

NOTES ON THE BOHEMIA MINING DISTRICT, OREGON.

By DONALD FRANCIS MACDONALD.

INTRODUCTION.

The Bohemia mining district is in Lane and Douglas counties, west-central Oregon. It lies on Calapooya Mountain, in the western foothills of the Cascade Range. The district is about 30 miles southeast of Cottage Grove, a small town on the Southern Pacific Railroad. The Oregon and Southeastern Railroad runs from Cottage Grove to Disston, within 12 miles of the mines, which are reached by stage.

In August, 1908, the writer made a short stay in this district and incidentally to other work visited some of the larger mineral properties. For some of the data presented herein he is indebted to Mr. J. S. Diller, of the United States Geological Survey, who made a reconnaissance of the region in 1898,^a and for many courtesies to Messrs. L. D. Ryan, F. J. Hard, W. W. Warner, and other mining men of the district.

PHYSIOGRAPHY AND GENERAL GEOLOGY.

The relief of the district is pronounced. Several peaks are more than 6,000 feet high, and the elevation of the lowest valleys is less than 2,000 feet. This bold relief is the result of mountain glaciation and stream erosion. The luxuriant vegetation due to the humid climate has somewhat masked the geologic features of the region. Great forests clothe the mountain slopes and the region is notable for its timber value.

The rocks of the district are andesitic lavas and tuffs of Tertiary age, which are cut by dacite porphyry and probably by basalt. The andesites are the most abundant rocks. Seven consecutive flows, aggregating 500 feet in thickness, appear on the south face of Bohemia Mountain. They vary from light to dark gray in color and in hand specimens show small elongated phenocrysts of feldspar and very small greenish crystals of pyroxene or chlorite. In weathering the rock assumes a light-gray to buff color, the feldspars becoming white and powdery. Good exposures of andesite are shown on Bohemia, Elephant, Fairview, and Grizzly mountains.

^a The Bohemia mining region of western Oregon: Twentieth Ann. Rept. U. S. Geol.

OTHER COPPER MINES.

As already stated, there are several small mines adjacent to the Queen of Bronze mine, and owned by Mr. Tutt and his associates. Considerable development has been done on these properties, and from three of them—the Cow Boy, the Lyttle, and the Mabel—about 4,000 tons of ore has been smelted. The characters of the ores, their modes of occurrence, and their associations are similar to those of the Queen of Bronze mine.

Some distance to the northeast of the Queen of Bronze mine is a prospect owned by Doctor Spence. On this property considerable work has been done and some good ore has been found.

PROSPECTS OF STIBNITE, JOSEPHINITE, AND CINNABAR.

Within the area here described stibnite, josephinite, and cinnabar have been found in small quantities.

A stibnite prospect is located in the SE. $\frac{1}{4}$ sec. 24, T. 40 S., R. 4 W., about 3 miles north of Watkins, on Applegate River. It is owned by C. M. Buck, of Watkins. The ore occurs in the fractures of a fine-grained brecciated greenstone. From a trench about 50 feet long and a tunnel about 25 feet long several tons of good ore has been mined. Where the ore is exposed the antimony sulphide is being changed to antimony oxide.

The mineral josephinite has been found only in the placers of Josephine Creek, in Josephine County. It is an alloy of iron and nickel, containing 60.47 per cent of the latter.^a When the mineral is polished it has the appearance of metallic iron or nickel. Although it has not been found in the rocks, the mineral in the placers has probably come from the serpentine through which the stream has cut its channel.

A small prospect of cinnabar, the sulphide of mercury, is located on Palmer Creek, a western branch of Applegate River. Although a considerable amount of the mineral is reported to have been found with the gravels of the stream, very little has yet been found in the surrounding rocks.

^a Am. Jour. Sci., 3d ser., vol. 43, p. 509.

The tuffs, in the main, are of andesitic composition and at many places are interbedded with andesite flows. A tuff composed of coarse fragments occurs near the White Ghost claim on City Creek. Fine tuff interbedded with lava is shown in the crosscut to No. 2 level in the Noonday mine. The slope east of Horseheaven Creek shows a considerable area of light-gray stratified tuffs. Fine gray banded tuffs were seen on the slopes below Judson Rock. These tuffs are contemporaneous with the andesites, particularly with the later flows.

A light-gray rock, probably dacite porphyry, cuts the darker andesites and tuffs in many places. This rock on fresh fracture shows minute aggregations of quartz, larger crystals of feldspar, and small dark crystals of pyroxene and hornblende. The fine groundmass between the large crystals is gray to slightly greenish, the green tinge being due to the presence of chlorite. This dacite porphyry cuts andesites and interbedded tuffs at several places along the road about halfway between Disston and Orseco. It also occurs within half a mile of the Musick mine, both to the northeast and to the southeast.

Basalt occurs in one or two small outcrops. It is a fine-grained, dark lava, best shown on the south edge of Bohemia Mountain. Its small outcrop suggests that it is intrusive in the andesite.

ORE DEPOSITS.

The ore deposits of this district are fissure veins, which cut the andesites and tuffs. Small sulphide impregnations also occur in the vicinity of altered diabasic dikes, but they have no economic value. The general strike of the veins is north to northwest, with a dip of 60° to 85°. They vary from 1 foot to 12 or 15 feet in width. Some are single veins; others consist of two or more parallel veins, separated by a few inches to a few feet of highly altered country rock. At the Musick mine there are three parallel veins, 1 to 4 feet in width, separated by thin walls of altered country rock. Only the fissure veins which have suffered postmineral fracturing have produced profitable ore. These veins, because of their oxidized and easily workable condition, gave good returns in free gold in their upper workings. Veins which have not been fractured since they were mineralized, or which are situated in regions of maximum erosion, such as old glacial cirques, show sulphide ores at the surface. They are tightly cemented and relatively impermeable and represent the conditions of mineralization that prevail in all the veins below the oxidized zone. The minerals which they contain are sphalerite, pyrite, a little galena, and very little chalcopyrite, with a gangue of quartz, altered country rock, and some calcite. So far these veins have not been found profitable, because their sulphide ore can not be cheaply treated, the tightness with which the ore is cemented makes mining more expensive, and the gold tenor is less than that of the oxidized material.

HYDROTHERMAL METAMORPHISM.

In the vicinity of the veins the mineralizing solutions have greatly altered the country rock. Several hundred feet distant from a vein the dark color of the rock is in many places changed to a greenish tinge, while close to the deposit it is gray to buff in color, has a clayey appearance, and crumbles easily. The pattern of the rock is fairly well preserved, however, the outlines of the feldspar phenocrysts being clearly visible, though the feldspar material has been changed to a white or yellowish powder.

Under the microscope it is seen that the basic feldspars have altered into sericite, calcite, and quartz, the quartz, however, being in relatively small quantity. The ferromagnesian minerals have been changed to calcite and the iron in them appears now as limonite or hematite. Farther away from the vein, where metamorphism was less intense, these minerals have reached only the chloritic stage of alteration. In many veins soft disintegrated country rock forms a considerable part of the vein matter. An examination of this material showed that near the surface it is composed essentially of very fine granules of quartz with considerable iron-stained kaolin. At greater depth the same rock contains an abundance of sericite and calcite with very little kaolin.

SECONDARY ALTERATION AND ENRICHMENT.

Some of the veins were brecciated after they were filled, and as a result oxygenated surface waters were able to percolate downward along the fractured zone. The ores were thus oxidized and sulphides leached out to depths of 100 to 300 feet, depending on the degree of brecciation and the rate of erosion. The gold occurred as threads and filaments included in the pyrite. The pyrite was leached away, leaving the relatively insoluble gold and some iron oxide occupying a part of the small cavity left in the vein material. This process brought about an association of free gold with iron-stained, spongy quartz and enriched the ore by leaching out the valueless sulphides. It also rendered the ore soft and porous, so that it is much more cheaply mined and milled than the unaltered ore.

Small local enrichments of free gold occur at the junctions of fissures; pyrite being abundant at these junctions, as shown by the mass of iron oxide left. It is probable that the smaller particles of gold were dissolved from the upper parts of the vein by the ferric sulphate solutions of oxidized pyrite and were precipitated by the local masses of pyrite below.

Some secondary sulphides were observed, but these are of no commercial value. They consist of pyrite crystals deposited in cracks in primary pyrite and of very small masses of sphalerite and galena.

MINING DEVELOPMENT.

Gold was first discovered in Bohemia in 1858. In 1875 the first mill, a five-stamp battery, was built on the Knott claim. From 1877 to 1891 little was done in the district. In the nineties the Musick, Champion, Noonday, Vesuvius, and several other mines became active, and mills aggregating 35 or more stamps were built. At the time of visit, in August, 1908, no ore was being milled in the district, nor had any milling been done since the previous summer. Several companies, however, had men employed in prospecting and development.

Figures for the total output of the camp are not available. As nearly as can be judged from the statistics published in "Mineral Resources of the United States," and from verbal reports, the total product is probably between \$300,000 and \$400,000, mainly in free gold. Although some rich shoots occur locally, the average tenor of the ore is low, generally running \$3 to \$5 a ton. The soft, spongy, iron-stained vein material is cheaply mined and milled. The cost of mining is from \$1.50 to \$2 a ton, and of milling little over 50 cents a ton. The concentrates range in value from \$20 to \$70 a ton and consist in the main of auriferous pyrite, with silver and a little lead and copper. Values less than \$25 a ton can not be profitably shipped because of present high freight rates.

The principal mines of the region which have produced values are the Musick, Champion, Vesuvius, Noonday, Helena, and California, and there are others of lesser note. The Musick leads in development, with about a mile of drifts along six 50-foot levels. Of these, levels 4 and 6 are reached by short crosscuts which tap the vein from the basin at the head of City Creek. About 2,000 feet to the west, on the other slope of the divide, a portal from one of the lower drifts opens out close to a good stand of mining timber. A shaft 80 feet deep connects directly with the two upper levels and through various stopes with most of the lower workings, thus giving good ventilation to the mine. Most of the ore was hauled out at the lower level, which attains a maximum depth of about 300 feet.

The Champion, Vesuvius, and Noonday have each about half a mile of workings. In the Champion most of the development work has been done on two levels, the lower of which attains a maximum depth of about 200 feet and is reached by a crosscut a few hundred feet in length through which all the ore is brought out. A considerable amount of stoping has been done, particularly where the greatest oxidation occurred. The lower workings here show considerable amounts of primary sulphides. The Vesuvius has been worked from several levels to a depth of about 300 feet and has many stopes. The steep slope on which it is situated has facilitated

its development by tunnels and has afforded a gravity transfer for the ore from stope to mill, as well as good ventilation and drainage for all the workings. The Noonday has three principal levels, all tapped by crosscuts from the steep slope of the Horseheaven basin; the lowest level attains a maximum depth of about 300 feet. Considerable stoping was done and the ore from the stopes was sent down to the mill on an aerial tramway about one-third of a mile in length. The Helena has more and the California somewhat less than 1,000 feet of workings. Both are developed by tunnels which will attain 100 to 300 feet of depth. The Helena has two levels and has produced some very rich specimen ore.

The ore from the Musick mine was hauled over a practically level electric tramway about a mile in length and dumped into the ore bins of the Champion mine. Thence the ore of both mines was sent down to the mill on a steep incline, 3,400 feet long. Haulage was effected by an endless cable to which the mine cars were attached by means of an automatic grab, the loaded cars going down pulling the empties up. The Musick-Champion mill, the largest in the district, has 30 stamps and is run by a water-driven electric generating plant located on Frank Bryce Creek, 7 miles below the mine. It handled the ore from both the Musick and Champion mines. The electric plant was designed to develop 300 horsepower and to operate the stamp mill, a small sawmill, and a local electric-light plant and to furnish mine power. A small auxiliary steam plant is provided for use in case of need. Other milling plants in the district are a 10-stamp mill at the Vesuvius mine, a 5-stamp mill at the El Calado property, and a 20-stamp mill on the Noonday group.

SILVER AND COPPER PROSPECTS.

The Riverside and Oregon-Colorado claims are promising copper prospects which show some good chalcopryrite ore and are located on strong veins. The Combination property covers a somewhat extensive lode, consisting of one large vein and some smaller veins, and is said to have produced ore which assayed more than 25 ounces of silver to the ton.

FUTURE OF THE DISTRICT.

The Bohemia district contains many well-defined veins and lodes. Many of those which show on the surface have not yet been explored, and no doubt many more are obscured by the dense vegetation which covers a large part of the district. It seems reasonable to suppose that other mines will yet be opened, and will find workable gold ore at least in the upper and oxidized portion of the veins. Workable bodies of copper and silver may possibly be discovered in the district.





A GEOLOGICAL FIELD TRIP GUIDE FROM COTTAGE GROVE, OREGON
TO THE BOHEMIA MINING DISTRICT

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This article, a companion to the "Overview of the Bohemia Mining District" (Ore Bin, May 1978), is the last in the four-part series on mineralization in the Western Cascades. The route of the self-guided trip and locations of checkpoints mentioned in the article are indicated on the centerfold map. Titles of the other articles in this series and sources of additional information on individual mines and the geology of Lane County are given on page 116.

Anyone taking this field trip is warned of the dangers of entering abandoned mines, caves, open pits, and quarries. Remember, you enter any mine at your own risk, and the greatest dangers are those that you cannot see until it is too late. Mines that look safe to you may instead be extremely dangerous.

Road Log

(Circles indicate checkpoints; triangles are parks; squares are mines.)

- | (1) | (2) | (3)* | |
|-----|-----|------|--|
| ① | 0.0 | 0.0 | Starting point is the junction of Interstate Highway 5 on-off ramp east of the Interstate and Row River Road. Take Row River Road south, passing the Village Green Motel, to Thornton Road South. |
| ② | 0.4 | 0.4 | Turn right on Thornton Road South and go to Mosby Creek Road junction. |
| ③ | 0.1 | 0.5 | Turn right. You are now traveling west on Mosby, which, after a few city blocks, becomes Main Street. Follow Main until it crosses the bridge over the Coast Fork of the Willamette River. Turn right onto North River Road; then, within half a block, turn left onto "H" Street. The Cottage Grove Historical Museum is two blocks ahead on the left, at the corner of Birch Street. |
| ④ | 1.4 | 1.9 | Cottage Grove Historical Museum. The museum (Figure 1), housed in an octagonal-shaped former Roman Catholic church that was built in 1897, is a joint |

* (1) Checkpoints; (2) Mileage intervals; (3) Cumulative mileage.

project of the city of Cottage Grove and the Cottage Grove Historical Museum Committee.

On display are some of the crude mining tools from the Bohemia mining district, including a working model of an ore stamp mill that shows how gold was extracted from ore taken from mines located east of Cottage Grove.

In July and August, museum hours are Wednesday through Sunday, 1-5 p.m.; the rest of the year, the museum is open 1-4 p.m. Saturday and Sunday on the second weekend of each month.

Return to checkpoint 2.

- ② 1.6 3.5 Row River Road and Thornton Road South junction. Turn right onto Row River Road.
- ⑤ 1.4 4.9 U.S. Forest Service Ranger Station, on Cedar Park Road, which intersects on the left. Here you may obtain a copy of the Forest Service's "Tour of the Golden Past," containing more information about Bohemia.
- ⑥ 2.5 7.4 Row River Road-Government Road junction. Turn left onto Government Road, which soon crosses and then follows the old OP&E Railroad, built by and for the Bohemia miners in the early 1900's. Now the railroad serves mainly the lumber industry.
- ⑦ 1.1 8.5 Cerro Gordo Mountain. Dorena Reservoir viewpoint and parking lot are to the right and past the roadcut. Park, walk back about 200 ft, and examine the roadcut. The rock high up in the cut is from a lava which flowed over an earlier, already cooled lava flow. Note the bright red color at the contact between flows. The color is caused by heat from the overlying flow baking the material below. Both flows are part of the Little Butte Volcanic Series as mapped by Peck and others (1964). In some parts of the roadcut, sedimentary material occurs between the lava flows (Figure 2).
- ⑦5 4.2 12.7 At milepost 10, to the left about 50 ft above road level, is Pinnacle Rock (Figure 3), a needle-shaped erosional remnant left when soft, weathered, outer rock was worn away, leaving behind the harder, unweathered core. On the return part of the trip, at checkpoint 75, you will see Pinnacle Rock from across the reservoir.
- ⑧ 2.2 14.9 Stop sign at junction with Row River Road. Across the road and to the right is an old covered bridge. Turn left onto Row River Road.
- ⑨ 1.0 15.9 You are now traveling around a bend in the river. Because river currents are always stronger on the outside of a bend, this is the area where it is hardest to keep a highway from being washed away. Here, during the 1964 flood, the river took the highway completely out and washed away the steel railroad track on your left, wrapping it up along the mountainside.
- ⑩ 1.1 17.0 Dorena Post Office and business district on the right.
- ⑪ 2.3 19.3 Row River Road-Sharps Creek Road junction. Turn



Figure 1. Cottage Grove Historical Museum (checkpoint 4).



Figure 2. Little Butte Volcanic Series lava flow rock overlying sedimentary material (checkpoint 7).

Figure 3. Pinnacle Rock, about 50 ft above road, visible from across the reservoir at checkpoint 75 on return trip.



right onto Sharps Creek Road and cross the bridge. The "Red Bridge" sign is the Forest Service "Tour of the Golden Past" mile point 0.0.

⑫ 0.3 19.6

Alteration zone. The rock face on the right shows zeolitic (green-colored) alteration. Such zones can be identified by the alteration of pyroxene, hornblende, and volcanic glass into green clay. Zeolites, carbonate minerals, and chalcedony have been introduced into the original rock.

⑬ 0.9 20.5

Rock quarry on the right. Mining in Oregon today generally means sand and gravel and stone. During 1975 (latest year for statistics), stone production from mines such as this was 21 million tons, making stone the mineral commodity with the greatest output. Sand and gravel production during the same period was 17 million tons. No other mineral commodity in Oregon came close to these totals.

△ 14 2.2 22.7

Sharps Creek Recreational Area on the right. This Lane County park rests on a stream terrace underlain by a gravel deposit. In the past, the stream bed was at a higher level and the stream had a lower gradient. Then the stream eroded laterally, cutting a broad valley. Now, with a steeper gradient, the stream is instead downcutting a narrow channel.

Just before you reach checkpoint 15, you cross a bridge listed in the Forest Service Tour.

15 3.7 26.4

The rock face on the right (Figure 4) has a complex geological history. As you face the outcrop, the rock jutting out on the right is a volcanic breccia with angular fragments from 0.1 to 7 in long. On the left is black basaltic lava flow rock. The 2-ft-wide vertical band of rock in the center is a dike. Between the dike and breccia and between the dike and basalt are zones of zeolitic and hydrothermal alteration. The flat face on the breccia next to the alteration is a fault plane. Slickensides, polished and striated (scratched) surfaces resulting from rocks moving past one another along a fault, occur high on this fault plane against the alteration zone. The slickensides dip toward the road slightly, showing that movement along the fault was mostly horizontal. The dike is parallel to the fault plane. Massive and crystalline calcite occur within the alteration zone.

Examine the black basalt on the left. Just above the road level, you can see quartz and another type of volcanic breccia. Fragments of basalt, about 1 or 2 in across, are cemented together by white quartz (Figure 5). The geological events at this stop include the faulting of two different types of rock against each other. Then a dike intruded along the zone of weakness created by the faulting. The basalt was crushed during faulting, forming a small breccia zone within the basalt. Hot-water action produced zeolitic alteration. At this stop, yellow and brown clay minerals formed, in contrast to the green minerals found at checkpoint 12. The water here may have been hotter and more highly mineralized than the water at checkpoint 12.

16 2.1 28.5

Arrastra mine, located a short distance up Walker Creek and abandoned about 1900. An ore-grinding mill called an arrastra, powered by water from a falls in Sharps Creek, was set up on the flat area between Sharps and Walker Creeks. Here ore was crushed to powder and gold was separated from the crushed ore. Although no evidence of the old arrastra remains, you may be able to find where holding bolts were fastened to the rocks.

17 0.2 28.7

Yellow-brown alteration in roadcut to left. This 100-ft zone has been silicified and pyritized, making the rock so hard and resistant to erosion that it formed the falls used as a water source for the arrastra. These types of alteration zones or areas within them are often gold bearing.

18 0.3 29.0

Gold Bottom unimproved campsite on the right, part of an old mining site. At the creek below the parking area, a cut was driven into a pyritized and silicified white- to gray-colored fracture zone. Small pyrite crystals and secondary quartz veinlets can be seen on broken rock surfaces in this zone. Apparently values were nonexistent or too low to warrant mining.

19 0.2 29.2

Umpqua National Forest boundary sign. This forest of about 980,000 acres is managed by the U.S. Forest

*Figure 4. Checkpoint 15.
At left is basaltic
lava flow rock; in
center is alteration
zone cut by dike; at
right is volcanic
breccia.*

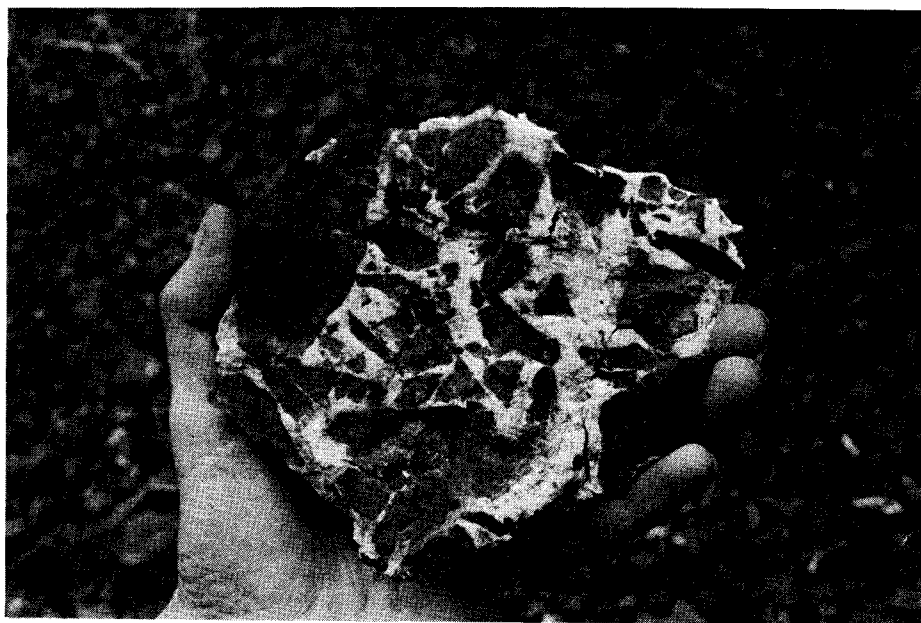


Figure 5. Breccia cemented by quartz (checkpoint 15).

Service under the Multiple Use Act of 1960.

⑳ 0.6 29.8

Fork in road. Take the left road and continue on Sharps Creek Road (Road 230).

㉑ 0.5 30.3

Stage Road sign on the right.

㉒ 0.6 30.9

Sailors Gulch (also spelled Saylor's Gulch). Placer gold was discovered on this small tributary of Sharps Creek in 1858. Water flowing over ore veins upstream picked up and carried gold particles in suspension until they were dropped as placer deposits farther downstream. Recovering this gold is called placer mining, in contrast to quartz or hardrock mining, whereby gold is extracted from bed rock.

△ 23 0.8 31.7

Mineral campground. This now peaceful spot was, at the turn of the century, the last stop for miners and freighters before they began the long, hard trip to Bohemia Saddle. At one time, a two-story hotel (Figure 6) was located between Fairview and Sharps Creeks. A post office, general merchandise store, several mining claims, and an assay office were located here at Mineral.

The 6-mi road between Mineral and Bohemia Saddle is known as Hardscrabble Grade. According to early travelers, it took from 4 to 8 hours to cover this stretch of road. Freight wagons needing only four horses to go from Cottage Grove to Mineral required six to eight teams to get up Hardscrabble Grade. According to Nelson (1969), this section of the road was built in 1898; the County contributed \$700, and mining companies and miners supplied the remainder of the cost. Because the grade, especially the first 3 mi, is extremely steep and the road between Mineral and Glenwood is narrow, drive very carefully. Once you start up Hardscrabble Grade, you have little opportunity to turn around.

Most of the rock along the Hardscrabble Grade from here to checkpoint 27 (Glenwood sign) has been silicified and pyritized. The rock is hard, so mine adits driven into it stand well.

㉔ 0.8 32.5

On the left are three adits which, at the time of this writing, should be reasonably safe to enter. Do not enter any mine, adit, tunnel, open pit, or cut except those listed in this guide as being reasonably safe. Remember that conditions may deteriorate. Furthermore, any loose rocks near or within adits should be removed by a skilled miner before anyone tries to enter. You enter any underground opening at your own risk.

The first adit is about 15 ft long, the second about 50 ft long, and the third about 20 ft long. The adits have been driven in a silicified tuff breccia. The breccia fragments have been eroded and are soft, while the quartz that came in along the fractures between the fragments is very hard. Pyrite crystals can be seen on freshly broken surfaces. Where weathering could reach it, pyrite has been oxidized to limonite.

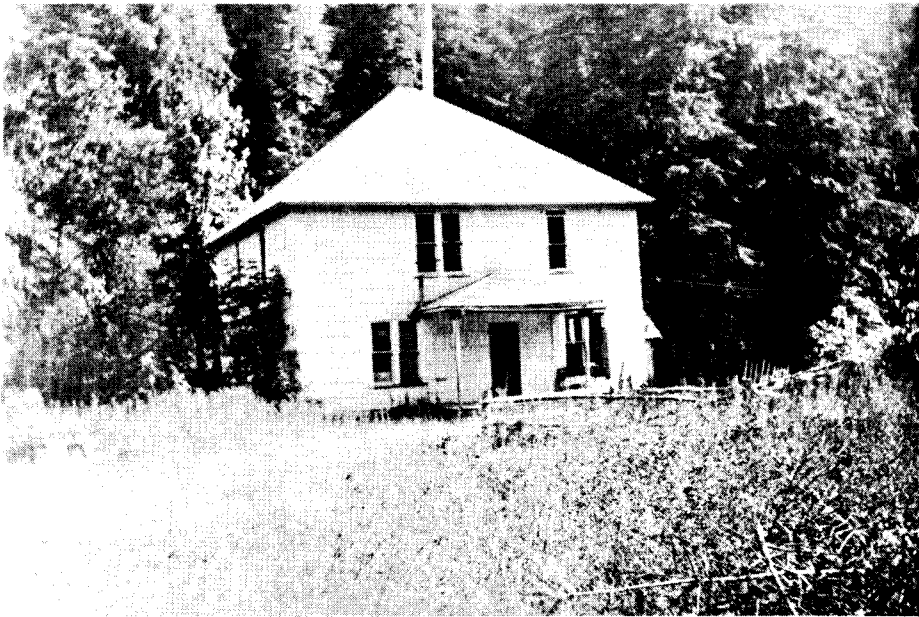


Figure 6. Old Mineral Hotel and post office located at foot of Hardscrabble Grade (checkpoint 23). (Photo courtesy Ray Nelson)



Figure 7. Giants similar to those described at checkpoint 28. These giants were operated in Josephine County, but similar ones were used in placer operations in the Bohemia district.

- ②⑤ 0.3 32.8 The 65-ft-long adit on the left is unsafe to enter because the back and hanging wall have loose rocks. The adit was driven on a 4-ft fracture zone bound by two parallel fault planes. The rocks have been silicified and pyritized.
- ②⑥ 1.5 34.3 An adit driven subparallel to the road is on the left. It follows a small fracture system for about 40 ft. The rock has been silicified and pyritized.
- ②⑦ 0.7 35.0 Road junction. Glenwood sign. Turn right for a side trip to Shane Saddle.
- ②⑧ 0.1 35.1 Glenwood cabin. In a switchback part way up Hard-scrabble Grade was a way station, a small shelter in which mail and supplies were deposited for those who lived and worked near Shane Saddle, 2 mi to the south. A placer mine at the same site employed the hydraulic system, using powerful jets of water to loosen alluvial material containing gold deposits and wash it downhill. Water from the stream above traveled through a hose and was forced through a nozzle, called a giant (Figure 7). The dirt, sand, and gravel accumulated in the stream bed was channeled into sluice boxes, from which the gold was recovered. Even today the nearby stream can be panned for a few flakes of gold.
- In the roadcut in front of the cabin are thin-bedded, flat-lying shale and sandstone beds, evidence that a body of water such as a lake existed in this area at one time (Figure 2, May 1978 Ore Bin). By walking down the hill below the cabin toward the creek, you can see a thick sill of andesite which has intruded along the bedding of the sedimentary rocks. This sill is about 50 ft thick, and the top of it forms a flat plane on which the stream is flowing. This plane also formed a trap for placer gold.
- ②⑨ 0.9 36.0 Wet Canyon. These sedimentary rocks have been altered; those near the cabin were not. Note the small dike (Figure 8) intruding the country rock on the east side of the canyon. The dike has elongated vesicles, and some of these gas-formed holes are filled with white minerals called zeolites. Both the sedimentary rocks and dike have been silicified, making the rocks hard, and chloritized, making the rocks green.
- ③⑩ 0.7 36.7 Adit at the left just before you cross a small stream. This was the Bull Lead mine (Figure 9). The adit was driven along a silicified zone which has sparsely disseminated chalcopyrite, galena, and sphalerite and considerably more disseminated pyrite. Pyrite can also be found along fractures, as can cockscomb and drusy quartz.
- This adit is reasonably safe to enter. It was driven into hard, strong rock that should not cave in. The roof has a natural arch with no loose hanging rocks. No shafts have been dug below the tunnel, and no mine timber has been left to rot and form bad air.
- At 20 ft the adit forks; the right fork is 20 ft long and the left about 40 ft long.

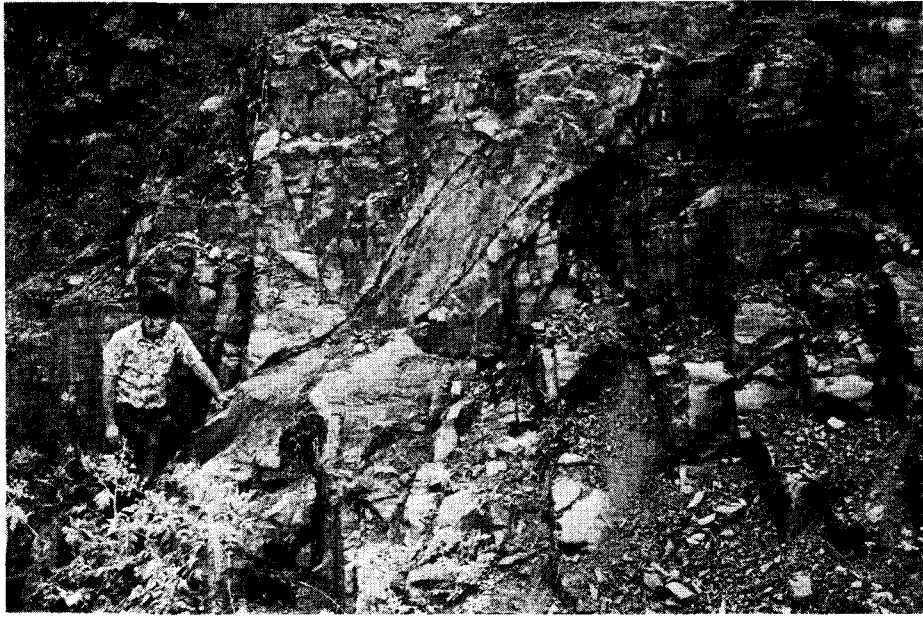


Figure 8. Dike at Wet Canyon (checkpoint 29).

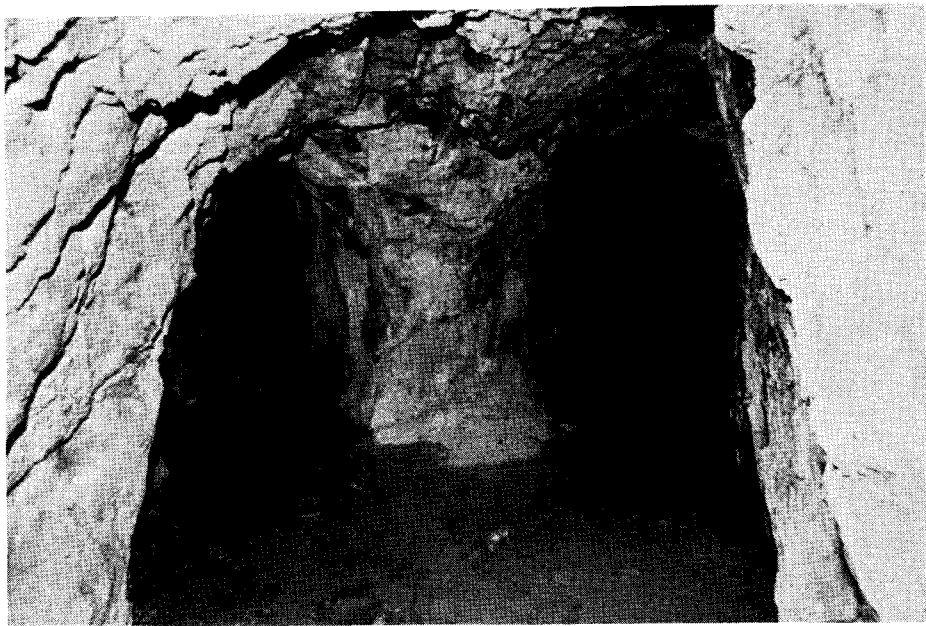


Figure 9. Fork in adit at Bull Lead mine (checkpoint 30).

Remember that most mines, tunnels, and shafts in the Bohemia and other mining districts are not safe to enter.

③① 0.5 37.2

Shane Saddle junction. Stop and park your car. A poorly maintained jeep trail starts about 200 ft east around the curve and leads to the northwest. Follow this trail for 600 ft to where it forks, and take the right-hand fork, which leads uphill for 200 ft.

③② 0.0 37.2

An open cut on the right of the trail contains a narrow band of stibnite-bearing ore.

This is the end of the side trip. Return to your car and then to the road junction at Glenwood (checkpoint 27).

②⑦ 2.2 39.4

Road junction at Glenwood. Turn right and continue up the Hardscrabble Grade (Road 230).

③③ 0.9 40.3

Road turns to the right. Note on left side of road a lava flow with 10 or more regularly spaced planes containing elongated vesicles (Figure 10). This lava is interbedded with tuff breccia and has been mapped by Lutton (1962) as part of a dome, a circular or oval accumulation of extremely viscous lava which, after having been squeezed from a volcano, congealed above and around the orifice instead of flowing away.

③④ 0.7 41.0

To the left is the old Vesuvius mine cabin. A boarding house was once above the road. The Vesuvius veins were discovered and staked about 1895; claims were bought a few years later by the Ziniker and Graber brothers, who sold them to Vesuvius Mines Company in 1902. By 1908 a ten-stamp mill was operating. The company also built a tramway and several buildings.

③⑤ 1.3 42.3

Bohemia Saddle. Turn right for side trip to Bohemia Saddle Park.

③⑥

0.1 42.4

Bohemia Saddle Park, maintained by Lane County. This park is situated on top of the Musick mine's old workings. The square-planked area near the picnic table is the top of a sealed-off ventilation shaft. Do not try to lift the timbers to look into it, because you could take a 40-ft vertical fall into one of the larger stopes (mine workings). Following the trail going down and along the mountain slope, you can see where the California vein crops out and where the mine workings have reached the surface (Figure 11). This dangerous hole is nearly vertical and is protected only by a smooth wire fence. Stay back from the edge.

This is the end of the side trip. Double back to Bohemia Saddle (checkpoint 35).

③⑤ 0.2 42.6

Bohemia Saddle. By turning to the left onto Road 230-F you may take a side trip to a lookout point.

③⑦ 1.3 43.9

Fairview Peak Lookout, elevation 5,933 ft. As you drive up to Fairview Peak, look for what appear



Figure 10. Planes of vesicles, called sheet vesicles, in volcanic rock (checkpoint 33).



Figure 11. Part of old Musick mine workings which have reached the surface (checkpoint 36). Shafts like these are very dangerous, so stay away from them.

to be old roadcuts. These were part of the old Knott Trail, built around 1870. The trail was wide enough only for a narrow wagon or sled, but it enabled mining and milling equipment to be brought into the district.

On a clear day, from the lookout you can see the Coast Range to the west and the Three Sisters and other Cascade volcanic peaks to the east. On a very clear day the Pacific Ocean can be seen to the west; Mt. Shasta, California, to the south; and Mt. St. Helens, Washington, to the north.

This is the end of the side trip. Double back to Bohemia Saddle (checkpoint 35).

35 1.2 45.1

Bohemia Saddle. Turn left back onto Road 230 and go east toward Champion Saddle.

38 0.6 45.7

The rock in a small open cut (6 by 10 ft) on the left side of the road and about 4 ft above the road bed (Figure 12) contains tourmaline of the schorlite variety. This site is hard to find, so drive slowly. On the way to checkpoint 39, the unimproved road to the left can be taken for a side trip to the old Forest Service Musick Guard Station, only 0.1 mi off Road 230. There you will see the old mule barn and guard station.

39 0.2 45.9

Musick mine road. Turn onto the road on the right for a side trip to the Musick mine and Bohemia City town site. Beware of high-centering your vehicle. Porphyritic basalt crops out on the right side of the road. The closer you get to the mine, the more epidotized the basalt becomes. Epidote gives the rock a greenish cast and forms a green coating along fractures.

