



## Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

## GOLD MINING ACTIVITY IN COLORADO.

BY T. A. RICHARD, STATE GEOLOGIST OF COLORADO.

---

*On revient toujours à ses premiers amours.* The search for silver having become discouraged by the late unpleasantness of 1893, Colorado has turned to the occupation of her early youth.

The production of gold in 1892 was worth \$5,300,000, that of the year just ended is conservatively estimated at \$15,000,000. The silver yield was 26,350,000 ounces in 1892, and has declined to about 20,000,000 in 1895. This comparison only inadequately indicates the altered conditions of the precious metal mining industry of the region, because the gold is largely the product of young and growing mines; the silver is the output of old bonanzas approaching exhaustion. The current year will see a notable accentuation of the wonderful ability of the State to adapt itself to economic conditions.

The story of the past four years affords an instructive example of the vicissitudes of mining. Two new mining camps came into prominence toward the close of 1891. One lay at the foot of Pike's Peak, the other sprang to life near the headwaters of the Rio Grande. The former yielded gold, the latter silver. The Cripple Creek district had been the scene years previous of an abortive mining excitement too brief to destroy the quiet of a peaceful pasture-land. Creede was in the very heart of the silvery San Juan, a country whose poetic name has been written large upon the pages of Colorado history. At that time silver mining was in fashion; everything favored Creede. Cripple Creek was overlooked and neglected. The uncovering of several magnificent veins enabled Creede to contribute \$3,100,000 to the silver output of 1892. Cripple Creek that year yielded in gold only \$583,010. The following June the news of the closing of the Indian mints came to Colorado like a paralytic stroke. The

silver industry seemed wiped out in a day. General disorganization supervened, but, amid the chaos of wild talk, incompetent statecraft and hysteric nonsense, the true manhood of the community asserted itself, order was restored, business was resumed, and hope returned. The silver miners flocked from Creede to Cripple Creek. The new district answered to the demand, and the concentration of a despairing energy developed it within a year from an uncertain discovery to a permanent goldfield of the first magnitude. Simultaneously, as if by an enchanter's wand, Leadville, the cloud city of the silver bonanzas of earlier days, grew into importance as a goldfield. An output valued at \$262,629 in 1892 swelled to \$897,456 in 1893. The old districts, such as Gilpin County, which had been unostentatiously contributing an annual tribute of gold since the day of the first discovery in May, 1859, awakened to increased activity. All over her wide extent of mountain-land, Colorado leaped to life and, throwing off the enfeebling miasma of an ignorant populism, gave herself up to the advancement of an industry which is one of the most beneficent known to a busy humanity.

A year of steady development and vigorous exploration has told its story. Some of it is conveyed through the stubborn testimony of statistics, some is suggested amid the rhetorical confectionery of an irresponsible press, more of it is known to those who direct the machinery of an industry whose unresting wheels are at the command of the capitalist. For the first time the annual yield of gold exceeds in money value that of silver; for the first time, also, it is believed, Colorado has wrested from California the honor of being the leading gold producing State of the Union.

It is needless to emphasize the importance to the State of these results, nor would the consideration of the conditions which have created them warrant the use of the pages of this REVIEW did they not afford an object-lesson of far more than local moment. The widespread revival of gold mining, which bids fair to make the closing years of this century outrival the golden age of early Californian discovery, attracts the attention of every thoughtful observer and becomes intelligible only by examining the causes which, in a typical mining region such as Colorado, have conduced to so marked an activity and resulted in so enlarged a productiveness.

When silver mining underwent eclipse, the sister industry benefited by the use of the whole of the complicated apparatus of men, money, and machinery thrown out of gear by the collapse of the silver market. The experienced miners, trained superintendents, careful chemists and expert mine managers of the silver camps were compelled to seek new avenues of employment in the wake of the capital departing from districts blighted by adverse legislation. Those who could not get positions went to work prospecting. The parties of gold seekers who wandered over the mountains in the autumn of 1893, were as diverse in composition as the companies of pioneers who sought El Dorado in the dawn of western history. They differed chiefly in being better equipped with experience and endowed with a larger knowledge of the ways in which an ore deposit can be converted into a profitable mine.

Another factor promoting the growth of gold mining was the uncertain market offered to any business save that one whose product was the measure of the value of the product of all others. Likewise the decline in silver, and the disorganization of enterprises dependent upon it, caused a diminished demand for labor and a consequent lowering of wages. This was not effected without strikes and disturbances of a serious kind which, however, ended invariably in a lessening of the cost of ore production. With the diminution of labor-costs came a concomitant cheapening of supplies, the ushering in of an era of economy, a general recognition of a new order of things and the departure of that spirit of reckless extravagance which, by some perverse fate, had always characterized the mining of silver rather than that of the more valuable metal.

