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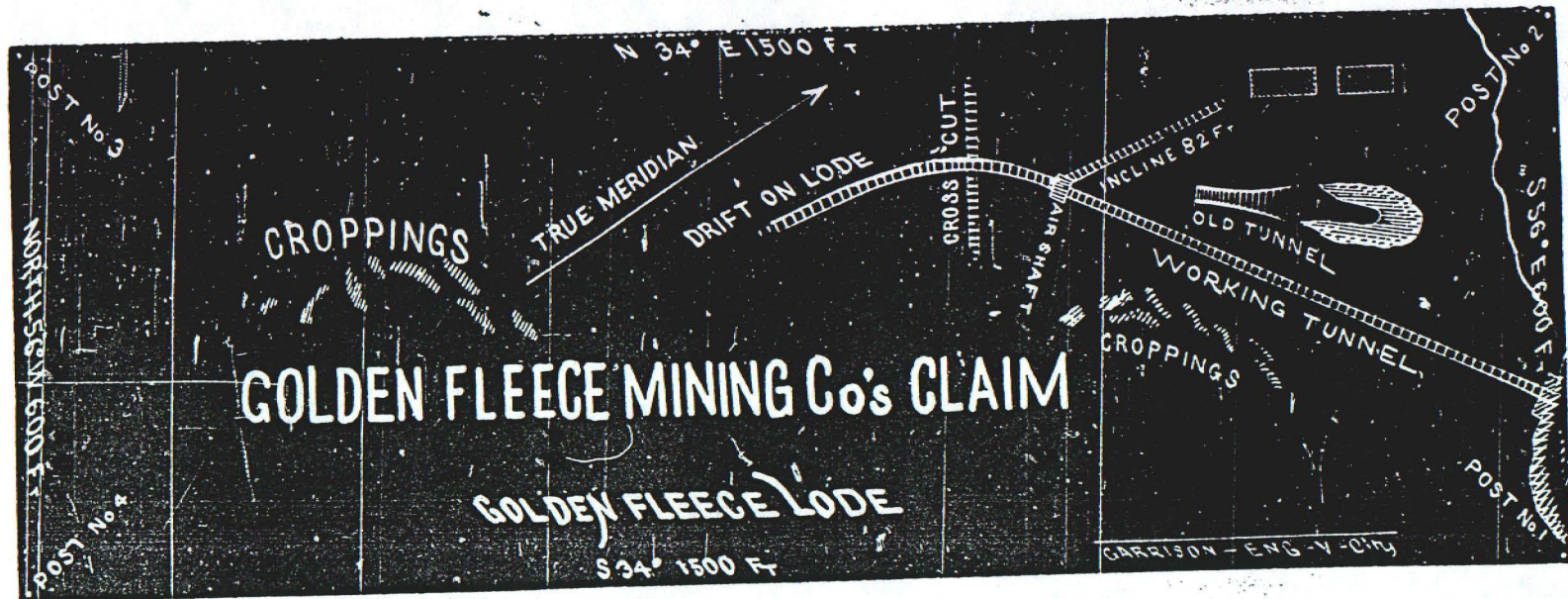
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Item 76

GEOLOGICAL REPORT
UPON THE
"GOLDEN FLEECE"
GOLD AND SILVER MINE,
PEAVINE MINING DISTRICT,
WASHOE COUNTY, NEVADA.

BY
W. F. STEWART,
(Geologist.)

RENO, NEVADA,
GAMBLE, STEARNS, BOOK AND JOB PRINTING ESTABLISHMENT,
1893.



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"GOLDEN FLEECE"

GOLD AND SILVER MINE.

The rapid and profitable extraction of precious metals from solid rocks may be fairly claimed as a modern art. The ancients knew but little about chemistry; still less about metalurgy, and nothing at all about geology, and therefore their methods of mining were crude, tedious and uncertain. In our time, through the beneficent aid of science, and by coupling rational theory with the ascertained facts of practical experience, the art of ledge-mining has become just as reliable, and not unfrequently, more remunerative than almost any other business avocation. In attempting to delineate the mineral qualities and lithological surroundings of a metal-bearing ledge, lode or deposit, it is the duty of the examining geologist to give, with approximate accuracy the trend, dip, volume, and also the probable permanency of the ore-containing matrix. The methods by which geologists arrive at an approximate knowledge of the true condition of an unexplored and undeveloped mine, are simple enough when clearly explained, and before entering upon the descriptive details of the objective point of this report, I desire to state briefly, some of the facts which serve as guides and indices to the phenomena of ore deposited in the Great American Basin.

