CHAPTER XLVI

MINERAL RESOURCES

MEXICO still seems to have inexhaustible wealth in her mineral resources. Some of her mountains are almost solid masses of iron or gold and silver ore. The innumerable enterprises for developing the country have produced, with more or less profit, colossal sums. If the work had been directed from the beginning with intelligent economy, the importance and profits of the exploitations would have been much greater. As for the riches already extracted from the principal mining regions, they are insignificant compared with those still shut up in the bowels of the earth.

Of the two branches of the grand cordillera, the western branch is much the richer in metal-bearing deposits. From the time when all these riches shall be developed with enough capital and sufficiently intelligent business management, the results attained will be surprising, particularly in the rich region comprised by the states of Sonora, Chihuahua, Durango, and Sinaloa, and in the still unexplored mountains of the states of Michoacán and Guerrero.

It may be said, without reference to political subdivisions, that the principal Mexican gold- and silver-mining deposits are found in a zone two thousand kilometres (twelve hundred and fifty miles) long by six hundred kilometres (three hundred and fifty miles) wide, and stretching from northwest to southeast. Outside of this district there are in other states mines which have been abandoned for a long time, but which to-day are being prospected.

It is impossible to state the degree of fineness of the ores, there being considerable variation. In some districts there is almost fabulous richness; in others there is only poor ore. The most celebrated mine in the country, the Valenciana, in Guanajuato, which is worked to-day with success, has given its best dividends with ores containing only five ounces of silver per quintal; and the same at Pachuca, where ores even less rich than those of the Valenciana have been giving the best results. These are large deposits of comparatively poor ore. The richer veins and irregular deposits have produced, and are still producing, masses of native silver of a grade so high as to appear almost fabulous. These cases are frequent in Sonora, Chihuahua, and Jalisco. At Batopilas a single mass weighed over one hundred and fifty pounds, and brought two thousand eight hundred and sixty-two dollars.

A vein of silver discovered by an Indian near Tastioto, Sonora, assays five hundred dollars per ton

Of all the auriferous districts of the republic, El Cerro Colorado (Red Mountain), in the state of Chihuahua, is undoubtedly the richest. It is being worked at present by a Mexican company.

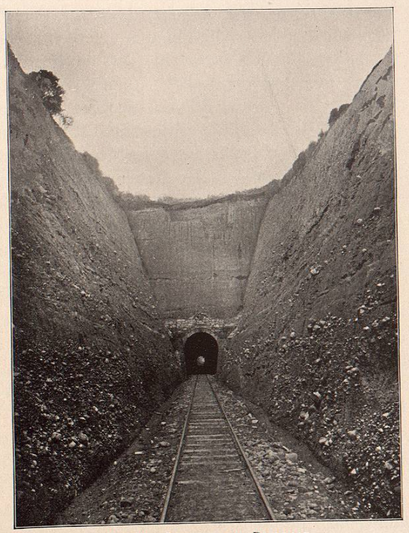
The zone now being worked, after thorough examination, is found to yield sixteen dollars of gold to the ton, and comprises about eighty thousand tons of ore. Gold has been found on the mountain-top, as well as on the slopes and base, hence it is believed that the mountain contains immense masses of rich ore not yet discovered. The system of reduction adopted, which has given excellent results, is by direct amalgamation, using the Huntington mills. This enterprise

of Cerro Colorado has a brilliant future, and if the company now working there will continue with the same energy and skill that it is now manifesting, untold riches will be its reward.

The samples of meteoric iron found in Mexico are mentioned in almost every treatise on that metal. Magnetic iron abounds. Reference is made elsewhere to the famous iron mountain, and there are other deposits, which, without having so great importance as the latter, are very interesting. In the district of Coalcoman (state of Michoacán) iron exists in deposits which, while irregular, are often colossal. There are many remarkable and very rich deposits, notably that of Chorreras in the state of Chihuahua. Yet during the past few years there have been over two thousand miles of railway built with imported rails.