The enthusiasm evoked by the success crowning the plucky effort of the bankrupted silver mines naturally gave birth to a good many misconceptions and exaggerations. An idea became prevalent in newspaper paragraphs that silver mines had been turned into gold producers, and that the alchemy of hope had been able to transmute the white metal into the yellow. It is indeed a fact that in rare instances, such as the Amethyst mine at Creede and the Guston on Red Mountain, the lower workings of silver mines have encountered ore carrying a proportion of gold larger than that characterizing the yield of the upper levels. This has been made much of. It is a part of those changes in

the composition of the ore of large mines which are as frequently observed in a lateral as in a vertical direction, along the strike quite as often as along the dip of the vein. The reverse, the diminution of gold values, also occurs; but for obvious reasons it receives less frequent mention. Besides this observation there is the more common one of an increase in the gold value, not absolutely but relatively, on account of a fall in the market price of the associated silver. When the white metal was in fashion, certain properties which yielded a product containing both the precious metals were spoken of as silver mines, although their ore carried as much as one-third of its value in gold. When the price of silver dropped 24 per cent,\* the relative importance of the two metals in such an ore became reversed; it now carried more gold (as measured in dollars, not ounces) than silver, and the mine owners hastened to remove the stigma clinging to a silver mine by labelling it a gold producer. Thus, to take a well-known example from outside the borders of our State, the ores of the Comstock contained 47 per cent. of their value in gold and 53 per cent. in silver. The drop of the latter from a price of 82 to 62 cents per ounce exactly reversed the ratio. No mysterious transmuting had taken place, only a sudden disturbance in the commercial relations between the two metals.

In extending our inquiry from single mines to entire districts it will be found that similar results have been produced by the operation of the laws of supply and demand. All the mining regions of Colorado produce both the precious metals, if we except Aspen, which hitherto has been as prolific of silver as it was niggardly of gold. Even from this district however, there now come whispers of gold discovery. The reports of the Director of the Mint show that Pitkin (the county in which Aspen lies) yielded no gold in 1891 and 1892, but it is credited with \$5,942 in 1894. The discredit thrown upon silver mining has caused a gradual cessation of prospecting for that metal and in Aspen it is the magnitude of the old bonanzas which has alone prevented a total discontinuance of operations. In the meantime, the surrounding hills are being carefully examined for gold veins. Some have been found. A beginning has been made even in this silver county.

\* At the beginning of 1893 bar silver was quoted in New York at 82 $\frac{1}{4}$  cents per ounce. On June 29th it had declined to 62 cents, and in March, 1894, it fell to its lowest point, 57 $\frac{1}{2}$  cents per ounce.

In other sections of the State where gold occurs more liberally associated with silver, the depreciation of the one metal and the appreciation of the other, the discouragement given to the mining of the former and the enthusiasm called forth in the search for the latter, have resulted in a dwindling of the number of active silver mines, an expansion of operations in gold mines and a consequent increase of gold production sufficient already, in some cases, to transfer the balance from one side to the other and enable an old silver mining district to assert itself as a gold region. Thus San Juan County yielded in 1892 gold worth \$155,624 and silver valued at \$354,125\*, but in 1894, the gold increased to \$360,320 and the silver diminished to \$235,000.† Other examples might be quoted.

The full effect of these changes is only now becoming evident. It will be more noticeable a year hence. While the silver production of Colorado only fell from 26,350,000 ounces in 1892 to 20,000,000 in 1895, in spite of a decline in the market value of the metal equal to 22 cents per ounce, or 26 per cent., this does not tell the whole story. Since the Indian mints closed, surface prospecting for silver has been discontinued, underground explorations have been restricted, the reserves of ore previously uncovered have been drawn upon, and no new rich mines have been undergoing development so as to take the place of former bonanzas. Vigorous growth has been succeeded by stagnation.

Ore deposits are not inexhaustible. The average life of a productive mine can be measured on the fingers of one hand; and, therefore, any region to maintain its output must be sustained by fresh discoveries to keep pace with the exhaustion which creeps upon old producers. Such is no longer the case in silver mining. The yield of Leadville is maintained because some of its ores carry a heavy percentage of lead as a by-product, and others contain iron in such a proportion as to render the output of certain mines valuable as a flux in the smelting of silicious gold ores. The big veins of Creede are receiving only a half-hearted development. The wonderful bonanzas of Aspen have been sadly impoverished and the mines of Rico are crippled by an insufficiency of exploratory work.

