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Geology of Fairview, Nevada

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SYNOPSIS—A series of igneous rocks overlying crystalline schists and limestones that have been intruded by granite, has been mineralized by hot solutions ascending the contacts of the several members, resulting in a number of strong veins, oxidized to a depth of 300 ft. and considerably faulted. Similarity with the deposits of Tonopah is pointed out.

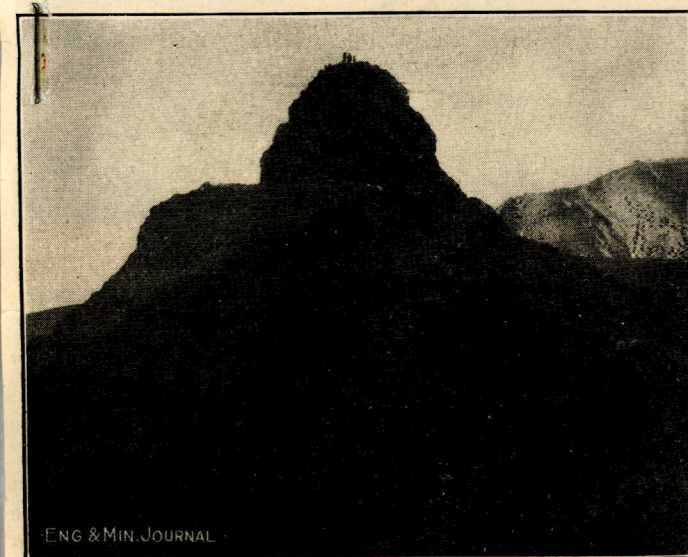
The Fairview district is in Churchill County, Nevada, 120 miles east of Reno. The nearest railroad station is Fallon, on the Southern Pacific, 45 miles west of Fairview. Credit for the discovery of the camp is usually given to F. O. Norton and C. K. Jarvis, who made the first locations in the early part of 1906. Reports of the

ment work is, however, being done on several other promising properties.

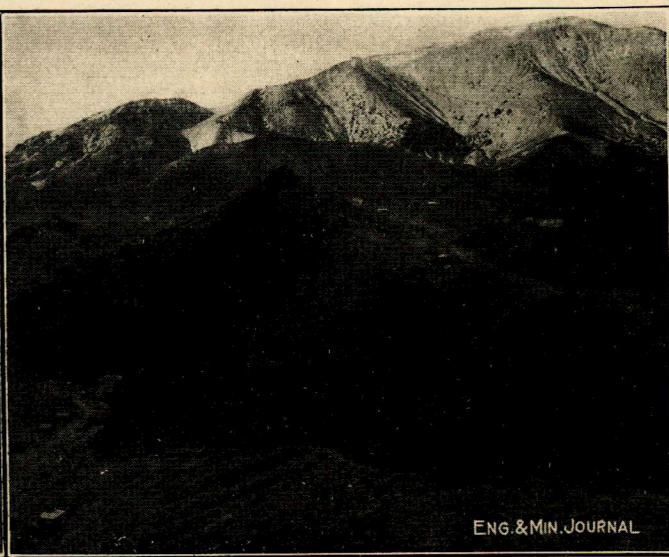
IGNEOUS ROCKS IN SCHISTS AND LIMESTONES INTRUDED BY GRANITE

In this part of Nevada a series of mountain ranges trends north and south with arid valleys between, and occasionally alkali flats. Fairview Peak is an isolated peak on a minor range between the Desatoya and Stillwater ranges. The Fairview district proper is on the western slope of Fairview Peak, at an altitude of 5800 feet.

The important rock types are, without exception, igneous, and appear to rest on a basement complex of pretertiary crystalline schists and limestones, which are in-



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OUTCROP OF "BLOUT" AND ANDESITE SILICIFIED

Nevada Hills vein glory-hole in right center, rhyolite dike in foreground.

finding of rich float and croppings soon attracted mining men from all parts of the state, with the result that the summer of 1906 saw Fairview added to the list of Nevada's boom camps. For a time there was considerable wildcatting, and the district attained a population of 2000. Within a few years, however, this had dwindled to as many hundred, until, at present, there are but two producing mines in the region, the Nevada Hills, at Fairview, and the Nevada Wonder, at Wonder. Develop-

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FAIRVIEW PEAK IN THE BACKGROUND

Part of town of Fairview in left foreground, Nevada Hills vein outcrop in left center, Eagle vein outcrop in left middle distance.

