

# *The* Land of Nayarit

*An Account of the Great Mineral Region  
South of the Gila River and East  
from the Gulf of California  
to the Sierra Madre*



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IN the *Historia del Nayarit*, being a description of "The Apostolic Labors of the Society of Jesus in North America," embracing particularly that portion surrounding the Gulf of California, from the Gila River on the north, and comprising all the region westward from the main summits of the Sierra Madre, which history was first published in Barcelona in 1754, and was written some years earlier by a member of the order, Father Jose Ortega, being a compilation of writings of other friars—Padre Kino, Padre Fernanda Coasag, and others—there appear many interesting accounts of rich mineral regions in the provinces described, the mines of which were then in operation, and had been during more than a century preceding, constantly pouring a great volume of metallic wealth into that flood of precious metals which Mexico sent across the Atlantic to enrich the royal treasury of imperial Spain and filled to bursting the capacious coffers of the Papacy. The Spanish archives of the three provinces included in the *Tierra del Nayarit*—Sonora, Sinaloa and Lower California (including that part of Arizona south from the Gila River)—all go to show that from the early Spanish occupation of the region, in 1630 or thereabouts, the region was richly productive in gold and silver, and historians later than Padre Kino—Humboldt, Velasco, Ward, and others—all present elaborate accounts of the mineral resources of the great region, the teeming virgin wealth that there lay in the bosom of Mother Earth, and the energy and activity displayed in all quarters in its exploitation. Humboldt, viewing the region with the eye of the scientist, pronounced it the

### "Treasure House of the World."

Receiving one-fifth of all the gold and silver produced, the royal Spanish Crown extended throughout the entire region the most complete and perfect protection. *Presidios* (military posts) with strong garrisons were scattered through the land, and all the highways and avenues of traffic were constantly patrolled in force. Everywhere were peace and prosperity—prosperity for the proud priest and haughty hidalgo, but toil and poverty for the masses. The conquerors had enslaved the native population, and by their ill-requited labor, wrung from them with cruelty and contumely, or tricked from them with the consolations of an alien religion to a belief in which their fathers had been converted by a liberal application of sword and fagot, employing crude and primitive processes that with free labor could not be profitably employed save in reduction of the very richest ores (which was even then true to a great extent), during two centuries they poured forth an

### Undiminished Stream of Riches.

Throughout the entire region extensive abandoned mine workings, the ruins of large towns, many now silent and deserted, and ruins of churches and missions, scattered along all the routes of travel, attest that the country supported a large population and that the industry of mining was extensive and actively prosecuted. Every few leagues along the river valleys are to be seen old churches, some of them yet standing and in use, presenting various stages of dilapidation and decay, while of others naught remains but a few crumbling walls. Yet all these were once surrounded by seats of population numbering thousands, supported by surrounding mines and the allied industries of primitive times.

In 1810, when the Mexican patriots rose for independence, a portion of the military protection of this distant region was withdrawn to aid in suppression of the uprising upon the eastern side of the Sierra Madre, in the more central provinces of New Spain; and when independence of Mexico was secured in

1821, and Iturbide established his short-lived empire, military occupation and protection by the arms of Spain were terminated. Then the stirring scenes of Iturbide's dethronement and exile, his return to seek restoration, and his tragic execution, with the frequent changes in the central government that characterized that troublesome time, left neglected the work of protection of the isolated land of *Nayarit*. The strong military posts which had been through nearly two centuries a salient feature of the land were abandoned, while the roads were no longer patrolled by armed forces looking out to punish marauders and enforce the law. Insecurity succeeded security, and mining men feared to follow their isolated calling, scattered as they were in little camps. Then came the

### Great Apache Uprising

Of 1825, with which the frequently changing central government, too closely occupied by revolutions and counter revolutions closer home, was unable to cope, and local authority was powerless. For a half century the entire region was harried with desolation and murder, and nowhere was life safe and property secure. Thousands were murdered, prosperous towns sacked and destroyed, mines attacked and all their workers massacred, and hundreds—yea, thousands—of valuable productive mining properties were abandoned. In 1853 all that part of the region between the Gila and the present International Boundary, by the Gadsden treaty, became territory of the United States, and some effort to terminate Apache incursions therein was made from Washington. But soon the American civil war broke out, and our federal government, like that of Mexico, had troubles of its own closer home. In the early seventies attention of the American military authorities was again turned to a solution of the Apache problem. With the rise to power of General Diaz in Mexico, and secure entrenchment of the Liberal party in the government of that republic, attention there was also turned to the Apaches. Working together, the military forces of the two nations captured the last predatory band (that of Geronimo) in 1884. They were deported, and

### Peace Returned,

For the first time in sixty years. During all the years of devastation brave souls had dared the appalling dangers, and here and there mines had been worked; but as a great industry mining was paralyzed, and a region which had been once populous and prosperous had changed to a wilderness, with scattered settlements at wide intervals.

With the return of peace twenty years ago the region took new life, mining was resumed in all parts, old mines were reopened, new mines developed, and activity in all avenues of material advancement has resulted. Already the region has advanced to the front rank in the production of copper, including the great mines at Cananea, Bisbee and Nacozari, the combined output of which three great camps in 1903 reached a total of 118,057,000 pounds of refined copper. The gold and silver production has also reached large proportions, and annually increases. Among the camps producing the precious metals is that of Minas Prietas, about 200 miles south of the International Boundary at Nogales, the annual output of which exceeds \$3,000,000 in gold and silver bars.

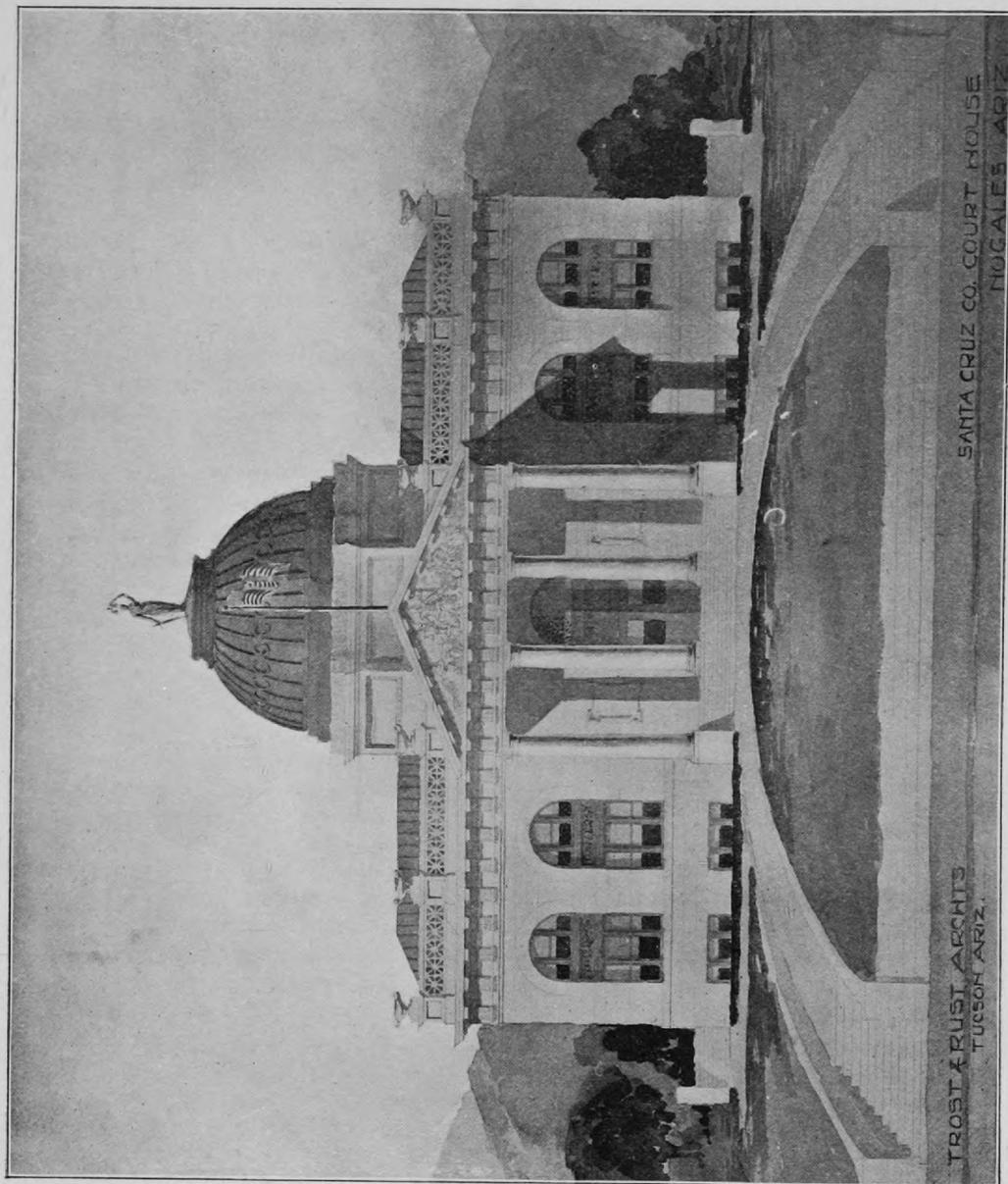
One of the principal seats of commercial and industrial activity in this great region is

### Nogales, the Line City,

Which includes two municipalities, separated by the width of a broad street, one in the United States, the other in Mexico. It is the gateway to the west coast of Mexico, the Sonora Railway, leased and operated by the Southern Pacific

Company, connecting the town with the port of Guaymas, upon the Gulf of California, 265 miles distant southward. From Guaymas steamer lines ply up and down the coast and across the Gulf to points in Lower California.

Connection is made with the main line of the Southern Pacific at Benson, a



distance of eighty-eight miles, the New Mexico & Arizona branch line of the Southern Pacific being the connecting link. At Fairbank, on the same line, seventy miles from Nogales, connection is made with the El Paso & Southwestern Railway, which connects with the Santa Fe system at Deming, N. M., and with the Rock Island and Texas Pacific routes at El Paso.

Nogales is the outfitting point for prospectors and travelers entering Sonora, the large and varied stocks carried by the various mercantile houses supplying everything that may be needed.

The city is made their home by many mining men operating in Sonora and Sinaloa, offering unusual advantages, being picturesquely located, with a delightful climate, good water, electric lights, excellent schools, and all the comforts of civilization. It is the center of a fine stock growing region; and in the valley of the Santa Cruz, close at hand, is a large body of fine agricultural land, a great deal of it under cultivation, supplying the town with vegetables, fruits, hay, etc.; and there are many thousands of acres yet to be reclaimed by operation of the new federal irrigation law, which will make Santa Cruz County a rich agricultural region, the produce of the fertile lands having awaiting it a rapidly developing market in valuable mining districts immediately surrounding, that are rapidly assuming importance as permanent and profitable producers of useful and valuable metals. The city is well built, of brick and stone, and has some very handsome edifices, including the court house, the public school, the Montezuma Hotel, the Brickwood, St. Andrews Episcopal Church, and many elegant private residences and comfortable dwellings.

Nogales enjoys an extensive trade with the state of Sonora in Mexico, and in southern Arizona. Its commerce reaches out also into Sinaloa, the adjoining state south of Sonora, and across into Lower California. It is the seat of the Arizona & Sonora Manufacturing Company, which conducts an extensive foundry and machine shop, and has turned out some of the best and most complete mills and reduction plants in Sonora, Sinaloa and Arizona, including the 20-stamp mill for the Yerkes Gold Mining Company, in the Altar district of the former state, and the mill for the Lluvia del Oro Mining Co., near Choix, in Sinaloa. This company is now engaged in filling contracts for a 200-ton reverberatory furnace for the Cieneguita Copper Company, at their extensive mines in the Sahuaripa district of Sonora, and a 100-ton quartz mill for the Lucky Tiger Combination Gold Mining Co., in the Moctezuma district of the same state, about sixty miles southeast from the International Boundary at Douglas. Roy & Titcomb, Incorporated, sales agents for the Arizona & Sonora Manufacturing Co., have an extensive mine supply house at Nogales, with branches at Douglas, Hermosillo and Guaymas. The house is a very important factor in development of the great region tributary.

### Banking Facilities

At the line city are adequate, and the houses are sterling and reliable. The Banco de Sonora has a strong branch at Nogales, Sonora. In Nogales, Arizona, the First National Bank is a safe, conservative institution, and the only American bank in the line city. In Nogales, Sonora, the house of P. Sandoval & Co. is one of the strongest and most widely known in the Southwest. Besides a banking and brokerage business, the house of Sandoval has extensive property interests in Sonora, including historic *Planchas de Plata* (Plates of Silver) mines, about twenty miles southwest from Nogales. The Montezuma, Brickwood and Arizona are the leading hotels in the line city. *The Oasis*, the *Border Vidette*, the *Daily News* and the *Daily Times* are the newspapers of Nogales. To enumerate all the important business houses would absorb too much space, and the reader is referred to the advertising pages herein. The

### Arizona and Sonora Chamber of Mines

Is an organization of business and mining men interested in the development of the region, which association is devoted to the collation and dissemination of important and valuable information in regard to the mining industry in the

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region described. It has a well furnished reading-room and offices, where all visitors are welcome, extensive cabinets of minerals, etc. The list of officers of the Chamber of Mines will be found upon the second page of the cover.

In the immediate vicinity of Nogales there has been a recent development of oil bearing formation—that is, men of long experience in oil regions have carefully examined the formation and pronounced it oil bearing. The Sonoita Oil Company, a local corporation, has been organized, and has taken up about 7,000 acres of land closely adjacent to Nogales, and will introduce improved machinery to thoroughly test the field.

In the region immediately surrounding Nogales were the seats of some of the *antigua* Spanish mining operations, many of which were conducted by the Jesuit and Franciscan friars who conducted the missions established for Christianization of the natives. Northward from Nogales about fifteen miles, in the valley of the Santa Cruz River, are the ruins of the Tumacacori mission church, which is noted in the annals of the early Spanish missions as having been under charge of missionary monks who devoted a great deal of attention to mining, and their properties are now known in tradition as the "Lost Tumacacori Mines." The church archives, long years ago transported to Spain, are said to have recorded that the mines worked by the Tumacacori friars were about ten miles to the east from the mission, in the Santa Rita Mountains, in the vicinity of a sharp peak visible from inside the church through the east entrance. Standing within the ruined building and casting the eye through the aperture, a sharp peak is discernible against the eastern horizon, and it is in about the center of the

### Tyndall District,

A region highly mineralized, which is today the seat of considerable activity, and where there are the shafts and tunnels in a score of hills, where the *antiguos*, as the early Spaniards are called, dug and delved. Among the principal mining properties in this region are the Joplin group, Goldtree group, Presidential group, Wandering Jew group, Santa Rita Mining Company's holdings, Warsaw, Trenton, Bland, Victor, Royal Blue, Temporal, Happy Jack, and scores beside which might be named.

The Joplin is now in active working, and is shipping to the smelter at El Paso high grade ores carrying copper, lead, gold and silver. It is under bond to Massachusetts people, who are actively prosecuting development and shipping ores.