Thus there is the suggestion of a dwindling and discredited industry unduly weakened by a constant transference of its lin-

\* Silver having an average price of 87½ cents. † Silver at 64 cents.

gering vitality to the enthusiastic prosecution of the search for gold. And there can be no mistaking the magnificent energy which has vivified the gold mining industry of Colorado. The past year, distinguished as it is by the notable enlargement in production, is yet more remarkable for the number of its discoveries. When the snow flies the finding of gold veins will be heralded from the tops of sunny hill-slopes and echoed from the depths of dark ravines. Everything, fashion and fact alike, favors gold mining at the present time. It is the only industry whose product has a market value that does not fluctuate. The general fall in prices has lessened the cost of the material used in gold mining, the lowering of wages has stimulated it, the improvement of metallurgical methods and the introduction of business ideas have alike aided it. No wonder new mines are eagerly sought after, and old ones formerly unprofitable are successfully resuscitated into profitable operation. Just now Cripple Creek is commanding the attention of the country. Its production has leaped from \$3,900,000 in 1894 to \$7,000,000 in 1895. This is an eloquent fact. But in the hurry to participate in the prosperity of its newest-born discovery, Colorado is giving the outside world the impression that it is a territory with one mining district. Its history refutes the idea, and its present condition disproves it. If such were the case, the present gold mining activity would have the familiar aspect of the excitements of the past which have strewn the West with ruined mills and buried mines. No : the gold mining of to-day in Colorado is not local, but distributed over a region which sweeps across the map for 280 miles, from Hahn's Peak in the north to Mt. Hesperus in the south.

It is confined to vein mining. The alluvium of bygone days has been exhausted ; and placer mining survives only in an occasional gulch where the Chinaman picks up the crumbs which have fallen from the white man's table, or in localities previously unworkable because of natural difficulties to overcome which heavy expenditures were necessary. Exceptions may indeed be cited against this generalization, and Breckenridge, Alma and Fairplay quoted, yet as a matter of statistics it is doubtful if more than five per cent. of Colorado's output comes from the gravel deposits whose discovery first attracted the wave of emigration of a generation ago.

The lodes whose degradation fed the alluvium and whose exploitation is now the mainstay of the industry occur in a geological environment of notable diversity from the granite of the geological dawn to the andesite of the revolutionary days of the early Eocene. Their occurrence has been studied by trained men and the relation between ore formation and rock structure has been carefully investigated so as to enable the young science of geology to take the hand of the old industry of mining and guide its blind footsteps amid the perplexities of the underground world.

What one science has done in the darkness another has supplemented in the light. The evolution of metallurgical practice has progressed by an adaptation to changing conditions. The very variety and complexity of the ores of our mountains which first offered many a stumbling block to the inexperienced metallurgist of a former epoch have become serviceable in the attainment of that mixture of materials of differing composition which is essential to successful smelting. The development of certain wet processes, cyanidation and chlorination, has supplemented the work of the smelter and the stamp mill, and by means of the connecting threads of the railway system there is now offered to the miner a choice of methods of ore reduction, which is in itself a very important factor in successful mining. It has permitted of the beneficiation of ores formerly not marketable, and it encourages the prospector to believe that no discovery he makes need be rendered valueless, as happens in other parts of the world, because of the refractory nature of the mineral he uncovers.

As discoveries accumulate camps previously isolated become united into a chain of successive centres of activity which follow the continental watershed from the borders of Wyoming to the boundary of New Mexico. The awakening of gold mining is anything but local in its character; it is a part of one widespread phenomenon, whose source of energy lies deeper than the vagaries of a speculative epidemic. The thirty years' of past endeavor have been but a period of incubation, giving the interval required to build a magnificent railway system, to erect complete smelting establishments and to afford training and experience to those captains of industry who now direct the operation of the furnace and the exploration of the mine. It is no empty rhetoric to say that no country has at its call an industrial machinery so



thoroughly organized as that which impels the complicated workings of Colorado's mining activity.

This is but in keeping with the times. The expansion of the arts and manufactures of our day requires to an increasing degree the use of the metals. Modern civilization advances on iron rails and is gilded with the gold torn by man from the darkness of the underworld. The art of mining becomes constantly more important to our material welfare. From the products of the mine the wheels of progress are made and from them also is built the elaborate edifice of a complicated civilization. Neither the absurdities of speculation nor the vagaries of human nature can rob mining of the dignity and beneficence which have clothed it from the misty dawn of human endeavor.

T. A. RICKARD.