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CALIFORNIA STATE MINING BUREAU.

WM. IRELAN, JR., State Mineralogist.

ELEVENTH REPORT

OF THE

STATE MINERALOGIST,

(FIRST BIENNIAL.)

TWO YEARS ENDING SEPTEMBER 15, 1892.



SACRAMENTO:

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1893.

that there is in the bed of Oro Fino Creek considerable placer gold, no effort has yet been made to obtain it. The difficulty to be contended with is lack of drainage.

#### KLAMATH RIVER.

The drainage of all the auriferous area of Siskiyou County ultimately finds its way to the ocean through the channel of Klamath River. It is a crooked, torrential stream, with tremendous flood stages, and a volume of flow only exceeded in the State by the Sacramento. From Cottonwood Creek to the mouth of Salmon River, a distance of 140 miles by the meanders of the river, the fall is, in round numbers, 1,700 feet, an average of a little over 12 feet to the mile. This is the auriferous portion of the river in Siskiyou County. In the immediate cañon of the river the deposits are practically all placers. The only quartz that I learned of was a blanket ledge, very much decomposed and lying exposed on the surface, situated on the north bank of the river, about a mile below where Ash Creek comes in. This was discovered in July, 1891, by following up float found in a river claim. Since that time over \$10,000 of gold has been literally picked up on the surface, some of the chunks being very large, one \$500.

The placers are the river bed for many miles, drift diggings in a few of the bars, notably at Hamburg Bar, below the mouth of Scott River, and hydraulic placers, principally in the benches, some of them as much as 500 feet above the present river bed. These bench deposits are most extensive and characteristic in the vicinity of Happy Camp, though scattered along the river from Hamburg Bar to Salmon River. The gold in appearance is very uniform, being a fine scale gold, smooth and water-worn. There is very little flour gold, and only a few claims produce nugget gold. One of these is a small hydraulic mine, just below Hamburg Bar, where the gold is in appearance similar to that mined at Scott Bar, on Scott River. Another is the upper end of the auriferous portion of the river, at the mouth of Cottonwood Creek, and below where the blue gravel channel is cut by the Klamath River, the source of the coarse gold being undoubtedly the blue lead channel. The bed, bars, and benches of the Klamath River in the aggregate of forty years of mining have yielded an enormous amount of gold, and much yet remains in the unworked ground.

The source of this gold, like that of many others of the California rivers, is not immediately adjacent. The river cuts across the main gold-bearing rock belt of the county, but that portion of it is not known to contain gold-bearing veins, the exceptional instance being noted above. The blue lead channel, near the junction of Cottonwood Creek, is only cut off for less than half a mile, and erosion has taken place to so slight a depth below its old bed as to preclude the idea of any gold derived from it having traveled far down the river. East of Cottonwood Creek no gold is found in the river or any of its tributaries. Generally where the river finds its bed in the slates, the latter are full of seams and masses of quartz, which, however, are not gold-bearing.

It is almost a certainty that the great bulk of the gold in the main river placers comes originally from the erosion of certain of the tributaries which cut the gold-bearing belt where it was rich in gold-bearing quartz veins. These tributaries are Shasta River, Humbug Creek, Little Humbug, Scott River, and Salmon River on the south, and Cotton-

wood, Beaver, and Indian Creeks on the north. Of these last three, Cottonwood Creek derived its gold from the erosion of the blue lead channel which lies west of it at a slightly greater elevation, and Indian Creek from the most westerly of the gold-bearing rock belts of Northern California, elsewhere more particularly described.

As compared with the other rivers of the auriferous regions of the State, the erosion of the Klamath has undoubtedly been coexistent with that of the present channels of the Feather, Yuba, and American, as distinguished from the period of erosion of their now drift-filled and lava-capped channels. The blue lead channel of Siskiyou, referred to as being crossed by the Klamath just below the junction of Cottonwood Creek, is likely the contemporary of the oldest of the latter, if, indeed, more complete investigation shall not demonstrate it as even older.

In Humbug Creek the placers are continuous from the river up to the quartz veins that undoubtedly formed them. Salmon River is similar in this, except that the placers have not been as rich, nor as continuous. Scott River, on the contrary, has tributaries that contain very extensive and rich placers, but the main river itself, except for the last 3 or 4 miles above its junction with the Klamath, and for the most part below where Mill Creek comes in at Scott Bar, has no placers. The South Fork has the Callahan's Ranch placers. All of the tributaries from the west have some gold; Oro Fino and Shackelford Creeks have very rich placers close down to their junction with the river, and on the eastern side of the valley, Indian and McAdams Creeks have equally rich and extensive areas of placers.

