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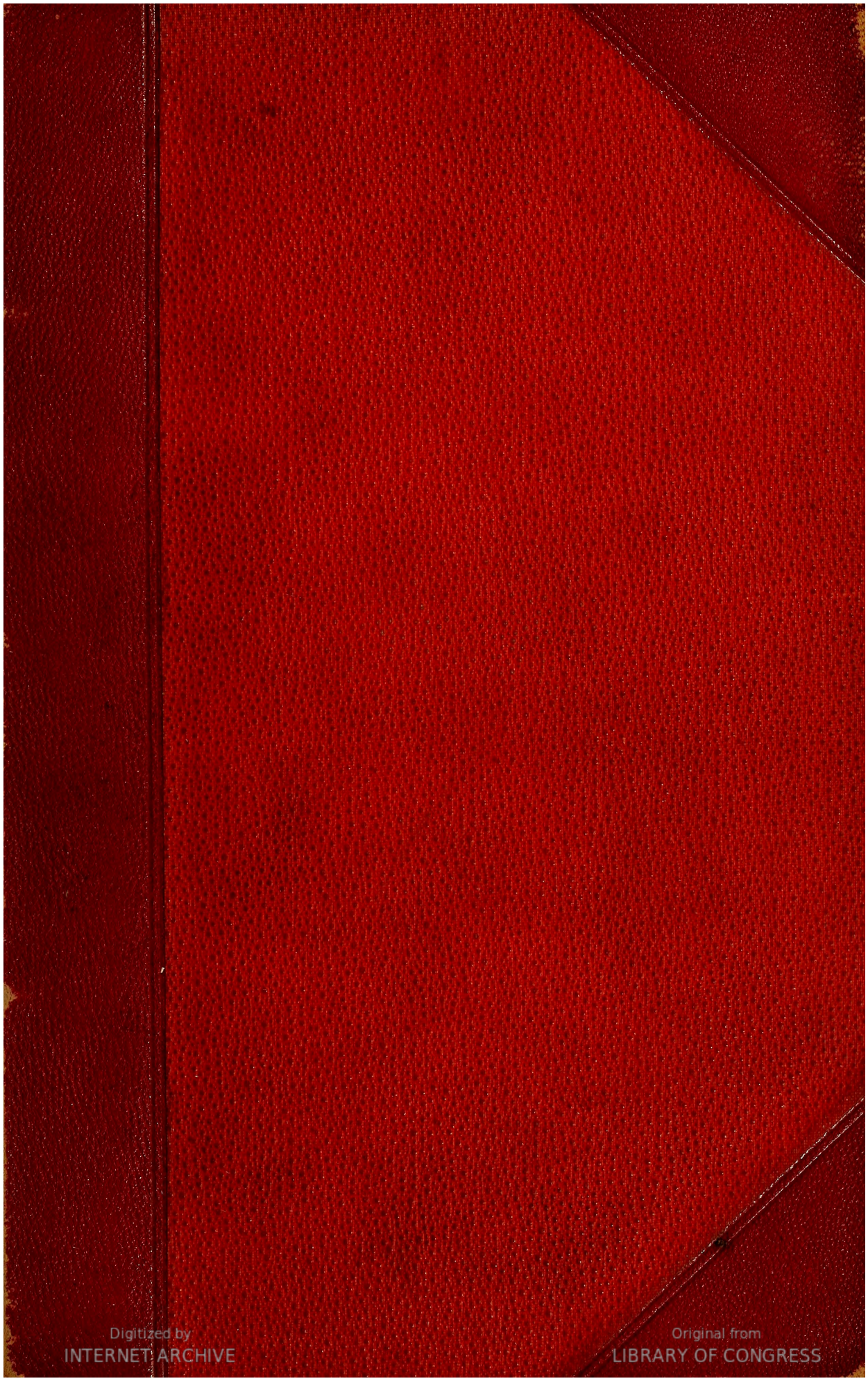

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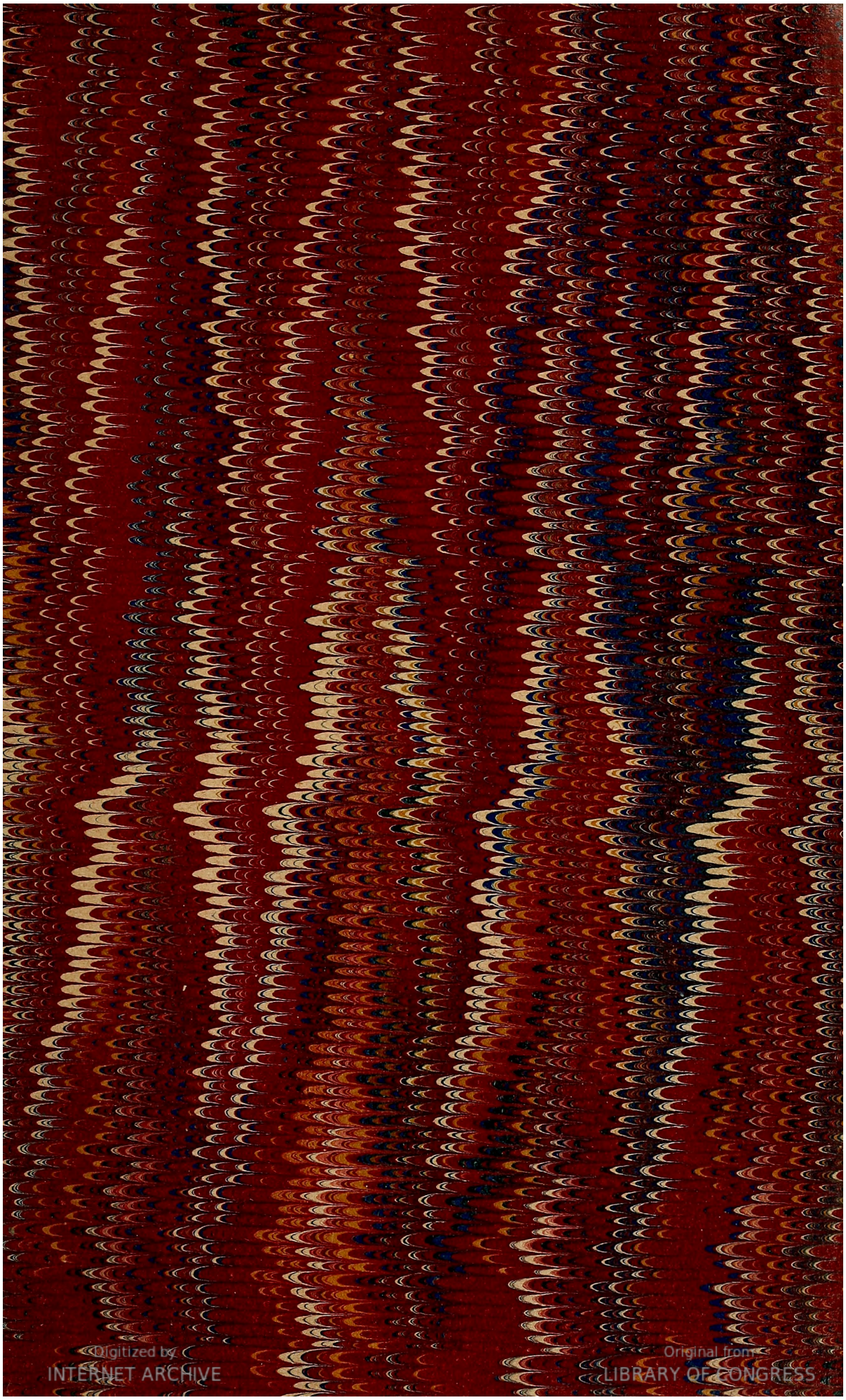

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FOURTH EDITION—PRICE, $1.00.

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THE EPIC OF BABYLON;

OR,

THE BABYLONIAN GODDESS OF LOVE

AND

THE HERO AND WARRIOR KING;

CONSTRUCTED FROM TRANSLATIONS OF THE GREAT ACCADIAN EPIC AND THE LEGENDS OF ASSYRIA AND BABYLON, FOUND IN CUNEIFORM INSCRIPTIONS ON TABLETS LATELY DISCOVERED ON THE SITE OF THE RUINS OF NINEVEH, AND NOW DEPOSITED IN THE BRITISH MUSEUM.

The Oldest Epic Poem of Antiquity,

RESTORED IN MODERN VERSE,

BY

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(ILLUSTRATED)

LONDON AND NEW YORK:

1883.

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BORDER STATES OF MEXICO:

SONORA, SINALOA, CHIHUAHUA AND DURANGO.

With a General Sketch of the Republic of Mexico, and Lower California, Coahuila, New Leon and Tamaulipas.

A COMPLETE DESCRIPTION OF THE BEST REGIONS

FOR THE

Settler, Miner and the Advance Guard of American Civilization.

THE MINING DISTRICTS AND MINES, THE AGRICULTURAL AND GRAZING REGIONS, CITIES AND TOWNS, LOCATION AND DISTANCES AND PRINCIPAL BUSINESS MEN, FACTORIES, ETC., EXPORTS, IMPORTS AND PRODUCTIONS; TO WHICH ARE ADDED, RESOURCES OF MEXICO, DUTIES, THE TRADE WITH MEXICO, HOW TO ACQUIRE PROPERTY IN MEXICO, RAILROADS AND TRAVELING IN THE REPUBLIC,

Collected from all the Works extant on Mexico, and Reports of Travelers, Official Records, and Reports of Mining Experts and Old Residents, with Information up to date; the whole making

A COMPLETE GUIDE

FOR

TRAVELERS AND EMIGRANTS.

BY

LEONIDAS HAMILTON.

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CERRO DE MERCADO DURANGO, MEXICO.

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GENERAL DESCRIPTION

OF THE

REPUBLIC OF MEXICO.

Physical Features.

The Mexican Republic is a land of marvels for the scientist, and, with its grand gorges, deep *barrancas*, lofty mountain peaks, beautiful valleys, elevated *mesas*, and ancient cities nestling among unrivaled scenery, will always be an object of interest to the traveler. Within its 1,224,996 square miles of territory, the shores of which are washed by two oceans, may be found a greater variety of scenery, climate, productions in agriculture, and minerals than in any equal area. Its series of mountain chains and elevated plateaus, extending from the northwest to the southeast the entire length of the Republic, have yielded immense mineral wealth, and contain within them deposits of all the known metals. These two great ranges of mountains, one on the eastern and the other on the western boundary, form a continuous chain with the great *mesas* in the center, and slope gradually down toward the Pacific Ocean on one side and the Mexican Gulf on the other, interrupted by plateaus, on which towns are to be found on the lakes, rivers, and amidst luxuriant vegetation. The varying altitudes produce a diversity of climate, ranging from the cold through the temperate to the torrid, and a wonderful variety of fruits and flowers of every description, from the European apple and rose to the Cuban guava and cactus, besides other species unknown to any other country.

Political Divisions and Population.

The present population of the Republic, as near as can be estimated from the work of Antonio Garcia Cubas of the city of Mexico, is somewhere in the neighborhood of

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9,525,000, in round numbers, taking into account an increase since 1876: divided among the different states, as follows:

Sonora	125,000	Oaxaca	680,000
Coahuila	115,000	Chiapas	200,000
Chihuahua	190,000	Durango	185,000
New Leon	200,000	Zacatecas	420,000
Tamaulipas	180,000	Aguas Calientes	100,000
Vera Cruz	550,000	San Luis Potosi	555,000
Tobasco	100,000	Guanajuato	900,000
Campeachy	95,000	Queretaro	170,000
Yucatan	350,000	Hidalgo	430,000
Sinaloa	200,000	Mexico	750,000
Jalisco	980,000	Morelos	150,000
Colima	75,000	Puebla	750,000
Michoacan	620,000	Tlaxcala	130,000
Guerrero	350,000		
Total			9,500,000

With the territory of Lower California, which Antonio Garcia Cubas, in his geography of Mexico, places at 23,195, in 1874, the population of the whole republic may be estimated at about 9,525,000, allowing an increase in Lower California, up to 1880, or about six years, of about 2,000 more.

National and State Governments.

Under the present Constitution of the Republic, adopted February 5th, 1857, the Government was organized with three branches: Legislative, Executive, and Judicial—Congress, President and Cabinet, and Supreme and Circuit and District Courts.

The supreme legislative power is vested in the Congress of the Union, composed of a Senate and Chamber of Deputies. The members are elected by secret ballot, deposited by Electors chosen by the people. One Elector is chosen for every five hundred inhabitants, and one for every fraction thereof, in each Congressional district. The Senators are elected at the same time as the Deputies—two for each State and one for the Federal District and Territory of Lower California respectively. A Deputy is chosen for each 40,000 inhabitants and one for every fraction over 20,000. Substitute Senators and Deputies are chosen at the same time and in the same manner. In order to be eligible for the officer of Senator it is requisite to be a Mexican citizen in the full exercise

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of his rights, thirty years of age at the opening of the session, resident of the State or Territory he represents, and not to be an ecclesiastic. The Deputies must be of the age of twenty-five years and possessed of the other qualifications demanded from Senators. Each Chamber of Congress decides with regard to the election of its members, and determines any doubts that may occur regarding the same. Over one-half the total number constitutes a quorum in the Chamber of Deputies. The quorum of the Senate consists of two-thirds of the members elected. Two ordinary sessions are held each year. The first commences on the 16th of September and terminates on the 15th of December; the second commences of the 1st day of April and ends on the last day of May.

The President is elected by secret ballot by Electors, in the same manner as Senators and Deputies, taking his seat on the 1st of December, for the period of four years, and he is ineligible to a re-election to a second term without another intervening. To be eligible to this office he must be a native citizen, thirty-five years of age at time of election, and *not to belong to the ecclesiastical state*, and a resident of the Repulic. The Cabinet is appointed by the President, and consists of Secretaries of Foreign Relations, Treasury, War and Navy, Interior and Public Works. Eligibility to these offices require the candidate to be a native citizen and twenty-five years of age. The President and Cabinet constitute the Executive branch of the Government.