Nearly half a century ago, Baron Von Humboldt, the Nestor of modern physical explorers, vaguely hinted at the probability of universal polar arrangement in the rock structure of our planet. In other words, the palpable northerly and southerly trend of the continents, of island chains, and of most of the notable mountain ranges on the globe, clearly indicated to the quick perception of Humboldt

that something more than accident had occasioned this manifest uniformity of polar trends, and that, in obedience to the law of terrestrial magnetism, the atoms and molecules of the rocks originally assumed positions precisely analogous to that now assumed by the mariner's needle. In brief, Humboldt was led to the conclusion that, by this polarized arrangement of atoms, the solid belt of the globe was constructed upon the plan of a vast crystal having its planes of cleavage, or lines of easiest fracture, in a polar direction. This novel hypothesis in relation to the polar cleavage of the earth's solids has been more boldly advocated by Dana, Van Cotta, and other distinguished scientists of the present period. In his excellent work on Geology, Professor Dana has devoted much space to the subject of the polar trends of continents, of mountain ranges, and of island systems, and by adding a liberal number of carefully prepared engravings, has furnished convincing proof of the truth of his hypothesis.

To the general reader, the introduction of the theory of polar rock cleavage into an ordinary mining report, may appear superficial and out of place, but there are substantial reasons for the assumption that the theory is something more than hypothetical. Long and careful observation of the rock structure of Nevada has convinced me that the so-called "theory of polar trends," is really an ascertained law of nature and that a careful study of the principle is of the highest importance, not alone to the student in geology, but also to every practical miner and to every expectant mining stock holder in the country. By reference to Professor Whitney's map of California and Nevada, it will be observed that the great inter-continental basin lying between the Sierra Nevada and Wasatch chains of mountains, is mainly a vast expanse of arid lands, strangely corrugated by parallel ranges of volcanic mountains, nearly all of which maintain a uniform trend, or strike toward the northeast by north and southwest by south. Along the eastern slope of the Sierra Nevada and at the base of the volcanic mountains referred to, occur the mineralized quartz veins and marvellous gold and silver bonanzas of Nevada and Utah. It may be here noted that the general strike of the main chain of the Sierra Nevada is slightly to the west of north and to the east of south, and therefore deviates from the northeasterly trend of the basin system of ranges; but the important fact remains that the great chain, as well as most of the inter-continental ranges, all strike toward some portion of the earth's polar circles. Another noteworthy and significant fact is that, as a rule, all of the well defined fissure quartz

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veins in the Great Basin maintain precisely the same strike or trend of the mountains in their immediate vicinity, and it is therefore reasonably inferable that the same principle of polar rock cleavage pervades this entire inter-continental region.

Incidentally it may be stated that there are many instances in Nevada in which apparently well-defined silver-bearing quartz veins strike squarely toward the east and west; but experience has proved this peculiar striking to be an abnormal position and that the deflection from the original polar course has been occasioned by the obtrusion of a volcanic dyke, or by some other local eruptive disturbance. Old quartz miners assert that "an east and west ledge is worthless," and the late W. Hopkins, the distinguished British mining engineer and author, stated that mineralized veins running due east and west, are rarely fertile in precious metals. My own observation of the vein system of this country satisfies me of the correctness of Mr. Hopkin's assertion, and I am more than confident that if a fertile "east and west vein" exists in Nevada it has been lifted from its true northerly trend by some tremendous lateral force.

In addition to the polar strike of the mountain ranges, and of the fissure vein systems of the Great Basin there are other notable physical markings of genuine metal-yielding quartz ledges, which should be understood by every practical miner in Nevada. For some unexplained and possibly inexplicable reason, nearly all of our heaviest deposits of free-milling gold and silver ores are found in veins which flank the eastern sides and bases of the hills and mountains, while the ores which occur on the western slopes are usually associated with copper, lead, zinc, antimony, arsenic and other base metals. Some notable instances of the occurrence of this curious mineralogical phenomenon may be cited, viz: *Pioche, *Tuscarora, *Cherry Creek, Lewis, Eureka, Austin, *Reville, *Virginia City and *Gold Hill. The localities marked with a star all rest on the eastern slopes, and they contain free-milling ores. The other localities all face toward the west and their ores are chiefly base metals. Whether these instances of free ore deposition are indicative of any natural law may be gravely questioned, but it is a curious circumstance which has attracted much attention from mining men in the various localities above mentioned and is certainly worthy of scientific consideration. For an equally inexplicable reason it has been ascertained that, as a rule, at the depth of a few hundred feet below the surface, the quartz ledges of Nevada uniformly "dip" toward the east with an inclination of from 30 to 60 degrees from the horizon. There are number-