The Wandering Jew is a mine which bears every evidence of having been one of the properties worked by the Jesuits nearly 200 years ago, and was discovered by Mark Lulley. In recent development old workings with rich ores were uncovered, which had been carefully concealed at the time of their abandonment, probably when the friars were driven away at the time of the Apache uprising. In the present workings upon "the Jew" there are blocked out, ready for stopping, several thousand tons of high grade shipping ore, heavy in lead and rich in silver. This property is also under bond to eastern mining capitalists who have projected extensive operations.

The Goldtree properties, now known as El Plomo group, were extensively worked some twenty years ago and their ores shipped. These ores are high grade sulphides of lead, rich in silver. The old workings, extending about two miles across the summit of a high mountain, consisting of many shafts and tunnels and the dumps at their entrances, show that operations were on an extended scale. The present owners, Albert Steinfeld & Co., of Tucson, have projected a

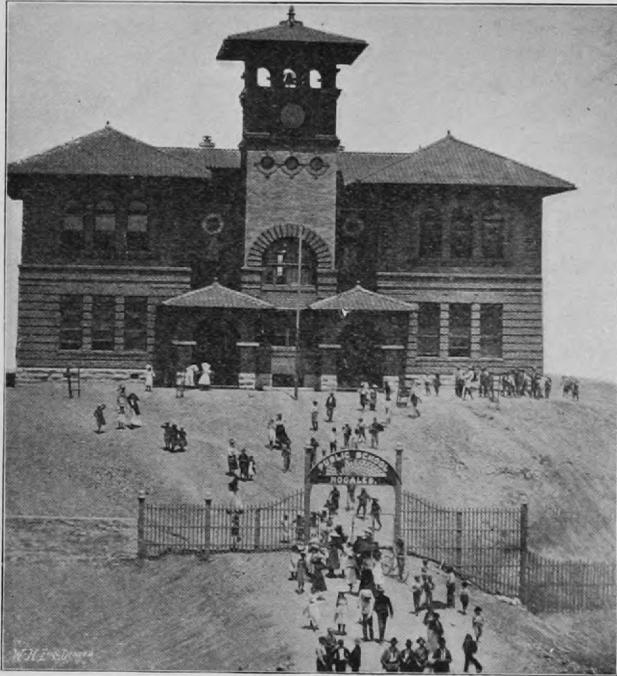
tunnel which will cut through the base of the mountain at a depth of 1,000 feet below the apex, and open extensively the entire group.

In the Tyndall district is a small concentrating mill, recently erected, to reduce custom ores. Upon the east side of the Santa Rita Mountains is the Greaterville placer gold mining camp, whose auriferous deposits have been worked many years and have yielded handsomely. Upon the north side of these mountains are many evidences of former workings, but no active operation at present. By competent experts the region is pronounced rich in mineral. Water is abundant, and extensive forest growths assure fuel and timber for many years.

Southeasterly from the Santa Ritas lie the

### Patagonia Mountains,

In which there is another rich and extensive mineral field, including Harshaw and Washington districts upon the east side of the range, and the Old Tucson district upon the west side. In the Harshaw district is the noted Mowry mine, a property with a romantic history, which was owned and operated by Lieutenant



PUBLIC SCHOOL, NOGALES, ARIZONA.

Sylvester Mowry, U. S. A., in 1860 and the early years of the civil war. The ruins of Lieutenant Mowry's reduction plant are yet standing in the vicinity—a few low, crumbling adobe walls. The ores, which are rich in lead and silver, were smelted and the lead and silver bullion transported by wagon to Guaymas, thence by water to Europe. Some of the silver was run into small plaques and ingots, and in the absence of money in a then remote region, they circulated from hand to hand as do coins elsewhere. They were of several sizes, each scrupulously of uniform weight and value. It was reported that some of the lead was shipped to the Confederate War Department, and cast into bullets for use in the military operations on behalf of the Lost Cause; and Lieutenant Mowry was put under arrest upon a charge of treasonable conduct and his property confiscated. A court of inquiry finally exonerated him, and he

left the service, going to Europe. After the war he returned to New York and published a book descriptive of the region, in which he asserted that his arrest and the confiscation of his property were the result of a conspiracy instigated by the general commanding the military district, to rob him of his property. The book asserts that it was leased to a civilian creature of the commanding general for a nominal rental, that the mine was gutted, and then abandoned. Twenty years later the mine was taken up by a company of Californians and worked several years, the ores being shipped. It is now the property of the American Industrial & Development Company, which has constantly employed a force of more than 100 men. The mine has been pumped free from water, and virgin ground below the old workings of Mowry and the latter company has been penetrated by a new shaft, drifts and levels from which have encountered large bodies of rich lead and silver sulphides and sulphurets. The main working shaft is now at a depth of about 600 feet.

Another famous property in the Harshaw district is the

### **Hermosa Mine,**

Upon which the town of Harshaw, a thriving and lively camp, was built in the early eighties. It was then owned and operated by a San Francisco company, which built a twenty-stamp mill, and within a few years realized a net profit of \$1,250,000. The mine was then in *borrasca*, as the Spanish designate the lean parts of mineral ledges, and operations were abandoned. The mill and property passed into the hands of the late Mr. James Finley, of Tucson, who had been superintendent for the California company. A cave in the old workings revealed another rich body of high grade silver sulphurets, extraction and reduction of which made Mr. Finley a very wealthy man. With the great slump in silver in 1893, Mr. Finley abandoned operations, and the property was idle ten years, the mill being sold and removed. In 1903 the Finley estate sold it to an Oklahoma company, which is now operating it. A tunnel 600 feet in length has been cut in below the old workings, and opened a large body of high grade sulphurets, which are reduced in a new mill completed in August of the present year (1904). The plant includes rolls and a Huntington mill, and has a daily capacity of about twenty-five tons of ore.

Not far from the Hermosa is the Hardshell mine, owned by Mr. R. R. Richardson, of Patagonia. This mine is developed to a depth of 600 feet, and has yielded large quantities of rich ores, which were concentrated and the concentrates shipped. The ores are lead-silver. The ledge, a true fissure, in porphyry, is wide and strong, and undoubtedly carries values to great depths. The group, all under the same ownership, would be a fine proposition for a large company.

Not far from Harshaw is the celebrated

### **World's Fair Mine,**

A property located in 1893 by Mr. Frank Powers, of Harshaw. During its ten years of operation the World's Fair has proved a veritable bank. Whenever the fortunate owner has needed money he has extracted and shipped a carload of ore that nets from \$10,000 to \$14,000 for each shipment. With ten years' working the mine has been developed by an extended system of tunnels, drifts and winzes, and in the various workings there are blocked out, ready for stopping, many thousands of tons of second grade rock. The deepest working, a winze about 150 feet down from the lower tunnel level, is more than 600 feet below the croppings at the apex of the ledge. In the upper workings the ores were rich lead-silver sulphides, but below the water level the character of the pay rock has changed, and a great deal of tetrahedrite (grey copper), rich in gold and silver, is found.

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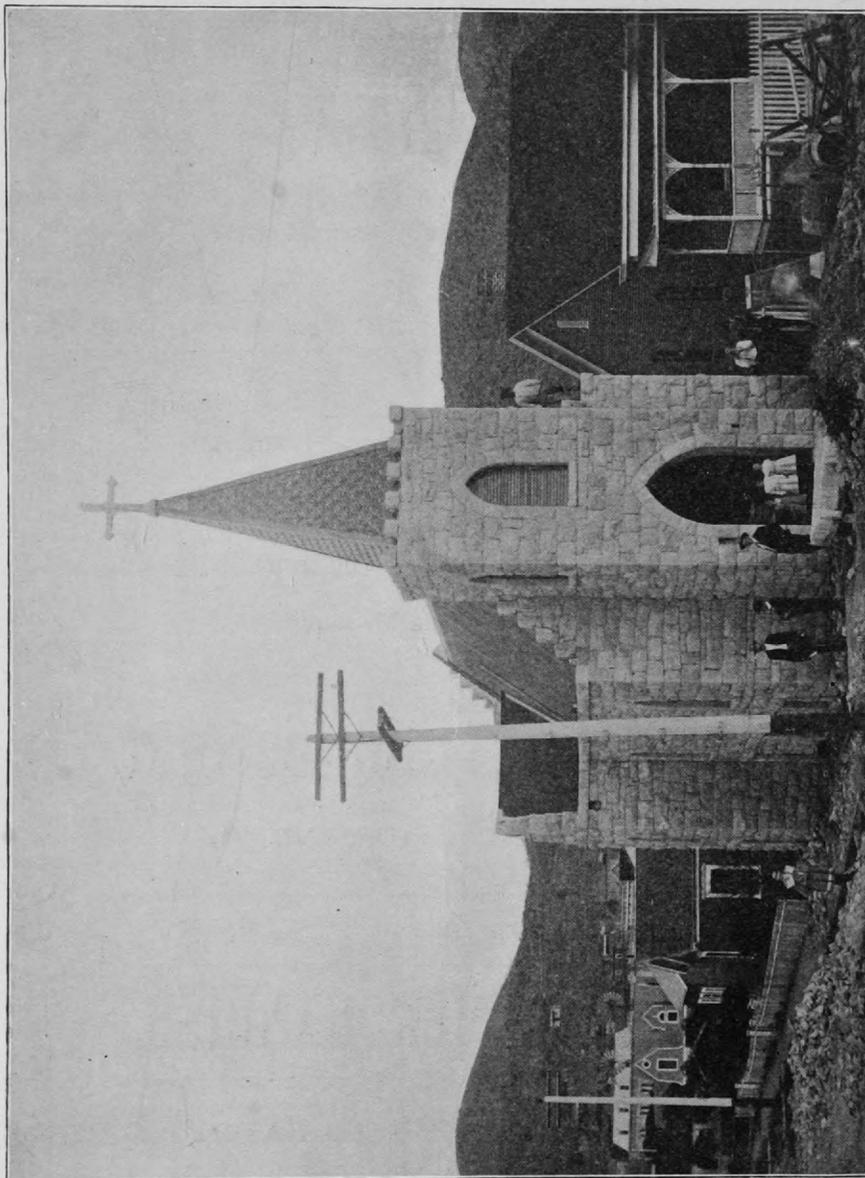
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Cananea, Sonora, Mex.  
Naco, Ariz.

Tombstone, Ariz.  
Bisbee, Ariz.

In the Harshaw district there are many valuable claims which with development would rank with the World's Fair, Hermosa and Mowry. Among these are the Flux, R.R.R., Lead Queen, Bluenose, Redmen, Andes, Trench, and many more. Near the Mowry the Endless Chain Mining Company, an Oklahoma corporation, is developing a group of fine properties, and is extracting high



ST. ANDREW'S CHURCH, NOGALES, ARIZONA.

grade rock that pays to ship. Over upon the south side of the district the Four Metals Mining Company, of Phoenix, Arizona, is developing three groups, one of sixteen full claims and two others of five each. They lie west and south of the Mowry, a couple of miles distant.

South from the Mowry about four miles is the

### Washington District,

With the great copper mines at Washington Camp and Duquesne. At the former place the Pride of the West Mining Company owns a group of claims, about 350 acres, and a 100-ton reduction plant—the latter a combination of electric and water concentration and smelting. The ores are rebellious copper sulphides, very difficult to treat. The company had first a 40-ton plant, which was in successful operation a long time. That was dismantled, and in its stead the present plant erected.

In the vicinity is the Pool group, several claims with large and well defined bodies of sulphide copper ores, principally chalcopyrite, such as are found in all the mines in the camp.

In the vicinity of Duquesne, which is about a mile away from Washington Camp, are the properties of the Duquesne Mining Co., (George Westinghouse & Co., of Pittsburg, Pa.), embracing about forty full claims (800 acres), upon which there is a 635 foot shaft and extensive underground development, exposing large bodies of chalcopyrite and chalcocite ores. It is understood that eventually the company will erect a great reduction plant on the Santa Cruz River, connecting it with the mines by a railway to Nogales, to reduce the ores to supply copper to the colossal electrical machinery factory operated by the Westinghouse Company at Pittsburg.

In the vicinity of Washington Camp and Duquesne are many other valuable properties, including the Belmont, Redbird group, Emma, all upon the same great contact of lime and porphyry, and all showing large and well defined bodies of copper sulphides, with considerable development. Eventually the district will be a great seat of metal production. The entire Patagonia region has an abundance of wood and water.

Upon the western slope of the Patagonia Mountains and eastward from the Santa Cruz River is the

### Old Tucson Mining District,

In which there are a large number of very promising properties, where good showings have been made in extensive workings. The Chicago & Patagonia Mining Company, J. T. Brickwood, general manager, are developing the Old Soldier group of mines, which is about twelve miles northeast from Nogales. They have a working shaft 200 feet deep, and a prospecting shaft about 150 feet on an incline following down a well defined ledge bearing high grade copper ores carrying gold and silver, with 500 feet of drifts and crosscuts.

The Golden Rose Mining Company, under bond to the Arizona-Mexico Investment Company, of Nogales, has a group of five claims further down the western slope of the mountain, toward the river, with a large body of good gold ore, and is arranging for erection of a mill for its reduction. Mr. L. W. Jimmie, of Nogales, is president of the company. The gentleman is also owner of the Blackhawk, a rich silver property in the same vicinity, which shows four feet of good ore, some going as high as 1,600 ounces in silver per ton. The Gladstone Mining Company are working the Macedonia and Arizona, two valuable copper properties, the ores carrying gold and silver. In the same district the Nogales Copper Company owns a group of copper mines presenting a fine showing, with considerable development. The Prudential Mining Company has also a good group of claims, upon which extensive development shows large bodies of high grade copper ores carrying gold and silver. Mention of other good properties is necessarily omitted.

Westward from Nogales about thirty miles is the

### Oro Blanco District,

A gold region, where are the Warsaw, Montana, Sorreltop, Old Glory, and a number of other mines. There is some placer mining in the district, but operations in both quartz and placer mining are greatly restricted by an insufficient supply of water. Storm waters are impounded in reservoirs and saved for use. A succession of dry seasons has rendered water very scarce, and there has been little doing. This year summer rains have been very abundant, and the cycle of eleven years to which Arizona is subject having now passed out of the period of drouth and entered a period of several years of abundant rains, the Oro Blanco region will now enjoy a period of renewed activity.

Upon the north of Santa Cruz County lies

### Pima County,

One of the oldest and largest in Arizona, from which have been carved several other counties, including Santa Cruz, Cochise, Pinal, Graham and Yuma. The county once included all that part of Arizona which came to the United States with the Gadsden purchase. Tucson, the county seat, disputes with San Augustine and Santa Fe the palm of seniority among cities in the United States. The county has a number of rich mineral regions, including the Silver Bell district, in which the Old Boot mine recently sold for more than one million dollars; the Red Rock, Imperial, Helvetia, Rosemont, San Xavier and other districts. The San Xavier mission, about nine miles south from Tucson, is another of the early missions founded by the Spanish conquerors, and long the seat of a religious order. It is about fifty miles north from the Tumacacori mission, in the Santa Cruz valley.