Reference has been made, in connection with the Quartz Valley placers, to the evidences of an old channel on the west side of the valley carrying coarse, river-washed gold. At several points above the present channel of Scott River, I am advised that small areas of similar wash remain, indicating the continuity of this channel toward Klamath River. It is, however, a singular fact that neither Scott River nor its western side ravines and cañons between Shackelford Creek and Scott Bar have any placer deposits. The conclusion is almost a certainty that the gold in the placers of Klamath Cañon, in Siskiyou County, came from Humbug and Little Humbug Creeks more largely than from any other source. Next to them in importance as contributing streams were Shasta and Scott Rivers and Indian Creek on the north from the Siskiyou range.

The bench placers present very interesting phenomena of the erosive action of water. It is noticeable that they lie on soft rocks as compared with the inclosing rocky walls of the narrow cañons immediately below. But the bedrock levels of the benches and of the present river beds in those portions of the river flanked with benches are regular, and have less than the average mean fall as compared with the portions of the channels in the precipitous cañons. The explanation is in the more rapid erosion of the softer rocks flattening the channel grade, which causes it to fill with drift gravels in flood stages; these latter in turn accumulating, turn the erosion of the river into a new channel on the one or the other side of the first one; this new channel, in its turn becoming flat and filling at a lower level as it catches up with the slower erosion of the hard rocks of the cañon below, is again left on one or the other side of a new channel. This is the geological process, indefinitely repeated, of the formation of the high benches and wide

season of 1892-93. When running it is a large producer and employs a large number of men.

#### COTTONWOOD.

This district is exclusively placer in its mining industry. It is located on the north side of the Klamath River, 18 miles northeast of Yreka. Originally noted for its rich, shallow diggings in Cottonwood Creek and the ravines tributary to it from the west, its special interest now is in the development of the old blue lead channel, which is here exposed by erosion of the capping sandstones, and where cut through by the Klamath River. Aside from some unimportant placer mining with rockers on the gravels of Cottonwood Creek, the only mining is on the blue lead, where it is cut by the Klamath River, 2 miles south of the town of Henley, formerly Cottonwood. This mining is being done by what is known as the Blue Gravel Mining Company (incorporated). Their locations include a tract of land extending 2 miles north of the river, and covering the blue lead channel, which can be distinctly traced by its exposed rims from 1,000 to 1,200 feet apart. The sandstone capping is full of fossils and pebbles in places, but where clear is of excellent quality for industrial use. It is extensively used in the construction of the culverts of the California and Oregon Railroad, which runs through the valley of Cottonwood Creek, 2 miles east of the deposit. Both the channel and the capping are considerably displaced, and dip on an angle of about 10° to the east. Though the compact cemented blue gravel had been discovered and mined to some extent in one of the ravines tributary to the Cottonwood, it was not until 1887 that the outlet of the channel was discovered and located on the Klamath River. The outlet was first drifted on with prospect tunnels, and then rigged up as a hydraulic mine. Away from the action of the atmosphere the gravel is blue and strongly cemented and compacted, requiring powder to break it up for piping. The gold is coarse, large nuggets being frequently found. Most of it lies on or close to the bedrock. So compact and cemented is the gravel that I am of the opinion that certainly one third of its gold is carried through the sluices and into the dump. Despite this probable loss the mine has been very productive for the work done. In three seasons only a small pit on the west rim has been washed out, and the ground is hardly opened. The average pay per square foot of cleaned bedrock off the outer rim is \$1. Gravel from a drift on the bedrock in the lower portion of the pit washed up at the rate of \$6 a cubic yard, and the average of all the ground hydraulicked has been 24 cents a cubic yard. In the year 1892, sixty days' run with 700 inches of water used from reservoirs that only gave two hours run at a time, returned \$12,000, being at the rate of \$200 a day, and 29 cents an inch for the water. The present hydraulic bank is 70 feet high, and contains considerable pipe clay hardened almost to the consistency of stone, and filled with angular rock fragments. For bank blasting Judson powder is used, and for making the powder drifts 50 per cent gelatine dynamite. In the pit a small quartz ledge carrying gold has been exposed. It is intended to prospect it by a shaft.

On the opposite bank of the Klamath River a prospect tunnel has been run to find the continuation of the blue lead southward. Blue gravel has been found, but not on the bedrock or in the channel. Operations were suspended at the time of my visit.