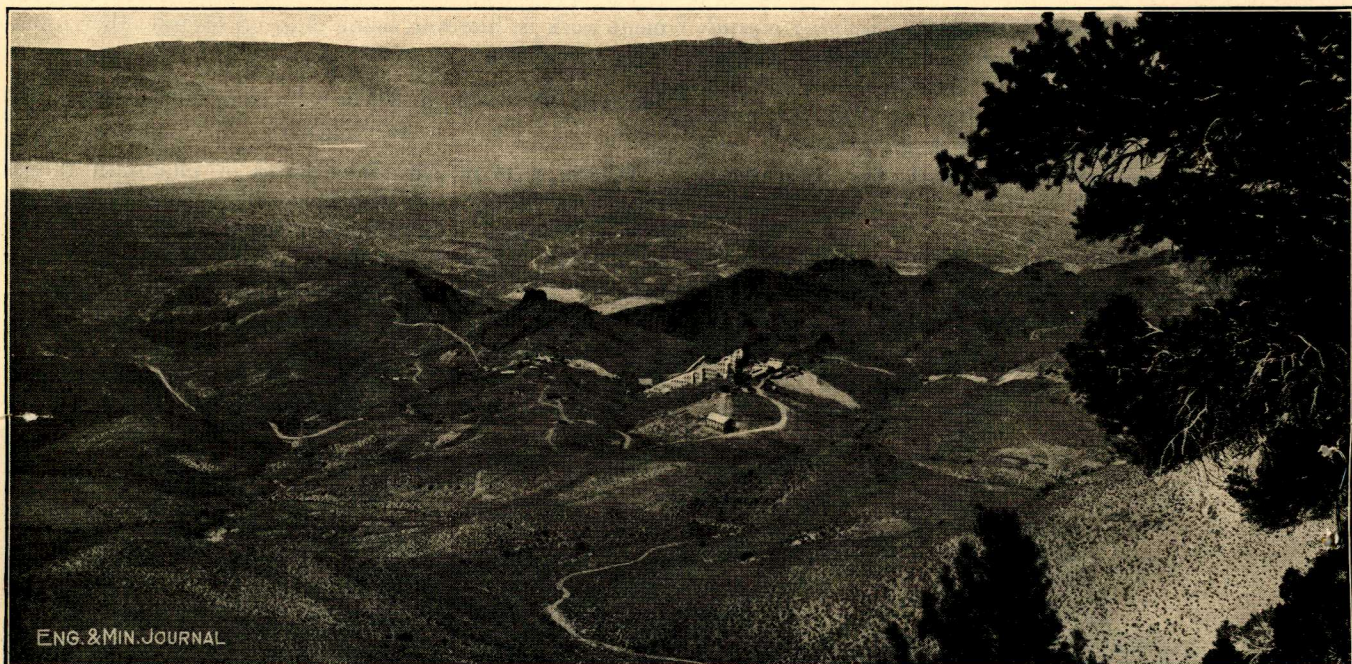
truded by granite. These types are, in order of age, a dacite tuff, earlier andesite, later andesite, tuff and rhyolite. There is also a later series of tuffs and flows on the flanks of Fairview Peak, which is of minor importance. The dacite tuff consists of a thick series of ashbeds and agglomerates varying greatly in physical characteristics. Immediately adjacent to the basement complex it is rather coarse, unstratified tuff, containing granite boulders. This is followed by a much coarser layer, which is overlaid by a series of fine, well stratified ash

beds, undoubtedly of lake origin. The earlier, or lode andesite, is, as its name indicates, the body in which, or on the borders of which, the important veins of the district occur. Its andesitic character is everywhere apparent, although it tends locally toward a dacite or a trachyte. It is a greenish porphyry, usually containing finely disseminated pyrite, weathers to a light gray or yellow, and was intruded into the older tuff beds as a large, irregularly shaped mass. The later andesite occurs as a surface flow, and is easily distinguished from the lode porphyry by its abundant hornblende and its purplish tint on weathered surfaces. It is overlaid by a second series of tuffs or agglomerates, locally called the "grade tuff." This series is coarser than the former, and is characterized by the presence of large boulders of granite and the earlier volcanics.

All the above mentioned formations are cut by a light-

peared a series of rhyolites, dacites and tuffs. This series, in Tonopah, is mineralized, but the veins are of little importance compared with those of the former period. With the exception of small stringers, the lode andesite of Fairview contains the only veins in the district. The analogy, however, is striking throughout the entire geologic column.