The Judicial power is vested in a Supreme Court and Circuit and District Courts. The Supreme Court is composed of eleven Judges Proprietary, four Supernumeraries, one Attorney-General and one Solicitor-General. The term of office is for six years. This body is also chosen by Electors. To be eligible it is necessary to be a native citizen, "instructed in the science of law in the opinion of the Electors," and over thirty-five years of age. The Judicial Circuits are eight in number, presided over by Circuit Judges, appointed by the Executive at the request of the Supreme Court. These Circuit Courts convene at the following cities: Mexico, Mazatlan, Celaya, Durango, Guadalajara, Monterey, Merida, and Puebla. There are thirty-one District Judges, distributed as follows: Two in Mexico, two in Tamaulipas, and one in each of the other States and Territory, appointed in the same manner as the Circuit Judges. The District-Attorneys of each District and Circuit are appointed by the Executive, also.

The State Governments are divided into three parts—the

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Executive (Governor), Legislature, and Judiciary." The The Governor and Legislature are elected by the people and the Judiciary is appointed. The State Judiciary consists of a Supreme Tribunal and Courts of the First Instance and Municipal Courts; the latter are presided over in some cities by Prefects and Sub-Prefects, and in others by Alcaldes and Justices of the Peace.

In relation to religious belief, Article 123 reads as follows: "It belongs exclusively to the Federal power to exercise in matters of religious belief and discipline the intervention which may be prescribed by the laws." The Constitution, laws of Congress, and treaties are, by the Constitution, declared to be the supreme law of all the Union.

It will thus be seen that much of the Mexican Constitution is modeled after our Federal Constitution, and even, in some instances, contains improvements on the same.

Nominally all religions are tolerated in the Republic, although the Roman Catholic predominates for the most part. In the large cities some of the Protestant denominations have obtained a foothold. On the overthrow of the Church party all the real estate held by the Church was confiscated, and by the Constitution of 1857 this class of property was forbidden to ecclesiastical corporations. Each State of the Federation is declared sovereign, and all the powers not expressly delegated to the General Government by the Constitution was reserved to the States, respectively. The Federal district and Lower California are, however subject to the General Government, and controled entirely by Federal laws. The Codes originally adopted by the Federal Congress for the Federal District and Lower California have since, with some slight modifications, been adopted by most of the several States, and the laws may therefore be said to be uniform in their main features throughout the Republic.

The Republic was declared independent February 24th, 1821; established as an Empire, under Iturbide, in 1822, and proclaimed a Republic December 2d, 1822, by Santa Anna. Iturbide abdicated March 20th, 1823. The Republic contains 27 States, 1 Territory, and 1 Federal District. The present Constitution was adopted February 5th, 1857.

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Education.

The principle of obligatory education is now in force in the greater part of the states of the republic, penalties having been decreed for those who contravene the law, and rewards for those who voluntarily observe the same. Primary instruction in the schools of the republic consists of the following branches: Reading, writing, Spanish grammar, arithmetic, tables of weights and measures, morality, and good manners; and moreover, in the girls' schools, needlework and other useful labors. In some of the states the study of geography, national history, and drawing are also obligatory; whilst, in the schools that are not supported by the government, a knowledge of algebra and geometry is taught, with the elements of general and natural history, ornamental and lineal drawing, and the French language. The number of primary schools in the whole of the republic reaches 8,103. Of the number referred to, according to the work of Señor Diaz Covarrubias, 603 are supported by the state governments, 5,240 by the municipal authorities, 378 by private corporations or individuals, 117 by the Catholic clergy, besides 1,581 private establishments that are not gratuitous, and 184 not classified. These schools are attended by scholars of both sexes. Secondary instruction, as well as professional education, are under the charge of the state, with subjection to the programmes established by the law, which prescribes as a mandate the liberty of education and professions.

In the republic there are 105 establishments of secondary and professional instruction. These embrace preparatory schools, civil colleges of jurisprudence, schools of medicine and pharmacy,(no one can practice medicine or keep a drug-store without a diploma from the government) schools for engineers, naval schools, commercial schools, academies of arts and sciences, agricultural schools, academies of fine arts, conservatories of music and oratory, military colleges, conciliatory seminaries supported by the Catholic clergy, blind school, deaf and dumb school, and secondary schools for girls. In these latter, mathematics, cosmography, geography, domestic medicine, history and chronology, book-keeping, domestic economy, and duties of women in society, natural, figured, and ornamented drawing, manual labors, horticulture and gardening, music, the French and Italian languages—cer-

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tainly, a young lady who graduates in these schools may be said to be accomplished, and our female seminaries might find some suggestions in a finished education. The whole number of educational establishments is 8,208, with 364,809 pupils. Besides these are eight model schools; 285,509 males and 79,300 females receive instruction, and this does not include the education under private tutors. There are 20 public libraries in the state, containing, in the whole, 236,000 volumes; and private libraries, containing from 1,000 to 8,000 works, are innumerable; and there are some with as many as 20,000, and collections of manuscripts and books upon history and travels, literature, law, biography, eloquence, encyclopedias, classic authors, mathematics, physical sciences, and antiquities, relating to America, Asia, Egypt and Nubia.

The most remarkable museums of the Republic are those of antiquities in Mexico, Campeche, Puebla and Merida; those of paintings in Mexico, Oaxaca and Puebla; those of natural history in Guadalajara and Mexico. The National Museum of Mexico, to which is annexed that of Natural History, contains a rich collection of Mexican antiquities, hieroglyphics, manuscripts, arms, utensils, idols, jewels, and every species of ornaments.

The Museum of Natural History at the Mining College, now the School of Engineers, is composed of two cabinets. In the first, there is a well classified collection of geological specimens, and another of zoology, which contains a large assortment.

In the second, are found two collections of minerals from Europe and Mexico, arranged according to the chemical mineralogical system of Berzelius.

The Academy of San Carlos, named in honor of Carlos the Third, of Spain, is one of the most notable institutions of the City of Mexico. It contains several galleries, where numerous original and valuable old Spanish and Italian paintings are to be seen. Among others, are works of Leonardo de Vinci, Murillo, Vernet, Coglietti, Canova, Van Dyck, Cortona, Perugino, Ingres, Decaen, Reni Marko, and other works of Podesti and Silvagni, and several of the Flemish and Dutch schools. In the other saloons are to be seen the paintings of some of the most proficient students of the Academy; also, many remarkable paintings of ancient Mexican artists, as Cobreza, Aguilero, the Juarez family, Ybarra, Arteaga, Vallejo, Echave, and others.

In the republic there exist 73 institutions dedicated to

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the cultivation of arts and sciences, of which 29 are scientific, 21 literary, 20 artistical, and three of a mixed character.

Resources of Mexico.

There are now being established, in the greater part of the states of Mexico, cotton, woolen, silk, earthenware, glass, and paper factories, which will add to her present prosperity. If all this great territory were populated, even in proportion to Guanajato and its territory, the census of the republic would reach 58,000,000 to 60,000,000, instead of only 9,000,000 to 10,000,000. This scarcity of population is the one great cause of the undevelopment of the vast agricultural resources of Mexico; and when they are fully developed, they will constitute an element of enormous wealth.

Within the territory of the republic, there are more than 5700 haciendas, (landed estates) and 13,800 farms, (ranchos) and not a few other locations, of immense extent. The value assigned to landed property, based simply on its valuation for taxes, is $161,397,311. The real value may be said to be double that amount, or about $323,000,000. The maize which is grown all over the territory, the wheat in the upper table-lands, the rice in the warm and damp sections, the coffee, vanilla, tobacco, sugar, and cotton in the hot countries, and many other articles, among which may be mentioned the "agave Mexicano," with its abundant returns, constitute the principal branches of national agriculture, and the annual products may be safely estimated at $100,000,000. If colonies were settled in this vast territory, employing their activity and intelligence in making such rich and extensive lands productive, under the influence of the varieties of climate, the benefits derived to Mexico are almost incalculable.

The rich and varied mineral productions of the republic have placed its mines in the niche of fame; and were it not for the scarcity of population before mentioned, they would produce a revenue that has never been dreamed of, in the imaginations of their Spanish conquerors.

The mines of Guanajato, which have been the most worked, and yielded enormously, still present immense wealth, with no signs of their being exhausted. The soil of Guerrero has been pronounced, by a Spanish mineralogist as one extensive crust of silver and gold. This seems like exaggeration, yet it has in a measure proved to be true in

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the immense deposits there found. In Sinaloa the waters have submerged rich treasures, some of which have been rediscovered.

The states of Zacatecas, Sonora, Chihuahua, Durango, San Luis Potosi, Hidalgo, Mexico, and Michoacan contain within their mountain ranges veins of gold and silver in inexhaustible riches. Although the best portion of the mineral district lies in the northern states of the republic, yet throughout its whole territory metaliferous deposits are found. Silver and gold are mostly worked, while the other metals and mineral substances, such as copper, iron, zinc, lead, magistral, antimony, arsenic, cobalt, amianthus, and copperas are almost neglected. The mountain of Popocatapetl is said to be one vast pile of sulphur. Salt mines are found at Peñon Blanco, in San Luis Potosi, Tamaulipas, south of the Isthmus of Tehuantepec, and in the islands of the Gulf of California. The Lake of Texcoco and its adjacent lands possess an extensive supply of carbonate of soda. In every state there exist quarries of white and colored marble. The alabaster of Tecali, in the state of Puebla, has attracted great attention, and the extensive coal-fields, platina, and quicksilver mines all add to the wealth of this great territory. Precious stones are not unknown; the opal with as varied and beautiful hues as those of Hungary, the turquoise, garnet, topaz, agate, and amethyst besides, are found extensively in many places. Building stone of a great variety is plentiful, from which magnificent structures may be built. Aside from the amount of ores that are worked outside of the republic on account of the law permitting free exportation of mineral ores, the annual coinage in gold, silver, and copper is on an average of $20,500,000, and the whole amount of coinage since the establishment of the mints up to 1875 being $3,001,237,281.62. In the colonial period (1537 to 1821): Silver, $2,082,260,657.44; gold, $68,778,-411; copper, $542,893.37—total, $2,151,581,961.81. Since the independence, or establishment of the republic (1822 to 1875): Silver, $797,055,080.71; gold, $47,327,383.11; copper, $5,272,855.93 — total, $849,655,319.84. Total silver, $2,879,315,738.21; gold, $116,105,794.11; copper, $5,815,-740.30. Grand total, $3,001,237,281.62.

Within the last five years, since the investment of additional foreign capital, the amount additional, on the average of twenty and one-half millions a year as the lowest estimate, would reach $102,500,000 more, which would make the sum total in 1880, $3,103,737,281.62 as the amount coined by the republic of Mexico.

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To show the increase of production, from the records of the mints, we herewith give the amount coined up to 1865, to compare with the amount coined in 1875, from official records, the first being taken from "El Minero Mexicano" of December 2nd, 1880, and the second or latter from Cubas' valuable work, which he claims to have obtained from the records at the mints.

Amount of Money Coined in the Republic of Mexico from 1772 to 1865.

In the Mints of	Silver.	Gold.	Total.
Mexico	$2,163,836,764	$77,753,472	$2,241,590,237
Catorce	1,321,545	.....	1,321,545
Chihuahua	15,626,400	1,286,095	16,912,495
Culiacan	12,795,505	4,735,283	17,530,791
Durango	35,294,581	3,139,889	38,434,470
Guadalajara	28,288,333	754,487	29,042,820
Guanajuato	164,591,216	15,094,529	179,685,745
San Luis Potosi	48,745,584	.....	48,745,584
Oaxaca	910,927	236 120	1,147,046
Zacatecas	204,234,941	550,008	204,784,949
Guadalupe y Calvo	2,063,958	2,311,104	4,375,062
Sombrerete	1,551,249	.....	1,551,249
Tlalpam	959,116	203,534	1,162,650
1865.—Total	$2,680,220,119	$106,064,534	$2,786,284,654

1875—Total amount coined from 1772	$3,001,237,281 62
1865— " " deducted	2,786,284,654 00
Increase in 10 years	$214,952,627 62
(or about $21,495,262.76 cents annually.)	

The average annual production of the mines of Sonora, from 1835 to 1842, was given by Francisco Velasco at a rough estimate of $1,500,000 annually, or $10,500,000 during the period of seven years. In 1828, Don Juan M. Riesago estimated the annual production at $2,000,000.

The laws originally demanded that all bullion should be brought to Mexico to be coined, and the cost of carrying was so great that the rich mines in these border States became almost neglected by capitalists, and the poorer ones nearest to Mexico City were mostly worked. This resulted in the smuggling of bullion out of the mines in the northern states of the republic, and no record could be kept at the mints, of those mines—in fact, there are no reliable records that give any account of the exports of bullion either from Mazatlan or Guaymas, although some records exist covering

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the last few years; while it is well known that the mines in those States have been extensively worked in certain localities for over a century.

Lower California.

This embraces a territory or peninsula, washed on its western shores by the Pacific Ocean, and east by the Gulf of California. Its area is over 60,000 square miles. Its capital is La Paz, which is the principal town. The whole of the center is traversed by a volcanic range of mountains of the Sierra Nevada. It is bounded on the north by California and north-east by the Colorado River, dividing it from Sonora.

The soil is generally not productive, though, at the base of the mountains and in small valleys, where the decomposition of lava has been going on for ages, it possesses an incredible fecundity. The formation of the whole State is volcanic, and the coast subject to storms. The scarcity of rivers bars much of its prosperity.

The productions are maize, manioc, wheat, beans, etc.; grapes, from which wine of a very rich flavor is produced; oranges, limes, lemons, citrons, prunes, dates, figs, pine-apples, bananas, plantains, and other tropical fruits; stock of various kinds graze in the valleys, consisting of horses, sheep, cattle, goats and hogs. Fish, in its waters, abound to a great extent, such as halibut, salmon, turbot, skate, pilchard, large oysters, thornback, mackerel, cod, lobsters, etc., and pearl oysters.