Adjoining the Blue Gravel on the north is the Black Jack-Drift Mine. It is being prospected by an incline shaft now down 180 feet, but not on bedrock. Some of the gravel coming out of the excavation of the incline was milled and yielded at the rate of \$3 a ton. Another lot milled \$6 a ton. The developments already made on this blue lead channel are so favorable as to warrant extended prospecting and mining on it at other points. For a number of miles of its course it is very advantageously located for opening and working.

Reference has been made to the existence of coal seams stratified with the sandstones. At Willow Creek, 4 miles from Ager, a 3-foot vein has been prospected by an incline for 340 feet, with 100 feet of crosscut, at a depth of 170 feet. A borehole sunk 700 feet east of the outcrop cut the seam at a depth of 134 feet. The seam is found uniform in thickness and of improving quality with increased depth. The prospect is owned by the Siskiyou Coal Company (incorporated), of Hornbrook, Siskiyou County. Nothing is being done with it at the present time.

#### MINERAL SPRINGS IN SISKIYOU COUNTY.

By W. L. WATTS, Assistant in the Field.

##### THE SHASTA SPRINGS.

These springs are owned by the Mount Shasta Mineral Springs Company, organized in Sacramento in 1889, their purpose being to develop and promote the sale of the Shasta and other mineral waters on the property owned by them in Siskiyou County, and to manufacture carbonated beverages from the waters of their springs.

On the Shasta Springs property three principal springs have been improved and utilized, viz.: the Shasta, the Glacier, and the Keystone springs. The Shasta Spring was first brought to notice in 1887 by the construction corps of the Oregon and California Railroad, and it is situated 4 miles from the town of Dunsmuir, on the east bank of the Sacramento River, which at this point flows through a deep cañon across the property of the above mentioned company.

About the time of the completion of the railroad, the Shasta Spring was improved in a crude way by the workmen, and became an exceedingly popular resort. The year following, the waters of the spring were piped for about a quarter of a mile to Mossbrae Falls, where a small pavilion was erected, forming an attractive stopping place for all trains. The attention of several capitalists was called to the remarkable medicinal qualities of the spring, and the present company was organized.

In May, 1890, the work of improvement and development was actively begun. An analysis of the water was made by Prof. W. S. Haines, of the Rush Medical College, and the bottling establishment was erected. The plan of piping the water to Mossbrae Falls was discontinued, for the water was found to lose carbonic acid gas in transit, and steps were taken to thoroughly develop the springs. The ground immediately around the springs was cleared, and the surface removed to bedrock, which proved to be a tufa, exhibiting microscopic lines of sedimentation; this was thoroughly cleansed and the main fissure from which the

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generally striking north to northeast and dipping east. Some of the principal veins follow this same strike and dip. There have been several subsequent minor movements, indicated by faults, shear zones and narrow veins and seams of quartz, striking in different directions. These in many cases faulted the earlier veins, as at the Hazel Mine. Many of the smaller pockety deposits are associated with intrusives such as diabase. In the Humbug district, some good ores were worked in serpentine, the principal mines having been the Boyle, Mountain Belle and Spencer. In general the work has been superficial. The best known mines in this entire region are the Morrison and Carlock, in Quartz Valley district, 4 miles northwest of Greenview, and the Hazel Mine southwest of Hornbrook.

Placer mining in this region has been on a small scale in later years, due to exhaustion of the more accessible ground and the protracted shortage of water. Developments in dredging are mentioned under the heading, Gardella Dredge.

From Cottonwood Creek southward along Shasta Valley, and past Yreka, extend the ancient sedimentary deposits flanking on the east what was formerly the so-called 'Cretaceous Island,'\* previously mentioned. These beds consist of clay shales, sandstones, and shore gravels or conglomerates. The shale and sandstone contain beds of coal, and some of the beds are remarkably rich in shell remains and casts. This series in the region of the coal workings south of Ager, dips east 23° to 40°, the former figure being nearer the normal dip. These beds have been broken by a series of basaltic intrusions which show in knolls throughout the valley. The conglomerate was cut by Klamath River and its nearby small tributaries in the region of Hornbrook and Cottonwood Creek, and was extensively eroded. This conglomerate was gold bearing and contributed a part of the gold mined from the placers of Cottonwood, Rancheria, and other nearby creeks, and the immediate section of the river. Eastward of the conglomerate, the gravels of Klamath River are said to be barren. A very interesting retailed account of this gold-bearing conglomerate written by R. L. Dunn, appeared in the Twelfth Report of the State Mineralogist, pages 459-471. The placers of the Cottonwood region, including Rancheria Creek, are estimated to have yielded about \$4,000,000. According to figures of yield reported by Dunn in the above paper, from workings then being mined, the conglomerate in the Blue Gravel Mine yielded 60 cents per square foot of bedrock when hydraulicked, this being only a part of the gold content, due to loss in the unbroken masses of conglomerate passing over the dump. The portion next the bedrock, when worked in an arrastra, paid 88 cents per square foot of bedrock. The conglomerate is overlain by Cretaceous sediments. The easterly area of sandstone and shale has been classified as Tertiary. Several unsuccessful attempts have been made to bring in oil wells in this vicinity and southward. Gas (probably dry marsh gas) was reported from a well 3½ miles south of Montague on the road to Grenada, and gas and alkaline water came from another shallow well. Six miles southeast of Montague, in the valley of Little Shasta River, some fresh water springs have been observed to emit gas.

