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CALIFORNIA GEOLOGY

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DEPARTMENT OF
CONSERVATION

Division of
Mines and Geology

California's MOTHER LODE HIGHWAY

In recognition of the sesquicentennial of the discovery of gold in California (1848-1998), CALIFORNIA GEOLOGY presents the first of a series of road logs from south to north on Highway 49. Together the guides will constitute an update of Bowen and Crippen's Geologic Maps and Notes along State Highway 49, from Division of Mines Bulletin 141, Geologic Guidebook along Highway 49—Sierran Gold Belt; The Mother Lode Country (Centennial Edition), published in 1948. Maps in this sesquicentennial version are simplified from the Department of Conservation, Division of Mines and Geology's more recent series of regional geologic maps. (To order maps, use tear-out form at center of magazine.)

A recommended place to begin this field trip is the California State Mining and Mineral Museum, at the fairgrounds less than 2 miles (3 km) south of Mariposa. Housing more than 2,000 specimens of gems and minerals, it also features a working model of a five-stamp mill, a replica of a 19th century assay office, and a 200-foot (60-m), U-shaped display of underground mining. Call (209) 742-7625 for more information...editor



Crystallized gold on quartz (1.5 inches or 4 cm), displayed at the California State Mining and Mineral Museum, Mariposa. Photo by Jim Spriggs.

California State Highway 49, variously known as the Mother Lode Highway or the Golden Highway, winds about 300 miles (480 km) through the Sierran Gold Rush mining districts and passes through nine counties.

This entire region has come to be known as the Mother Lode. However, technically, the Mother Lode is a belt

of gold-bearing quartz veins which appears to start at Mariposa in Mariposa County and terminates at Georgetown in El Dorado County. It forms a more or less continuous belt of quartz veins that occupies a fault zone approximately 1 mile (1.6 km) wide and 120 air miles (193 km) long.

The veins range from great white quartz masses 150 feet (45 m) wide, to

In 1933, State Highway 49 was assigned its number, in recognition of the Gold Rush. Also reminiscent of that era are metal state highway number signs, which are the shape of the blade of a miner's shovel.

stringers less than the thickness of a person's little finger (Photo 1). The thickness of a vein is no criterion of its value. Rich pocket mines were found largely in narrow veinlets, whereas the massive silica-carbonate rock of the Peñon Blanco is practically barren of gold.

Mining methods and techniques developed in the California gold belt have spread to the far corners of the earth and have become standard practice everywhere. Many famous technicians and financiers had their training in the Mother Lode before attaining even greater distinction and achievement in other fields. Bret Harte and Mark Twain owe much of their reputation to the gold country, and through their stories the romance of the region has become familiar to the world.

MARIPOSA TO COULTERVILLE

Mariposa, the county seat of Mariposa County, is on the tourist route to Yosemite Valley. Its fine old county courthouse, a white frame structure erected in 1854, has been in continuous use. The town lies at an elevation slightly above 2,000 feet (610 m) in a northwesterly trending valley bordered on the east and west by ridges of moderate height. Vegetation in this region is largely foothill pines, small oak trees, grasses, and patches of chaparral. There are a few small stands of yellow pine on protected north slopes southwest of Mariposa. Early-day logging operations removed much of the timber in this region.

Just south of town, in the vicinity of the county fairgrounds, is the Mariposa Mine, reportedly discovered in 1849 by Kit Carson and two associates. As early as July 1849, Palmer, Cook, and Company were running a stamp mill on ore from the Mariposa Mine (Photo 2). In 1859 John C. Frémont wrested the title to the mine from its original owners when accorded title to the Las Mariposas grant of 44,000 acres (17,800 hectares). Mines of the Las Mariposas grant also included the Pine Tree, Josephine, Princeton, and many minor workings such as the Peñon Blanco claim. The latter is one of the longest claims on record (5,850 feet;



Photo 1. Weathered outcrop of quartz-ankerite-mariposite rock, northwest of the McAlpine Mine, southern Tuolumne County. This rock is part of a narrow linear mass of altered rock and quartz veins that holds up the steep hill immediately east of Highway 49, about 1 mile (1.6 km) northwest of the Tuolumne-Mariposa county line. The rock was formed by hydrothermal alteration of serpentinite in the Melones Fault Zone, a major fracture in the earth's crust along which many of the gold-bearing quartz veins of the Mother Lode were emplaced. *Photo by Chris Higgins.*

1.8 km), its title having been recorded before length limitations on mining claims became law. The Mariposa Mine had its heyday between 1900 and 1915. Estimated total production for the mine is \$2,193,205. Workings

reached a depth of about 1,550 feet (470 m) along a 60- to 70-degree incline or about 1,350 feet (410 m) vertically. The veins lie in meta-augite andesite of the Peñon Blanco Volcanics, locally called greenstone.

Highway 49 passes successively through Jurassic metavolcanic rocks, a serpentine intrusive body, and finally into the black slates and sandstones of the Mariposa Formation (map, page 38). From Mount Bullion to the divide where the highway begins its drop into Merced River canyon, the rocks on both sides of the road belong to the Mariposa Formation.

Mount Bullion, about 5 miles (8 km) northwest of Mariposa, was once a flourishing mining center, the site of the Princeton Mine and supply center for placer diggings close by. Evidence of hand placering is manifest along every streambed and gravel exposure. The Princeton Mine was opened in 1852 and until 1933 was the largest producer in Mariposa County. Gold in excess of \$4 million was recovered by 1915. The shaft is inclined at angles varying between 45 and 60 degrees and falls to an inclined depth of 1,660 feet (506 m). The vertical depth is slightly greater than 1,350 feet (410 m).

Less than half a mile (800 m) north of Mount Bullion, a road from Hornitos and Merced Falls joins Highway 49. Hornitos was founded by the Spanish before the Gold Rush and is the hub of a very old mining district. The Mount Bullion-Hornitos road cuts across the strike of Jurassic rocks of the Mother Lode Belt.

The Washington, or Jenny Lind Mine, 1.5 miles (2.4 km) northeast of Hornitos, was located in 1850. One of the most lucrative in the Hornitos district, it produced more than \$2 million in gold. The first milling machinery of note in the district was installed at the Washington in 1851. The stamp mill that operated in the 1850s is reputed to have turned out \$1,000 in gold a day. The vertical Jenny Lind shaft is 1,540 feet (470 m) deep.

The Mount Gaines Mine, 5 miles (8 km) northeast of Hornitos on the Hornitos-Bear Valley road, was the last major gold producer in Mariposa County. It has an inclined shaft with an average dip of 30 degrees having a total inclined depth of 1,322 feet. The Mount Gaines veins are unusual in that they dip 30 to 35 degrees from horizontal

whereas steeply dipping veins are more common along the Mother Lode. The wall rock is meta-andesite and vein minerals include pyrite, quartz, chalcopyrite, galena, and sphalerite as well as disseminated gold. Bornite, proustite, arsenopyrite, and argentite have been found in small quantities.

By 1911, the Mount Gaines had produced \$1.25 million.

A large quartz vein called May Rock crops out of the gently rolling land west of the highway, about 2 miles (3 km) south of Bear Valley.

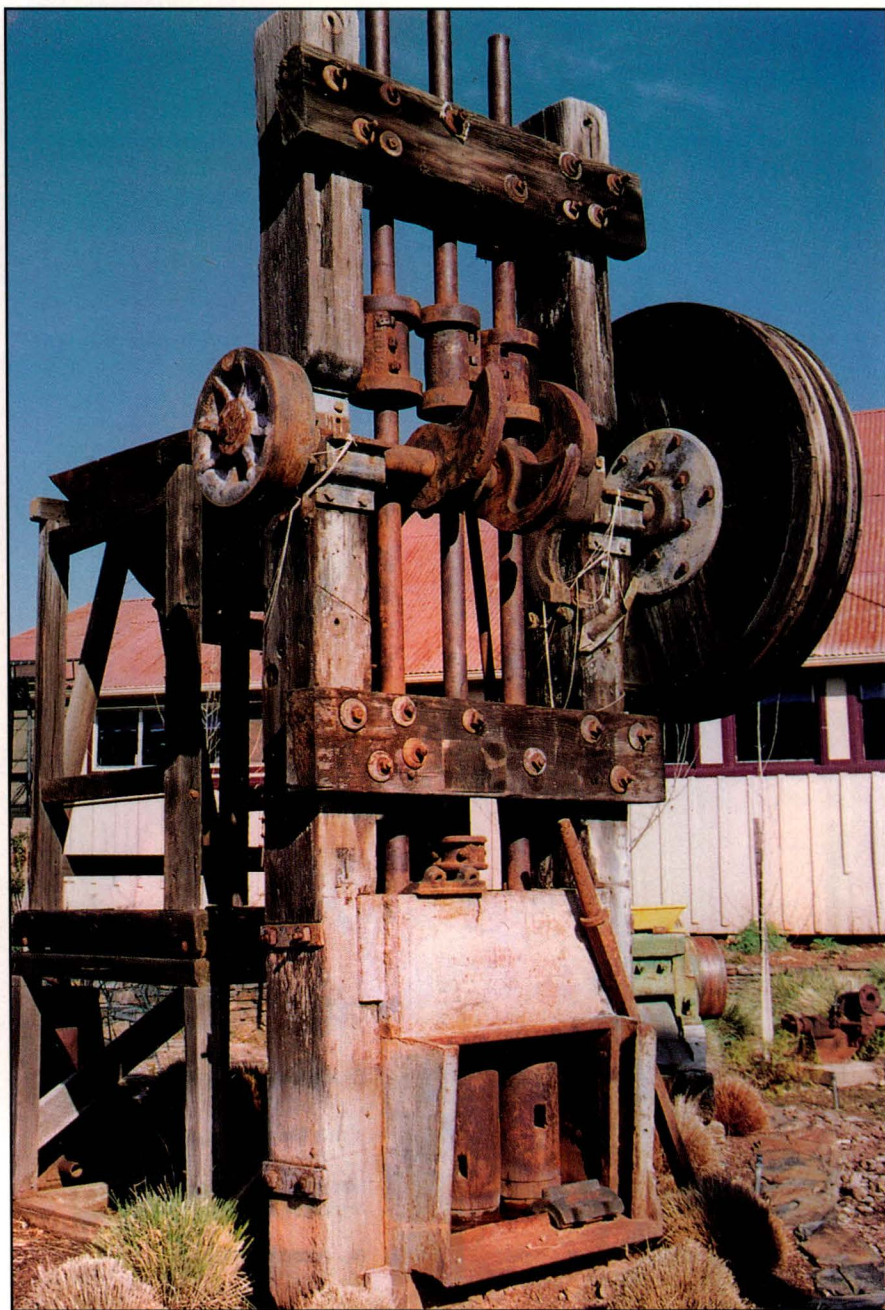
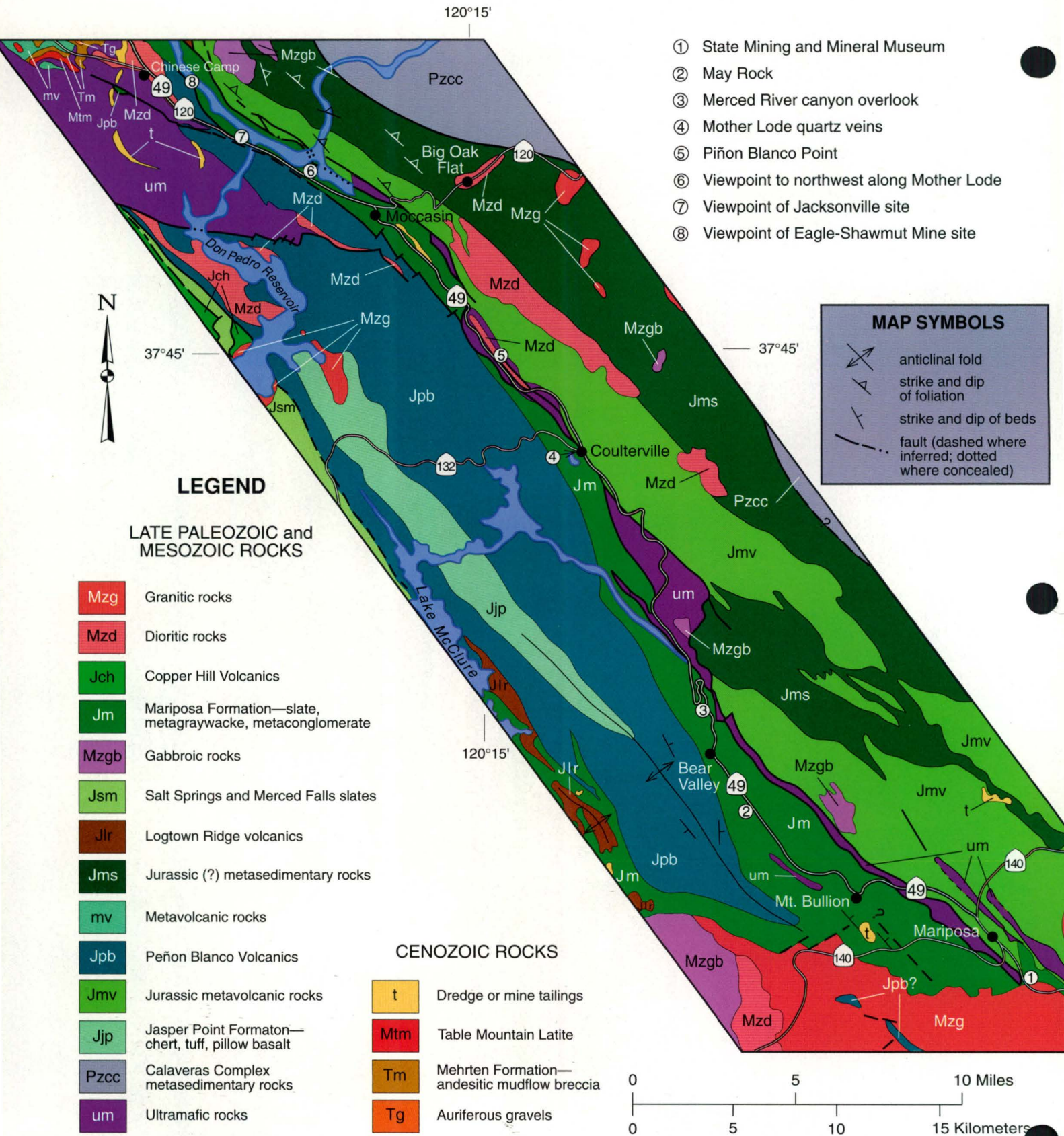