40 0.6 46.5

Musick mine and Bohemia City. One of the most productive veins in the district, the Musick vein, was discovered in 1891 by James Musick, who organized the Bohemia Gold Mining and Milling Company. The mine was later purchased by the Oregon Securities Corporation, which also acquired the Champion and Helena mines. Consolidating operations at the Champion site, they built an electric railroad (Figure 13) to haul Musick ore over to the Champion stamp mill.

When you return to Road 230, just past the junction you will notice an extremely level stretch, which was the grade of the narrow-gauge electric railroad that ran between the Musick mine and the stamp mills at the head of Champion Creek. After 1908, the mine was owned by various companies and ran periodically. By the 1950's, however, snow had collapsed most of the buildings. All that remained of the once-prosperous camp were some crushed snowsheds, the old Lundberg stage house (now being restored by the Cottage Grove Prospectors Club), post office, store, hotel, a few cabins, and the ruins of the stamp mill (Figure 14).

Among hazards in the area are rotting boards and timbers with nails, and the mine adit is not safe to enter.

In the mine dumps and along the road to the upper dump you may find specimens of galena, epidote, pyrite,

Figure 12. Tourmaline occurs in open cut above road (checkpoint 38). This stop is hard to find, so watch mileage carefully.



Figure 13. Electric tram that once ran between Musick mine and Champion mill. (Photo courtesy Ray Nelson)

chalcopyrite, sphalerite, cockscomb quartz, and, rarely, a flake of gold.

End of the side trip. Double back to Road 230 (checkpoint 39).

- (39) 0.7 47.2 Road junction. Turn right (east) onto Road 230.
- (41) 0.3 47.5 Champion Saddle. The old Knott Trail can be seen nearby. Here you may choose to stay on Road 230, going around the bend to the right, or you may instead take Road 2259, the Champion Creek road, to the left. The roads join at the junction of Champion and Brice Creeks. This road log first follows Road 230 to the junction; then it jumps back to this point again and describes Road 2259 from here to the junction.
- (42) 0.2 47.7 The road has crossed the saddle, and the roadcut is now on the right. The light-colored outcrop on the right is the Champion vein. From within 500 ft of this spot, \$300,000 in gold values have been taken. The Champion vein also crops out along Road 2259, so checkpoint number 42 is used for both outcrops.
- (43) 0.1 47.8 The close relationship between granitic (granodiorite) intrusions and veins is shown here and at checkpoint 42. The vein cuts across the granodiorite. Hot water circulating during late stages of cooling of these intrusions was probably the source of metals found in the veins. The granodiorite looks unaltered; however, the green mineral epidote, an indicator of alteration, can be found along rock fractures called joints and in small veinlets.
- (44) 0.4 48.2 The rock on the right side of the road shows some propylitic alteration, which means it has a greenish cast because of the development of fine-grained chlorite and epidote, both green-colored minerals. The rock contains a vein-fracture system along which up to 4-in quartz veins, containing euhedral, thumbnail-sized quartz crystals, have formed.
- (45) 0.3 48.5 Notice the grove of trees to the left and upslope. Their trunks are curved near the ground but become straight higher up. This curvature is caused by the weight of the annual 10- to 15-ft-deep winter snow pack as it creeps slowly downhill, deforming the bases of the saplings in the process. As you drive through the grove, also look to the right for trees with yellow metal plates. These trees are survey bearing-trees. By reading the plates, you can tell how close you are to a section marker.
- (46) 1.3 49.8 Road fork. Road 230 continues to the right, but you should take the left fork, Road 2243, which parallels the Noonday Ridge and its trail. The old Noonday (or Annie) Trail, built in 1892, was the main route for freight and supplies before Hardscrabble Grade and Champion Creek Trails were built.
- (47) 0.6 50.4 A roadcut showing an alteration zone to the right. The yellow-brown color is from the oxidation of the introduced pyrite. Near the center of the cut, you can

see a gray clay fault gouge zone. The fault may have acted as a channel for hydrothermal solutions carrying sulfur, which combined with iron in the wall rock to produce pyrite. This site, part of the San Francisco vein system, has been mapped by Luttor (1962) as a breccia zone or pipe. Breccia zones are often rich in ore.

- (48) 2.3 52.7 Turn left for a short side trip on the unnumbered road which joins Road 2243 at the switchback.
- (49) 0.2 52.9 Take the fork to the left for a short distance and park in the grove of tall trees at the site of the old Ridge Hotel, which was located on the Noonday Trail (Figure 11, May 1978 Ore Bin). The hotel had lodging for both miners and animals.
Double back to Road 2243 (checkpoint 48).
- (48) 0.1 53.0 Road junction. Turn left back onto Road 2243.
- (50) 3.8 56.8 Junction with Brice Creek and Road 2149. Turn left onto Road 2149 and follow the creek downstream.
- (51) 0.8 57.6 Here the road is about to pass through a small ridge of very hard rock which causes Brice Creek to make a horseshoe bend. The rock is hard because it is near a large granodiorite intrusion and has been subjected to propylitic or contact alteration. Near the creek, small, light-colored dikes are exposed in the bed rock.
- (52) 0.5 58.1 This is the east edge of a large granodiorite intrusion, molten igneous rock which cooled slowly underground before reaching the surface of the earth. Not only was local ground water heated by this intrusion, but it was also changed in chemical composition. Heat from the slowly cooling granodiorite body affected the surrounding country rock, both by direct contact and also by these hot aqueous solutions which circulated throughout the area. These solutions probably produced the major changes in the country rock. The granodiorite was later exposed after cooling by uplift and erosion and can be seen in the roadcut on the left.
- (53) 0.9 59.0 On the left, high up on the slope, a granodiorite dike stands up like a wall.
- (54) 1.7 60.7 As you cross the Brice Creek bridge, look downstream to the right. When the Oregon Securities Company took over the major mines, it did a great deal of development, including provisions for generating electrical power. A dam was constructed between two rock walls beneath the bridge on which Road 2149 crosses Brice Creek. A flume ran along the north bank of Brice Creek, and you can still see traces of the ditch that carried the water. The dam was removed several years ago by State officials to allow migrating fish to pass.
You are at the junction of Champion Creek Road 2259. At this point, the road log returns to Champion Saddle (checkpoint 41). Those wishing to go directly to Cottage Grove from here should instead continue with checkpoint 54 on page 113.

- (41) 0.0 47.5 You are back at Champion Saddle. Now take the left fork, Road 2259.
- (42) 0.2 47.7 The little open cut to the right is the Champion vein outcrop. Look up and see where the vein crops out on Road 230. The checkpoint number 42 was used for both outcroppings of this vein. As you look down the valley you see a glacial cirque, a steep-walled, half-bowl-shaped recess caused by glacial erosion.
- 55 1.0 48.7 Champion mine and mill. The building (Figure 15) back against the mountain slope is the 1,200-level adit portal house. Do not try to enter; the portal building is in bad shape and the adit is caved in. Take care as you look around.
- This mine was discovered in 1892, and a ten-stamp mill was built here in 1895. A thirty-stamp mill operated from 1902 to 1917 under the Oregon Securities Company and the West Coast Mines Company. The mine was idle until the period between 1932 and 1938, when various operators, including the Mahala Mines and the Bartels Mining Companies, produced nearly \$100,000 from the Champion. A flotation mill (Figure 12, May 1978 Ore Bin) built in 1939 recovered other minerals in addition to gold, values which would otherwise have been lost.
- Some concentrates and ores were shipped intermittently from 1939 until the early 1960's, but since then the mine has been inactive. In 1960 the Champion site still contained many buildings, including a machine shop, blacksmith shop, assay office, portal house, mine office, diesel electric plant, cookhouse, bunkhouse for 75 men, flotation mill, and several smaller buildings. Now only the portal house and mill foundations remain.
- Minerals found on the Champion dump include quartz crystals, galena, sphalerite, and hematite. Because ore was transported over a narrow-gage railroad from the Musick mine to be processed at this mill, the ore samples may have come from either mine. From where you stand, the railroad grade looks like a line; the end of the grade has a rock dump downslope. The Musick ore came down to the mill level by tram.
- (56) 2.4 51.1 Golden Curry mine. The authors did not find and check this adit; therefore we warn you to stay out of it if you come upon it.
- (57) 0.3 51.4 Trixie mine. Stop and look at the two portals on the left, but do not enter. These adits are unsafe: the timber is rotted; and the bank and rock above the portal are ready to cave down. Look and drive on.
- (58) 0.4 51.8 The two adits on the left are not safe to enter. The first, about 65 ft deep, was driven along a fault zone. Material from this fault is falling into the portal. At the second, 10 ft deep, large rocks on the floor have fallen from the back (roof). One large rock in the back is ready to join the others on the floor.
- The rock along the road is granodiorite containing



Figure 14. Musick mine and Bohemia City, with restored stage house and post office (checkpoint 40). In foreground is covered portal and mine track. Stay out of mine.



Figure 15. Old Champion mine portal house (checkpoint 55).

tourmaline (black) and epidote (green) along fractures.

⑤9 0.2 52.0

Downing Point. Two greenhorn miners died here during a snowstorm in the early 1890's.

⑥0 0.2 52.2

Bohemia Smith Falls on the right. Here a drunk early-day miner named Bohemia Smith wandered off the trail between Lundpark and the Champion mine, stepped off the edge of a cliff, and fell, landing in a small tree. When searchers found him, he was completely unharmed, holding his jug, and singing merrily. The spot where he fell has been known as Bohemia Smith Falls ever since. This waterfall and several of the others are caused by basalts that have been altered by nearby intruding granodiorite. The contact alteration has resulted in dense, blocky fractured rock which forms erosion-resistant outcrops.

⑥1 0.3 52.5

Epidote-rich knots can be found in the volcanic breccia on the left. These knots contain plagioclase, quartz, chlorite, pyrite, and magnetite, and some contain very small, well-formed crystals (Figure 5, May 1978 Ore Bin). Walk back up the road and around the curve to see a vertical fault which has lava flow rock on one side and volcanic breccia on the other.

⑥2 0.4 52.9

The rock face on the left at the first curve past Weaver Creek also has epidote knots which contain the same minerals as those at the previous stop, but here the country rock is a volcanic conglomerate rather than a breccia. Breccias have angular fragments, while conglomerates have rounded components. This conglomerate (Figure 3, May 1978 Ore Bin), with subrounded boulders of various types of volcanic rock up to 10 ft in diameter, crops out in Champion Creek below the road curve. To go down to the creek to see this conglomerate, walk past the curve for about 150 ft, and then go down the road outslope.

⑥3 1.6 54.5












The start of the old Noonday (Annie) Trail is marked by a sign board. The trail, on the right, goes up the ridge. This was the main route for freight and supplies before Hardscrabble Grade and the Champion Creek Trail were built.

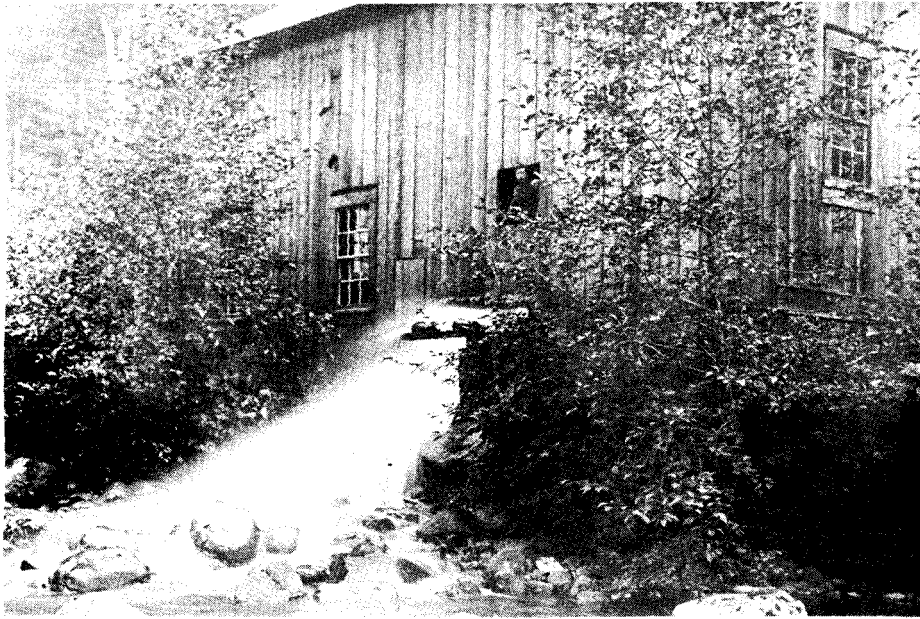
⑤4 0.2 54.7
60.7

Junction with Road 2149. This stop has been described. The two legs of the tour have joined. We now show two cumulative mileages: the first is for the southwest leg, which followed the Champion Creek; and the second is for the northeast leg, which followed Noonday Ridge. Now turn left onto Road 2149.

⑥4 0.3 55.0
61.0

Trestle Creek sign on the right. Trestle Creek enters the other side of Brice Creek from the northeast. The name came from the trestle built to carry water from the dam to the powerhouse at Lundpark. A lost gold mine is reported to be somewhere along this creek. By checking the map, you will note that Trestle Creek parallels the granodiorite-country rock contact. Along this creek is a good place to look for mineralization.

-  0.4 55.4
 61.4
- Hobo campground on the right.
-  0.6 56.0
 62.0
- Lundpark campground on the right. Lundpark, named after Alex Lundberg and Harry Parker, was an overnight stop on the way to Bohemia. Although nothing remains of the old buildings, Lundpark was once a bustling place. Parker ran the hotel, where nearly all of the men going up the mountain spent the night; Lundberg took care of the barn and warehouse. Freight from the Lundpark warehouse went up to the Champion mine two or three times each week during the summer.
- Water from the dam at checkpoint 54 ran a powerhouse (Figure 16) on the north side of Brice Creek. Some of the concrete foundation remains.
-  2.4 58.4
 64.4
- Cedar Creek campground on the right.
-  2.2 60.6
 66.6
- Umpqua National Forest boundary sign on the left.
-  2.0 62.6
 68.6
- Disston store to the right. The town of Disston was the easternmost end of the railroad started in 1902 and completed by the Oregon Securities Company, which controlled the Champion, Musick, Helena, and Noonday mines. A post office was established here in 1906. With the railroad operating, supplies reached the mines in two days instead of three.
- You are now back on Row River Road.
-  0.7 63.3
 69.3
- Junction with Layng Creek road. Turn right onto Layng Creek road for a side trip to a fossil plant location.
-  1.9 65.2
 71.2
- Forest Service Rujada campground on the right.
-  0.2 65.4
 71.4
- Forest Service Road 2142 joins Layng Creek road on the left. On the right is the Forest Service Layng Creek Work Center. Turn left onto Road 2142.
-  0.7 66.1
 72.1
- The Rujada fossil locality (Figure 10, May 1978 Ore Bin). The thin-bedded shale and sandstones exposed on both sides of the roadcut (Figure 17) contain up to 40 recognized types of plant fossils. Lakhanpal (1958) describes the fossil flora in detail.
- R. Upton and J. Anderson once established a logging camp nearby. The name "Rujada" is derived from their initials plus "da" for the Department of Agriculture.
- This is the end of the side trip. Return to checkpoint 70.
-  2.9 69.0
 75.0
- Row River road junction. Turn right.
-  2.6 71.6
 77.6
- La Sells Stewart Park on the right. The sign is almost hidden by trees. The gravel road leading to the park crosses a private logging road that parallels the main road.
- The park affords a good view of Wildwood Falls, caused by Brice Creek's effort to erode a basalt flow.



*Figure 16. Hydroelectric powerhouse built at Lundpark (checkpoint 66).
Only foundation remains today. (Photo courtesy Ray Nelson)*



Figure 17. Rujada fossil locality (checkpoint 73).

A dike has intruded the flow, adding to its resistance to erosion. The flat valley floor above the falls is the top of the flow. Look at the stream channel wall downstream from the falls to see how much erosion has occurred. Wildwood Falls Park is on the other side of the creek.

- ⑪ 1.0 72.6 Sharps Creek Road junction, the starting point of
78.6 the loop through the Bohemia mining district, on the
left.
- ⑧ 4.4 77.0 Government Road joins Row River Road. Take the
83.0 left fork and stay on Row River Road. You will now go
around the southwest side of Dorena Lake.
- ⑦⑤ 0.5 77.5 After about half a mile, look northeast across the
83.5 lake and valley to see Pinnacle Rock (Figure 3) rising
above the trees.
- ⑦⑥ 3.3 80.8 Baker Bay Park on the right.
86.8
- ⑦⑦ 2.6 83.4 Schwartz Park on the right
89.4
- ① 4.7 88.1 Interstate 5, east on-off ramp, the starting and
94.1 the ending point for the road log.

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Additional Reading

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Bohemia Mountain



A white snow covers the Bohemia gold mining country every winter and assures plenty of water for the mountain flowers each spring.



Chapter 1

Beginnings of Bohemia

In August 1858 some of the earliest settlers of the upper Coast Fork country, including O. P. Adams, W. W. Oglesby, Rufus Adams, and William Shields, starting from what is now Cottage Grove, went to what is now called Sharp's Creek and tried mining thereon. They gained a livelihood only, but had no equipment. Later that year Adams and Frank Buoy went to Josephine County in southern Oregon, making the trip on foot. They inspected the mining operations there and secured a whip saw for making lumber. Upon their return they built sluice boxes, exabing them to make a "handsome little stake."

The following year, 1859, Buoy, Lile Miller and Adams went prospecting on the left hand fork of Sharp's Creek, known today as Sailor's Gulch (at the mouth of which Conley's cabin is located). There they installed their sluice box. Results were beyond expectation; the ground was very rich.

While at Sailor's Gulch, Adams went hunting on the mountain that has since been named in his honor. While on its summit he saw another mountain toward the southeast, later named Grouse Mountain. He at once led his partners to the unknown regions; but, looking only for placer gold and not knowing that the mother lode was a quartz ledge, they returned disappointed from the great gold-bearing district. The War Between the States intervening, the country was dormant from 1860 to 1864.

Chapter 2

How Bohemia Got Its Name

In the spring of 1863, George Ramsey and James (variously referred to as John or Frank) Johnson, supposedly fleeing from Roseburg after killing an Indian, made their way into the extremely wild and untenanted wilderness of the Calapooya Mountains, traveling by way of what is now the North Umpqua River and Steamboat and City Creeks.

One day Johnson killed a deer and while dressing the animal, his eye was caught by the glitter of gold quartz. It did not take him long to unearth some specimens, which old pioneers say were of unsurpassing richness. This free gold was found in a small vein near the headwaters of City Creek, within three-fourths mile of Bohemia Mountain. The men ascended the mountain to find where they were, and seeing the valley of the Coast Fork River to the northwest, they came out that way to civilization.

This discovery brought many prospectors, and in the summers of 1864 and 1865 a deluge of locating and development went on. Among the first in the new camp were O. P. Adams, J. W. Vaughn, Bird Farrier, and many others.

Johnson claimed that he discovered the first gold on a claim known later as the Mystery, and said that it must have been a pocket, which, after producing \$700, gave out at a depth of six feet. However, some believe that the real find was elsewhere and that the exact location is still a mystery.

Much of the early prospecting was done along the creek bed below the original discovery and, while gold was found in considerable amount, it was light and hard to save, and at that time quartz mines were considered to be of little value.

Nevertheless, over 100 claims were staked, and the Oregon State Journal, published in Eugene, contains mention, in issues of June 10, 1865 and May 18, 1867, of gold discoveries, both placer and quartz, in the mountains southeast of what is now Cottage Grove.

Since Johnson was from the old world country of Bohemia, and hence was called "Bohemia" Johnson by his friends, the new mining camp became known as "Bohemia Johnson's" mines, or later, the Bohemia Mines.

Chapter 3

The First Bohemia City

In 1866 a miners' meeting was held in the new gold camp, as shown by the old county mining records, and on June 1, 1867, the Oregon State Journal reports as follows:

EUGENE CITY: June 1, 1867. We have a letter dated May 23, 1867, enclosing a copy of the proceedings of a miners' meeting, and a copy of the laws adopted there:

The letter follows:

Bohemia City, May 23.

"We arrive near here on the evening of the 20th inst, and made camp about two miles from the Johnson Ledge - the snow being too deep and soft for the horses (to go farther). Came to the ledge the next day. Snow five feet deep over the ledge. The Johnson ledge is no humbug - whatever the others may be - we took a surface prospect, Mr. Johnson being with us. We picked off a little of the rock. It has the appearance of being 1/4 gold, had strings of gold in one piece, one to two inches long. Almost as good is found in other ledges, they say, but these were not seen.

"James Butler and 40 others started this morning to find and prospect a ledge supposed to be about 15 miles from this place, east. He, with a party, found gold bearing quartz in that direction several years ago, while prospecting for placer diggings. They will be gone four or five days.

"/s/ James Butler, President
"C. Hand, Secretary"

Copy of Miners Code of Laws. (Main items only reported).

Art. 1. The District shall be known as the BOHEMIA DISTRICT, and shall extend six miles in every direction from discovery on Johnson's Ledge.

Art. 2. Claims taken in 1866 and laid over by miners meeting in last October shall be good till June 1, 1867.

Art. 5. Claims shall be 100 yards by 25 yards.

Art. 6. One claim only to each person, and two to the original locator.

Art. 12. Water running through "Bohemia City" is reserved to the town.

Art. 13. Town lots shall be 50 by 75 feet, and shall be held by building a house thereon, or by fencing in the property.

Thus was founded "Bohemia City," or the "old city," as it was later called.

In the fall of 1867, Bird Farrier made the first cash sale in the district, selling the Excelsior claim to Joseph Knott for \$900 cash.

In 1868, another miners' meeting was held - L. F. Mosher, chairman - M. May, secretary. The number of men in camp now exceeded 100; other prominent claims were discovered, covering 17 ledges. Roseburg expected to get a road built in from their side of the camp.

Also in 1868, John Alexander and Bird Farrier built an arrastre (a Spanish type gold mill); and a number of cabins, a hotel, saloon, and a branch office of the Douglas County recorder's office, were built, presumably at Bohemia City.

On August 19, 1868, it was reported that a road was being built and a mill would be installed on the Chadwick ledge and the Barker ledge.

Chapter 4

The Knott Trail and Gold Mill

The Knotts' 5-stamp mill was the first mill taken into the district. Accounts as to the year vary. The C. G. Leader of Jan. 7, 1899 states the year as 1870, the Bohemia Nugget of December 1899 says it was 1875, the 20th annual report of the U. S. Geological survey says 1875, and the late Oliver Gilbertson, who figured in Bohemia history for many years and who started a history of the camp, says the road was completed in 1870, and the "Oregonian" says 1872. The main facts are clear.

A trail, or road, sufficiently wide for a narrow wagon or sled, was started just above Red Bridge (Culp Creek) and followed the divide between Sharp's creek and Frank Brice (the old maps read Frank Brass) creek, over the shoulder of Adams Mt., along the Utopian Saddle, over Catch Cotch (now Cat) Mt., Elephant Mt., around the side of Fairview Mt., and down to the Champion Saddle. According to various accounts the trail was built by from 30 to 300 white men and/or Chinese, entirely hand work. Around cliffs, rocks were laboriously piled one upon another, in beautiful examples of dry rock



The Old Knott Mill

wall construction. That it was well built is shown by the fact that today (1959) large portions are still in perfect shape and may be easily followed, except for trees and brush. The trail may be seen, cutting down southeastwardly across the face of Fairview Mt. below the lookout.

The work was completed to Champion Saddle just at snowfall, so plans to "switch back" up Grouse Mt. were abandoned and supplies were pulled straight up the hill to Knott Springs. The oxen used in hauling were sent out, the crew built a cabin and Levi Knott and his daughter and a few men spent the winter there.

In the spring Knott went to San Francisco and bought a Joshua Hendy five-stamp mill, a steam engine and boiler. These were shipped to Portland on an ocean freighter, up the Willamette on a river boat to Eugene, by wagon to Red Bridge, and over the Knott Trail by sled pulled by 16 oxen and a crew of Chinamen. It was set up before snowfall - ore was pulled by ox sled from two shafts dug straight down on the ore body on the top of Grouse Mt.; and 350 tons of ore were crushed, yielding \$4,700; a vast sum in those days.

The next year a short run of 75 tons gave \$1,060. Various runs were made until 1874 (or 1877?). The mill was near the summit and water very scarce. Knowledge of milling was limited and recoveries poor. Litigation started and the company never ran again. Nevertheless, production from the Knott mine has been credited with the construction of a ferry boat at Portland, which Knott later ran; and

it has been said that part of the capital of the Ladd & Tilton bank in Salem came from this mint. Total production has never been revealed. The mine was patented in 1893.

In 1877, snow crushed the Knott mill building, interest in the district was lost and the camp was completely deserted. In 1889 L. F. Wooley, editor of the C. G. Leader, visited the silent city under Bohemia's peak, and among old records found there saw the names of S. F. Chadwick, Jesse Barker, John Newbrandt, Joseph Gale, and many other well known Cottage Grove pioneers.

Chapter 5

The Reawakening After 20 Years' Sleep

For years nothing was heard of the district - all was deserted. Then in the July 15, 1889, issue of The Leader we find an article on the "Bohemia Gold Camp" stating:

"The Knott mine is located on Grouse Mt. and has two deep shafts. Six miles southwest of the Knott, is the Pearson group of mining claims, with free milling ore assaying \$260 to the ton. The ledge is over a mile long.

"Two miles west of Pearson's mine is the Brokerhoff silver mine, and one-half mile from Pearson's is the Sharp's Silver Star.

These mines are now forgotten, their very legends are dim and vague, yet Pearson installed a five-stamp mill run by water power and called the old 'Star' mill. W. B. Hartley states that his father worked at this mine and mill, which were on upper Martin Creek; that the ore was rich, but that most of the values were lost in milling and went down the creek to form the present day placer deposits. The ore was worked out and the mill dismantled before 1898, and this part of the camp in turn forgotten. Traces remain in the name of China Creek, which was placered by Chinamen; and in old tunnels which are found along the creeks and ridges.

However, interest was reawakened in the camp. The Jennings brothers had made a stake from the Pearson or Star mill and were to run this stake into real money later in the district; and in 1890 Dr. W. W. Oglesby and Pearson discovered the Annie mine and O. P. Adams, Joseph Kennedy, James Musick and others revived the camp and the boom was on."

Chapter 6

The Musick Mine

For years the "old city" on the east slope of Bohemia Mt. had been deserted. Where 100 men had camped and built their cabins, hotel and saloon; where every foot of ground had been looked over, tramped on and presumably prospected, all was still and forlorn. To this silent spot, in 1891, looking for locations for



The Musick Mine

himself and friends in Los Angeles, came a prospector of much experience in California, Arizona and Oregon – James A. Musick.

Stories relate how he, climbing through brush and over rocks on the steep mountain slopes, became tired and thirsty and threw himself down to drink from a sparkling stream which sprang from Bohemia's flank. And there shining up at him from the rocky stream bed was gold – free, glittering, "Specimen" gold – in place in the huge quartz ledge lying undiscovered within a stone's throw of "Old Bohemia City."

The following is taken almost entirely from the special mining edition of the Bohemia Nugget, December, 1899 – and was obtained by the Nugget writer directly from the diary of J. M. Cook, one of the original owners of the Musick mine.

"Mr. Musick staked two claims, the Los Angeles and Defiance, one for himself and one for his friend, Davis. A company known as Bohemia Gold Mine and Mill Co. was formed by Musick, Davis, Cook, and Brady; and in 1892 a five-stamp mill was purchased and the men arrived in Cottage Grove. Mr. Cook recalled that freight was 3 1/2 cents per pound from C. G. to the mines, and passenger fare \$9 – one way. The wagon road only extended to the W. W. Hawley ranch on Sharp's creek and from there a trail had to be cut out. However, it was of such uncertain character that heavy freight had to go by way of the Warehouse (Lundpark) and the old Annie Trail.

"Over this roundabout route the mill, engine, boiler, tools and provisions were packed; and in the latter part of October, 1892, the Bohemia mill whistle sent up a shrill blast and the run was started. Since so much time was taken up in getting the mill ready to go, the winter's snows were beginning and the run was short. In nine days time the company took out \$4,000. In the spring of 1893 construction began on camp buildings and a 70-foot tunnel was run to

get under the ore. Between June and October ore taken from the dump and tunnel yielded \$11,000. In 1894 the clean-up gave \$13,000 for the summer's run. In 1895, \$14,496 was realized. A deep tunnel was run, from the mill to the ledge at depth and the Bonanza chute was opened. In 1896, the clean-up was \$17,137.

"In 1897 a bridge, known as 'Red Bridge,' was built across Row river at the mouth of Sharp's creek, and the wagon road was extended to the foot of the mountain. Operations were continued from May until the next February and the clean-up from this longer run was \$35,873.

"In 1898 the road was built up Hardscrabbel Ridge to the mine. The county contributed \$700 and the remainder of the grade was built by the company, with the aid of some donations from the miners. Supt. Cook added a sawmill to the mine, a new mill building was built, bunkhouses were erected and a new ten-stamp mill hauled in and set up. Early snow to the depth of 26 feet in the drifts stopped work until spring.

"In 1899 the mill started again and had made a short run when an offer was received for the sale of the mine. The offer of \$85,000 was accepted and Supt. I. H. Bingham arrived and started intensive development. From this time on, the mine ran more continuously, and in 1902 the property was consolidated with the Champion and the Helena in the huge Calapooya Mining and Tunnel Co. Its history for a time merged with theirs and will be treated in that connection later.

"Such is the early history of the Musick, a large easily-seen ledge which lay undiscovered at the very feet of the early miners for some 15 years, and then yielded year after year, what were in those days, very handsome sums in gold."

Chapter 7

The Annie Mine

In 1890, Dr. W. W. Oglesby and Henry D. Pearson discovered rich out-croppings of ore near the summit, on the northeast side of Grouse Mt., and, as in the case of the Musick, the new discovery was only a short distance from old workings; just over the brow of the hill from the old Knott Mine. The new claim was named "The Annie" in honor of the doctor's daughter Annie (Annie Oglesby Graham). Rich ore was milled by hand power, with the jig pole stamp.

A company was organized in 1891, with John B. McGee as superintendent and one-fourth owner. The old Knott mill was purchased, moved down hill a short distance in order to secure more water, set up and refitted. The summer's run netted \$10,000 in gold, according to mint returns.

In 1892 the run was resumed, the Annie Trail was built from Kerr's ranch at Wildwood on Row River; up and over Grizzly Mt. to the mine;

and the mint reports credited the Annie with \$16,500 in gold.

Work was started early in 1893—so early that when "Andy" Nelson (father of the writer), and Jack Klopfenstein arrived on foot after the long hike from Kerr's ranch, they found the mill entirely buried in snowdrifts.

Locating the boiler room by means of the smokestack, which protruded some three feet out of the snow, they dug down, found the door and proceeded to overhaul the machinery by lantern light. The rest of the crew arriving, they were put to work by Supt. McGee on the job of cutting off the tops of trees, hauling them across the snowbanks and throwing them down the hole for use as wood for the fire under the steam boiler.

Under such difficulties the successful run began, with Klopfenstein as mill man and Andy Nelson as engineer. It is interesting to note, as showing the influence of Bohemia mines on early Cottage Grove history, that Nelson used his engineer's salary to pay for a visit to the Chicago World's Fair of 1893, where he saw one of the first electric light plants in operation. He came home and promptly established Cottage Grove's first electric plant and its first incandescent system of lights.

The Annie Consolidated Co. built a 500-foot tramway to move ore, laid hundreds of feet of pipe to get more water, and started to make the trail into a road. The year 1893 being a year of depression or "panic," the road crews were, according to report, not paid in money. They were given their meals, lodging was provided in tents along the route, and morale was kept up by the bonus of a keg of whiskey each Saturday night.

Tom Parker, who lived for many years at Lundpark, related how—no machinery being available, not even a peavy, and no horses being used—the entire road was strictly hand-built; logs being moved simply by 40 or 50 men taking hold and rolling them off the right-of-way. The road was steep, the switchbacks sharp. Teamsters handling the 10-horse teams later, had trouble pulling the Noonday machinery around the turns.

The Annie ran until its sale in 1896 to the Noonday Co. of Chicago. Production from the free milling ores exceeded \$50,000.

When the Noonday people took hold they proceeded to develop the nine claims, until the underground workings totaled some 5,300 feet. They built a fine double cable tramway with 40 buckets, each holding 500 pounds of ore. And with total disregard of the facts relating to treatment of the type of ores exposed they hauled in and set up, down in the basin of Horse Heaven Creek, the finest mill yet seen in the district with its 20 stamps, eight concentrators, two boilers, and a 60 h. p. high-speed engine, all admirably suited to the oxidized ores which had been milled. The mill ran two weeks in September 1899. Today it still sits there, totally unable to mill at a profit the sulphide ores encountered at depth.

The mine and mill site were patented (bought from the government) and all laid dormant until the coming of the new flotation method of milling base ores. The Annie (or Noonday) will be spoken of again in a later chapter on "Bohemia in the Years Between Wars."



Champion Camp and Tramway

Chapter 8

The Champion Mine

First mention of the Champion Mine as such came in 1895; although the ledge was known in the very early days, being on the old Knott Trail. As the Champion, consisting of 13 claims, it was owned by the Hartford Co. of Chicago. Diller, in a U. S. Geological Survey report of 1898, says that a 10-stamp mill was built on the property in 1895. The ore was carried on an aerial tramway 3,400 feet long, down the northern slope of Champion Saddle to the mill on Champion Creek, a branch of Frank Brice Creek.

In 1898, five stamps were running on \$40 ore from workings not over 100-feet deep. Total tunnel length was 1500 feet. Early in 1899 the Hartford Co. sold to August Kelly for \$16,000 and in 1900 the mine was bonded for sale by P. J. "Pat" Jennings (of Helena Mine fame) with intention to consolidate it with the Helena Mine. By 1902 Jennings was able to announce that he had purchased 21 claims, including Champion 16, Mitchell 2, Graber 2, Hoff 1, all between the head of Champion Creek and the Musick Mine. The company was named the Calapooya Mining and Tunnel Corp., capitalized at \$3,000,000. Plans were made to run a 7000-foot tunnel through the ridge at greater depth, and at a cost of \$25 per foot. Time for completion was set at 16 months. Also announced were plans for a power plant to be built on Row River to supply power for "all the mines."

Jennings was also largely concerned in the promotion and construction of a new railroad from Cottage Grove to the Bohemia District, which would give cheap freight rates for supplies going in, and make it economically feasible to ship out the base sulphide ores being found at depth in all the mines.

The start of the railroad was celebrated in May, 1902, Governor T. T. Geer being present to drive the symbolic spike. Within a month, grading had been completed for a distance of five miles, and the local depot was under construction. Meanwhile, work progressed at the Champion. In June an extension of only 25 feet on an old drift tunnel resulted in a good strike of free milling ore and work was started on rebuilding the mill, which was badly in need of repair. The ore appearing better each month, a new offer for the property was received, and early in 1903 a new company effected the consolidation of the Calapooya Mining and Tunnel Co., the Helena Consolidated Mining and Milling Co., the Musick Mining and Milling Co., the Broadway Group, and other properties into one huge New Jersey corporation called the Oregon Securities Co.

This same group also organized and held control of the new Oregon and Southeastern R. R. Co.

Plans were laid for vast new developments and the history of the Champion - as of the Musick, Helena and others - was for some 17 years merged with the history of the Oregon Securities Co. and its successor, the West Coast Mines Co., to be dealt with in a later chapter devoted to that operation.

Chapter 9

The 'Fabulous' Helena

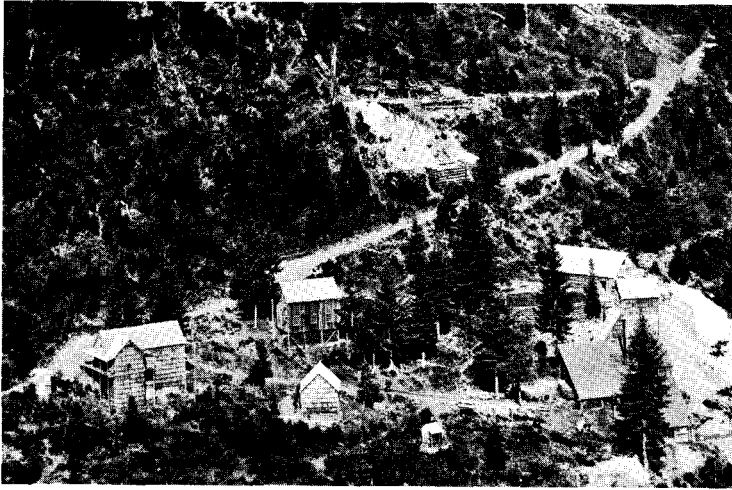
Once again, gold was found, under the very trails which had been traveled for many years by eager prospectors. In 1896 C. B. "Charlie" Bruneau, an early-day Cottage Grove photographer who had been bitten by the gold bug, discovered the Helena ledge, which crossed directly under the Annie trail on Grizzly Mt.

The find looked good and in 1897 one-third interest was sold to Hugh Behne, and one-third to R. J. and P. J. Jennings, the Jennings Bros. who had made a small stake in the old Star Mine on Martin Creek. Shortly afterward the Jennings brothers bought out Behne, and they and Bruneau started active development of the mine.

By January, 1899, six claims made up the group, divided into Helena No. 1 and Helena No. 2.