\* See State Mineralogist's Report XXVII, pp. 5-25, for general geology of this area.

All the north-central portion of the county, as described above, is accessible by roads from Yreka and other nearby points on the Pacific highway. Yreka, the county seat, is 286 miles north of Sacramento by paved highway. The entire region is served with electric power by California-Oregon Power Company. Timber is lacking in the Shasta Valley section, but is obtainable in the western part of the area. Elevation of this region ranges from 2000 feet to 5000 feet and there is some snowfall in all parts of it.

#### Klamath River District.

Until a few years ago the terrace deposits and bars along the Klamath River, and the placers along several of its tributaries, were the scene of the principal mining operations in the northwestern part of the county.

The country tributary to the Klamath on both sides remains for the most part difficult of access. The road following the river from the Pacific highway near Hornbrook to Martins Ferry climbs over the Bald Hills of Humboldt County to a connection at Orick with the coast highway. It is 76 miles from Hornbrook to Happy Camp over this road. For a distance of 120 miles from near Hornbrook to Somes Bar, it follows the course of the Klamath River in this county and makes accessible one of the most extensive mining regions of the state. While the smaller and more easily worked placers along the river have been mined, there remain many terrace gravel deposits of interest to the hydraulic miner and numerous low bars offering possibilities for small scale drift mining operations. The gold quartz veins have not yet been prospected far enough to permit a fair opinion of their possibilities, but some very promising showings are being made. The area from the river northward to the Oregon state line and westward to Del Norte County, comprising many separate isolated districts, may be classed as the base metal district. At the west end, in the Preston Peak country, are numerous small copper prospects, now all idle. The Buzzard Hill Mine on the south and the Grey Eagle property north of Happy Camp mark a valuable copper mining district, sufficient work having been done to prove large orebodies in the latter mine. Quicksilver ores occur along the watersheds of Beaver Creek and Empire Creek, and copper and zinc ores have been noticed in the latter locality. From Indian Creek eastward to the railroad a number of gold quartz mines, mostly of pockety nature, have been opened. Prospecting and development of such properties is now going on along the upper courses of Indian, Thompson, Horse, Beaver and other creeks. On Independence Creek, 14 miles south of Happy Camp, the Independence Mine has made a fine showing of phenomenally rich gold specimen ore.

The Klamath River district as a whole is well supplied with standing timber and water for mining purposes. While the people of California have forbidden the building of dams in the Klamath River, the question of utilizing waters of the river for hydro-electric power generation is complicated by the matter of jurisdiction, most of this mining region being in the national forest, and to a certain extent under federal control.

At Happy Camp local miners think that large yardages of gravel left behind by former hydraulic operators can now be worked at a

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PART VI.

The Counties of

Shasta, Siskiyou, Trinity

By G. CHESTER BROWN, Field Assistant.

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INTRODUCTION.

The three counties presented herewith are situated at the extreme north end of the State, and midway between the eastern and western boundary counties. They thus include the upper end of the Sacramento Valley, with its northernmost tributaries, also portions of both the Sierra Nevada Mountains on the east and the Coast Ranges on the west, the two systems forming a junction at Mount Shasta in Siskiyou County. Lassen Peak which has recently been attracting attention by its renewed volcanic eruptions is in southeastern Shasta County.

The drainage systems of western Siskiyou and Trinity counties are tributary to the Klamath and Trinity rivers which flow direct to the Pacific Ocean. This western drainage area is the only district in California where hydraulic mining is still active on any considerable scale, because of the silt question not affecting any navigable streams.

Though the central part of this section of the State is traversed north and south by a transcontinental railroad line, the greatest drawback to the development of the three counties in question is lack of transportation facilities. This is particularly true of the distinctly mineral areas, in the rugged, western mountains. In addition to the mineral output, lumbering and stock raising are important industries.

Acknowledgment is here made of assistance rendered by the various owners and operatives of properties, both during the field work and in the subsequent preparation of this report.