The pearl fishery is much pursued at La Paz. In this region, a gold mine has been worked to some extent. There are about 30 towns in the state, six bays on the east coast and ten on the west, twelve islands in the gulf, and eight west of the coast.

The territory of Lower California is divided into eight municipalities—La Paz, San José de Comondu, Mulege, Santo Tomas, San Antonio, Todos Santos, Santiago, San José del Cabo. Population, 25,000.

La Paz, the capital, has about 3,000 inhabitants

This territory is about to be colonized, as we learn from the "Diario Official" that a contract has been signed by the Acting Secretary of Public Works, in virtue whereof, Messrs. J. Kelly & Co., of Mazatlan, engage themselves to colonize 36 000 hectares of public lands in Lower California.

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The Climate of the Table Lands of the Northern Part of Mexico.

The altitude of the table lands of Mexico has a marked effect upon the climate. In the summer the thermometer records a mean temperature of 85 degrees at El Paso, 3800 feet above the sea. It sometimes reaches 105 degrees in July. The constant breezes, however, make the heat more bearable. In December—the middle of the winter season—the mean temperature is about 48 degrees, the mercury falling sometimes to 5 degrees below zero. Snow falls sometimes two feet in depth, and ice forms a solid sheet on the Rio Grande, andthe streams are sometimes frozen to a considerable depth, strong enough to bear a heavy mule team and loaded wagon. The frosts are severe, therefore, and grapevines at El Paso and other points have to be protected by burying in the earth from eighteen inches to two feet beneath the surface. The Rio Grande generally freezes so as to make the fording an impossibility during the coldest weather. The whole of the table lands is subject to extremely cold weather, and travelers not only often suffer severely but actually perish from the cold when not carefully protected. In the mining region of Jesus Maria, in Chihuahua, the ice frequently forms to a considerable thickness in the houses. The rainfall reaches from six to fourteen and fifteen inches, and when accompanied by sleet and snow makes traveling anything but pleasant in the face of some of the winter storms that sweep over the elevated plains. Travelers recount some very disagreeable experiences in midwinter traveling. Mr. Ruxton speaks of riding through one of these storms when his blanket, used as a protection against the storm, froze stiff and hard as a board while he he was in the midst of a storm of sleet and rain. His feet were frozen, and he came near perishing. Stopping and squatting upon the ground, having lost his way in the night, he drew his blanket around him as best he could, and remained till near morning in that position, with his blanket over his head. He says that before morning he was completely snowed in, the snow being over his head on a level. From this we should judge that the climate of these table lands may be said to be somewhat similar to the climate of the Mississippi Valley, bordering Illinois, Indiana and Iowa. The statement, therefore, that the climate of Mexico is tropical will not apply to these table lands. In most of the mining regions of this portion of Mexico snow falls and ice forms.

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All the mines of any value or located in the mountains or cold regions. Durango, Coahuila and part of New Leon and Tamaulipas have about the same climate as in Chihuahua, with a less proportion of snow in New Leon and Tamaulipas. The table lands are healthy, and the air is pure and bracing. The altitude produces every variety of climate on the plateaus until the low lands or plains are reached, when tropical features alone prevail. The low, marshy regions are to be avoided not only on account of the "vomito"—the scourge of those regions—but also the malarial fevers which make such localities dangerous for the settler.

The climate of Chihuahua City is about the same as at El Paso, with perhaps more cold weather, since the altitude is higher, and the mountains adjacent reaching several thousand feet above the level of the plain, and in the winter time are perpetually covered with snow. The peak of Jesus Maria, in the southwestern portion of the State, is 8456 feet above the sea, and La Tarumara 8340. The city of Durango, Humboldt says, is about 6845 feet above the sea, and the Cerro de Mercado, or Iron Mountain, adjacent is 8220 feet, making the climate, consequently, from the altitude and surroundings, cold in the winter season, with considerable snow and ice prevailing.

In the mountainous part of Sinaloa the same may be said, though the altitude of the whole State is much lower, since the highest peaks, viz., La Bayona and Cabeza de Caballo, make only 5614 and 4365 feet respectively above the sea. In New Leon, El de la Silla and Sierra de Gomez are 7800 and 6602 feet respectively above the sea level.

The State of Tamaulipas has the highest mountain peaks of any of the Northern States of Mexico. Los Gallitos is the highest, being 9633 feet, while Orcasitas is 7562 and El Metate 7144 feet above the sea. Sr. Don Perez Hernandez, in his work published in 1862, gives much valuable information, from which we extract the above figures.

Ruxton says. "The City of Mexico is 7470 feet above the sea level, and La Villa de Leon 6020, thus showing that the table land of Mexico does not decline so suddenly as is imagined. Indeed, excepting in the plains of Salamanca and Silao, there is no perceptible difference in the temperature, and, I believe, in reality but little in elevation in the vast region between the capital and Chihuahua. Snow falls here occasionally, and the mercury is sometimes seen below the freezing point. For the greater part of the year, however, the heat is excessive, and a low, intermittent fever prevails."

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SONORA.

CHAPTER I.

Boundaries and General Description.

The name of Sonora is derived from "Sonot," an Opata Indian name, which means "Señora," an appellation bestowed by the Spanish conquerors upon an Indian woman who treated them with great hospitality, when they visited the settlements of that tribe. The Indians, in attempting to imitate the Spaniards, pronounced the word "Sonora."

The State comprises nine districts: Hermosillo, at which is located the capital; Ures, the former capital; Guaymas, Alamos, Magdalena, Altar, Oposura or Moctezuma and Sahuaripa. The state originally extended its boundaries from the river "de las Cañas" on the south, to the river Gila on the north. The southern boundary extended then from the state of Jalisco on the south to Arizona, and included a part of the same. Yuma, with Tucson and other towns and ranchos south of the river Gila, were originally included in the state. The state was then 1,395 miles in length, but in 1830 it was divided, and the south-eastern boundary fixed 54 miles south of the city of Alamos, on the border of the Mesquite rancho. This constituted the dividing line between the states of Sonora and Sinaloa; the distance from the former capital, Ures, to the southern boundary being 354 miles. The northern boundary extended to the Gila River, until the boundary line between the United States and Mexico was fixed south of the same river.

The length of the state is about 700 miles. Mean breadth from the state of Chihuahua on the east to the Gulf of California on the west is about 300 miles. The exact measurement is not known, as the state has never been completely surveyed. The most narrow breadth between Mesquite and Alamos is about 120 miles. The area in square miles is about 123,466.

The general direction of the state is from north-west to

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south-east, along the Gulf of California. Its whole western boundary, from the mouth of the river Colorado on the north, extends along the coast south-east to Sinaloa. It is bounded on the north by Arizona and New Mexico. Along the coast the surface is diversified by valleys, plains, and foot-hills. Some of the plains are 30 to 40 miles, some reaching to 90 miles, in extent. In the neighborhood of the Sierra Madre mountains it is lofty and broken. The surface may be said to possess three distinct features outside of the mountainous district. First, dry plains; second, elevated plateaus, or table lands; and third, agricultural valleys, or bottom lands. The dry plains are located in the north-western part of the state, between the head-waters of the Gulf of California, and the valley of Santa Cruz, bordering upon Arizona in the north. The table lands lie in the north-eastern part of the state, extending from the Santa Cruz valley and the source of the Bapetito River, the main branch of the Yaqui on the west, to the base of the Sierra Madre mountains, which extend along the boundary line between the state and Chihuahua.

From Guaymas to the northern border line, the surface is generally level, diversified here and there by isolated mountains, conical or table-topped, which give grandeur to the landscape, without occupying much arable area. The soil is of great depth and richness, resembling in many localities the famous *brazos* of Texas, but happily exempt from the malarias of the latter.

In the interior, plains and valleys of immense extent are crossed by the traveler, in some instances 200 miles in length. The largest river of the state is the Yaqui, or Buenavista, which is only navigable for flat-boats in high water. The river Mayo may also be mentioned. Both of these rivers empty into the Gulf of California. The source of each is in the copious springs of the Sierra Madre, and they are never dry in the seasons of most drought.

The river Sonora or Arispe passes through Ures and Hermosillo, and loses its waters in the sandy plains of Siete Cerritos, about 21 miles west of Hermosillo. The Horcasitas, or Rayon, a small stream, joins the Sonora about five miles east of Hermosillo. The same stream is also called Opodepe and Cucurpe. The Oposura, Aribechi, Santa Cruz, San José de Pimas, Tecoripa, Altar, and Caborca, are mere creeks, fordable when their waters are high, and almost entirely disappear in dry seasons, some of them entirely sinking in the sands. The Colorado River on the north-west ex-

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tends along but a small part of the boundary. There are many sand-plains along the coast, as well as large sterile tracts in the interior, and only on the banks of the streams or river bottoms are the lands capable of irrigation. The principal sand-plain extends from the mouth of the Colorado to the Salinas Bay near port La Libertad.

The only port suitable for commerce is that of Guaymas, to which we will call particular attention hereafter. Some trade is also done at La Libertad. In Santa Cruz de Mayo, of the department of Alamos, in the southern part of the state, there is a small bay or roadstead called the port of Santa Cruz.

That portion lying between Mesquite on the south along the base of the Sierra Madre, extending north to the ancient capital city Arispe, is sterile in places, but has never been completely explored by surveying or civil engineers, while the region further north is, in places, very fertile. This territory will demand a more particular description hereafter. The most valuable agricultural lands are situated on the banks of the rivers and creeks, or river bottoms. Irrigation is necessary for almost the entire territory, either natural or artificial. The yield in this case is vastly greater than is produced in countries where the sole dependence is rain. The dry plains are generally level, with a hard surface, and adapted for purposes of wagon-roads and railroads. Experience has shown that artesian well-water may be obtained. The arid spots cannot be cultivated. The table-lands are covered with a short and luxuriant grass, upon which immense herds of cattle have been and may still be raised.

We herewith give the following from the pen of an able Spanish writer, Velasco, who impartially describes the state, in his valuable work on Sonora, which has been translated by Mr. Nye. Page 14:

"The most thickly settled places are upon the banks of the rivers and creeks, while at the interior settlements between Alamos and Hermosillo there is so great a scarcity of water on the roads that the traveler is compelled to carry a supply with him. It is not uncommon to travel eight or even sixteen leagues, (about three miles to the league) without finding a stream or a place where water may be procured by digging. On that part of the coast called Tiburon, to the west of Hermosillo, the distance between watering-places is still greater, and the supply more scanty, and on the old road of Cieneguilla, which is from fifty to sixty leagues in length,

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there are but three watering-places, including one well. On the road from Hermosillo to the port of Guaymas, in the dry season, no water is to be had for thirty-six leagues, except at La Posa and La Cieneguilla, and it is occasionally so scarce at these places that foot passengers perish from thirst. The coast is so dry that the rancheros have sunk wells in different parts of it, thirty and forty yards in depth, without finding moisture. The region between Arispe and the Gila, however, is well watered by numerous creeks, and abounds in pools and swamps, and the mountains are well supplied with water, and timber of various kinds, such as cedar, pine, evergreen oak, ebony, etc.; well stocked with deer and birds, and containing medicinal herbs of marvelous efficacy, one of which, called '*colorada*,' is used by the Apaches for the treatment of wounds. The valleys are expansive and beautiful, abundantly watered, and clothed in verdure during the entire year; and nature has lavished her vegetable and mineral wealth upon these frontier regions with so prodigal a hand that they may well be called the Paradise of Sonora. The inscrutable decree of the Almighty has bestowed them upon savages, incapable of appreciating or enjoying his munificent gift."

Thus we see the region north-east and bordering upon the State of Chihuahua, outside of the valleys of the Yaqui and Mayo rivers, is the best portion of the state, and includes the valleys and foot-hills of the Sierra Madre. In this region there are now many cattle-ranches of large extent, that may be purchased at very low rates, we should judge, taking our data from the prices prevailing in Sonora. The mineral belt also extends through this region, including valuable mines of gold and silver, galena and coal, to which we will give a more extensive description hereafter, under the title of "Mining Districts and Mines."

CHAPTER II.

1. Climate.

The climate is varied in the mountain region from extreme heat to the freezing point. In the winter season, the cold weather commences in the latter part of October, and reaches the lowest degree, or freezing point, from Novem-

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ber to March. Ice sometimes appears in October, but not usually till November or December. In the settlements nearest the mountains the frosts set in earlier than in the interior. In the latter region, three or four years often pass without any frost, especially near the coast. This is true of Hermosillo, Buena Vista, Alamos, and in the valleys of the rivers Yaqui and Mayo. The warm season commences in May, and the heat becomes extreme during the months of June, July, and August.

At Hermosillo, Guaymas, Ures, Buena Vista, and San Antonio de la Huerta, the mercury reaches above one hundred degrees during the months last mentioned. In September refreshing rains fall, and continue during the winter season. A hot wind occasionally visits Hermosillo during the months of June, July, and August, which blows from eleven in the morning till four in the afternoon, during which hours business practically ceases. The inhabitants seek shelter in their houses, and no one ventures forth unless driven by necessity. These hot winds are a terror to the Sonorians, and they remember, with some degree of apprehension, a time in which the wind scorched the skin like the heat of a furnace, and drove the hares, deer, coyotes, and other wild animals to the settlements for refuge, while plants and trees were literally scorched out at the root. This "*viento caliente*," or hot wind, also springs upon Guaymas suddenly sometimes, and blows for twenty-four hours without intermission. On reaching the coast it meets the damp and cooler atmosphere, and by the time it passes about three miles over the gulf, its heat is absorbed, and it vanishes. Water may be kept cool, however, in jars, even during the prevalence of this wind. In the beginning of June the poorer classes abandon the interior of their adobe houses, and sleep in the corridors or court-yards. Others often sleep in the streets before their doors, for the heat is insufferable within their houses.