The Loretta - Helena - American Boy - Verde - White Bear and Fallen Leaf claims extended from Horse Heaven basin up and over Grizzly Mt. and down to Champion Creek on the west side. The ledge averaged 4 to 5 ft. wide and the whole thing assayed above \$12.

But the "rich streak" running alongside the common ore ran \$3,000 and more to the ton. A pan full of pounded ore weighing five pounds yielded \$180. Selected ores went to \$30,000 to the ton.

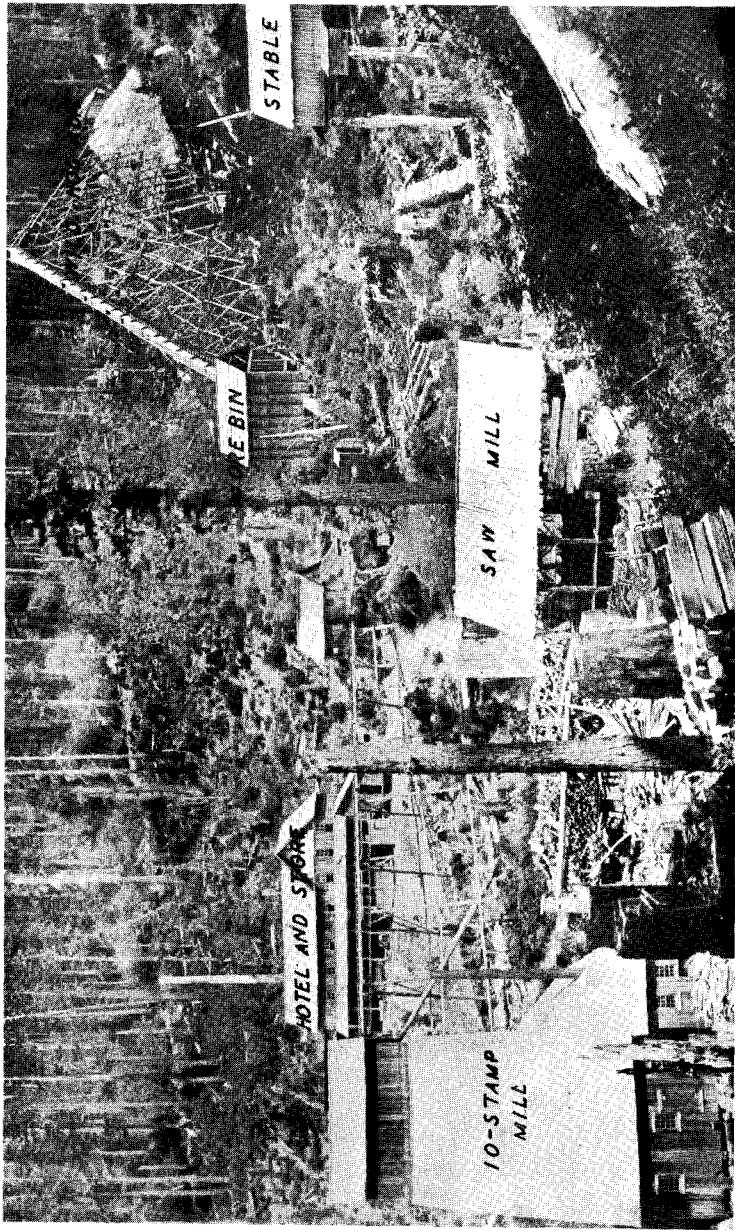


The Helena Mine

Beautiful specimens of gold-encrusted rock were displayed in Cottage Grove store windows. A local saloon was named the "Helena." Miners flocked to the hills. A small hand-operated stamp in a few short weeks pounded out the price of a new five-stamp steam mill. This was quickly increased to 10 stamps, running night and day.

In July 1899, a dispute arose over the White Wings Claim, which intervened between Helena No. 1 and Helena No. 2 groups. The "Bohemia Nugget" issue of July 21, 1899, prints its news letter from Correspondent Ross at Bohemia, as follows: "The civil engineers crew who have been running out the lines in camp, met with an obstacle when they started down the side lines of the Helena; in the shape of a man with a gun, who broke up the crew, and also the transit; stakes, chains, tripods, and excited men were found scattered all over a large scope of country. When they got together again they disbanded, and surveying is dull at present." The dispute was settled when the Helena purchased the conflicting claims of G. G. Warner; and milling was resumed.

For more than two years they ran steadily on free milling gold ores. The "Nugget" of June 1902 reports dividends had been paid each month for 26 continuous months. Two shifts of men were working, in each of six tunnels. As they penetrated deeper into Grizzly Mt. the free milling ores gave way to rich smelting ores, carrying an average of \$339 in gold, lead and zinc, and 3 to 5 percent copper. It was obvious that new methods were needed for handling this ore; and the means to that end were sought by the inclusion of the Helena, early in 1903, in the big new consolidation of mines by the Oregon Securities Co. The Helena will be seen again, under that head.



The Vesuvius in Its Heyday

The Vesuvius Mine

In 1897 Johnny and Gottfried Graber and the Ziniker Brothers, lately arrived from Switzerland, purchased the Vesuvius claim on Fairview Mountain and started work. While some of the partners labored in the tunnels, others went out to make a grub-stake. Other claims were located, the names reminiscent of the old country. "William Tell," "German" and "Wild Hog." By 1900 they had opened Upper Vesuvius ledge, and milled \$5,000 from the ore, in the old Knott mill, which Stocks and Harlow had moved onto the west slope of Fairview. Having never over 50 feet of "backs" over the workings, the partners moved down the hill 350 feet and drove 900 feet through hard rock to get under the ore exposed above. Day after day they drove ahead, with only low grade showing, till one night in March, 1902, they fired their "round" and left it overnight, for the smoke to clear.

Coming back next morning, in the glow of their miner's lamps, they found the entire end of the tunnel glittering with gold. Some of the most beautiful specimens ever found in the camp, running \$29,000 to the ton, came from here.

The news spread fast, and Frank Hard of Colorado took one look and "had to have that mine." He made them a very attractive cash offer and the boys took their profit. From this start came Gottfried Graber's participation in Knowles and Graber, now Pioneer Hardware of Cottage Grove. Graber, Knowles, Gettys and others having been brought together in the Bohemia District where so many early-day settlers got their start.

The Vesuvius Mines Co. was founded by F. J. Hard, a Colorado mining man who first came to the district in 1894. With a fixed confidence in the camp, Mr. Hard by 1903 had purchased 30 lode claims and had located nearly as many more. These were combined into four groups, Utopian, Vesuvius, Oregon-Colorado, and Riverside. The last three were purchased by land patent from the government, and are now owned outright.

An extended campaign of development was carried on, including about 10 miles of well constructed mountain road which is now part of the principal haulageway to the district. By 1908 a 10-stamp mill with concentrating tables had been built at the Vesuvius. An 1800-foot tramway connected mine and mill. A light plant-assay office and sawmill were in use, and a three story combined store, office, bunk house, cook house and post office was built.

Underground work was pushed ahead. From some 3,000 feet in 1908 it was extended until by 1921 there were over 7,000 feet of tunnels, crosscuts and raises. An extensive ore shoot was found at the junction of Jasper and Vesuvius ledges. This was worked out completely by way of upper Vesuvius tunnel, while Wild Hog tunnel was started 650 feet below to pick up the ore at that level.

World War I intervened with its high cost of materials and labor, work was slowed down, and in 1920-'21 the death, within a few months

of each other, of both F. J. Hard and his son Charles removed the management team. Wild Hog tunnel lacked some 380 feet of reaching the downward extension of the ore shoot worked out above. It was neither within the power or inclination of Mr. Hard's wife and daughter (upon whom the management devolved) to continue operation; the mine fell idle and the only activity for years was the completion of purchase of the Riverside and the payment of corporation and property taxes. Thieves carried away much of the equipment, snow broke down the mill and careless campers destroyed the main building by fire.

In 1949, the High Potential Mines leased the Vesuvius, which they purchased in 1958 and started prospecting and re-opening the old workings. A shoot of high grade ore was found on the surface, and construction of a small mill was started. The old workings were cleaned out and work began on an access through them to get under the ore found above. Operations will undoubtedly start on this new shoot when development has been completed and gold prices justify operations.

(The writer is indebted to W. W. Elmer, consulting mining engineer of Portland, for a great deal of this history; and to Gottfried Graber and Franc Lucille Hard for personal accounts of the early days.)

Chapter 11

The Copper Mines

Oregon-Colorado, Riverside, Etc.

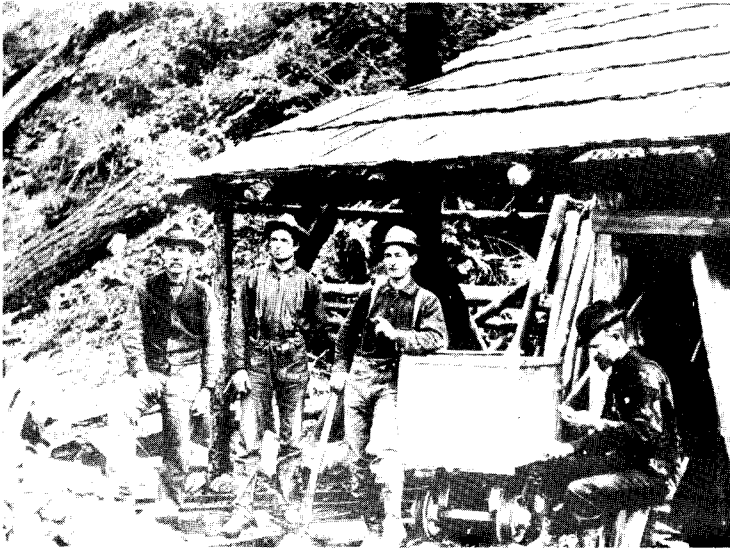
As the early day mines were developed and the tunnels driven deeper under the surface, it became apparent to all that the free milling gold ores of the surface gave way at depth to what was called "base" ore, that is, rock which contained a heavy percentage of the sulphides of lead, zinc and copper.

It was reasoned that veins which outcropped in the bottoms of deeply eroded canyons, would show the same percentage of base ore, as was found at the same elevation in the central part of the District, and this was found to be true.

All around the outer fringe of the camp, at lower altitudes, are found strong veins of the base metals. Prominent among these, because of their greater development, are the Oregon-Colorado and the Riverside. Both of these properties were extensively developed by the Vesuvius Mines Co.

The Oregon-Colorado was discovered about 1898, and was owned then by J. I. Jones, J. V. Cook and James Hemenway. By 1901 approximately 450 feet of tunnel had been driven, exposing a ledge 14 feet in width, carrying up to one ounce of gold, three to five ounces of silver, and up to 33% copper. At this time it was purchased by F. J. Hard and incorporated as the Oregon-Colorado Mining and Milling Co., which was later merged into the Vesuvius Mines Co.

Under Mr. Hard's management, work was started on a deep tunnel,



Oregon-Colorado Crew

450 feet below the upper workings, and a wagon road was constructed from Champion Saddle to the mine, a distance of four miles. By August 1904 the main tunnel was in 800 feet; several hundred tons of ore were on the dump, bunkhouses and cookhouse built, and the road completed. By October 1906 they had driven in 1200 feet, air pipe and rails were installed, and four ore shoots had been cut. In 1910, reports show 2000 feet of main tunnel completed, giving a depth below the ridge top of 1000 feet. Average values of ore, according to flotation tests made by Minerals Separation Co., were 4.22 oz. silver, 3.69% copper, with a trace of gold at depth and up on to one ounce at the surface.

Strenuous efforts were made to raise money for a concentrator; but World War I brought a stop to work, and the loss of Mr. Hard and his son soon after, caused the Oregon-Colorado to lapse into inactivity, along with the rest of the Vesuvius groups.

The mine is four miles down the far side of the Calapooya crest, and hauling raw ore up a steep mountain grade four miles, then down again 36 miles to Cottage Grove, and thence to Tacoma, Wash., to the smelter, is still not economically feasible.

The Riverside Mine – almost four miles by road and trail east of the Oregon-Colorado, but only over the ridge in direct line and on a parallel ledge – followed closely the history of the Oregon-Colorado. It was opened up about 1899 by Cook (of Musick fame) and Hemenway, Smith, Hardy and Thompson, under the name of the Riverside Gold Mining Co. By 1901 some 350 feet of work had been completed and good gold values found.

In May 1901, F. J. Hard bought the mine, and as was his invariable custom, started a big tunnel at depth. By 1905 this was in 1200 feet, all on the vein or directly alongside it, with frequent cross-cuts showing a vein and ore shoots much wider than the tunnel. By 1910 the main tunnel was 1800 feet long, still in ore. The grade of ore was similar to that at the Oregon-Colorado; not quite so much copper, a little more gold and some lead and a lot of zinc. Operations ceased here at the same time as those of the other Vesuvius Mines Co. properties.

In addition to the above, the Golden Slipper, Mayflower, Calapooya, Mineral King, Copper King, Grizzly, Rattlesnake and Stonewall groups all carry considerable amounts of copper, as do all the central mines at depth.

Before going ahead with the history of the Big Mines, we will list some of the rest of the almost 2000 mining claims that were located before 1902.

Chapter 12

Some of the Other Mines and Prospects

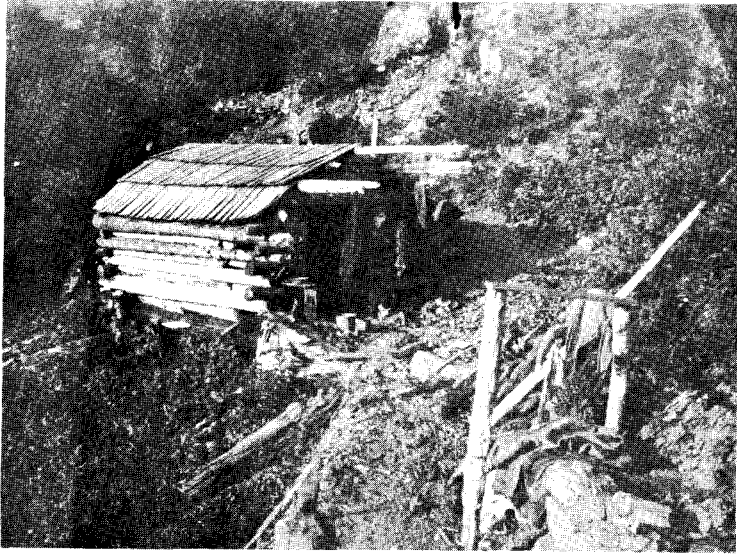
Not all the claims in Bohemia were fortunate enough to have men of courage and persistence at the helm, nor were they all endowed with rich ore shoots, easily found.

The district covers a roughly circular area of about 60 square miles, and the main mineralized belt occupies an area of 5 1/2 miles long by 1 1/2 miles wide, trending in direction, north 60° west (U.S. Geological Bulletin 893). Kimball, in a report in Engineering and Mining Journal in 1902, states that there were "not less than 2000 mining claims of record, some of which, as may be assumed, are fractional and some relocations. The district numbers about 60 head of stamps." (ore stamp mills).

The names of the older locations ring out like poetic bells. The old prospectors may have been a rough bunch, but one cannot doubt that they were a well read and thoughtful group. Long days and evenings in a mountain cabin, no distractions and plenty of time to think, brought forth such titles for claims as:

Ajax, Annie Laurie, Albatross, Alpharetta, Arcturus, Arlington, Axe Billy, Birds Nest, Blue Bird, Black Traveler, Blue Jacket, Black Bear, Belle of Fairview, Bohemia Girl, Bohemia King, Big Four, Cleopatra, Canyon View, Cripple Creek, Cosmos, Crystal Consolidated, Confidence, Dixie, Double Eagle, Drum Lomond, Eagle Rock, El Calado, Excelsior, Evening Star, Fallen Leaf, Forsaken, Friar Tuck.

Falling Star, Frozen Limb, Gold Coin, Golden Stairs, Golden Slipper, Gold Standard, Golden Rule, Gold Cross, Great Eastern, Gettysburg, Grizzly, Hiawatha, Houchy-Kouchy, Hard Scrabel, Hyeu, Holy Smoke, Hidden Treasure, Holy Terror, Hercules, Ivanhoe, Jennie Lee, Keno, Last Chance, Lost Province, Lucky Grouse, Lizzie Bullock, Lonely, Mountain Chief, Mastodon, Mineral King, Midnight, Monte Zuma, Nightingale, Nomadic, Nemo, Neversweat, Oro Fino,



Old Peek-a-boo Mine Cabin

Ophir, Oliver Twist, Opportunity, Plato, Parkers Pen, Pickett's Charge, La Fiesta, Peek-a-boo, Quickstep, Royal Flush, Rattler, Sweepstakes, Syndicate, Three Brothers, Trixie, Three Monte, Utopian, Uncle Sam, Wappaloo, War Eagle, Tall Timber, Tennessee, and of course girls' names by the dozen; also a fair sprinkling of states and cities.

Among those well enough developed to be listed in U.S. Geological Bulletin No. 893 were the following mines, all shown with the names of those men most known in connection with their development, not necessarily the present owners:

Combination, long worked by Nobby Clark; Cosmos or Greenrock, of the Miller brothers; Cripple Creek, now belonging to Kruse and Williams, but developed by Gilbertson, Cochran, Woodard and others; Crystal, in which the late George McQueen was interested; El Capitan or President group, developed by Al Churchill and William Patten; Glenwood, formerly owned by Fingal Hinds and Fred Williams; Gem, Rico and Slide, long owned by the McMurgeys of Eugene (and the only claim cabin which boasted a grand piano); Gold Cross, another McQueen property; Golden Slipper, formerly Oglesby and Gowdy's property, Grey Eagle, and Alice, of McQueen's; Grizzly, of Klopfenstein, Johnson and Byrne fame; Ingham, belonging for years to Dr. Ingham of Portland, now owned by William Bartels; Le Roy, a stock company property; Mayflower, developed by W. P. Ely, newspaper publisher of Kelso, Washington; North Fairview, owned by Klopfenstein, Jenks and McQueen; Ophir, discovered by O. P.

Adams; Oro Fino, owned by Owens; Peek-a-Boo, worked for years by Billy Edwards; Rattlesnake; Stonewall; the Sunset of Wyatts; the Syndicate of Edd Jenks; Shotgun; Reed and Fletcher; the Star group of Prof. Day's; Sweepstakes, where Brund labored for many years; Tall Timber; War Eagle, of Oliver Gilbertson's; Utopian, a property of Vesuvius Mines Co. and later owned by Ray Nelson, and the Yellow Jacket, of Jim Sears', long an active prospector in the district.

Space forbids listing more of these claims. It is not the intention of the writer to slight these others; they are simply less well known to the sources used in this compilation. Information concerning them would be welcomed.

Chapter 13

The Golden Years Under Oregon Securities Company

When, in early 1903, the Oregon Securities Co. secured control of the Oregon and South Eastern Railroad and the Musick, Champion and Helena mines, it set about a systematic plan of development.

The Broadway group and other claims were purchased. With the purpose of centralizing operations the Musick 10-stamp mill and the 10 stamps of the Helena mine were moved over and installed alongside the 10 of the Champion, in a huge new building. Concentrating tables and Frue vanners were added, to save the base metals. Six long copper plates, plated with quicksilver, caught the free gold. To operate all the machinery an electric power plant run by Pelton type waterwheels was built at the "Warehouse" (now Lundpark). Seven miles of power line was constructed alongside the new road which was built up the Champion canyon, with the double purpose of feeding an electric railroad which was to connect with the O & SE railroad at the Warehouse, and with the Champion mill; also supplying the motors at the mine.

Air compressors were installed, and air pipe run up to an through the mines. A Postoffice called "Orseco" was established.

The main working tunnel, No. 9, was driven in, as a crosscut, 1,000 feet through country rock till it hit the Champion vein at depth. To connect this tunnel with the mill, distant 835 feet vertically, and 3,000 feet away on the slope of the hill, an incline tramway covered by snow sheds was built and operated by electrical mechanisms installed by Electrical Superintendent Andy Nelson.

Meanwhile mine development went forward at all three mines under direction of General Manager A. B. Wood and C. C. Mathews, superintendent. By the spring of 1905 the mill was ready, and the run began. In nine months \$83,159.53 was realized from 12,311 tons of ore milled. As milling continued at the Champion, a 6,000 foot tramway was built on a level grade to the Musick mine, and in May 1906

ore began to move over this. As developed ore began to become scarce the need for more development was apparent, and T. C. Archer of Prescott, Ariz., was brought in as superintendent in 1905. As his stopes neared the grass roots, he started a deeper tunnel, No. 12, 1,200 feet below the ridge top, to cut the ledge at this depth and open up more ore. While this was underway, mining went on in No. 9 and during the summer of 1905 the "High Grade" was hit. The vein had split around a "horse" (an intrusion of plain country rock) and the miners had followed one side of the ledge. Becoming curious, they went back and ran the Brooks Crosscut through to the other side, finding a body of ore centered on a beautiful core of gold encrusted rock which ran \$30,000 to the ton. Joe Landess saw this stope, and relates how the rocks glittered with gold "like a jewelry store."

Some samples of this ore still exist here in Cottage Grove. So valuable was it that only certain men were permitted in the stope, where canvas was spread down and the walls brushed down upon it, while larger pieces were packed in double sacks and carried out. Common report has it that several sacks were "High-graded" and hidden out, while miners made away with more than wages by sifting a little ore in their tobacco pouches.

However, the lower grade rock, in vast amounts, was what made the mine, and it had to be opened up ahead of milling demands. No. 12 was not completed - Superintendent Archer resigned in January 1906, and as available developed ore was worked out the mine ran less steadily.

Musick was worked out down to sulphides as far as they then knew, and the tramway and tunnel proposed to reach the Helena was never completed, so Helena ore never reached the big mill.

Profits had been disbursed in dividends. The panic of 1907 came along, and the company was reorganized as the West Coast Mines Co., while work went on.

Chapter 14

The Champion Mine in the Years Between the Wars

After the conclusion of World War I, it will be remembered that inflation struck the country, prices rose higher and higher, culminating in the crash of 1929. Gold is a peculiar product to market. Due to its use as a base for our paper money, the price is fixed by the U. S. Government, and gold may only be sold for that price. Gold which was mined in Bohemia when wages were \$2 per day, and other things correspondingly low, was sold at \$20.67 per ounce. After the war, with wages and material cost doubled, then tripled, gold still sold for \$20.67. Raw ores of lead, copper and zinc could not be shipped so far at a profit. Operation was impossible.

From 1919 until 1933, the camp was practically deserted. Roads were blocked by fallen timber, trails were abandoned, cabins deserted and falling in. Vandals and thieves carried off everything movable, and careless hunters destroyed many buildings by fire. Only a few of the old-timers kept faith, holding on to their claims by keeping up their annual assessment work.

And only one mine continued in intermittent operation. The Bartels family had acquired control of the Champion mine, and also the eastern extension of the Champion ledge, which runs through property called the Evening Star claims and through the old Knott Mine. For years, Fred Bartels, working under incredible difficulties, ran a five-stamp mill and cyanide plant at the Evening Star, opening up the ledge to the east and proving that ore extended far beyond the previous boundaries of the Champion.

In 1930 and 1931, the U. S. Geological Survey and the State of Oregon, cooperated in an investigation and report on mining districts of the Cascades, which was very favorable to Bohemia. It stated that the district is "the largest, the most extensively developed, the most productive" and "has greater possibilities of future production than any of the others" of the Cascade range. When this report was published, it recreated interest in the district.

Musick, Helena and Noonday ran again and will be treated of in the next chapter. In 1935, a company was formed by Robert Betts, with George Stowell as mining engineer, and a new mill was built at Champion to try the new method of "flotation" to recover the values of lead and copper as well as gold. It was depression days, money was hard to raise. The mill was barely finished and no money left for development of ores. The company was unable to go ahead. Thus matters rested until 1939, when at last it seemed that Bohemia's greatest chance had arrived. Higgins & Hinsdale, operating as H & H Mines, acquired control by lease and purchase, of the greater part of the center of the district.

Here, for the first time, were brought together sufficient money, brains, ability, technical knowledge, experience in mining, and sufficient property to justify large operations. Development of new ore bodies proceeded at once. No. 9 tunnel was driven far to the east, into Noonday ground. No. 12 tunnel was at long last completed into the ledge and was made the main working tunnel (justifying Supt. Archer, of the old days). Musick mine was opened 100 feet below previous workings. Everywhere new ore was opened up. Systematic sampling disclosed ore reserves valued at \$2,714,000.00. A new flotation plant, utilizing the latest in machinery, was built at the mouth of No. 12. Competent mining engineers and mill men were put in charge, and the run began. Recovery was excellent. The mill saved gold and silver, lead, copper and zinc in the form of concentrates, eliminating the shipment of barren rock. Everything was proceeding full speed ahead, when World War II broke loose. High cost of operations and scarcity of men intervened and the Champion closed down, and metals so vitally needed were lost to the war effort.

The Other Mines Between the Wars

During the early 1930's, the cost of materials and labor was low, and by government order the price of gold was raised to \$35 per ounce. A new method of saving metals, called "flotation," was perfected. These things resulted in the reopening of mines, all over the country. In Bohemia the Noonday, Helena, Champion and Musick were thus made productive again.

Noonday - The last work had been in 1916, '17 and '18 when Albert Helliwell and John Coffman made several shipments of ore to the Selby smelter in California. In 1934 a small flotation mill was opened and the property produced some \$50,000 while operated by the Grouse Mt. Mining Co. Operations were continued by K. O. Watkins, who had become interested in the district. Ore was mined in 1936 and 1937, and in 1939 H & H Mines bought the property and started development work in connection with the Champion. Wm. Bartels is now owner of the Noonday.

Helena - This mine was purchased in the early 1930's by L. M. Capps of Idaho. Prospecting and development opened extensive base ores, and in 1935 Dale Wyatt organized the Helena Mines Co. and built a 35-ton flotation mill. Ore worth \$35,000 was produced in '35 and '36, and in '37 under W. G. Reaves the property produced \$85,000. The Mines Service Co. under Geo. Barton produced ore in 1938 and 1939, and then the mine was idled by high cost of operation and government prohibition of gold mining during World War II.

Musick - West Coast Mines Co. sold the Musick to Capps of Idaho in 1921. Nothing of consequence was done until gold went up in price. In 1935 the Minerals Exploration Co. leased the claims and built a concentrating flotation plant, which operated during 1936 and 1937. Rich base ores of copper, lead, zinc, gold and silver were mined and milled. The production during these years was \$107,000. In 1939 H & H Mines leased the Musick to run in connection with their other mines. Ore had been worked out, down to the lowest tunnel level, but by sinking a shaft, and running a lower level, it was found that excellent ore extended on down into the mountain. Then, as with the other mines, the war intervened. All gold mining was ordered stopped, notwithstanding the huge tonnages of copper, lead and zinc available, which was now being saved by flotation, and once more the Musick lay sleeping, in the shadow of old Bohemia mountain.

All the Mines—1945-1959

After the conclusion of World War II and the lifting of the ban on gold mining, various efforts were made to get the mines back on a productive basis. The higher prices being paid for lead,

copper and zinc, and the higher savings of values being made by flotation led to a resumption of operations.

At the Champion, with ore worth over \$2,700,000 blocked out by H & H Mines (according to report by mining engineer Graham), the mill was reconditioned under ownership of Fred and Wm. Bartels. It was in intermittent operation under the supervisions of Ken Watkins, Fred Bartels, and Wm. Bartels Jr., during 1946-47-48-49-50-51. Ore was mined from the Champion, and hauled in from the Helena and Musick. Also, between 1945 and 1949, several cars of concentrates were shipped, and Harold Barton, operating as lessee, shipped several cars of high-grade ore to smelter during 1949-1950-1951.

Several mining companies of national note made investigations looking toward purchase of the property, all reports being favorable, but apparently terms could not be agreed upon.

The Helena was purchased by Ken Watkins in 1945. Helena Mines Inc. was formed with W. E. Caldwell of Corvallis as president; Ken Watkins, vice president; and Harold Barton, secretary. The mine operated intermittently. Some ore was milled at Champion mill and some high grade was shipped direct to smelter.

The Nooday was leased to Silver Shield Mining & Milling Co. of Salt Lake City, in 1945, by Higgins, and was sold by him to Wm. Bartels in 1954.

The Musick lease contract was sold by H & H Mines to Watkins in 1944, and re-sold by him to the Tar Baby Mining Co. of Salt Lake City. This company bought the mine from Capps in 1946. In 1948 Helena Mines Co. secured a lease on the Musick, and sub-leased the east end of the property to Nordstrom and Wyatt. These men did development work, 1949 to 1952, through to the east end line of Musick and on into the Clucky Fraction, opening some first class base ore, heavy in lead, copper and gold.

Vesuvius Mines Co. sold the Riverside and Oregon-Colorado mines to Ken Watkins and the Vesuvius to Ray Nelson.

In all these efforts, the extremely high cost of labor and materials as compared to the fixed price of gold, required that lead, zinc and copper carry most of the burden of costs and profits. When foreign shipments caused the break in lead and zinc prices, closing a large share of U.S. mines, it became necessary for Bohemia District, like the rest, to await more equitable prices for domestic ores; or a raise in the price of gold to a value consistent with inflated labor and materials cost.

So it rests today. A proven mining camp, with vast reserves of ores, awaiting the proper combination of men, money, and prices, to become again the roaring boom camp of yesterday.

In this history, no mention has been made of the famous Black Butte Quicksilver mines, with a recorded production of over \$1,000,000.00. This mine is southwest of Bohemia District, some 20 miles and its history is separate and distinct.

It has been endeavored to make this a straight history, with the hope that corrections will be made by those having knowledge unknown to the author, in order that these facts may be preserved for future use.

New Developments 1959-1969

The price of gold remaining the same – while all other commodities and labor joined the rising spiral of inflation – it has not been economically feasible to operate any of the mines during this period.

However, many changes have been made in looking to the future. Of prime importance, because of the benefits of a consolidated operation, has been the acquisition of many of the principal mines of the District by one company, the BOHEMIA MINERALS, Inc.

Included in this consolidation are the Musick, Helena, Champion, Evening Star, Oregon-Colorado, Stonewall, Gilbertson, Nordstrom, Utopian, Sweepstakes, President, Greenrock, Glenwood, Tall Timber, and others. Under the auspices of this company and its affiliates, development work goes on. At Musick mine – since ores were worked out between #6 level and the surface, and deeper development work meant an extremely long tunnel on the East side – a deep tunnel, #10, was driven from the West side of Bohemia peak, running in 400 feet below the old Musick workings and giving a large block of stoping ground on good base ore between this level and the old ones above.

At the Star mine on Puddin Rock creek, Northwest Mine and Milling Co. has installed extensive water power works and is constructing a new mill for the reduction of gold ores.

On Elephant Mt., Hal Barton is developing his group of claims.

At the Vesuvius, work is under way by High Potential Mines under the ownership of Ray Nelson.

On Grouse Mt. Wm. Bartels Sr. has acquired ownership and control of the Noonday (including the Annie) and the original Knott mine, as well as the Ingham group, and is doing a large amount of development work including a complete rehabilitation of the old Knott shafts. The Bartels family has been very prominent in Bohemia mining since the early 1920's and has contributed much to the active work of the camp – at Evening Star and Champion as well as at Noonday and Knott.

At Cripple Creek mine, Kruse and Williams had done much work on both mine and mill; and under the present ownership of Ray Nelson, a prominent ledge junction is being opened up to provide future milling ore.

At the Helena, Extensive core drilling both east and west of the old workings shows typical Helena ores at depth.

Access to the District has been enhanced by new Forest Service roads, which, added to the older mine and county roads, give at least 8 ways of entering the camp, some on very easy grades.

A Look at the Future

Bohemia is a recognized mining district, mapped as such by the U. S. Geological survey, and Oregon Department of geology and mineral industries. Recorded production by U. S. Government figures is \$1,025,000 to 1947. Since reports were not made on the earliest and richest ores -- actual production is a great deal more.

Among the main mines are: Musick, Helena, Champion, Noonday, Vesuvius, Crystal, Grizzly, Utopian, War Eagle, North Fairview, Syndicate, Cosmos, Mayflower, Golden Slipper, Riverside, Oregon-Colorado, Cripple Creek, President or El Capitan, Star, Combination, Knott.

In these mines there are now developed and by means of tunnels, shafts and cuts, 97,300 tons of lead, zinc, copper, gold and silver ores; 62,000 tons of copper-gold ores valued at prices of January 1955 at \$5,063,000.00. These figures are from reports of Oregon Department of Geology, H and H Mines, and Graham.

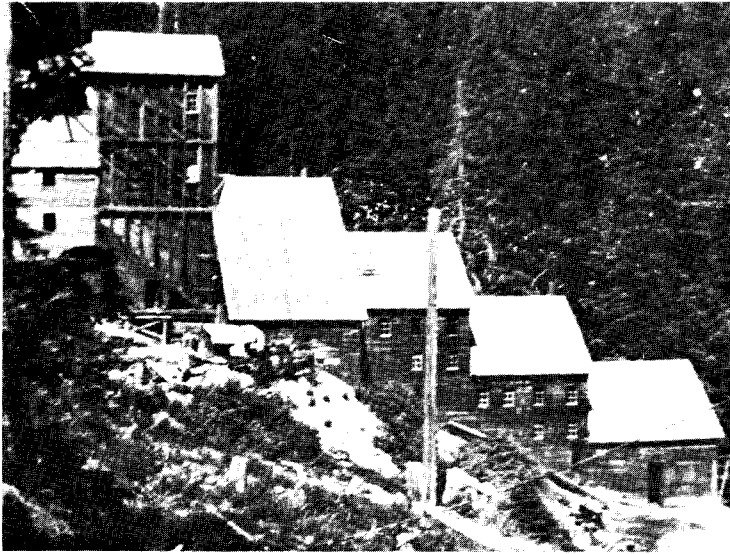
Considering only the probable ore to be expected from future, based on indication as of now, in only the Musick, Vesuvius, Champion and Noonday, there will be available 491,600 tons of base ore worth at present prices \$14,748,000.00.

These figures are from reports of G. Collins, W. W. Elmer and W. T. Graham, all mining engineers of national note. They reflect only the most conservative estimates on total future production, down to the altitude of 4,400 feet, which is as deep as development has yet proceeded in the center of camp. As the deepest tunnel, under outcrop, is 1200 feet at Champion No. 12, and ores are exposed by erosion in canyons at 1500 feet greater depth, the possible tonnage is enormously greater than given above.

"Major discoveries of new metal deposits in the U. S. have been rare during the past ten years. Imports of base metals are on the increase and practically all the older mining districts are being closely scrutinized for the possibility of reopening these districts. Greater demands, fewer discoveries, depletion of present reserves, and increased metal prices are keeping the larger producers constantly on the alert for new fields or for possible reopening of the older fields. In view of these changed conditions, it seems reasonable to conclude that any district which offers the possibility of producing new mineral wealth will, within the next few years, receive the attention of the mining industry." (Quote from report of W. T. Graham, registered mining engineer.)

If for no other reason, the need for domestic copper in war times will oblige the country to secure its local sources of supply, just as has already been done with nickel, at the development at Riddle, Ore.

The ultimate development of the district awaits driving of a really deep level tunnel, say at Mineral on Sharps Creek, if Cottage Grove wishes to secure the trade from the mines; or at Riverside or lower level on Upper Steamboat creek, when the trade would



The New Champion Flotation Mill

go out to Roseburg. This work will ultimately be done, barring interference by government bureaus, since such a program will become economically feasible as the nation's reserves of ore are depleted.

The amount of ore that will be developed by such a program, is of course theoretical now, since it is far below the zones which are opened for inspection, in the middle of the camp. Estimates by competent mining engineers and geologists place the total in excess of 1,250,000 tons. Its value in money would be tremendous; and its value to a country desperate for raw minerals in time of war, would be incalculable.

"Bohemia" Sharp, Hermit

From the North West Herald, the Bohemia Nugget of July 7, 1899, reprinted this tale of old "Bohemia" Sharp:

I met the "Old Timer" yesterday in his element as the center of an admiring constituency in the lobby of the Imperial (a Portland hotel), and only had time to hear him tell his latest.

"I recently visited Salem," he said, "and fell in with my old crony and prince of good fellows, Colonel N. B. Knight, who vouches for the truth of the following. It appears that the colonel one evening was regaling a party of friends with anecdotes of the Civil War, when one of them, James H. Sharp, the pioneer prospector of the Bohemia district, stated that the war had greatly influenced his life. "It was this way," said the miner. "In 1861, I was a young man in St. Louis, had a splendid position and was a member of the crack militia company of the city. For three weeks we drilled once a week, and once a month, in our handsome uniforms, we gave a swell dance which was attended by all the young ladies of St. Louis swelldom. These were pleasant days, never-to-be-forgotten, always-to-be-remembered. Then one day we heard that Fort Sumpter had been fired upon; immediately our bugler sounded the bugle call, and as soon as we could properly array ourselves in our uniforms and shoulder our arms, the company assembled. It was a brilliant sight, a military band led the way, playing patriotic airs, our captain bore himself superbly, and as we marched through the streets of the city in perfect step, the citizens gathered on the sidewalks to cheer; from the windows the ladies were waving flags and handkerchiefs, and throwing floral tributes at our feet. The legions of Caesar never felt more thrilled or joyous. We marched in this manner for three miles out to Jefferson barracks and laid down our arms and disbanded! I don't know what became of the others, but I drew my little savings, bought a ticket to Callao, but at the isthmus was induced to change my mind, and come with a party to Oregon, and have lived practically a hermit's life in the Bohemia mountains ever since. That war ruined all my prospects."