Photo 2. A stamp mill for crushing ore, displayed on Main Street, Coulterville. Photo by Max Flanery.



Geologic map for Highway 49, Mariposa to Chinese Camp. Modified from Strand (1967) and Wagner, Borgtuno, and McJunkin (1990).

Bear Valley, formerly called Haydensville, Biddles Camp, Simpsonville, and Johnsonville, was promoted by J.C. Frémont during his administration of the Las Mari-posas grant. Much of the town is a ruin of small stone, adobe, and frame buildings (Photo 3). Another road from Hornitos joins Highway 49 just north of Bear Valley.

Two miles (3.2 km) north of Bear Valley and just over the divide marking the drop into Merced River canyon, a large turnout on the west side of the highway affords a good parking place from which to observe the panorama to the north (Photo 4). The river has cut a gorge which is more than 1,200 feet (365 m) below the level of Bear Valley and more than 2,000 feet (610 m) below the ridge tops on either side. Remnants of the old rolling land surface can be seen on the ridge to the east of the river. Hell Hollow, which is a narrow gorge tributary to the Merced, lies immediately below the road to the northwest. The first fossils by which the age of the Mariposa Formation was determined came from outcrops in Hell Hollow. To the east of the Merced River and more or less paralleling its course, the white outcrops of the main branch of the Mother Lode can be followed for miles. In the vicinity of Whites Gulch, the quartz outcrops take an abrupt turn and strike almost due north. The abrupt change is noticeable from several points along Highway 49 as it drops from Bear Valley into the canyon of the Merced. Steeply dipping linear outcrops of metavolcanics of the Peñon Blanco Volcanics can be seen in the hillside to the west of the Merced River.

The Pine Tree and Josephine mines lie in a gulch between the two major switchbacks between Bear Valley and the Merced River bridge. These mines were opened about 1850 and were among the earliest of the lode mines. Because the veins crop out on the flanks of a ridge of considerable height, they have been worked largely by adits and winzes rather than deep shafts. None of the workings extend more than 800 feet (244 m) from the adit levels. Some of the veins have been traced for 1,200 feet (365 m) along their strike. Production records on these mines are incomplete, but the estimated figure for both mines is in excess of \$2,697,000. A narrow belt of serpentine discontinuously parallels the Melones Fault Zone, east of the vein system. Between the Pine Tree and Josephine mines and the bed of the Merced River, the highway drops rather abruptly across a typical section of the Mariposa Formation. The rocks are mainly black slate with interbedded lenses of black, arkosic sandstone. The sandstone contains fragments of slate that are probably reworked Mariposa material. The slates weather to a tan or grayish buff as they approach the soil mantle.

The site of the hamlet of Benton Mills, or Bagby, including a stamp mill that processed gold ore from Frémont's mines, was situated just across the Merced River. The Yosemite Valley Railroad once passed through Bagby but the tracks were removed during World War II.

North from Bagby for more than 6 miles (9.6 km), Highway 49 winds up a steep slope through a barren area



Photo 3. Ruins along Highway 49, Bear Valley, Mariposa County. *Photo by Max Flanery.*

of serpentine and related mafic and ultramafic rocks. This is one of the largest areas of this type of rock to be found along Highway 49. Serpentine ordinarily is not a favorable medium for supporting plant life but some species can survive on it. The sparse vegetation consists principally of California holly and chemise with an occasional foothill pine.

Slightly less than 2 miles (3 km) beyond the summit of the Bagby grade, the highway crosses the eastern border of serpentine and continues along the contact of serpentine and Jurassic metavolcanic rocks for about a mile (1.6 km). Outcrops consist mainly of weathered tan mica schist and phyllite, both of which somewhat resemble weathered rocks of the Mariposa Formation. They have, however, suffered a much greater degree of metamorphism, being schistose rather than slaty.

The Virginia Mine, downhill a short distance from the summit of the Bagby grade, was one of the earliest patented claims in Mariposa County and was worked on a small scale over a very long period. The mine is 1,300 feet (396 m) deep on the incline and the wall rocks are schist, greenstone, and serpentine. Records are incomplete but known production is in excess of \$660,000.

About 2 miles (3 km) north of the Bagby summit are several dikes of an unusual grayish white rock known variously

as albitite, soda syenite, and albite granophyre. Intrusive bodies of this rock are also found in many places to the east of Moccasin Creek. The rock is medium to fine grained with aplitic and porphyritic phases. It is composed mainly of the soda feldspar albite plus variable amounts of soda-rich minerals such as riebeckite and aegirite. The latter two are not present in the dikes

crossing Highway 49 but are present in some of the Moccasin Creek outcrops.

The Mary Harrison Mine is on a knoll west of Highway 49, about 2 miles (3.2 km) south of Coulterville. It was discovered sometime before 1867 and operated for a considerable period prior to 1895 by the Cook estate. In 1895, the mines of the Cook estate passed

into the ownership of the Merced Gold Mining Company, which is responsible for most of the recorded production. This was well in excess of \$300,000. The Mary Harrison Mine was worked to a depth of 1,200 feet (365 m) by shaft and winze. Most of the workings were in the dolomite-ankerite-mariposite-quartz rock which forms a very broad zone along this part of the Mother Lode. This mine has not been operated since 1903.

Beautifully banded rocks composed of minerals associated with gold ores—mariposite (chrome mica), white quartz, and carbonate minerals such as dolomite, ankerite, and calcite—can be found north of the Mary Harrison (Photo 5). Talc schist is present in some places, probably derived by the shearing of serpentine. The gold ore itself consists of gold-bearing iron pyrites, usually somewhat oxidized. This exposure is on an abandoned section of the road near the refuse disposal site.

An excellent exposure of the veins of the Mother Lode is on the south side of Coulter-

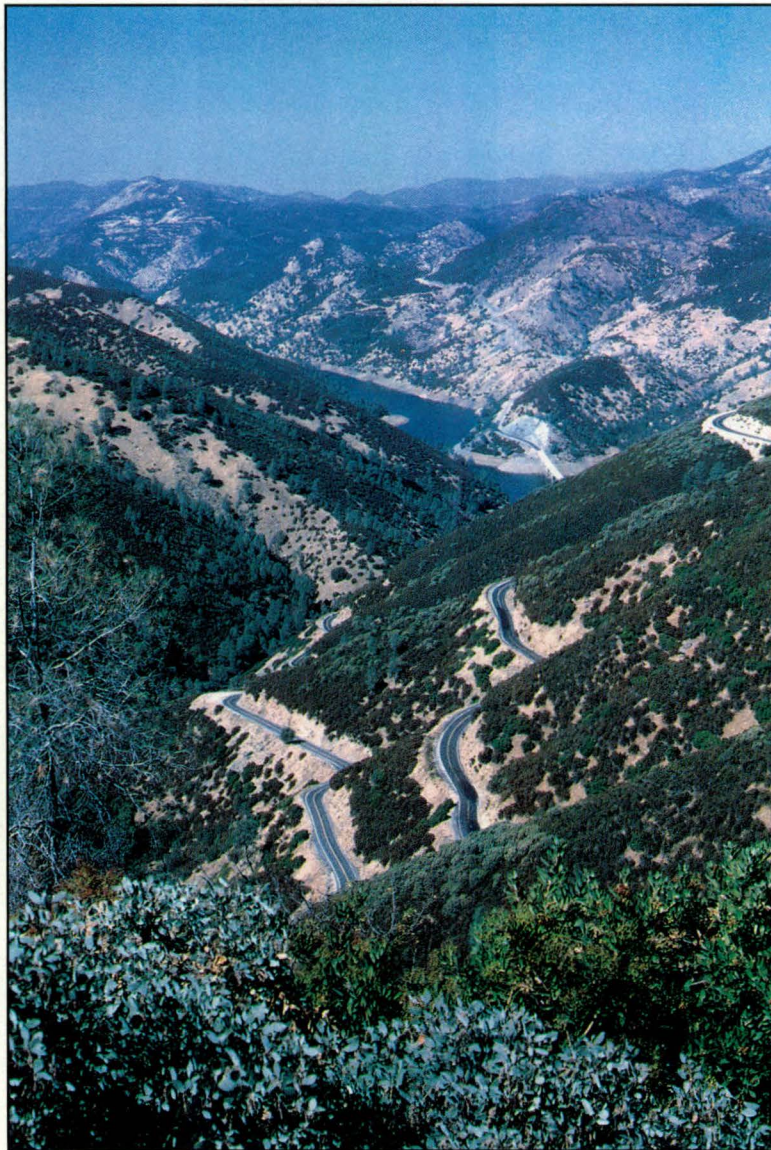


Photo 4. View north of the Merced River canyon and Highway 49 from the Bagby overlook, Mariposa County. The Mother Lode extends from the right side of the photograph in the foreground to the center of the far horizon. This section of Highway 49 passes through the most rugged landscape of the Mother Lode. Fossils used to first date the Jurassic Mariposa Formation were found in Hell Hollow, the deep gulch in the foreground. *Photo by Chris Higgins.*

Gold prices have increased dramatically since the Gold Rush days. For instance, in 1834, the U.S. Treasury established the price of gold at \$20.67 per Troy ounce (31.1 g). However, the official price changed to \$35 per Troy ounce 100 years later. In 1968, the U.S. government stopped controlling the price of domestically mined gold. Today, gold is worth approximately \$350 per ounce. Two million dollars of gold in 1849 would be worth about \$34 million at today's prices.

be along the highway about 3 miles (5 km) north of Coulterville, and again at the divide that marks the boundary between Mariposa and Tuolumne counties, about 5 miles (8 km) northwest of Coulterville.