Another county in southern Arizona is included in the area which came under the stars and stripes with the Gadsden purchase—Cochise. It is the southeastern county in the Territory, and includes one of the richest mineral fields anywhere in the world, in which are the far-famed silver mines at Tombstone, and the equally famous copper mines at Bisbee. The

### Tombstone Mines

Were discovered by Ed Schieffelin, in 1878, and during a period of nearly ten years they were very rich in production, the camp being one of the most noted and lively in the Rocky Mountain region. With depth of operation the handling of water in the mines became a serious problem, and the various mining companies could not agree upon an equitable method of keeping their mines dry. It was a case where unity of effort was required. The companies owning the deepest mines refused to drain all the other properties through their pump shafts. Other differences arose, and operations were abandoned, the pumps drawn, the mines filled with water, and Tombstone was desolate for a period of ten or twelve years. In 1901 the Tombstone Consolidated Mines Company acquired 95 per cent of the property and set about a systematic development and operation of the long abandoned mines. A four-compartment shaft has been sunk nearly 1,000 feet, and is sunk steadily as the water lowers. It measures 7x22 feet inside the timbers. Two great hoisting engines assist in the operations, and the pumps have a lifting capacity of 2,500,000 gallons of water every twenty-four hours.

The mines have been examined and reported by mining engineers of world-wide standing and reputation; and the concensus of expert and scientific opinion is that geological indications and past records all point to continuation of the ore

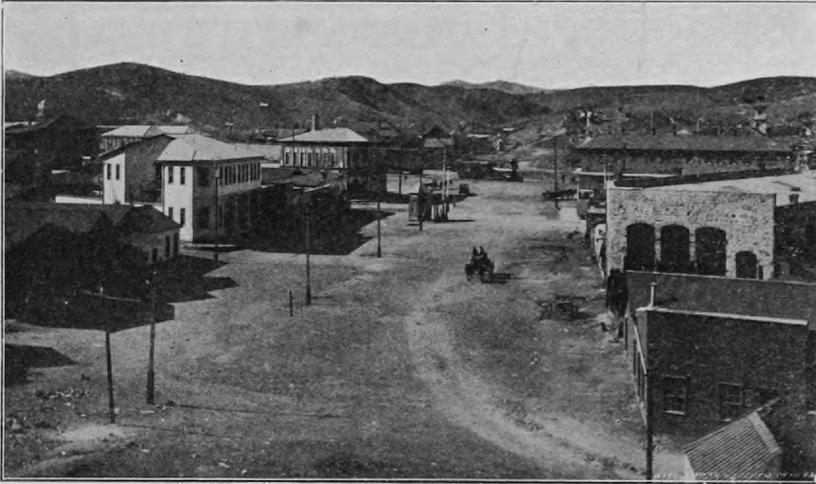
deposit to great depths. Since these mines were closed down there have been great improvements in methods of mine operation and ore reduction, which have greatly cheapened the cost of metal production. With those improved and cheapened methods of operation the phenomenal earnings of former years will be surpassed, even with silver at a discount of 60 per cent from the price it commanded in the halcyon days of the camp.

Within two years Tombstone has been connected with the outside world by rail, a branch of the El Paso & Southwestern Railway having been constructed from Fairbank, nine miles distant.

About twenty-seven miles south from Tombstone, and within nine miles of the International Boundary, fifty miles east from Nogales, are the great

### **Bisbee Copper Mines,**

Where are conducted the operations of the Copper Queen Mining Company and the Calumet & Arizona Mining Company. The first named company has produced copper continuously since 1880, and the production has steadily increased



NOGALES IN 1901—VIEW ALONG INTERNATIONAL LINE.

from 1,379,940 pounds of refined copper in that year to 36,385,000 pounds in 1903, an aggregate of 400,000,000 pounds within the period of twenty-four years. The Calumet & Arizona Company did not begin smelting until 1902, in which year its production was 2,066,676 pounds of refined copper, which output was raised to 25,000,000 pounds in 1903.

During many years the Copper Queen Company conducted its smelting operations at Bisbee, but during the present year it has dismantled its smelting plant, and now its ores are transported by rail twenty-seven miles to Douglas, where they are treated in a new and colossal reduction plant of 2,500 tons daily capacity, in which are reduced not only the ores from Bisbee, but those from Nacozari, Sonora (Moctezuma Copper Co.), and Morenci, Arizona (Detroit Copper Co.), all under the same ownership as the Copper Queen.

The Calumet & Arizona Company has also at Douglas, a new and thriving town on the International Boundary, about seventy miles east from Nogales, an extensive reduction plant constructed upon the most scientific principles, capable of the most economical production of refined copper.

# Banco de Sonora.

Paid-up Capital, \$1,000,000. Surplus, \$500,000.

Main Office: HERMOSILLO. Branches: NOGALES, GUAYMAS, CHIHUAHUA.

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## Sonoita Oil Company,

of Nogales, Arizona.

Capital, \$5,000,000.

PROPERTY, 8,000 ACRES Land, with first-class indications for OIL, located in Santa Cruz County, Arizona, within one-half mile of the New Mexico & Arizona Railroad.

In the Warren district (Bisbee and vicinity) a number of other strong companies are developing fine properties, among which may be named the Calumet & Bisbee Development Co., Calumet & Cochise Development Co., Lake Superior & Pittsburg, Calumet & Pittsburg, Pittsburg & Duluth, Wolverine, etc. All these companies have extensive holdings upon which many hundred thousand dollars have been expended in scientific development, with every confidence that they will all take rank as great and permanent producers.

To describe the various mining districts of Cochise County would tax the capacity of a library, without mentioning a modest pamphlet like this. There may be named the Turquoise, Gleason, Pearce and Dragoon districts in the Dragoon Mountains; the Paradise and Bowie and Dos Cabezas districts in the Chiracahua Mountains, and many others, all having productive mines.

About fifty miles by rail southwest from Bisbee, entering the state of Sonora, Mexico, at Naco, are the great

### Cananea Copper Mines,

Where the Cananea Consolidated Copper Company (Greene Consolidated Copper Company in the United States) have within five years developed and established one of the greatest copper mining camps in the known world, the production of which in 1903 was 45,000,000 pounds of refined copper. The mining lands of this company, 4,214 *pertenencias* (a *pertenencia* is a hectare), equivalent to 10,408 acres. The ores are of great extent and variety, including great masses of oxides, carbonates and sulphides, with frequent deposits of native copper, occurring through a distance of seven and one-half miles along the main tract of the company, which lies along the east side of the southern half of the main range of the Cananea Mountains, seventy-five miles southeast from Nogales.

The mineral holdings of the Cananea Consolidated (Greene Consolidated) Company are divided into five zones—the Cobre Grande, Veta Grande, Esperanza, Capote and Puertocitas. The developed ore body in the Veta Grande is quoted by the Copper Handbook (1904 edition), an eminent authority, as having been in June, 1903, six million tons, averaging 10 per cent copper. The Capote ore body is estimated to have a minimum width of 165 feet and a maximum width of 225 feet, with eleven millions of tons of ore exposed, which estimate the authority above quoted asserts could be increased without damage to the truth. Work in these ore bodies constantly extends their limits, and extensive developments in the other zones named are exposing great reserves of valuable ores. The

### Machinery Plant

At Cananea is one of the most extensive and complete upon the continent. The buildings are with steel frames, covered by iron sides and roofs. The power plant has three engines, with direct connected 100 K.W. dynamos and one 200 K.W. dynamo, giving a total of 700 H.P. This plant generates a 250-volt current to supply power wherever needed about the plant, and furnishes light for all the mine buildings and the two towns of the camp—Ronquillo and La Cananea.

The furnace building encloses eight Mitchell economical, hot blast, air jacketed furnaces, the united capacity being a daily consumption of about 1,300 tons of ore. A new concentrating mill with a daily capacity of 2,400 tons of ore has recently been completed and set into operation. By its use in concentration of the silicious ores, and smelting of the concentrates with other non-silicious ores, the ore consumption is raised to about 3,000 tons daily and the output of blister copper will be more than doubled, very likely reaching an annual product of 100,000,000 pounds of refined copper.

The blister copper is shipped east, where it is refined for the company at a very favorable rate.

The mines and works are connected by an eleven-mile narrow gauge railway, well equipped with motive power and rolling stock, ample to meet all requirements.

The company conducts extensive boarding houses for employes, a colossal department store and a bank, the latter with a capital of \$200,000 Mexican, and doing a highly profitable business. In 1903 the company paid three dividends of 2 per cent each, in January, February and March, after the net earnings were put into betterments. With those completed, and with the consequent increased production, 3 per cent dividends are now being paid every two months—18 per cent per annum. The capitalization is \$8,640,000.

The Democrata Mining Company has properties in a central location, surrounded by those of the greater corporation. Its ground is well developed, with great ore reserves, and it has a 250-ton reduction plant, complete.

The Indiana-Sonora Mining Co. (Copper Queen) has also extensive holdings at Cananea, upon which active development is in hand. No ore has been shipped, but in due time shipments will probably go to the new smelter at Douglas.

Cananea, which is in the Arizpe district of Sonora, supports a population of very near 20,000, and is the largest camp in operation in Sonora. Seven years ago there were not 500 people in the entire region.

In the Cananea Mountains are many valuable undeveloped and partly developed copper properties which need only capital and scientific management to bring them into the list of producers. The region is but a single field in a great copper belt extending from Globe and Clifton and Morenci, north of the Gila, through to the Mayo River, the southern limit of the state of Sonora, including the three camps named—Bisbee, Cananea; Nacozari and Transvaal in the Moctezuma district; Santo Nino (Yaqui Copper Co.), Tonichi and Chipiona (Cianguita Copper Co.), in the Sahuaripa district; Baroyeca and Piedras Verdes, in the Alamos district. Of some of the others, more hereafter.

About midway between Cananea and Nacozari, directly south from Bisbee about sixty miles, is another partly developed copper region of immense area and possibilities, the property of P. Sandoval & Co., bankers, Nogales, Sonora.

But to return to our starting point, "the line city." On the Mexican side of the International Boundary is the

### Magdalena District,

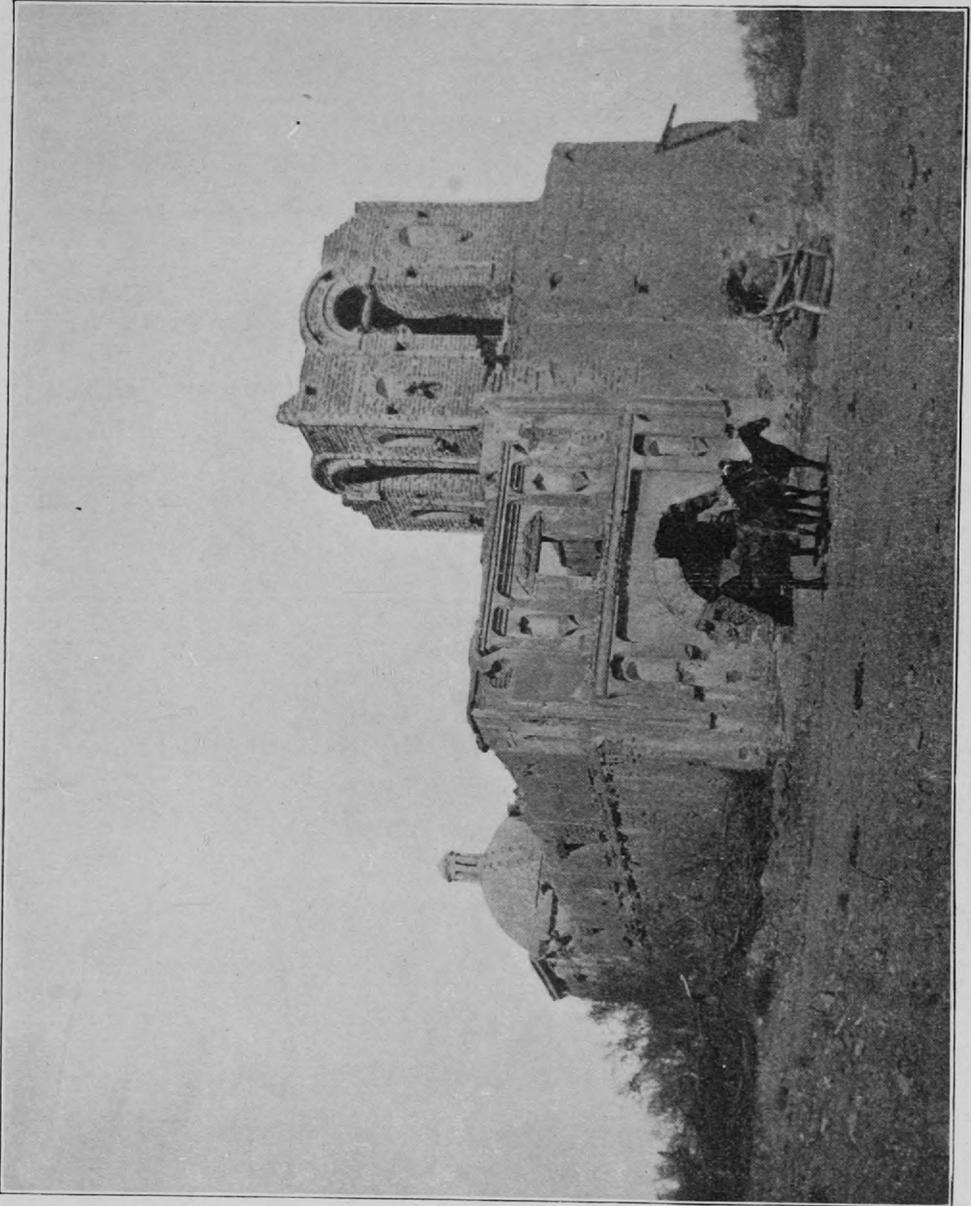
One of the richest and most attractive in Mexico. It is the seat of some of the most noted and historic mines of the Spanish occupation, including the Planchas de Plata, Cocospera, Higuera and Cerro Prieto, and is now the scene of great activity.

One of the most interesting of these *antigua* properties lies about twenty miles southwest from Nogales, and is known as "Planchas de Plata" (Plates of Silver). In the *Historia del Nayarit*, instanced at the outset of this pamphlet, it is related that some fifteen years preceding the publication of the work, which dated the discovery back to the year 1739, a mineral discovery was made a short distance from the *Real de Arizona* (whence may have been derived the name of the Territory) which attracted the attention not only of New Spain, but of all the nations of Europe. A Yaqui Indian working in the vicinity revealed to a trader his surprising find, and the other made it public. The news of mineral wealth so abundant spread far and wide, and soon attracted a great multitude.

At a depth of a few *varas* (Spanish yards, about thirty-three inches) in the bed of a canon cutting down the side of a mountain were found

### Masses of Pure Silver,

Globular in form, weighing one to two *arrobas* (an *arroba* is twenty-five pounds).



RUINS OF TUMUCACORI MISSION CHURCH.  
(EIGHTEEN MILES FROM NOGALES.)

Several pieces weighing twenty *arrobas* each were taken out, and one found by a man from Guadalajara, weighed twenty-one *arrobas* (525 pounds). The author relates that as no animal could carry so great a weight as a pack, and an effort to cut or melt down the lump was not successful, an ingenious contrivance was employed for its transportation. A litter or carriage was slung between two

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pack mules, the mass of metal was raised into the branches of a tree, the animals led underneath, the load lowered to the resting place designed for it, and in that way it was easily transported.