(Editorial Note— Bohemia Sharp, for whom Sharps Creek, which the right hand road to the Bohemia district follows, was named, lived practically the life of a hermit at his homestead across the creek at the point where Buck creek flows into Sharps creek. In spite of being an extremely intelligent and well-educated man he clothed himself only in "long-handled" underwear. To further explain his story, Missouri was a split state at the time of the Civil War. The authorities in power, being secessionist, ordered the militia to proceed to Jefferson Barracks and there ordered them to lay down their arms and disband.)

The Helena Story

By Larsana Nelson

Professor Day was hankering for somebody to talk to besides himself and the woodrats. His cabin was out by its lonesome, half a mile east of the Mayflower, the other side of Windy Creek. Besides, the mail'd probably come in at the Noonday. So he latched the cabin door and set out for the Noonday mine, five miles uphill. And that's how he can tell about the night Charlie Bruneau came:

That night, as they all sat in the big long bunkhouse, talking, and between times listening to the fire sing, there was a knock at the door. They opened it, and there was a tenderfoot. Those feet were mighty sore, and there was dust on the brand-new duds that some clerk'd told him were "genuine miners' clothes." He asked for shelter, and they gave him food and a bunk, as is the custom in the hills. This man was Charles Bruneau.

After he'd emptied his plate twice and got his boots off, he told them about his yen. A photographer by trade, he knew absolutely nothing about mining, but he'd always dreamed of finding gold. Today it would be called an obsession. It ate at him so that finally he took his savings and outfitted himself for prospecting. He hoped that if he could find gold, his yen would be cured and he could go back home to his business. He still knew nothing about mines--wouldn't know gold ore if he saw it--but he had to look. He asked the miners in the bunk-house, "Where would be a likely place to dig?"

"Why sure, we know where you can raise a little color. It's not worth much, but it's real gold, and it's right convenient to the boarding house. Used to be, you could only get to the mine here by the Annie trail, but we've been building a road around the side of old Grizzley. You go up 'bout a half mile onto the new part of that road, to where there's a spring with a condensed milk can by it. If you face that can, you'll see some red dirt in the fresh cut. You dig there. It runs only maybe a dollar, dollar and a half a ton, but maybe it'll cure you of that gold fever."

So Charlie Bruneau took some of the little bit of cash he had left and hired another strong back. Together they started and they dug a hole; for a week and ten feet they dug in that red streak that wasn't worth a miner's sweat. Ten feet from the road was the ledge -- the richest ledge in the Bohemia country.

The yen for gold was not cured -- it grew, and into the hole went all his pile. Along came a man named Jennings, who bought half in the dream and made it come true. Three years later the tenderfoot's yen was parlayed into the \$3000 a ton Helena Mine.

The Lost "Frenchman" Mine

No mining story is complete without a lost mine, and Bohemia has several--The Lost Frenchman, Lost Dutchman, the Lost Lode of Trestle Creek, and the Lost Mine of Fiddlers Green.

Of these, perhaps the most famous is the Lost Frenchman. Persistent stories linger still, of the French Canadians who came into the Bohemia country from the High Cascades and came out again with gold dust to trade for their necessities.

John Alexander was a lad of 15. His father was building the Old Military road up the Middle Fork of the Willamette river, above what is now Oakridge. John relates that three Frenchmen and their Indian wives were camped near the road camp for several days, and that these people spoke of having much gold. Later their tracks were followed from Campers Flat, up an Indian trail along what is now Coal Creek, and over into the Bohemia country. Many legends persist of the Frenchmen who came to the old military road to trade gold for flour and tobacco. Legend places the mine somewhere between Steamboat Creek, and Cowhorn peak, in that vast wilderness once populated in summer by a few Indians, who came there to make arrow heads, hunt, fish and bathe their rheumatism away in the Steamboat hot springs.

The McReynolds family of Cottage Grove has legends of Indians who came from Klamath Falls and the High Cascades, down through Camas Prairie onto the North Umpqua in the Illahee country. In there, in a deep canyon or valley filled with boulders ranging in size from a car to a house, is perhaps located the lost gold mine of legend. As late as the 1930's, two half-breeds came in there one month, and came out laden with gold.

Billy Edwards, prospector of Bohemia, and friend of Halo Tish, the old Indian chief, told of the Indian tales of the Frenchmen. The older Indians were well aware of the mine and the gold; and of the trappers who were working it. Billy was of the opinion that the mine was closer to the Upper Steamboat, or perhaps on the Willamette-Umpqua divide.

Chas. Nordstrom, one of the last of the oldtimers, as late as 1949, spent two weeks near the head of Coal Creek and Windy creek, in a vain search for the lost lode. He was convinced that it must be near this spot, because of the numerous tales he had heard and added up.

In early days, remains of sluice boxes and ditches were to be seen at the outlet of Crescent lake, and of course these lent credence to the idea that the mine was a "lode" mine and that the high-grade, being located in a waterless spot, was brought to the lake to be washed out. There is no known deposit of either placer or lode gold, anywhere close to the lake outlet. The Frenchmen were known to have pack-horses, and if the gold deposit was sufficiently rich, it would have been well worth packing to the nearest water.

The upper Steamboat creek carries a goodly amount of placer gold, washed down from the Musick mine in Bohemia. The Steamboat placers were being worked long before "Bohemia" Johnson made his discoveries above there. Perhaps the old trappers, who were in the Cascades long before the first English and American settlers came to the Willamette valley, had found the Steamboat deposits and worked out the richest part.

However, the weight of evidence points to some other source; and as the old saying goes, "where there is so much smoke, there must be some fire." Somewhere in that tangled wilderness, concealed under the brush and debris, awaits a fortune for him who is persistent enough, or lucky enough, to find it.

Place Names of the Old Bohemia Country

ADAMS MT., named after O. P. Adams, who ascended its slopes to first view the mining country to the east.

ADAMS MT. TRAIL, from Lundpark to Utopian Saddle.

ANNIE CREEK, named after Annie Oglesby Graham, of Annie Mine fame.

ANNIE TRAIL, from Lundpark to the Annie mine on Grouse Mt.

BAREBONES MT., the name is obvious, from the bare sides of rock.

BOHEMIA MT., named after "Bohemia" Johnson, but first called Mt. Majestic.

BOHEMIA SADDLE, between Bohemia and Fairview Mts.

BRADLEY'S DOG-HOUSE, a reputed "robbers" hangout.

BRASS CREEK, now called Frank Brice creek.

BRISTOW MEADOWS, named after the pioneer family.

CATCH COTCH or CAT MT., a refined form of the original name.

CAT CREEK ROAD, went from nowhere to nowhere, neither end completed to its destination.

CHAMPION CREEK, named after the Champion mine.

CHAMPION TRAIL, up the sides of Champion canyon, before the road was built.

CHAMPION SADDLE, between Fairview and Grouse Mts.

CHINA CREEK, a branch of Martin Creek, placered by Chinamen.

CITY CREEK, from Musick mine to Steamboat Creek. Named after the older Bohemia City.

COMBINATION, Knobby Clark's old "stamping ground" up Martin Creek.

CRAWFISH LAKE, one of the most inaccessible spots in Bohemia until the road was built.

CRYSTAL CREEK, flows from the Crystal mine.

COUCH TRAIL, afterwards the Oakland trail or wagon road.

DAY'S CREEK, named for Prof. Day of the Star mines.

DEAD HORSE HILL, on the Noonday road, derivation obvious.

DOWNING'S POINT, a miner named Downing, lost in a snow storm, froze to death here.
 ELEPHANT MT., named for its shape.
 ELEPHANT LAKE, at the east foot of Elephant Mt.
 ELK MEADOWS, one of the oldest gold producing parts of the camp, known long before Bohemia Johnson's day.
 FAIRVIEW MT., once you stand on its top, the naming is as clear as the view.
 FIDDLERS GREEN, on the Oakland trail, site of a lost mine.
 FROG ROCK, on the Riverside wagon road, beyond the Oregon-Colorado.
 GLENWOOD STATION, stage stop on Hardscrabbel hill.
 GOULD & CURRY CREEK, now corrupted to Golden Curry, named after the famous mine at Va. City, Nevada.
 GRIZZLY MT., no Grizzlies there now.
 GROUSE MT., well named in the olden days.
 HARDCRABBEL RIDGE, also trail, and road, extends south-westerly from Fairview peak. A hard "scramble" in the early days, for the first prospectors to ascend it.
 HAWLEY RANCH, early day stage stop. The "Painted Post" ranch.
 HELENA SADDLE, between Grouse and Grizzly Mts. above the Helena mine.
 HORSE HEAVEN, a canyon, also a creek therein. Good pasture, for pack horses.
 JACKASS RIDGE, named for the mountain canary, the prospectors burro.
 JOHNSON MEADOWS, famous cattle pasture in the high country.
 JUDSON ROCK, landmark on the Hardscrabbel trail, named for Frank Judson Hard.
 KITTEN ROCK, offspring of Cat (or Catch Cotch) Mt.
 KNOTT TRAIL or ROAD. Original sled trail for heavy machinery, over Adams Mt. to the Knott mine.
 LUNDPARK, new name for the WAREHOUSE, named for Harry Parker and Alex Lundberg, as stage stop on Brass Creek.
 MARTIN CREEK, southerly branch of Sharps Creek.
 MINERAL, stage stop at the foot of Hardscrabbel Mt., formerly a hotel and post office.
 MONTE RICO (rich mountain), a ridge S. W. of Bohemia peak.
 MONTE RICO TRAIL, the old trail down to Steamboat placers.
 NELSON CREEK, named for the pioneer electrician, Andy Nelson.
 NOONDAY ROAD, superseded the Annie Trail, built entirely by hand labor.
 OAKLAND WAGON ROAD, superseded the Couch trail. From Oakland, Oregon, to Bohemia mines, but didn't stretch quite that far.
 OREGON-COLORADO ROAD, to the copper mines in the south-east.
 PACKERS SPRINGS, on Adams Mt., a cool drink after a hard climb.
 PARKERS PEN, a play on words. Cabin at Parker Bros. mine.
 PILOT ROCK, on the end of Jackass ridge.

PUDDIN' ROCK, from its shape.
POWER HOUSE, the water power electric plant at Lundpark, for the mines.
RANGER PRAIRIE, good hunting, lost mines.
RED BRIDGE, the first covered bridge crossing Row river to Sharps creek road, Barn red.
RIDGE HOTEL, stopping place on the Noonday road.
SAILORS GULCH, first good placer in the district.
SHANES SADDLE, between Bohemia and the Twin Rocks country.
SHARPS CREEK, after old "Bohemia" Sharp.
SHARPS BIRD NEST, "Bohemia's" old mine, high on the ridge top.
STEAMBOAT CREEK, also trail. The best placer mines.
ST. PETER'S CREEK, below the Peek-A-Boo mine, past the President group.
STOREY MINE, after the famous Storey County, of Virginia City, Nevada, fame.
TRESTLE CREEK, a trestle carried the powerhouse flume across here. Site of a lost mine.
TWIN ROCKS, a land mark in the south.
UTOPIAN SADDLE, between Catch Cotch and Adams Mts.
WAREHOUSE, famous stopping place, now called Lundpark.
WEAVER CREEK, Downing's partner, lost in the snow, was found next spring on the banks of this creek, sitting where he froze.
WINDY CREEK, far away near the Steamboat country.
WYATT CREEK, named for the well-known early miner, M. F. Wyatt.

—AND MANY, MANY MORE—

DESCRIPTION

of the

BOHEMIA MINING DISTRICT

of the

CASCADE MOUNTAINS, OREGON

by

Elmer Fisher and Fred J. Bartels

As part of the course in Economic Geology,
School of Mines, O.A.C. 3rd term, 1919

PREVIOUS WORK

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HISTORY

The Bohemia mining district was discovered, according to Dr. W.W. Oglesby of Cottage Grove, Oregon, by Frank Brass and himself, in August, 1858. The district was named from James Johnson, also called Bohemia Johnson, who, with George Ramsey, reached it in 1863 from Roseburg, by way of the North Fork of Umpqua River and Steamboat and City Creek. Free gold was found in a small vein near the head waters of City Creek but gave out at a few feet in depth. This discovery brought many prospectors. Bird Farrier discovered what, by purchase, became later the Knott claim, where a five-stamp mill was erected in 1875. It shut down in 1877, and the Bohemia district was almost forgotten until interest in it was revived by Dr. W. W. Oglesby, O. P. Adams, and others in 1891. The first lode of importance, located the same year was the Musick which installed and operated a five-stamp mill continuously until 1895. An addition of a five-stamp battery was then made and the ten stamps operated during the summer months until 1908. There has been very little activity in the entire district during the last five years.

OUTPUT

The output of the Bohemia district since its discovery has been chiefly from the Champion, Musick, Gelena, Noonday, and Vesuvius, which estimated approximately for the entire district is about 5,000,000. The average running time has been about $6\frac{1}{2}$ months out of the year, because of heavy snows in winter which interfere with the work.

LOCATION AND TOPOGRAPHY

The Bohemia mining region is situated at an altitude of between 4,000 and 6,000 feet above sea-level along the crest of the Calapooya Mountain and upon both slopes, about 35 miles directly southeast of Cottage Grove, from which point it may be reached by a good road up Row River. The road forks at the mouth of Sharp Creek, one road leading to the Noonday and Champion mines, and the other a good road leading up Sharp Creek by a shorter route to what is generally known as the Musick Mine. The region may be approached also from the railroad at Oakland, on the southwest by road and trail, but the distance is somewhat greater than from Cottage Grove. The slopes throughout the region and its approaches are steep and generally well wooded, but offer no special difficulties in the way of road construction.

The mines cluster about Bohemia Mountain and lie close to the crest of the Calapooya Range, where it forms the divide between Steamboat Creek, flowing south into the Umpqua, and Sharp Creek with Frank Brass Creek, flowing north into Row River and the Willamette. The divide between this stream and the North Fork of the Umpqua is comparatively low, so that Bohemia and Grouse Mountains and the other peaks in that vicinity are separated from the crest of the Cascade Range, 40 miles to the eastward, by lower ridges and hills. The higher peaks of the Cascade Range may often be seen from the Bohemia region above the clouds which lie over the interval. Seen from the Cascade Range, the Bohemia Peaks of the Calapooya Range stand out prominently in the distance. Next to Bohemia Peak the prominent elevations of the Bohemia region are Fairview, Grouse, and Grizzly peaks, each of which stands at a marked bend of the serpentine crest of the Calapooya Range.

GEOLOGY

The rocks of the district consist of andesitic lava flows interbedded with pyroclastic material, the product of Tertiary volcanos, and perhaps fissure eruptions. These flows and tuff beds have been more or less altered by subsequent hydrothermal metamorphism and have been slightly tipped in various directions by the same orogenic forces which probably caused the uplift of the Cascade Range. A porphyritic dacite cuts the andesites and interbedded tuffs in several places along the road about half way between Disston and Orseco. It also occurs within half a mile northeast of the Musick Mine, and about one mile southeast of Bohemia mountain on Churchills property. Basalt occurs in one or two small outcrops. It is a fine grained lava, best shown on the south edge of Bohemia Mountain. Its small outcrop suggests that it is intrusive in the andesites.

PETROLOGY

Rocks of the Bohemia Mining District

ANDESITES:

With very few exceptions all of the rocks of the Bohemia district might be included under this heading. The tuffs, too, and most of the basalts are andesitic. In several of the andesites hornblende is present, but generally pyroxene is the only characterizing ferro-magnesian silicate. Although widely distributed, the andesites are much altered. At the Champion mine is a fine even grained andesite, containing small veinlets of epidote. In thin sections shows feldspars altered to kaolin, considerable magnetite, abundant chlorite, and veinlets of epidote and chlorite. At Champion crosscut is a gray greenish porphyritic andesite. Megascopic examination shows feldspars partly altered to kaolin, hornblende, phenocrysts partly altered to chlorite. Pyrite is present in the rock. Microscopic examination shows the rock to be porphyritic, with a few much altered, somewhat resorbed phenocrysts of plagioclase. The groundmass is a confused fine grained aggregate of altered feldspar, chlorite, and epidote with some magnetite and impregnated pyrite. The altered femic phenocrysts contain the larger grains of pyrite.

A specimen from the Champion dump is a highly altered gray to greenish andesitic breccia, the femic minerals having been altered to chlorite, and the feldspars kaolinized. The fragments were probably an earlier dark colored andesite. The thin section shows that the rock consists of highly altered angular fragments imbedded in an altered tuff-like groundmass. Kaolin and chlorite are the chief alteration products. There is some epidote present. Also some secondary opalized silica in small seams.

A specimen from the lower Champion dump is a gray porphyritic andesite, the hand specimen showing phenocrysts of plagioclase, hornblende, and pyroxene. Texture is medium grained. Thin section shows two generations of phenocrysts consisting of plagioclase and augite. The larger sized plagioclase is considerably altered. The larger sized augite is also much altered. Several phenocrysts showing the change from pyroxene to uralitic hornblende in so-called reaction rims. The larger first generation of phenocrysts appear to be somewhat resorbed.

The second generation of plagioclase is comparatively fresh and appears to contain some inclusions of a black glass. The groundmass consists of fine grained plagioclase crystals surrounded by small irregular grains of augite. There is some magnetite present.

Another specimen taken near the Champion mine shows the rock to be an amygdaloidal andesite, the amygdules containing epidote and quartz with a few crystals of pyrite. The thin section shows the rock to be a fine grained amygdaloidal, - some amygdules filled with epidote entirely, some with quartz, pyrite, and chlorite. Some of the plagioclase phenocrysts are fractured and

impregnated with calcite. Few greatly altered femic minerals. The groundmass is fine grained and altered with abundant chlorite, calcite, epidote and magnetite.

A specimen taken on the trail near the Champion is a gray porphyritic andesite, showing phenocrysts of plagioclase and pyroxene. The hand specimen shows alteration. In thin section shows plagioclase phenocrysts in many cases resorbed. The femic phenocrysts, which were probably augite are completely altered to a mass of epidote and chlorite. The groundmass consists of small plagioclase feldspars surrounded by altered femic minerals. Field name augite andesite.

A specimen of the country rock taken from Churchills property about one mile southeast of Bohemia mountain is a light colored porphyritic dacite or quartz porphyry. In the hand specimen there is prominent quartz phenocrysts which shows resorption, also phenocrysts of plagioclase. There are small veinlets of quartz running through the rock in all directions. The specimen contains considerable disseminated pyrite.

A specimen of rock taken from the lower dump of the Vesuvius mine on Fairview Mountain is light gray in color, showing flow structure. The rock contains phenocrysts of plagioclase and hornblende in a felsitic groundmass.

ECONOMIC GEOLOGY

The ore deposits of this district are lodes and fissure veins which cut the andesites and tuffs. They have a general strike of 60 to 80 deg. west and dipping steeply to the southwest. The ore bodies vary from 1 to 12 feet in width. The principal ore minerals are pyrite, chalcopyrite, sphalerite, galena, gold and silver, in a quartz gangue and altered country rock. The character of the ores is such that it would lead one to believe that they were for the most part formed near the surface. Some of the deposits are highly oxidized, extending in some veins to a depth of 800 feet. The oxidized bodies exhibit fissuring, chambering, brecciation, and crustification, with some lamellar quartz and comb structure. The walls are more or less irregular, and frequently the vein matter is frozen to the walls. As a rule, the ore occurs in pipe-like form. The quartz aggregates are generally not glassy or milky, but usually fine grained, an amethyst color is often noticeable. Kaolin is present in most of the veins which is a product of secondary changes by descending waters. Sericite and chlorite appear in the altered country rock in greatest amounts close to the veins, which is a product of porphyritic alteration. It seems quite evident from a study of the vein characteristics and rock alteration that the ore deposits may be classed under heading given by Lindgren as "Metalliferous Deposits Formed Near the Surface by Ascending Thermal Waters, and in Genetic Connection with Igneous Rocks". In some cases it is probable that veins formed at intermediate depth are present.

Veins in the district which have not been fractured since they were

mineralized, or which are situated in regions of maximum erosion, such as old glacial cirques, show sulphide ores at the surface. These are tightly cemented and relatively impermeable and represent the conditions of mineralization that prevailed in all the veins at the time of mineralization. The minerals which these tight veins contain are sphalerite, pyrite, a little galena, and a very little chalcopyrite, with a gangue of quartz, country rock, and some calcite. So far these veins have not been profitably exploited, because their sulphide ore cannot be cheaply treated, as a rule. The gold tenor is considerably less than that of the oxidized material.

ORE SPECIMENS

Champion

A specimen of ore from the Champion Mine No. 8 level, is a fine example of crustification, which probably was deposited on country rock. There is an abundance of free gold present. The specimen is coated with limonite, and pyrolusite, with some kaolin. The country rock was probably completely altered and rendered soft, the silica remaining as a hard crust.

Another sample of ore from the same mine on level 8 is a massive piece of galena through which is disseminated a small amount of pyrite. The specimen is coated with cerrusite which is due to the oxidation and carbonization of the lead sulphide. Such alteration is characteristic of alteration by descending solutions.

In another specimen from this mine, level 7, the ore is high in quartz. There is a considerable coating of hematite and an abundance of chalcopyrite. The structure of this ore shows brecciation and successive deposition.

A specimen from level No. 9 shows banding and little veinlets of quartz running in all directions. The specimen contains both primary and secondary galena, a little chalcopyrite, and abundant pyrolusite. Extensive alteration is in evidence.

A piece of the ore taken on level No. 7 is a massive coarsely crystalline galena, containing a little sphalerite, and some secondary quartz. The specimen shows some alteration.

Musick

A specimen from the upper level at a depth of 150 feet is principally quartz, which contains many small cavities some of which have assumed the shape of vugs which are lined with small crystals. There is considerable marcasite present, some of which has been altered to limonite.

A sample of the ore taken from Level No. 2 shows extensive brecciation. The inclosed fragments are probably porphyritic dacite which are cemented together with quartz. The specimen contains abundant chalcopyrite, a little marcasite and manganese.

An ore specimen taken from level No. 4 is a massive coarsely crystalline galena, containing some chalcopyrite, part of which has been altered to covellite. There is also some sphalerite and kaolin present.

Another specimen taken from level No. 4 is considerably brecciated, containing inclusions of country rock which has been altered to chlorite and kaolin. The sample is a high grade ore of chalcopyrite.

Vesuvius

A specimen of ore taken from the Vesuvius mine in the upper level at a depth of 200 feet shows extensive crustification. It consists of alternate crusts of quartz, marcasite, iron oxide, and chalcedonic silica. Such crustification is characteristic of secondary deposition, a change in the solution and deposition from cool solutions.

An ore specimen taken at a depth of 600 feet shows brecciation and a combination of geodetic and crustification structure. The small quartz crystals are capped with trigonal pyramids, and crustified with minute crystals. The enclosed fragments are altered andesite, cemented together with quartz. The ore contains an abundance of chalcopyrite which is somewhat altered.

Another specimen of ore taken in the wild hog tunnel at a depth of about 900 feet shows coarse inclosures of brecciated country rock, which is considerably silicified and shows replacement. The ore contains a little chalcopyrite.

Churchills

A specimen of the ore taken from the upper workings is an andesitic breccia cemented together with quartz. It also shows a crustification of quartz and some hydrous silica. The specimen contains a stibnite, galena, and a little chalcopyrite. The sample is extensively oxidized.

Another specimen from the upper workings is a quartz breccia containing some inclusions of silicified country rock. The ore minerals are galena, sphalerite, and a little chalcopyrite which occurs mostly in small seams. The specimen has been considerably oxidized.

A specimen from the lower workings contains chalcopyrite, galena, sphalerite, pyrite, covellite, calcite, and quartz. The covellite occurs as a thin coating on the chalcopyrite, probably resulting from its alteration. The sample shows the result of considerable leaching and oxidation.

DESCRIPTION OF MINES.

The principal mines of the district which have produced values are the Musick, Champion, Vesuvius district, Noonday, Helena, California, Gold Leaf, and there are others of lesser note. The Musick leads in development, with about a mile of drifts along six 50-foot levels. Of these, levels 4 and 5 are reached by short crosscuts which tap the vein from the basin at the head of City Creek. About 2,000 feet to the west, on the other slope of the divide, a portal from one of the lower drifts opens out close to a good stand of mining timber. A shaft 80 feet deep connects directly with the two upper levels and through various stopes with most of the lower workings, thus giving good ventilation to the mine. Most of the ore was hauled out at the lower level, which attains a maximum depth of about 300 feet.

The Champion, Vesuvius, and Noonday have each about half a mile of workings. In the Champion most of the development work has been done on two levels, the lower of which attains a maximum depth of about 800 feet and is reached by a crosscut a few hundred feet in length through which all the ore is brought out. A considerable amount of stoping has been done, particularly where the greatest oxidation occurred. The lower workings here show considerable amounts of primary sulphides. The Vesuvius has been worked from several levels to a depth of about 500 feet and has many stopes. The steep slope on which it is situated has facilitated its development by tunnels, and has afforded a gravity transfer for the ore from stope to mill, as well as good ventilation and drainage for all the workings. The Noonday has three principal levels, all tapped by adits from the steep slope of the Horse Heaven basin; the lowest level attains a maximum depth of about 500 feet. Considerable stoping was done and the ore from the stopes was sent down to the mill on an aerial tramway about one-third of a mile in length. The Helena has more and the California somewhat less than 1,000 feet of workings. Both are developed by tunnels which will attain 100 to 300 feet of depth. The Helena has two levels and has produced some very rich specimen ore.

The ore from the Musick mine was hauled over a practically level electric tramway about a mile in length and dumped into the ore bins of the Champion mine. Thence the ore of both mines was sent down to the mill on a steep incline, 3400 feet long. Haulage was effected by an endless cable to which the mine cars were attached by means of an automatic grab, the loaded cars going down pulling the empties up. The Musick-Champion mill, the largest in the district, has 30 stamps and is run by a water-driven electric generating plant located on Frank Bryce Creek, 7 miles below the mine. It handled the ore from both the Musick and Champion mines. The electric plant was designed to develop 300 horsepower and to operate the stamp mill, a small sawmill, and a local electric-light plant and to furnish mine power. A small auxiliary steam plant is provided for use in case of need. Other milling plants in the district are a 10-stamp mill at the Vesuvius mine, a 5-stamp mill at the El Galado property, and a 20-stamp mill on the Noonday group.

SILVER AND COPPER DEPOSITS

The Riverside and Oregon-Colorado claims are promising copper prospects which show some good chalcopyrite ore and are located on strong veins. The Combination property covers a somewhat extensive lode, consisting of one large vein and some smaller veins, and is said to have produced ore which assayed more than 100 ounces of silver to the ton.

FUTURE OF THE DISTRICT

The Bohemia district contains many well-defined veins and lodes. Many of those which show on the surface have not yet been explored, and no doubt many more are obscured by the dense vegetation which covers a large part of the district. It seems reasonable to suppose that other mines will yet be opened, and will find workable gold ore at least in the upper and oxidized portion of the veins. Workable bodies of copper and silver may possibly be discovered in the district.

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THE BOHEMIA MINING REGION OF WESTERN OREGON

WITH NOTES ON THE BLUE RIVER MINING REGION AND ON THE
STRUCTURE AND AGE OF THE CASCADE RANGE

BY

J. S. DILLER

ACCOMPANIED BY

A REPORT ON THE FOSSIL PLANTS

ASSOCIATED WITH THE LAVAS OF THE
CASCADE RANGE

BY

F. H. KNOWLTON

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THE BOHEMIA MINING REGION OF WESTERN OREGON.

By J. S. DILLER.

INTRODUCTION.

In response to the petition of a large number of citizens of Douglas and Lane counties, Oregon, requesting a survey of the Bohemia mining region, a preliminary examination was made in July, 1898. There being no topographic map of the region, only a reconnaissance was attempted, but as the results may be of interest and may be serviceable in spreading information concerning this little-known mining camp, it has been thought best to publish them.

HISTORY.¹

The Bohemia mining region was discovered, according to Dr. W. W. Oglesby,² of Junction City, Oregon, by himself and Frank Brass, in August, 1858. The region was named from James Johnson, also called Bohemia Johnson, who, with George Ramsey, reached it in 1863 from Roseburg by way of the North Fork of Umpqua River and Steamboat and City creeks. Free gold was found in a small vein near the head waters of City Creek, but gave out at a depth of 6 feet. This discovery brought many prospectors. Bird Farrier discovered what, by purchase, became later the Knott claim, where a 5-stamp mill was put up in 1875. It shut down in 1877, and the Bohemia region was almost forgotten until interest in it was revived by Dr. W. W. Oglesby, O. P. Adams, and others in 1891. The first ledge of importance, located the same year, was the Musick, which has been running a 5-stamp mill almost continuously ever since. In 1892 the Annie (since called the Noonday) was opened. The Champion put in a 10-stamp mill in 1895 and the Noonday a 20-stamp mill in 1896. Over a hundred claims have been located in the district.

OUTPUT.

The output for the Bohemia mining region for the last few years has been chiefly from one mine, although two others have contributed at intervals. The average running time of the Musick mine since 1893

¹These facts are largely taken from an article by O. P. Adams in the Cottage Grove Messenger of April 2, 1897. A fuller account of the discovery and development of the Bohemia mining district is given in a special mining edition of 1899 of the Bohemia Nugget, published in Cottage Grove, Oregon.

²Letter to the author August 12, 1898.

has been about six and one-half months each year. The heavy snows of winter interfere with the work. The concentrates already secured in the Bohemia region, almost wholly from the Musick mine, amount to over 1,000 tons and are estimated to be worth about \$40,000.¹ Dividing this equally among the years since 1893, the output of the region, as shown by reports of the mine superintendents, may be given approximately as follows:

Output of Bohemia mining region, 1893-1897.

Year.	Free gold.	Concentrates.	Total output.
1893.....	\$11,000		
1894.....	13,000	\$10,000	\$23,000
1895.....	14,500	10,000	24,500
1896.....	17,000	10,000	27,000
1897.....	35,900	10,000	45,900

The output for 1898 will probably exceed \$50,000. The foregoing table is an underestimate, for the returns from some of the mines did not permit such tabulation. A probably better estimate is given below.

The following data have been tabulated from the annual reports of the Director of the Mint upon the production of the precious metals in the United States:

Production of gold in Lane County, Oregon.²

Year.	Amount.	Remarks.
1888.....	\$5,000	
1889.....	3,500	Pearson mine, \$500.
1890.....	3,000	Lizzie Bullock, \$299; Excelsior, \$93.
1891.....	20,490	W. H. Thompson, \$10,490; Annie Consolidated, \$10,000.
1892.....	31,500	Annie Consolidated, \$16,500; Occidental, or Musick, \$15,000.
1893.....	57,000	
1894.....	32,500	
1895.....	34,062	

¹ Assays of ores and concentrates are frequently made by Mr. J. W. Cook, president of the Bohemia Gold Milling and Mining Company, and occasionally by others, to furnish basis of estimate. The assay made by the Survey (\$19.89) is apparently far below the average. The mine operated by Mr. Cook is widely known, from its discoverer, as the Musick mine.

² Although the Bohemia region lies in both Douglas and Lane counties, the output of the mines is reported at Cottage Grove, in Lane County. All the mines enumerated under Lane County appear to be of the Bohemia region. The output for 1889 and 1890 as given does not agree with that reported from the mines, and in 1893, 1894, and 1895 reports from mines were not given. The sudden increase in 1893 was apparently due to special activity in the Bohemia region.

LOCATION AND TOPOGRAPHY.

The Calapooya Mountain extends from the Cascade Range to the Coast Range and forms the divide between the Willamette and the Umpqua. From the Cascade Range it extends almost directly west, but as it approaches the Coast Range it turns north and becomes less prominent. The rather low gap which separates it from the Coast Range is passed through by the railroad, midway between Drains and Cottage Grove. This gap was once occupied by a stream, carrying the waters of the Umpqua northward into the Willamette, before the Umpqua had found its way through the Coast Range directly to the sea.

The Bohemia mining region, whose location is shown in fig. 1, is situated at an altitude of between 4,000 and 6,000 feet above sea, along the crest of the Calapooya Mountain and upon both slopes, about 35 miles directly southeast of Cottage Grove, from which point it may be reached

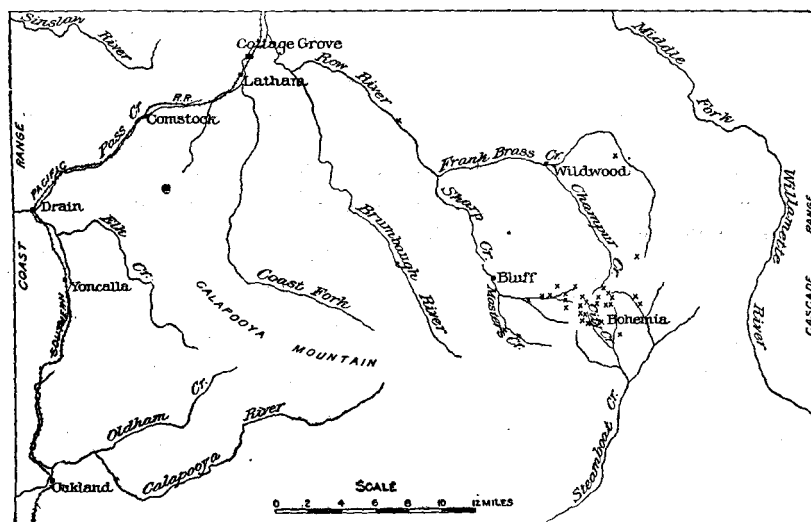


FIG. 1.—Map showing the relation of the Bohemia mining district to Oakland and Cottage Grove.

by a good road up Row River. The road forks at the mouth of Sharp Creek, one fork leading to the Noonday and Champion mines and the other—a good road—leading up Sharp Creek by a shorter route to what is generally known as the Musick mine, at the Bohemia post-office. The region may be approached also from the railroad at Oakland, on the southwest, by road and trail, but the distance is somewhat greater than from Forest Grove. The slopes throughout the region and its approaches are steep and generally well wooded, but offer no special difficulties in the way of road construction.

The mines cluster about Bohemia Peak and lie close to the crest of the Calapooya Mountain, where it forms the divide between Steamboat Creek, flowing south into the Umpqua, and Sharp Creek with

Frank Brass Creek, flowing north into Row River and the Willamette. The Umpqua and the Willamette have long struggled for supremacy in their head-water region. In this unequal contest the Umpqua, having the shorter course to the sea, has the advantage, and as a result has captured the original head waters of the Willamette, first in the neighborhood of Drains, and later the outlet of Diamond Lake, which was once the source of the Middle Fork of the Willamette. The divide between this stream and the North Fork of the Umpqua is comparatively low, so that Bohemia Peak and the other peaks in that vicinity are separated from the crest of the Cascade Range, 40 miles to the eastward, by lower ridges and hills. The Cascade Range may often be seen from the Bohemia region above the clouds which lie over the interval. Seen from the Cascade Range the Bohemia peaks of the Calapooya Mountain stand out prominently in the distance. Next to Bohemia Peak the prominent elevations of the Bohemia region are Fairview, Grouse, and Grizzly peaks, each of which stands at a marked bend of the serpentine crest of the Calapooya Mountain.

GEOLOGY.

COMPOSITION AND STRUCTURE OF THE CALAPOOYA MOUNTAIN.

The Calapooya Mountain throughout its whole extent is composed of lavas like those of the Cascade Range. They are arranged in sheets radiating from the volcanoes whence they came, and are piled up to a great thickness. The walls of the canyon along the Middle Fork of the Willamette toward its source illustrate this feature at a number of points, and it may be seen also in the summits of some of the more prominent peaks. Generally the sheets of lava are very irregular and no parallel arrangement on a large scale is visible. The lava filling the throat of a once active volcano may make a prominent peak, as in Cougar Rock, or may stand on end with conspicuous columnar structure, as in Bear Bones Rock, a short distance east of the Bohemia mining district. The region has lost much by erosion. Its streams have carried the material away and cut deep, narrow valleys, almost narrow enough to be called canyons. They expose rocks to a depth of over 2,000 feet—lavas, vein matter, and stratified fragmental volcanic material.

The composition and structure of the Bohemia mining district are essentially those of the Calapooya Mountain as a whole. Upon the northern slope of the divide within the district the lava sheets incline northward, and upon the opposite side they incline southward, apparently; but in Grouse Mountain, as well as along a part of the upper course of Horseheaven Creek, they swing round and dip eastward, as if they emanated from a volcanic center about the head of City Creek. Such may have been the case, but, as will be shown later, the distribution of the fragmental volcanic material is opposed to this view. It is possible that this divergent dip is due to uplifting by mountain-building forces.

AGE OF THE CALAPOOYA MOUNTAIN.

The age of the Calapooya Mountain has not been positively determined, because no fossils have yet been found in the rocks of which it is composed. It is supposed, however, that, being a spur of the Cascade Range, and being composed of similar volcanic rock, it is of essentially the same age. As to the age of the Cascade Range, evidence is found in the plant remains—which are described in detail by Mr. Knowlton in a paper accompanying this—that the tuffs on the Columbia River near the middle of the range, and on Coal Creek near the summit of the range, in Lane County, as well as the sandstone upon the western slope of the range near Ashland, are of Miocene age. The stratified tuffs containing the fossil plants were evidently laid down in lakes developed among the lava flows, and show that during the Miocene there was extensive volcanic activity in the Cascade Range. Evidence of earlier igneous eruptions has not been observed in the Cascade Range, but from the records of volcanic action found in the Eocene of the Coast Range at a number of points, and also at points between the Coast and Cascade ranges, it is suspected that the volcanoes of the Cascade Range may have been active in Eocene time. The same may be true also of the volcanoes in which much of the lavas of the Calapooya Mountain originated.