Where Highway 49 drops to the level of Moccasin Creek, the serpentine end against the Mariposa Formation. Here, the Melones Fault Zone is a broad mineralized zone which in places reaches a width of more than 1,890 feet (576 m). Along the western fault contact, the Peñon Blanco Formation has been sheared into the Mariposa in many places.

North of the Moccasin Creek dam and powerhouse of the city of San Francisco, Highway 120 leads east to the old placer mining district of Big Oak Flat. The placers of Big Oak Flat

ville, west of Maxwell Creek bridge and along State Highway 132 (Photos 6 and 7). Many invasions of vein material along the same line of weakness can readily be seen in these exposures. The white silica-carbonate vein rocks are accentuated in many places by rust-colored zones that mark the positions of sulfide-bearing gold horizons. Other yellowish-brown zones are made of a leached, pulverized vein material that represents intra-mineral or postmineral movement along the Mother Lode fault system.

cliffs, the name has persisted through the years. The weather-resistant quartz has kept the softer country rock, which forms the flanks of the ridges, from being obliterated by erosion. The best views of the Peñon Blanco may

Coulterville is in a small valley about the same elevation as Bear Valley. It was founded about 1850 and was the center of a placer and gold quartz mining district that embraced the Malvina, Louisa, Potosi, Champion, and Tyro mines as well as the Mary Harrison. Many fine old buildings remain, including one built and operated by Chinese merchants. There is also a museum at the corner of Highways 49 and 132.

COULTERVILLE TO CHINESE CAMP

Between Coulterville and Moccasin Creek canyon, Highway 49 passes over a rough region of serpentine and greenstone resembling the terrain north of the Merced River bridge. The principal features of scenic and geologic interest along this part of the route are the many white-tipped comb-ridges, named the Peñon Blanco (white cliff), that mark the surface trace of the Mother Lode quartz veins (Back Cover Photo). Although the long white walls are hardly tall enough to be considered



Photo 5. Quartz-ankerite-mariposite rock along an abandoned segment of Highway 49, just north of the Mary Harrison Mine, Mariposa County. The mineral mariposite, a chrome-bearing mica, imparts an attractive shade of green to the rock. Such rock has been quarried at a few places in the southern Mother Lode as decorative stone. The cross-cutting white quartz veinlets indicate several episodes of hydrothermal alteration. *Photo by Chris Higgins.*



Photo 6. Massive quartz vein of the Mother Lode by Maxwell Creek just south of Coulterville along Highway 132. When viewed on end from the highway, a steep easterly dip of the vein is noticeable. This dip approximates that of the Melones Fault Zone. *Photo by Chris Higgins.*

together with the adjoining Deer Flat and Groveland districts are credited with production in excess of \$25 million. Northeast of Big Oak Flat, near Soulsbyville, several highly productive mines are in what is known as the East Belt. The East Belt roughly parallels the main Mother Lode about 5 miles (8 km) east of it. Veins of this belt tend to be discontinuous and much narrower than those of the main Mother Lode system and cut granodiorite as well as metasediments of the Calaveras Complex.

Photo 7. Road cut along Highway 132, a few hundred yards southwest of Coulterville and Highway 49. This is probably the premier site along Highway 49 for easily accessible viewing of the massive quartz veins and quartz-ankerite-mariposite rock that mark the main trace of the Mother Lode. The rock is not a single vein, but rather a complex of individual veins that have been emplaced during several episodes of hydrothermal activity along the Melones Fault Zone. Pyrite is visible in places in this rock. *Photo by Chris Higgins.*



The most productive mines in the Soulsbyville vicinity were the Soulsby, with a production of \$5.5 million, and the Black Oak, with a production of \$3.5 million.

Jacksonville Road, an alternate route north to Jamestown, runs subparallel to the Mother Lode, mostly through metavolcanics. Also the route to Stent and Quartz, it joins Highway 49 a couple of miles north of its junction with Highway 120 at Moccasin.

Highway 49 was on the bank of the Tuolumne River before the river was dammed. Historical Landmark 419 is in the turnout on the east side of new Highway 49 about half a mile (800 m) north of the Tuolumne River bridge. It commemorates Jacksonville, which was founded in 1848 and named for Colonel Alden Jackson. The town was a supply and amusement center for the mines along Moccasin and Woods creeks, but is now inundated by the reservoir.

Considerable capital was invested in the Harriman Mine, on the east side of the reservoir, but no great production was ever recorded. With the exception of the Eagle-Shawmut, few mines in the Jacksonville district contained ore of sufficient grade to warrant major development. The gold values are dissemi-

nated through the wall rock in association with pyrite in what is locally called gray ore.

The Eagle-Shawmut Mine has many miles of workings, most driven since the turn of the century, and has produced



Photo 8. Quartz veins and hydrothermally altered rock of the Mother Lode, exposed at the Eagle-Shawmut Mine, east of Chinese Camp. Eagle-Shawmut, the most productive underground gold mine in Tuolumne County, was typical of many Mother Lode mines in that it produced gold from quartz veins and altered country rock. The mine and mill site can be viewed from the end of Shawmut Road, a remnant of the old Highway 49 right-of-way that now ends at Don Pedro Reservoir. *Photo by Chris Higgins.*

huge tonnages of low grade ore (Photo 8). The total vertical depth of the mine via shaft and winze is about 3,550 feet (1,082 m) from the surface outcrop. The main shaft dips an average of 65 degrees. Ores in the mine consist of auriferous quartz, massive iron sulfides, and ankeritized country rock. The Eagle-Shawmut has a recorded production of approximately \$7.5 million. It was one of many major gold mines along the Mother Lode that was forced to shut down because of World War II limitations on gold mining and postwar high operating costs.

Mariposa Formation conglomerate in this area contains fossil leaves and late Jurassic cephalopod and pelecypod molluscs. These were first described by H.W. Turner in the 1880s.

Chinese Camp was a placer-mining center first settled by Chinese laborers in 1849. Now there are ruins of structures

built in the 1850s, together with a few more modern dwellings. Piles of soil and gravel that were turned over in the frantic search for gold are reworked remnants of Eocene and later Tertiary deposits, most of which have eroded.

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* Available for purchase from address on tear-out order form at center of magazine. The Mariposa Sheet is \$7.00; the San Francisco-San Jose Sheet is \$18.00.

See what gold can do it brings men from all nations here to this distance shore to make their fortune many go home worse than when they came others have wealth countless wealth thus it is some must fall that others may rise. — Elizabeth Keegan, 1852.

DIARY OF A FRENCHMAN

Trinity River Placers, 1850

ERNEST DE MASSEY

After short-lived careers in glass manufacturing, agriculture, and the military, Ernest de Massey joined the rush to *El Dorado*. Sailing around Cape Horn with him on the brig *Cérès* were his cousin Alexandre Veron and workman Pidaucet. His journal, now property of the Los Angeles Public Library, covers his 7-month voyage from Hâvre, France to California and various travels and adventures including those in northern California placer mines. This article and notes about the author are from the California Historical Society's Special Publication No. 2 (1927), *A Frenchman in the Gold Rush, Adventures and impressions of a tenderfoot argonaut at San Francisco, Santa Cruz, San Jose, Humboldt Bay, and the Trinity and Salmon River placers in 1850-1851*, a translation by Marguerite Eyer Wilbur.

The following conversions may be useful to those not familiar with the metric system: 1 meter is about 1 yard; 1 hectometer is nearly 110 yards; 1 kilogram is 2.2 pounds...editor.

We had left Trinity [Trinidad] Bay on April twenty-fifth [1850] with sixty-five men in our party. Sixty of this number had been scattered or lost along the trail, and had been exposed to hunger, thirst, and weariness. Several had disappeared and we had heard nothing from them. The Franco-American party that had caught up with us on the main route

had not come across any of them though they were three days behind us.

Pidaucet and I had reached the end of our journey not only at the cost of infinite misery, energy, and perseverance but also by the will of Providence which had led me to the right trail just when I was getting more hopelessly lost than ever.

The placer of Big Bar on the Trinity is situated on the left [south] bank of the Trinity River. It is built on a narrow plateau about fifty meters back from the bank. Just below it extends an alluvial shelf smaller and lower than the first. There the miners have staked out their claims. First arrivals have the right to stake out a space two meters in width and of indefinite length.

The camp itself consists of thirty or forty tents and shacks. There is a general merchandise store here as well as a butcher who kills an animal whenever he can get one. Flour sells for one and a half piasters, rice for the same figure, bacon for two piasters, half-dried meat for fifty cents a pound of fourteen ounces—weighed on unreliable scales. A bottle of brandy is worth seven piasters and ordinary wine brings four piasters. A pair of shoes, worth over in France about six francs, costs twelve piasters.

After our many days of fasting we felt the need of a good substantial meal. For lunch I had rice with bacon, meat, and pancakes instead of bread. To drink we had a mint concoction without sugar in it.

My first year of experiences is now about over. But the end of our troubles is not yet in sight. You can readily understand what an unsatisfactory year this has been for me. All the time we were lost in the depths of the virgin forests without help of any kind, and exhausted after three weeks or more of steady walking, reconnoitering and enduring every kind of privation. Cousin Veron was loafing at Trinidad, sleeping in a tent on a good mattress, and living off the fat of the land, without giving a thought to his friends. The idea never occurred to him of joining Grand-Perret's party and coming out to join us with some food and supplies which would have been a lifesaver for us now and would have made it possible for us to have conserved our meager capital of a paltry thousand francs. This amount is all we have left and, owing to the high cost of everything, it will not last long.

But I have no right to blame him if he lacks courage and initiative; these qualities are not in him. Moreover

I knew perfectly well when I left him alone at Trinidad with only himself to rely on that his interests as well as ours would suffer—a thing he is not aware of.

I am jotting down these reflections at ten in the evening. Contented in body if not in spirit I am about to roll up in my blankets under a tree beside Pidaucet who is already dreaming of paradise. By resting and sleeping I shall try to collect fresh strength to begin the life of a miner, for this is what is in store for me.

On Wednesday, May twenty-second, [1850], I started off along the river to try to find out how these gold-diggers extract the precious metal from the sands. After dinner I ordered Pidaucet to erect a shelter large enough to house three persons, to build a crude oven of stones and mud outside for cooking purposes, and to cut down a tree for making a rocker. A rocker is an object formed something like a cradle and commonly used for washing the earth and auriferous sands. In France this same thing would bring about ten francs, but out here it sells for five hundred.

Slinging my gun over my shoulder I went down the river for a league and a half, stopping at all the shacks, keeping my eyes open, and asking questions wherever I could make myself understood. Two miles up the right bank, after crossing the river on a tree-trunk that had been thrown over, I came to a second group of placers. This was called Long Bar of the Trinity River.