At Hermosillo and some other towns a southern breeze springs up about eight o'clock, and continues during the night, making the attempt to sleep more bearable; but, if the breeze fails to put in an appearance, the sleepy god is courted in vain. At Arispe, Bacuachi, and Frontreras, the winter lasts longer than the summer; and at Santa Cruz, near the northern boundary of the state, the altitude of the surrounding mountains is such, that the temperature varies from the cool and pleasant to the freezing point. Serious epidemics are unknown; and at Hermosillo the only dis-

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eases that prevail, and that to a limited extent, are phthisis and diarrhea. On the rivers Oposura and Sahuaripa, "goitre," or swelled neck, appears on the necks of men, but mostly on the women. The disease is called "*buche*" by the Spaniards. Intermittent fevers often prevail, probably caused by the immoderate use of fruit, in the interior; but they are of short continuance. We may justly affirm that the climate is, on the whole, salubrious, and is really more healthy than that of the adjoining States, or the central part of the republic. The atmosphere is pure and dry, entirely free from malaria, with but one exception, in the neighborhood of Santa Cruz, where the adjacent swamps sometimes induce fever. The interior of the State is entirely free from noxious vapors. The air is pure and healthy, sweeping over the plains and through valleys from the sierras and the sea.

In Guaymas, Matape, Horcositas, Arispe, and Altar, persons are found who have attained to ages ranging over a century. The average duration of life, with the observance of prudence and temperance, ranges from seventy to eighty years, says Velasco. "Owing to the practice of vaccination, small-pox rarely makes its appearance. Venereal diseases are not common, except in the neighborhood of the rivers Yaqui and Mayo, and on the coast. Catarrhs frequently appear in a mild form during the changes of the seasons. One may sleep in the open air with perfect impunity, and experience no inconvenience. The diseases that affect children are diarrhea, intermittent fevers, vomiting, ophthalmia, eruptions of the face, and other difficulties that accompany teething. These diseases, owing to the lack of medical skill, produce a mortality among children that carries off one-fourth from birth up to the period of teething, annually. After this critical period, good health generally attends them to the age of puberty."

2. Soil and Productions.

The soil along the coast, from the valley or delta of the Colorado to the Altar or Magdalena River, is mostly unfit for productions of any kind, and the land south of the Altar River is used for grazing purposes, from the port of La Libertad on the coast, in places where the sand plains are not prevalent, to the Yaqui River. The exceptions are on the Altar or Magdalena Creek or river and its branch the San Ignacio, and the river Sonora. Wherever no streams exist,

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it may be safely said the soil cannot be cultivated. Very good grazing lands are found occasionally, from La Libertad to Guaymas or in its neighborhood. On the San Ignacio, sweet and sour oranges, lemons, citrons, limes, pomegranates, and peaches are raised. The territory between the San Ignacio and the river Altar, produces cotton of excellent quality. Several large plantations are in this vicinity, one of which is devoted to the raising of this valuable production. Cotton-mills are here erected, owned by the Ortizes of Hermosillo. Also the "guava" is cultivated, and the plantain-tree attains a large size, bearing a heavy burden of fruit.

In and around the territory of Hermosillo large vineyards are located, from which considerable quantities of "*aguadiente*" or brandy and wine are produced. Wheat is also grown in this locality, with beans, lentils, Chili peppers, garlic, onions, and sweet potatoes. The fruits are abundant, and the grape, muskmelons, and watermelons, are raised of excellent quality. Orchards containing figs, apples, peaches, pears, apricots, etc., are found in this neighborhood. Cotton was first experimented upon in 1811, but was soon after abandoned, and was again continued in 1842, and carried on up to the present time at from 12 to 20 miles west of Hermosillo, on the plantations of Tennaje and Palomos, and at Chino Gordo, 12 miles east. Sugar is produced from the cane, on the coast near the Yaqui River, and at San Ignacio and Ceris. The average yield of wheat is 250 to 300 from one bushel sown, upon the haciendas of Messrs. Antisernes, called the Topahui, and upon the haciendas of Hermosillo it rates from 150 to 175 from one. Indian corn and beans are extensively grown at San Antonio, Santa Rosa, on the rivers Sonora and Yaqui and Santa Cruz, and other localities. The bottom lands of the Yaqui, Mayo, and lands bordering upon the Sonora and Santa Cruz rivers, produce wheat, also. On the river Yaqui, beans, lentils, sugar-cane, cotton, flax, indigo plant, coffee, tobacco, and various kinds of fruits, are raised. Sheep and cattle and horses in immense herds are raised, as well as many domestic fowls. The tobacco has a narrow leaf, owing to the lack of proper cultivation.

Extensive salt-pits are also situated near the mouth of the river Yaqui, on the coast. In the same place, and in the mouth of the river Yaqui, are located the great oyster-beds of common and pearl oysters. The distance from Coccori to Cochori is about 90 miles, across the valley of the river Yaqui. The whole of this tract of land is susceptible of a

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high degree of cultivation. We will give, hereafter, a special description of this region. The soil is here moist and alluvial, capable of raising all the productions of the temperate and tropic zones. The irrigation is produced by annual overflows of the river, and suffices for the production of wheat, maize, and every class of productions yet experimented upon. This section may well be compared to the rich lands of Egypt lying along the banks of the Nile. Immense sugar plantations may be here established, and produce fortunes for the possessor. The best portion of this land has been granted by the republic to a gentleman residing in Mexico. Near Altar, on the Magdalena or Altar river, pomegranates, figs, and grapes are raised, and immense herds of horses and cattle are seen grazing in the vicinity; also extensive ranchos that are exceedingly fertile are here located.

In the northern part of the state, near Santa Cruz, is located a beautiful valley, clothed in verdure the year round. It is well watered by the Santa Cruz River, that takes its rise from a perpetual spring located to the north of the valley. Immense quantities of stock are here raised, and all kinds of grain, especially wheat, which is of excellent quality. It also produces the best red pepper of the state, and its hides find a ready market. The distance from Santa Cruz to Villa de Guadalupe, by way of Occua, Santa Ana, Santa Marta, San Lorenzo, and Magdalena, is 120 miles. When heavy clothing is necessary at Santa Cruz, other parts of the state are subjected to immense heat. Many swamps are in the vicinity, which produce fevers.

The Presidio of Bacuachi raises cattle, sheep, and horses, and produces good wheat, which is mostly grown, owing to the early frosts. Near the Presidio of Fronteras, the lands produce excellent wheat, maize, etc.; also, delicious peaches, apples, and the famous bergamot pear. A creek runs through this valley, which is used to irrigate the neighboring lands. Wild game is abundant in the neighborhood. The plains adjacent are all fertile and well watered. The climate is cool and healthy, and would be an excellent place to establish a colony. Indeed, the whole of the north-eastern part of the state presents advantages that no other part of the state combines. It is well timbered, has abundance of water, and is one of the richest mineral regions of the state.

To convince one of the remarkable resources of the state, a visit to the Hacienda de la Alameta, fifteen miles from Hermosillo, owned formerly by the Artazernes, will be suf-

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ficient to satisfy the most skeptical. On the Alameta are miles of wheat, corn, and sugar-cane, and cotton. On this hacienda is erected a flour-mill of the best description, with abundance of water power, and a sugar-mill and works, a manufactory of blankets—the wool of which, and the dye-stuffs, are grown on the place. A wagon manufactory, carried on for the sole use of the hacienda, is also located in its limits. Tobacco also is produced of excellent quality. Oranges, lemons, pomegranates, and other tropical fruits of delicious flavor are grown in abundance. These places are simply principalities, where a man has all the products of the earth under tribute and at hand. The large cotton-mill near La Labor, at San Miguel, was offered to San Francisco capitalists on liberal terms, but was purchased by the Ortizes of Hermosillo. The cotton is raised at its very door. Indigo, brazil-wood, cochineal, and other dye-stuffs, grow spontaneously on the Yaqui and Mayo rivers; also coffee of the best quality.

The agricultural resources we thus see are rich beyond that of any state in the Republic of Mexico. If the state were well settled by an energetic class of immigrants, the future of this famous state would be of the most flattering character. We anticipate jus such an immigration on the completion of the Southern Pacific and Santa Fé Railroads. We shall hereafter give some attention to the railroads of the state.

CHAPTER III.

Guaymas.

The port of Guaymas is situated on the Gulf of California, about sixty miles above the mouth of the river Yaqui, in latitude 27 deg. 22 min. north, and longitude 104 deg. 30 min. west of Cadiz. It is completely sheltered from the sea, and is one of the best harbors on the Pacific. The entrance runs north and south, and is formed by the island of Pajaras on the east, and the islands of San Vicente, Pitayas, and Tierra Firma on the west. There is also another entrance, called Boca Chica, formed by the island of Pajaras on the south, and the beach of Cochin on the north. The length of the bay is from four to five miles. The bottom is muddy, and

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when vessels remain for some time it is necessary to sight the anchor every fortnight. The depth of water at the island of Pajaras is seven fathoms, which gradually decreases to two, along the side of the mole. The latter, according to the opinion of mariners, is one of the best on the Pacific, excepting that of Callao. The depth of water at the anchorage is three fathoms; and vessels drawing fifteen feet are loaded, discharged, and hove down with facility. There are three landing-places, but no fortifications, although there are several points well suited to the purpose. The tides are irregular and uncertain, being influenced by the winds from the gulf. In time of full and new moon they rise and fall eighteen to twenty inches; and in the autumnal equinox, about four feet. Sailing-vessels are often delayed by calms in passing up the gulf to reach the harbor; but since the era of steamships has arrived, it will have no appreciable effect on the commerce of the port, save only with sailing-vessels. The harbor abounds in various kinds of delicate fish and shell-fish. The latter comprises the shrimp, crab, lobster, oyster, and mussels of different kinds. The town is situated on the north of the bay, and is surrounded by a range of hills of moderate height, which leaves but one single entrance from the land side. There is but one principal street, called "Calle Principal," from the entrance to the Plaza; the others being short and narrow. The soil is dry and rocky. The climate is not severe in winter; but the north and north-west winds blow with great violence, and cause much inconvenience. The summer heat is excessive; the thermometer occasionally rising up to 104 deg. in the shade, and never falling below 90 deg., from June to September; and when the north wind blows during this season from the dry and parched land lying adjacent and north of the city, it is so dry and parching in its effects that it ruins the finer articles of furniture. The health of the place is good. Water, for drinking, is drawn from four public wells on the skirts of the town, which is carried in carts and on the backs of donkeys, in leather bags. There are no trees in Guaymas but a few stunted ones in the Plaza. In the suburbs is a large orange-grove planted by Mr. John A. Robinson of this city, who resided some fifty years in Sonora. The grove is now owned by Mr. N. Graff, of Guaymas. Wood is scarce, and is brought from nine to fifteen miles from the interior; also from the river Yaqui in boats, by the Indians, and constitutes the only fuel; it is sold by the "carga," or load. There are two kinds of carga—the

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"burro," or donkey carga of 150 pounds; and "mule" carga of 300; 50 sticks, or billets, as thick as the wrist, are counted out, 18 inches long, for the "burro" carga, and sell for 25 cents per carga; and the same number of twice that length for the "mule" carga, and a corresponding price is demanded. The wagons used are the latest improved, although one sees occasionally the awkward cart coming in from the ranchos with wheels hewed or sawed off the end of a log. The houses are mostly adobe, with here and there a substantial brick building. There are about one-half dozen wholesale importing houses, and quite a number of retail houses. The former import direct from Europe and the United States. Lumber is scarce, and is brought from San Francisco and Puget Sound. It sells from thirty to fifty dollars per thousand. Lumber is admitted free of duty. There are no banks either in Guaymas or in the State of Sonora; and business is carried on with foreigners by ordinary bills of credit, and by drafts on San Francisco, London, Hamburg, and Paris banks. The principal business firms are Aguilar & Co., Sandoval & Bulle, Domingo Carrez, G. B. Fourcade, W. Iberri, Arvillez & Co., J. J. Rodgers, Luis Jarequi, Ramon Carrizosa, Aguayo Bros., Echiquyen & Escobos, and some others, who do a large wholesale as well as retail trade.

An agency of Wells Fargo is the only American institution finding a foothold in Sonora. The American Consul is also stationed at Guaymas. There are quite a number of hotels, among which might be mentioned, "Cosmopolitan" and "Hotel de Guaymas."

There is also a shoe manufactory, a soap factory, an ice factory, one Roman Catholic church, and public and private schools. It is not generally known that compulsory education is one of the Mexican institutions. Courts of the first and second instance, a hospital, and a railroad depot, are also found in Guaymas, of A. T. & S. F. R. R. The population is about 5,000. The Atchinson, Topeka, and Santa Fé Railroad, called the Sonora Railway, commences at Ardilla Island, so called, and runs north, crossing a bridge across a portion of the bay near the old rancho of Guaymas. The land is level beyond this point for ten miles, and no grading is necessary. The completion of this railway will add to the commercial importance of Guaymas, and it will open up one of the richest portions of the Republic. Capital is flowing along the line of the railroad, and new towns are being established with the accustomed energy of pioneer settlements.

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East of the town, the country is more adapted to agriculture and grazing. East and south-east, commencing about sixty miles distant, are located the rich bottom lands of the Yaqui River, which supply the town with fowls, sheep, and grain. Flour and meat are brought from the interior; San Antonio and Santa Rosa furnishing corn and beans for the Guaymas market. Hides and bullion, flour, and, in fact, nearly all the exports of the state, are shipped at this point. There are two Justices of the Peace, a judge of the first instance, and a prefect and board of aldermen. The custom-house is very much lacking in store-houses and offices. The future of Guaymas is yet to come, through the energy and industry of foreign capitalists and immigrants. This will remain the port of the state on the gulf, and it will hold its influence upon the commercial relations of Sonora. It will eventually be the most important town in the state. The railroad will soon connect it with San Francisco and the East. Another road is in contemplation, connecting it with Mazatlan in the state of Sinaloa, and from thence to the City of Mexico, which we will notice more particularly hereafter. A new port, La Libertad, above Guaymas, has been opened, giving an immediate outlet to the valuable district of Altar and north-eastern Sonora. A considerable amount of eastern capital has been invested in Guaymas and landed property adjacent. The foundries of San Francisco are turning out engines, mills, and costly machinery for the several mines owned in part here. The steamship lines established between San Francisco and Guaymas and Mazatlan are carrying this machinery to those ports, and from there transported to the interior. A new steamer has lately been built for the gulf trade above Guaymas.