That the upbuilding of the Calapooya Mountain belongs to the later Eocene or early Miocene is suggested by the distribution of Eocene and Miocene strata about its base. At the southern base of the Calapooya Mountain, about 12 miles northeast of Oakland, and also near its western end, in the neighborhood of Comstock, characteristic Eocene fossils are found in the sandstones and shales, while at the northern base of the mountain the nearest fossils now known are Miocene, which occur a few miles southeast of Cottage Grove. From their distribution it appears that the Calapooya Mountain was the barrier to the southward extension of the sea that deposited the Miocene so widely in the Willamette Valley.

ROCKS OF THE BOHEMIA MINING REGION.

The rocks of the Bohemia region are known to the miners generally as syenite, but, as already stated, they are wholly volcanic and are generally lava flows, although tuffs are quite common. Among the lavas andesites are by far the most abundant. A few of them are more or less conspicuously porphyritic and contain phenocrysts of quartz; they are therefore classed as dacite porphyries. Basalts occur sparingly.

Dacite porphyry.—One of the best examples of this rock occurs on the ridge southeast of Bohemia Mountain. It is light gray in color, with many white spots, due to small phenocrysts of feldspar, scarcely 2 mm. in length, with a few rounded grains of quartz. The large angles of symmetric extinction in the thin section show that the lime-soda feldspars are about labradorite in composition. The small grains

which appear as a black pepper-like sprinkling in the hand specimen are composed chiefly of chlorite or greenish hornblende, with some epidote, and represent some ferromagnesian silicate, probably pyroxene, that has disappeared. The groundmass, which is not very sharply distinguished from the phenocrysts, is composed chiefly of clear grains of quartz, with clouded grains of feldspar. Some of the latter show crystallographic outlines, but the quartz grains have irregular outlines.

A similar dacite-porphyry occurs in the Mystery claim, nearly half a mile southeast of the Musick. The feldspar phenocrysts are more numerous and fresh, with decided zonal structure. Some of the feldspars are surrounded by a granophyric border. The groundmass is holocrystalline, often granophyric and microporphyritic, with much plagioclase. In this rock there are some patches of pyroxene, but it is much less abundant than the plagioclase. Most of it is monoclinic, and looks like augite, but a portion may be orthorhombic.

The most sharply defined outcrop of dacite-porphyry lies near the eastern border of the mining district, where it occurs in the form of a dike, cutting through a thick set of tuffs near the Buckhorn opening upon the western slope of Hematite Mountain. The rock, although not distinctly porphyritic, contains some quartz and feldspar phenocrysts in a granophyric groundmass. The ferromagnesian silicate has been replaced by chlorite and carbonates.

The andesite is not often so porphyritic as to warrant its being called andesite-porphyry, but is so in one case on the northern portion of the divide between Grizzly and Grouse mountains. The phenocrysts of plagioclase have a symmetric extinction of nearly 25° , and probably belong to labradorite. They are larger and much more abundant than the irregular grains of augite. The groundmass is granular, chiefly feldspar. Each grain contains numerous smaller ones of different minerals, which render it micropoikilitic, and in some cases granophyric, as in the dacite-porphyrries, but in this case no quartz phenocrysts were discovered.

Andesites.—With very few exceptions all of the rocks of the Bohemia region might be included under this heading, for the dacite-porphyrries are only porphyritic quartz-bearing andesites. The tuffs, too, and most of the basalts are andesitic. In several of the andesites hornblende is present, but generally pyroxene is the only characterizing ferromagnesian silicate. Although widely distributed, the andesites are much altered, and only a few of the least-altered forms will be noted.

On the Champion trail one-fourth mile southeast of the Musick mine is a gray, minutely porphyritic pyroxene-andesite, in which, besides the crystals of plagioclase, there are dark spots of pyroxene or chlorite derived from it. Most of the pyroxene is certainly augite, but some of the altered forms suggest hypersthene. The groundmass is chiefly plagioclase, the minute lath-shaped crystals of which, with the pyroxene, give a somewhat ophitic structure. A few dark-bordered spots suggest

which appear as a black pepper-like sprinkling in the hand specimen are composed chiefly of chlorite or greenish hornblende, with some epidote, and represent some ferromagnesian silicate, probably pyroxene, that has disappeared. The groundmass, which is not very sharply distinguished from the phenocrysts, is composed chiefly of clear grains of quartz, with clouded grains of feldspar. Some of the latter show crystallographic outlines, but the quartz grains have irregular outlines.

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carbonates, and the pseudomorphs suggesting olivine are chiefly oxide of iron and quartz.

Tuffs.—Tuffs are abundant, especially in the eastern part of the Bohemia region. They are well exposed also at several places in the western and central portions.

As the region is approached by the Sharp Creek trail the stratified tuffs are first seen under Judson Rock, where the fine gray banded tuff is well exposed. Well-stratified tuffs occur also in the reservoir to A. F. Johnson's stamp mill, upon the western slope of Elephant Mountain. A coarser variety, of larger distribution, was seen on the White Ghost claim, near the right-hand bank of City Creek. At this point the component lapilli are a centimeter or so in diameter and the fragmental character is visible to the eye. Here, too, it is associated with the interesting tourmaline hornfels, which doubtless excited the miners' hopes. The rock is in places gneissoid in structure and is composed chiefly of tourmaline, with much quartz and minute scales of clear mica. This appears to be a product of contact metamorphism, with tuff on one side, but on the other side of a 10-foot ledge of hornfels nothing was exposed.

In the tunnel to No. 2 level of the Noonday mine tuff is well exposed in sheets interstratified with lavas. They are all of fine material. It is a matter of surprise to find no coarse fragmental material of volcanic origin in the region. It furnishes evidence that the explosive outbreaks were outside of the district, possibly to the eastward, for in that direction the tuffs become coarser and much more massive. On the trail from the Noonday to Riverside a good view is obtained of the slope east of Horseheaven Creek as far south as Hematite Mountain. This slope is made up chiefly of light-colored, well-stratified tuffs.

Alteration of country rock.—Very few, if any, of the rocks of the Bohemia district are entirely unaltered, although the alteration is usually so small as not to affect the general appearance of the lavas in the hand specimen. Near the veins, however, the alteration is greater, and it is to be supposed that this alteration was effected in connection with the development of the veins. While the general alteration of the lavas consisted chiefly in the chloritization and carbonatization of certain minerals, the changes which were brought about closer to the veins are different, in that sericitization and silicification are the most important processes, and these are accompanied or followed by the deposition of sulphides, especially pyrite.

Within a few feet of one of the branches of the Musick vein, near the eastern part of Bohemia Mountain, the original character of the andesite has entirely disappeared. The general appearance of the rock, as seen in a hand specimen, is not greatly changed, but under the microscope it is found to have been completely altered and to be composed of sericite, carbonate of lime, and quartz, with a small amount of pyrite. The distance to which this process extends from the veins has not been determined accurately, but there are indications that at times it extends 50 feet or more. One specimen of such altered material was found at

the mouth of the 120-foot tunnel on the Wall Street vein. Its distance from the nearest vein appears to be over 50 feet, but this is not certain, for there may be others concealed near by. Several hundred feet farther up the slope is the comparatively fresh hornblende-bearing andesite of the Galena spur, the specimen from which was taken within 2 feet of the vein.

The Broadway and Champion are adjoining mines upon the same vein. In the Broadway the wall rock upon the north side, a few feet away from the vein, although fresh looking, is much altered. It is composed very largely of fine-granular quartz, with many films of sericite and considerable pyrite. The original ferromagnesian silicates have been entirely removed. The only trace of original structure is marked by an occasional patch of sericite scales resulting from the larger crystals of feldspar. Upon the south side, at the same distance from the vein, much of the feldspar, in both large and small crystals, is still preserved, although much is altered, and granular quartz is abundant. There is much chlorite and some epidote and sericite, representing the pyroxene and feldspar, which have disappeared. Pyrite is not present.

Upon the north side in the Champion, 12 feet from the vein, as in the Broadway, there is much silicification. Pyrite is common, and the carbonates are present quite as abundantly as the sericite. The pyrite appears to find its place most commonly in the porphyritic feldspars.

Five feet from the vein upon the south side the rock is highly silicified, with the development of granophyric structure. Traces of chlorite remain, and the oxides of iron are present instead of the sulphides. As this lies near the surface, the sulphides have been oxidized.

In the Noonday, at the west end of level No. 2, where the vein pinches out, the south wall retains nearly all its feldspars and there has been but little silicification. Chlorite, carbonates, and a little epidote represent the minerals that have disappeared. Upon the north side, near by, there has been much silicification and sericitization, accompanied by the development of considerable pyrite. Locally one process prevails over the other, and when this is the case silicification is usually the most prominent. The north wall rock of the Klondike is highly silicified, but in the south wall silicification has produced scarcely as important changes as those due to carbonatization and sericitization.

VEINS OF THE BOHEMIA REGION.

Size of the veins.—The veins are rarely well defined. Generally they are narrow but irregular mineralized belts, or zones, in which there has been much crushing of rock material. The crushed mass, as well as the adjacent country rock, sometimes for a distance of 12 feet or more, may be impregnated with pyrite. The veins are irregular and vary from a mere film to sheets 12 feet thick. A vein may be simple, as in the case of the Champion, where there is but one ore body, or it may be composed of several parallel veins only a few feet apart, as locally in the Musick. When simple the veins attain a thickness at times of 4 feet, but when compound they are as much as 12 feet thick.

Courses of the veins.—None of the veins have been followed to a greater depth than about 320 feet beneath the surface, and they have been traced on the surface for comparatively short distances—the Musick for about 900 feet, the Champion for 570 feet, and the Noonday for nearly the same distance.

The true courses of the veins noted are given in the accompanying list, which begins with the most northerly:

Courses and dips of veins in Bohemia mining region, Oregon.

Location.	Course.	Dip.
Ophir	N. 15° W.	63° SW.
Musick	N. 40° W.	75° SW.
	N. 55° W.	
Clarence and Acturas	N. 45° W.	70° SW.
Grey Eagle	N. 50° W.	70° SW.
Lizzie Bullock	N. 55° W.	75° NE.
	N. 78° W.	
Champion	N. 55° W.	70° SW.
Noonday	N. 55° W.	75° NE.
	N. 82° W.	
	N. 85° W.	
Helena	N. 58° W.	74° NE.
	N. 65° W.	
White Swan	N. 60° W.	55° SW.
Golden Slipper	N. 60° W.	80° SW.
Story	N. 55° W.	70° SW.
McKinley and Hobart	N. 66° to 71° W.	81° SW.
Elsie	N. 67° W.	85° NE.
	N. 78° W.	
Vesuvius	N. 70° W.	60° SW.
	N. 75° W.	75° SW.
Else Dora	N. 72° W.	
Pearson	N. 74° W.	85° NE.
Wall Street	N. 75° W.	75° SW.
Near Noonday	N. 80° W.	
Howe	N. 82° W.	57° NE.
Excelsior	N. 85° W.	
Yreka	N. 88° W.	64° SW.
Combination	N. 86° W.	65° SW.
Crushed Zone	N. 87° W.	? SW.
California	N. 81° W.	
	S. 75° W.	
Delta	S. 75° W.	
Little vein by Combination	S. 20° W.	85° SE.
Galena spur of Wall Street	S. 8° W.	

From this list it will be seen that there is a wide range in the course of the veins—from N. 40° W. to S. 70° W.—although for short distances the local trend may fall outside of these limits, as, for example, the Ophir, whose strike is N. 15° W. The average course of thirty-one observations is N. 72° W., approximately the general course of the Calapooya Mountain, and it seems probable that the formation of the veins may have been connected with the axial uplift of that crest. The dip of the veins is always at a high angle, and generally to the southwest, although in a number of places it is to the northwest. The same vein—as, for example, the Noonday—is inclined in different directions in different portions of the mine.

The last two courses given in the list, that of the little vein near the Combination and that of Galena spur, are nearly at right angles to the general course of the other veins. It is evident that these veins are smaller and less numerous than the others and belong to a different group, although they have essentially the same history, composition, and structure as the other veins.

Relation of veins to joints.—The veins follow sets of joint planes, of which there are two—one lying between N. 30° W. and N. 70° W., and the other nearly at right angles to this, a little west of south. The joints of the first set are most abundant and occur generally in the neighborhood of the veins. Those of the second set are not common. The best examples were seen about Grouse Mountain.

Fissure veins.—It is evident from the relations of the joints and veins that the joints determined the position of the veins, and aided in affording an opportunity for the circulation of the mineral-bearing solutions by which the ores and gangue were deposited. The development of the veins, however, can not be ascribed to the presence of simple joints alone, but to a crushed and porous belt of rock in which there may be many irregular joints. The crushed condition of the rock is well displayed in the faces of some of the drifts. Occasionally the walls or inclosed fragments show well-marked polish or striae of slickensides due to faulting. These appear more abundant about the Noonday mine than anywhere else in the district. The existence of faults of at least small extent can not be doubted. It is possible that the evidence of faulting was once more general, and that it has been to some extent obscured or obliterated by subsequent deposition of vein matter. The country rocks are wholly volcanic and much alike, so that it was not possible in a preliminary study to determine the amount of displacement. From the foregoing considerations and from others which follow, the deposits in the Bohemia district may be considered, in part at least, fissure veins.

Gangue.—The principal gangue mineral is quartz, which is more or less abundant throughout the veins, and is in many of the small veins the sole constituent. Such veins are of milky quartz, fresh, bright, and solid, but the larger veins contain quartz that is more or

less porous and cavernous, and the larger openings are lined with quartz crystals. While the crystal lined cavities which occur more or less abundantly in all the large veins are positive evidence that the deposition took place in a cavity, yet the absence of banding indicates entire irregularity in the shape and order of deposition in the cavities. By the oxidation of the inclosed iron pyrites near the surface the porous quartz is deeply stained red, yellowish, or black, the color depending upon the degree of oxidation and hydration of the iron.

Next to quartz the most important gangue material in the vein is a white, clayey substance resembling kaolin. When treated with nitrate of cobalt solution and ignited it becomes blue, like kaolin similarly treated, but between crossed nicols its interference colors are in part high instead of low, as are those of kaolin, and it has a finely foliated structure with parallel extinction, like sericite. Mr. George Steiger determined that it contains 6 per cent of water. Kaolin contains 11 per cent or more of water, while sericite contains less than 5 per cent. It is evident, therefore, that the white argillaceous matter contains only a small portion of kaolin and is made up chiefly of sericite. Subsequently in this paper, however, the material is referred to as kaolin, partly because some of it is kaolin and partly because the miners will more readily recognize it by that name. Mr. Lindgren¹ showed the importance of sericite in the veins of the mining districts of Idaho Basin, and at the same time called attention to the scarcity of kaolin under such conditions. One of the vein minerals of rather local distribution and of little importance is epidote. In some places, as, for example, the southern end of the Mystery, it forms considerable masses and contains large scales of red hematite.

Another mineral which should be considered with the gangue minerals is carbonate of lime. It is rare and of but little importance. There was found at the mouth of the Helena a large fragment of yellowish and pale green, somewhat stalactitic mineral, which upon investigation proved to be allophane. It is said to have come from the tunnel on the vein. Although allophane was seen at only one place in the mining district, it is not of rare occurrence elsewhere in mines containing copper ores.

Ores.—In the deeper portions of the veins the ores are pyrite, sphalerite, galenite, chalcopyrite, oxide of iron, and cerusite. Excepting the last, they usually occur irregularly intermingled. When found together they are in general of approximately equal quantities, although there is much variation. Pyrite is the only one which occurs alone, and is much more widely distributed than the others, extending far into the adjacent country rock. The iron oxide intermingled with the sulphides is red hematite, and its presence is generally considered an indication that the ore is rich in gold. The dark-brown to black oxide of iron is sometimes associated with a partially weathered form

¹ Eighteenth Ann. Rept. U. S. Geol. Survey, Part III, p. 639.

of good sulphide ore. The sphalerite (zinc sulphide), galenite (lead sulphide), and chalcopyrite (copper and iron sulphide) are almost absent from the rock in the zone of oxidation, where yellow to black oxide of iron derived from the pyrite is most abundant and lead carbonate (cerusite) derived from the galenite occurs in a few places. The metal sought is gold, which near the surface is native, finely filamentous, and distributed through iron-stained quartz; but at greater depths, about 200 feet, beyond the reach of surface influences, the gold is largely contained in the sulphides.

MINES AND PROSPECTS OF THE BOHEMIA REGION.

In the Bohemia region there are at present (July, 1898) seven quartz mills and an arrastre. One mill has 2 stamps; three have 5 stamps; two have 10 stamps, and one has 20 stamps. Only four of the mills are now in operation. Besides the mines supplying these mills there are many prospects which are now being actively pushed forward, and some details of the region may be most conveniently grouped under the separate head of the respective claims. These will be noted in the order of examination, beginning upon the southwest. A small number of prospects were not seen.

The Ophir.—The Ophir, where O. P. Adams opened two short tunnels, has two veins; one 5 feet and the other only 3 feet, with 8 feet of country rock between. The strike is N. 15° W., dip 63° SW., and the smaller vein is below the larger. An assay of its ore gave not a trace of gold and 5.65 ounces of silver per ton. In this vein there is a trace of galena. Considerable pyrite is mixed with the quartz. The region has suffered much from erosion, and the sulphides come near the surface.

The Clarence.—Southeast of Ophir, upon the same vein, is the Clarence, in which there is a small surface opening. The vein matter is chiefly quartz, with some galena and sphalerite, but only a trace, and considerable black oxide of iron. The schistose structure of the vein strikes N. 45° W. and dips 70° SW. The vein contains considerable kaolin.

The Acturas.—Here there is an open cut upon a 5-foot vein, which comes across from the Clarence with a strike N. 45° W. and dip 70° SW., just as in the other claim.

The Peek-a-boo.—Westward of the Acturas, upon the other slope, near the summit of the ridge, is the Peek-a-boo, where several open cuts and pits have been made in material containing numerous white spots resembling kaolin. Several openings have been made to the northwest, on the same ridge, in rock said to assay well, but no definite mineralized belt was exposed.

The White Swan.—Near the west base of Bohemia Mountain, on one of the branches of Sharp Creek, there is a soft schistose belt 5 feet wide exposed in the White Swan. Its strike varies from N. 60° to 90°

W., dip 55° SW. There is considerable vein matter for 100 feet in width, which yields traces of gold, but no assays have been made.

Combination mine.—On Martin Creek the Star mine was extensively opened up several years ago, affording specimens showing free gold, and for a time ran a 5-stamp mill. It was not in operation in July, 1898, and was not examined. Two miles below, on Martin Creek, at the mouth of Quartz Creek, is the Combination mine, in which, besides an open cut, two tunnels have been run in nearly a hundred feet, and drifts along the vein at two levels have been made for about the same distance. In the upper drift the course of the vein is N. 86° E., and it dips 65° SE. It has a width in some places of nearly 10 feet, but the pay streak is narrow.

Locally the vein contains much kaolin. A sample of the ore from the upper level yielded 0.55 ounce of gold and 47.75 ounces of silver per ton. The ore is crushed, and the values are apparently in the pyrite and galena, although these sulphides are not especially abundant. Sphalerite and chalcopyrite are present at some points along the vein, but are not common. Ore from a shaft in tunnel No. 1 contained 0.90 ounce of gold and 22.55 ounces of silver per ton. At the southwest end of level No. 1 the vein material is argillaceous, wet, soft, and slippery. It is slickensided, containing much kaolin with other clay, besides quartz and some limonite. An assay yielded 0.20 ounce of gold and 0.95 ounce of silver per ton. The oxidation of the sulphides in the vein, seen locally along level No. 1, is much less common in level No. 2, where finely crystalline granular quartz containing considerable pyrite but only traces of other ores is irregularly distributed through the soft material of which a large portion of the vein is composed. The hard parts, containing pyritiferous quartz, yielded no distinct trace of gold and only 0.20 ounce of silver per ton.

On Sharp Creek near the mouth of Martin Creek there is an idle stamp mill once used for an adjacent prospect, and a short distance farther downstream is Walker's mine, where a large arrastre, 32 feet in diameter, was once run by a turbine wheel, but proved unsuccessful. The material worked in the arrastre is exposed in a broad open cut, and is largely fragmental, without definite evidence of vein structure. It is in part argillaceous, and strongly colored purplish red, white, and yellowish.

Musick mine.—The only mine in the southwest portion of the field that has been operated continuously, excepting in midwinter, for a number of years is the Musick mine. It was discovered and operated for some years by Mr. Musick, but is now (July, 1898) worked by the Bohemia Gold Milling and Mining Company, of which J. W. Cook is president. It lies at the base of Bohemia Mountain, at the head of City Creek, which flows into Steamboat Creek, and has about 2,500 feet of horizontal underground workings, reaching to a depth of nearly 200 feet from the surface, although there is a range of over 300 feet

between the highest and lowest points of the mine, of which a general section, based on measurements by Mr. Cook, is shown in fig. 2.¹

The course of the vein at different points varies from about N. 40° to 80° W., and its dip lies close to the vertical upon either side. In general its course is that of the Calapooya Mountain, although it has not been traced with certainty more than about a quarter of a mile. It is quite irregular in width, ranging from 4 to 12 feet, and has rather

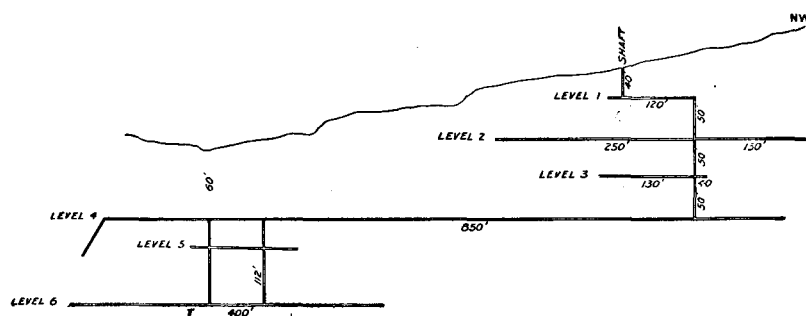


FIG. 2.—General section of the Musick mine.

numerous branches. The vein itself, where best exposed, is made up of three parallel veins, as shown in fig. 3, a section taken from near the top of the main shaft.

a is an irregular mass of quartz permeated and colored with limonite, but contains here and there traces of pyrite. An assay yielded 0.15 ounce of gold and 1.65 ounces of silver per ton. *b* has a greater width, and generally at this level there is more quartz that is crystallized, filling small drusy cavities, and the whole is well colored by red and yellow oxide of iron, and contains numerous rectangular crystal cavities from which pyrite has been removed. This is said to be the richest ore at this level, and our assay confirms this statement. An average sample yielded 0.20 ounce of gold and 5.90 ounces of silver per ton.

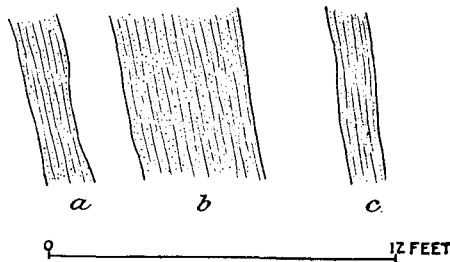


FIG. 3.—Section of the Musick vein.

In *c* there is the greatest amount of soft limonite, with a small proportion of quartz, and the ore is not rich. The specimen assayed carried only a trace of gold and but little silver. This portion of the vein is not seen farther down in the shaft, but is reached from level No. 3 by a short crosscut.

Descending to the first level, 40 feet below the surface, the vein continues completely oxidized. At the west end of this level is the

¹In 1899 the mine was sold to Montreal capitalists, I. H. Bingham, superintendent, for \$85,000.

middle vein (*b* of fig. 3), colored by oxide of iron. South of it is a mass of chiefly kaolin-like sericite, beyond which is the vein marked *a* in fig. 3. A specimen at this point yielded 1.25 ounces of gold and 2.05 ounces of silver per ton.

Level No. 2 is 90 feet beneath the surface at the shaft, but somewhat deeper at the west end, where specimen No. 16, rich in pyrite, was obtained and assayed, yielding only a trace of gold and silver. About 160 feet below the surface, at the west end of level No. 3, the full vein is in view, with a width of about 12 feet. A specimen from the vein marked *a* in fig. 3 contained 1.80 ounces of gold and 4.75 ounces of silver per ton, besides 7.25 per cent of zinc, 11.72 per cent of lead, and 2.31 per cent of copper. A specimen from vein *b* in fig. 3 gave 1.15 ounces of gold and 3 ounces of silver per ton, with 16.55 per cent of zinc, 18 per cent of lead, and 2.37 per cent of copper, while a specimen from *c* contained 0.95 ounce of gold, with 2.40 ounces of silver, and 4.47 per cent of lead. At this level the vein rock is much less rotten and discolored by oxides of iron. Pyrite and chalcopyrite are common in all the specimens. Galena and traces of zinc blende appear in the last two, and, although they occur at a number of points throughout the mine, are of much less general distribution than pyrite and chalcopyrite. At this level we find associated with the iron oxide about the sulphides numerous white acicular crystals and bunches of cerusite (lead carbonate), evidently derived from the alteration of the galena. More or less kaolin is usually associated with the vein, and occasionally it occurs in large masses, but generally contains no considerable quantity of the precious metals. At the east end of level No. 3, only a little over 100 feet away, the same ore, rich in sulphides, yielded only a trace of gold, with 0.10 ounce of silver, 3.10 per cent of zinc, and 2.10 per cent of lead.

Fifty feet below level No. 3, nearly 200 feet below the surface, is level No. 4, which has been opened for 850 feet. At the west end a sample of ore yielded 0.25 ounce of gold and 3.85 ounces of silver per ton, with 15.63 per cent of zinc, 4.24 per cent of lead, and 2.87 per cent of copper. In this level, near the west end, the lower portion of vein *c* is exposed. It is especially rich in pyrite, containing 1.50 ounces of gold and 2.40 ounces of silver per ton, with 1.97 per cent of zinc and 1.15 per cent of lead. Near by the middle portion of the vein is especially rich in galena.

Ore of the same character—that is, especially rich in galena—occurs more abundantly in level No. 6, which lies 112 feet below No. 4. Its development is confined to the southeastern portion of the mine, which is only 180 feet below the surface. This level is only 400 feet in length, and samples were taken from both ends and from three intermediate points, but only three of the specimens have been assayed. The distribution of the ore is very irregular, and the samples collected probably contain more than the average values. At the east end the

vein rock is filled with small nodules of kaolin-like sericite, which form nearly half of the mass. Between the nodules of sericite is quartz containing a considerable proportion of sulphides. The ore as a whole contains 0.10 ounce of gold and 0.80 ounce of silver per ton, 3.84 per cent of zinc, 0.49 per cent of lead, and 1.23 per cent of copper. Another sample near by consists chiefly of galena, with some intermingled chalcopyrite and pyrite, and contains 0.80 ounce of gold and 5.80 ounces of silver per ton, with 11.33 per cent of zinc, 45.90 per cent of lead, and 0.89 per cent of copper. At the western end of this level the ore is chiefly galena, with quartz and sulphides. Some small cavities are lined with quartz, others with pyrite. The ore yielded 1.25 ounces of gold and 4.75 ounces of silver per ton, with 63.32 per cent of lead. On this level galena is one of the most prominent ores. At one point sphalerite is especially abundant, and constitutes the greater portion of a considerable mass.

Mr. Cook informs me that about 1,000 tons of concentrates have been obtained by two concentrators of the 5-stamp mill in the few years it has been running, and now that the road is completed to the mine the concentrates will be shipped. A sample taken July 28, 1898, assayed 0.80 ounce in gold and 5.60 ounces in silver per ton, with 6.44 per cent of zinc, 10.48 per cent of lead, and 0.79 per cent of copper.

Concerning the ores of the Musick mine in general, it may be said that oxidation extends to a depth of nearly 100 feet, although pyrite is sparingly present above that level. In the quartz and limonite of the oxidized portion, traces of lead, copper, and zinc ores of any kind are entirely absent. Below that level, however, the sulphides become locally prominent, and within the limits of this mine the amount of lead and zinc sulphides present appears to increase somewhat with the depth. Kaolin occurs irregularly distributed throughout the vein at all levels.

The California.—Near the Musick vein, upon which the Musick mine is located, to the northeast, is the California, which has been prospected for several hundred yards on a course varying from S. 75° to 81° W. If it continues farther westward on this course it must join the Musick vein some distance beyond the present limit of the Musick mine. The California is about 5 feet in width and locally contains much black oxide of iron. Some of the material from the vein was worked years ago, but the results are not now available.

The White Ghost.—Southeast of the California, upon the right bank of City Creek, is the White Ghost or Old City ledge, in which there were prospecting pits dug long ago. The rock is peculiar and quite unlike any other found elsewhere in the Bohemia region. It consists chiefly of quartz and tourmaline, in places so arranged as to give the rock a gneissoid structure, the strike of which is N. 55° W. The rock is much fractured, and locally it contains considerable pyrite and siderite. This material is associated with and surrounded by fragmental

volcanic material, which suggests that this was once the center of volcanic activity. The pyritiferous ore is said to range from a few dollars to \$20 a ton in gold and silver, but no assays were made.

The Mystery.—Southeast of the White Ghost is the Mystery, which has been more extensively opened. A specimen, rich in scales of micaceous red hematite with a trace of galena, contains 1.95 ounces of gold and 7.25 ounces of silver per ton, with 0.16 per cent of lead and a trace of copper. This sample was probably much richer than the average. Near the center of the Mystery claim is the Discovery shaft, to the west of which the quartz contains particles of sphalerite, galena, chalcopyrite, and kaolin. An assay yielded 0.05 ounce of gold and 1.30 ounces of silver per ton, with 5.57 per cent of zinc and 2.27 per cent of lead. At the Discovery shaft the porous ore is greenish within, due to chlorite, and rusty on the surface. It contains many scales of red hematite. A small pocket containing \$700 in gold was found over thirty years ago near the southeast end of the Mystery and caused great excitement. Large scales of hematite occur in the gray quartz, associated with yellowish-green epidote. The fine-granular quartz, which has been broken up and brecciated, is full of minute particles of pyrite and other sulphides, while the fragments are first coated with a layer of hematite scales and then covered with quartz crystals.

The Wall Street claim.—On the left bank of City Creek, north of the Mystery, is the Wall Street claim, upon which development work was going on in July, 1898. Nearly opposite the sawmill is a ledge which strikes N. 75° W. and dips 85° SW. It is about 5 feet wide, and the ore is iron-stained quartz, with some partially altered galena, and upon assay gave 0.15 ounce of gold and 2.20 ounces of silver per ton. A tunnel running a little east of north, approximately at right angles to the strike of the veins in that portion of the field, is now 120 feet in length, reaching to a small vein, and will soon be extended to the Wall Street. If continued in the same direction for nearly 1,000 feet it would perhaps reach also the Vesuvius and the Champion.

In the course of the tunnel, but upon the surface, is a small vein, ranging from 1 to 18 inches in a length of 3 feet. Being rich in galena, it is called Galena spur. It contains also much sphalerite and red hematite, with some pyrite and chalcopyrite, as well as much limonite and nests of quartz crystals. The course of this little vein, seen for only a few yards, is N. 8° E., and it is probably an offshoot from one of the larger veins. The ore from this small vein assays 2.75 ounces of gold and 16.65 ounces of silver per ton, 3.95 per cent of zinc and 53.80 per cent of lead.

The Vesuvius.—On the southern slope of Fairview Peak, nearly a mile northeast of the Musick mine, is the Vesuvius, which has been opened for some time, and is now being worked, with adjoining prospects, to furnish material for a 5-stamp mill, located upon the Sharp

Creek slope. At the upper opening of this mine are two veins of porous quartz, deeply stained and permeated by oxide of iron. From the smaller vein a sample was taken which yielded 0.50 ounce of gold and 0.95 ounce of silver per ton. One from the larger contained 1.10 ounces of gold and 2.40 ounces of silver per ton.

A little lower down on the Sharp Creek slope another tunnel reaches a 5-foot vein, consisting of iron-stained porous quartz, which has been opened for mining. This vein dips southwest and overlies the vein just noted above apparently about 30 feet.

The Story claim.—On the divide a short distance southeast of Fairview is an opening recently made on the Story claim by A. F. Johnson. Besides a 35-foot shaft there is a short tunnel on a small vein which lies, approximately, in the line of the Champion, with strike N. 55° W. and dip 70° SW. Rich pockets are said to occur here, with a fair average for the other portions of the vein, but no samples were taken.

The Lizzie Bullock claim.—Mr. Johnson has another claim, the Lizzie Bullock, upon the south slope of Elephant Mountain. A 6-foot vein opened by a small shaft contains stringers of quartz, and strikes N. 55° W., with a dip of 75° NE. This dip is the reverse of that most common in the region, and may be due in this case to surface creeping. In a second opening the vein is 7 feet thick, contains much quartz, and strikes N. 78° W., with a southwesterly dip. These ledges are said to range from \$4 to \$9 per ton. Here there is a 2-stamp mill, run by a small overshot wheel, which has no permanent water supply and can be operated only a small portion of the year.

The Delta claim.—In the same region is the Delta claim, where a 60-foot tunnel is run in upon a 3-foot vein that strikes N. 75° E. The vein matter is largely quartz, containing some galena and sphalerite.

The Elsie Dora claim.—Upon the opposite side of the ridge is the Elsie Dora, at the foot of which lies a little glacial lake. In this claim there is a tunnel over 250 feet in length along a 7-foot vein, but no work has been done here for some years. The course of the vein is N. 72° W., and, passing through the hill, it possibly appears upon the northwest slope in the claims just noted.

The Golden Slipper claim.—East of Fairview Mountain, about the head of the western branch of Champion Creek, is a small group of claims, among which the Golden Slipper has been most extensively prospected. Two tunnels have been run in, and about 10 tons of ore removed. The exposed vein is small and the rock is considerably jointed. The strike is N. 60° W., the dip 80° SW. The ore is yellow-stained quartz rock containing considerable sphalerite and galena, with some pyrite and chalcopyrite. The porous quartz contains many cavities lined with little quartz crystals. N. 60° W. from the Golden Slipper, upon the lower slope of Fairview, is an opening possibly upon the same vein, and to the southeast there are several openings, made chiefly by the owners of the Broadway.

The Broadway claim.—The Broadway lies on the divide at the western end of the Champion, nearly a mile directly east of the Musick mine. A tunnel 140 feet in length reaches the vein, along which a drift extends eastward for 60 feet. The richest ore is said to be near the Champion, which is not yet reached by the drift. An average sample, collected across the face at the eastern end of the drift, assayed 0.05 ounce of gold and 0.30 ounce of silver per ton. The vein at this point is $2\frac{1}{2}$ feet wide and composed of rather soft quartzose material which is not deeply colored by oxide of iron, as is usually the case so near the surface. Small crystals of pyrite are scattered through the adjacent country rock at some points along the north side of the drift, but are not abundant in the exposed portion of the vein.

Below the Broadway about 250 feet, upon the northern slope, is a second tunnel, 70 feet in length. At its mouth is the Diamond ledge. Still lower down upon the same slope is the Frank Brass claim, where a 90-foot tunnel penetrates tuff, containing little nodules of pyrite, to reach a small vein. The ore of this vein is chiefly quartz, with some kaolin and oxide of iron upon the outside, and a small amount of sulphides within.

Other claims appear farther north, upon the slopes of Champion Creek, but none are now working and the openings are small. Some of them will be noted under the Helena, to be considered later. In a section extending a little east of north across the middle portion of the Bohemia mining region there appear to be at least seven veins—the Frank Brass, Diamond, Champion, Vesuvius, Wall Street, Mystery, and Ophir.

The Champion mine.—The Champion mine, known also as the Hartford mine, is located on the very crest of the range, a little more than a mile directly east of Bohemia, between Fairview and Grouse Mountain. The ore is carried on a tramway 3,400 feet long down the northern slope to a 10-stamp mill on Champion Creek, a branch of Frank Brass Creek. Only five of the stamps were running in July, 1898. The mine having reached to a depth of but little over 100 feet, where deepest, has not passed beyond the zone of oxidation, and thus far only a small amount of concentrates has been saved. A sample of these concentrates yielded upon assay 0.20 ounce of gold and 3.40 ounces of silver per ton. The mine is worked almost wholly from one level, 520 feet in length, ranging from 56 to nearly 250 feet beneath the surface. At the face of this level, where the vein had a width of 4 feet, it consisted chiefly of rotten quartz permeated by limonite. A sample made up of material collected every inch directly across the vein yielded 0.05 ounce of gold and a trace of silver per ton. Within the vein was found a fresher mass of quartz containing considerable pyrite, and an assay showed only a trace of gold and silver. Occasional masses of kaolin-like sericite occurred in the vein, but they are not conspicuous.

From the face of one of the stopes, 70 feet above the level and 112

feet beneath the surface, a sample was obtained by taking small and approximately even-sized fragments an inch apart across the face, as in the previous case. This specimen consisted of quartz permeated by limonite, and yielded 0.20 ounce of gold and 1.50 ounces of silver per ton. Farther westward from the face of a stope, 70 feet beneath the surface, another sample was taken in the same way and contained 0.15 ounce of gold and 1.15 ounces of silver per ton. In both cases the vein material consisted of porous quartz deeply stained with limonite. A brecciated sample collected from near the same place, containing much quartz with some sericite, traces of sulphides, and cavities having a dark lining, assayed 0.05 ounce of gold and 0.90 ounce of silver per ton.