Long Bar is well situated, and adequately sheltered, being on low ground which forms a little plain a short distance from where the river

Voyage en Californie

1849 et 1850

Par Ernest de Massey

En rade de San-Francisco. Californie le 23^{ème} 1849. Dimanche

On voit dit-on quelquefois des pépites d'or de la à six lignes. C'est possible, mais jusqu'à présent la plus grosse que j'aie vue, de mes propres yeux, et touchée de mes mains, est grosse comme le poing, et pèse 40 onces. C'est un fort joli coup de pioche, elle ressemble à un morceau de métal coulé dans un trou de rocker. Le fondre d'or qui est la monnaie la plus courante, pour les paiements dans le commerce ne ressemble ni à du gros ni à du fin sable, mais bien à du gros boy pour la forme. Sa couleur comme celle de l'or mat, est jaune-brun et mat d'ence et généralement acceptée pour 16 dollars, un peu moins que sa valeur intrinsèque; ajoutée

describes a half-moon for a distance of five or six hectometers [?]. Some wooded slopes and the river form its boundaries. The site, however, does not seem to be safe from the winter floods. The stores here carry a better line of goods and are more pretentious than those at Big Bar. Miners working there and in the neighboring placers come over and lay in provisions here every Sunday.

After leaving the camp the river forks. Following the right branch for about two miles I found both banks were staked out and being worked. Gold is found in nuggets in the crevices of rocks and in shallow soil close by. The miner washes the gravel in a large pan of beaten iron; each panning is called a beating. A good miner can make one hundred beatings in a day. Of this number possibly three-quarters yield nothing, or practically nothing. At other times the gold runs from twenty-five cents to twenty-five dollars, or better.

“Looking at it closely I discovered a bit of dull yellow about the size of a small hazelnut.”

It is this constant element of chance that keeps enthusiasm and interest at high pitch, sustains morale, and enhances the endurance. Beyond this it is a hard life. However, it is one that fascinates and appeals to men of strong and independent character.

On this tour of inspection I stopped to chat with one miner who had just taken out a pile of gravel, and was examining it. Looking at it closely I discovered a bit of dull yellow about the size of a small hazelnut. Taking it out I handed it to him. It proved to be a

nugget—the first I had seen at the placers. I asked him to sell it to me. Its intrinsic value was eight francs, but he wanted ten for it. I accepted his offer, however, and I am going to send it to you in France at the first opportunity. I am hoping to find many more which will be even larger.

Since the day was nearly over I retraced my steps and returned to Big Bar. I am now fully resigned to my miner's lot—which is far from being sybaritical. During the day Pidaucet had put up a shack. This is preferable to a tent which is apt to be hot. But in trying to cut down a tree to use in building our rocker, he broke the hatchet. This has been an unlucky day for us!

An American workman can do almost anything with a hatchet, but a Frenchman handles it clumsily and in addition has to have a saw, chisel and shovel; otherwise he can do nothing. These were the objections raised by Pidaucet when I suggested he use this simple tool at the placers in making rockers.

Not knowing when this primitive method will be replaced by some more efficient means of gold-extraction I am going to give you a concise description of this rocker, even though it is of no value to you.

The rocker, in French *La Berceuse*, is formed like a cradle to which has been added a handle. It is operated by hand with a rocking movement. Usually it is made of boards. When these are not available a tree-trunk split in half is used. The half is then hollowed out, openings being made in the lower part to carry off the water. It is then equipped with a sieve of fine iron mesh, or wrought iron, with holes in it.

This, which is attached to a movable square frame, is designed to receive the earth, sand, or auriferous gravel. The bottom of the rocker is next filled with boards three or four centimeters high and one-quarter of a centimeter apart to catch all the flakes of gold which, being heavier, fall to the bottom when freed from the gravel as the water flows off.

After the rocker has been made it is placed wherever it is most convenient on the bank of the river and is then ready to be operated. To handle it three strong, energetic and able-bodied men are needed; one to shovel the earth, another to carry and transport it in pails for a long or short distance (an always laborious task because of the steep embankment and loose boulders) and deposit it in the rocker, and a third to pour water constantly from an iron pan through the rocker with one hand while keeping it moving with the other. In a short time the refuse earth passes off into the river. The sieve is then removed, and the pebbles extracted. This operation is repeated from sunrise to sundown, with a rest of two hours at noontime. To avoid monotony the three partners change places and in the same day each one takes his turn as shoveler, carrier and cradle-rocker.

When work is over for the day, two men prepare supper while the third gathers and sorts what residue has collected, which is held in by the boards in the bottom of the cradle. This takes about twenty minutes. An average day at Big Bar will net about ten dollars a man. This would mean about three hundred buckets of earth washed—some thirty-five hundred liters. A few claims run considerably higher, so I have heard, but miners as a class are uncommunicative and do not tell how much they take out. Often the luckiest complain the loudest.

Gold is found only in a coarse powder which contains a certain amount of iron in the form of a black sand. This is easily separated with a magnet. While these details may not seem necessary yet they are obligatory to an understanding of the life I am about to enter, hoping to clear my conscience of my own sins and those of others.

The vegetation in the high altitudes where the placers are located is not so abundant as that we found in the country we came through in getting here. The soil itself does not seem very fertile. The mountains, which are on the right shore of the Trinity and face the camp at Big Bar, are steep and covered with brush, hazel-nut trees, and a bush that bears a fruit much like the hawthorn. Interspersed with these are conifers and scraggly live-oaks.

On the banks of the river grows a wild vine which drops its leaves, so I am told, in autumn. It bears a small grape, disagreeable to taste, containing a small amount of sour juice. I am strongly of the opinion that this bush is indigenous to California. Among plants, the *madia-sativa* is very common. Parsley also grows abundantly everywhere. Fruit trees such as we have in France are not found in California. I merely mention this to give you some idea of the natural setting of this part of the country where we are about to stage our little drama.



A section of Bancroft's Map of California, 1868, showing the Trinity, Klamath and Shasta mines, 18 years after De Massey's visit. Courtesy, The Bancroft Library.

We expect to sleep in our own shack to-night. Having had no shelter but the stars for more than a month now, there is a certain amount of satisfaction in having a roof, primitive as it

is, over our heads. Unfortunately reptiles and insects have not yet abdicated, so we have to be philosophical and let them make themselves at home anywhere.

On May twenty-third I found a rocker for rent. We have staked out a claim but there are few desirable ones available. For our initial venture after eight hours' work we took in twelve dollars altogether. Of that eight dollars went to Pidaucet and me. Figuring our food at seven dollars, we had only cleared a dollar profit. This is not encouraging, but we must credit it to experience. After a modest supper, hoping for better days to come we went to sleep, as soon as it was dark, on the bare ground.

On May twenty-fourth we were unable to find a rocker for rent, so we had to lay off. We spent the day taking much-needed baths, mending our clothes, washing them, making enough biscuits to last several days, and finally taking a little rest which I felt the need of, for, in the past fifteen days, I have been walking constantly, under the most trying conditions.

“... brute strength and luck count for more than education, clothes, or good looks.”

If Pidaucet could only fish! The river is full of trout and salmon although we have not seen or heard of any game around here. But I do not think he knows how to handle a rod and I am powerless to persuade him to try it. Still it is unfortunate to have no fish to sell for we might earn even more than by digging up the river.

On May twenty-fifth, being still without the needed equipment, I decided to clear off our claim for some three meters and prepare the sand for the day when I could possess a rocker—this expensive and rare object. If our work were profitable and we had what we

needed the situation would prove tolerable. But we are always hungry. If we did not check our appetites I believe we would be eating all the time.

When we got in here we were so emaciated that we looked like walking skeletons and each of us had about reached the limit of endurance. Skins tanned, features drawn, beards uncut, feet almost bare, clothes in tatters, hats hardly recognizable, we looked more like rascals in disguise, or famished brigands, than honest and respectable citizens. Even to-day we look very little better. But here where we are now, brute strength and luck count for more than education, clothes, or good looks.

Moral standards are missing. The merchant follows his own lax instincts unhindered; he sells his merchandise not for dollars which have a fixed and recognized value, but by taking in payment gold-dust. Dust which is actually worth from eighty to eighty-five francs is taken at a valuation of from seventy-five to eighty francs. Thus he makes a profit of at least five francs on the weight alone. The miner has no recourse but to accept it or lose a day's time in going to Long Bar, the only camp where there is any competition. But this is merely typical of the way man exploits man in all countries, civilized or uncivilized.

To-day, May twenty-sixth, being Sunday and a day of rest, the American Protestants are holding religious services. The rest of us who are skeptics, free thinkers, and atheists are also glad of the chance to rest one day in seven. Everyone is putting in the day to suit his own particular fancy. Some are reading the Bible, others are laying in supplies for the following week, several have gone out hunting, and the more ambitious are out prospecting.

The word “to prospect” which I am using here for the first time requires explanation. It denotes the act of going out to locate new auriferous beds richer than those being worked at the moment. There are both small and large prospects. The former term is used to describe the kind made on Sundays when the prospector, taking just enough food for the day, goes up and down the river carrying his pick-axe and iron pan, taking samples wherever he thinks gold might be present. Sometimes the results are excellent, but more often than not it is merely time wasted. Large prospects are usually undertaken by a party and, as a general thing, last a week or longer.

On Monday, May twenty-seventh, as our rocker was not ready we began the week by getting the sands ready to work. Pidaucet, who is proud of his physical strength and experience in manual labor, came over to give me an elementary lesson in how to use my pick and shovel. While I was watching him demonstrate his theory my professor hurt his wrist, making it impossible for him to continue.

Pidaucet is very unlucky. Only six days ago he broke my hatchet—the only useful tool I had for chopping—and put it out of commission for the time being. And now, just when he might be extremely useful—in the past he has been nothing but a parasite—he is incapacitated. I was at a loss to know what to do under these circumstances as it was impossible to work alone without a rocker and there was no way of getting one here at the placers. Neither was I financially able to afford to sit around and lose time waiting. Our little savings have already diminished considerably in the last few days and soon will be gone. So, cost what it may, I am going to put my pride in my pocket,

make the break, and hire myself out to a group of miners at the rate of four dollars a day, and food. In this way I shall be saving capital and learning how to prospect for gold at the same time—a thing I know nothing about at the present writing.

“Quite a few have been abandoned and left for dead on the roadside by their companions who barely managed to keep alive on herbs, lizards, and snakes—anything in fact they could find.”

None the less I must confess it is not easy for me to sacrifice my freedom in the interests of men whom I do not know and, who, while they may be honest, on the other hand, might be brigands, or ex-convicts. Moreover, I have never worked for anyone else before, in fact ever since I have been twenty-one I have always had workmen under me. So, in a year, you see I have descended all the rungs of the social ladder which I am now trying to climb up again.

You will be interested to know that the party we left behind us had an even more tragic experience than we did. Its members suffered for a longer period, many being scattered and lost in the forest. Several gave up and went back to Trinidad. Others attempted to cross a river on a raft which capsized. Everything was lost—food, tools, and baggage.

Others who started out to climb almost impregnable peaks with the hope of getting their bearings have not returned and nothing has been heard

of them. And yet no one thinks of going out to help them!

Quite a few have been abandoned and left for dead on the roadside by their companions who barely managed to keep alive on herbs, lizards, and snakes—anything in fact they could find. Even the dog they had with them died. The ones who took along a large supply of provisions and were on horseback—believing this was the wise thing to do—have had nothing to eat for a long time, and are as famished as the rest.

Every day or so, two or three survivors of this ill-fated expedition straggle in. Buoyant, optimistic, and led by experienced guides, when they started out, they made the rest who were hurrying on ahead to reach their destination as fast as possible, with their heavy packs on their backs, look pitiful. But now they too are in bad shape. They come limping in and are so bruised and weary they can scarcely walk, while their clothes are in tatters.