In 1892 there was transported from Chupaderos, state of Chihuahua, to the capital the most noted meteor ever found in the republic of Mexico. It broke in two pieces as it fell, both together weighing twenty-eight tons.

There are twenty-one states of the Mexican republic known as mining states,—Lower California, Coahuila, Chihuahua, Durango, Guanajuato, Guerrero, Hidalgo, Jalisco, Mexico, Michoacán, Morelos, Nuevo León, Oaxaca, Puebla, Querétaro, San Luis Potosí, Sinaloa, Sonora, Tamaulipas, Vera Cruz, and Zacatecas.



TUNNEL, INTEROCEANIC RAILROAD.

The number of minerals found in the republic is three hundred and twenty-four. There are twelve hundred and forty-seven mines in operation, and four hundred and forty-seven owned by different companies which are not worked. These mines produce gold, gold and silver, silver, copper, lead, cinnabar.

From our knowledge of ancient history of the great southwest we conclude that the civilization of the Toltecs and the Aztecs dates back to the seventh century, and from that time until the arrival of Cortez in 1519, over nine hundred years, we have evidence that these ancient and primitive people devoted a portion of their attention to working the precious metals. It is also evident that they mined in the most crude and imperfect manner, washing for gold and rough-smelting for silver. The process was imperfect in separating gold from silver, and much of their silver carried considerable gold. Yet in their workmanship they showed high artistic skill and great mechanical knowledge. At the time of the advent of Cortez Mexico was rich in gold and silver in every condition of use and ornament. The value of the treasure that Montezuma brought to Cortez as a present to the Spanish king, according to Prescott's estimate, was seven million four hundred and twenty-two thousand dollars. This does not include a vast amount of ornaments and the priceless jewels that were retained by Cortez and his followers. This can be taken as some evidence of the vast wealth of the ancient Toltecs and Aztecs, though little of their

gold and silver was brought to the knowledge of the greedy Spanish soldiery. Subsequently the Spaniards applied their knowledge of mining to the precious metals, and year by year extended their possessions and their facilities, introducing the use of quicksilver and approved methods aside from smelting. As time progressed we find the business of mining and that of treating or working the ores becoming separated, until shortly previous to 1810, the year of Mexico's greatest prosperity, the two were totally distinct. At this time the *rescatadores* bought the ores, hauling them to their haciendas, and reducing them by the most approved appliances then known. This system was carried on to an enormous extent, a vast floating capital being employed, and all classes being deeply interested in a fascinating and productive industry. Mining was extended to the northward, and soon the most ancient mining-ground of the Toltecs and Aztecs in Arizona and New Mexico, whence they had been driven to the south by famine and the attacks of the barbarous Red Indians, would have been again opened to the eyes of the world. But in the year 1810 occurred the great revolution which was the commencement of the internecine troubles and civil wars which disrupted this unfortunate country.

For fifteen years after the beginning of the revolution the products of the metals decreased immeasurably. The civil war destroyed the chain of communication between capital, which was buying and working the ores, and the miners or producers. Haciendas were ruined, and in many cases the machinery and works on the mines were destroyed. In all districts the principal mines were abandoned and machinery allowed to go to absolute ruin. The silver produced was only the gleaning of more prosperous times. The lower classes, by a desultory system, gathered only the rich surface-ores. The sole exception was the mines at Tazco, a short distance south of the capital, where there was a military station.

Humboldt, who in his studies of Mexican mineralogy is generally accurate, said, "The common feldspar belongs to the most ancient formations, as the mines of Pachuca, Real del Monte, and Moran, which furnish twice as much silver as Saxony, are contained therein. We frequently discover only vitreous feldspar in the porphyries of Mexico." The most ancient rock known is in the district of Guanajuato, the clay slate, which rests on the granite rocks of Zacatecas and the Peñon Blanco. It is ash-gray or grayish black, frequently intersected by innumerable small quartz veins, which pass into talc slate and schistose chlorite. In the mines of Valencia are discovered banks of syenite, hornblende slate, and true serpentine alternating and forming subordinate veins in the clay slate. Two different formations rest on the clay slate,—porphyry, at a considerable elevation, and the old freestone of the ravine and table-land of low elevation. The porphyry of the Sierra de Santa Rosa, of a greenish color, varies according to the nature of the base and the crystals contained. The oldest hornstone or compact feldspar is found passing into ptotonite or klingstein of Werner, which latter has a great analogy to the porphyry slate.