Alamos.

The city of Alamos is situated some 240 miles south-east from the port of Guaymas, on the direct road by way of Buena Vista, on the Yaqui River. The town is situated in a rolling or hilly country, at the base of the Sierra Madre mountains, and is devoted principally to the mines in the vicinity, furnishing supplies to all the surrounding region. The population is about 5,000. We will give a more particular description of the mines in this district hereafter.

There is much business done here with Chihuahua, and the northern part of Sinaloa. The principal business houses are Thomas Robinson Bours, Vincente Ortiz & Hijos, and A. Goycoolea & Co.

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Altar.

Altar is a small mining town of about 2,500 inhabitants, and was formerly called Santa Gertrudis del Altar, and it is sometimes now called Guadalupe. It is watered by a small stream called Rio de la Assumpcion, branching from the Altar or Magdalena river. The stream is insufficient for irrigation in the dry season. The town is situated near the banks of the stream upon a plain about 80 miles northeast from the gulf coast, and about 100 miles from La Libertad, which is located southeast on the coast. The plains on the west are dry and sandy, and are a part of the great Colorado desert, which extends down the coast near Lobos, about 50 miles distant in a south-west direction. The discovery of mines of gold and silver in the vicinity of Altar gave it a great impetus at one period in its history. It is mostly built of adobe houses, and contains several retail shops, one church, two justices of the peace, a prefect, and judge of the first instance. The town is garrisoned by a few soldiers, and the streets are irregular. East of the town are situated ranchos exceedingly fertile and abundantly watered. The place is distant from Santa Cruz about 120 miles, which lies in a north-east direction by way of Magdalena and Arispe. Santa Magdalena is about 70 miles distant. The latter town is also called San Ignacio, and is located due east of Altar, in a beautiful valley. The number of inhabitants is about 3,000.

The stage connects at Magdalena with Hermosillo on the south-east and thence to Guaymas, and on the north with Tucson by way of Tombstone and Benson, Arizona.

Hermosillo.

Hermosillo is the largest town in the State and numbers about 12,000 inhabitants. It is situated in a valley about three and a half leagues, or about ten miles in length and five in breadth, sheltered on the north by valleys, hills, and on the west by the range of hills called "Chanate," and on the east by the "Cerro de la Campana"—hill of the bell —so-called because its rocks, when struck together, produce a sound similar to that of a bell. The base of this hill is bathed by a small stream or river called the Sonora, running from east to west, which is sufficient to irrigate the lands between San Juanica and Chanate, cultivated by the inhabitants of the city, and of the pueblo of Ceris, which is

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in sight to the south; the said lands being in length, from east to west, 12 to 15 miles.

A large aqueduct passes through the middle of the settlement, which serves for irrigating the neighboring lands. Another passes near the river and the Cerro de la Campana, and a third divides the city north and south, furnishing water to the houses and orchards of orange, citron, lime, and fig trees, pomegranates and peach trees in the neighborhood, as well as immense fields of wheat, corn, and other cereals. The average annual quantity of its agricultural products reaches to about 70,000 bushels of wheat and about 300,000 bushels of Indian corn, and an immense quantity of other cereals. Large vineyards of grapes, from which brandy and wine are produced, and plantain trees of enormous growth, mingle with the rich landscape. The wine produced is hard to keep, owing to its tendency to sour, and it is mostly manufactured into brandy or aguadiente. The Tennage and Palomos cotton plantations are located from twelve to twenty miles west of the city, and at the Chino Gordo, about twelve miles east. Sugar-cane has not been very successfully grown in this vicinity; but at San Juanica and Ceris it is raised in small quantities. The capital of the State is located here, and the Legislature meets biennially, the same as under the Constitution of California. The Constitution of the State of Sonora is mostly copied from the old Constitution of California. The streets of the city are kept clean and are well paved. The principal street is called the "Calle Principal," the same as in Guaymas. The public buildings are, the capitol, the mint, the assayer's office, and municipal buildings, including the prison and public school, and one or two churches. The school is held in a building purchased by the city, and consists of two departments, male and female. The number of pupils is about 600. Public examinations are held every six months.

There are several hotels. The principal ones are, the "Iturbide," "Nacional," "Cinco de Mayo," and "Cosmopolitan." All are one-story adobes, with a court in the center, where the guests are obliged to sleep in the summer season. The houses are nearly all one-story adobe buildings, with occasional brick residences and buildings. A new Catholic church is in course of construction. The principal plaza, in front of the church, is the most attractive feature of the city, and is set with orange trees and evergreens and covered with lawn grass, with enticing paths,

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meandering through flower beds, and bordered with orange trees, which afford an excellent shade. It is kept open all the time, and is provided with convenient seats for the leisure-taking Sonorians. An eye-witness pronounces it, in "size, beauty, and arrangement, as excelling any in San Francisco." The whole is surrounded with a very pretty iron fence. In the center is a grand stand, from which music is wafted upon the evening breeze Thursday and Saturday nights, on which occasions it is the favorite resort of the people of the city. The ladies of Sonora are very beautiful, and, indeed, the town is known as the place of beautiful women.

The ladies of Hermosillo of the higher class never go on the street with their faces uncovered. The "mantilla" of rich and gorgeous material is very gracefully thrown over the head, and one portion, with that indescribable drapery for which the Spanish ladies are noted, is carelessly thrown across the lower part of the face, concealing the features, and over the shoulder, while the beautiful eyes, some lustrous black and others of blue, only are revealed to the gaze of the spectator, as they float along with that grace of carriage and modest demeanor for which the Spanish ladies are so celebrated. The latest styles from Paris are ordered, and Worth has many customers throughout the republic. The descendants of the ancient Castilians are to be seen in blondes as well as brunettes; and although the taste of the people is generally in favor of bright colors, still fashion has been wielding her scepter in Mexico as well as in the United States.

Hermosillo is celebrated, as well as the rest of the state, for the fecundity of its women. It is not unusual to see a family with from 15 to 25 children. As an instance in point, there is a lady residing in Hermosillo weighing 260 pounds, tall and handsome withal, in spite of her corpulence, who is the last of a family of 28 children. This fact is vouched for by a well-known citizen of this city. Another gentleman, an American by birth, and at one time a prominent citizen of Guaymas, but now residing in this city, married a Spanish or Mexican lady, and is the fortunate father of no less than 17 children. The children of Sonora go almost naked, and thrive remarkably well, since the statement of Velasco that there is a great mortality among children, to which we have already referred. The prominent citizens even dress their children only with a shirt, hat, and boots.

The business of the place is confined to the port of Guay-

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mas and the interior of the state. There are about 30 shops and mercantile establishments in the city. The town is the favorite resort for travelers through the state. The principal business men of the place are the Ortizes, Camous, Pesquiera, Ruix & Mascareñas, Carlos Maneti, Alvistiqui & Alatorre, and Antonio Calderon. Most of these business houses import direct from Europe and the United States. The houses of Ortiz and the Camou Bros. are probably as strong financially as any in the republic. The Ortizes, besides owning a large number of haciendas, comprising several hundred thousand acres, stocked with immense herds of cattle and horses and flocks of sheep, and several of the best mining properties of the state, own the large cotton-mill, called "Industria Sonorense," which employs about 300 men and women; also a sugar-mill and tannery. All these mills are located at Los Angeles, on the San Miguel River. The Camou Bros. own several large haciendas, also, with their thousands of cattle and horses, mules, sheep, and large mines. They also own the steam flour-mill, located at the city of Hermosillo, and another at El Molino Rancho. The town of Hermosillo is orderly, and the police regulations good. There is a very good market-place for the sale of meat and vegetables, but no bakeries, such as are seen in the United States, in the city. Water is found in abundance in wells, at the depth of 20 or 30 feet. Wood is plentiful, and brought from the timber, about two or three miles distant. A natural cement stone is within the town limits, that is easily quarried, being soft, until it hardens on exposure. It may be quarried and used for building purposes. There is also a fine clay, used in the manufacture of brick, in the vicinity. There is also a shoe factory and wagon factory, and plenty of carpenter and blacksmith shops, etc., worked by foreigners. Wardrobes and other pieces of furniture are manufactured in the town.

The railroad now being built from Guaymas will add to the business energy of the city, and its future is assured as the most important inland city in the State. There is a club in the city called the "Casion," of about one hundred members, of the principal citizens of the place, located in the former magnificent residence of Gov. Pesquiera; also a theater; and society is of the gayest during the sessions of the Legislature, when balls and receptions are quite frequent. There is no gas in the city; but an attempt is being made to organize a company for that purpose. The streets and houses are lighted by lamps. Señor Falizardo Torres is the

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superintendent, and Mr. Edward Norman is the cashier of the mint which is located here. This mint and those of Sinaloa, Chihuahua and Durango, are leased to an English company.

Hermosillo is the centre of the richest mining and agricultural district in the State, and is the distributing point for the supply of numerous mines and haciendas surrounding it. The principal merchants are Germans, who are doing a large and prosperous business. A view of this part of the State may be enjoyed from the summit of the Cerro de la Campana, which lies within the city limits.

The Sonora railway runs from Guaymas, on the Gulf of California to this city, and thence northward through the Valley del Barranca, passing the City of Magdalena, and from thence through the Valley of the Santa Cruz to Nogales on the border, and connecting with the Southern Pacific at Benson, Arizona. The distance from Benson to Guaymas is 352 miles, making a run of about 20 hours, or at the present time, of 19 hours and 40 minutes.

Besides the natural growth of travel over the line of this road in the increase of trade, we predict an immense travel by tourists over this line as well as over the Mexican Central. For the benefit of the tourists, we call their attention to the wonderful Aztec ruins lately discovered about four leagues southeast of Magdalena. These ruins consist of a mammoth pyramid, and a mountain palace. The pyramid has a base of 1350 feet, and rises to the height of 750 feet, with a winding roadway from the bottom leading up an easy grade to the top, wide enough for carriages to pass over, which is said to be twenty-three miles in length: the outer walls of the roadway are laid in solid masonry from huge blocks of granite in rubble work, and the circles are as uniform and the grade as regular as they could be made at this date by our best engineers. The wall, however, is only occasionally exposed, being covered by debris and earth, and overgrown with plants and trees, giving the pyramid the appearance of a mountain.

The mountain palace lies to the east of the pyramid, and is honeycombed by hundreds of rooms cut in the solid rock, with hieroglyphics on the walls, and innumerable stone relics are in and about the rooms. The size of the rooms ranges from 6 by 10 to 16 by 18 feet, and are cut even and true, with an entrance at the top. The ceiling is about 8 feet high. The rooms are one above the other, to three or more stories high. Here is a rare chance for some American archæologist.

The increase of the sale of mines promises well for the State, no less than six mines, said to be valuable, ranging in

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price from $200,000 upwards, having been sold to New York and Chicago parties in the last six months, and more are coming every day.

"For the gold mine of Los Mulatos, $1,000,000 has been refused."

The distance from Hermosillo to Ures is about fifty miles, situated north-east, and to Arispe, 150 miles north-east of Ures, and Santa Cruz, about 250 miles; thence 170 miles to Tucson by way of Magdalena, distant 300 miles, and is about 100 miles by stage from Guaymas.

Ures.

This town was formerly the capital of the State, and is situated in a most beautiful valley, stretching from east to west, the soil of which is exceedingly fertile and suitable for the production of all kinds of fruits, excellent wheat, sugar-cane and cotton of superior quality. The environs are picturesque and pleasing to the eye of the visitor. It is located on the Sonora River, and on the road from Hermosillo and Alameda, a road lined with trees on each side similar to the Alameda between San José and Santa Clara in this State: the road in this instance being bordered with trees on either side for four miles, and presents an elegant drive for the residents of Ures.

The town originally was environed with numerous creeks that threatened it with inundations, when it was removed upon a neighboring plateau. The town is not so large as Hermosillo, yet its neat and elegant gardens of rare and beautiful flowers, lime, orange, and citron groves, make it a gem of a little city. There are some very substantial residences of brick scattered here and there among the adobe houses, and even elegant residences, among which may be mentioned Gov. Pesqueira's residence, handsomely furnished. A large orchard is attached to his residence and grounds, with orange, lime, lemon, peach, and olive trees bearing finely, besides an extensive vineyard.

Since the capital of the State was removed to Hermosillo the population has shrunk from 10,000 to 5,000. There is quite a rivalry between the two cities, and the dispute over the capital is not yet ended. If the Atchison, Topeka and Santa Fè Railroad passes up the Sonora river to El Paso, it will pass through this place. There is a vast agricultural and mining country around and adjacent to the city, and business is quite extensive. There are some heavy com-

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mercial firms in the city, among which may be mentioned Lauro Morales, Joaquin Villaes, Cusa & Co., Francisco Hernandez, Manuel Morales & Co. and Francisco C. Aguilar. The climate is much cooler at Ures than at Hermosillo, and one is able to sleep within doors. Among the important haciendas of arable land may be mentioned, Santa Rita, Molino, Guadalupe, Topahui and others. There are no important public buildings except certain small houses purchased during the administration of General Urea to form a palace, a penitentiary or House of Correction. Excellent stone for building is in the neighborhood of the city. The principal hotel is the Gubion, kept by a Frenchman.

The Rancho of Gov. Pesquiera, called Las Delicias, is located about 60 miles distant by way of Canada Andia, El Puertecito, El Molinate, Soqui, San José, La Estancia, La Concha and Baviacora. The last named town was once an important place, with a population of 3,000, and is situated in a pretty little valley one mile from the Sonora River, in one of the most fertile and beautiful districts of the State.

