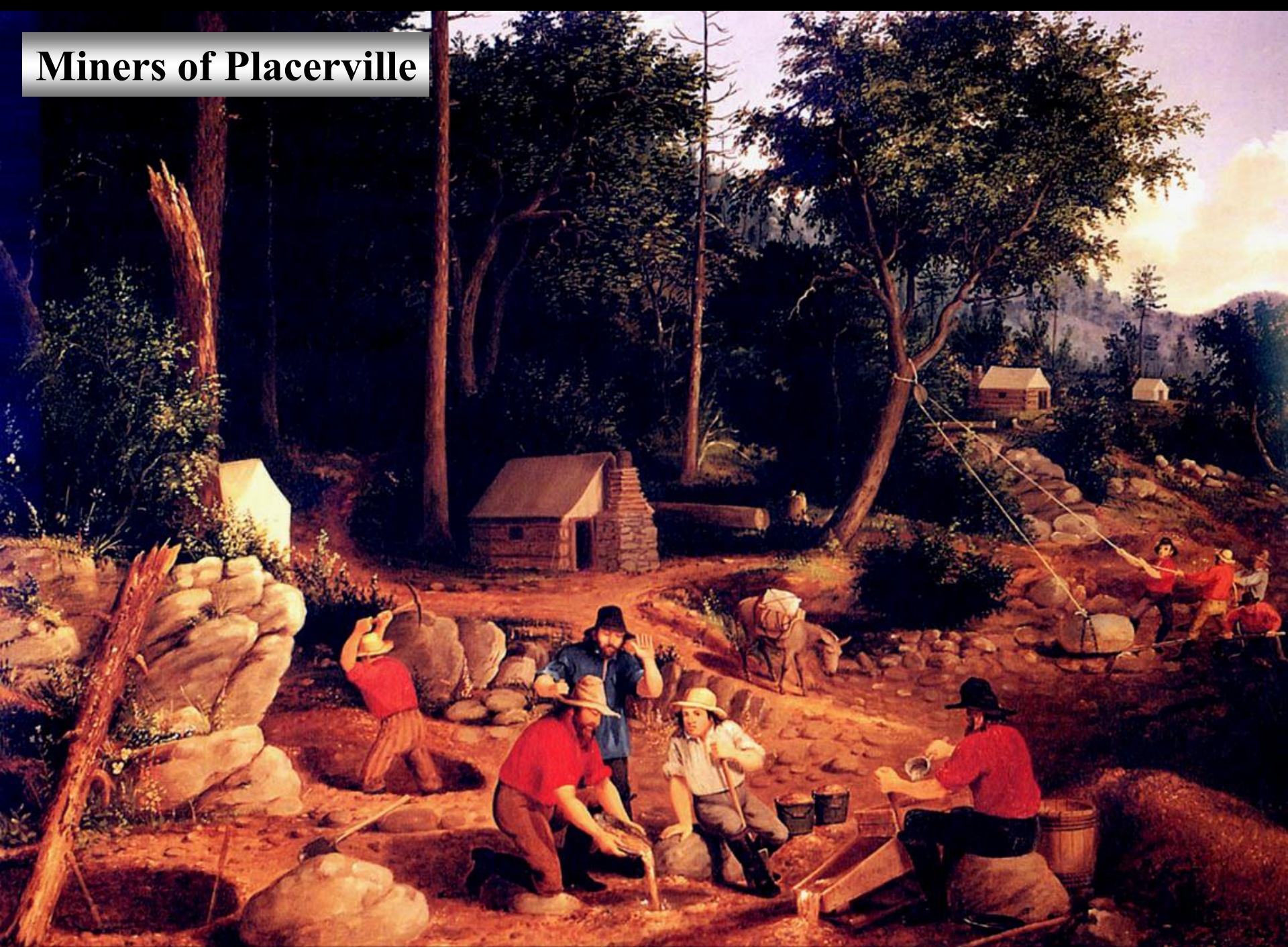




**Jamestown**



# Miners of Placerville





# Miners in the Sierra