The largest vein of the district is the so called "blout" vein, which occurs on the southwesterly contact of the lode andesite with the dacite tuff, and ranges in width from a few to 60 ft. Near its walls it is compact, massive quartz, growing coarser toward the center, where vugs with well developed quartz crystals are found. It is a true replacement vein, formed by hot ascending solutions along the zone of weakness at the tuff-andesite contact. The gradation from true andesite through silicified andesite to pure quartz can be observed in many places. Though



FAIRVIEW DISTRICT FROM FAIRVIEW PEAK, STILLWATER RANGE IN DISTANCE

In left distance, Labou Flat; old town of Fairview now deserted, in left center; Nevada Hills mill and buildings in center; "blout" outcrop at left of mill; Eagle's Nest mine in right center; Dromedary Hump at extreme right.

gray rhyolite, which is favorably exposed on Rhyolite Hill as a volcanic plug, sending off an arm to the southward. This same rhyolite is also seen about half a mile further west, where it outcrops as an unusually persistent small dike, in lode andesite for most of its length, and cutting two of the most important veins of the district.

GEOLOGICAL COMPARISONS WITH TONOPAH

The geologic history of the region is similar to that of Tonopah. In both districts, a pre-tertiary limestone, intruded by granite, is overlaid by tertiary volcanics. The first of these, in Fairview, is tuff of heterogeneous character; Spurr noted "a series of folded gravels, tuffs, lavas,," overlying the paleozoic limestones near Ray, about eight miles north of Tonopah. The ore-bearing body at Fairview is an intruded andesite, while that of Tonopah is a trachytic flow which was for years considered andesitic. In both districts this was followed by a period of mineralization and erosion, after which a later andesite was poured out. Subsequently there ap-

peared a series of rhyolites, dacites and tuffs. This series, in Tonopah, is mineralized, but the veins are of little importance compared with those of the former period. With the exception of small stringers, the lode andesite of Fairview contains the only veins in the district. The analogy, however, is striking throughout the entire geologic column.

The Nevada Hills vein, the most important productive vein of the district, runs nearly parallel to the "blout," and dips steeply to the south. Its lower limit is found where it joins the "blout," which dips steeply to the north. Both "blout" and veins appear to have had a common origin in the solutions which ascended along the tuff-andesite contact, as there are many unquestionable points of similarity between them. This hypothesis, however, is open to the objection that the solutions as they ascended in the contact fissure were as eligible for precipitation as they were after they branched out into the fissures in the andesite alone, and they had, in both cases, access to whatever precipitants there were in the andesite. It is possible, however, that the controlling factor was some constituent of the dacite tuff which acted to inhibit precipitation in the contact zone. The solutions, after they entered the andesite body, were free from this restraint, and deposited their metallic burden. This theory

at Calumet, and he reads nothing else. It is unfortunate that the conservative, reasonable and decent Finnish newspapers published on Lake Superior are not read by the anarchistic element. But the line of division is sharp, the fair newspapers are read by the conservatives, the inflammatory by the radical, and clannishness is extreme. An experiment is about to begin, looking toward a breakup of this class distinction, but its early success is questionable.

Criticism of the anarchistic element among these people must not be too harsh, they scarcely can be blamed for their feelings, induced by years of oppression, of civil and military outrage of all sorts, and of broken promises, solemnly made and repeatedly reiterated by highest authorities, from the Czar down. Criticism should be directed toward the Moyers, the Petronellis, the editors, and the others who circulate false statements.

It will be interesting to observe how far this proposed elimination of an undesirable element will be carried and what effect a sharper demand for labor may have on mine managements. Just now, conditions are somewhat favorable to the movement. It will also be interesting to watch for the next development along lines of Western Federation activities in the Lake Superior region.

Rail Production in 1913

The Statistical Bureau of the American Iron & Steel Association has collected and published figures for the entire production of rails in the United States in 1913. This showed an increase of 174,865 tons, or 5.2% over 1912, but is less than that of 1906, 1907 and 1910. The accompanying table shows the production of rails for two years, classified according to the kind of metal from which they were made.

	1912		1913	
	Tons	Per Cent.	Tons	Per Cent.
Openhearth	2,105,144	63.3	2,527,710	72.2
Bessemer	1,099,926	33.0	817,591	23.3
Electric steel.....	3,455	0.1	2,436	0.1
Rerolled rails.....	119,390	3.6	155,043	4.4
Total	3,327,915	100.0	3,502,780	100.0

No iron rails were rolled in either year. The notable point in this statement is the continued increase in the proportion of openhearth rails.