The grounds of the hacienda of Las Delicias is fenced in and laid out with orange and lime groves and flower gardens, containing rare flowers. The hacienda consists of a little over 30,000 acres of arable land, and about one-fifth is first-class agricultural land, devoted to the raising of wheat, Indian corn, potatoes, etc.; the balance is very good grazing land, covered with alfalfa and gramma grass. It is situated in a valley of considerable extent. Gov. Pesquiera has made this hacienda his residence, owing to the existence of rich mines in the vicinity, which are owned by him, and demand his attention in working them.

Among the reptiles that are found in the State may be mentioned the scorpion, whose sting is deadly. Rumor says that they are more deadly in the interior than on the coast.

One citizen near Guaymas was recently bitten by one of these reptiles on the hand. He simply twisted a strong India-rubber band around his wrist to keep the poison from communicating to the rest of the system, and took some ammonia, and the wound soon healed, without any serious result following. Strong spirits are generally used to work off the virus from the system.

Santa Cruz is the most northern town of Sonora, distant about 120 miles from the boundary line of Chihuahua and ten to fifteen from the boundary line of Arizona, and situ-

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ated on a road direct to Guadalupe or Altar, which passes through Occua, Santa Ana, Santa Marta, San Lorenzo, Santa Magdalena, or San Ignacio, Teneuate, Imuris, and San Lazaro. The population is about 800. The town is located in a beautiful valley, clothed in verdure the entire year, in latitude 32 degrees 15 minutes north, and in a region that is pronounced to be the best agricultural region of the State, outside of the bottom lands of the rivers Yaqui and Mayo. It is also the best timbered of any portion of the northern part of the state, and in other respects presents advantages to the settler. Indeed, the valley of Santa Cruz, with its adjacent districts, where there are several rich and highly-cultivated haciendas and missions, must become the future granary of Arizona. The Santa Cruz River rises in a broad valley, or rather plain, north of the town, and passes the base of a mountain range through an open country, studded with oaks, into an open plain covered with luxuriant grass, without tree or shrub. It then passes between a low range of hills into the valley where the town is located. The river then flows south nine miles to San Lorenzo—a considerable rancho—and then takes a northerly course, winding its way through a beautiful valley, until it is lost across the line into Arizona, in the desert plain or sands some ten or fifteen miles north of Tucson. It is about 150 miles in length. Its width varies from 20 to 100 feet, and during dry seasons portions of it disappear. This valley was traversed by the earliest Spanish explorers in 1535, seduced by the flattering accounts of Cabela de Vaca.

Marco de Niza and Coronado led their deluded adventurers through it in search of the famed cities of Cibola, north of the Gila River; and before 1600, its richness having been made known, it was soon after occupied as missionary ground. Remains of several of these missions still exist. The Mission Church of San Xavier del Bac, erected during the last century, was the finest edifice of the kind in Sonora. Tumacacori, a few miles south of Tubac, was the most extensive. The towns and settlements of the Santa Cruz valley, across the line, in Sonora, are, Santa Cruz and San Lorenzo. The lands of this valley are suitable for stock-raising and all kinds of grain, especially wheat, which is produced of excellent quality.

Bacuachi.

The town or Presidio of Bacuachi is located about 50 miles south-east from Santa Cruz, on the road to Arispe,

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which is located on the Sonora River. It was at one time rich in cattle, sheep, and horses; but the Apaches swept them away, and the town became almost a heap of ruins. It is located in a very fertile valley, near the base of a range of mountains on the west, on the Sonora River, that rises in a valley north of the town and across the boundary line, in New Mexico. It also lies in a straight line drawn from the boundary line between Arizona and New Mexico, and is distant from the boundary line of the United States about 40 miles within or near the lower part of the prohibited belt. There are gold mines in the neighborhood of marvelous richness. The rich placers on the Sonora not being very distant, great quantities of this precious metal was extracted from the mines in the vicinity, of twenty-two carats fine. The miners were driven off by the Apaches, and the mines were, consequently, abandoned. The gold is coarse, and pieces have been found weighing twenty-five marcs. These mines might be made to yield a magnificent return if they were opened. The future of this mining district is just to open, since the suppression of the Apaches. A colony of miners will here find a rich field; for the whole region is rich in minerals, and but awaits the hands of man to develop their vast resources. This locality has been peculiarly exposed to the incursions of the Apaches, and for that reason, its mineral wealth has been withheld from the prospector. We predict a tremendous immigration to this point and all along the headwaters of the Yaqui River. The climate is cool and healthful, and epidemics or fevers are entirely unknown, while the soil is of the most fertile character, producing wheat, corn, etc., and presents a grazing region unexcelled anywhere; and there is an entire absence of swamps that are found in the Santa Cruz valley, which sometimes induce fevers. There are here two justices of the peace, subject to the sub-prefect of Arispe.

The town of Fronteras is situated in latitude 31 deg. N., north-east of Bacuachi, distant about 35 miles, and 20 miles from the boundary line of New Mexico. The town contains but one street, at the foot of a creek whose waters irrigate the neighboring lands, which produce excellent wheat, maize, etc; also, the delicious peaches for which Sonora is celebrated, apples, and bergamot pears. The town is situated 35 miles north-east of Bacuachi, and the greater part of the road is between dense thickets. This point was the most exposed to the Apaches of any in the State, but is now comparatively safe. The climate is cool and healthy,

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timber is abundant, and game plentiful. The plains are fertile and well watered. Two justices of the peace are located here.

Bapispe is situated about 18 miles west of the boundary line of Chihuahua, on the banks of a small creek which empties into the river Bapepito. It is isolated from all other towns, and is situated about 40 miles south of the boundary line of the United States at New Mexico, and east of Bacuachi about 90 miles.

The creek passing the town rises in a valley south-east of the town and flows north-west into a plain about 20 miles; then south-west into the Bapepito, near Oputo. A road connects this town with Janos in Chihuahua, about 40 miles distant. This territory of the Bapispe district contains the towns of Guachinera and Baserac, and haciendas Santa Ana and Loreto ; it formerly comprised a number of wealthy ranchos, but all have been despoiled by the Apaches. Bapispe possesses excellent grazing lands and abundance of water. The population is about 800. They are engaged principally in the manufacture of soap and leather. About six miles east is located a rich silver mine, that has not been worked much on account of the Apaches.

Arispe is situated south-west of Bacuachi, on the river Sonora, in a valley skirting an immense table-land or plain, and a range of mountains extending north-east and south-west. Extensive silver mines are located south-east in this range of mountains, called the Babiconicora and Banamiche ; also, south-west, the San Rosalio mine is located, also of silver, The hacienda of Las Delicias, owned by General Pesquiera, is also situated south-west of Arispe. A road runs from Bacuachi along the river Sonora, in a south-westerly direction, through Bacadobabi, Chinapa, Guipaberachi, Ciniriasanta, Arispe, Bamori, Sinoquipe, Monteport, Bamanitchi, Huepaca, Mochobavi, Aconche Babiacora, Concepcion, Puretecito, San Francisco, and Ures, distant about 100 miles. The same river passes Ures and Hermosillo in the same direction, until it is lost in the sandy plains on the coast, south-west of Hermosillo, and is about 200 miles long.

Moctezuma, or Oposura, is situated on the Soyopa River, in a large plain, that extends from the head-waters of the river Soyopa, which runs almost due south for about 100 miles, and then taking a south-easterly course, empties into the river Yaqui, about 20 miles further. A road runs from Moctezuma, down the Soyopa River to the Yaqui, and thence along the Yaqui to Comoripa and Buenavista. This plain

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is one of the largest in the state, and over 100 miles in length, and about 40 miles wide at its widest point. In the mountain ranges west of the head-waters of the Bapepito are situated the silver mines of El Pintos, Sesentero, San Pedro, El Rosario, Cinco Señora, El Humacal, and Plomosa. South-west of Soyopa, on this river, is located the Mina Prieta copper mine, and the silver mines of El Paste, and Los Bronces. East of the latter, the La Barranca, and the great gold mine called the San Antonio de la Huerta; the latter two of which are located near the mouth of the Soyopa River.

Sahuaripa is a small town located on a branch of the Bapepito, east of the river of that name, and distant from Bacuachi about one hundred and fifty miles south-east by way of the road through Bapepito and Oputo, crossing the branch of the river ; thence south, along the Bapepito, to Cienega, Guainipa, Iascotol, and crossing the Bapepito to Huasavas; thence to Baca de Huachi, crossing again the same river ; thence south-east to Nocori, on the river Viejo, which empties into the Bapepito south-west about fifteen miles ; thence to Palmar, Casa, San Gabrielle, through the silver mine of San Felipe to Sahuaripa.

This region is well watered, and abundance of timber is found in the mountains. Several large haciendas are also in the neighborhood, along the stream and between the two streams ; the stream on the north being the Rio Viejo, which takes its rise in the same neighboring mountains on the east. North-east of Sahuaripa, distant about fifty miles, is located the great gold mines of Cieneguita and the silver mine called the Minas Prietas Viejas, both of which are located at the base of the mountains ; the Cieneguita being north of the latter about fifteen miles.

A road runs direct from the town through a rancho to the Minas Prietas Viejas mine. This is a rich mineral region, and will ere long be completely settled.

The region north of these mines has never been completely explored, and has not yet known the tread of the American miner. The second main branch of the river Yaqui, called the Papigochi or Mulatos, runs south of this region, taking a north-easterly course and emptying into the Bapepito about fifty miles south-west of Sahuaripa.

Gold placers are located east of Santa Cruz, about forty miles; and the mine of La Cananea south-east of Santa Cruz thirty miles ; and the Santa Teresa silver mines and San Rafael Valle silver mines, forty miles south-west. The

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Planchas de Plata silver mines are located west of Santa Cruz about fifty miles. The Altar mine, or mines surrounding Altar, are located in many districts. West of that place the gold mines of La Basura are located about seventy miles, and silver mines north-east of the same mine about ten miles. The Cajitos gold mines are located south-west of Altar about seventy miles; and south-west of La Basura, the placers of gold Micaray, and Alamo de San Feliz, silver, are also located about seventy miles; also, the silver mines of Los Palomos are located on the river Assumpcion, south-west of Altar about ninety miles, and about seventy miles north of La Libertad, on the coast. South of Altar about thirty miles, are located the Alamitos, silver, and La Tollena, gold mines, near. The Mina Grande silver mine is located about eighty miles south of Altar, and Latesote near Cienega, east about ten miles. Caborca gold mines are located near the same river. Rich gold placers are also found west of Altar on the elevated plains about one hundred miles distant; and the Quitovac gold mines, which were once rich, about one hundred and fifty miles north-west of Altar. So that the town may be said to be completely surrounded by mines.

Rivers Yaqui and Mayo.

The river Yaqui, or Buena Vista, rises in the Sierra Madre Maicova, and takes a south-westerly course through Bapispe, Todos Santos, the pueblo of Soyopa, Honavas, Tenichi, San Antonio and Comuripa, to the city of Buena Vista, where it enters the Yaqui settlement and finally empties into the Gulf of California, in front of the pueblo of Rahum. It has many branches, and may be said to drain all the region east of Arispe, Ures and Hermosillo, to the summit of the Sierra Madre range, which divides the states of Sonora and Chihuahua, and north of the river Mayo.

One of its branches called the Bapepito rises in the south-eastern portion of Arizona; and another called the Papigochi, or Mulatos, at the base of the Sierra Madre, across the boundary line in south-western Chihuahua. It is the largest river of the state, and is estimated to be four hundred miles in length, from its source to its mouth. Its waters pass through the richest agricultural portion of the state, and through immense placers of gold, and along the base of ledges of silver, copper, galena, and tin ores.

Its rich bottom lands are the most fertile of any in the state,

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and raise in spots now under cultivation, wheat, sugar-cane, corn, cotton, the indigo plant, tobacco, and the various cereals. At and near its mouth, where the soil is not under cultivation, immense cane-brakes of a kind of bamboo extend along its banks for about sixty miles. If brought under control by proper agriculture, its valuable lands could produce immense quantities of all the products that an alluvial soil, well irrigated, will produce. The best portion of the lands are in possession of the Yaqui Indians, with some exceptions, but its lands are so extensive that after reserving sufficient for the Indians, millions of acres of arable lands would remain to be brought under cultivation.

Here is an opportunity for colonization that is unrivaled in the United States or the Republic of Mexico. The land is easily irrigated from the river, and would provide homes for colonization of a large population. In time of high water the river is navigable for small vessels for from fifty to seventy-five miles. Flour-mills are located on its banks, owned by foreigners—the result of foreign capital and energy. At its mouth are located the best oyster-beds on the coast of the gulf. We are assured by parties who have tested the qualities of these oysters, that they are equal to our best Eastern bivalves. San Francisco will soon have the pleasure of testing them on the completion of the Sonora Railway connecting Guaymas with San Francisco. Packed in ice manufactured at Guaymas, they can successfully be exported direct by rail to San Francisco, on the completion of the railroad, thus opening up a new avenue for some enterprising gentleman who will take the initiative. San Franciscans would like to try some of the Yaqui oysters if they are as represented. We understand that Dr. Charles McQuesten of this city, and Rafael Escobosa of Guaymas, are now the *bona fide* owners of these oyster beds, and the extent of their possession comprises one league square in the delta of the Yaqui at the old mouth. The oysters are found in the sloughs which extend from one to two miles inland.

The basin of this river at its widest point is about ninety miles wide. After the rains have ceased, the river is fordable, though still deep until the droughts in April, May and June. Near Soyopa, Buena Vista, and Honavas, are located a greater proportion of the best bottom lands. The salt-pits of the river, located near the coast, supply the interior towns, and are considered the property of the Yaquis. The annual overflow of the river supplies sufficient irrigation for one crop of wheat, maize, beans, len-

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tils, and various kinds of fruit, at the points thus irrigated. Cotton, flax, and coffee, are also successfully raised. We are told by Velasco, the sheep raised upon its nutritious grasses attain the size of a yearling calf, and make excellent mutton. Beef cattle of the best quality are raised. At one time the Mission of Huirivis alone owned 40,000 head. The tobacco raised by the Indians upon the banks of this river is of very good quality; and the plant might, with proper cultivation, be equal to that of Havana. Immigration to this region must be of incalculable value to the state in the increase of its productions.