Another work, entitled *Los Ocios Espanoles*, refers to the discovery, and J. F. Velasco, who wrote in 1845 a very valuable book descriptive of mines in Sonora, gives it extended mention, quoting both the authorities cited, and refers also to documents relating thereto existing in the archives of the missions of *Pimeria Alta*.

Velasco relates that in 1817 Dionisio G. Robles, of Rayon, a town on the San Miguel River, about 175 miles southeast, fitted out an expedition and proceeded to Arizona for the purpose of exploring these mines. They remained in the locality but eight days, being driven out by Apaches. They found a small lump weighing about five pounds, but they felt that had they been permitted to remain longer their search would have been richly rewarded. The members of the expedition all agreed that the entire region was rich in minerals, and that eastward from the scene of their explorations was a mountain ridge containing numerous veins of silver, crossing each other in all directions. That was probably the field of recent exploration and development.

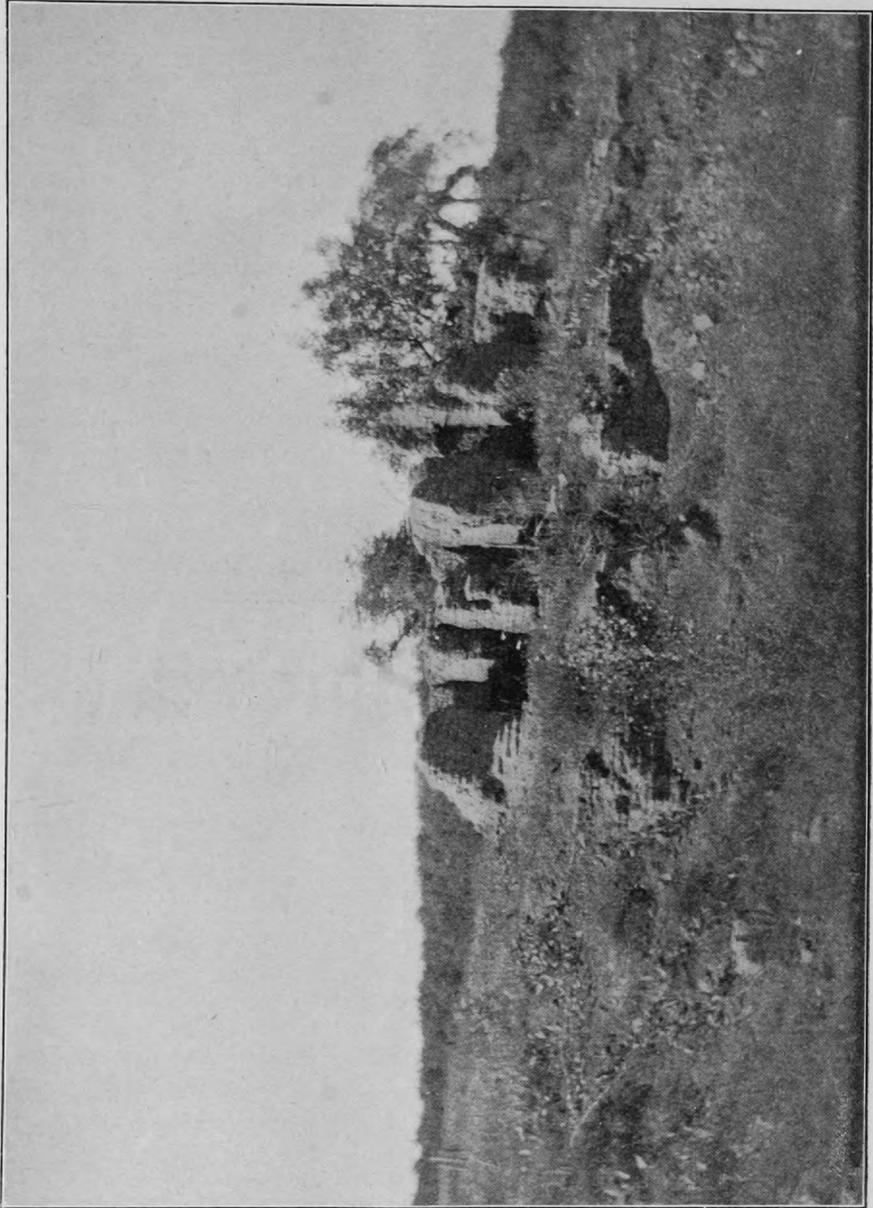
The authorities quoted all relate that the larger masses found were immediately seized by the military commandant at the Presidio of Altar, claiming them as the property of the Crown. The parties interested protested, but were overruled. Appealing to the audience chamber at Guadalajara, they were referred to the Court at Madrid. After seven years the King decreed the silver as of the royal patrimony, and ordered that the mines be worked for his own benefit. That decree caused abandonment of the property by the claimants, and for some reason the King's order to work it was never complied with. From that time, with the exception of the effort of Robles in 1817, no attempt was made to work

### Las Planchas de Plata Mines

Until 1878, when Captain A. N. Towne put up a 5-stamp mill and operated several years. In 1886 Doctor A. J. Clarke, now residing at Santa Ana, acquired the property, erected a small mill, established a store, and successfully and profitably conducted operations through several years. Later an American company bought the property; but about all they succeeded in doing was development of a protracted and costly litigation. Finally, between four and five years ago, Messrs. P. Sandoval & Co., Bankers and Brokers of Nogales, secured ownership, and set about exploitation and development on a very careful and economical basis. Conditions seemed very unfavorable, but the enterprising firm, with dauntless zeal and energy, set about improving the conditions. They reopened and cleaned the old mines, opened new ones, repaired and renovated the old mill, and resumed bullion production. With an old 10-stamp mill, subject to frequent breakdowns which took up about half the time in repairs, they nevertheless succeeded in realizing a monthly profit of \$1,500, which was regularly maintained during a period of more than four years. In the course of that time they developed and exposed, ready to stope and send to the mill, large bodies of low grade ore which would pay to treat upon an extensive scale with a large mill, the erection of one in the near future being contemplated. Five hundred tons of ore daily could be supplied such a mill through an indefinite period. Heretofore only high grade ores have been sent to the mill, and hundreds of thousands of tons which would pay to work on a large scale are left in the workings.

The geological characteristics of the Planchas de Plata region are marked and striking. To the eastward a distance of eight or ten miles an immense *trachyte* dyke, running in a northerly and southerly direction many miles, and

many hundred feet in width, has been thrust up through a series of limestone beds superimposed upon a porphyry field, pushing back both formations, folding and crumpling back the rocks for miles beyond. In the axes of the folds the crushing and crumpling of the rocks on the lines of contact, aided perhaps by an upthrust from below, broke and ground the porphyry into a fragmentary condition, leav-



RUINS OF MOWRY SMELTER, PATAGONIA MOUNTAINS.

ing in many places great air vesicles and even chambers. Then came a great flow of superheated waters, strongly impregnated with salts of silver, depositing bromides and chlorides upon the cleavage planes of the broken rock and filling the air vesicles and chambers with the native metal. Released from their beds by erosion and rolling down into the bed of the canon below, the "plates of

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Nogales, Arizona.

silver" constituted the great find chronicled by the Jesuit author, and the broken porphyry impregnated with chlorides and bromides in the mountain ridge to the eastward was the network of veins of silver, crossing each other in all directions, described by members of the Robles expedition in 1817. The silver bearing rocks are plainly porphyry, the cleavage planes coated with bromides and chlorides. Where they have been greatly crushed and broken the values run high, and where they are broken into large pieces the ores are of lower grades. The ores that have been milled have run from 100 ounces up to 2,000 ounces per ton. The immense masses left in the mine yield from thirty to sixty ounces.

The properties included in the holdings of the Sandovals (Big Mountain Mining Co. is the name of the corporation) comprise about 320 acres. Besides theirs there are in the vicinity the *Mejia* mine, owned in Guaymas, and *La Corrusca*, owned by Mr. Bracey Curtis, of Nogales. The latter property Mr. A. W. Tennant is developing under bond.

About six miles north from Las Planchas de Plata are the Promontorio mines, now owned and operated by the Promontorio Consolidated Mining Company. During many years these mines were under the ownership of Mr. L. Ephraim, of Nogales, who was a constant shipper of high grade ores. A small concentrator treated the second class rock, and the concentrates were shipped. The company now owning the property are commencing extensive operations and erection of a large reduction plant, which will put the really fine property in the front rank as a permanent and profitable producer. The property is developed by means of tunnels and winzes, which have exposed large bodies of high grade silver ores, carrying gold. Its location, close to railway, and the numerous advantages it enjoys for cheap and economical operation, together with the extent of the property, the extent of the developed ore bodies, and the high grade of the ores, all tend to make of the Promontorio an ideal mining proposition.

About twenty-five miles southeast from Planchas de Plata, twelve miles eastward from the line of the Sonora Railway, at Quijano station, thirty miles south from Nogales, is the camp of the Hays Mining, Milling & Lumber Company, of Washington, D. C. This corporation owns 50,000 acres of fine timber land, underneath which run numerous large and well defined ledges of copper, carrying gold and silver, and a large gold bearing ledge twelve feet in width, rich in free gold, that will pay very handsomely to mill. A 30-stamp mill has been recently completed and set into operation.

Upon the east side of the Pineta Mountains is the valley of the

### Cocospera River,

Where are the ruins of an *antiguo* mission church and the vestiges of what was once a goodly sized town, with great slag dumps which bear evidence that the place was the site of extensive smelting operations. In the Pineta Mountains and the Sierra Azul, upon either side, are many *antigua* mines, whence came the ores reduced at the smelters. In one of the *antiguas* the Sierra Azul Mining Company have developed a fine body of high grade wolframite, rich in gold. This ore concentrates easily and commands a high price.

West of the Sonora Railway in this region are the Guacomea Mountains in which there have been mining operations of some extent. The Guacomea Mining Company operated a 20-stamp mill several years and made shipments of gold bullion, some of which was smuggled out of the Republic without paying the export duty, and the property was confiscated. The original owners, having not been paid the entire purchase price, were restored to possession, and they sold to the Hays Company, which moved the machinery to the Pineta Mountains, adding it to a 10-stamp mill they had previously had in operation.

In this vicinity the line of the Sonora Railway follows the Magdalena River, a beautiful valley flanked by mountains upon either side. Fifty miles south from Nogales is Magdalena, a town of about 3,000 inhabitants, seat of government of the district, and also of a great and growing trade with rapidly developing mining regions, and surrounded by a rich agricultural and horticultural region.

About fifty miles eastward from Magdalena the Dolores and Santo Domingo Rivers unite to form the Rio San Miguel. Above the junction, in the canon of the Santo Domingo, is the great placer gold field which bears the name of the river, and several miles farther up the stream is another great field of auriferous deposit named *La Brisca*. Both of these fields are embraced in the holdings of the Greene Consolidated Gold Co., of New York, the area including one of the richest known gold deposits, extending nearly fifteen miles along the river channel, together with the gravel benches along either side, which have long been celebrated for the richness of their deposits of placer gold. These deposits were derived from erosion of innumerable gold ledges in the ranges surrounding the river valley, known as the Caliche, Sierra Azul and Santa Rosalia Mountains, forming a great natural basin drained by the river. This region is declared by Prof. Robert T. Hill, of the United States Geological Survey, to be "one of the

### Greatest Gold Bearing Regions

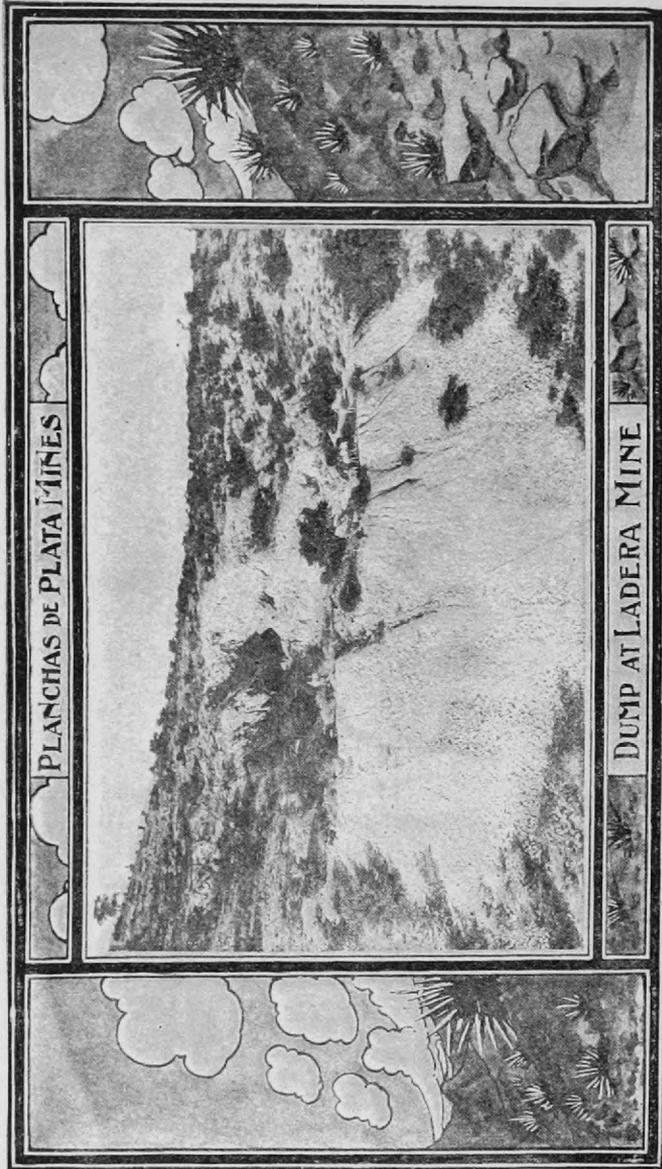
In the world." The river has cut its channel through a formation of yellowish tuffaceous material to a depth of 100 to 400 feet. The main channel has numerous collateral feeders, which extend from the gold bearing veins to the central channel, and have also cut numerous cañons from thirty to 100 feet in depth. Geological indications are that the basin was once dammed by a barrier at the lower end, since removed by erosion, which formed a lake, upon the bottom of which was gradually deposited through the ages a bed of reddish gravel from forty to 100 feet in depth, carrying gold in large quantities. As erosion continued the deposits of gravel were gradually removed from the benches and distributed upon the bed of the river to their present depth of forty to sixty feet of pay gravel upon the bed rock, which innumerable and exhaustive tests show to run from seventy cents to twelve dollars per cubic yard.

This section of the country was noted as one of the sources of the great supply of gold which during the early Spanish occupation poured across the Sierra Madre to the vice-regal court at the City of Mexico, thence to the royal treasury of Spain; and before that time it was the source of much of the gold that the Aztecs had accumulated, to have wrested from their possession by the daring *conquistadores*. The beds of the cañons in the surrounding mountains were worked by the Spaniards and by their Aztec predecessors; but they were unable to handle the immense volume of water in the river channel and percolating to the bed rock (the surface flow never less than 200 inches, and that underground much greater).