In this mine, as far as developed, there are few points where pyrite occurs, and distinct bodies of the other sulphides were not found, as in the Musick mine. The oxidation appears to have extended deeper in the Champion than in the Musick mine, but this is accounted for by the fact that erosion has removed much more material from the surface at the Musick mine than at the Champion, which is on the crest of the ridge.

The Knott and other claims.—The Knott was the first claim upon which mining was fully undertaken. In 1873 it was furnished with a 5-stamp mill, which was operated for about four years. It is one of the group of claims upon the slopes of Grouse Mountain, and has been more extensively worked than any other of that group excepting the Noonday. The altered rock penetrated by the two deep shafts is brecciated, and consists of quartz, kaolin, and oxide of iron, and does not contain much of the sulphides. The same sort of material occupies a number of acres upon that portion of the hill, and extends southeast into the Gray Eagle, where its strike is N. 51° W., its dip 70° SW. On the northwest brow of the hill an opening exposes some vein material, where the direction is N. 85° W., almost directly across the Champion mine to the Musick mine.

The McCrum, Keep, Lucky, Grouse, and Elsie are claims recently marked out, largely on older claims about Grouse Mountain. The Keep claim, upon the south side of the mountain, has a small surface opening upon a vein about a foot in thickness. The strike of the vein is N. 48° W. The Elsie, farther southeast, shows in a shallow opening a width of 5 feet or more of vein matter, having a strike N. 80° W. and dip 85° N. The material yields a few colors when panned. Near by another out-crop shows an 18-inch vein striking N. 67° W.

The Sunset vein, which has been opened up by several tunnels, has a width of about 2 feet, although not well defined, and is composed of ferruginous material, quartz, and kaolin. In some places the rock to a distance of 10 feet on either side of the vein is altered, but at others the fresh rock is seen close to the vein. The joints of the material strike S. 52° E. and dip 72° NE., parallel to those of the adjacent rock. Half

a mile farther south another vein, about 4 feet in width, has been opened; strike N. 82° E., dip 57° NE. Crushed zones parallel with the joint of the rock are opened at a number of points along the southwest slope of Grouse Mountain, but the amount of vein matter in them is small and their distribution is very irregular. One of these crushed zones is well exposed in an open cut, supposed to be upon the Twin Sister claim. The material is brecciated, but not impregnated with ores to any considerable extent.

The Confidence claim, which is located several miles southeast of Grouse Mountain, has a 60-foot adit. The vein, which is not well defined, contains considerable talc. Its strike is N. 58° W., dip 65° SW. A selected sample from the face of the opening shows pyrite and chalcopryrite in considerable quantities, and by an assay yielded 1 ounce in gold and 3.40 ounces in silver per ton. Counting gold at \$20.67 and silver at 60 cents per ounce, the values would amount to \$22.71 per ton.

Noonday mine.—The Noonday mine, which is now operated upon the property formerly known as the Annie, is located about a mile east of the Champion. A 5-stamp mill was run for a number of years. In 1896 the company erected a 20-stamp mill far below the mine, on Horseheaven Creek. The mill was run only about five months, and has since been closed awaiting development work, which is still progressing with a small force of men.

The Noonday mine has a larger extent of underground workings than any other of the mines in the region. The drifts and tunnels are over 2,000 feet in length, distributed at three levels, each of which is connected directly by a tunnel with the steep slope about the head of Horseheaven Creek. The lowest level, which is most extensive, reaches a point on the vein about 300 feet beneath the surface. The course of the vein varies from N. 55° W. to N. 85° W., and the farther westward it is followed the more it bends to the south, toward the irregular brecciated mass about Knott's original claim on Grouse Hill. In dip it varies from 75° N. to 85° S. near the surface, and at a greater depth the dip varies within these limits. The vein is also very irregular in size and so faintly outlined through the country rock as to be difficult to follow. This has not been unexpected, for the evidences of movement along the vein are more distinct in this mine than in any other of the region. On level No. 2 the thickness of the vein ranges usually from 0 to 4 feet, with a rare maximum of 6 feet. It averages, perhaps, about 3 feet.

The ore is of the same character as that of the Musick and Champion mines. Near the surface it is completely oxidized, and the softened quartz-ore mass is deeply stained by iron oxide. The ore above level No. 1 has been removed, excepting near the western end. It contains no visible sulphides. The foot wall is smooth and slickensided, and the vein matter is in part brecciated, as if by faulting, but there is much banding, with more or less distinct comb structure of later origin. In

the tunnel leading to level No. 2 there is a small vein in line with prominent slickensides on the road, and the vein strikes east and west. Toward the west, on level No. 2, the large vein which is mined narrows, and finally pinches out. Slickensides are common. Faulting has undoubtedly played an important rôle in the history of the vein. The fault plane runs east and west, and the striations upon it dip 20° E.—just the reverse of those seen on the road near the mine. Another small slipping plane in the same part of the mine runs nearly north and south, and its striations dip toward the south.

At the east end of level No. 2 a sample of the ore was taken. It yielded a trace of gold and but little silver, although the ore removed from its vicinity is said to have been rich, and the chimney to which it belonged dipped to the eastward. Another sample was taken from level No. 2 near the end of the tunnel, but the assay yielded only a trace of gold and 0.90 ounce of silver per ton, with 0.31 per cent of zinc, 4.41 per cent of lead, and 0.07 per cent of copper. This ore, unlike that of the first specimen, is not oxidized, and contains distinct traces of chalcopyrite and galena in the quartz-ore mass.

At level No. 3 the amount of drift has been greatest, and a large body of ore is being made readily accessible if sufficiently rich to work. The tunnel entering at this level reaches first a small vein, which is followed for about 500 feet before crosscutting to find the principal vein upon which the upper levels are located. Near the northern end of the crosscut, between the two veins, which are about 120 feet apart, there is a small mass especially rich in pyrite which yielded 0.10 ounce of gold and 1.65 ounces of silver per ton. Farther east, on a drift from the same crosscut, there is a bit of ore, chiefly quartz, in which there is some galena, pyrite, and chalcopyrite. The ore yielded 0.30 ounce of gold and 1.70 ounces of silver per ton, besides 1.03 per cent of zinc, 2.10 per cent of lead, and 0.25 per cent of copper. Cavities lined with small crystals of quartz are more common at this level than higher up, and at times they are coated upon one side by pyrite. The first vein reached by the tunnel to the third level is well exposed at the western end of the drift. It is whitish, rather soft and tuff-like, has a width of about $2\frac{1}{2}$ feet, and stands vertical, with a strike N. 82° W. The ore contains 0.10 ounce of gold and 0.65 ounce of silver per ton. Richer ores than the samples assayed were not seen anywhere in the lower levels of this mine, although at one time specimens rich in free gold were found here, and the discovery of such have been reported also since the mine was examined.

The Helena claim.—About one-third of a mile north of the Noonday is the Helena, which has recently attracted much attention on account of the fine specimens of free gold it has afforded. The vein is about 5 feet wide. It strikes N. 58° W., dips 74° NE., and contains, besides limonite and porous quartz, considerable kaolin, with rare crystals of cerusite. This oxidized ore occasionally incloses pyrite, with some

sphalerite and traces of galena. The openings follow the course of the vein, the upper one for 125 feet and the lower one 110 feet below the other, for a distance of 225 feet. The upper level has afforded some fine specimens of film gold deposited on quartz and partly buried in quartz. The whole is frequently stained by oxide of iron. It is said that samples of this material containing free gold have assayed over \$1,000 per ton, while pyrites from the same vein near by yielded \$2,500 per ton. These, of course, are very exceptional values and represent only the richest material. This especially rich portion of the vein is of small extent along the drift. An average sample collected across the face of the tunnel a short distance beyond the richer portion contained 0.05 ounce of gold and 0.35 ounce of silver per ton. A sample of selected ore near the same point contained 0.90 ounce of gold and 1.15 ounces of silver per ton, amounting to about \$19.29 in value. In the lower adit free gold occurs less abundantly than at the upper level, although sulphides are more abundant in the lower level.

White Wings and other claims.—The vein of the Helena opening runs northwest, directly into Grizzly Mountain, which stands on the crest north of Grouse Mountain. The vein possibly reaches the opposite side of the ridge, for at this point is the claim known as White Wings. The opening is small, but exposes vein matter with considerable sphalerite, galena, chalcopyrite, and pyrite. This ore was assayed and yielded 0.07 ounce of gold and 0.45 ounce of silver per ton, besides 3.84 per cent of zinc and 1.68 per cent of lead. Near the summit of Grizzly Mountain a shaft about 35 feet in depth shows a mass of brecciated, kaolinized material deeply stained by limonite. The same vein may extend farther northwest across Champion Creek, where a number of other claims have been located, to the Else Dora and Delta, nearly 2 miles away. This is the most northerly vein that has been opened in this field, although several others have been reported, especially on the head waters of Frank Brass Creek, where some fine specimens of ore rich in sphalerite, with traces of galena, have been obtained. Near by the rock is rich in pyrite, but none of it has been assayed.

South of White Wings is the Edna, which has been opened on both sides of the ridge. On the west side is an adit 100 feet in length along the vein, running N. 80° W. The vein matter is chiefly quartz and contains some pyrite. Upon the east side of the divide a short tunnel is run southwest along joint planes to a vein about a foot in thickness. This little vein strikes N. 48° W. and dips 60° SW., but has not been followed.

Riverside and other claims.—About 2 miles east of the Noonday mine, along Horseheaven Creek, which flows into Steamboat, there are a number of claims, upon some of which considerable development work has been done, especially upon the McKinley, Hobart, Riverside, Buckhorn, Yreka, and the Mayflower. The McKinley and Hobart claims are in the same vein, which strikes N. 66° W., and contains

much cellular quartz and limonite, which is said to average \$9.50 per ton, although much of the ore runs higher.

The Riverside is on a small ferruginous vein 2 to 4 inches wide, in greenish rock, into which several tunnels have been run. The vein yields considerable free gold when crushed and panned, but none of it was assayed.

Upon the left bank of Horseheaven Creek is a small vein in the Pearson claim. Its strike is N. 74° W. and its dip is 85° NE. A short distance farther east, upon the lower slope of Hematite Mountain, is the Buckhorn claim, where a tunnel has been run into a thick mass of stratified tuff. The tunnel is 30 feet long, to open a vein which is about 5 feet in width. The vein is not sharply defined, but contains much quartz, with soft clayey matter, through which some quartz is distributed. The vein material yields free gold upon panning. An assay showed it to contain 0.05 ounce of gold and 0.10 ounce of silver per ton. North of the vein in the tunnel the rock is rich in pyrite, which assays 0.05 ounce of gold and 0.15 ounce of silver per ton.

The Yreka was examined, but not the Roy or the Mayflower. The Yreka shows a 5-foot vein, which strikes S. 88° W. and dips 64° SE. Four feet of the material is quartzose, with much pyrite, which yields upon assay a trace of gold and 0.10 ounce of silver per ton. Upon the upper side of the vein, for about 8 to 12 inches in thickness, the ore is rich in sulphides of zinc, lead, and copper. An assay yielded no gold and only 0.05 ounce of silver per ton, but contained 17.71 per cent of zinc, 11.88 per cent of lead, and 1.38 per cent of copper. The easternmost prospect of the region in July, 1898, was near the southeastern base of Hematite Mountain, which was not examined.

NOTES ON THE BLUE RIVER MINING REGION.

The Blue River mining district was examined by my assistant, James Storrs, who collected samples of the more important veins and country rocks. The region lies upon the western slope of the Cascade Range, near the McKenzie Fork, about 45 miles northeast of Eugene. It is 50 miles a little east of north from the Bohemia region, and its rocks, like those of the latter, are wholly igneous and of comparatively recent origin. The rocks differ, however, from those of the Bohemia district in being generally more siliceous, although both andesites and basalts occur. Rhyolite is common, especially upon the slope of Gold Hill, in the neighborhood of the Vere, Gold Reef, and Excelsior claims, where it is frequently so conspicuously banded as to be mistaken for a stratified rock. The Uncle Sam, Wagner's, and Republican are in andesite. The summit of Gold Hill is well-marked basalt, quite rich in olivine. Andesites more or less altered occur upon the trail between Gold Hill and Blue River.

At least a dozen claims have been opened by shafts and tunnels, ranging up to 250 feet in length. There are no working mines¹ as yet in this

¹A 10-stamp mill is reported to have started in February, 1900, in this region, and yields good returns.

district, but active prospecting continues. The general course of the veins is N. 60° to 88° W., and their dip is 75° to 90° SW., although in a few cases the dip is at a high angle to the northeast. The veins of the Blue River region are approximately parallel to those of the Bohemia region, and, it may be inferred, originated in essentially the same movements, although in the Blue River region the movements did not result in the development of so persistent a ridge as Calapooya Mountain.

The veins range in size from a mere trace to about 5 feet in thickness, and the gangue is quartz, usually more or less deeply stained by oxide of iron. The quartz occasionally has a well-defined banded structure, with crystal-lined cavities here and there between the layers. The best examples of this structure were seen in the face of the long tunnel in the Warner claim. Some of the pyrite is said to be very rich, but none of it has been assayed by the Survey. Sphalerite and galenite, although common in the Bohemia mines, were observed in the Lucky Boy but in none of the other openings of the Blue River region. There being no active mines in the Blue River region, the exposures thus far are confined almost wholly to the zone of oxidation. It is probable that at greater depths the sulphides of zinc, lead, and copper will be found in a number of the veins.

NOTES ON THE STRUCTURE AND AGE OF THE CASCADE RANGE, WITH SPECIAL REFERENCE TO THE LOCALITIES OF FOSSIL PLANTS DESCRIBED BY MR. KNOWLTON IN THE FOLLOWING PAPER.

Left bank of Columbia River, Oregon, near the mouth of Moffats Creek, opposite the lower (now abandoned) steamboat landing.

Bonneville is the nearest station on the Oregon Railroad to this locality. It is 4 miles west of Cascade Locks. The mouth of Tanner Creek is one-fourth mile below Bonneville and that of Moffats Creek nearly a mile farther down. This is the locality visited in 1871 and 1873 by Professor Le Conte,¹ who collected a number of leaves and described their mode of occurrence as well as the general structure of the region. Since his observations were made the railroad has been built, affording a fine exposure for nearly a mile of the upper part of the heavy volcanic conglomerate, but most of the lower part is covered. Le Conte reports two species of oak and one of conifer. The leaves I collected in 1895 were obtained from the same dark band, which is yet exposed at only a few points close to the water's edge. The best exposure is near the 40-mile post, and among the leaves found there Mr. F. H. Knowlton identifies poplar and maple.

The section, as given by Le Conte, is well shown in the precipitous cliffs. There is about 100 feet of volcanic conglomerate overlain by a

¹Am. Jour. Sci., 3d series, Vol. VII, 1874, pp. 167-180, 259-267. Proc. California Acad. Sci., Vol. V, 1873, pp. 214-220.

great thickness of more or less nearly horizontal sheets of basalt. No stumps were seen standing in the dark band, as observed by Le Conte, but numerous silicified logs and fragments of wood and leaves with traces of coal occur. The dark band, reported by Le Conte to be 15 feet above the water surface of the Columbia, was only 8 feet above it in 1895. The conglomerate below the leaf bed is coarse and some fragments are angular, but generally they are well rounded, indicating water action. Of the thirteen fragments collected from this conglomerate eleven are well-marked hornblende-andesites, rather poor in pyroxene. In an equal number of pebbles or boulders in that part of the conglomerate above the leaf bed only three or four hornblende-bearing andesites were found, and they contain much hypersthene, so they may be designated hornblende-bearing hypersthene-andesites. The rest are chiefly fragments of hypersthene-andesite.

At various places in the conglomerate above the railroad there are trunks of trees of large size, some standing, but others prostrate. The exposures were not sufficiently complete to show positively that the trees were still standing where they grew, but from what could be seen that is the impression they created. The accumulation of the volcanic boulders, gravel, sand, and fine material to make the conglomerates must have been subaerial, and rather slow to allow the growth of trees from 2 to 4 feet in diameter before being covered up in the course of deposition.

On Tanner Creek the relation of the basal conglomerate to the overlying sheets of basalt, as pointed out by Le Conte, is very clear. A short distance back from the river the cliffs of basalt rise 3,000 feet. This great thickness of basalt certainly accumulated after the formation of the conglomerate containing the Miocene leaves.

The lavas of Mount Hood are chiefly hornblende-andesites and hornblende-bearing hypersthene-andesites. Besides these, Hague and Iddings¹ have reported olivine-bearing hypersthene-andesite approaching basalt. The great floods of basalt probably, as about Mount Shasta, came out later from adnate cones upon its lower slopes. The heavy conglomerate along the Columbia records the period of activity in the large volcanoes, which may have at that time attained nearly or quite their present magnitude. The pass of the Columbia may even then have been a line of drainage across the range, filled up later by the final floods of basalt. The age of the conglomerate, as indicated by the fossil leaves, according to both Lesquereux and Knowlton, is Miocene. It is possible, but not probable, as we shall see later, that the eruptions, as in the Coast Range, began in an earlier period (Eocene), the records of which have not yet been found among the lavas in the Cascade Range. The real bottom of the volcanics of the Cascade Range is not visible along the Columbia River. It is below tide level.

¹Am. Jour. Sci., 3d series, Vol. XXVI, p. 22, September, 1883.

Coal Creek, Lane County, Oregon.

Coal Creek, about 50 miles east of Oakland, is a branch upon the south side of the Middle Fork of the Willamette, near its head, in the western slope of the Cascade Range. This locality is about 20 miles southeast of the Bohemia mining region, and lies in a depression between the Bohemia Mountains and the crest of the Cascade Range. The altitude of the locality is not known, but it must be in the neighborhood of 3,000 feet. The leaves were discovered by a party of miners prospecting for coal about 3 miles above the mouth of the creek.

The Middle Fork of the Willamette cuts a deep and narrow, canyon-like valley in the western slope of the Cascade Range. Much of its course is bordered by a small flood plain. Occasional ledges of rock appear in the stream bed, but generally the bed is of coarse gravel, protecting the underlying rock from stream cutting. Upon the slopes, in places, at least 2,000 feet of nearly horizontal sheets of lava and beds of fragmental volcanic material are well exposed. The bottom beds wherever seen are igneous. The most common form just below the mouth of Coal Creek is diabase, very closely related, apparently, to that of the Roseburg region, which was erupted in the latter part of the Eocene. This discovery excited the expectation that on Coal Creek we should find Eocene fossils, but in that we were disappointed.

The deposit bearing fossil plants on Coal Creek is chiefly sandstone, with some conglomerate and shale, disturbed in places by the extrusion of igneous rocks like diabase. The pebbles of the conglomerate are all of igneous material, largely of a rhyolitic character. The sandstone contains considerable feldspar, but is composed chiefly of grains of igneous rocks. The sandstones strike N. 85° E., and dip in some places to the southwest and elsewhere to the northeast. The thickness of the whole mass may be as much as 1,000 feet, but the traces of coal are very small, and it is a matter of surprise that men should have prospected so much with so little encouragement.

In a district of active volcanoes the lava flows frequently interrupt local drainage and thus produce lakes. The strata in which the fossil leaves are inclosed were deposited most likely in a lake developed under such conditions. The position of the beds at the bottom of a deep ravine of Coal Creek, beneath several thousand feet of volcanic material, shows that a large part of the Cascade Range has been erupted since the leaves were buried. Among the fossils from this locality Mr. Knowlton recognizes with more or less doubt three species, only one of which has been seen elsewhere, and then in the Miocene.

Near Comstock, Douglas County, Oregon.

This locality is by the railroad 1 mile north of Comstock station, near the western end of the Calapooya Mountain. A section of the rocks about 50 feet in thickness is exposed upon the western side of the track. Conglomerate above, containing pebbles of volcanic rocks,

and sandy layers below, with white shaly beds between, contain numerous leaf impressions.

Half a mile southwest of Comstock the sandstones and shales contain *Cardita planicosta* and other characteristic Eocene fossils. These strata dip gently to the west and northwest, and have a wide distribution in the Coast Range. In some places the plant beds appear also to dip gently to the northwest, conformably to the Eocene, but at other exposures the position is different and it is possible that the plant beds are unconformable on the Eocene. This is the more likely to be the case if the beds are Miocene, as Mr. Knowlton supposes.

Five Miles North of Ashland, 3 Miles Southeast of Ashland, 1 Mile East of Murphy's Springs, and about 4 Miles a Little South of East from Ashland.¹

All these localities lie at the western base of the Cascade Range, a few miles from the railroad, in southern Oregon. At Ashland the Cascade Range is separated on the southwest from Siskiyou Mountain, a part of the Klamath group, by Bear Creek Valley, a branch of Rogue River Valley.

The topographic features just referred to are composed of four sets of rocks: (1) Pre-Cretaceous sedimentary and igneous rocks; (2) Cretaceous conglomerates, sandstones, and shales; (3) Miocene conglomerates, sandstones, and shales; (4) Miocene and later lavas.

Among the pre-Cretaceous rocks of the Ashland region quartz-mica-diorite is one of the most important. It extends from Ashland southward into Siskiyou Mountain. It is the base upon which the Cretaceous strata lie and from which the sands and silts of both the Cretaceous and the Miocene strata were derived.

The Cretaceous strata occupy the middle portion of Bear Creek Valley and much of the lower slope upon the southwest side. They are characterized by fossils of the Chico epoch, and dip eastward beneath the Cascade Range, in all probability connecting with similar rocks of the same age exposed on Crooked River, in eastern Oregon.

The Miocene beds are exposed upon the lower slope of the Cascade Range a short distance northeast of Bear Creek. Although not accurately measured, they must have a thickness of over 500 feet. They are characterized by containing the leaves described by Mr. Knowlton, obtained from the localities noted above. Besides the leaves, a number of fragments of wood were collected from strata underlying the leaf beds, and of these Mr. Knowlton says they are certainly later than the Cretaceous, and are probably Miocene. The Miocene sandstones, like those of the Cretaceous, are composed chiefly of quartz, altered feldspar, scales of biotite, sericite, and kaolin, derived directly from the disintegration of the adjacent diorite, which formed the shore of the water body originating them. The conglomerate, of which a heavy bed occurs

¹The last two localities are probably the same, as they are upon the same ranch, in a light-colored shale, which is not common. The fossil leaves noted by Mr. F. M. Anderson in the Journal of Geology (Vol. III, p. 461) are probably from the same place.

near the base of the Miocene, is made up largely of fragments of older igneous rocks from the Klamath Mountains, and differs from those of the Cascade Range. Mixed with these in the conglomerate, but more particularly in the overlying sandstones, are pebbles of quartz, quartzite, schist, and slate from among the older rocks of the Klamath Mountains. In the conglomerate many of the pebbles are imbricated, sloping eastward, showing that the currents or waves which determined their final position in the bed came from that direction, and indicating that a body of water of considerable size then existed upon the site of this portion of the Cascade Range. The beds dip gently to the eastward, and appear to overlies the Cretaceous strata conformably, but it is evident that their line of contact must represent a long time interval during which the great thickness of Eocene conglomerates, sandstones, and shales were deposited along the northern base of the Klamath Mountains, in the Umpqua and Coquille valleys and beyond throughout the Coast Range and valley region of western Oregon and Washington.

The older portion of the Miocene strata contains no trace of the modern volcanic rocks of which the Cascade Range is composed. They dip gently eastward beneath the sheets of lava composing the range. They are cut by dikes and in places separated by intruded sheets of igneous material connected with the lavas, and it is evident that the Miocene strata of the Ashland district are older than the adjacent portion of the Cascade Range. If there were any eruptions during the Eocene in this portion of the Cascade Range there should be a record of them in the strata overlying the Cretaceous. The absence of volcanic rocks seems to show that the earliest eruptions in this part of the Cascade Range took place in a later portion of the Miocene or Pliocene. The same is true at the southern end of the Cascade Range about Lassen Peak, where a great thickness of sediments containing no volcanic material lies between the Cretaceous rocks and the lavas which make up the range.

The Cascade Range, from Lassen Peak to beyond the Columbia, is underlain nearly or quite continuously by Cretaceous strata. From the divide between the head waters of Rogue River and the Umpqua northward it is in large part underlain by Eocene strata of marine origin, and the lavas are associated with leaf-bearing lacustrine Miocene sediments of volcanic material. From the same point south the Eocene is entirely absent and the lavas are immediately underlain by leaf-bearing Miocene deposits, supposed to be essentially of lacustrine origin and containing in the earlier sediment apparently no volcanic material. This suggests that the eruption of the modern lavas began in the latter part of the Miocene. Concerning the Cascade Range from Lassen Peak in California to the Columbia, it may therefore be said that, as far as our present knowledge goes, the Cascade Range is not underlain by a parallel ridge of pre-Cretaceous rocks. It is younger, and is composed almost wholly of igneous rocks derived from Miocene and later eruptions.

FOSSIL PLANTS ASSOCIATED WITH THE LAVAS OF THE CASCADE RANGE.

By F. H. KNOWLTON.

A number of small collections of fossil plants from the western slope of the Cascade Mountains, in Oregon, have been submitted to me for study, and reports upon these have been made from time to time during a period of nearly five years. Most of this material has been collected by Mr. J. S. Diller, of the United States Geological Survey, or by parties under his direction. As a considerable portion has proved to be new to science, it has been thought advisable to bring it together in one place, as an expression of our present knowledge regarding this flora and its bearing on the question of the age of the beds in which it occurs.

Following is a list of the localities from which the material has been obtained:

1. Left bank of the Columbia River, Oregon, near the mouth of Mofats Creek, opposite the lower (now abandoned) steamboat landing. Collected by J. S. Diller, 1895.
2. Comstock, Douglas County, Oregon. Collected by J. S. Diller, 1895.
3. One mile east of Murphy's springs, southeast of Ashland, Oregon. Collected by J. S. Diller, 1895.
4. Coal Creek, Lane County, Oregon. Obtained by J. S. Diller, 1898.
5. Five miles directly north of Ashland, Oregon. Collected by J. S. Diller, 1898.
6. Three miles southeast of Ashland, Oregon. Collected by Elmer I. Applegate, 1897.

SYSTEMATIC ENUMERATION OF SPECIES.

ACROSTICHUM SIMULATUM n. sp.

Pl. I, fig. 1.

Similar to *A. hesperium* Newberry, but smaller. Pinnæ linear, 1.5 mm. to 2 mm. in width; length unknown. Margins undulate lobed; nervation anastomosing and forming elongated areoles, one vein in each lobe slightly thicker than the others; otherwise as in *A. hesperium*.

This species is represented in the collections from Coal Creek by several small fragments only. The best one has been figured, but, as may be seen, it is so small as to give only an imperfect idea of the frond. It is clearly very close to Newberry's *Acrostichum hesperium*, yet appears to differ in points that may entitle it to specific distinctness. It was a smaller fern, with the pinnæ more remote, and apparently with a decurrent wing connecting the pinnæ. The rachis is not so strong, nor is there evidence, in the fragments at my disposal, that it was flexuose, as in *A. hesperium*. The margin of *A. simulatum* is undulate lobed; that is, there are low, rounded lobes separated by very shallow sinuses. The nervation is identical in character with that of Newberry's species, with the single difference that at regular intervals, corresponding to the rounded lobes, there is a single slightly stronger nerve, but at the end of two meshes it is reduced to normal thickness. Of course no additional light is thrown on the fructification.

Acrostichum hesperium was described from the Green River group at Green River, Wyoming, and apparently has not been found outside of these beds.

Locality: Coal Creek, Oregon. Collected by J. S. Diller, 1898.

ASPLENium TENERUM ? Lesquereux.

The collection from Coal Creek contains a small fragment of the upper part of a pinnule that appears to belong to this species, but it is too small to be identified with certainty. *Asplenium tenerum* was described by Lesquereux¹ from supposed Miocene beds "near Gilmore station, on the Union Pacific Railroad," in Wyoming. This locality and the beds in which the specimens occur have not been since determined, nor has the species been since collected. Its recognition as far away as Oregon is open to question, yet as nearly as can be made out from the mere fragment, this species is close to, if not absolutely identical with, Lesquereux's.

Locality: Coal Creek, Oregon. Collected by J. S. Diller, 1898.

LASTREA (GONIOPTERIS) FISCHERI Heer.

Pl. I, fig. 24.

Lastrea (Goniopteris) fischeri Heer, Fl. Tert. Helv., Vol. I, p. 34, Pl. IX, fig. 3, 1855; Lesquereux, Cret. and Tert. Fl., Pl. L, fig. 1, 1884.

The collection contains several fragments that seem to belong to this species. The largest and best of these has been figured. It is slightly larger than the figures given by Lesquereux and cited above, but is otherwise indistinguishable. All of the American material appears to be somewhat larger than the European.

Locality: Five miles directly north of Ashland, Oregon. Collected by J. S. Diller, 1898.

¹Cret. and Tert. Floras, p. 221, Pl. XLVIA, fig. 112.

SEQUOIA ANGUSTIFOLIA ? Lesquereux.

The material from Coal Creek contains a minute fragment that with little doubt may be said to belong to this species. *S. angustifolia* was described originally by Lesquereux from Elko station, Nevada, in strata supposed to be of Green River group age. He also reported it from Corral Hollow, California, and I found it in the Miocene lake beds of western Idaho, in what Lindgren has called the Payette formation.¹

Locality: Coal Creek, Oregon. Collected by J. S. Diller, 1898.

SEQUOIA LANGSDORFII (Brgt.) Heer.

The material from Murphy's springs contains a number of branchlets that appear to belong to this species. They are rather smaller than the type examples as figured by Heer and others from the European Tertiary, but they are much the same as other North American material so referred. It is also found in numerous branchlets in the collections from about Ashland.

Localities: One mile east of Murphy's springs, Oregon, and about 4 miles southeast of Ashland. Collected by J. S. Diller, 1895. Five miles directly north of Ashland, Oregon. Collected by J. S. Diller, 1895. Three miles southeast of Ashland. Collected by Elmer I. Applegate, 1897.

PINUS sp.

Pl. I, figs. 3, 4.

Leaves in fives, perhaps occasionally in fours, linear, with a central strong rib and one or two smaller ones on each side, making the leaves about five ribbed.

The collections made by Mr. Applegate contain several fragments showing more or less complete fascicles of leaves of Pinus. One of these, the one shown in fig. 4, shows the base of the fascicle. It is somewhat obscure, but appears to have been surrounded by several scales. The leaves are held close together, and are preserved for about 7.5 cm. from the base. In this example there are clearly five leaves, while in the other specimens there are but four. Whether this is the normal variation or merely an accident of preservation, the material in hand is not sufficient to determine.

In several cases branchlets of *Sequoia langsdorfi* are preserved on the same pieces of matrix.

Locality: Three miles southeast of Ashland, Oregon. Collected by Elmer I. Applegate, 1897.

JUGLANS sp.

Pl. I, fig. 5.

The Comstock material contains a single fragmentary leaf that apparently belongs to this genus. As may be seen from the figure, it

¹ Eighteenth Ann. Rept. U. S. Geol. Survey, Part. III, Pl. XCIX, fig. 4.

is too much broken to permit a proper diagnosis. It appears to have been rather broadly lanceolate, with an obtusely wedge-shaped base. The margin is provided with numerous small, sharp teeth. The midrib is rather thin, with apparently some eight pairs of alternate secondaries, which are camptodrome, arching near the margin and probably sending weak branches into the small teeth.

It is so fragmentary that comparisons made between it and other species would be of little value.

Locality: Comstock, Douglas County, Oregon. Collected by J. S. Diller, 1895.

POPULUS ZADDACHI ? Heer.

Pl. I, fig. 11.

Populus zaddachi Heer, Fl. Tert. Helv., Vol. III, p. 307, 1859; Lesquereux, Cret. and Tert. Fl., p. 158, Pl. XXXI, fig. 8; Mem. Mus. Comp. Zool., Vol. VI, No. 2, p. 11, Pl. VIII, figs. 1-8.

The collection from the Columbia River, near the mouth of Moffats Creek, contains a single small specimen that is referred with some hesitation to this species. It is smaller than the usual form of this species as found in the Auriferous gravels, yet is not markedly different from one of the smallest specimens figured by Lesquereux.¹ It is, perhaps, closer to a leaf referred to *P. zaddachi* by Lesquereux, from Florissant, Colorado, and figured by him in the Cretaceous and Tertiary Floras (Pl. XXXI, fig. 8). In any event it is close to this species.

Locality: Left bank of Columbia River, Oregon, near the mouth of Moffats Creek. Collected by J. S. Diller, 1895.

ALNUS CARPINOIDES Lesquereux.

Alnus carpinoides Lx., Cret. and Tert. Fl., p. 243, Pl. L, fig. 11.

This species is represented in the collections by a single broken leaf. There is, however, little doubt that it belongs to this species, which was described originally from Bridge Creek, Oregon.

Locality: Three miles southeast of Ashland, Oregon. Collected by Elmer I. Applegate, 1897.

CASTANEA CASTANEÆFOLIA (Unger) Knowlton.

Castanea castaneæfolia (Ung.) Kn., Cat. Cret. and Tert., Pl. N. Am., p. 60.
Castanea ungeri Heer, Phil. Trans., vol. 159, Pl. XLV, figs. 1-3; Pl. XLVI, fig. 8, 1869;
 Lesquereux, Cret. and Tert. Fl., p. 246, Pl. LII, figs. 1-3, 7, 1883.
Fagus castaneæfolia Ung., Chlor. Prot., p. 104, Pl. XXVIII, fig. 1, 1847.

The Murphy's springs material contains a single fragment that appears to belong to this species. The collection from southeast of Ashland also contains one rather well-preserved example.

¹ Mem. Mus. Comp. Zool., Vol. VI, No. 2, Pl. VIII, fig. 7.

Localities: One mile east of Murphy's springs, Oregon, southeast of Ashland. Collected by J. S. Diller, 1895. Three miles southeast of Ashland, Oregon. Collected by Elmer I. Applegate, 1897.

QUERCUS SUBSINUATA n. sp.

Pl. II, fig. 5.

Leaf elliptic-lanceolate, narrowed below to a wedge-shaped base and a long slender petiole, and above to a slender acuminate apex; margin provided with rather small, sharp, outward-pointing teeth; nervation pinnate-craspedodrome; midrib very thick, straight, rapidly diminishing in size above; secondaries about ten pairs, alternate, thin, arising at an angle of approximately 45° , curving slightly upward and ending in the marginal teeth; other nervation obscure or not preserved.

This species is unfortunately represented by the single somewhat imperfect example figured, which lacks almost all of the margin. It is about 12 cm. long exclusive of the petiole, which is 2.5 cm. long and rather slender. The nervation, with the exception of the midrib and secondaries, can not be made out.

This species appears to be most closely related to *Q. nevadensis* Lx.,¹ of the Auriferous gravels of California. This latter differs, however, in being broader and more nearly obovate than lanceolate, and in having more numerous secondaries. Otherwise they appear to be rather close.

Locality: Five miles directly north of Ashland, Oregon. Collected by J. S. Diller, 1898.

QUERCUS ? sp.

Pl. I, fig. 8.

Leaf of firm texture, narrowly lanceolate (base destroyed), long-acuminate at apex; margin entire below, remotely and obscurely toothed above; midrib very thick and strong; secondaries numerous, about sixteen or eighteen pairs, alternate, emerging at an angle of approximately 45° , slightly curving upward, craspedodrome, ending in the minute marginal teeth; nervilles very numerous, close, percurrent or broken; finer nervation forming small quadrangular areas.

- Only the upper portion of this leaf, about 7 cm. in length, is preserved. It is 17 mm. wide at the broken base, and about 4 mm. where broken at the apex. It appears to have been continued above to a sharp point. The margin, as stated, is nearly or quite entire below, and with few remote minute teeth above, each one being entered by a secondary.

Inasmuch as only the upper portion of this leaf is preserved, it can not be satisfactorily characterized, and has not been given a specific

¹Mem. Mus. Comp. Zool., Vol. VI, No. 2, Pl. II, figs. 3, 4.

name. In general appearance it resembles several of the forms known from the Auriferous gravels of the John Day Valley, Oregon, yet apparently differs in a number of particulars. I have little doubt that it belongs to the genus *Quercus*, but this determination has been questioned, and it is more or less a matter of opinion.

Locality: One mile east of Murphy's springs, Oregon, southeast of Ashland. Collected by J. S. Diller, 1895.

QUERCUS BREWERI Lesquereux.

Pl. II, fig. 3.

Quercus breweri Lx., Cret. and Tert. Fl., p. 246, Pl. LIV, fig. 6.

The material obtained by Mr. Applegate contains the single specimen figured that belongs, without question, to this species as figured by Lesquereux. It was described originally from the John Day Valley, Oregon.

I was some time ago inclined to regard this species as identical with *Quercus consimilis* of Newberry, described only a few months earlier, from the same locality, but it is probable that there are differences sufficient to warrant keeping them separate. The little leaf before us is certainly the same as those figured by Lesquereux under this name.

Locality: Three miles southeast of Ashland, Oregon. Collected by Elmer I. Applegate, 1897.

QUERCUS APPLGATEI n. sp.

Pl. I, figs. 6, 7.