The river Mayo rises also in the Sierra Madre, and though it is smaller, and its bottom lands more narrow than those of the Yaqui, yet its fertility is the same, and may produce like results proportionate to the extent of its lands that are susceptible of cultivation. The Mayo Indians are located on its banks. The two rivers are separated by a low range of hills or mountains, and the intervening hills are good grazing lands. The pueblos of the Mayos, from the sierra on the east to Conicari on the west, are Macollagui in the sierra, Conicari, Camoa, Tecia, Nabajoa, Cuirimpo, Guitajoa, Echojoa, Santa Cruz, and Masiaca.

The Yaqui settlements extend from Buena Vista to Belen, over a territory of 84 miles in length. A brig might enter the mouth of the river Mayo, and a harbor is located at the port of Loreto, at this point. It was the first settlement of the gulf, and renowned for its pearl fishery, which has produced splendid fortunes. In the gulf, many large whales are sometimes caught, of various kinds; also, sharks of enormous size haunt its coasts, to the great danger of the pearl fishermen, who are Yaqui Indians. They always carry a long, keen knife with them while diving after pearls, to defend themselves. The "manta," or blanket fish, also, is another great enemy of theirs, and very formidable. It has fins like the arms of a man, says a writer, by which it seizes its prey.

The Presidio of Buenavista is located on the Yaqui River, on the main road to Alamos, about 300 miles from Arispe, by way of Hermosillo, and about 260 miles by way of the road of Matape, which runs along the banks of a stream by that name, south of Hermosillo. It is situated upon a small rocky promontory or hill, and is, consequently, very hot. It claims some importance as a military position, and is supposed to present a barrier against the revolt of the Yaquis and Mayo Indians. Its soldiers are poorly supplied and seldom paid.

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The recent attempts to survey the lands of the Yaqui and Mayo rivers have been suspended, awaiting a petition from the Legislature of Sonora to the general government to supply a force of 1,000 soldiers to keep the Yaquis in subjection during the survey and location of certain government grants upon those rivers. For this purpose, a return grant by the owners to the general government of a portion of the lands is to be made to cover the expense of maintaining the military in this district.

The lands adjacent to the town are of the fertile character that belongs to the bottom lands of the Yaqui and Mayo rivers. From this point, the Yaqui River is navigable during the greater part of the year, and timber, grain, and other productions can easily be transported to Guaymas. Mines of gold and silver are located at Cumuripa, Cendraditas and San Francisco de Borja, which, when worked, yield abundantly.

The current of the river is rapid at Buenavista and many other points. Ore might be transported from this place and shipped from Guaymas. Along the river, above Buenavista, there are hundreds of veins of gold and silver that could be worked profitably. The placers are located near this place, and are said to be very rich.

The town of San Pedro de la Conquista is situated south of Hermosillo, on the river Sonora, a short distance. Cattle and horses are here raised, and different kinds of grain grown. There have been no mines of any consequence discovered here. The land is well timbered with iron-wood, the mesquite, the huayacan, (a very solid and compact wood) and the huevito. An herb is here found, called the "confituria," which is much esteemed, as possessing medicinal qualities, and is said to be used as a specific for hydrophobia.

The land is fertile, producing wheat and Indian corn or maize, beans, pulse, lentils, Chili peppers, sweet potatoes, etc. Figs are raised in profusion, grapes, peaches, apricots, pomegranates, quinces, sweet and sour oranges, limes, citrons, and the guava.

Wheat is sown from October to December, and sometimes as late as January, and is harvested from May to July. Two crops of beans are raised annually. The first is planted in February or March, and the second in July and August. Two crops of corn are also sometimes raised, the most abundant being gathered in November and December. That gathered in July or August is generally of inferior

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quality. Grain, flour, and other products are transported to Guaymas and other places, in wagons drawn by mules and oxen.

There are several grist-mills turned by water-power at this place, the best grinding from 25 to 30 cargas (of 300 lbs. each), in 24 hours. Sugar-cane is also raised. The climate is healthy, and the population about 1,200. The town has two justices of the peace, subject to the tribunal of first instance at Hermosillo.

The Indians and Presidios.

The Yaqui and Mayo Indians inhabit the cane-brakes on those rivers, and are depended upon mostly for laborers all through the state. They are not averse to labor, and are employed in every capacity. They possess remarkable natural abilities, and soon learn the trades of blacksmithing, carpentering, etc. They have been known to manufacture fireworks, and are skillful players on the harp and violin. Their character is resolute, and they are very jealous of their lands. They are generally copper-colored and well formed. The women are of medium height and corpulent. In some of the settlements, the women are exceedingly fair and handsome; but these latter are mostly half-breeds. The Yaqui, with few exceptions, has but few wants. A cotton shirt and drawers for the men, and shawl and petticoat for the women, suffices; while the children run naked, with the exception of a cloth around the loins. Their nature is joyous, and they are very fond of music and dancing. They are suspicious, and a supposition of deception serves as well as the reality. They have been known to revolt against the government and commit great atrocities. They are brave, and have been known to fight steadily for hours against the government troops. They shun the society of the whites, and only live near them for the sake of employment. Velasco says, "They will steal, gamble, and drink, and have no generosity or gratitude"—a rather peculiar trait for the Indian—yet they work in the mines, till the soil, build houses, and perform nearly all the labor of Sonora. They alone of all the Indians are skillful pearl-divers; but so "great is their love of robbery," says Francisco Velasco, an impartial Spanish writer, "that they abandon any occupation, however profitable, for the purpose of stealing cattle and horses from the ranchos in the neighborhood of the river. This they practice even in times of peace."

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But Mr. Andrade tells us that this is not so at present. They have greatly improved since the writing of Velasco's book. Their population amounts to 13,500 in the state, according to Cubas.

The Mayos possess the same characteristics as the Yaquis. Being located on the Mayo, they are called Mayos. The Ceris are more allied to savages, are filthy, drunken, and bitterly hostile to the whites. They are located by the government upon the pueblo of San Pedro de la Conquista, where they have lands assigned to them for their support. They are lazy, and dress themselves in either the skins of the pelican or a coarse blanket wrapped around the waist. Some wear nothing but a strip of cloth about the loins, and none wear shoes. They paint their faces in black stripes, and many pierce the cartilages of the nose, and append to it pieces of a green stone resembling glass. The women perform the greater part of the labor, gathering the crops, etc. The men are tall, erect, and generally stout. The women are copper-colored, and wear a petticoat made of the pelican skin, with the feathers, which covers the form from the waist down. They worship the moon, and prostrate themselves, beating their breasts, and kiss the ground on the appearance of the new moon.

The Opatas are more frank and docile, and are friendly towards the whites, many of them serving as soldiers. They are brave to the last extremity, and have been known to withstand an onset of the Apaches outnumbered eight to one. They are just and humane in their dealings, and capable of a high degree of education. They are the bitter foes of the Apaches, showing them no mercy in an encounter.

The Opatas live in several of the towns, where the mixed race predominates, called Opodepe, Cucurpe, Suaque, Aconchi, Babiacora, Arivechi, Santo Tomas, Bacanora, and Nuri in the center; Oposura, Guayavas, Baca de Huachi, Nacori, Mochop, and Oputo in the sierra; Chinapa, Bacuachi, Cuquiurachi, and Cumpas, to the north. The Opatas are able-bodied, and as fleet as the game they pursue. Their haughty character is illustrated by the following, related by Cubas, of a band of them in rebellion: "Persecuted by General Gandara with very superior forces, in consequence of an insurrection, they refused to surrender themselves, even after each one at his post had shot his last arrow, Their captain, with some few who had survived the contest, took refuge on the summit of an almost inaccessible mount-

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ain, and there awaited the approach of General Gandara's emissaries, who had intimated their submission. Believing themselves humiliated at the demand for the delivery of their arms, they declared to the envoys of the general their resolution to deliver themselves up to their conquerors, without abandoning their arms. Upon General Gandara's insisting in his demands, and they in their resolution, their conduct decided him to take them prisoners by force, which they avoided by an act worthy of the ancient Spartans, in throwing themselves over the precipice at the moment the general's troops were ascending the heights." The Opatas are most useful citizens, and have on many occasions proved their loyalty to the Mexican Government by resisting the attacks of the Apaches. They seldom go barefooted, every man has a blanket, and every woman a long scarf. They are good carpenters, masons, shoemakers, and house-painters, and manufacture blankets, shawls, coarse cottons, saddles, pack-saddles, bridles, etc., and considerable quantities of soap.

The Papajos are numerous, and located in the western part of the state, subsisting principally on wild fruits, especially the "pitaya," from which they manufacture a delicious syrup, and carry it to the settlements for sale in earthen jars. In the winter they resort to the settlements of La Pimeria to trade, exchanging skins and baskets. This tribe is also the sworn enemy of the Apaches.

The Apaches are divided into the Coyotes or Pinelores, the Tontos, Chiricahuis, Mimbreños, Gilenos, Mescaleros, Sacramantenos, Mogollones, Carrizalleños, Gipanes, Faraones, and Navajoes. They have had no fixed habitation, and reside in the mountains and on the plains, and often make incursions into Sonora, near Altar and Magdalena, and also in the north-east, in the mountains of Chihuahua, near Janos, and in Coahuilla. They are the most savage of all the Indians of Mexico, and are exceedingly fleet, both in traversing the vast plains and in climbing the rugged eminences of the mountains; and, besides, are excellent horsemen. Their arms are mostly the bow and arrow; but some few have fire-arms, and a lance with a flint point. They use a leather quiver, and a shield of leopard's skin, ornamented with feathers and with small mirrors in the center. They are cowardly, and only attack unawares; crafty and treacherous, and scalp their victims. They make use of smoke for telegraphic signals. They are fond of hunting deer and wild boars, "ciballos," or Mexican bulls, black bears, wild

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goats, and Rocky Mountain sheep. Their dress consists of a strip of linen passing between their thighs, and fastened at the waist, and leggings of deerskin with fringes, ornamented with beads, and garnished with leather strings, and wear pendants and ear-rings, and in their hair they fasten a long false braid, adorned with trinkets, shells, or silver buckles. The women, who are as active as the men in their habits, use very short garments of deer-skin or kid, which they call "tlacalee," with fringes of leather strings, on the edges of which are hung casebels, tassels, and red beads. They wear, also, a kind of jacket called "bietle," made of the entire deer-skin, open in front, ornamented in the same manner. They wear moccasins of deer-skin, the same as the men, which are called "teguas," and are fastened to the leggings. They are all of swarthy complexion, well proportioned, wear long hair, and no beard. Both the men and women have very small feet. The women decorate themselves with ear-rings of shells, or small green and white stones, resembling crystal; and in some instances the men are decorated in like manner. Their huts are simply poles covered with grass or skins, and a small door, admitting a grown person. If the place is wooded, they encamp at the foot of a tree, and cover the branches with grass to protect them from the rain; but generally they live without any protection whatever. Their atrocities are well known, and they have long been a terror to the Sonorians; but the dispersion of Victorio's band subdued them, with the exception of small roving bands, that do not hesitate to attack even the stages, as they did but a short time since, near Mesilla, in New Mexico. Comparative peace may be said to exist, though settlers may do well to keep on the lookout, and travel well armed.

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DISCOVERY OF GOLD.

In 1799, the first discovery of gold in the western part of the state was made at San Ildefonso de la Cieneguilla, about forty miles south or south-east of Altar, of which many incorrect accounts have been published. This discovery was accidental, and occurred as follows :

"A company of soldiers from Altar, on their way to chastise the Ceris, having gone in a south-east direction, encamped in that neighborhood. One of their number, who was strolling about one hundred yards from the camp, observed that the bed of a small ditch formed by the rain was of a yellowish color, and on further examination, he collected a number of pieces of gold from the size of a lentil to that of a bean. He reported this to the commander of the detachment, who immediately ordered a careful examination of the surrounding country, the result being the discovery of gold in all parts in greater or less quantities. The gold lay upon the surface, scattered like grains of corn. The gambucinos followed its direction to the west to the distance of six or nine miles, where they encountered a natural phenomenon. The beds of all the ravines within a circumference of more than 12 miles was covered with particles of gold, hundreds of these weighing from one to 27 marcs, and presenting the appearance of having passed through a furnace."— *Velasco.*

After the surface gold was exhausted, shafts were sunk and tunnels run through a vein of calcareous stone in some places, and in others through a stratum of red stone, both of which contained gold, and from which large quantities were extracted. The mine was actively worked until 1803, when a second mine was discovered, called San Francisco, 21 miles east of Cieneguilla, which is about 40 miles south-east of Altar. "This mine proved extremely rich, the gold being scattered about on the surface in great abundance, especially in the ravines. In the ravine called San Miguelena, the gold was so abundant that three, four, and even five

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marcs were often collected in five minutes ; the grains being the size of a bean. Large lumps were occasionally discovered. One found by a Yaqui weighed 100 ounces, and another weighed 28 marcs. Quitovac, San Antonio, Sonoita, El Zoñe, La Basura, San Perfecto, Las Palomas, El Alamo, El Muerto, and Vado Seco, are gold mines discovered from 1834 to 1844 in the vicinity of Altar."

Mines of Sonora.

The mines of Sonora have been worked from time immemorial. The immense number of old mines that have a history clouded with early traditions prove the ancient character of the mines of Sonora. Some have been known to reach back one hundred years, and others have no data to determine the first period in their history. The number of abandoned mines are considerable, some of which were unquestionably exhausted, while others were abandoned on account of the ignorance of the miners on reaching ores that were refractory or hard to work. Right here it might be well to caution American capitalists against buying holes in the ground, solely because, at one period in their history, they had yielded millions.