The Greene Consolidated Gold Company have thoroughly tested and explored this ground a distance of fourteen miles along the river channel, sinking shafts to bed rock and running drifts, proving that the gravel gives uniform gold values through the non-worked canon. Now extensive appliances for recovery of the gold from the gravel are in course of installation. Steam shovels and aerial tramways are being installed to move the gravel and dump it into sluice boxes, where the values will be sluiced out. Heavy pumps will drain the bed of the stream, discharging the water into the sluices, separating the gold from the gravel, leaving it deposited in the riffles. The water, which has heretofore been an insuperable obstacle to working the rich gravel, by the natives,

will be made to contribute to the work, and will afford the cheapest and most economical method for separating and saving the gold.

In the region surrounding the Santo Domingo River are several good, pro-



ducing gold mines, with *antiguo* records extending back to the days of the Spanish occupation. Among these are the Caliche, Klondyke, Tucabe and

### Cerro Prieto Mines,

The latter being situated within a few miles of the confluence of the Santo Domingo and Dolores Rivers. The properties include a group of mines embracing 102 *pertenencias* of mining ground. The name *Cerro Prieto* (Black Mountain) is applied to a lofty ridge of dark limestone, about 7,000 feet in length, rising about 1,000 feet above the mill site at its southern base. Through the ridge

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runs a great porphyry dyke, varying from ten to one hundred feet in width, all mineralized, carrying gold in quantities to pay handsomely when treated on a large scale. The rock is soft, friable, easily milled, and the gold readily separated. Wherever tested in the entire distance of 7,000 feet the rock yields from one to eight dollars in gold. The property has been opened by a series of tunnels, the lowest, but a short distance vertically above the mill site, having reached a length of 1,000 feet. This tunnel is 800 feet below the upper tunnel, now in operation, and all are connected by upraises, so ores from the tunnels above are dropped down to the lowest tunnel level, and out to the mill. A 20-stamp mill has been in operation several years, but it will be shortly replaced by one with a daily capacity of 200 tons.

About seven miles northeast from Cerro Prieto is the *Providencia* group, very similar to the former in general characteristics—formation, great ledges, free gold, etc. Beyond that, still to the northeast, is the *Caliche*, a great mountain of low grade gold ore, which is bonded to the Greene Consolidated Gold Co.

Beyond the Santo Domingo River some eight or ten miles, eastward from Cerro Prieto, are the Klondyke and Tucabe camps. The Klondyke has a five-stamp mill, and its monthly production of gold bullion runs from \$9,000 upward. The Tucabe has a five-foot Huntington mill, with a daily capacity of ten to fifteen tons. It has shipped some very fine gold bullion. In the immediate vicinity of the Klondyke is the *Rey del Oro* (King of the Gold), an *antigua* mine which shows extensive workings. It has a broad ledge, varying from ten to thirty feet in width, with free milling gold values disseminated through all parts. A tunnel is following the ledge to cut under the old works, and it is in ore with goodly values all the way. The property needs a large mill, and with one would pay very handsomely. There are many more good prospects in the vicinity.

Down the San Miguel River, just below the union of the Dolores and Santo Domingo to form the first named stream, is the town of Cucurpe—modern in its present acceptance, but the site of an older town that was of some importance during the time of the Spanish occupation. Westward from Cucurpe a league and a half is

### “La Higuera,”

A gold region which bears every evidence of having been the seat of extensive operations in *antigua* days. There was once a large town, as shown in the vestiges of many buildings; and the ruins of more than a score of *arrastras* show the method of ore reduction employed. The formation is lime and porphyry, between which runs in a north and south direction a great dyke twenty to sixty feet wide and nearly a mile long. The rock material in the dyke includes lime sulphates and quartz, and it bears geologic evidence that in the formative period it was finely crushed and broken, and a flow of gold-impregnated solutions precipitated their contents among the finely comminuted rock. Present development is mostly by tunnels, which have exposed an eighteen-foot ore body which mills from six to fifteen dollars per ton. The properties, including about 200 acres of ground, are owned by a company organized by the Brady-Levin Co., of Nogales and Tucson, which is vigorously prosecuting development work, the cost being materially assisted by the output of a small 5-stamp mill. In the near future a larger mill will be erected and set into operation.

Passing down the San Miguel River there are good mineral regions in the mountains on either side, and westward toward the railway there are Animas, Santa Barbara and a number of other mining camps, with any number of *antigua* regions that would pay to prospect and develop. At Llano station on the Sonora Railway is the San Francisco mine, a gold property upon which a 10-stamp mill has been steadily and profitably running several years. In the immediate vicinity,

*Las Kieles* is the name of a promising gold property; close to the railway track, which is in course of development. At Tuape the San Miguel River passes into the

### Ures District,

One of the richest in natural resources in the state. Eastward from the town are the extensive copper properties of the Richfield Mining Company, upon which considerable development work has exposed large bodies of valuable ores. There are other valuable prospects and properties in the vicinity. Westward toward the railway is the Querobabi region, in which are a number of promising gold properties.

Farther down the San Miguel River, in the vicinity of Opedepe, is the San Ricardo, a gold mine with a record of rich production going back into *antigua* days. It was operated by an American company twelve years and more ago. They erected a 20-stamp mill and shipped a great deal of gold bullion. Detected in smuggling some of the gold out of the country without payment of the export duty, they lost the property, which was confiscated by the Mexican Government. The mill went to ruin, and later the property was sold to another American company, of Canton, Ohio, which has done considerable development and erected a mill. It was projected to be of 20-stamps, and the machinery is upon the ground; but as yet only five stamps have been set up. There is a twelve-foot ledge of good gold ore, which has been developed to such an extent that competent experts declare it shows one million dollars in sight, which could be recovered to material profit by the operation of a 20-stamp mill.

Westward from San Ricardo several miles is the *Mina de Oro* (Mine of Gold) in operation, a Huntington mill producing regular bullion shipments. The Santa Gertrudis is another good property near at hand. In the same vicinity is the *Amarillas*, a silver property, with an *antigua* record of rich production. In one small chamber is shown where more than \$100,000 in values were extracted within a few weeks. Recently the old shaft has been pumped out, and sinking was resumed. A goodly showing of high grade shipping ore has been already made. About six miles from the *Amarillas*, southward, is the *Socorro* mine, which has a great record of production, in recent years as well as in *antigua* times. About a year ago the property was bought by some experienced Colorado miners, who have unwatered the workings, cleaned them out, and started development. In the same vicinity are the *Nopalera*, *Tortuga* and other good mining properties, while the region offers alluring inducements to the prospector. From *San Ricardo* and *El Oro* on the north to *Socorro* and *Nopalera* on the south, a rectangular area about five miles by fifteen, the solid granite is cut by numerous ledges, all of which show good gold and silver values on the croppings, and would doubtless prove profitable with development. Anywhere in the United States the region would be alive with prospectors, and several hundred shafts would be sinking.

A few leagues farther down the river from Opedepe is the town of Rayon, the center of another important mineral region, in the vicinity of which are the properties of the Palo Alto Mining Company, which make a good showing in copper. Below Rayon is the San Francisco mine, a gold property which is yielding handsomely by the old *arrastra* process of reduction. Southwest from Rayon about seven miles is the noted

### Copete Mining Region,

Where the Copete Mining Company has extensive holdings, and a smelting plant of 250 tons daily capacity, which, however, has not been in operation for two years or more. Development is progressing upon the 500-foot level, where good

ore is reported, and it is anticipated that the smelter will again blow in some-time in the near future.

Adjoining the Copete is the Sultana mine, the property of the Giroux Consolidated Mining Company, of New York, which is deemed one of the coming great mines of Sonora. A shaft has been sunk to a depth of 1,050 feet, in rich sulphide ores of copper carrying gold and silver. At the depth stated the ore body is thirty-five feet in width, and the ores yield values in the three metals to the amount of eighty dollars gold per ton. The ore body is opened by several levels and numerous drifts, aggregating several thousand linear feet. Two thousand feet away another shaft is sinking, and is now down about 350 feet, all the way in ores of the same quality and value as those developed in the deeper shaft. The policy of the company contemplates erection of an extensive reduction plant; but in the meantime the richer ores will be shipped.

Beyond the Sultana is the *Colorado* mine, property of Mr. C. S. Mills and associates. In this property several thousand feet of tunnels and crosscuts have developed large bodies of low grade gold ores, with very rich spots, the ores from the latter being successfully and profitably worked by *arrastras*.

The Copete region offers great allurements to prospectors, as there are numerous ledges in kindly formation that can be secured from the Mexican Government by the prescribed methods of acquiring and holding titles to mineral lands. The same assertion may be truthfully made of all the regions noted in these pages; and to enumerate all the mines in all the regions would expand this little pamphlet to a ponderous volume.

Following down the San Miguel and leaving the Ures district for a time, the stream joins the Sonora River in the Hermosillo district, not far from the city of the same name, the state capital. The Hermosillo is one of the richest districts in Sonora, and also one of the greatest in area, extending from the Gulf of California to the Yaqui River—as also does the Ures district. In the Hermosillo district are the great

### Minas Prietas Gold Mines,

Which are located about thirty-five miles southeast from Hermosillo, and twelve miles from the line of the Sonora Railway, over the Torres & Prietas Railway—a narrow gauge line. The camp was one of the *antiguos*, the mines having been worked more than 160 years ago. Authentic accounts present that in 1743 some of these mines, including *La Mina Colorada*, were operated by Jesuit missionaries, who realized great profits. Persistent depredations by Indians compelled abandonment of operations some years thereafter. In 1790 and several years following the *Prietas* and other mines were worked with good results by venturesome miners, who had been attracted to the region by reports of former successful operations. As depth was attained water compelled abandonment, as the primitive method of carrying water in rawhide buckets upon the backs of men, climbing rude ladders (notched poles) was not calculated to cope with the subterranean flow. In this day and generation immense pumps with raising capacity of thousands of gallons hourly, working a thousand feet or more below the surface, keep free from water miles of drifts and galleries, rendering possible development and exploration.

It is in contemplation of such differences between the early Spanish methods and those of the present day that one realizes the ancient mines were not worked out and exhausted, or carried to depths so great that further exploration would be profitless, a condition that modern methods and machinery have rendered well nigh impossible. In those days, to cope with the forces of Nature was a much

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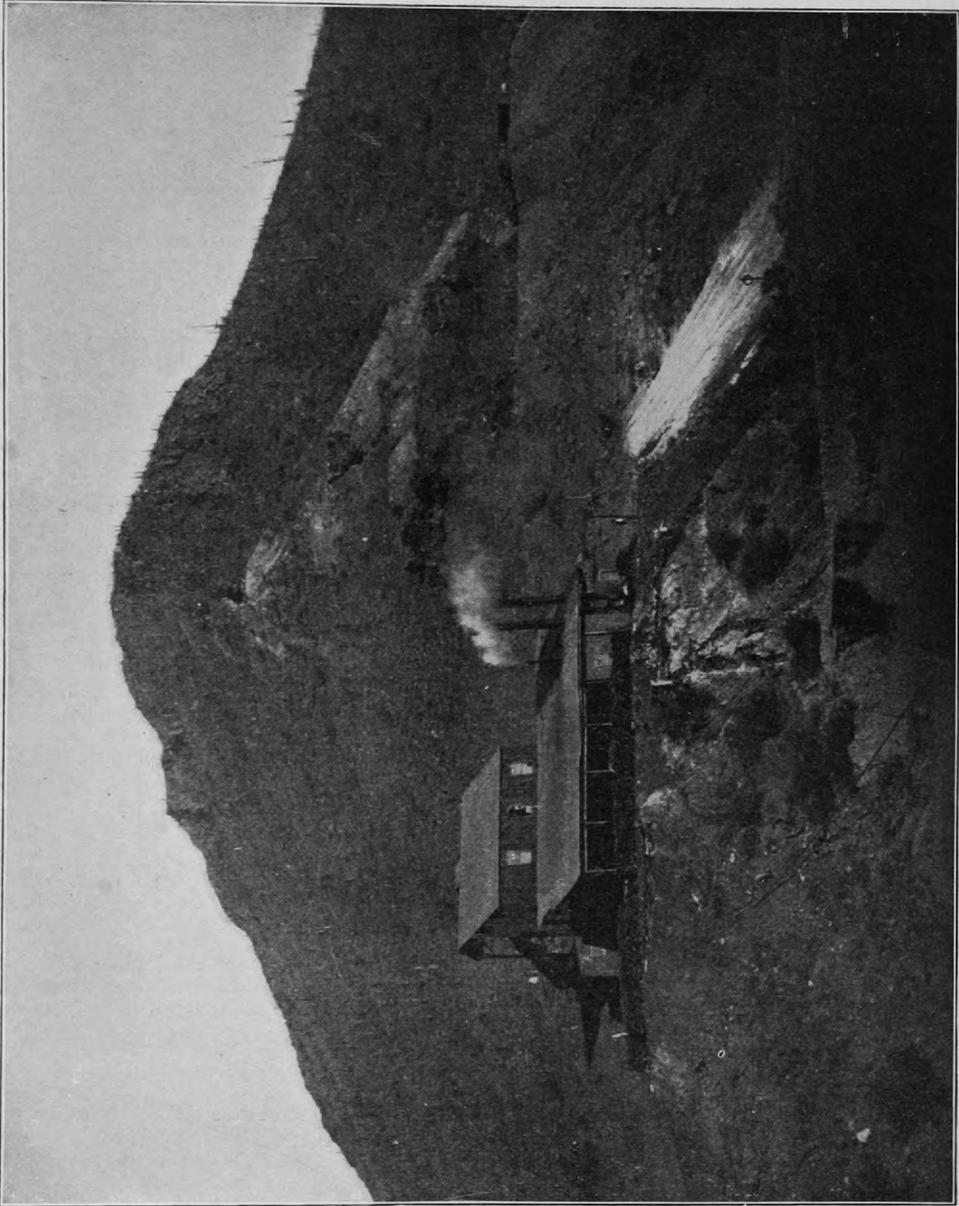
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Guaymas, Sonora, Mexico.

more colossal undertaking than now. In all other processes of mining there is

### The Same Wide Difference

As between the rawhide bucket and the Riedler pumping engine. Slowly and painfully the *antiguo* miner bored into the rock great holes three to four inches



CERRO PRIETO MINE AND MILL.

in diameter, but not deep. They were filled with lime, plugged, and water poured in. Then the miner awaited the slow process of the lime's swelling to rend and break the rocks. Today a machine drill bores a three-quarter inch hole into the adamantine rock with almost the same ease and facility that a test

knife bores into a cheese; a stick of dynamite is inserted, the fuse lighted, and in a few seconds the solid rock is riven into fragments, and tons of the crumbled mass are ready to raise to the surface. And instead of going up in rawhide buckets carried upon the backs of men painfully toiling to the surface upon rude ladders, a great hoisting engine, as ponderous and magnificent as a locomotive or the machinery of an ocean steamer, shoots to the surface at express train speed a carriage which conveys the rock by the ton. And the rude *arrastra*, where a blindfolded burro, circling in the sun the livelong day, dragged around, in a paved basin six or eight feet in diameter, a huge rock, grinding by abrasion the auriferous ore, to separate and save the gold by amalgamation—the process slow, tedious and wasteful—is replaced by a great mill, crushing and grinding hundreds and thousands of tons of ore daily, employing, beside amalgamation, the most subtle processes of chemistry to seek out and extract the most infinitesimal atom of value, leaving the pulverized rock when it reaches the tailings bed as dry of gold and silver as are the sands of the Sahara of water. Within the past quarter of a century fortunes have been made treating by the cyanide process and extracting the gold and silver from the tailings dumps of old Spanish mines that had been worked long years ago by *arrastras*. And the primitive *vasa*, which at the best could smelt but a ton or two of non-rebellious rock each day, is replaced by a great smelting furnace with a daily capacity of from thirty to 400 tons, while by machine concentration before smelting the ore the output of the furnace is quadrupled and quintupled, and by improved and wonderful processes the most rebellious ores are treated and compelled to deliver their values. The contrasts outlined explain why it is

### Now So Profitable

To work the old abandoned Spanish mines in Mexico.