Included in the total for 1913 are 195,659 tons of girder and high T-rails for street railroads. Imports of rails in 1913 were 10,408 tons; exports, 460,553 tons, leaving 3,052,635 tons, as the approximate domestic consumption.

The make of rails in 1912 and 1913 is classified as follows, according to section:

	1912		1913	
	Tons	Per Cent.	Tons	Per Cent.
Under 59 lb.....	248,672	7.2	270,405	7.7
50 to 85 lb.....	1,118,592	33.9	987,313	27.6
Over 85 lb.....	1,960,651	58.9	2,265,062	64.7
Total	3,327,915	100.0	3,502,780	100.0

Openhearth steel was used chiefly for the heavier sections. Of the rails over 85 lb. to the yard, 87.3% were of openhearth steel, while the lighter sections were about evenly divided between openhearth and bessemer.

Alloy steel rails made in 1913 were 59,519 tons, of which 47,655 tons were titanium steel and 11,864 tons manganese, copper or nickel steel. The total was 89,748 tons below that of 1912, and was the smallest reported since 1909.

Mining Radium Ores

WASHINGTON CORRESPONDENCE

Senator Walsh, of the Senate Committee on Mines and Mining, in reporting the bill to provide for and encourage the mining of radium ores, gave a new turn to the measure by inserting into it sundry provisions that operate a distinct limitation upon the plan. These are now beginning to receive more attention than heretofore because of the news that has been brought from Colorado concerning the alleged fact that prospectors have hastily taken up practically all of the known radium locations, so that the bill is largely an academic proposition in its main features.

The two points that are being given special notice in Senator Walsh's measure relate to method of purchasing ores. The first is as follows:

If the United States shall at any time fail or refuse to purchase any such radium ores of sufficient value to be merchantable, upon the tender of the same in carload lots at any railroad station, the exclusive right of the United States to purchase such ore or any ores thereafter extracted from the mining claim from which the same were mined and from all other mining claims contiguous thereto and held in common therewith as well as the right to enter upon the same for failure diligently to mine any of such claims, shall thereupon cease and the unrestricted right of disposition of all ores within such claims or extracted therefrom shall thereupon accrue to the owner or other rightful occupant thereof.

The second reads as follows:

That the Secretary of the Interior is hereby authorized to lease for the purpose of exploration and development of radium-bearing ores unallotted lands within Indian reservations now existing or hereafter established by Act of Congress or Executive Order in such quantities and upon such terms and conditions and under such rules and regulations as he may prescribe: Provided, That such radium-bearing ores when mine shall be sold and delivered to the United States as herein provided: And provided further that all royalties derived from any such leases, rentals or other moneys paid on account of the same shall be deposited to the credit of the Indians entitled to occupy the reservation from which the same come to be expended for their benefit as the Secretary of the Interior may direct.

Options to Purchase Mining Property

By A. L. H. STREET*

Although it is generally held by the courts that a person who holds an option to purchase property will not be held strictly to a provision in the agreement requiring him to exercise his right to purchase before expiration of the time limit fixed by the contract, unless it appears that such limit was made by the essence of the contract, the New York Supreme Court lately held in the case of Beebe vs. Worth, 146 New York Supplement p. 146, that, since mining property is subject to great fluctuation in value, a holder of an option to buy such property will be held strictly to a clause requiring the purchase to be made within a specified time.

Portland Cement Production

The final figures for the portland cement industry in 1913, as obtained by the U. S. Geological Survey, show a production of 92,097,131 bbl., shipments of 88,689,377 bbl. and stocks on hand 11,220,328 barrels.

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nds some support in the fact that the vein is weak near the "blout," and does not reach its full strength within 20 or 25 ft. of the junction. Also, the fact that the Nevada Hills vein fissure was almost certainly blind makes it reasonable to suppose that the ascending solutions were forced to move more slowly there than in the adjacent open "blout" fissure, thus furnishing conditions more conducive to precipitation.

ZONE OF OXIDATION IS 300 FT. DEEP

The Nevada Hills vein ranges in width from 1 to 15 ft., and is occasionally even wider. Its gangue consists of quartz, partially replaced andesite, calcite and smaller amounts of pyrolusite and rhodochrosite. The minerals are argentite, stephanite, ruby silver, horn silver, pyrite, chalcopyrite, galena, tetrahedrite, sphalerite, silver and gold. The ore of the western segment of this vein is largely primary, with small, rich pockets of secondary; at the eastern end, however, strike faulting has given rise to considerable secondary enrichment. This faulting is most noticeable along the foot wall. Mineralization is conspicuously higher on the hanging side of the fault gouge than elsewhere, this condition persisting even when the gouge leaves the true foot wall, and reaches out into the vein. The proportion of silver to gold, by weight, is 100:1, as the grade of the ore increases, this proportion decreases.