less instances in the State in which the surface inclination is in the opposite direction; but deep digging—as at Virginia and other localities—plainly indicated that the general “tilt” or “dip” of the rocks and ledges is, at profound depths, toward some point of the east. A knowledge of this peculiar “dip” or inclination of our quartz veins is of great value to parties desirous of sinking vertical shafts so as to tap their ledges at great depths. It is safe to assert that the ignorance of this simple fact in relation to the rock structure of Nevada, caused the loss of many millions of dollars and a world of mental perplexity to the early developers of the Comstock lode. Another point of serious importance to the prospector and mine locator is in relation to the *kind* of rocks which environ the veins or ledges. Quartz in the form of veins, permeates a great variety of other minerals, but the number of rock species thus permeated, which may be classed as favorable wall rocks for a mine, is extremely limited. Eruptive rocks contain nothing of value to the miner. Granite is but slightly cleavable, and if it contains quartz veins they are liable to be either very narrow, or merely superficial “gash veins.” Limestones are, by reason of their cavernous nature, always unreliable. Limestones, especially the dolomitic varieties, frequently contain beds and chambers of exceedingly rich silver ores, but such ores are usually charged with base metals, and, except when the limestone forms a contact with some other rock, it rarely contains a well defined quartz ledge. Gneisoidal and chistose rocks sometimes contain fertile fissure veins, but they are usually narrow and difficult to work. The rocks which may be classed as permanent reliable and fertile lode bearers are mica-slates, clay-slates, magnesian slates and propylite, or basic porphyry. The series of rocks last named are all eminently cleavable and are usually fractured in a polar direction to the bottom of their respective masses. It is a noteworthy fact that the most productive and most reliable free-ore quartz veins in Nevada, exist in this familiar series of cleavable rocks. This is specially true of the porphyries in which are found the splendid bonanzas of the Comstock and the promising ore bodies of Candelaria, Tuscarora, Aurora and Bodie.

Having briefly stated some of the hypothetical speculations of the learned as well as a portion of the facts established by actual experiment in relation to the geological structure and mineralogical characteristics of the Great Basin, we shall presently see how the recital fits the conditions and future hopes of that somewhat famous mining property, the GOLDEN FLEECE GOLD AND SILVER MINE.

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Immediately to the west of the town of Reno, in the county of Washoe, Nevada, and distant about four miles from the line of the Central Pacific Railway, there rises from the valley of the Truckee river, a lofty isolated butte, which is really a lateral branch or side spur of the main Sierra Nevada. This conspicuous butte reaches an altitude of about 8,000 feet above tide water, and is locally known as "Peavine Mountain." Upon the eastern slope of the mountain, at the elevation of 4,627 feet above the sea, in the heart of a vast field of porphyry, rests the Golden Fleece Mine. The mine is situated ten miles to the northwest of Reno and can be readily reached by two well graded carriage roads which terminate at the town. Peavine was regularly established as a mining district about ten years ago. From time to time paroxysmal attempts have been made toward the development of the numerous locations in the district, but the impetuosity of most of the locators together with their general ignorance of some practical method of dressing and reducing the rebellious out-put of their mines rendered their efforts abortive, and notwithstanding a prodigious expenditure of money upon impracticable furnaces and other crude mining contrivances, the camp, to use a Nevadaism, gradually "petered out," and with the exception of labor performed at the Golden Fleece and upon a few neighboring locations, but little has been done at Peavine during the past three or four years.

Through the boundless faith and untiring efforts of the Golden Fleece Company, the great "mother lode" of the Peavine system has at last been brought to the light, and after a careful exploration I have no hesitancy in pronouncing the Golden Fleece one of the most enormous silver-bearing quartz lodes on the Pacific coast. In fact, from present indications, it is questionable whether there is a larger mineralized quartz vein on the Globe. As already intimated the surface ores of the Peavine ledges are peculiarly rebellious, being, as a rule, heavily charged with sulphate of zinc, sulphuret of iron and some lead. In fact the rebellious nature of these surface ores has hitherto been the chief hindrance to the successful development of the property; but I now learn that Scheyer & Co., of Denver, Colorado, have lately worked a batch of Golden Fleece ore at their reduction works, and found not the slightest difficulty in working it successfully. This is certainly encouraging to the owners of the great lode, but I have abundant reasons for the belief that the time will speedily arrive when the Golden Fleece ores may be successfully