Leaves of coriaceous texture, elliptical or elliptical-lanceolate in outline, somewhat wedge-shaped or rather abruptly truncated at base, rather abruptly acuminate at apex; margin provided with few large, coarse, obtuse or rounded teeth; petiole not preserved; midrib of medium strength, passing direct to the apex; secondaries, nine to twelve pairs, alternate, emerging at a low angle, but much curving upward and ending in the teeth; nervilles numerous, fine, both percurrent and broken, approximately at right angles to the secondaries; finer nervation very perfectly preserved, forming numerous minute quadrangular areas.

This fine little species is represented in the collections by nearly a dozen more or less perfectly preserved examples. They vary in length from 4.5 cm. to 6 cm. and in width from 18 mm. to about 22 mm., being usually about 2 cm. They are narrowly elliptical or elliptical-lanceolate, being rather abruptly narrowed to both base and apex, and have the margin provided with (for the size of the leaf) large, blunt teeth. In some instances the basal portion lacks the teeth, but usually the leaves are toothed on the whole margin. The midrib is rather slender for the size of the leaf. It is ridged in the center. The secondaries all end in the marginal teeth.

This species has affinities with a number of forms described from adjacent localities. Thus *Quercus consimilis* Newby,¹ found at Bridge Creek and John Day Valley, Oregon, and more recently near Boise, Idaho, is similar in size, but is narrower and has much smaller, sharp teeth. *Quercus idahoensis* Kn.,² from the lake beds near Boise, Idaho, is very suggestive of the form in hand, but differs in being much larger, relatively broader, and has very sharp, almost bristle-pointed teeth. *Quercus payettensis* Kn.,³ from the same locality as the last, is a much narrower species and has relatively larger teeth.

I take pleasure in naming this species in honor of the collector, Mr. Elmer I. Applegate, of the United States Department of Agriculture.

Locality: Three miles southeast of Ashland, Oregon. Collected by Elmer I. Applegate, 1897.

QUERCUS PACIFICA n. sp.

Pl. I, figs. 9, 10.

Leaves evidently thick and coriaceous, linear, abruptly rounded, and about equally obtuse at both ends, or very obtusely wedge-shaped at base; margin entire, possibly revolute; petiole short (1 mm. long), thick; midrib thick, straight; nervation very obscure, but apparently with some eight or ten pairs of very thin secondaries, emerging at a low angle; camptodrome.

The collection contains a considerable number of leaves of this little species. They are linear in shape, being about 3 cm. in length and 8 mm. or 9 mm. in width. They are of nearly or quite the same width throughout, being very abruptly rounded to the obtuse apex, and usually to a similar base, though occasionally a trifle wedge-shaped below. There is some evidence to show that these leaves were resolute in the margins, as in some of the forms of the live oak (*Quercus virginiana* Mill). On account of the thickness of the leaves it is impossible to make out the nervation, except the midrib and faint indications of secondaries in one example.

This species is very closely related to several Miocene Pacific coast species. Thus, it is quite like some of the smaller, narrower leaves of *Q. convexa* Lx.,⁴ yet these are rather oblanceolate than linear, and are not abruptly rounded at base and apex. It is also very much like the smallest leaves of *Q. simulata* Kn.,⁵ from the Miocene lake beds (Payette formation) of northwestern Idaho. This small leaf is exceptional for that species, the remainder being 7 cm. or 8 cm. in length, and, further, it is ovate-lanceolate rather than linear. The probable specific distinctness of the leaves under consideration is further

¹ Proc. U. S. Nat. Mus., Vol. V, p. 505.

² Eighteenth Ann. Rept. U. S. Geol. Survey, Pt. III, p. 729, Pl. CII, fig. 4.

³ Op. cit., p. 730, Pl. CII, fig. 9.

⁴ Auriferous gravels of California: Mem. Mus. Comp. Zool., Vol. VI, No. 2, Pl. I, figs. 15, 16.

⁵ Eighteenth Ann. Rept. U. S. Geol. Survey, Part. III, Pl. CI, fig. 3.

emphasized by the fact that all the examples are of the same size and shape. *Quercus pacifica* is undoubtedly closely allied to the above-mentioned forms, yet seems on the whole entitled to rank as a separate species.

Locality: Five miles directly north of Ashland, Oregon. Collected by J. S. Diller, 1898.

QUERCUS CONSIMILIS Newberry.

Quercus consimilis Newby., Proc. U. S. Nat. Mus., Vol. V, p. 505, 1882 [1883]; Later Extinct Fl. of N. Am., p. 71, Pl. LXIII, figs. 2-5.

Quercus breweri Lx., Cret. and Tert. Fl., p. 246, Pl. LIV., figs. 5-8 [not 9].

The material from Murphy's springs contains a number of fragments that undoubtedly belong to this species. One of the best preserved is hardly to be distinguished from leaves of Lesquereux's *Quercus breweri*, but which, as already indicated, is referred to the slightly older *Q. consimilis* of Newberry.

Locality: One mile east of Murphy's springs, Oregon, southeast of Ashland. Collected by J. S. Diller in 1895.

ULMUS OREGONIANA n. sp.

Pl. II., figs. 1, 2.

Leaves coriaceous, broadly ovate-lanceolate in outline, narrowed or rounded below to an obtusely wedge-shaped, slightly unequal-sided base, acuminate at apex; margin sharply and obscurely doubly serrate, the teeth small; midrib thin, straight; secondaries eight to twelve or fourteen pairs, alternate, rather remote and at somewhat irregular distances, often considerably arched upward, not closely parallel, usually forking and sometimes with three or four branches ending in the teeth, with fine nervilles passing to the secondary teeth and the sharp sinuses; nervilles numerous, occasionally percurrent, but mainly broken and irregularly anastomosing; finer nervation forming irregularly quadrangular areolae.

This species is represented by several leaves, two of the most perfect being figured. As may be seen, they are ovate-lanceolate in shape, obtuse and little unequal-sided at base, apparently acuminate at apex, and have the margins provided with small, sharp, minutely and rather obscurely doubly serrate teeth. They are from 7.5 cm. to about 9.5 cm. in length, and from 3.5 cm. to nearly 5 cm. in width. The petiole has not been preserved in any of the specimens.

This species appears to have been rather closely allied to a number of species described from the Tertiary of this country. For instance, *Ulmus braunii* Heer, as figured by Lesquereux¹ from Florissant, Colorado, is about the same size, but is very unequal-sided at base and has simply serrate margins. The closest affinity appears to be with the species from the Auriferous gravels of California. In size, outline, and

¹Cret. and Tert. Fl., p. 161, Pl. XXVII, fig. 4.

margin it seems nearest to *Ulmus affinis* Lx.,¹ but this species differs in the numerous close, parallel secondaries. *U. californica* Lx.,² from the same horizon, has much the same nervation as *U. oregoniana*, but is in general much smaller and inclined to be cordate at base. The other Auriferous gravel species, *U. pseudo-fulva* Lx.,³ has the same irregular nervation as ours, but is strongly cordate at base and has much larger teeth. They all form, however, a closely related aggregate.

Locality: Five miles directly north of Ashland, Oregon. Collected by J. S. Diller, 1898.

FICUS? HESPERIA n. sp.

Pl. II, fig. 4.

Leaves thick, coriaceous, elliptical in outline, apparently about equally rounded to both base and apex (the latter destroyed); margins perfectly entire; petiole short, very thick; midrib very thick, perfectly straight; secondaries very light, alternate, about six pairs, emerging at a low angle, much curved upward and following along the margin, forming an intramarginal line, and ultimately joining the secondary next above; intermediate secondaries present, sometimes reaching the marginal vein or disappearing below it; nervilles anastomosing and forming large irregular areas, which are again divided by the anastomosis of finer nervilles.

The single specimen figured was all that could be found in the collections, and unfortunately it lacks the upper portion and considerable of the margin. It is elliptical in shape and appears to have been about 9 cm. in length. The width is 4 cm. The petiole is only about 3 mm. long and nearly as wide. The midrib, as stated, is very thick for the size of the blade, being nearly 3 mm. thick at the base. It decreases in thickness upward, but still remains strong to the apex. The secondaries are just as remarkable for their slenderness; there are about six pairs, and each one arches up at a distance of about 2 mm. from the margin, joining the one next above, thus forming an intramarginal line. The nervilles are very peculiarly disposed, being anastomosed to form large elliptical or irregularly quadrangular areas, which are filled with smaller areas formed by the anastomosis of the finer nervilles.

I am somewhat uncertain as to the generic affinities of this species. The shape, the thick, short petiole and very thick midrib, together with the intramarginal line formed by the secondaries are all suggestive of *Ficus*, but the peculiar manner in which the nervilles anastomose does not occur in any species of this genus with which I am familiar. That it is a form quite new to science in this country there can be no doubt, but of the generic affinity I am not so certain, and have therefore placed it in this genus with a mark of interrogation.

Locality: Three miles southeast of Ashland, Oregon. Collected by Elmer I. Applegate, 1897.

¹ Auriferous gravels of California: Mem. Mus. Comp. Zool., Vol. VI, No. 2, Pl. IV, figs. 4, 5.

² Op. cit., Pl. IV, figs. 1, 2.

³ Op. cit., Pl. IV, fig. 3.

FICUS sp. cf. *F. SORDIDA* Lesquereux.

Pl. IV, fig. 2.

Among the specimens from Comstock, I find the single example here figured, which represents only the upper portion of a large leaf. It approaches most closely to *Ficus sordida* Lx.¹, as figured from the Auriferous gravels of California. It was perhaps a larger leaf than even the largest one figured by Lesquereux, and seems to have been somewhat more acute, but otherwise it is certainly very similar.

Locality: Comstock, Douglas County, Oregon. Collected by J. S. Diller, 1895.

FICUS sp.?

Pl. III, fig. 1.

Leaf large, thick, broadly ovate in outline, rounded to an abruptly truncate, possibly subcordate, base, and above to an obtusely acuminate apex; margin and petiole not preserved; midrib very thick, straight; secondaries about six pairs, alternate, remote, much arching upward, camptodrome; fine nervation not well retained.

The single example figured is all that is to be found in the collection belonging to this form. As it lacks nearly or quite all of the margin, it is impossible to give its exact size, but the part retained is about 15 cm. in length and 11 cm. in width.

This fragment agrees rather closely with the upper portion of the leaf of *Ficus sordida* of Lesquereux¹ from the Auriferous gravels of California, but it is not well enough preserved to be identified with certainty.

Locality: Five miles directly north of Ashland, Oregon. Collected by J. S. Diller, 1898.

FICUS sp.

The material from Comstock contains a portion of a very large leaf that is evidently a *Ficus*, but as it includes only a segment of the central part of the leaf and is entirely without margin, it is impossible to make out its characters. It seems not unlike some of the large fig leaves described from the Auriferous gravels of California, but this is hardly more than conjecture.

Locality: Comstock, Douglas County, Oregon. Collected by J. S. Diller, 1895.

BENZOIN DILLERI n. sp.

Pl. IV, fig. 3.

Leaf large, rather broadly ovate-lanceolate in outline, rounded below to a truncate, slightly unequal-sided base, gradually and regularly narrowed above to an acuminate apex; margin perfectly entire; petiole long, slender; nervation in effect palmately tri-nerved from the apex of the petiole; midrib strong, straight; secondaries six or seven pairs, alternate, the lowest pair arising about one-third the length of the

¹ Mem. Mus. Comp. Zool., Vol. VI, No. 2, p. 17, Pl. IV, fig. 7.

leaf above the base, all arching upward, curving inside the margin and joining the one next above by a broad loop; the pair of nerves on lowest and strongest pair of secondaries arising at an angle of about 45° , much arching upward and joining the secondaries next above, each with several secondary branches on the outside, which join by broad loops just inside the margin of the blade; nervilles apparently percurrent, but together with the finer nervation obscurely preserved.

This species is represented by the single example figured. It is broadly ovate-lanceolate, being 14 cm. in length and about 5 cm. in width at the broadest portion, which is about one-fourth the length of the blade from the base. The petiole is 3 cm. in length and about 1.5 mm. in width. This leaf is referred to the genus *Benzoin* on the ground of its similarity to certain of the smaller leaves of the living *Lindera* (now *Benzoin*) *obtusilobata* Blume, a native of Japan. The most common form of this living species has very broadly ovate-cordate leaves that are broader than long, but leaves are not uncommon that are simply ovate or ovate-lanceolate and longer than broad. It is with these that the relationship with the fossil leaf under consideration becomes apparent.

Benzoin dilleri is very closely related to and possibly identical with an undescribed form from Carbonado and Roslyn, Washington, localities on the western and eastern sides of the Cascade Mountains, respectively. The leaf before us is rather larger, more truncate and less unequal-sided at base, more acuminate at apex, with perfectly entire margins, and has a greater number of secondary branches on the midrib, and the basal ribs lighter and not ascending so high. The petiole is not preserved in any of the Carbonado or Roslyn specimens. In *B. dilleri* it is fully 3 cm. in length. These differences are slight, and might be shown to disappear if a larger series were at hand for comparison. In any case, they are very close.

The species is named in honor of the collector, Mr. J. S. Diller, of the United States Geological Survey.

Locality: Five miles directly north of Ashland, Oregon. Collected by J. S. Diller, 1898.

CINNAMOMUM DILLERI n. sp.

Pl. IV, fig. 1.

Leaf coriaceous in texture, ovate oblong in outline, rather abruptly rounded below to an abruptly acuminate base, more gradually narrowed above to an acute apex; margin perfectly entire; petiole short, stout; blade equally three-nerved from just above the base; central rib or midrib straight, passing to the apex of the blade; lateral ribs arising just above the base, arching and about equally dividing the space between the midrib and the margin, passing nearly or quite to the apex; midrib with a single thin pair of secondaries near the apex which pass quite to the apex, also with numerous, mainly broken, nervilles at right angles to it and passing to the lateral ribs; ribs with twelve or fifteen secondary branches on the outside, which arise at an angle of about 45° , arch

upward and, often by a series of loops, join the one next above, or in the upper portion reduced to a series of loops along the rib well inside the margin; nervilles numerous, mainly broken and irregular; finer nervation consisting of very numerous fine nervilles which anastomose, forming irregularly quadrangular areolæ.

This fine species is represented by several specimens in the collection from Comstock. In outline they are ovate or rather oblong-ovate, being about 9 cm. in length and 4.5 cm. in width. The petiole is 1.5 cm. in length and 2 mm. thick. The nervation is characteristic of the genus *Cinnamomum*, being strongly and equally three nerved or ribbed from a short distance above the base and dividing the blade into four nearly equal areas. The lateral ribs pass up nearly or quite to the apex, where they join the only pair of secondaries to the midrib. The finer nervation is very perfectly preserved and is well shown in the figure.

In size and shape this species is similar to *Cinnamomum heerii* of the Dakota group, but the nervation of the latter species is wholly unlike the one before us. There seems to be no North American form in the Tertiary with which this closely agrees, and it appears to have its nearest affinity with forms from the Swiss Miocene.

Locality: Comstock, Douglas County, Oregon. Collected by J. S. Diller, 1895.

LAURUS SIMILIS n. sp.

Pl. V, figs. 1-4.

Leaves coriaceous, lanceolate in outline, broadest above the middle, from which point they taper gradually to a wedge-shaped base and upward to a rather obtuse apex; margin perfectly entire; petiole long, very stout; midrib very thick below, running straight to the apex, diminishing much in thickness above; secondaries, six or seven pairs, alternate, irregular, emerging at an acute angle, arching near the margin and joining the one next above, often by a series of loops; nervilles numerous, percurrent or broken, and at right angles to the secondaries, finer nervation forming very numerous minute quadrangular areas.

This species is represented in the collection from Comstock by two nearly perfect specimens, and also by a number of fragments. The two examples figured give a good idea of the whole leaf.

These leaves are 11 cm. or 12 cm. in length and about 4 cm. in width at the broadest portion, which is at or above the middle, from which point they taper downward to the wedge-shaped base and upward to the obtuse apex. The petiole, as stated above, is very thick and stout for the size of the leaf, being a little more than 1.5 cm. in length and 3 mm. thick at the end. The midrib is also very thick, being fully 1.5 mm. wide at the base of the blade. It is rapidly reduced in thickness above.

Among living species *Laurus similis* approaches very closely indeed to *L. canariensis*; in fact, is hardly to be distinguished. One point of

difference, however, is the absence of glands in the axils formed by the secondaries with the midrib, as in the living species.

Among fossil forms the one under discussion approaches closely to a number. It is very close to *Laurus perditā* Kn., a species described from the Miocene of the Yellowstone National Park.

Locality: Comstock, Douglas County, Oregon. Collected by J. S. Diller, 1895.

RHUS MIXTA Lesquereux.

Pl. III, figs. 2, 3; Pl. VI, figs. 2, 3.

Rhus mixta Lx., Mem. Mus. Comp. Zool., Vol. VI, No. 2, p. 30, Pl. IX, fig. 13.

The Comstock material contains a number of more or less perfect leaflets that must belong to this species, as described by Lesquereux from the Auriferous gravels of California. They have, as may be seen from the figures given, the same lanceolate shape and oblique base, the serrate margin, and the primate nervation, with the secondaries ending in the teeth.

Locality: Comstock, Douglas County, Oregon. Collected by J. S. Diller, 1895.

ACER BENDIREI Lesquereux.

Pl. VI, fig. 4.

Acer bendirei Lx., Proc. U. S. Nat. Mus., Vol. XI, p. 14, Pl. V, fig. 5; Pl. VI, fig. 1; Pl. VIII, fig. 1.

Acer trilobatum productum Al., Br., Lesquereux; Cret. and Tert. Fl., p. 253, Pl. LIX, figs. 1, 4.

The small collection from the left bank of the Columbia River, near the mouth of Moffats Creek, contains two leaves that certainly belong to this species. While these examples are fragmentary, they are sufficiently well preserved to make the determination satisfactory. The largest and best specimen has been figured.

This species, under the name of *Acer trilobatum productum* Al., Br., was first reported by Lesquereux from the John Day Valley, Oregon. Later, while examining a larger collection from the same locality, he became convinced of its specific distinctness from the European form, and gave it the name of *A. bendirei*, in honor of the collector of the later material. It has also been reported from the Miocene at Spanish Ranch, California, by Lesquereux.

Locality: Left bank of the Columbia River, near the mouth of Moffats Creek, opposite the lower steamboat landing, now abandoned. Collected by J. S. Diller, 1895.

PHYLLITES OREGONIANUS n. sp.

Pl. V, fig. 5.

Leaf apparently coriaceous, lanceolate or narrowly oblong-lanceolate in outline (margin entirely destroyed), apparently acuminate at apex; midrib very thick, strong, grooved; secondaries numerous, some fifteen or more pairs, alternate, at irregular distances, emerging nearly at a

right angle, or in the upper part of the leaf at an angle of nearly 30° , tortuous, camptodrome, arching by a hood bow, and joining the secondary next above, with smaller loops outside; nervilles numerous, fine, oblique, and irregular, forming very irregularly quadrangular areas.

The single example figured is all that could be found of this form in the collection, and were it not for the fact that it appears so unlike anything else in the material it would be discarded on account of its fragmentary state. It lacks every portion of the margin, and evidently considerable of the basal portion as well. The portion remaining is about 14 cm. in length and nearly 6 cm. in width. The nervation is well shown in the drawing.

This form seems to be quite unlike any described species, at least of the western part of this country, yet so many of the essential characters can not be made out that it has been decided not to attempt to place it in a more definite genus. The manner of arching in the secondaries suggests certain forms of *Ficus*, but this is too indefinite to justify its inclusion in that genus. It is probable, from the number of leaves in the matrix associated with this, that a careful collection at this point would contain better material of this form, but until more material can be had it is best placed under *Phyllites*.

Locality: Five miles directly north of Ashland, Oregon. Collected by J. S. Diller, 1898.

PHYLLITES sp.

Pl. VI, fig. 1.

Leaf thick, coriaceous, elliptical-obovate in general outline, rounded below to a nearly truncate base and above to an obtusely acuminate apex; margin entire; petiole slender; midrib rather thick; secondaries about eight pairs, thin, alternate, at an angle of about 40° , somewhat curving upward, disappearing well below the margin; nervilles and other finer nervation not discernible.

This form is represented in the collections by two examples, the nearly perfect one figured and another showing a portion of the base only. The specimen figured is 10.5 cm. long, exclusive of the petiole, which is 2 cm. in length. The leaf is about 6 cm. in width. In outline it is somewhat elliptical-obovate, with the broadest point slightly above the middle, from which point it is rounded to a somewhat abruptly truncated base and above to an apparently acuminate apex.

This leaf was evidently very thick and coriaceous, for while the midrib shows plainly, the secondaries are very thin and disappear some distance below the margin. The finer nervation is entirely obscured by the thick parenchyma.

I am unable at present to suggest a probable generic affinity for these leaves. In some respects they are suggestive of *Ficus*, but such reference would be too uncertain to be of much value.

Locality: Five miles directly north of Ashland, Oregon. Collected by J. S. Diller, 1898.

DISCUSSION OF THE FLORA AND ITS BEARING ON THE AGE OF THE BEDS IN WHICH IT OCCURS.

As here enumerated, the flora of the western base of the Cascade Range in Oregon embraces 28 forms. Of this number 10 are described as new to science, and 7 are more or less broken or imperfect specimens not identified specifically, thus leaving 11 species having a distribution outside of the beds here considered. In order to bring out more graphically the distribution of this flora, not only within the area under discussion but beyond its limits, the following table has been prepared:

Table showing the distribution of the flora.

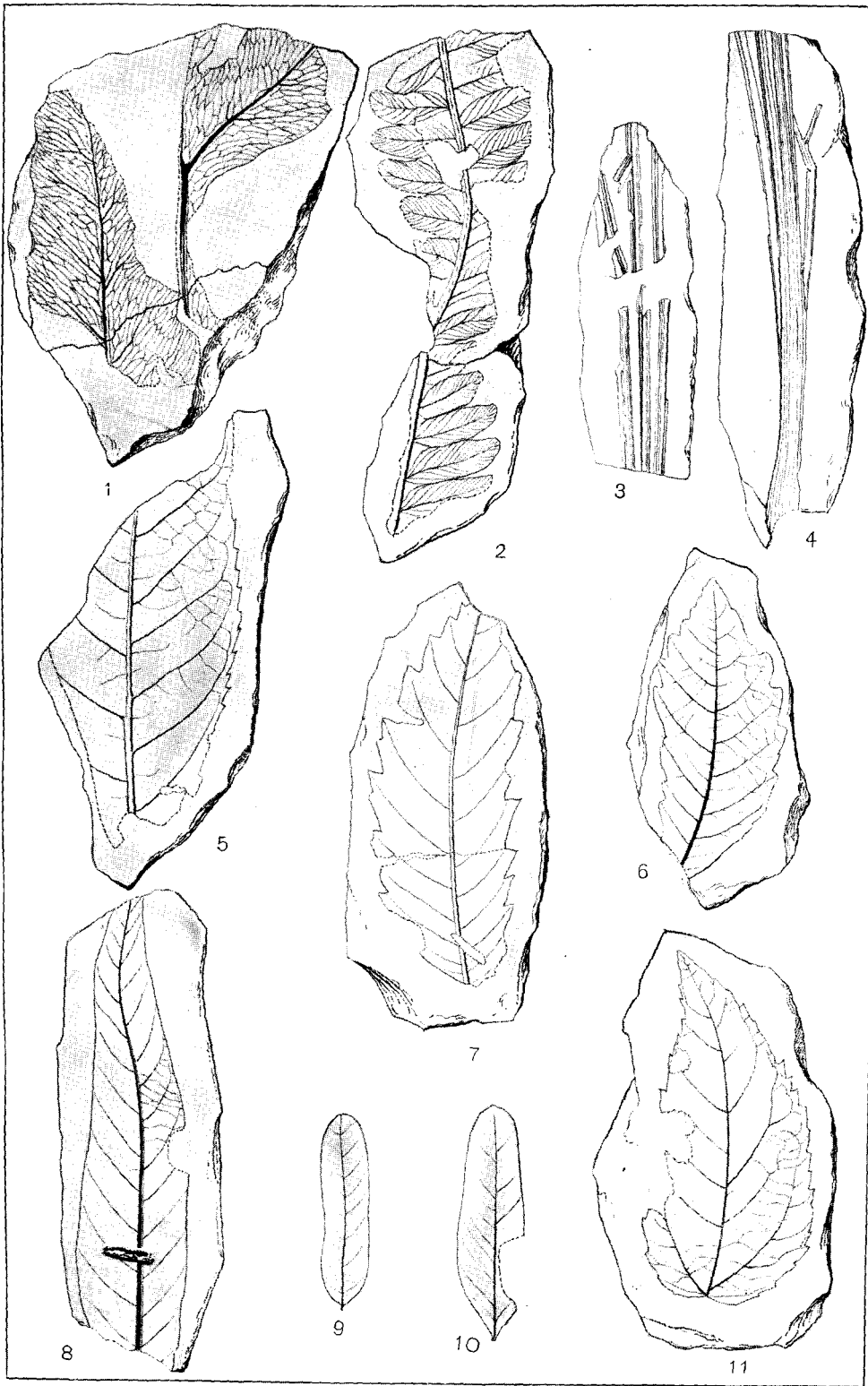
	Within the area.						Outside the area.				
	Mofats Creek.	Comstock.	Murphy's springs.	Coal Creek.	Five miles north of Ashland.	Three miles south-east of Ashland.	Auriferous gravels.	John Day Valley.	Bridge Creek.	California Miocene.	Green River group.
<i>Acrostichum simulatum</i> n. sp.				×							
<i>Asplenium tenerum</i> ? Lx. ^a				×							
<i>Lastrea fischeri</i> Heer					×			×			
<i>Sequoia angustifolia</i> ? Lx.				×						×	×
<i>Sequoia langsdorfi</i> (Brgt.) Heer			×		×	×		×		×	×
<i>Pinus</i> sp.						×					
<i>Juglans</i> sp.		×									
<i>Populus zaddachi</i> ? Heer	×						×			×	
<i>Alnus carpinoides</i> Lx.						×			×		
<i>Castanea castaneæfolia</i> (Ung.) Kn.			×			×	×	×	×	×	
<i>Quercus subsinuata</i> n. sp.					×						
<i>Quercus</i> sp.			×								
<i>Quercus breweri</i> Lx.						×		×			
<i>Quercus applegatei</i> n. sp.					×	×					
<i>Quercus pacifica</i> n. sp.					×						
<i>Quercus consimilis</i> Newby			×					×	×		
<i>Ulmus oregoniana</i> n. sp.					×						
<i>Ficus?</i> <i>hesperia</i> n. sp.						×					
<i>Ficus</i> sp.		×									
<i>Ficus</i> sp.					×						
<i>Ficus</i> sp.		×									
<i>Benzoin dilleri</i> n. sp.					×						
<i>Cinnamomum dilleri</i> n. sp.		×									
<i>Laurus similis</i> n. sp.		×									
<i>Rhus mixta</i> Lx.		×					×				
<i>Acer bendirei</i> Lx.	×							×		×	
<i>Phyllites oregonianus</i> n. sp.					×						
<i>Phyllites</i> sp.					×						

^a Age of beds from which this was described uncertain; probably Miocene.

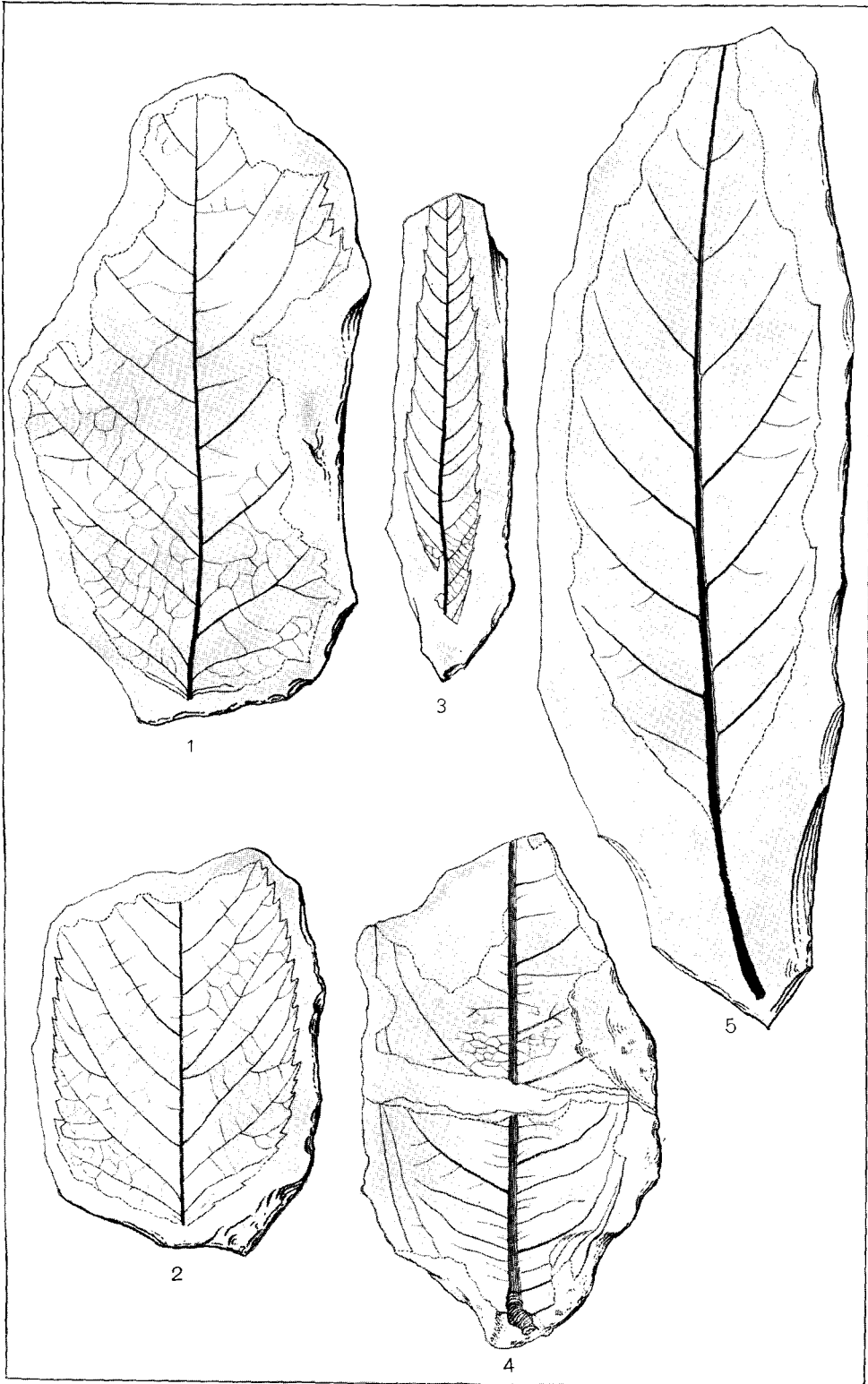
It needs but a glance at this table to show that the species having a distribution outside of these beds are confined almost exclusively to the Miocene. Of the eleven species, all but perhaps three are practically confined to this horizon. Of these three, *Sequoia langsdorffii* enjoys a distribution from the Upper Cretaceous to the Miocene; *Sequoia angustifolia* has been reported from beds supposed to be of Green River group age, but the locality has not been studied by modern geological methods, and the age of the beds (Elko station, Nevada) is open to much question. A similar condition exists regarding *Asplenium tenerum*. The locality from which it was originally described is not now known, and the finding of what appears to be this form in the Cascade Range is its second record. It can therefore have little weight. The remaining eight species have, so far as I now know, never been found outside of beds of Miocene age, at least in this country.

The recognized affinities of the species described as new to science also, in most instances, point to the Miocene age of this flora. Thus the unnamed species of *Juglans* is undoubtedly allied to forms described by Lesquereux from the Auriferous gravels of California. *Quercus sub-sinuata* is most closely related to *Q. nevadensis* Lx., of the Auriferous gravels. *Quercus applegatei* is related to a number of forms (as *Q. consimilis* Newby., *Q. idahoensis* Kn., and *Q. payettensis* Kn.) from Bridge Creek and John Day Valley, Oregon, and the lake beds of the vicinity of Boise, Idaho. *Quercus pacifica* is close to *Q. convexa* Lx., of the Auriferous gravels, and *Q. simulata* Kn., from Boise, Idaho (Payette formation). *Ulmus oregoniana* is related to *U. affinis* Lx., and *U. californica* Lx., both of the Auriferous gravels. The *Ficus* sp., from north of Ashland, is probably a fragment of *F. sordida* Lx., of the Auriferous gravels. *Benzoin dilleri* is related to an undescribed form from the vicinity of Carbonado and Roslyn, Washington, and may possibly not be as young as supposed. The same may be said of the form described as *Cinnamomum dilleri*, while *Laurus similis* is close to an undescribed ~~form~~ from the Yellowstone National Park. As these last three species are all from the same locality (Comstock), it is possible that they may represent an older horizon than the others, perhaps Eocene, but the evidence is not conclusive either way. *Acrostichum simulatum* is allied to *A. hesperium* Newby., a species of the Green River group, but is not identical with it. It is smaller in size and differs slightly in outline and nervation, and may well be a descendant of the Green River group species.

In conclusion, therefore, I do not hesitate to say that the fossil plants point unmistakably to the Miocene age of these beds.



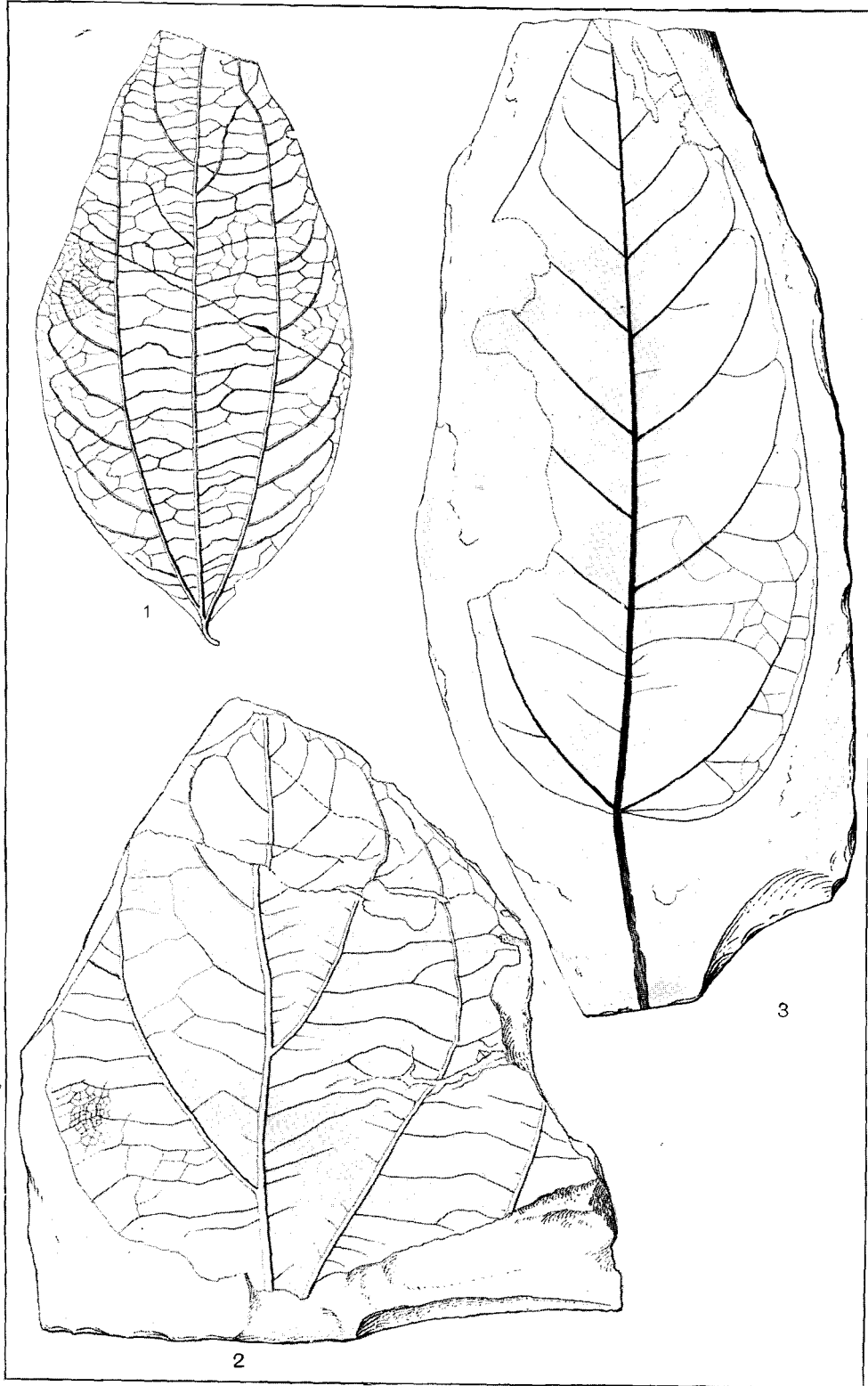
MIOCENE PLANTS FROM OREGON.