“I made one hundred and fifty trips up and down a path as hard to descend as it was to climb—a distance of some seven kilometers in all—carrying a weight of fifteen kilograms in each hand.”

Almost everyone is out of funds and there is no choice but to go to work as day laborers. Even so, for the time being, their strength is so far gone that they are unfit for manual labor. Unable to find work, many of them, after resting a day and being somewhat revived by the food generously

offered them, have gone on up the river in preference to spending their last remaining funds at this camp.

“Skeptics like myself, who mock at prophets and events, are now being punished for our levity.”

On the twenty-eighth and twenty-ninth, I worked until evening in the interest of my two Irish bosses, but their claim is not a rich one, and I believe that in these three days they will just about break even, counting the food they have supplied me in the capacity of hired man at the rate of three dollars a day.

The work has been extremely irksome. I had to fill, carry, and empty three hundred buckets of sand. I made one hundred and fifty trips up and down a path as hard to descend as it was to climb—a distance of some seven kilometers in all—carrying a weight of fifteen kilograms in each hand. All this was under a broiling sun! In addition we were badly treated, badly fed, and poorly housed at night.

Such a life is somewhat strenuous for anyone not accustomed to it. Naturally I was not sorry when my lords and masters told me, on the evening of the third day, that they would have to dispense with my services, for I am afraid I could not have held out much longer. Then, too, I had not been able to please my employers and they were tired of me.

On May thirtieth, as I was taking an enforced rest with Pidaucet who has not yet been able to work, a group of three Americans offered me a job with them. I accepted, for there will be ample time to loaf when work is not available.

These Yankees out here are boorish in the extreme. They have a sinister look and are absolutely uncommunicative. Hard workers, themselves, they believe in making those under them labor. Also, they are very strong physically. I cannot say where they hail from; in all events not from a civilized part of the country. It is from this population out here that squatters and filibusters might be recruited. When my day was over I was paid off, and I was glad to see the last of them.

“If my luck gets any worse I shall be dead, or insane by the time I am forty.”

So ended my thirty-eighth year. This same anniversary I celebrated a year ago on board the *Cérés* in the mid-Atlantic off Lisbon. At that time I was gay, full of enthusiasm, and cheerful over the future. The day was made memorable by meeting an English brig, the *Caroline*, of Sunderland, which had run out of food and water. Her food almost gone, she had come over to us for assistance. Anyone who is superstitious might have deduced, from this incident, trouble ahead for us. Skeptics like myself, who mock at prophets and events, are now being punished for our levity.

Those, however, who predict calamities and misfortunes nearly always find them and few in this world are completely happy. Such are my thoughts as I am about to begin—on June first, 1850—my thirty-ninth birthday. If my luck gets any worse I shall be dead, or insane by the time I am forty. I had not

counted on any such bad luck as this when, in 1849, I set sail from Havre.

“... a tax-collector came in and, in the name of the law, demanded from each miner the sum of twenty dollars . . .”

A miner called Fredet, whose brother runs a carriage-works on the Champs-Elyseés in Paris, got into Big Bar today. As he had no tools and very little money he offered to help Pidaucet build a rocker and to go into partnership with us. It is imperative for us to start some kind of work as Veron has not arrived yet—there is nothing to stop him from joining us eventually—so I told him he could work with us on our


Monday, June third. At last we are at work! We have taken out an ounce of gold-dust between us, netting us five dollars and a half apiece for our work. While this is not a large sum yet we are our own masters and this is just the beginning. He have high hopes of making much more.

On Tuesday, June fourth, we had just begun work when, around noon-time, an individual who called himself a tax-collector came in and, in the name of the law, demanded from each miner the sum of twenty dollars to be paid once a month. You can readily imagine no one wanted to pay it. Had he been able to collect I doubt if the State of California would have been the richer. All the money received without any control or check would never have reached its destination. The American administration even though it is quite business-like and carefully supervised, is not entirely free from cupidity, greed, and disloyalty on the part of both of the underlings and chiefs who look after them.

Nevertheless, this visit from the tax-collector gave certain jealous and ill-tempered Americans a pretext for picking a quarrel with new miners—and our neighbors have lopped off part of the claim we are working. These bold citizens, who refused to pay the tax, were angry with us for also refusing.

Veron came in on Wednesday, June fifth, with a party. Among them were several miners whom we had lost on trip out. As Veron had experienced some discomforts and had been deprived, during his trip of eight days, of many of the comforts he had had at Trinidad in the restful month he spent there since

Vessels Advertised.

 **FOR TRINIDAD BAY AND NEW ELDORADO.**—The splendid bark **HECTOR**, F. Kemp, master, will positively sail for the above port on Saturday, 30th inst., having been detained for the arrival of the steamer until that time. All persons wishing passage will please apply immediately, as she will positively sail as above. For freight or passage, apply to Capt. Kemp, or to D. OKESON, at Sullivan & Root's office, foot of Clay street. m27-4

Advertisement of the “Splendid Bark Hector” from the *Alta California*, March 28, 1850.

claim as soon as the rocker was ready, with the understanding that a place was to be made for Veron when he gets here. This being mutually agreeable, we set to work. Pidaucet is just beginning to get some use out of his sprained wrist, and although the rockers have gone down fifty per cent. in value they still sell for fifty dollars; even so it is cheaper to build than to buy one.

our departure, he felt he ought to air his grievances about the trip and the hard labor ahead of him here at the placers.

His pride wounded, his character embittered, and his conceit hurt, instead of blaming his own stupidity, carelessness, and negligence, he blamed me as the cause of all his misfortunes, past, present, and future. While he had never shown this side of his character to me, yet his travelling companions, who got it at first hand, told me all about it.

When he first started out to join us at the placers, relying on his physical strength rather than on his endurance, he took on a load weighing forty kilograms. After a day's hard marching he was so exhausted that the day after he lost his head completely and threw his entire load into a ravine, returning to Trinidad without it.

Then he made up a lighter package consisting of sugar, chocolate, tea, tools, ammunition, and a gun, but he forgot to put in any real provisions. Leaving our tent in care of Mr. Ville-neuve whose partner, Mr. Mulnaer, a Belgian who had some mules, was making up a party to go out with him, Veron finally left for good. Anyone else, in leaving a tent and its contents to a neighbor whom he knew only casually from having met on board the *Hector*, would have taken inventory of what he was leaving behind him. But not Veron! The idea never occurred to him.

“... we have just learned that a fire has destroyed most of San Francisco and that the majority of the merchants in the city have been ruined.”

On the trip, as he had nothing to eat but tea, sugar, and chocolate, he bought some provisions from Mulnaer without making a bargain. The result was that after he reached the placers he had trouble over the price. I paid what Veron said was justly due him, but the creditor was not satisfied. It was a simple matter for him to charge whatever he desired as his partner was holding what we had left behind.

In face of all this Veron said nothing about these arrangements while Mulnaer remained at Big Bar. But after he had left for Trinidad I heard through other channels what had happened. Finally I got the whole story out of him.

For three weeks now we have been working from twelve to thirteen hours a day and resting only on Sundays. Our most productive day netted us twelve dollars apiece, but most of the time we have taken out only five, six, seven, or eight dollars. When the day has been poor and Pidaucet's laziness and Veron's foolishness and complaints are worse than ever, then all my patience and philosophy are needed to endure it. If I had not had strong bonds of kinship with my cousin it would have been far easier for us to have separated long ago and for each one to have gone his own separate way, stood on his own feet, and made the best of it.

Life here may not be all a bed of roses, but we have just learned that a fire has destroyed most of San Francisco and that the majority of the merchants in the city have been ruined. We have had no details as yet. If De Gaulne has been wiped out I am in grave danger of losing the four hundred dollars placed on deposit with his firm. The goods we have coming out are also placed in jeopardy—a consoling prospect to look forward to and divert us from our present trials and tribulations.

We have also heard that at Camp Murphy, in the mines south of here, the French to the number of five or six hundred and the Americans, some twelve or fifteen hundred, have had trouble, declared war, and as the result of some disagreement are fighting. We understand that the conflict threatened to assume the proportions of a civil war until the Governor of California and the French consul, Mr. Dillon, stepped in and curbed the disorder. The bitter feeling, however, still runs high.

Despite the fact that we have not heard how the trouble started, anyone who knows the quick temper, pride, and aggressiveness of the two nationalities as reflected in these particular individuals can without injustice readily imagine that both sides must have been equally guilty. This is what made the attempt at reconciliation progress so smoothly. . . .

“Certain sections had already been staked off by the miners who were busy working them, having even turned the river from its course to pan the river bottom.”

Falling in with some discouraged miners who were returning to Trinidad, I took advantage of the opportunity to send a letter to Oscar de Gaulne in San Francisco—my agent there—telling him all about our trip out, our straitened circumstances, and the uncertainty of making a living at the placers. I also requested him to forward this letter, dated June 23, 1850, on to France, to watch for the arrival of our merchandise, and to expect us back only when we had given up all hope of succeeding at the placers. At the same time I sent

a note to Villeneuve at Trinidad, asking him to send out at his earliest convenience the provisions and personal belongings we had left behind in our tent in his care.

The San Francisco papers have run full accounts of the tragic journey of our train up to the Trinity giving such heartrending details that thoughtful and generous hearts would undoubtedly have been touched if the fire had not happened almost simultaneously and given them problems and troubles of their own to face.

Toward the end of June, as our claim was no longer producing and Pidaucet—a man destined to fail us both in body and spirit—had developed whitlow and was no longer working for us, we had no choice but to go out prospecting, that is, to start out and look for new gold-diggings where the dust is more abundant than on our present claim.

Having agreed to this plan we decided first to visit the camp of the Canadians on down the river, prospecting, from time to time, as we walked. This colony is about thirty miles [?] away on the opposite bank of the river.

So we started off, packs on our backs and loaded down with equipment and provisions. Though we made several sample washings on the way yet we found the yield to be exactly what it was at Big Bar. If any richer claims exist they must be held by miners who are working them and who have replaced the rocker by the long-tom, a better and faster machine.

Certain sections had already been staked off by the miners who were busy working them, having even turned the river from its course to pan the river bottom. To do this, however, requires

both strength and capital. Yet a few have had exceptional luck. Among them is the Marquis de Franclieu, an ex-Algerian colonel who came out and staked off a claim two miles below Big Bar. With him came two passengers from the Cérés, a rosary, and a charm. By using a compass they crossed safely through the forests beyond Trinidad to the placers without making a detour. There they took up a claim that is bringing them in one hundred dollars a day apiece. What luck!

After travelling about three days we reached our destination. On the trip Veron and I prospected while Pidaucet looked on, being unable to do any manual labor. In fact he even threw his tools away so that he would be sure not to have to work.

“... Indian paths no wider than my hand—and along the edge of cliffs so steep that the least false step would send us down into the river flowing fifty meters beyond.”

Veron is always losing his head at the slightest provocation. He was climbing along the bank of the river where the pitch was steep, and for greater safety he actually threw his pack away letting it drop down into the river. It contained all our funds, four hundred dollars in all, most of which represented the net results of two months' work of all three of us, and my portfolio containing all my notes.

When I saw what he had done I jumped in and fished it out. By some miracle it was unharmed and I dried it out in the sun. I am most unlucky in having associates of this calibre, com-

panions who get so upset over any little thing. True we have been travelling over difficult trails; Indian paths no wider than my hand—and along the edge of cliffs so steep that the least false step would send us down into the river flowing fifty meters beyond. More than once, too, we have had to take off our shoes and carry our packs on our heads. But this is not where Veron is so trying.

After three days of many catastrophes like this we finally reached the Canadian camp. I was . . . curious to see how far the descendants of the French Colonists, who came over in the seventeenth century, have conserved the old pronunciation and their family names, and what affection they have for the French whom they so fondly call their fellow-countrymen.