There are several large quartz ledges on Quartz Hill, which is across the river from Scott Bar, and one ledge is said to have yielded the Quartz Hill Hydraulic and Quartz Mining Company considerable gold. The surface has been rich hydraulic ground.

Bibl.: Report VIII, p. 605; XI, p. 447.

#### Humbug Creek.

This district, on the northeastern slopes of Old Baldy, is exclusively a quartz mining region, and is situated in the headwater forks and canyons of Humbug Creek, about 16 miles northwest of Yreka. The first mining in the district was carried on in 1854, and since that time considerable gold has been produced, although the operations have been practically confined to surface workings, due to a theory that the pay ore did not go down. As a matter of fact, a more intelligent exploration of the ore bodies has disproved the conclusions of the pioneer miners, and the properties that have been worked to any depth at all have yielded good returns, the Spencer and Mountain Belle mines being examples. The ledges in the serpentine are small, averaging 1 foot in width, and upon reaching the water level carry the gold largely with the sulphurets. The adjacent slates and granites are full of ledges carrying low-grade gold ores. The sulphurets consist of pyrite, blende and galena.

Bibl.: Report XI, p. 444.

#### Cottonwood.

This district, containing both placer and quartz mines, is located on the north side of the Klamath River, some 20 miles northeast of Yreka, and to the west of Hornbrook, a station on the Oregon branch of the Southern Pacific Railroad. It was originally noted for its rich, shallow diggings in Cottonwood Creek and the ravines tributary to it from the west. The old blue lead channel, famous for its rich gravel, is here exposed by erosion of the sandstone capping and cut through by the Klamath River. The gravel is blue and strongly cemented and compacted, while the bank contains considerable pipe clay hardened almost to the consistency of stone and filled with angular rock fragments. The gold is coarse, occurring mostly on or close to the bedrock. Both the channel and the capping are considerably displaced, and dip on an angle of about 12° to the east. In 1887 the outlet of the channel was discovered on the Klamath River, although the blue gravel had been mined in one of the ravines tributary to the Cottonwood, several years previous to that time. Some of the gravel on the bedrock gave returns of \$6 per cubic yard.

The quartz prospects have been only partially developed and there is but little mining activity in this district at the present time. The country rocks, slate and quartz-porphry contain many quartz ledges which carry gold values sufficient to warrant careful investigation.

The *Hazel*, with a gold production record of over \$500,000, is the only quartz property that has been worked to any extent.

Bibl.: Report XI, p. 448.

#### Callahan.

The placer mines in this district are confined to the old gravel channel and bars of the South Fork of Scott River. The channel and high bars of the main Scott River, below the junction of the South and East Forks at Callahan, was mined for a distance of 3 miles, and a large annual gold output obtained. The high bars have been worked out and abandoned for a number of years, and the gold in the river channel is at such a depth that it cannot be profitably mined. On the South Fork, a few claims in the gulches and high bars are worked whenever water is available. On Jackson Creek, one of the headwater streams of the South Fork, 7 miles above Callahan, hydraulic mining is pursued on a small scale. The Montezuma River claim, 1 mile southwest of Callahan, was the largest gold producer, having a record of \$50,000 annually.

Bibl.: Report XI, p. 433.

#### Happy Camp.

This district, also known as Indian Creek, is situated at the confluence of Klamath River and Indian Creek, some 70 miles west of Yreka, and contains both placer and quartz mines. The shallow and more easily removed gravel deposits have been worked out, but the benches are still being hydraulicked for their gold content. There is a large expanse of mineral land yet to be developed. The shallow diggings yielded large returns and were worked over by the Chinese after being abandoned by the white miner. The Classic Hill, on Indian Creek, one of the famous hydraulic mines of this district, was worked for a number of years by Chinese. The formation consists of a soft talcose slate, intercalated with stringers of quartz, which in places concentrate and form a well defined quartz vein, rich in gold, the deposit being known as "seam diggings." The quartz prospects are worked in a very limited way. The Grey Eagle copper mine is the only developed property in the district.

#### GOLD MINES—QUARTZ.

*Advance*, in Sec. 17, T. 40 N., R. 10 W., in the Liberty mining district, 13½ miles southeast of Etna Mills, in the Klamath Reserve. Owners, Advance Mining Company, of Denver; president, H. E. Wood; watchman, C. Ritz. Comprises 100 acres, patented, on Cow Creek. Short ore shoots in dioritic schist and limestone; 400-foot tunnel, drifts and stopes. Equipment consists of 1500-foot tramway, dwellings, and 5-stamp mill, driven by waterpower (water from Russian Creek,