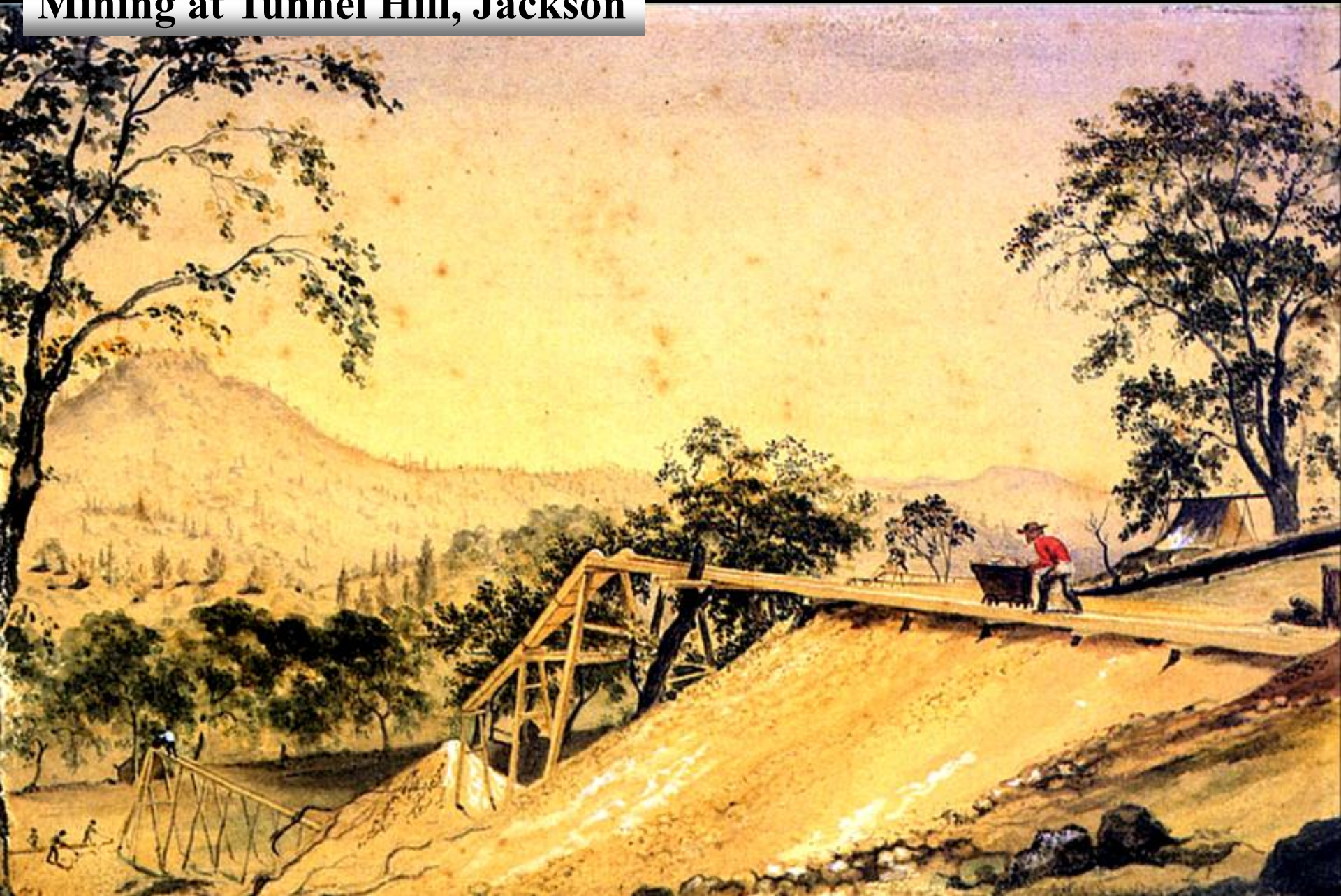


# Panning Operations, Foster's Bar



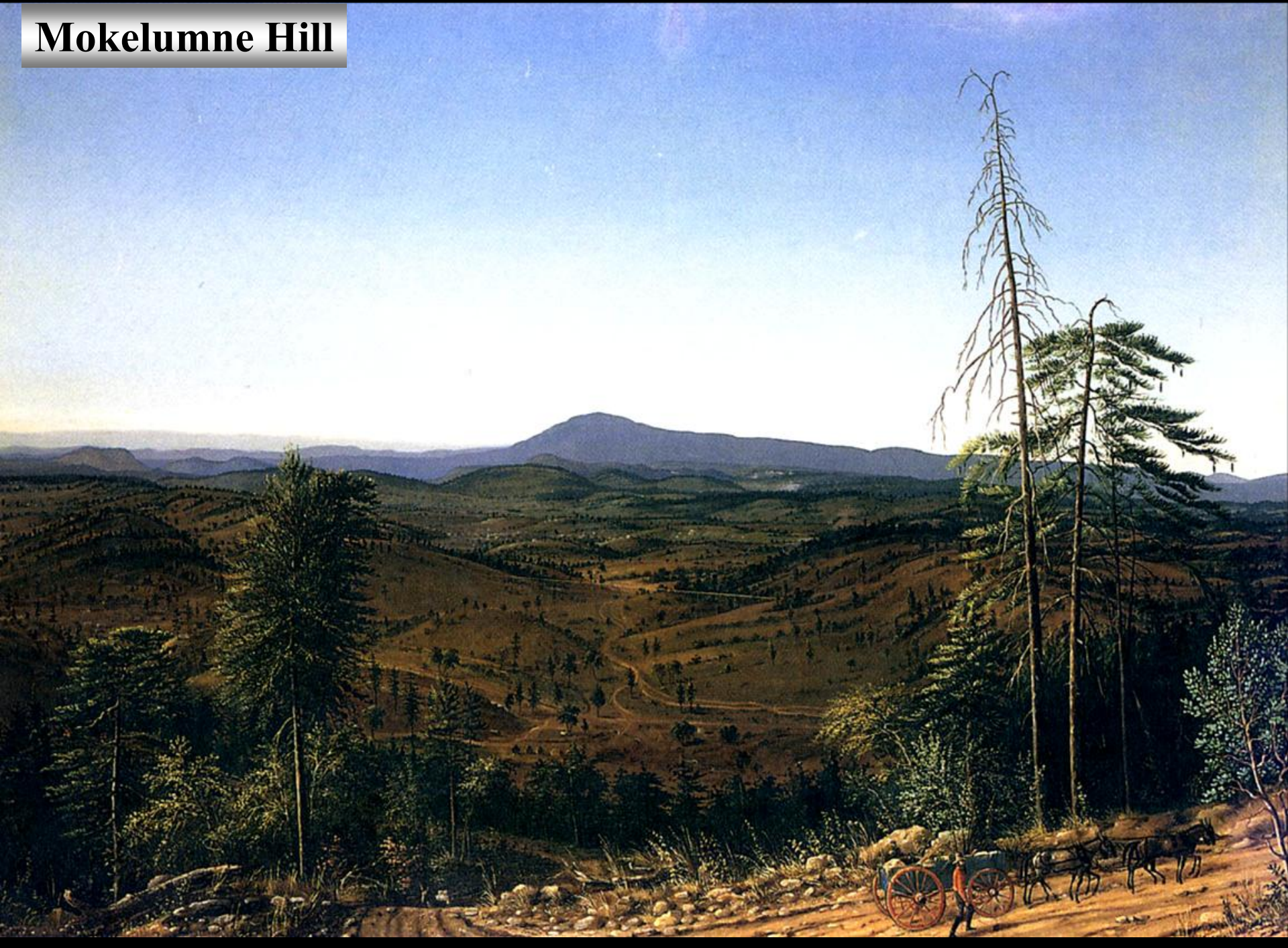