Their settlement radiates an air of peace and good-will. The members live in tents set up in sheltered and wooded spots near the river. They all seem prosperous, and far from miserable. Our arrival created somewhat of a sensation. They gathered around us, asked questions about France, and gave us a cordial welcome. Among the most friendly were Mr. Petit, and especially Mr. Gervais. Both appeared to be influential members of this community. . . .

Everyone was busy tending to his own affairs, looking after his own quarters, the animals, or attending to community business. The elder, or community supervisor, Mr. Gervais, brought us a delicious piece of fresh venison which we gratefully accepted. We asked him to come and have lunch with us the next day. This was the only hospitality we were able to offer.

He accepted and the next day at eleven he arrived bringing a complete dinner with him. This good fortune

and this foresight on his part were completely unexpected. The affability of this good man who, weather-beaten though he was, had the true French spirit of hospitality and generosity, touched me to the quick, for we were two thousand leagues away from France, and this man, whose ancestors had left there two hundred years ago, knew the mother-country by hearsay only.

The meal was as gay and jolly as anyone could ask for in view of our present financial and geographical status. This fine old patriarch who owned a number of servants, pack-animals, a furnished tent, and a certain amount of gold, ranks as one of the aristocrats of this back-country. Perhaps, despite our clothes, he was able to judge from our manners and our conversation that we were not as uncouth as we looked. Had I been certain of this I should have enjoyed it even more, and retained even pleasanter memories of this occasion. . . .

The day after this feast we again took the trail for Big Bar, following the opposite bank of the river. We prospected time and time again, but all our attempts were uniformly unsuccessful. In speaking of the Canadians—whom I shall probably never see again—I should like to say that their pronunciation of French is identical with what was in current use, during the seventeenth century in Normandy and several other French provinces.

For instance they pronounce *qui que ce sais* as we would pronounce *qui que ce sait*. When I was quite young I knew some old men nearly eighty-nine whose fathers had been alive during the reign of Louis XIV and who still clung to this old-fashioned method of pronunciation. Similarly many expressions they use at the present time have long gone out of

fashion and give to their conversation the stamp of archaism.

After eight days' absence we got back to Big Bar, unhappy over the prospect of resuming our life of drudgery. A few days later I heard that the things I had asked Villeneuve to send out had arrived. While I did not know what the package contained yet in our present straitened circumstances anything was acceptable.

The package weighed one hundred pounds and the transportation charges were one dollar a pound. This exorbitant price we had to pay, or lose everything. I was completely out of trousers, and shirts, and was as ragged as a disreputable beggar. To go prospecting I had to buy two pairs of shoes, one for Veron and one for myself, at twelve dollars each.

“. . . it is customary to exact justice individually rather than through judges and lawyers . . .”

When we unpacked Veron was not satisfied with the contents. In fact they had sent about forty pounds of things that were absolutely useless and not what I had asked for. But whose fault was it? Veron had had trouble over the price of the food he had bought on the way out from Mulnaer, Villeneuve's partner, and had not told me about it so these men had done what they please with the flour and other provisions, and apparel, and had sent us only what they could not easily dispose of.

There is no redress in a country like this when it is customary to exact justice individually rather than through judges and lawyers who often absorb in costs over and above the value of

what is in litigation, making the case a farce.

Veron added fresh coals to the fire by losing his temper, swearing he would never pay even half the transportation charges, saying he was abandoning his luggage, and turning the whole affair over to me. To such conduct, contrary to all written and verbal agreements—for I am the official head of our commercial company—I refused to pay the slightest attention, and merely paid the freight charges out of our common purse.

Thereupon he seized me by the collar and began to argue. As he had given me this admirable excuse, I decided we had better separate. So I divided up the two thousand francs worth of gold-dust and we parted. Each was now free to go and do whatever he pleased.

Pidaucet and Fredet, our two workmen, are far too happy over his departure to follow him. They have promised to stay with me indefinitely. Both, however, have had bad blisters on their hands for the last fifteen days and have been incapacitated. This was the way I spent July 14, 1850—St. Bonaventura's Day—to cap the climax of all that has happened to me in the last few months! After paying one hundred dollars for the baggage held for me, my capital was diminished by half. But by selling off what I am not using I can probably get back fifty per cent. of this amount. Now that I have some extra clothes I can appear more like a gentleman and less like a typical miner.

Rumors vague at first, but growing more and more persistent, have been circulated around Big Bar of the discovery of rich placers only a few days' trip from here. Those near the Klamath, Salmon, and Upper Trinity rivers have been most highly recommended.

Every day a few prospectors who have not found much gold-dust here slip off quietly from camp heading for one of these regions. So much of this has been going on that Big Bar, so prosperous and well-populated only a month ago, is now almost deserted. Merchandise has gone down over half. My cronies being unable to work because of their minor ailments, I decided to go off on another prospecting trip while their blisters were healing.

We agreed that during my absence they were to guard my claim, work it if they could, and that all expenses as well as any profits taken out were to be shared equally. This left me to put up with all the trials and troubles while they rested.

Having purchased out of my own pocket enough food to last from fifteen days to a month, I joined the first group leaving. In this party one of the Americans spoke French, and as he had a mule and was all alone he kindly offered to pack my twenty-pound load of provisions. I carried the rest. As the guns, tools, and blankets weighed around twenty-five kilograms this was sufficient to carry over a mountainous country, barren of roads, and little travelled. . . .

In mid-July, De Massey joined seven other men and three mules on a trip to the Salmon and Klamath rivers. The party endured thirst, hunger, fatigue, and sickness, encountered a forest fire, and tromped through snow, only to find placers no richer than those they had left. Meeting disappointed prospectors from the Klamath River, they turned back just short of their goal.

On Wednesday evening, August second, we got into Big Bar. I intended, without losing any time, to give a full account of my exploring expedition, to map out plans, and to start out at once

with my partners. But to my amazement I found my shanty deserted.

Upon making inquiries I learned that Pidaucet and Veron having formed a partnership had left together for the lower Klamath, and that Fredet who was not over his *panaris* and the blisters on his hands was expecting to leave camp tomorrow for the same place, taking my watch and money with him and without leaving any word as to where I could rejoin them.

“After paying a driver twelve dollars for transporting my few belongings, I had exactly seventy dollars in gold-dust left as my entire wealth.”

So I got in just in time to look after my few personal belongings and to let Fredet know what I thought of such conduct and the way Pidaucet and Veron had failed to keep their promises. I also declined from this time on to be associated with men who were so irresponsible and ungrateful as not to consider how much time I had lost and how much money I had spent on the trip for our mutual benefit at a time when they were unable to travel. A fifteen days' walking trip and fifty dollars spent—this was the result of my loyalty. From now on I am going to look after my own affairs and have nothing more to do with them.

The next day when I went out to see some of the miners who were still living at Big Bar I learned that a fire had completely wiped out Oscar de Gaulne, my agent, and that as the result of this disaster he had gone insane and had been sent back home. So the two thousand francs I had left with him

were lost, new goods were arriving, and no one was there to receive them. Neither was there money for the custom charges. Upon learning this I concluded that a longer stay at the mines was out of the question. Clearly duty called me to San Francisco for I did not want anyone to think I had not put forth every effort possible to save something out of the wreckage.

Selling off what tools I could and some of my clothing, I bought provisions for the trip and found a companion who was returning to the coast. After paying a driver twelve dollars for transporting my few belongings, I had exactly seventy dollars in gold-dust left as my entire wealth.

This meager capital and the physique of a seasoned miner were my sole stock-in-trade as I had no credit or backing for carrying on my business with bankers, creditors, money-lenders, and consignees in San Francisco. Almost wiped out by the fire, discouraged, and despondent, I faced the almost inevitable certainty of not being able to raise the necessary capital to release my goods from the vessels, pay the customs, or rent a place to display them. From seven to eight thousand francs were needed to get me out of this situation. And yet Veron pays no attention to all this, even though his interests are involved with mine.

On Monday, August 5, 1850, I set out from Big Bar, disillusioned and with no prospects for the future. When I reached here the twenty-first of last May I was brimming over with optimism; and I have done everything in my power to succeed. I have willingly stooped to any kind of work, no matter how fatiguing, but I am now convinced that a miner's life is practical only for men who are accustomed from childhood to the hardest manual labor and

Public Balance.

POUR LES RESIDENS FRANCAIS.

SAN-FRANCISCO, LE 28 DE JANVIER, 1851.

AVIS IMPORTANT.

Nous rappelons aux Français nouvellement débarqués qu'ils trouveront au Consulat de France et à la poste les listes des lettres qui n'ont point encore été retirées. Lorsqu'il nous sera donné une part plus large dans la rédaction du journal, moins resserrées par l'espace, nous pourrons les transcrire dans l'intérêt de nos compatriotes fixés dans l'intérieur de la Californie.

Les personnes qui désireront envoyer des journaux dans leur famille trouveront le 31 courant, au bureau du *Public Balance*, Montgomery st., et au bureau de la rédaction française, Pine st., près de l'Hotel Richelieu, l'édition du journal de la 2e quinzaine de janvier, destinée aux abonnés étrangers. Pour les personnes qui n'ont pas le temps de faire une longue correspondance, l'envoi d'un journal, en contresignant l'enveloppe, est un moyen bien simple et sûr de rester en rapport avec

pas, ... aidant, d'étourdir le joueur innocent, et surexcitait l'imagination passionnée du joueur de profession. Le son métallique de l'or l'emportait parfois sur le bruit du tambour et de la grosse caisse. San-Francisco enfin offrait aux yeux effarés du nouveau débarqué l'aspect inexplicable d'une immense loge de fous. Cet aspect, Dieu merci, n'est plus le même aujourd'hui, et le changement est si extraordinaire que les histoires de l'an passé sont prises pour des fables inventées à plaisir, et l'on s'expose au blâme en disant la vérité.

Les deux-tiers des maisons de jeux sont fermées aujourd'hui, et ce qui reste (le chiffre en est encore beau) ne voit autour de ses tables que les *gamblers* se livrant au doux sommeil ou d'un farniente fort peu lucratif. Le temps d'arrêt, ou plutôt la crise commerciale, qui se fait sentir en ce moment se rattache aux jeux par quelque secret endroit, car si l'argent devient rare, nous savons fort bien où il passe et où il a passé.

En continuant cette revue qui doit embrasser San-Francisco dans tous ses détails, nous aborderons quelques sujets qui donneront la clef de bien des désastres peu ou mal expliqués.

La moralité qui devrait être la base de toutes les actions humaines n'a malheureusement été, jusqu'à ce jour, à San-Francisco, qu'un mot vide de sens.

JULES DE FRANCE.

(La suite au prochain numéro.)

La Rédacteur,
ERNEST DE MASSEY.

that only by extraordinary good luck is it possible to take out a fortune within a few weeks or months.

Three of us are travelling with one mule. The first two days we did not walk; we trotted. I made no complaint but kept up the pace and camped with the rest. But on the third day my legs refused to function and I had to lag behind. The way the guide was pressing ahead made me think my driver had some evil intentions for he had charge of all my capital which, though little enough, will be invaluable after reaching San Francisco.

In the evening, despairing of catching up with him, I had to pass the night alone in a ravine. I had two ship-biscuits and my blankets. It was enough, however. While I was munching at my supper, thinking over my troubles, bemoaning my ill-luck, and almost ready to give up after this series of calamities one on top of another, along came an American on horseback.

Liking the place, he got off, tied up his horse, and came over and sat down by me. His society quite revived my flagging spirits and dispelled my fit of pessimism. Though far from feeling hilarious, I grew almost cheerful.