and profitably worked without the assistance of Messrs. Scheyer & Co. As before stated, the Golden Fleece rests in the heart of a wide and deep field of porphyry. Porphyry is not the home nor the permanent abode of base metals. It is *par excellence*, in Nevada, the rock which holds out most notable deposits of FREE MILLING ORES of gold and silver, and it will be strange indeed if the entire order of nature shall appear reversed at Peavine. It is by no means unusual for base ores to appear at, or near the apices of the mineralized ledges in porphyry beds. Even the great Comstock was notably base in zinc and lead at the outcrop at the foot of Mount Davidson, but these unwelcome metals soon disappeared as depth was attained, and to-day Comstock ores are as easily reduced as any simple sulphuret ores in the world. In my judgment, if ever the Golden Fleece is opened to the depth of 400 vertical feet, every vestige of rebellious elements will disappear and the great mine will yield ores just as tractable as those of the Comstock. I have stated that where quartz veins exist in cleavable rocks, such as slates and metamorphic porphyries, such veins will invariably penetrate to the very bottom of the containing mass. Some idea may be formed of the probable profundity of the Golden Fleece lode when it is known that the mine rests in the midst of a porphyry bed which is more than five miles in diameter in any direction. The porphyry zone which holds the Comstock is less than one mile in diameter, and although penetrated to the depth of 2,400 feet, yet the great lode gives no apparent signs of exhaustion.

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LOCAL GEOLOGY AND TOPOGRAPHY

OF THE

GOLDEN FLEECE MINE.

The great porphyry bed in which the Golden Fleece reposes, completely covers the sloping eastern and northern flanks of Peavine Mountain. It spreads far down into the valley below, and owing to the disintegration and erosion of its surface, it is deeply furrowed by innumerable ravines and gorges, and looks for all the world like an exaggerated photograph of the Moon.

At the head of one of the deepest of these eroded canyons appears the outcrop or "gossan" of the Golden Fleece. Immediately to the east of, and actually infringing upon that side of the ledge, there is an isolated dyke or chimney of obdurate trachyte which at the depth of 100 feet below the surface, has a mean diameter of 450 feet. As this chimney of trachyte is the only visible mass of tough, eruptive rock in that portion of the country, of course the intelligent (?) mining engineer had to tackle that very hard spot for a starter, and incredible as it may seem, the entrance tunnel to the mine was driven bodily through this terrible barrier for the entire distance of 450 feet. The absurdity of this brilliant bit of engineering will be apparent when it is stated that the ledge could have been just as readily tapped by driving through soft "pick rock" and by commencing the work at a point a few yards from the present opening. Some wisacre has written that "there is nothing so successful as success," and although the work upon the dyke was very tedious and fearfully expensive, yet it finally led to a successful development of the great lode, and the blundering engineer has been forgiven and forgotten.

As will be seen by reference to the accompanying map, the opening adit, or tunnel, bears west of south and runs in a straight course through the trachyte mass above described, until it cuts the ledge at the point marked "air shaft," 450 feet from the tunnel opening. At the point marked "air shaft," the ledge and ledge matter is about six-

teen feet in width and is highly mineralized with sulphuret of iron and silver. From this point an incline shaft nine feet in diameter was driven through the ledge to the depth of 82 feet where a heavy stream of water was encountered and work upon the incline was temporarily suspended. As work upon the incline progressed the ore grades increased in texture and in value. I have examined a large number of specimens from the bottom of the incline which were very fine in appearance and which will doubtless assay largely in silver.

From the air shaft the ledge was fully explored by drifting and timbering to the distance of 570 feet. For the greater portion of that distance the ledge has been exposed, and wherever encountered it is heavily mineralized. That the ledge is enormous in width has been fully proved by cross-drifting, but how wide it really is, cannot be stated, although a cross-cut was made at the extreme southern terminus of the main drift to the distance of 60 feet east and west, yet no wall found on either side. The entire intervening mass in this sixty-foot cut, is silver-bearing quartz, much of which is evidently high grade ore. At the point marked "cross cut" on the map, is the only place where either of the true ledge-walls are to be seen beyond the air shaft.

At that station, a cross drift was made east and west through 45 feet of ore. No wall rock was reached on the east side of the ledge, but on the west side, a true hanging wall of clay and porphyry was exposed at a point ten feet west of the main drift or tunnel.

By referring to the map, or diagram, it will be observed that the ledge is slightly curvilinear or crescent shaped. The true strike of the vein if undisturbed, would be nearly due north and south and the bent condition of the lode was plainly occasioned by the lateral force of the obtruding trachyte dyke or chimney. In addition to this palpable deflection of the ledge, the tremendous side force literally crushed the quartz into powder and the ore in the vicinity of the dyke is almost fine enough for the battery without further breaking.