The Eagle vein, which ranks second in importance to the Nevada Hills vein, is roughly parallel to it at a distance of 1100 ft., and dips approximately the same, at 70° to the south. While its genesis was undoubtedly similar to that of the latter, its physical characteristics are widely different, due largely to the important part that secondary enrichment has played in its formation. The vein averages 16 ft. in width, the richest ore being close to the walls. As in the case of the Nevada Hills vein, the strike faults which followed the formation of the original vein allowed ingress to the descending waters of that period. Quartz, calcite, rhodochrosite, rhodonite and ore sulphides were deposited, the last being rather coarser than the primary sulphides. Banded or ribbon structure is characteristic of this period. The banding is most prominent near the walls of the vein, and consists of seams of dark sulphides separated by pinkish calcite and rhodochrosite. A still later series of transverse faults was responsible for a further, though comparatively unimportant enrichment. The maximum depth of oxidation is 300 feet.

The Dromedary vein runs parallel to the Nevada Hills vein, 3800 ft. to the north. It is a strong quartz vein, dipping steeply to the south, and has produced several bunches of bonanza ore near the surface. It is now being developed at depth. The Wingfield and Eagle's Nest veins are well defined quartz veins which resemble the "blout" in many respects. The latter is at present being developed at a depth of 300 feet.

SIXTEEN FAULTS IN 300 FT. OF VEIN

The faults of the district have a general northeast-southwest trend, and dip, on the average, from 50 to 75° to the east or west. The east-dipping series is by far the more important, and is probably older than, or contemporaneous with the west-dipping series. An east-dipping fault invariably throws the east side downward and to the north; a west-dipper throws the west side down-

ward and to the north. The country is much faulted; on the 550-ft. level of the Nevada Hills mine, there are 16 faults in 300 ft., with horizontal movement ranging from 1 to 130 feet.

The main fault and the Aztec fault are the most important of the district. The former has a strike-slip of about 130 ft., and a dip slip of 350 ft., and displaces all the veins that have been mentioned. It is noteworthy that the veins are uniformly larger and of higher grade on the east side of the Main fault than on the west; the strongest mineralization is immediately adjacent to the fault. The Aztec fault is nearly vertical; the east side dropped at least 600 ft. The strike-slip has not been determined, but is probably small. Erosion has removed all the later andesite west of the Aztec fault, with the exception of a few shallow patches which doubtless represent depressions in the old lode andesite surface. On the east side of the fault, however, a thickness of 650 ft. of later andesite has been proved. Thus it seems certain that the later andesite flow was at least 700 ft. thick, and that there has been at least 750 ft. of erosion since its eruption. Acknowledgment is made to the Nevada Hills Mining Co. for access to the reports of A. C. Lawson, O. H. Hershey and C. C. Starr, which have formed the basis of this article.

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Impending Labor Changes in Lake Superior Region

SPECIAL CORRESPONDENCE

In the Lake Superior region there is a general, though not by any means a concerted, movement for the elimination of certain classes of labor. It may be said to have begun after the strike on the Mesabi range in 1907. It received additional impetus last summer, when a strike occurred on the ore docks of the Great Northern road. It spread to the copper region lately, as the result of the recent disturbance on Keweenaw Peninsula.

While the supply of labor available for mine operation will have its bearing on the rapidity with which this elimination can take place, it is likely to continue until the result desired has been accomplished, that is, until those men who, by race and old world sympathies and education, are anarchistic, shall be in such minority as to make their presence negligible.

Although two of the strikes mentioned were conceived in the minds of leaders of the Western Federation of Miners, they could not have been so serious, nor have left so terrible a heritage of hate and distrust as they have in the copper country, for example, had it not been for the fertile soil into which the utterances of these leaders were dropped. A man who for years has been beaten down by his tyrannical government, who has known authority only as something to dread and hate and whose forefathers have lived under the same influence, is easily worked upon by such arguments as Moyer and his associates know how to present.

Such a man cannot be blamed too severely if he responds readily to the discords played upon his heart-strings. Liberty and the rights of man, as we know them, were beyond his conception at home, and he has not been long enough in America to reverse his point of view. He reads such journals as the Finnish daily, *Työmies*, one of the agencies which helped to engender hatred