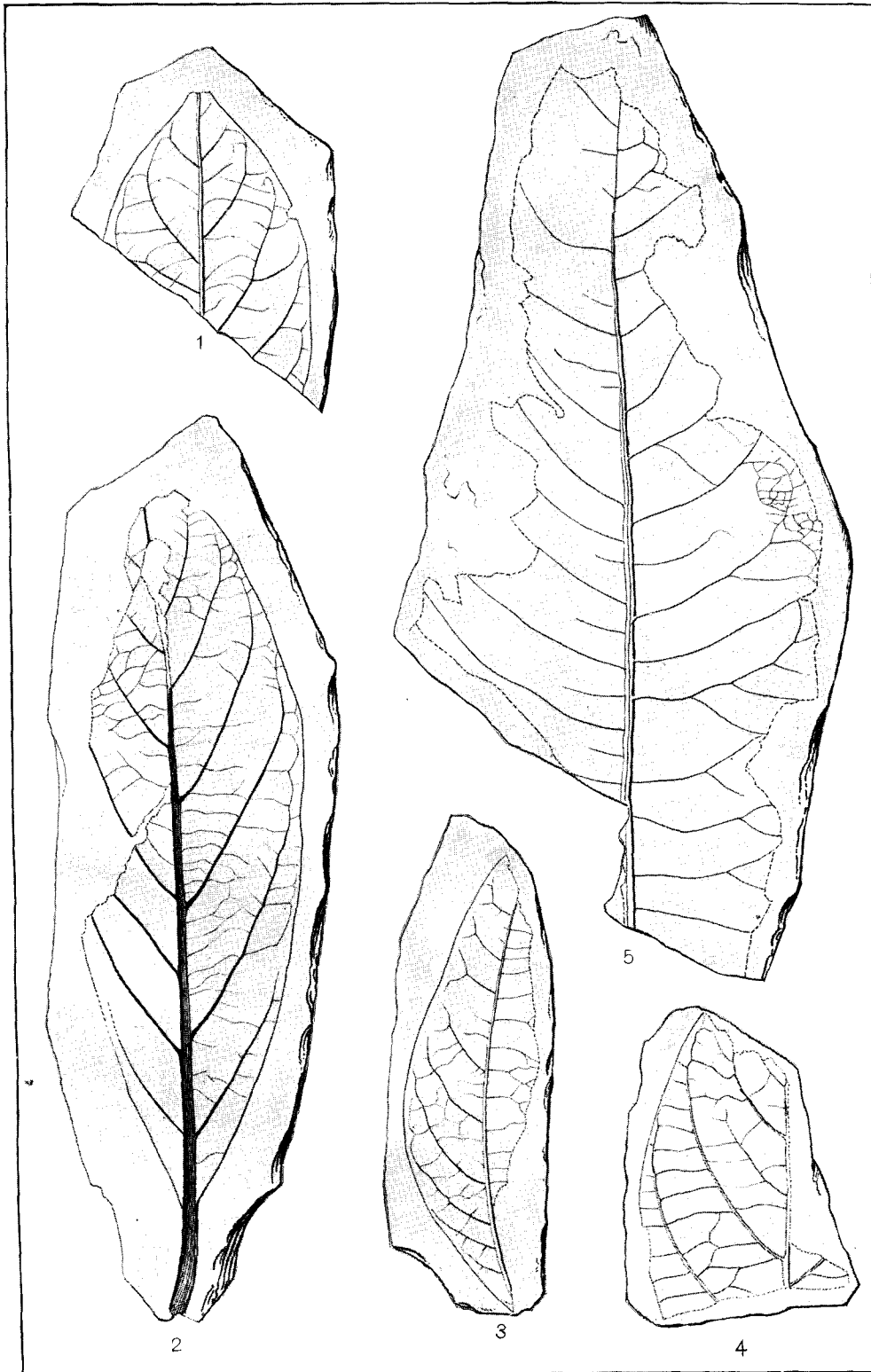
MIOCENE PLANTS FROM OREGON.



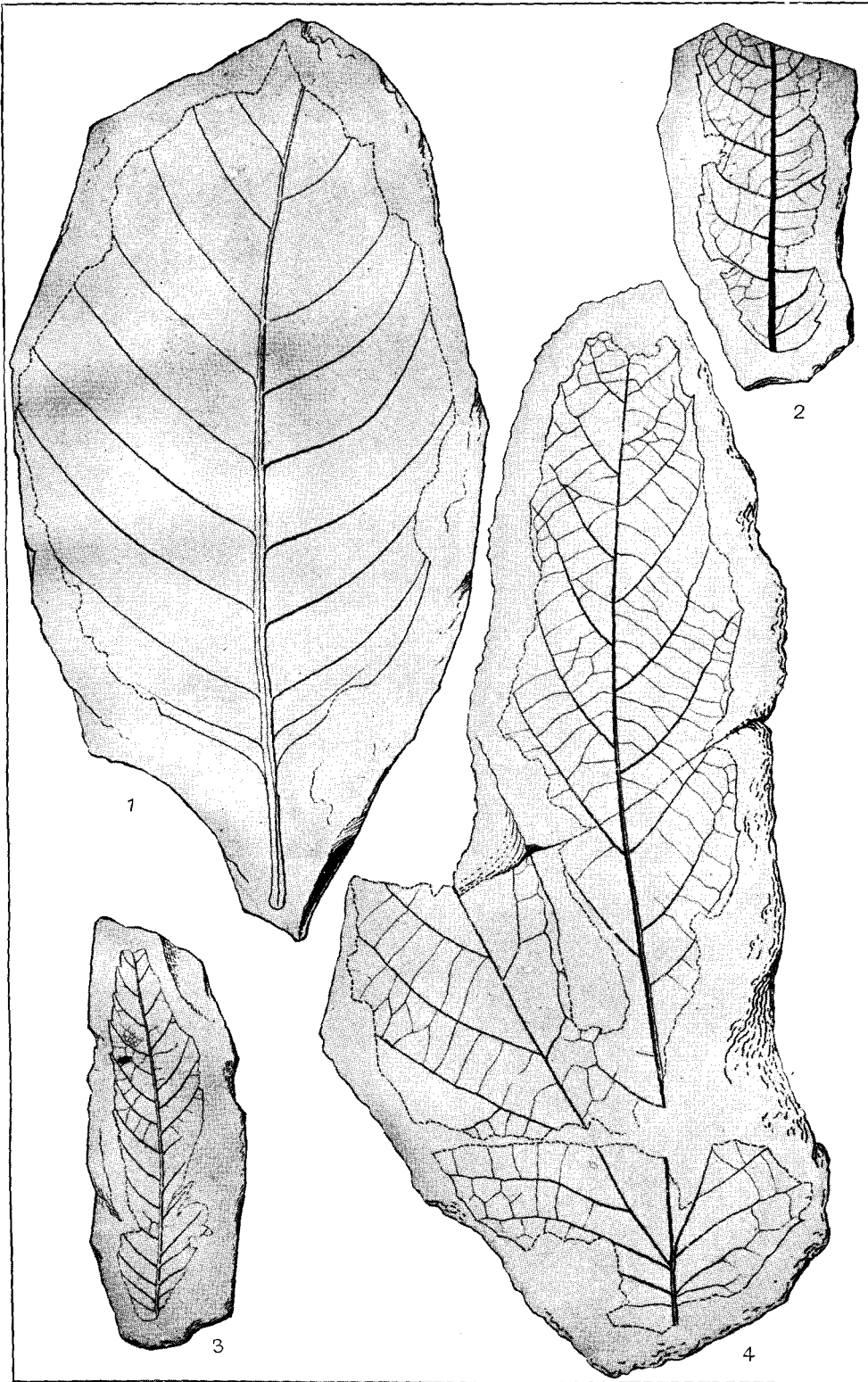
MIOCENE PLANTS FROM OREGON.



MIOCENE PLANTS FROM OREGON.



MIOCENE PLANTS FROM OREGON.



MIOCENE PLANTS FROM OREGON.

THURSDAY - Nov. 20, 1969 - 7:30 P.M. Cottage Grove, Oregon

Membership Meeting: Bohemia Mine Owner's Association

Agenda: Consideration of Resolutions on the following,

1. Administrative Encouragement of Mining,
2. Mining Law,
3. Bohemia Mineral Reserve;

and any New Business. You are invited to attend and help develop these position resolutions for the Association which now has 33 members.

(At City Hall Chambers, over the fire station)

Hal Barton

HAROLD E. L. BARTON
Route 4, Box 319
Eugene, Oregon 97405

Rec 11-18

Clarence F. Hyde



795 Willamette Street
Eugene, Oregon 97401

*File under Bohemia
mines
Hal Barton*

~~BRANCH OFFICE~~
~~1200 NIXON ST~~
~~EUGENE, OREGON 97401~~
~~PH 342-2436~~

July 1, 1976

Effective June 1, 1976 the Branch Office has been discontinued. This clears the way for my spending more time this summer in the Bohemia Mining District. The sales force of the Branch Office continues related to the main office as shown above.

You can reach me by leaving a message at my home phone (345-3962) and, if I am at a phone in Eugene, at 343-3571. This latter phone will not be answered during the summer months if I am not available.

I do have a large number of properties in the Bohemia Mining District listed with me for sale, mostly on a 3-year payout basis. Some of these are patented only, some are mixed patented and possessory title, and some are possessory title only. The groupings range in price from \$4000.00 to \$115,000.00.

I was able to come as far as Grizzly Saddle (Between Grizzly and Grouse Mountain) last Sunday, but the high roads around North Grouse Mountain both to the East and West were blocked by heavy snow. On a scouting hike a week earlier I saw many elk tracks from the Noonday property down to Horseheaven Creek (the first time ever, for me, in Bohemia District); along elk track at one place was fresh bear track, buck track, and bob cat sign.

If you know of mineral-interested people who would like a chunk of wild Bohemia for their own, do refer them to me, for the summer at home:

mail to....Harold E. L. Barton
31458 Fox Hollow Road (a new coordinated no.)
Eugene, Oregon 97405

or at: Helena Camp
Bohemia Mining District....find me if you can!

I expect to be able to drive to the Helena Camp and through to Bohemia saddle by July 4. There is some doubt that one will be able to get up Champion Creek or across Bohemia Saddle itself by the 4th.

Hal Barton
Associate Broker,
CLARENCE F. HYDE, Realtor

THE BOHEMIA DISTRICT

The Bohemia district is located in township 23, ranges 1 and 2 east, partly in Lane County and partly in Douglas. It occupies a portion of the westerly spur of the Cascade Mountains known as the Calapooia Mountains, the highest point of which is reached in Bohemia peak with an altitude of 6530 feet. At least four other peaks, however, Fairview, Elephant, Grouse, and Grizzly peaks, are in the immediate neighborhood of Bohemia peak, and have altitudes above 6000 feet. These altitudes are considerably greater than are to be found elsewhere in the Calapooias, so that the district is a prominent topographical feature of this section.

The nearest point on the Southern Pacific railroad is Cottage Grove which is 35 miles from the center of the district. A good wagon road covers the whole distance, 28 miles of which is a practically level stretch in the Row River valley. At the mouth of Sharps Creek the road forks, one branch making the ascent upon the southern slope of Hardscrabble Ridge, the other entering by way of Champion Basin. The latter branch was completed just during the past year. For two years the Oregon and Southeastern railroad has been under construction from Cottage Grove into the district. This railway is now completed for about 30 miles of this distance. It is expected that its ultimate terminus will be at the "Warehouse" on Frank Brass Creek, though it is said to be the plan of the Oregon Securities Company to extend the track to the mill in Champion Basin belonging to this company -- electric traction being the proposed method of conducting traffic upon the severe grades existing between the points in question.

The veins of this district strike north 15° to 90° west, the average being about 60° west. The dip is in general from 60° to 85° southwest. The principal gangue material is quartz; the vein minerals associated with the gold are pyrite, sphalerite, galena, chalcopyrite, iron oxides, cerussite, millerite, and others. The oxidized zone is exceedingly variable in depth, the extremes being between a few feet, and perhaps 500 feet.

A considerable gold production has been accredited to the district in the past, but for two or three years every energy has been directed toward development, so that production during this period has been practically nil. The building of the railroad has stimulated activity to a remarkable degree, however, so that the condition of the camp is far better than ever before, and unless indications are seriously at fault a satisfactory output of metal will follow very soon.

It is stated that over 3000 claims have been located in the Bohemia district.

Anaconda -- Owned by the Anaconda Gold Mining Company, of Bohemia, R. McMurphy, of Eugene, manager. Located upon Fairview Mountain. Developed by 50 feet of open cuts and 400 feet of tunnel work. The ore is free milling.

Baltimore -- Edward Jenks of Bohemia, owner. This is a Fairview Mountain property opened by 200 feet of tunnels. The ore is base.

Belcher -- Mr. Day, of Eugene, owns this property, which is to be found upon Johnson Meadows. It has 200 feet of work.

Benefit -- G. G. Warner of Eugene, is owner. It is located in Champion Basin. Opened by a tunnel 60 feet long.

Boston -- Owned by the Bohemia Gold Mining Company, George W. Lloyd, of Cottage Grove, manager. Opened by 60 feet of tunnel, and situated near Hardscrabble road.

Calapooia - The Calapooia-Bohemia Gold Mining Co., R. McMurphy of Eugene, manager. The property is upon Windy Creek. Development consists of 100 feet of open cuts and 600 feet of tunnels.

Cripple Creek-- Cochran and Gilbert are the owners of this property. It is situated upon Jackass Ridge and is opened by 200 feet of tunnels.

Crystal Consolidated -- Owned by the Bohemia Gold Mining Co., George W. Lloyd, Cottage Grove, manager. Located upon Fairview Mountain. Development consists of two tunnels each having a length of 200 feet. A saw mill was put in early in the year and a five-stamp mill is almost completed. A wagon road has been constructed which connects with the new road in Champion Basin.

Elephant Group -- A. J. Howard, Cottage Gorge, owner. Located upon Elephant Mountain, and opened by 100 feet of work.

Elkhorn -- Andrew Brund and D. P. Burton are the owners. It has 800 feet of work.

Evening Star -- Whipple Brothers, owners. Located upon Grouse Mountain. Two hundred feet of workings.

Glenwood -- Owned by F. Hinds, Cottage Grove. Hardscrabble road. 300 feet of development.

Gold Cross -- Bohemia Gold Mining Co., George W. Lloyd, manager. The location of this property is upon Noonday Ridge. A large ore shoot is developed by 800 feet of tunnels.

Gold King -- This mine is the property of A. W. Zinikie. It is located on Horse Heaven Creek, and is developed by 300 feet of workings.

Gold Star -- Peterson and Klucky own this claim, which is to be found upon Fairview Mountain. Five hundred feet of development work has been done.

Golden Rule -- The Golden Rule Gold Mining Company, is the owning corporation, of which William Wechter, of Salem is the manager. The claim is located at the foot of Hardscrabble road. It is opened by 100 feet of open cuts and by tunnels 60-70 feet in aggregate length.

Golden Slipper Group -- Dr. J. P. Oglesby of Cottage Grove, is manager for the Golden Slipper Mining Company. The holdings of the company are upon Horse Heaven Creek. 300 feet of work has been done in two tunnels.

Grizzly -- Owned by the Grizzly Gold Mining Company, Dan Byrne of Cottage Grove, manager. The location of the property is upon Grizzly Mountain. A good body of base ore is exposed by the tunnels and a shaft aggregating 800 feet of workings.

Grouse Mountain -- Owned by the Grouse Mountain Mining Company, 400 feet of development work has been done.

Helms Brothers -- The location of this property is at Ridge Hotel. 500 feet of development has been done.

Henry Clay -- Messrs. Whale and Gilbert, of Salem, are the owners of this claim. Location, Monta Rica Ridge. The ledge is opened by 1200 feet of work.

Iawatha -- Property of the Iawatha Gold Mining Company Alfred Johnson et al. Location is upon Fairview Mountain. The ore is exposed by two tunnels and an upraise is said to be good. It is partly free and partly base. The development work amounts to 360 feet.

Iowa -- Property of the Iowa Gold Mining Company. Location, Horse Heaven Creek. 150 feet of development work.

Judson Rock -- W. H. Blair, of Cottage Grove, is manager for the Judson Rock Mining Company. The property is located upon Fairview Mountain. Development to the extent of 400 feet is reported.

Knott -- D. Laddof Bohemia, owns this Grouse Mountain property. An 80-foot shaft has been sunk.

LeRoy -- Owned by the LeRoy Mining Co., LeRoy Brothers, of Cottage Grove, principal owners. The property is located upon the Fairview slope of Champion Basin. The ore is practically all base. Eight hundred feet of tunnel has been driven. The mining equipment includes a small Leyner compressor and drill.

Mayflower -- The owning corporation of this group is the Mayflower Mining Co., of which W. P. Ely, of Kelso, Washington is manager. The property is situated upon Horse Heaven Creek. A wide ledge carrying values in gold, silver, copper, and lead is exposed by tunnels aggregating 1000 feet in length.

Montana -- Reed and Fletcher are the owners of this group. Location, Grizzly Mountain; developments, 1500 feet.

Nemo-- Owned by Gill Meadows and Charles Rutan. Located upon Grizzly Mountain. Two tunnels have been driven, the combined length of which is 500 feet.

Noonday -- Noonday Mining Company, Herbert Leigh, Eugene, agent. Located on Noonday Ridge. One of the older properties of the district which has been developed by 4300 feet of tunnel, 500 feet of upraises, and by open cuts. A 20-stamp mill is upon the property, but operations are at a standstill presumably until transportation facilities are improved.

North Fairview -- North Fairview Mining Company. Herbert Leigh, Eugene, manager. The location of this property is upon Fairview Mountain. It is opened by 1100 feet of tunnel and many open cuts. Oxidized quartz with occasional shoots of pyrite and galena are the vein materials.

Oliver Twist Group -- O. G. Gilbertson, et al., owners. The group is located upon Jackass Ridge, and is opened by 200 feet of work.

Oregon-Colorado -- Owned by the Oregon-Colorado Mining, Milling, and Development Company, F. J. Hard, Portland, manager. Location, junction of city and Annie Creeks. The ore body, which comprises a ledge seven to eight feet wide containing a pay streak two to five feet wide, is exposed by 1500 feet of tunnels and upraises. The ore is base, and a concentrating plant will be installed as soon as conditions will warrant this step. A wagon road has been built to connect with the Hardscrabble road.

Oregon Securities Co. -- G. B. Hengen, Corn Exchange Bank Building, New York, secretary; C. C. Matthews, superintendent. Incorporated under the laws of New Jersey, this company has affected the consolidation of the Helena Consolidated Mining and Milling Company, the Musick Mining and Milling Company, the Calapooia Mining and Tunnel Company, the Broadway Group, and other properties. The same interests are concerned in the construction of the Oregon and Southeastern railroad from Cottage Grove to Bohemia district.

The activities of the management have been directed largely during the past year toward a betterment of above-ground conditions at their properties with the apparent purpose of centralizing milling operations. A mill with 30 stamps has been constructed in the Champion Basin near the site of the old Champion mill; an electric power plant has been installed upon Frank Brass Creek seven miles below with a capacity of 500-horse power; poles and wires have been strung; seven miles of good mountain road has been constructed from the "Warehouse" into Champion Basin and a long wire tram, compressor pipe line, etc., have been installed. In addition to these improvements much work has been done upon the long crosscuts being driven to the Musick and Helena mines through which ore will be brought by electric traction to the upper terminus of the tram for delivery to the mill. Milling will include amalgamation and concentration.

The Helena No. 1 is developed by some 7000 feet of work. Its ledge is to be tapped by the new working tunnel at a total depth, it is said, of 1800 feet from the surface. Details of development in the Helena No. 2 are not at hand. The Champion is

an old mine, and 3000 feet of development is said to be the amount done in it. The Musick is the pioneer producer of the district; develop is said to aggregate 7000 feet. The Broadway group is a comparatively undeveloped property with perhaps 900 feet of workings.

Peek-a-Boo -- Billy Edwards and others own this property. It is located upon Jackass Ridge. 200 feet of workings are reported.

Rambler -- The Rambler Consolidated Mining Company, is the corporation owning this mine. It is developed by a shaft 50 feet deep and a tunnel 250 feet in length. J. H. Scott, Crawfordsville, Ind., is one of the principal owners.

Rattler -- Ben Pearson, of Cottage Grove, is the owner of this Jackass Ridge property. It is developed by 100 feet of workings.

Riverside -- The Riverside Mining and Milling Company is the owning corporation, in which F. J. Hard, of Portland, is manager. The mine is located upon Noonday Ridge, and includes a 4500-foot extension of the Gold Cross ledge. Development amounts to 700 feet. The ore is both free and base.

Scorpion Group -- This group is located upon Horse Heaven Creek, and is the property of Jack Morgan and others. Development consists of 110 feet of tunnel workings.

Sears Group -- Property of James W. Sears, of Bohemia. The group is located upon Grouse Mountain. 600 feet of development work has been done upon it.

Shane Group -- Details of development upon this property

are not available. It is owned by W. H. Shane. Location, Monta Rica Ridge.

Sunrise Group -- Owned by C. A. Loveless, Fargo, N. D. Located upon Adams Mountain. Development amounts to 1200 feet of workings.

Sweepstake Group -- S. J. Brund, of Bohemia, owns this group. It is located upon Elephant Mountain. Opened by 1000 feet of tunnel work.

Syndicate -- Ed Jenks and associates have opened up this property upon Noonday Ridge by 250 feet of work.

Three Monte -- Al. Churchill owns this claim. It is a Fairview Mountain location, developed by 250 feet of work.

United States Consolidated -- C. J. Barhite, of Eugene, is largely interested in the mine. It is opened by 350 feet of tunnel work and numerous surface cuts.

Utopina Group -- Alex. Pugh and associates are developing a group by this name upon Elephant Mountain. 300 feet of tunnel work has been done.

Vesuvius -- Owned by the Vesuvius Gold Mining Co., F. J. Hard, of Portland, manager. This is one of the most extensively developed properties to be found upon Fairview Mountain -- 2300 feet of tunnels and upraises having been made within a continuous body of oxidized ore. Within the last few months the Stocks and Harlowe property adjacent to the Vesuvius has been acquired by the management of the latter. A five-stamp mill was included in this transaction, and this has been renovated and put to work upon the ore taken out of

the Vesuvius during development.

Wall Street-- S. G. Davidson, of Portland, is owner of this claim. It is located upon Grouse Mountain. 500 feet of development work discloses a body of good base ore.

White Iron -- 200 feet of work has been done upon this property of J. B. King which is located upon Elephant Mountain.

Winchester Group -- J. I. Jones of Cottage Grove has developed this group by 400 feet of work. It is to be found at Johnson Meadows.

LIST OF PROPERTIES TAKEN FROM BULLETIN 893

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1935 - Helena Mining Co
produced \$85,000

Champion and Evening Star, Page 51, owner Fred Bartells, Cottage Grove, Oregon. 900 feet cross cut and 200 feet of drifting on vein has been done and a production of \$50,000 since the issuance of Bull. 893.

Helena, Page 54, Mines Service Incorporation, 69 West Broadway, Eugene, Oregon. There are only eight claims in the group now instead of eleven as heretofore. This property was operated by Dale Wyatt in 1934 and produced \$34,000, and in 1937 by W. J. Reaves produced \$84,000. Number of these operators didn't do any development work to speak of. Only stoped ore that was already developed.

Musick, Page 57, owners L. M. Capps, Blackfoot, Idaho. Operated by Mineral Exploration Company from October, 1935 to October, 1937 and produced \$130,000. No information as to what was done at that time in the way of development work. The Mines Service Inc. has some kind of an option on this property.

Noonday, Page 60, owned by A. W. Helliwell and E. C. Lockwood of Cottage Grove. This property was operated by the Grouse Mountain Mining Company in 1934 and produced \$50,000. Very little development work was done.

Vesuvius, Page 62, owner is the Vesuvius Mining Company, Miss Frances Lucille Hart, President, 410 St. Claire, San Jose, California. No change since 1931. Under option to Mines Service Inc.

Combination, Page 63, owner David von Neeva, Cottage Grove, Oregon. No change since 1931. This property under option to Mines Service Inc.

Gosmos, Page 64, owners Miller Brothers, Disston, Oregon. A 25 ton mill has been installed and the property has produced approximately \$10,000 since 1931.

Cripple Creek, Page 65, no information, but Miller Brothers should be able to tell you who the owner is.

Crystal, Page 66, owned by the Elephant Mountain Mining and Milling Company, 69 West Broadway, Eugene. 70 feet of drifting on the vein is all the work that has been done since 1931. Under option to the Mines Service Inc.

El Capitan, Page 67, owned by Bill Patton, Culp Creek, Oregon. No information.

Glenwood, Page 67, owner Fred Williams, Cottage Grove. No change since 1931.

No information on Four Monte and the Gem Properties on Page 67.

Gold Cross and Gray Eagle, Pages 67 and 68 and North Fairview, Page

LIST OF PROPERTIES TAKEN FROM BULLETIN 893

71, owner George McQueen, Cottage Grove. No change since 1931. These properties under option to Mines Service Inc.

Grizzley and Syndicate, Pages 68 and 77, owner Ed Jenks, Cottage Grove, Oregon. No change since 1931.

Ingham, Page 69, owner E. H. Ingham of Portland. No change since 1931.

Leroy, Page 69, owner Elephant Mountain Mining and Milling, 69 West Broadway, Eugene, Oregon. No change since 1931.

Mayflower, no information.

Ophir, Page 72, owner Fred Williams, Cottage Grove, Oregon. No change since 1931. Under option to Mines Service Inc.

Oregon-Colorado, Page 72, owner Vesuvius Mines Company. No change since 1931. Under option to Mines Service Inc.

Orofino, Page 73, changed names and no information.

Peek-a-bee, Page 73, owner W. E. Edwards, Eugene, c/o Mines Service Inc. No change. Under option to Mines Service Inc.

Rattlesnake, Page 74. Must mean the Rattler, owned by Fred Williams of Cottage Grove. No change since 1931. Under option to Mines Service Inc.

Reed and Fletcher, Page 74, owned by William J. James, Route 2, Eugene. No change since 1931.

Riverside, page 74, owner Vesuvius Mining Company. No change since 1931. Under option to the Mines Service Inc.

Shotgun, Page 75, owner F. S. Day, Disston, Oregon. No information.

Stonewall, Page 76, owned by Miller Brothers, Disston, Oregon. No change since 1931 and under option to Mines Service Inc.

Sunset, Page 76, owners E. E. and Dale Wyatt of Gold Hill. No information.

Sweepstakes and Utopian, Page 78, Ray Nelson, Cottage Grove, Oregon. No information on these properties. Mr. Nelson has sent seven samples to the Assay Laboratory from a Philco Claim. The highest run \$4.90.

The War Eagle, Page 79, Owner, O. G. Gilbertson of Cottage Grove, Ore. No change since 1931 under option to Mines Service Inc.

Yellow Jacket, Page 80, owned by Carl Owen of Cottage Grove, Ore. No information.

LIST OF PROPERTIES TAKEN FROM BULLETIN 893

Albany, Page 103, owner A. M. Hammer, Route 1, Turner, Oregon.

Bob and Betty, Page 105, owner W. S. Risley, Albany, Oregon. No change since 1931.

Galena, Page 106, owner Weyerhaeuser Timber Co. This property has about 700 ft. of tunnel. Patented timber land. Nothing done since 1931.

Tillicum and Cumtillie, Page 106. Old names of this property are Free Gold and Golden Fleece. Owner Frank Bevier, Foster, Oregon. Two full claims and 300 ft. of drifting along the vein open down about 100 ft. below the other workings. A home made two stamp mill powered by water wheel has been installed on the mill site on Day Gulch about a 1/4 of a mile west of the property. This property has been worked in a small way since 1931.

Hastings, Page 106, owner Gaylord Ingham of Albany, Oregon.

Lawler, Page 107, owner G. G. Howard, 107 Old Broad St., London, England. No change in property since 1931. Mr. Bert Bavier of Albany, Oregon can give you some information on this property. In an early day he found a five pound nugget on this property.

Mammoth Reef, Page 108, owner Percy Calkins, Foster, Oregon. No information.

Mule, Page 109, also known as the Highland Chief owned by Rex Keefover Foster, Oregon. No information.

Monroe, Page 109 has been relocated as the Mayflower. Owned by Glenn Peck of Foster, Oregon. No information.

Paymaster, Page 109, owner Dave Maelley, Foster, Oregon. No information.

Riverside, Page 110, owner George Oakey, Foster, Oregon. My Oakey has installed a small mill and has worked the property in a small way since 1931.

Savage, Page 110, owner, W. S. Risley of Albany, Oregon. Mr. Risley has erected a small mill on the property and worked it in a small way since 1931.

Silvery Signal, Page 110, owned by Eugene Wheeler, Foster, Oregon. Mr. Wheeler has erected a mill on the property and working it in a small way.

Snowstorm, Page 111, is owned by Charlie Graves of Gates, Oregon. No information.

Mother and Wakefield Lodes in Sec. 15, T. 11 S., R. 4 E. is not listed in this Bulletin, and ~~is~~ owned by the Wakefield Realty Co. of Portland.

There are a total of seven mills in the Quartzville District. Jake Clemens, Clarence McAlister and Aho Brothers all of Foster have mills besides the ones already mentioned.

Rt. 4, Box 319
Eugene, Oregon 97405

December 8, 1969

R. E. Corcoran, State Geologist
1069 State Office Building
Portland, Oregon 97201

Dear Sir:

Attached hereto are 3 resolutions recently passed by the BOHEMIA MINE OWNERS ASSN.

The actions came after 5 or 6 months of consideration of problems which were very real and immediate to the claimants in the Bohemia District. They are being forwarded to you for study and future reference as the matters touched upon may come up for action in the future.

A copy will be sent soon to state and national representatives from this area, to other mining associations and State Geology Departments. We have provided a copy, together with a duplicate of the old Bohemia Miners Road & Trail map prepared by Frank J. Hard in the early 1920's, to the Lane County Commissioners and to Herbert W. Lombard, Jr. of Lombard, Lombard, Williams & Ackley, Attorneys, active in the Bohemia District.

One of the more recent additions to Bohemia District are F.S. signs designating certain roads as "Special Service" roads on which tolls will be charged to miners hauling ores or concentrates even though the initial pioneering on these roads was completed by miners. There is also talk of vacating County roadway in favor of more "Special Service" roads. Have you had experience with similar moves and their effect on mining costs? I would appreciate receiving any comment you may have.

With best regards,

Harold Barton
Harold E. L. Barton, Pres.
BOHEMIA MINE OWNERS ASSN.

cc: Norm Wagner
Lem Ramp ✓

Dear Len: Sorry to have missed you last week. There are several things I want to discuss the first chance we get. I appreciated the help of Mrs. Jacks and my immediate mission was accomplished. Sincerely, Hal

BOHEMIA MINE OWNERS ASSOCIATION

RESOLUTION NO. 3 - Adopted by the Members, November 20, 1969

"MINING LAW"

WHEREAS the rapid increase of utilization of minerals on a world-wide basis requires stepped up exploration and development of the limited mineral districts in the United States; and,

WHEREAS the historic Mining Law of this country has encouraged individual initiative in developing these mineral districts through liberal laws of location, reasonable requirements for discovery and patenting, and through tax incentives; and,

WHEREAS the Departments of Agriculture and Interior have, particularly since the passage of the mining Act of 1955, increasingly infringed upon the property rights of claimants by following practices and interpretations in direct violation of Mining Law and precedents of the Supreme Court, specifically:

1. by uneven application of discovery tests;
2. by challenging validity of claims on a wholesale basis with superficial examination, incompetent reporting, and manipulation designed to deny the established property rights of claim owners;
3. by over-emphasis of the weight to be given a single test - that of immediate marketability - of many tests to be applied to the validation of a lode discovery; and,
4. by establishing the rule at the administrative level invalidating locations when a patent is presently denied, while having hearings examiners, attorneys and engineers for the government agencies join with witnesses for claimants in asserting that the locations did merit further exploration as demonstrated mineral land, thus cancelling equities which should continue in the locator.

And WHEREAS the changes being made and recommended on both local and national levels to increase the tax burden of mining will be counter-productive and discourage the needed acceleration of mineral exploration and production; therefore,

BE IT RESOLVED that the BOHEMIA MINE OWNERS ASSOCIATION urges the Land Law Review Commission and the Congress of the United States to consider carefully the infringements made upon the rights of mining claimants by the administering agencies and the need, in the interest of an expanding mineral industry and in the national interest, to re-affirm the principles of the historic Mining Law and precedents and to establish guide-lines that will encourage miners and simplify the administration of mining laws.

Ray E. Nelson, Secretary

Harold E. L. Barton, President

BOHEMIA MINE OWNERS ASSOCIATION

RESOLUTION NO. 2 - Adopted by the Members, November 20, 1969
(ENCOURAGEMENT OF MINING BY THE ADMINISTRATION)

WHEREAS the current administration of mineral lands by the Department of Agriculture has seriously discouraged and repeatedly interfered with the orderly development of mineral claims; and,

WHEREAS, though the Department of Agriculture has been successful in curtailing serious abuses of occupancy in Forest Service lands, it has at the same time twisted the true and intended meaning of the mining law in such a way as to evict prospectors and miners from legally filed claims. AND, in addition, the Forest Service is actively pursuing the policy of pressuring for removal of structures considered essential to sound methods of prospecting and exploration of mineralized areas which are open under Mining Law for location, development and purchase (patent).

THEREFORE, be it RESOLVED that the BOHEMIA MINE OWNERS ASSOCIATION urgently request:

- 1) That the Department of Agriculture revise its policies to actively encourage and assist prospectors and miners in the fullest exploration and production from mineral lands, which, because of their limited extent, require more intensive search and discovery rather than curtailment, which follows in the steps of current policies of the Department.
- 2) That the Land Law Review Commission and the Congress of the United States be called upon to review closely the applied policies of the Department of Agriculture and to make such recommendations and to pass such enabling legislation as shall adequately encourage an expansion of activity by individual prospectors and mine developers.

Ray E. Nelson, Secretary

Harold E. L. Barton, President

BOHEMIA MINE OWNER'S ASSOCIATION

RESOLUTION NO. 1 - Adopted unanimously by the Members, October 24, 1969

"MINER'S ACCESS"

WHEREAS miners and prospectors, acting on their own initiative and at their own expense in time and money, were responsible for completion of the first network of trails and roads in the BOHEMIA MINING DISTRICT, including but not limited to the KNOTT Wagon Road and subsequent SHARPS CREEK road from Martin Creek, the ANNIE TRAIL and subsequent NOONDAY RIDGE-MINE Road, the CHAMPION CREEK Road to the Champion Mine and Spur to the Crystal Mine, the UTOPIAN Road, the OREGON-COLORADO Road, the MAYFLOWER Trail and Road, and the WOOD CAMP-BIG ROCK Road;

AND WHEREAS portions of these roads, including some parts in later years consolidated into the networks of County and Forest Service roads, were maintained through the years primarily by cooperative effort of miners and prospectors active in the BOHEMIA MINING DISTRICT so that miners and prospectors have, in reasonable equity, and their successors in interest should share, the right to full and continuing use of such roads without unreasonable restraint or tax for mining purposes;

AND WHEREAS the mining community has experienced infringements upon these earned and historic rights from government agencies, and from other private users who in no way shared in developing or maintaining the earliest Mine Roads.

THEREFORE be it RESOLVED that the BOHEMIA MINE OWNER'S ASSOCIATION petitions individuals and agencies of government at all levels to reverse the trend to limit, to interfere with, and to unduly tax the rights of miners to ingress and egress in lands open for mineral exploration.

(Inquiries or annual dues of \$2.00 may be forwarded to the Secretary of BMOA at the address below. Memberships are invited from all who are interested in furthering the mining industry.)

James L. Potterf, Secretary
420 E. 3rd Avenue
Eugene, Oregon 97401

12/4/69

file w/ Barton copy

NOTICE OF MEETING - 7:30 P.M., Council Chambers, City Hall, Cottage Grove
January 7, 1970 (Wed.) - BOHEMIA MINE OWNERS ASSN.

At our last meeting which was well-attended, Resolutions No. 2 and No. 4 were adopted. Resolution No. 4 was modified slightly and then referred to the Membership as a Committee of the Whole for further consideration.

Ray E. Nelson asked that he be allowed to resign as Secretary, a nominating committee was appointed by the Chairman, and since the meeting James L. Potterf (Jim) has agreed to serve.

It is proposed that at the Jan. 7 meeting our By-Laws be amended to provide for a regular election date for officers.

DRAFT of Resolution No. 4, BMOA, 12/10/69 for further consideration:

"MINERAL RESERVE"

WHEREAS in areas being intensively developed for minerals the interests of miners and of the Forest Service sometimes come into natural conflict. These conflicts have discouraged mineral production and increasingly impede exploration for new deposits; and,

WHEREAS the BOHEMIA MINING DISTRICT in Lane County, Oregon is one of a very few distinctly mineralized zones in the entire Oregon Cascades and is recognized as having the greatest mineral reserves for future production of all known deposits in the Cascade Mountains of Oregon; and,

WHEREAS increasing worldwide consumption of mineral products such as can be extracted from BOHEMIA DISTRICT-type ores requires substantial increases in production from these domestic ores;

THEREFORE, be it RESOLVED that steps be taken by the BOHEMIA MINE OWNERS ASSOCIATION to have a substantial portion of the area now known as the BOHEMIA MINING DISTRICT set aside by the Congress of the United States as a special mineral reserve, thus encouraging exploration, mining, and milling in this unique highly mineralized area, with other desirable public uses continued in such a way as not to conflict with the primary reservation for mineral production.

In considering Resolution No. 4, it needs to be borne in mind that at the present time there is land classified as (1) private, (2) County, (3) National Forest, and (4) BLM (Oregon & California re-vested) so that the administration is private, County, Forest Service (Dept. of Agriculture) and Bureau of Land Management (Dept. of the Interior). Who should administer a Mineral Reserve? Come with your answers on January 7, 1970 and start the new decade right!

Ed Barton
BMOA PRESIDENT