When the enormous mass of ore at the southern terminus of the main drift was encountered, a large flow of water came in from above and the cross drifts, as well as the header, had to be firmly bricked-headed with heavy timbers in order to prevent the crumbled ore and rotten porphyry from making a disastrous cave. This inflow of water

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may cause a temporary hindrance to further explorations in that quarter, but experience has shown that such aqueous obtrusions are sure indices of a big bonanza of ore, and when proper pumping appliances shall be brought to bear, the body of water can be profitably utilized in driving the machinery of the mine.

In concluding this portion of my report I desire to state that I have seen many assays of ore purporting to have been taken from various portions of the Golden Fleece mine. Many of these assays indicated fabulously rich ores while many other tests showed correspondingly inferior results. I have no legitimate reason for doubting the correctness of those assays, but I thought it would be more satisfactory for me to make my own selection of ore samples for a test. On the 8th instant I visited and examined the mine and selected three samples for assay. Mr. A. B. Williams, of Reno, who bears a good reputation as an assayer, did the work for me and the annexed is the result:

ORE ASSAY REPORT—No. 1810

RENO, Nev., April 8, 1879.

Return of three ore samples deposited for assay by Golden Fleece Mining Company with A. B. Williams:

ASSAY NO.	DEPOSITOR'S MARK.	SILVER.	GOLD.	VALUE PER TON OF 2,000 LBS.
1	Incline Shaft.....	\$ 62 83		\$ 62 83
2	Side Crosscut....	158 64	\$ 52 74	211 38
3	Head of Drift....	69 12	Trace.	69 12

Charges \$3.00.

A. B. WILLIAMS, Assayer.

LOCATION AND HISTORY

OF THE GOLDEN FLEECE MINE.

The Golden Fleece Gold and Silver Mine was located October 4th, 1873. Incorporated under the laws of the State of Nevada, December 10th, 1873, with a capital stock of 30,000 shares—Par value per share, \$20.

Total Capital \$300,000

Number of feet in claim--1,500 feet in length by 600 feet in width.

Principal place of business at Reno, Washoe County, Nevada.

LIST OF OFFICERS.

T. K. HYMERS,	President,	Reno,
M. LIPPMAN,	Secretary,	Reno,
D. LACHMAN,	Treasurer,	Reno.

TRUSTEES.

T. K. HYMERS,	M. LIPPMAN,	D. LACHMAN,
S. CAHN,	GEN. ROBERT M. CLARK,	

COST OF DEVELOPMENT.

Total expenditure upon the mine for labor and material to date, \$36,000.

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As the accompanying diagram is a copy of Mr. Hoffman's work, the field notes of that gentleman's survey of the Golden Fleece are annexed for the purpose of reference:

FIELD NOTES

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GOLDEN FLEECE MINING COMPANY'S CLAIM, GOLDEN FLEECE
LODE, PEAVINE MINING DISTRICT, WASHOE
COUNTY, NEVADA.

Beginning at post No. 1, situated in ravine about 210 feet southeasterly of the mouth of Golden Fleece tunnel, thence running

1st Course—South 34 deg. west 1,500 feet to post No. 2, whence bears post No. 2 of U. S. survey No. 37 south 21 deg. 35 min. east, distant 297 feet, a pine tree 6 inches diameter, north 48 deg. west, distant 107 feet; thence

2nd Course—North 56 deg. west, at 300 feet south center post, 600 feet to post No. 3, whence bears post No. 1 of U. S. survey No. 37, north 34½ deg. east, post No. 4. of U. S. survey No. 37, north 0 deg. 55 min. east, lone pine near Golden Fleece boarding house, north 28 deg. east, a small pine tree north 80½ deg. east, distant 156½ feet; thence

3rd Course—North 34 deg. east 1,500 feet to post No. 4; thence

4th Course—South 56 deg. east at 300 feet north center post, at 429 feet the mouth of Golden Fleece tunnel bears south 73½ deg. west, distant 55 feet, 600 feet to post No. 1. the place of beginning; containing 20 66-100ths acres.

Bearings expressed from the true meridian, magnetic variations 17 deg. east.

Surveyed July 15th, 1875.

CHAS. F. HOFFMAN,
United States Deputy Mineral Surveyor.

In the ore house and in the great dump at the mouth of the working tunnel, there are now about 800 tons of ore, which the owners or the mine estimate will average between \$50 and \$60 per ton. By Scheyer & Co.'s dry-working process small batches of this pile of ore have been worked, and, without sorting, yielded, as I am informed, \$65.45 per ton in gold and silver.

The facilities for obtaining wood and water at the mine are unsurpassed in the State. There is an abundant supply of water on the ground, and wood can be had delivered at the mine at all times of the year at \$6 per cord.

W. F. STEWART, Geologist.

Virginia City, April 10th, 1879.