After abandonment of the Minas Prietas mines by the *antiguos*, on account of the inflow of water, they were idle for a long period of years. In the early sixties there were *denounced* (located) by Don Ricardo Johnson, a practical mining man, yet alive and actively operating in Sonora, several of the old mines, including the *Creston* and the *Prietas*. Those two he pumped out and worked a number of years, realizing some profit. He sold the *Prietas* to an American company, which built a 40-stamp mill at a cost of \$300,000, and in a short time recovered several millions of dollars, when operations were unfortunately suspended by a fire in the shaft. In 1886 those holdings and others of that company passed to the Creston-Colorada Company, of Cleveland, Ohio, which has operated continuously since that time, turning out nearly two millions of dollars annually, giving support to thousands, and greatly enriching the fortunate owners. In more recent years the ownership of the company has passed from the hands of the Cleveland people to a syndicate of New York financiers headed by John W. Gates, at a price which is said to have reached five millions of dollars.

In 1890, or thereabouts, great and rich ore bodies were developed in the *Grand Central*, *Amarillas* and other properties, upon a ledge parallel to that in which all former successful operations had been conducted, and another great enterprise was launched in the camp, the company erecting splendid machinery, and adding immensely to the regular bullion output.

There are two great companies operating at Minas Prietas, the Creston-Colorada and the Grand Central. The properties of the latter company are under lease to the Charles Butters Company, Limited. The Creston-Colorada Company owns the *Prietas*, *Fortuna*, *Creston*, *Colorada*, the *Don Ignacio* and other properties extending a mile or more along the main ledge. The *Creston*,

*Fortuna* and *Prietas* mines are at Minas Prietas proper, and the *Colorada* and *Don Ignacio* at *La Colorada*, a section (called *comisaria*) of the same municipality, about a mile away. At *La Colorada* is the mill, consisting of thirty stamps, six Huntington mills, nine amalgamating pans, sixteen Frue vanners; and it has a daily capacity of near 200 tons. The tailings are treated by cyanide, a large and very greatly improved plant having been recently added to the equipment, replacing one which had been in operation several years. The mill is connected by an Otto wire rope tramway with the Creston hoist, whence come the ores from the *Fortuna* and *Creston* mines. It is said that the ore reserves exposed for stoping in the *Fortuna* alone are sufficient to keep the mill constantly employed through a decade, with development still continuing; and the ore bodies in the other mines named are also large, extensive and valuable.

The Creston shaft is 1,143 feet deep, and it connects with deep workings in the *Creston*, *Prietas* and *Fortuna* mines. The hoisting engine is a great machine, of superb workmanship and finish, capable of hoisting at express train speed heavy ore elevators from a depth of 2,500 feet, and is one of largest and finest machines of the kind. A colossal air compressor, propelled by a 500-H.P. Corliss engine, supplies compressed air to run the machine drills in the depths, and it has a propulsive force sufficient to keep fifty drilling machines in constant operation. A great Riedler pump upon the 1,000-foot level, raising to the surface a constant and heavy flow of water, keeps the various levels well drained.

In a sub-section of the camp, locally designated as *Primavera*, adjacent to *La Colorada*, is the seat of operations of the Charles Butters Company, lessee of the properties of the Grand Central Company, which owns the *Amarillas* and *Grand Central* mines. Upon one side of a narrow canon is the great hoist at the Grand Central, and upon the other a large quartz mill with a battery of thirty 900-pound stamps and six Huntington mills, with grinding pans, amalgamating pans, Frue vanners, etc. The ore is conveyed across the canon from the mine to the mill by an Otto aerial wire-rope tramway about 1,000 feet in length. There is also a rail tramway, the cars elevated by a small hoisting engine and cable, to transport wood and other mine supplies across the canon and up the mountain side to the hoist. A large air compressor supplies propulsion to twenty-five machine drills in the mine.

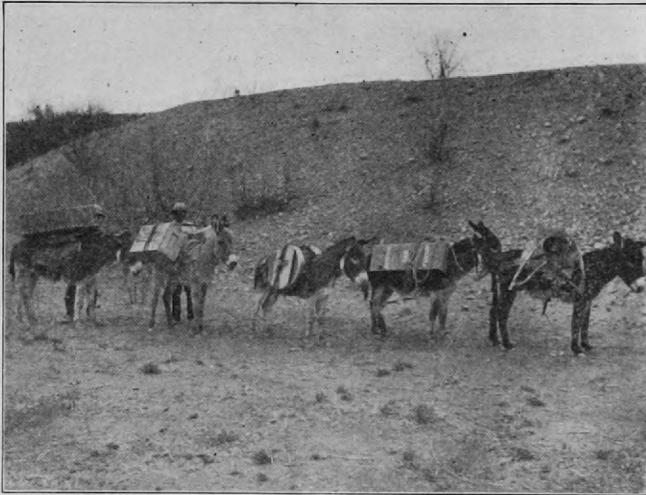
At the mill the grinding pans, amalgamating pans and vanners are no longer in use, the ore going through the stamp and Huntington mills, and from the latter the pulp goes direct to the cyanide plant of the Charles Butters Co., but a few hundred feet from the mill. This plant, which employs the Butters electrolytic process, has a daily capacity of treating 400 tons of pulp, extracting the values to an infinitesimal per cent. It was erected about five years ago by the Butters Company, under contract with the Grand Central Company to treat an

### Immense Mass of Tailings,

That had accumulated at the rate of a couple of hundred tons daily through a period of four years' operation of the great mill. When the tailings pile was exhausted the Butters Company suggested to the Grand Central Company that the pulp could be as successfully treated, and more economically, by cutting out the amalgamating pans and vanners, running it directly to the cyanide plant. The suggestion was well received, resulting two years ago in a lease of the plant to the Butters Company, which has successfully operated it upon the plan proposed.

The camp is supplied with water from the *Matape* River, twenty miles distant, whence it is conveyed by a pipe line. Near the town of *San Jose de Pimas*, a heavy pumping engine forces the water into a large cement reservoir, upon an elevation overlooking both *Minas Prietas* and *La Colorada*, midway between,

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whence it is distributed to all parts of the camp by gravity. A smaller plant at *Chivato*, five miles away, was long the sole source of supply, which was however very inadequate. It is still in use, supplying a part of the camp.

It goes without saying that to keep up so great a plant there are extensive machine shops, a foundry, etc. The

## Country Rock

Of the region is a hornblendic diorite, capped by a quartzite, except where between the higher hills erosion has cut away the cap. Upon one side or the other of the quartzite are dykes of quartz porphyry; the mineralized veins, both as contacts between the dykes and the diorite, also as independent veins traversing the diorite itself. The veins vary greatly in width, narrowing in places to two feet, and at others swelling to one hundred feet or more. The largest and most productive ore bodies are often found at the junctions of the main veins with tributaries. The gangue consists of quartz and altered dyke matter, and even of the diorite mineralized. The ore occurs in detached bodies of irregular shape and varying greatly in size, occurring in such relation to each other as to form chutes easily worked and readily handled. The ores are principally quartz carrying varying amounts of pyrite, chalcopyrite and galena. The proportion of gold and silver in the ores varies considerably, but the combined product of all the ores as worked is a mixed bullion, of which about 65 per cent of the value is gold and 35 per cent silver.

Many more properties in the *Minas Prietas* region are susceptible of handsome development, and with the application of intelligent and well directed effort, backed by ample capital, would readily rank as producers. The properties of the *Campania Union Mineria* are described in that category, and negotiations are said to be in hand for their transfer to a strong American syndicate with means necessary for extensive development. The *Bastilla* is a fine property upon the same ledge as the *Prietas* mine, adjoining the *Fortuna* upon the south, upon which extensive development shows a large and valuable ore body.

Northeast from *Minas Prietas* about twelve miles lies the *Zubiate* camp, where there are rich silver mines with a record of production going back into the early Spanish days. Four or five years ago the property passed under the ownership of a California company, which opened new, large and rich ore bodies and erected a 15-stamp mill for their treatment. Shortly after it commenced operation the mill was destroyed by fire. Undaunted, the company replaced the mill with one of forty stamps, and that commenced turning its wheels a year ago. Within a short time the fact was discovered that the process employed failed to save a large percentage of the values in the ores, so the stamps were removed, and grinding mills, dryers and roasters were installed, the pulp going from the latter to the amalgamating pans. The new machinery was completed and operation was resumed in September of the present year (1904), the altered process much more successfully accomplishing the results sought of attainment.

About twenty-five miles west from *Minas Prietas*, and westward from the line of the Sonora Railway, are the *Tarasca* mines, where another *antiguo* camp has sprung to new life under modern methods. The ancient workings were extensive, developed to considerable depths several very rich ledges, and are followed long distances. Some miles away, at *Aguaje* (Spring of Water), surrounding the ruins of an old church, the vestiges of old *arrastras* and thousands of tons of tailings, covering hundreds of acres of ground, show that the ores from the *Tarasca* were there reduced and parted from their values. The present owners are a California company. Shafts have been sunk and drifts run below the old workings, opening large bodies of high grade shipping ores.

In the region between Minas Prietas and Hermosillo are the Dewey mine, Mina Grande, and a number of other good properties. North from the *Zubiata* are the *Tortuga*, *Constitution & Italia*, *Last Chance*, *Santa Rosa* and *Las Cruces*. The *Last Chance* is a mountain of low grade gold ore, undeveloped, yet the making of a great mine.

Northwest from Hermosillo about forty miles are the *Verde Grande* and *El Mojin* properties. The *Verde Grande* has erected a 100-ton smelter, but it is not yet blown in.

Hermosillo, the capital of Sonora, is a beautiful, well built city, with a population of about 12,000, uniting the charm of the old Spanish civilization with the comforts and conveniences of the present day. The streets are macadamized, with cement-paved sidewalks, and lighted by electricity, as are also all the principal buildings, residences, etc. A telephone line connects all parts of the city, a good street car line is a great public convenience, and the hack service is one of the best and cheapest anywhere in the world. The climate is most delightful through eight months in the year—from October to July—and it is attracting great attention as a very enjoyable winter resort. As it is only twelve hours' travel from the main line of the Southern Pacific at Benson, many tourists en route to California take advantage of the opportunity to make the side trip and get a glimpse of Old Mexico that presents little change from former days.

Visitors at Hermosillo find in the Hotel Arcadia a large, elegant hostelry, complete in its appointments in the American style, that compares favorably with the best hotels in the United States. It occupies an entire block, 130x250



PATIO, HOTEL ARCADIA.

feet in dimensions, the structure forming a square around a beautiful *patio* 75x36 feet, filled with rare tropical plants, trees and flowers. The rooms are elegantly furnished, the table well supplied, and everything complete in every particular.

From Minas Prietas eastward roads radiate to all points

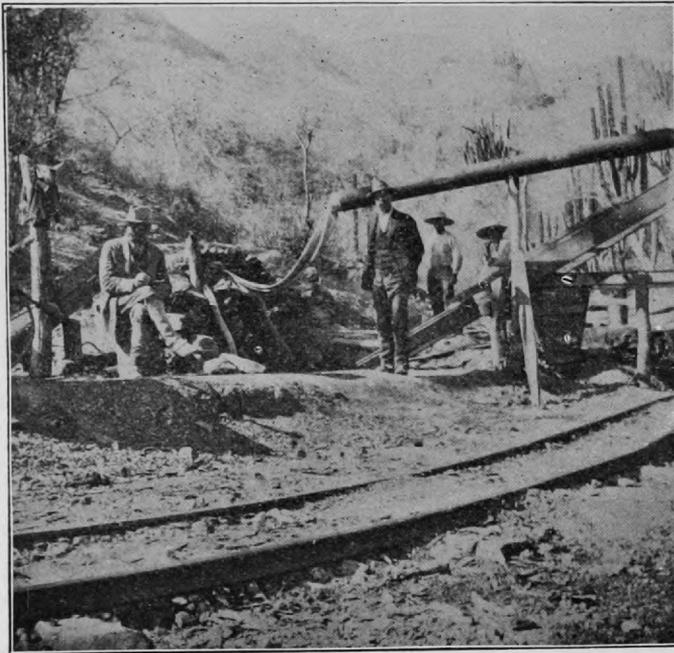
### Along the Yaquí River,

About one hundred miles distant, beyond which, in the Sahuaripa and Alamos districts, lies one of the greatest and richest mineral regions upon the face of the earth, which in *antiguo* days was one of the most populous and richly pro-

ductive in New Spain. West of the river, in the Hermosillo and Ures districts, are also rich and extensive mining regions, with historic records, and yet far more capable of swelling the world's volume of precious metals than ever before in their history. In the category are included the camps at *San Javier*, *La Barranca*, *Los Bronces*, *San Antonio de la Huerta*, *Las Goteras*, *Cerro Colorado*, *San Juan Grande*, *Soyopa*, etc.

At *San Javier* the Gold Coin Mining Company have in successful operation a 30-ton copper smelter, and are producing a high grade matte, rich in gold and silver. This company owns and operates the *Santa Rosa*, a famous *antigua* mine. At the same place the Wyman Mining Company, operating the *Animas* mine, has erected a 50-ton concentrating plant, and ships concentrates of very high grade. The *Verde Grande* is a great copper property near *San Javier*.

At Toledo, on the west bank of the Yaqui River, but a few miles from the



COKE MINE, LA BARRANCA.

various camps mentioned in the two preceding paragraphs, which are clustered within a radius of twenty miles, the Yaqui Smelting & Refining Company, a Toledo, Ohio, corporation, has established a large customs smelter, now in successful operation. A lead stack with a daily capacity of 100 tons has been running several weeks, and a copper stack will be installed shortly. The company buys ores from numerous camps on both sides of the river, and its operations are calculated to materially aid in development of a mineral region of great richness.

One of the great advantages of the rich region of which Toledo is the center is the contiguity of an inexhaustible supply of anthracite coal and natural coke at *La Barranca*, but six miles away from the Toledo plant. Development has been conducted upon an extensive scale through several years by the Sunset Development Company (Southern Pacific), and there is no discount upon the

productive capacity of the coal measures. Another great coal field is known to exist about forty miles distant, beyond the Yaqui, in the

### Sahuaripa District,

Which was mentioned cursorily in a preceding paragraph as having been one of the great seats of metal production in early Spanish days. The district includes the famous *Trinidad*, *La Bufa*, *Mulatos*, *Cieneguita*, *Tayapa*, *Ostimuris*, *Tejada*, *Tonichi*, *Santo Nino*, and many other noted mining regions, that bear every evidence of having in early days supported large populations, and the records show that through near two centuries they poured forth a constant stream of precious metals.