# Mining at Tunnel Hill, Jackson



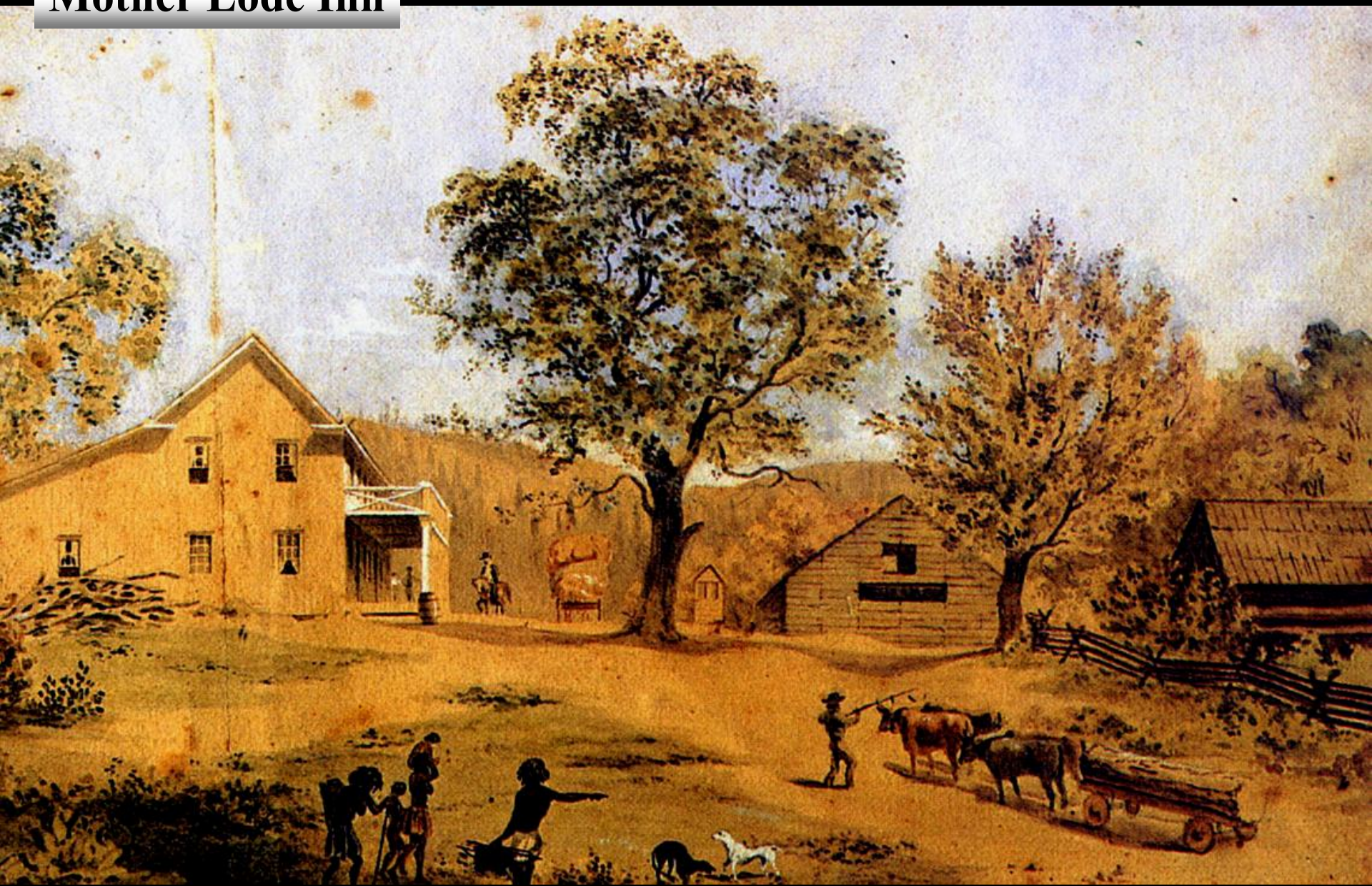


# Mokelumne Hill





# Mother Lode Inn







**Panning For Gold**





**Prospectors in the Sierra**





**The Forty-Niner**