The stranger was a young man, but wrinkled, pale, and taciturn. He was fairly well dressed and looked like either an agent sent out by some capitalists to explore the country, or a newspaper reporter. Since he did not speak French and I knew only a few words of English we only exchanged a few monosyllables before sleeping. I noticed, moreover, that he was much more of a gentleman than most of his fellow-countrymen whom I met at the placers.

We both got under way early in the morning. He was on his horse while I followed behind on foot in hope of finding my muleteer who has deserted me, at the next stopping place. The latter was located in a field where a large store, serving as café, restaurant and hotel, was the rendezvous for all inbound and outbound travellers. Here I found my two travelling-companions and had a good meal—sitting down on a bench with a table in front of me and being waited on—a luxury I had not known since leaving the miserable Hector at Trinity City.

According to translator Wilbur, De Massey explored San Jose and Santa Cruz, returned to San Francisco, and eventually became editor of a newspaper. After fire destroyed the paper, De Massey and a partner opened a bookstore. The former returned to France in 1857.

Parts of De Massey's column in the January 28, 1851 *Public Balance*, an otherwise English-language San Francisco newspaper. Courtesy of the California State Library.

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NOVEMBER/DECEMBER 1996 CORRECTIONS

Photo caption, page 143:

The McCloud Formation contains abundant fossil corals, but not reef coral. Lower beds of the McCloud are probably of Late Pennsylvanian age.

Photo 3 caption, page 153:

The log in this photo is also in Photo 9, not 10.

Photo 9 caption, page 158:

The log in this photo is also in Photo 3, not 2.

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FOSSIL MARINE ALGAE or TRACE FOSSIL?

RICHARD P. HILTON
Sierra College

In CALIFORNIA GEOLOGY's July/August 1996 issue, the objects in the cover photo were identified as fossil marine algae from the Paleocene Carmelo Formation, Point Lobos, California. Here, Dick Hilton invites us to contemplate another explanation...editor

In 1976 I participated in a National Association of Geology Teachers field trip to Point Lobos, led by Bob Andrews of the Naval Post Graduate School at Monterey, California and John Kingsley of Monterey Peninsula College (Andrews and Kingsley, 1976). Bob showed us details of deep ocean fan deposits of the Paleocene Carmelo Formation, basing his deep water interpretation on microfossils he had found. He also showed us fossil marine algae, complete with floats, that looked very much like some of the modern seaweeds (photo below). The algae, then described as being in the order Cryptonemiale, had been described by Herold (1934) and Nili-Esfahani (1965) and were found on several sandstone surfaces including ones displaying ripple marks.

There are similar rocks at the tip of Point Reyes, north of San Francisco. They belong to the Point Reyes Conglomerate, another Paleocene formation that looks very much like the Carmelo Formation 110 miles (about 180 km) to the south. The beds and clasts are similar and the two formations are the same age. Kathleen Burnham and Tom Anderson



Fossil and seaweed in the Carmelo Formation, Point Lobos.
Photo by Richard P. Hilton.



Fossil in the Point Reyes Conglomerate, Point Reyes. *Photo by Richard P. Hilton.*

(1994) wrote an abstract suggesting these are indeed the same rocks offset by the right lateral San Gregorio Fault.

Since childhood I have often visited Point Reyes, exploring its wonder and beauty. I hoped I might find some fossil "seaweeds" in the Point Reyes Conglomerate, perhaps further proof that these rocks were part of the Carmelo Formation so far south. A couple of years ago, after a long walk along Point Reyes Beach, I explored some of the cliffy area in the Point Reyes Conglomerate north of the lighthouse. There, on a sloping bed of sandstone, were fossils similar to those found at Point Lobos (photo above). The Point Reyes Conglomerate and the Carmelo Formation of Point Lobos may indeed be one in the same set of rocks.

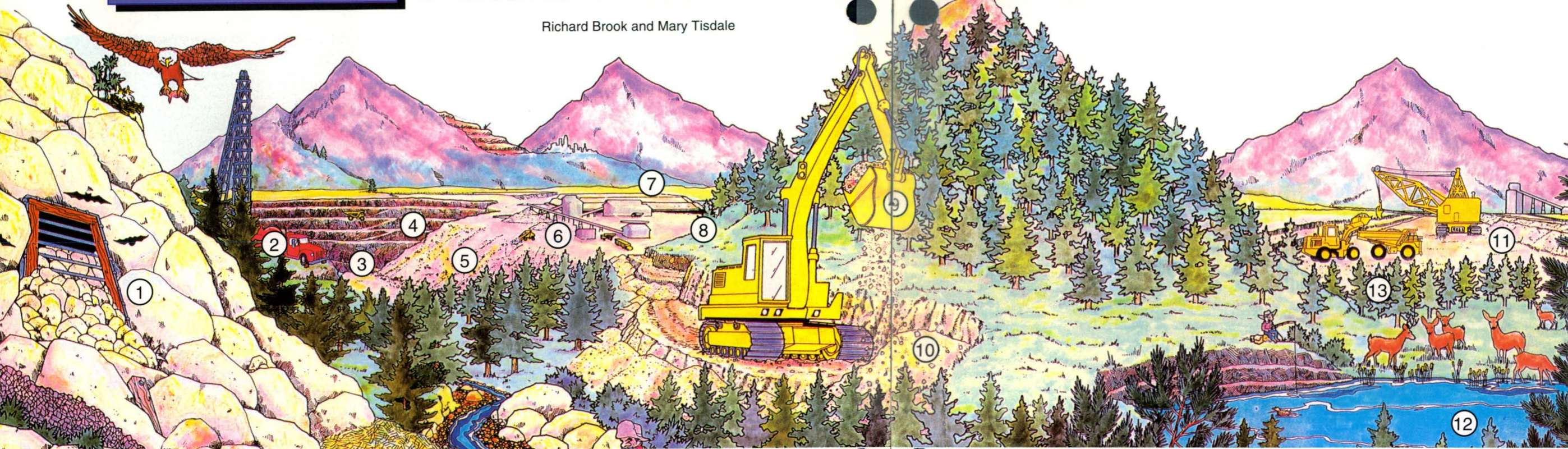
In 1981, Gary Hill described in detail several fossils in the Carmelo Formation. He interprets the elaborate and beautiful fossils not as "seaweed," but as traces of an unknown critter that plodded through and into the clastic sediments of a deep sea.

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MINING BRINGS OPPORTUNITIES AND CHALLENGES

Richard Brook and Mary Tisdale



LEGEND

1. mine adit (sealed and closed)
2. truck-mounted drill rig
3. open mine pit
4. steps or stairs
5. waste rock for reclamation
6. ore processing plant
7. lined heap leaching
8. replanting
9. backhoe recontouring access road
10. storage pile of roadcut material
11. strip mine overburden
12. quarry reclaimed as lake
13. reforested area

Artwork and associated research by Shelly Fischman.

America is fortunate to have abundant supplies of minerals. Mineral resources, found throughout the nation both on private and public lands, are essential raw materials needed to maintain our standard of living. The former U.S. Bureau of Mines estimated, based on our current standard of living, that each American consumes about 19 short tons (17 metric tons) of newly mined minerals each year. As a nation, this totals about 5 billion short tons (4.5 billion metric tons) of minerals consumed each year.

Development of mineral resources can bring many local and national benefits. Mineral development provides jobs to mine workers, transportation workers who move the mineral to market, and factory workers who transform the mineral into useful products. Nearly 300,000 people work directly in mining throughout the United States. Employment in industries that support mining, including manufacturing, engineering, and environmental and geological consulting, accounts for about 3 million jobs. Sometimes royalties are paid to the mineral owner after the mineral is extracted and sold. Royalties from development of federally owned minerals are important sources of income

for the federal government; federal mineral royalty is about \$400 million annually.

Each mineral has its own crystalline structure, chemical makeup, and physical qualities, such as hardness and color. Rocks are made from minerals. Rocks and minerals are used everywhere and by everyone.

For example, computers contain quartz crystals in their highly demanding timing devices, silicon in their processing chips, and gold, silver, and copper in their wiring. Rocks and minerals are used in the production of fertilizers. Ceramic insulators, metallic electrical wiring, antennae, mineral-coated television screens, and ceramic speakers are examples of uses of rocks and minerals in the communications industry. Gravel, crushed stone, tar, asphalt, road salt, and cement all play a major role in transportation. Our homes and other buildings are made of rocks and minerals in the form of copper wiring and pipe, concrete, sheet rock, floor coverings such as tile, metal fasteners such as screws and nails, shingles, glass, aluminum siding, and stone. Consumers use cosmetics, toothpaste, appliances, cookware and tableware, and thousands of other articles all made from substances drawn from the

earth. Modern medicine relies on many drugs, ointments, and tools made from rocks and minerals. The pigments in paint, the stone or metal that forms statues, and the clays used in pottery are examples of rock and mineral use in art. The manufacture of paper involves the use of rock or mineral-based materials to bleach, color, and coat the paper.

Mineral development can also bring less desirable consequences. Development of a mine to extract the mineral resources sometimes requires the construction of roads, buildings, railroads, pipelines, and power lines that impact the surrounding land. Rock and soil that do not contain valuable minerals often must be moved to gain access to the valuable mineral-bearing rock, which is called ore. Improper disposal of this waste rock can create long-term hazards. Processing ore to concentrate the valuable mineral constituent, such as gold or copper, can require large amounts of water, reducing water availability and disrupting aquatic environments. After milling, finely-ground non-mineral rock particles, known as tailings, are discarded in special ponds that may pose long-term environmental consequences.

Unfortunately, some miners in the past have abandoned mines once the ore was exhausted, leaving tailings, waste rock, and sometimes the mine workings exposed to the environment. Some estimates place the number of abandoned mining sites across the country as high as 200,000. For the past 30 years, mining sites have been required to be restored before they are closed or abandoned.

Many of the abandoned mining sites do not pose significant environmental or safety hazards. Some old sites have been reclaimed as a result of subsequent mining activity; however, there remains a number of abandoned mining sites that may have safety or environmental consequences.

Abandoned sites may have safety or environmental impacts for many reasons. For example, large mining pits or waste rock piles detract from the visual resource values of the landscape. Unsecured adits, shafts, or other mine openings can be safety hazards. Some sites may have radioactive contamination through concentration or release of naturally occurring radioactive materials. Chemical processing of the ore can leave residual contamination in the tailings. Mining exposes deeper parts of the

earth's crust to the natural processes of weathering, oxidation, and bacterial action. In some cases, as waste rock from mining is weathered, heavy metals such as zinc, copper, cadmium, and lead can be leached into the water. Surface and ground waters flowing from abandoned mine sites can contain enough dissolved metals to be toxic to aquatic life and dangerous to human health.

New technologies and laws are helping to identify solutions to these environmental problems. Citizen awareness of the environmental issues, as well as a commitment by the industry and the public, are making restoration of many previously forgotten mining sites possible.