The veins of Guanajuato contain common quartz, carbonate of lime, pearl spar, splintery hornstone, calcareous spar, a little sulphate of baryta, and brown spar. The most abundant metals are prismatic black silver and red plunet or vitreous silver, mixed with native silver and silberschwartz. In the Catorce mine the gangue is decomposed, and contains lime spar, red ochre, and muriated and native silver. In Tazco and Real de Tehuilotepec are calcareous spar, lacteous quartz, gypsum, oxide of iron, galena, etc.

The district of Santa Eulalia, in the state of Chihuahua, a space of two square leagues, is thickly interspersed with veins of silver. Two hundred mines were worked, upward of fifty of them to a depth of six hundred feet, which would be the greatest limit, as the water and ore had to be carried out on the backs of the natives.

The famous vein of Guanajuato alone, since the beginning of the sixteenth century, produced three hundred million dollars, and during ten years of its greatest activity about eighty million dollars. The provincial treasurers' receipts from eleven principal mines during eleven years show a production of eighty million dollars. The silver exported from Vera Cruz annually equalled two-thirds of the silver extracted from the globe. The amount of production of the above mines, considering the crude manner in which they were worked in those days, shows conclusively that the ores must have been very rich and extensive. If these mines had been owned and worked by our present skilled miners, with modern appliances, the yield would have been fabulous. The total product of Mexican mines since they began to be worked is estimated at five and a half billions of dollars.

The last ten years have added a tremendous value to the mining interest, not only in opening up many new fields and generally stimulating the public mind, but also because of the more exact appliance of science to mining processes. The last link to bind the Mexican mineral world to American wealth is now being welded by the extension of the railway system through the republic. This once accomplished, there must be a legitimate mining excitement over Mexico which has not been equalled in her history. For no other mining region of North America has been so bounteously endowed by nature, not only as to ores of exceeding richness, but also as to extent of the mineral field, as Mexico.

The Spanish fathers must have become aware at an early date of the rich deposits of copper in the northern district of Lower California, and it was probably the first metal to receive their attention. That copper was mined to a considerable extent by the old mission padres is evident from the number of bells, kettles, implements, and utensils which were manufactured in a crude way in those days.

At San Telmo may be seen the ruins of an old foundry with its furnaces, and several caldrons are still there which were hammered out of copper mined in the vicinity.

At the San Fernando Mission, which at one time numbered about five thousand people, the most extensive work was done; and it is said that nearly all the mission bells in this district, as well as in California, were wrought in a primitive way by its priestly coppersmiths. One of the bells at the Rosario Mission, below San Quintin, marked "El Rosario" and dated "1810," was cast at San Fernando.

During the excitement at Alamo some years ago, and at Mexican Gulch, where the Viznaga mine is now pouring out a golden stream, spoons and horns were found, and decomposed sections of an antiquated arrastra, showing that these deposits were worked in the early part of this century.

Copper has been for a long time neglected in Mexico, and only recently has assumed any considerable importance, although its deposits are numerous.

Mercury has special interest in the Mexican mining industry, because of the process of treating silver ore generally adopted in the country. There are yearly consumed over seven hundred tons of mercury, of which hardly half is produced in the country, the rest coming from California and Spain. However, there are in Mexico important mercury deposits, the only trouble being that the miners have been so busy working silver, with which they are familiar, that they have let the mercury remain unworked and even unseen. This metal is found in several states, particularly in Querétaro.

Calamine is found in Mexico, but is not yet exploited; zinc is found in quantities in the form of blendes accompanied by silver ore. Antimony and manganese, while found in several mines, have not been worked. Although there are no mines exclusively of zinc worked in the