The *Tonichi* copper properties, owned by the Tri-Metallic Mining Company, are situated about ten miles east from the Yaqui River, beyond Toledo, and they include a great ledge of rich copper ores carrying gold and silver, which is being developed by tunnels. The ledge is sixty feet in width in places, and it follows the crest of a lofty ridge. A tunnel is running from a canon below to cut the ledge 1,000 feet below the croppings. It is pronounced by experts as having the making of a great property.

Southeast from *Tonichi* a long day's ride lies the great *Trinidad* and *La Bufa* region, which is attracting great attention. Within a radius of a score of miles there are 125 known *antigua* mines that have all been in the past great producers, and with capital and intelligently directed effort can be again put into the list of producers. The operations of the Bufa Mining & Reduction Company show what can be done. Five or six years ago a few practical mine workmen in the employ of the companies at *Minas Prietas* and at *La Dura* took up this great property. They had little capital, but great faith in the indications and the former record of production. They sunk a shaft to penetrate below the old workings, reaching at a depth of 300 feet the rich ore bodies tradition said were there; and continuing to the depth of 600 feet they opened a body of high grade ores (grey copper, etc.), which stood the excessive cost of transportation upon the backs of mules to the railway at Torres, 150 miles distant, thence by rail to El Paso, where they sold to the smelter at net prices ranging from \$200 to \$600 per ton. The second grade ores were concentrated in a small concentrating mill which was assembled from odds and ends bought from abandoned plants, and the concentrates shipped. Other shafts were sunk and connected by several thousand feet of drifts, on the various levels, opening great bodies of high grade ores. Last year a concentrating mill and matting furnace with a capacity of fifty tons daily was erected, and the ores are treated on the ground, producing a high grade matte, which is shipped. Ores are blocked out ready for stoping, sufficient to supply the plant for years to come. Vigorous prosecution of development continues to demonstrate that the limits of the ore body are not yet reached, and the company has entered upon a long career of prosperity.

About fifteen miles distant are the great *Trinidad* mines, that have been among the most famous silver mines in Mexico. Within two years those who successfully reopened *La Bufa* have bought the *Trinidad*, and have diligently prosecuted operations with most gratifying results. *La Trinidad* will shortly be again among the great producing mines of Mexico; and besides *La Bufa* and *La Trinidad* "there are others."

A day's ride northeast from *Trinidad* are the famous *Mulatos* gold mines, owned and operated by a Pennsylvania corporation.

Directly north from *Trinidad* two days' travel are the properties of the

Cieneguita Copper Company, which have been declared by competent experts as among the

### Greatest Mines On Earth.

The company's holdings include three great groups—the *Chipiona-Cieneguita*, the *Ostimuris*, and the *Tayopa*. The first named includes seven great ledges, comprised in an area owned by the company, two and one-half miles long and one mile wide. Upon all these ledges extensive *antiguo* workings are found running the entire distance and frequently connected underground hundreds of feet. In the old workings the *antiguos* left exposed thousands of tons of rebellious ores, and the new workings of the present company have developed immense bodies of high grade copper sulphides carrying gold and silver. One of the bodies developed is twenty-three feet wide, and another thirty-nine feet. Competent experts estimate that in those two ledges are 2,600,000 tons of ore that will yield 5 per cent copper, sixty ounces per ton silver, and \$3 to \$8 per ton gold. Other ledges carry galena, with paying values in gold and silver. Beside the showings in the old Spanish workings, the Cieneguita Company have opened up the ore bodies with thirteen tunnels varying from 300 to 1,000 feet in length. Want of space forbids an extended description of all these great properties.

A 200-ton reverberatory furnace to reduce ores is in course of construction, and within six months it will be in operation. When completed the plant will be immediately duplicated, and successive duplications will increase the capacity to 1,000 tons daily as rapidly as possible. Roy & Titcomb (Arizona-Sonora Manufacturing Co.) are the contractors.

In the vicinity of *Cieneguita* are also many other *antiguos* worth the attention of practical mining men and the expenditure of money.

Adjoining the Sahuaripa district on the south is the

### Alamos District,

One of the most noted in the annals of New Spain for its remarkable production of gold and silver. At the City of Alamos were made up the great *conductas*, consisting of hundreds of sumpter mules, each laden with a small fortune (200 pounds of gold and silver bars and ingots), which under heavy guard monthly traversed the Sierra Madre, to the City of Mexico, whence the treasure was sent to Spain; and in the fastnesses of the high Sierras, along the route they followed, the traveler may yet see places where the trail, in winding its way over the rocky, lofty escarpments and climbing the precipitous sides of deep canons, has been worn, by the frequent wear of passing hoofs, deep into the solid rock—the veritable banks of one of the streams of wealth, now long since run dry, that flowed across a continent and an ocean, to the enrichment of imperial Spain.

In the immediate vicinity of Alamos is the famous *Quintera* mine, from which an immense fortune was realized by the Almada family. After more than a century the property is continuing in operation, and yielding richly. It is now worked to a depth of 1,500 feet, and is owned by a French syndicate.

It is related that the original owner of the *Quintera*, Juan Almada, to signalize the wedding of his daughter as one of dazzling distinction, lined the bridal chamber walls with bars of bullion from the mine, and laid a pavement of silver bars from the door of the family residence, which was across the plaza from the church shown in the engraving, across the plaza to the church door, which pavement was covered with costly tapestry; and over that remarkable pavement the bridal party made their progress to the altar; while the bridal bower was a veritable casket of silver.

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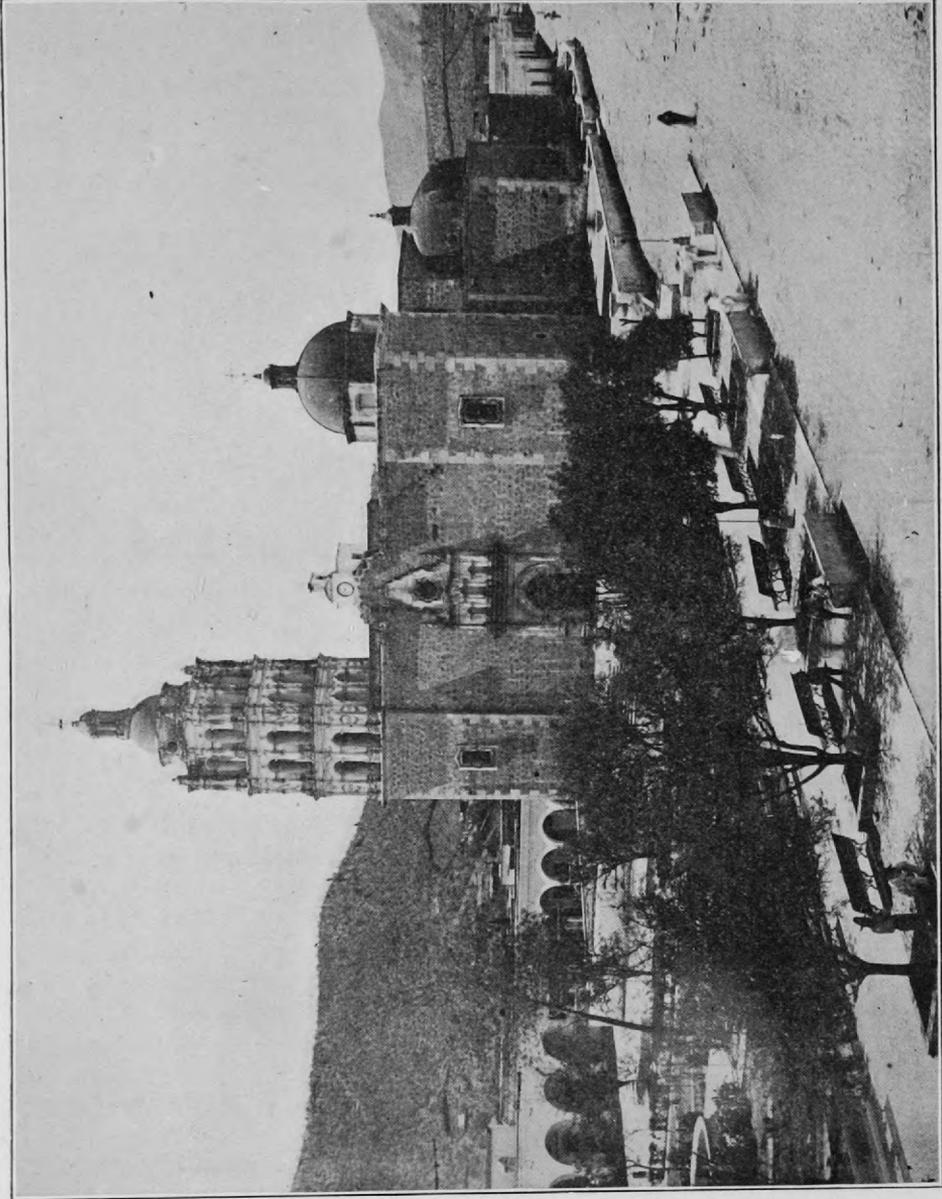
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An extensive iron deposit is reported at a point forty-five miles to the north-east of Alamos, which is estimated by Professor Dumble, the eminent geologist, to contain 16,000,000 tons of ore by actual measurement. In its origin and general character the ore in sight in this deposit is a duplication of the famous iron mountain in Durango, only somewhat smaller. It is a great mass of iron,



CHURCH AT CITY OF ALAMOS.

which has come up with the porphyritic and rhyolitic rocks, in which are found the principal mineral deposits of this region. Normally the deposit increases in value as depth is attained. It is but fifty miles from the anthracite field at Pilares, which is particularly adapted for smelting this ore, and the vicinity affords an abundance of flux.

The following constitutes a responsible analysis of the iron ore located as above:

Silica.....	1.27	Phosphorus.....	0.293
Manganese.....	0.31	Ferrous Oxide (metallic).....	13.15
Sulphur.....	trace	Ferric Oxide (iron).....	67.86
Alumina.....	0.27		

Even now an enumeration of the mining properties in operation in the Alamos district would overtax the space of a much larger book. At *Baucari* are rich gold quartz mines, and also at *Trigo*. At El Cerrito are rich placer mines, while at Baroyeca and Piedras Verdes are great copper properties, and at La Dura steadily producing silver mines which have been in operation a quarter of a century and reached a depth of 1,200 feet. The last named place is in the extreme northwest corner of the district, about 120 miles from the Sonora Railway at Ortiz. The district offers many great opportunities. In the

### Guaymas District,

Through the northern edge of which passes the road from *Ortiz* to *La Dura*, a few miles south of *La Barranca* and *San Javier*, there is considerable mining, and the mountains of the district in all parts are known to be rich in mineral; but the long continued Yaqui Indian trouble, which has had its seat in that district, has checked and retarded development.

Near *Suaqui Grande*, on the *Tecoripa* River, a day's journey westward from *La Dura*, the Chicago & Sonora Gold Placer Mining Company has in operation a gold dredge, which is reported very successful. It is stated that the company contemplate constructing other dredges. This placer field extends along the *Tecoripa* River from *Suaqui Grande* to its union with the Yaqui at *Cumaripa*, a distance of about thirty miles; and there is also a good placer field along the Yaqui.

At *Batamote*, west from *Suaqui Grande*, the Ruby Gold & Copper Company operates valuable copper mines, reducing the ores in a reverberatory furnace.

At San Marcial, between *Batamote* and *Ortiz*, are extensive coal measures, upon which there has been considerable work. The field extends northward into the *Hermosillo* district, and at *La Lapiz* the United States Graphite Co., of *Saginaw*, Michigan, has opened extensive beds of graphite, from which they have shipped regularly, through several years, large quantities to the United States.

In the *Bacatete* Mountains, southwest from *Ortiz*, is the *Bonancita* region, noted for its gold quartz ledges and rich placer grounds.

Returning to *Hermosillo*, and passing thence up the *Sonora* River, the *Ures* district is again entered. At the distance of a day's ride northeast from the city, and about the same distance southeast from *Copetè*, described in preceding pages, is the *Gabilan* region, of *antiguo* fame. There the *Ures* Consolidated and *Vega* Mining Companies are operating valuable properties. The *Ures* Consolidated has a 10-stamp mill.

A few miles further up the river, the *Coches* Mining Company has developed a valuable gold property and erected a mill to treat the ores by cyanide process.

### The City of Ures,

The seat of government of the same district, is about fifty miles from *Hermosillo*, and is a town of about 2,000 people. Over on the southeast toward the *Matape* River are the *Chipiona* and *Colorada-Ures* mining regions, a few miles northwest of the town of *Matape*. There lead and silver predominate. Directly south ten or a dozen miles are the *Marquesa* and *Quincy* properties. The former is owned in *Hermosillo*.

In the southern edge of the district, directly south from *Ures*, is the *Llano*

Colorado region, famous for its placer diggings more than a century ago. An American company is now successfully working the ground by hydraulic process. A few miles to the westward are the *Realito* mines, where extensive *antigua* workings and the ruins of more than 100 *arrastras* tell of great production. From the *Los Angeles* mine, in the same vicinity, rich silver ores are now being shipped.

A day's ride east of *Matape*, the latter place a long day's ride from *Minas Prietas*, the traveler reaches *Suaqui de Batuc*, at the confluence of the *Moctezuma* and *Yaqui* Rivers. The former comes from near the Arizona line, nearly 200 miles northward, and the *Yaqui* comes out of Chihuahua to the east, turning at the junction with the *Moctezuma* and flowing south. Along both rivers are rich mineral regions. Southeast of *Suaqui de Batuc* are the famous *Santo Nino* mines, owned by the *Yaqui Copper Company*. A large sum of money (more than a million) was raised for their exploitation, but a quarrel in the company has stopped all operations, after expenditure of a great deal of money. The mines are all right, but they need development, machinery and management.

In the vicinity of *Suaqui de Batuc* are *Todos Santos*, *El Cajon*, *Zaragoza*, *Estrella*, and other good properties, several in course of development.

Overshadowing *Batuc*, which interesting town is a couple of leagues up the river from *Suaqui de Batuc*, is the famous *Lista Blanca* Mountain, wherein a lacework of rich silver veins ramify to great depths, which have been worked almost continuously for two centuries. There are also copper and quicksilver deposits in the same mountain.

Eastward from *Suaqui de Batuc* a day's travel—about fifteen leagues—is the great

### Lampazos Silver Region,

In the *Moctezuma* district, another property with a record of production going back into the eighteenth century. The ledges are wide, strong and well defined, and by adits have been explored to depths of 1,000 feet or more below the cropings. There are workings in two of the great ledges, which cut into the summit of a lofty ridge, from which they can be seen extending down the west side several miles. Parallel thereto are several other great ledges, that bear every external evidence of being similar. Capital and labor judiciously expended would probably demonstrate that they are equally rich. The group in operation is owned by *Lic M. A. Lopez*, of *Hermosillo*. But few miles away from *Lampazos*, upon all sides, are groups of *antigua* mines and old ruins of camps long since abandoned, which show that there must have been a great and wonderful activity.