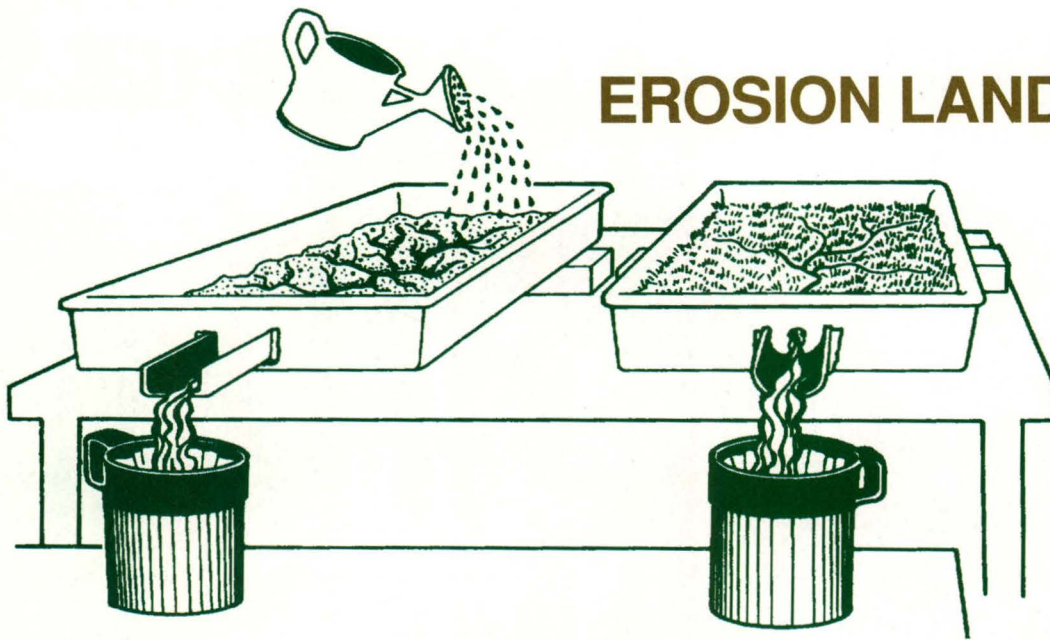
National and state laws now require mining companies to develop operation and reclamation plans to eliminate or minimize environmental impacts. Companies are required to reclaim land disturbed by exploration or extraction. In a broad sense, the mining site is reclaimed when the disturbed land is returned to its pre-mining use or another use determined to be beneficial. In some cases mining pits are transformed into lakes, filled with fish, and used for recreation. In other cases tailings ponds are reclaimed by removing

the water and covering the pond bed with topsoil. After plants are reestablished, the area can again be habitat for birds and animals. Sometimes the mine workings are completely sealed, and other times are partially sealed to provide habitat for bats.

While many of the safety and environmental impacts from mining can be mitigated, some compromise is necessary. To sustain the health and productivity of the land while continuing to enjoy the benefits of mining, difficult decisions are required, including establishing land-use limits based on scientific data and public input. As with any land-use determination, mining brings both promise and problems. Working together, miners and citizens have the opportunity to benefit from mines while addressing conflicts and challenges.

In California, the mineral extraction industry employs 10,000 residents directly and thousands more indirectly.

EROSION LANDSCAPES



Objective: In this activity, students will learn the importance of revegetating areas that have been reclaimed after mining. Students will compare the movement of water and the degree of erosion over slopes with and without plant cover.

Materials: For this activity you will need:

- two large plastic trays (such as cat litter boxes)
- a portable hand drill with 3/8" (9 or 10 mm) drill bit
- a watering can with a sieve style head
- soil mix (soil, sand, and gravel)
- grass seed (rapid growth)
- two coffee filters and coffee filter holders
- two large empty coffee cans
- duct tape
- two empty juice cans or cartons of about 8 oz (240 ml) capacity
- wooden blocks to support the trays
- water

Procedure: Drill a small hole at the end of each tray at the center just above a line 1 inch (2.5 cm) from the top. Have students fill the two trays with soil mix to just below the drilled holes. Pack the soil mix slightly, but don't overdo it.

Leave one tray as it is, containing just the soil. For the second tray, ask students to spread a thin layer of rapid-growth grass seed evenly over the entire area. Have them gently press the seed into the soil, then place the seeded tray on a sunny windowsill.

Using the watering can, they should gently water the grass seed daily. When the grass is firmly rooted, you are ready to conduct the experiment.

Place both trays side-by-side on table with the ends with the holes lined up near the table edge. Place a wooden block under each tray at the end opposite the one with the hole. Place a bench at the end of the table to serve as a platform for two coffee cans, which will serve as water catchments for water draining from the two trays. Rest a coffee filter holder inside each coffee can. Place a filter in each filter holder.

Using waterproof tape, attach small "troughs" made from empty juice cartons or cans to the ends of the trays to guide the runoff from the trays to the filters (see figure above.)

Now, using the watering can, have a student gently pour about 17 oz (500 ml) of water over the tray containing just the soil. Have students record their observations. Measure and record the volume of soil that drained into the coffee filter. Next, pour the same quantity of water over the tray planted with grass seed. Students should record their observations and measure the volume of soil runoff. Encourage students to compare the movement of water through sites that have plant cover to those that do not.

Discuss how rivers and other bodies of water can be affected by surrounding areas with and without plant cover. Have students pour some sand or soil into a clear glass of water. Note how materials begin to settle out. Discuss how a stream or lake could be affected by an accumulation of sediment. High levels of sediment can adversely affect aquatic plants and animals. Relate your discussion to mine reclamation and the importance of revegetation to control stream sedimentation.

Extension: Introduce other variables (such as different slope angles, different rates of watering during germination, different compaction, and different percentages of vegetative cover) and record the results.

For a simpler activity: Have students make a mountain of soil in the middle of a pie tin. Next, have them squirt water on the mountains and record their observations. Next, have students rebuild their mountains, this time adding small stones or pebbles to the slope of the mountain. Once again, have the students squirt water on the mountain and observe and record the effects. Do the stones have any effect on the erosion? Finally, have students place small twigs onto the slope of the mountain. The twigs will represent trees. For a third time, have the students squirt water on the mountain and observe and record ten effects.

Extension: Have students inventory their school grounds to identify areas likely to have erosion problems and design a landscape to control erosion.

NATURE'S PUZZLE

Natural systems are complex arrangements of physical components (geology, topography, soils, climate, and weather), material cycles (water, for example) and biological components (plant and animal communities). When people change a piece of the natural landscape through mining, the effects involve many components of the earth's natural systems.

Objective: In this activity, students will relate the challenges of restoring an ecosystem to those of piecing together a simple puzzle. Students will describe the challenges of restoring a natural environment altered by natural and human forces.

Materials: Each small group of students will need:

- a puzzle pattern
- old magazines
- white glue
- scissors
- ruler
- poster board
- drawing materials

Procedure: Show students pictures of altered environments. Discuss how natural events (earthquakes, volcanic eruptions, floods, and fires) and human activities (road paving, mining, deforestation, dam construction, draining wetlands, and causing fires) affect natural habitats. What do students think should be done? Explain that the best solution is prevention wherever possible, and the next best solution is restoration. Together, list reasons for restoring systems (for example, erosion control, flood control, wildlife preservation, aesthetics, and the improvement of water quality).

Divide the class into small groups, and distribute to each group a copy of one of two circular puzzle patterns about 12 inches (30 cm) in diameter, one divided into pie-slice

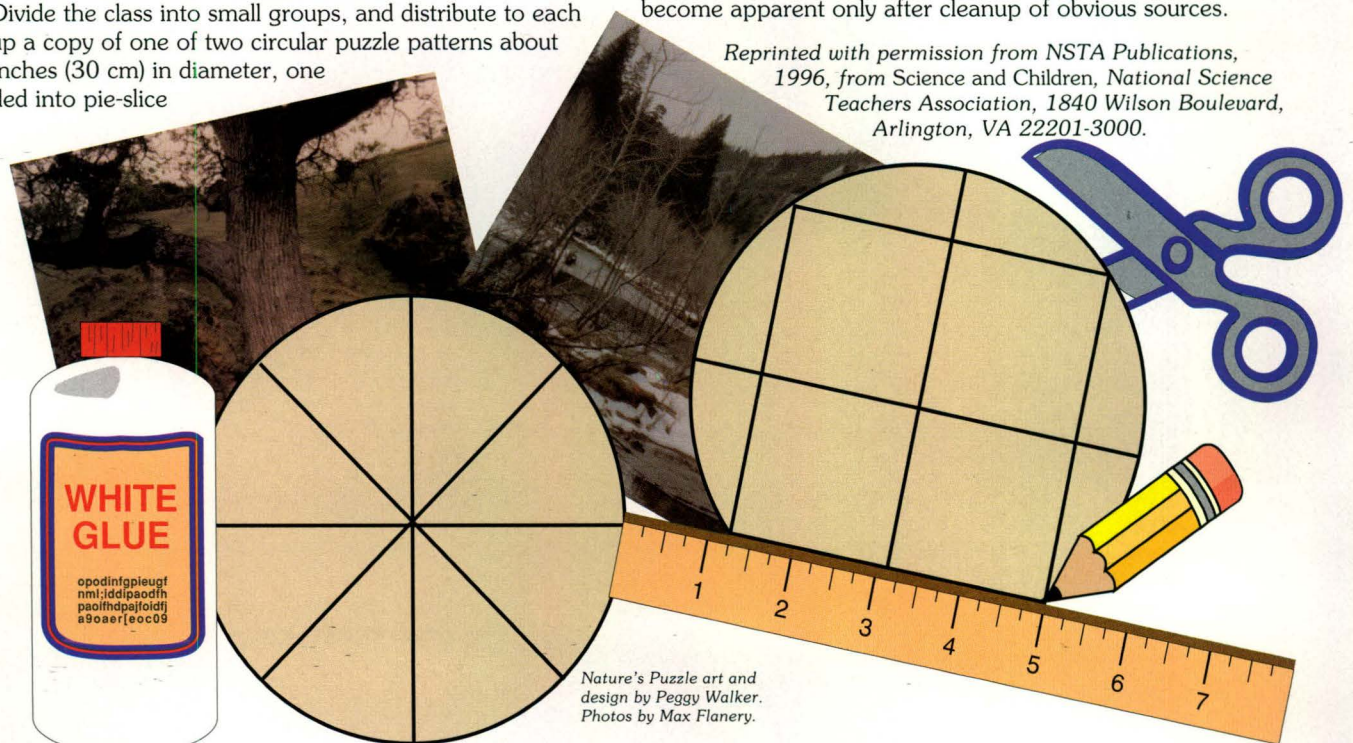
pieces and the other into small square and partially square pieces in a waffle-like grid. (The puzzle can be more or less complicated by number and shape of the pieces depending on the time available for the activity and the students' skill level.) Have students glue the puzzle pattern to the back of the poster board.

Have students reverse the poster board and carefully cut it on the lines of the pattern. Instruct students to scatter the puzzle pieces, explaining to them that they represent a natural area that has been disturbed.

Discuss with students the difficulties of putting ecosystems back together. Specifically discuss food, habitat, and shelter for the animals, as well as habitat for plants.

Tell students to arrange their scattered puzzle pieces face down. Have them switch places with another group, and ask the students to try to put the puzzle pieces back together without turning the pieces over. Have the students tape the puzzles together and turn the puzzles over. Some of the pictures may be accurately reconstructed, but because of identically shaped puzzle pieces that can be interchanged (without the visual clue of a picture to guide students), some may not. This emphasizes the point that for an ecosystem to function, the parts must be put together properly, and that missing parts make it difficult to restore. The thousands of geological disturbances resulting from historic hardrock mining in the west are good examples of the difficulties of reconstructing disturbed ecosystems. For example, at the Chalk Creek site in the Rocky Mountains, scientists working on restoration efforts have determined that even with total cleanup, it could take decades to see complete restoration of water quality there. Additional causes of contamination are likely to become apparent only after cleanup of obvious sources.

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Nature's Puzzle art and design by Peggy Walker. Photos by Max Flanery.

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View southeast along Highway 49 toward Peñon Blanco Point (in sunlight) at the Tuolumne-Mariposa county line. This portion of the Mother Lode is marked by prominent knobs held up by hard, massive quartz veins ("bull" quartz of the miners). Despite their dramatic appearance on the landscape, most of the explored parts of these veins contain little or no gold. *Photo by Chris Higgins.*



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