To follow up the *Moctezuma* district northward to the *International Boundary*, at *Douglas*, a distance of nearly 200 miles, and enumerate all the *antigua* camps to spring into renewed life, awaiting only the touch of the modern wizard, labor, intelligently and scientifically directed, would completely fill this pamphlet, to exclusion of all other districts. The

### Moctezuma District

Was one of the noted ones of the richly productive mineral regions of the early Spanish days, and it included some world famous mines. Today, at *Nacozari*, is a great copper property, connected with the American system of railways at *Douglas*, eighty miles distant, by an independent railroad, one of the regularly producing mines of *Sonora*. They are under the same ownership as the *Copper Queen* at *Bisbee*, the *Indiana-Sonora* group at *Cananea*, the *Globe* and the *Morenci* north from the *Gila River* in *Arizona*. A narrow gauge railway connects the reduction works at the town of *Nacozari* with the mines, some seven miles away. The plant, which is a combination of concentration and smelting, with a daily capacity of 200 tons, was in operation a period of years. Since com-

pletion of the great reduction plant at Douglas the smelter has shut down, and the concentrates are all transported by rail to the new "Smelter City" at the line.

In the *Huacal* region, eastward from Nacozari, are many famous *antigua* mines, notably the *Huacal*, *Dona Maria*, *Churumbabi*, and many more. Several strong American companies are in active operation.

The *Dona Maria* is a property about which clusters both romance and mystery. In Ward's History of Mines in Mexico, published in London in 1824, it is related that those mines were owned and operated by Dona Maria Rodriguez, a wealthy widow. Having accumulated an abundance of riches, she abandoned her valuable properties and started for her childhood home in Spain, there to enjoy her declining years. She loaded a train of forty mules with gold bars and ingots (8,000 pounds—four tons of gold), and proceeded to the City of Mexico, where the woman and her wealth disappeared. Ward intimates that she was murdered and her wealth appropriated by those in authority.

Northeast from *Nacozari* about sixty miles, and beyond the Bavispe River, is the *Pilares de Teras* region, where are the *Cinco de Mayo* and *Roy* mines—valuable producers. Not far away is the famous *El Tigre* mine, a recent discovery, very rich in gold and silver. A mill of 100 tons capacity is in course of construction (*Roy & Titcomb*, of *Nogales*, contractors). Two or three miles away, and nearer *Pilares de Teras*, are the *San Juan* mines, which with present development are predicted as destined to rival those at *El Tigre*.

The *Moctezuma* district is the extreme northeastern section of the state of Sonora. To the west, lying between that and the *Magdalena* district, described hereinbefore, lies the

### Arizpe District,

In which are the great copper mines at *Cananea*, which have already received description in these pages. The district is drained by the *Sonora* River, which rises near the *International Boundary*, flows south about 150 miles, then turns in a southwesterly direction, passing *Ures* and *Hermosillo*, toward the *Gulf of California*.

The municipality of *Arizpe*, the seat of government of the district, on the *Sonora* River, about seventy-five miles south of the *American line*, was a place of great importance in the early Spanish occupation. It is now a town of about 1,000 people. Vestiges of long gone dwellings, churches and other structures show it was a city of real importance, and its population is said to have reached 35,000. It was the seat of extensive smelting and refining operations, as shown by the ruins of many furnaces and the surrounding slag dumps. It was the seat of government of the *Intendencia de Arizpe*, exercising jurisdiction over a great region, the *King's Intendente* being semi-independent of the *Viceroy* at *Mexico*, and exercising an almost despotic sway. The site of his palace is a vacant spot beside the church. The latter, a very large one, which dates back to 1710, as shown by the inscription over the door, is noted for the large number of fine paintings upon its altars. It was also noted for its gold and silver plate, which all disappeared between two days about thirty years ago. Its value was estimated at a quarter of a million dollars.

Westward from *Arizpe* about fifteen miles and sixty miles east from the *Sonora* Railway at *Imuris* station, are the *Santa Rosalia* gold mines that were operated extensively by the early Spaniards, and are reputed to have yielded richly, a reputation recent developments fully justified. Some eight years ago a *California* company secured the property and commenced development. Tradition went that when the mine was abandoned by the Spaniards, at the time of the *Apache* uprising in 1822, a tunnel leading to the richest ores was closed and concealed. After search the tunnel entrance was found underneath the talus

P. Sandoval.

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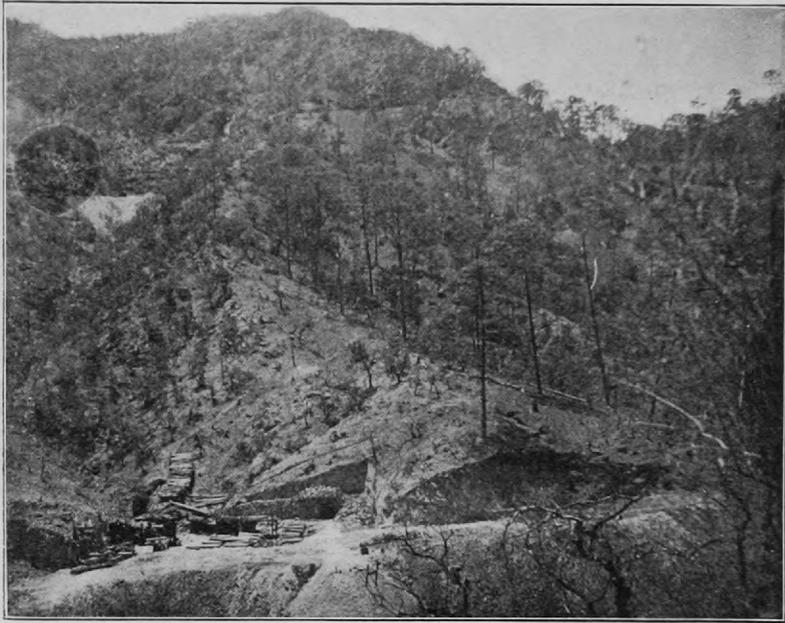


**Nogales, Sonora, Mexico.**

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at the foot of a bluff. The heavy *mesquite* door was swung open and the tunnel followed. At a distance of several hundred feet, according to tradition, another door was passed, and behind it the old workings were entered. There was found a great vein, twelve feet wide, of free-milling gold ore that afterward milled above twenty dollars per ton, and a rich streak two feet in width from which the first carload shipped netted in San Francisco \$24,000, the second \$18,000, and the third \$22,000. A mill was erected and continued in operation several years. The property was afterward sold to George Mitchell, the mining magnate, of *Cananea* fame; but, owing to the multiplicity of his operations Mr. Mitchell has let it lie idle.

North from *Arizpe* and west from *Bacoache* is the *Picacho* mine, owned by the Douglas Brothers, of Bisbee and Nacozari. The property, which is very rich in gold, was discovered by a peon about six years ago. It has already yielded a great deal of money, and is yet producing.



CHIPIONA MOUNTAIN.  
CIENEGUITA COPPER COMPANY.

In the *Picacho* region, and to the eastward, near *Bacoache* on the Sonora River, is a very rich and promising region. In the vicinity of *Bacoache* are extensive placer grounds, and in the *Ajo* Mountains, northeast from *Bacoache*, have been recently made extensive developments.

Southeast from *Arizpe* about twenty-five miles are the famous *Chispa* and *Carmen* mines, with long and fruitful records of production.

Half a day's ride down the river from *Arizpe*, near the town of *Banamichi*, is the *Santa Elena* mine, a gold property with a record of production of several million dollars. Forty years ago it was owned by General Ygnacio Pesqueira, the famous Liberal leader, a soldier and statesman who was the right hand man of General Diaz in the West during the troublous times during and following French intervention. From the *Santa Elena* he derived much of the sinews of bloody war waged by him against reactionary forces and the bloodthirsty Apaches.

With return of peace General Pesqueira sold the property to an American company, which erected a large mill and operated upon an extensive scale. Ten years ago it passed into the hands of an English company, which added greatly to the plant, and shipped bullion. But mismanagement caused its shutdown four years ago. It has since been idle, and has filled with water.

In character of ores, formation, etc., the *Santa Elena* is the counterpart of the great *Minas Prietas* mines. It is now 550 feet in depth. To take over the property, which can be acquired on reasonable terms, pump it out, and sink, as has been done at *Minas Prietas*, would be an undertaking for heavy capital, which would yield rich returns and create another great camp.

Below *Banamichi* about twenty miles is *Huepac*, where a Milwaukee company has considerable property and a small reduction plant, which is doing well.

As has been asserted of the other districts, these pages present only the salient points of the Arizpe district, with the assurance that it includes numerous opportunities, both in *antiguo* mines and in ledges that have never yet been opened.

As yet these pages have paid no attention to the far famed

### Altar District

Of Sonora, the largest in area, occupying the northwest, extending nearly 300 miles along the American line and a couple of hundred along the Gulf coast. This



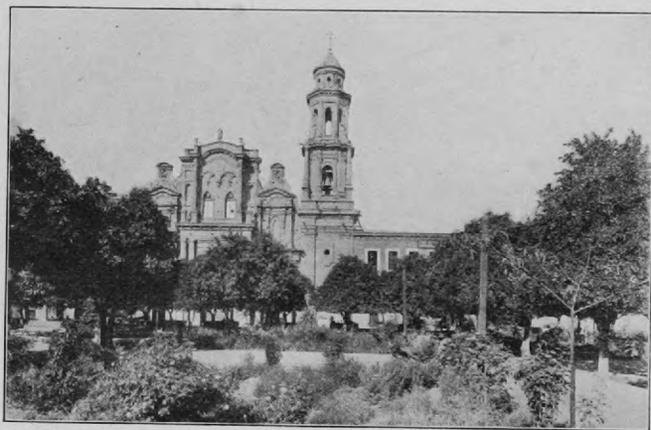
STATE CAPITOL, HERMOSILLO.

district was noted for the richness of its great placer deposits even before the days of Spanish occupation, and it has numerous gold ledges, in which some of the richest *antigua* mines were developed, some of which are now in successful operation. The Altar is the most arid region in Sonora, and operations are greatly hampered and restricted through scarcity of water; yet that obstacle is frequently overcome and mines are profitably worked. In the early extraction of placer gold millions of dollars were taken out with the *batea* (gold pan) without the aid of water, the natives having become very expert in the successful use of that implement dry. Invention of various kinds of "dry washers" has greatly facilitated extraction of placer gold. The machine is a combination of air blast and agitation, the auriferous earth traveling down an inclined table with riffles, the table kept in constant agitation, the air blast carrying away the earth, and the riffles catching the gold. Of course, where water can be secured it is employed. In the early rush of gold seekers to California, in 1849-50, many went

from the Altar region, and the methods they had learned at home were quickly adopted.

At La Cienega, about seventy-five miles southwest from Santa Ana station on the line of the Sonora Railway, is an extensive placer field, many miles in extent. Over thousands of acres the ground is honeycombed with tunnels, shafts and drifts, where the bed rock was reached, the auriferous rock lifted to the surface, the gold extracted dry by *bateas* wherever water was unattainable, and with water where it could be had. Development of water by sinking wells and pumping it to the surface for hydraulic washing has been proposed—there being plenty of water below. The field is covered by a concession to P. Sandoval & Co., of Nogales. Northward from *Cienega*, near *Caborca*, is another rich placer field, the *Palomas*. In the vicinity of *El Tiro*, *El Cajon*, *Cerro Colorado*, and many other localities, are placer fields which have been worked over and over again. West from Llano a Texas company is successfully operating in dry placers with improved machinery.

In quartz mining the region has been also famous. The great *El Tiro* ledge is traced a distance of twenty miles in a north and south direction. At *El Tiro*, on the north end, the *Reina de Oro* Mining Company has sunk several shafts to depths of 400 to 600 feet, connected by levels every 100 feet, and all in good free



CATHEDRAL, HERMOSILLO.

milling gold ore, averaging six feet in width. The company has a small Huntington mill. At *El Cajon de Amarillas*, on the south end, twenty miles away, the Yerkes Gold Mining Company has large bodies of free milling gold ore ready for stoving, and a new complete 20-stamp quartz mill ready for its reduction. *El Tiro* is about fifty miles southwest of Santa Ana station, and *El Cajon* is about forty miles west from Llano station.

Between *El Tiro* and *La Cienega* lies *Cerro Colorado*, which is almost literally a mountain of ore. This property has been worked for years, the workings following rich streaks and stringers of gold rock, which was reduced in a small 3-stamp mill near *La Cienega*, leaving exposed more than a million tons of low grade gold ore which will mill \$5 per ton. Several years ago it was thoroughly sampled by an Idaho miner named Hanley, who estimated that there were \$8,000,000 in sight in the mine, and he was arranging to buy and work the property; but before he had completed arrangements, Mr. Hanley died suddenly at *Cerro Colorado* and the deal fell through.

Altar, the seat of government of the district, is about sixty miles west from Santa Ana. West from the town nine miles is *La Cuchilla*, where the *Rey del Oro Mining Co.* has a good gold property, and three Huntington mills in operation.

West from Magdalena station on the Sonora Railway is *Tubutama*, where the Sonora Milling & Mining Company developed a copper property and set up a smelter last year. The company has since bought the *Juarez* gold mine, northwest from Caborca about thirty miles. This newly acquired property is an *antigua* which has been worked more than a century as placer ground by Papago Indians, who occasionally found some very large gold nuggets. In 1902 Serano & Co., of Altar, bought a nugget of pure gold weighing 38.8 ounces. The ledge upon the property was developed and worked in 1881 by a San Francisco company which erected a 20-stamp mill with the old pan amalgamation process, which was not adapted to the work, as shown by the rich values run off in the tailings—a fine, flour gold, very susceptible to the cyanide process, however, which will be adopted and installed by the new owners, making the *Juarez* a substantial and remunerative property. Plans and specifications for such a plant have been completed, and construction will soon begin.

At *La Calera*, west from *Caborca* about nine miles, the Arizona-Mexican Copper Company, of Phoenix, Arizona, is developing *El Gran Proveedora de Cobre*, a very valuable copper property, upon which extensive development shows rich ore bodies. It is equipped with a hoisting engine, and the depth attained is now about 400 feet.

Over upon the Gulf coast, near *San Jorge Bay* and at *Quitovac* the Sierra Pinta Mining Company have in operation two very valuable gold properties, which are connected with their reduction works at *San Jorge Bay* by a narrow gauge railway about thirteen miles long.

Near *El Plomo* and *San Francisco*, in the extreme north, near the Arizona line, there are in operation valuable gold properties, and extensive copper mines are in course of development. The *Sombretillo* is another very valuable property near the Arizona line.

In closing these pages the statement is reiterated, that to fully describe the great region ("the Land of Nayarit") would require volumes rather than a few pages. The assertion that the region is one of the richest in natural resources of any on the American continent is within the bounds of truth. It offers a very inviting field for investment. To call attention to the rich field open to the world, and to aid in development of the great resources outlined, is the mission of the Arizona and Sonora Chamber of Mines, an association of the business men of Nogales and prominent mining men operating in Arizona and Sonora. It has devoted its attention to collation and dissemination of accurate and reliable information of the region, which is ever at the disposition of the investing public. All communications addressed to the Chamber at Nogales, Arizona, will receive prompt and careful attention. Visitors to the Line City are cordially invited to call at the rooms of the Association, where all the mining journals and magazines are on file, and other literature pertaining to the mining industry. Copies of this work will be forwarded upon application.