Most of the abandoned mines, or quite a large number of them, and of the richest, have been ruined by the class of miners of Mexico called "gambucinos," a poor class who had no capital, and were in search of "bonanzas," or rich spots, working these solely, and filling the drifts and shafts behind them with rejected ores and rubbish, so that, when they finished a mine it was almost entirely ruined. In some instances, they have extracted the pillars of old mines of great value, and the walls have fallen in, thus doing an incalculable injury to the mines of the state. There is an old Spanish proverb that tersely states: "It takes another mine to work a mine."

This is undoubtedly true of every mine abandoned by these miners. We use strong language on account of the destruction following in the wake of the "gambucinos." The warning of Mr. Mowry to capitalists in his valuable work on Arizona and Sonora, we herewith quote, and leave its lesson with our readers. He says : "As it is desirable that, in the investment of foreign capital there should be no error committed at the outset, than which nothing would retard the progress of this new mining field more; all persons new to the country had better leave abandoned mines

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alone, unless directed to them by persons long resident in the country, whose character and veracity are undoubted, and who, after the investigation of all the facts, current accounts, and traditions, have full confidence in some abandoned mine or other. There are, undoubtedly, many abandoned mines that are well worthy of attention and outlay of capital, but strangers are not likely to know at once which of the many deserted mines it will be prudent to meddle with. Under the present state of things, the safest investments for new comers will be *those mines that have bona fide owners, for, as long as a mine can be worked according to the custom of the country, it is hardly ever abandoned altogether. The owners are fully alive to the value of their possessions*, and as they are already in a more or less independent position, and always in expectation of a sudden fortune, they are not anxious to sell unless induced by a fair offer. *It is not advisable to enter into any arrangement with Mexican miners to furnish capital* to open up a mine, but it is better to buy the whole at once."

The Mexican people are shrewd and full of grandiose language, extravagant in speech, and due caution in taking their description of properties, with some allowance when they are anxious to sell, is of the first importance. It may be well to remember that where an anxiety to sell is apparent, that the purchaser will do well to make haste slowly, and look further for investment. The properties that are being worked, and where a fair examination can be made by reliable mining engineers, are the ones to buy. These are mostly not for sale, but they may be purchased on a liberal offer. Another way to obtain properties of value, is to prospect for new mines, and when a discovery is made, by "denouncement" a title may be obtained under the laws of Mexico that is perfectly valid; and indeed, this is one of the safest means to obtain valuable mines; for the whole state is rich in veins of gold and silver. In the appendix may be found an abstract of the mining laws of Mexico, with directions as to the obtaining of properties in the republic.

As an instance of the unreliability to be placed on representations of the riches of mines that are for sale in Mexico, we give the following data: A company of gentlemen of this city were induced to open up an abandoned mine, called Santa Gertrudis, near Altar, which was represented by the parties interested, to be very rich. The vein first discovered was narrow, but was followed down on the assurance that it would become broader and richer. Extensive plans were entered upon; a stamp mill and engines purchased, ready to

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be shipped as soon as the mine was developed sufficiently to warrant the erection of the works. The vein was followed for nearly 200 feet, and some $30,000 were expended. The result was unsatisfactory and the mine was abandoned; the representations being entirely erroneous, to say the least, as far as the experiment progressed. Thus, it is easily seen that experiments in mines in Sonora are as unsatisfactory as in California; and it is well to be cautioned in advance in regard to abandoned mines and properties that are found upon the market. We could point out other instances with similar results. *The paying mines, as a rule, are not for sale*, though there are some exceptions, and no greater mistake can be made than to expect a rich mine in as old a mining state as Sonora, to be bought for a mere nominal sum. There are exceptions, but they are rare; a fair offer has to be made to purchase a valuable mine.

Mining Districts of the State of Sonora, and Location and Description of Mines.

The Alamos mining district is situated some 240 miles south-east from the port of Guaymas, on the direct road from that point to El Fuerte in Sinaloa, and on the road also from Arispe on the north to the same place, and from thence to Culiacan and Cosala and Mazatlan. This district is particularly rich in silver leads. The principal mines are as follows: The most ancient and richest mine is the Quintera, several millions having been taken from it since its discovery, over 100 years ago. It is of immense depth, and has been abandoned, and is worked occasionally by gambucinos, and is mostly exhausted. There are many old mines of whose origin we can obtain no data, their origin being known only by tradition. Among the Promontorio mines in the small Real of Promontorio, five miles north of Alamos, may be mentioned the Nuestra Señora de Vabranora, which was owned and worked by the family of Almados for the last century. Don José M. Almado reached a deposit of black ores at a depth of 600 feet with surprising results. The present owners are an English company, who purchased the mine from Mr. Robinson of Guaymas. The ores are reduced at the works situated at Las Mercedes, about two miles east of Alamos. The Promontorio mines contain the best ores in the district. The Promontorio mine, from which the mines were named, especially has produced exceedingly rich and abundant ores. The Tirite mine, to the south of

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and adjoining the Promontorio, is said to be still richer, but its vein is not so wide. It was formerly owned by James Brady of Guaymas, who reopened it by running a tunnel into the heart of the vein. The pillars in the old shaft and drifts were taken out some years ago by Pascual Gomez, and two of them yielded $80,000. The Dios Padre mine, adjoining the Promontorio on the north, was, prior to 1860, owned and worked by Fernando Aduaña, son-in-law of José de Almado. In August, 1860, Mr. Andrew J. Wiley from California purchased the mine, and associated himself with Messrs. W. W. Light, D. Maddox, U. F. Moulton, Skinke, Backus, Beard, Sanborn, Oatman, Robinson, and L. A. Garnet. The mine was reopened by a shaft and yielded very profitably.

The Quintera and Libertad mines are located north of the Dios Padre. The Pulpito, on the same lead, was discovered by a Mexican, who worked it secretly. In January, 1861, Mr. Benjamin Rountree purchased the rights of both parties and associated with himself Messrs. W. W. Light, Johnson, Price, Thos. Finley, Robert S. Stillwell, J. R. Hardenburg, and others, and they proceeded to open up the mine, but found it unprofitable and abandoned it. The Nacharama mine is situated nine miles from Alamos, and is one of the most celebrated in the district, but it was abandoned on account of the influx of water. In 1860 the mine was purchased by Messrs. W. T. Robinson, J. G. Baldwin, Thomas H. Williams, Wm. S. Long, Henry Fouche, and others. The mine had the reputation of being rich at the time of its purchase. The Vista Nacacharama mine was purchased by Messrs. Robinson, Ira Oatman, Goggins, Bowman and Whiteside, and was called the Sacramento Company's mine. The Mina Grande, Europia, Iglesia, and Palomos are well spoken of by tradition. The first two were denounced by Michael Gray in January, 1860, and afterwards sold to John Heard. The Pietras Verdes, 15 miles north of Alamos, and Narvayez, in the Promontorio, are filled with water.

There are three large haciendas for the reduction of metals in the city of Alamos, called La Aurora, La Ubalama, and Las Cabras.

The district or Real of Minas Nuevas is located about two leagues west of Alamos, and contains many rich mines, among them, San José Ubalama, which is situated six miles from Alamos, and was owned by W. J. Hill and E. B. Johnson, who erected machinery at the mine to work it. Tradition spoke of it as exceedingly rich. The Descubri-

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dora, Rosario de Talpa, Sambono, and others, are located in this district.

The Rosario de Talpa and the Sambono were once successfully worked by Mr. Robinson of Guaymas, and T. Robinson Bours, formerly of Stockton, but who now resides at Alamos. The San José mine is situated six miles from Alamos, in this district, and was owned by W. J. Hill and E. B. Johnson, in 1861, who placed machinery at the mine to develop its riches, which tradition declared to be fabulous. There are many other mines in the vicinity, as we have only mentioned the principal ones, and the district is unquestionably one of the richest in Sonora.

The mine called Balvaneda, situated in Promontorio, formerly belonged to José Maria Almado. It was formerly rich, and yielded handsomely up to 1861, though the water flowing into it caused such trouble and expense that it was afterward abandoned. La Europita, in the Promontorio, was worked by Don Manuel Salido up to 1861, with good results.

Lead is found in the ores of the Promontorio mines, which may be used for smelting, although most of the ore is reduced by mills. La Europita was once one of the richest mines of the district, and with Quintera, produced an immense amount of silver. These two mines gave to Alamos its greatest celebrity. The former was worked up to 1861.

Although Aduaña is generally included in the district of Alamos, yet it possesses a group of mines that are distinguished from the Promontorio mines. The Aduaña is situated about three miles west of Alamos. In this district, which, with that of the Promontorio, comprises an area of eight leagues, with the face of a small mountain range included on the south, are located many old and new mines over the whole area, which Velasco pronounces, that "without exaggeration, there is not a hand's breadth of the soil which does not contain some vein of the precious metal." La Cotera and Santo Domingo, and Nacacharama and La Libertad in the Aduaña, were all worked up to 1861. Calesa and Los Cangrejos are full of water.

There are five haciendas in Aduaña for the reduction of ore—one in Talajiossa called Zarragoitas, La Espinosa, and the old hacienda of Promontorio; also, two in Minas Nuevas; making eleven in all.

The district of Alamos contributes very largely to the export of silver from Sonora, part of which is exported from the port of Santa Cruz de Mayo, south of Alamos, on the

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coast, distant about 100 miles, which is said to be one of the favorite points for smuggling bullion out of the state, while the larger proportion is carried to Guaymas.

San Ildefonso de la Cieneguilla.

This district is located in the western part of Sonora and north-west of Hermosillo about 100 miles, and south-eas of Altar the same distance. Scarcely any region equals this in its number of veins of gold and silver. Its first mine, called Descubridora, was discovered four years after the first placers, to which we have referred under the heading of "The Discovery of Gold." This mine yielded abundant quantities of silver ores, the yield of the poorest being five to seven and the best 12 to 15 marcs to the "bulto" of three cargas (900 lbs.). Its owner received from it, in less than four years, $2,000,000. Fifty small establishments for crushing ores were erected and in constant operation, from which large profits were realized. The vein was crossed, after the mine had been worked for five years, by a species of hard rock, called "caballo," which was again repeated. This discouraged its owner, and the pillars were removed, which yielded $500,000, and supports of strong timber exchanged for them; but the gambucinos soon left the mine in ruins. Many other mines were discovered in the neighborhood, but none so rich or abundant in ores. Only one exceeded it in the quantity of its ores, viz: the Cerro Colorado, in the Cieneguita district, six leagues to the east of Cieneguilla, on the right of the road to the placers of San Francisco.

From the appendix of the work entitled "Sonora," a translation of Francisco Velasco's great work, by Mr. Wm. F. Nye, published in 1861, we quote the following interesting fact in relation to the Cerro Colorado mine. He says: "The Cerro Colorado mine is situated some eight or nine leagues from the city of Alamos, on the bank of the Mayo River, and derives its name from the reddish color of the mountain in which it is located. It was formerly owned by Castro and Don Manuel Salida, and afterwards by Dr. W. J. Hill, of Alamos, who sold one-half his interest some few months since for $12,000. Messrs. J. S. Garwood, E. D. Wheeler, Michael Gray, and others of San Francisco, were the fortunate purchasers. The last owner of this mine, Don Manuel Salida, took from it more than a million of dollars, and, at the time of his death, gave orders to blow the mine up, which was accordingly carried into effect by his peons.

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The writer visited the mine in company with Dr. Hill; but, on account of its dilapidated condition, could not explore it. At a depth of 70 feet is a chamber 20 feet in diameter and 25 feet high, the walls of which, impregnated with virgin silver, glittered like diamonds by the light of a solitary candle. In working the mines of this district, it is not unusual to discover spots of exceeding richness, called by Mexicans 'bonanzas,' and from one of these, from two to three hundred thousand dollars are frequently extracted."

Gold Mining Districts.

The district of San Francisco is located seven leagues to the east of Ildefonso de la Cieneguilla, and was discovered Oct. 4th, 1803, by Teodoro Salazar, who was searching for a mine of which he had received notice. This mine proved extremely rich, the gold being scattered about on the surface in great abundance, especially in the ravines. The ravine called San Miguelena was the richest spot, and the grains were coarse, being about the size of a bean. Large lumps were occasionally found, one of which weighed 100 ounces, and another 28 marcs. In portions of this mineral region the gold was mixed with white quartz, which led to a ledge of very rich gold-bearing quartz. Here a mine was opened by Teodoro Salazar, and he occasionally struck extensive pockets that were very rich. The mine was eventually abandoned, and another found one league distant from San Francisco, not so rich as the former, but yielding very fine gold, of 22 and 23 carats fine. In the Sierra to the south, veins were found near the creek of San Blas, a small town near the northern border of Sinaloa. The water in the creek having failed, this mine was abandoned. The annual yield, on an average, of the mine of San Francisco, Velasco puts at from $1,000,000 to $5,000,000. Quitovac, San Antonio, Sonoita, El Zoñe, La Basura, San Perfecto, Las Palomas, El Alamo, El Muerto, and Vado Seco, were the gold mines discovered from 1833 to 1844. Since that time, many other mines have been found, bearing both gold and silver. The great drawback to the mines of San Francisco, which are so rich in gold, is the scarcity of water, which has been brought from the river Arituava, 21 miles distant, and commanded fabulous prices. If the waters of the river were conducted to the placers, or artesian wells sunk and reservoirs formed, the mines would yield immensely.

The district of Mulatos is located to the north-east of

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Alamos, and nearly due west of Jesus Maria in Chihuahua, upon the slope of the Sierra Madre towards the gulf, and is called the Mineral of San José de Mulatos, which was discovered in 1806. Two gold mines were here found, from which were taken several thousand marcs of gold, 24 carats fine. The region is located near the eastern border of the state, in the pass of Mulatos, about 70 leagues, or 210 miles, from Hermosillo. It is said that several millions were extracted from these mines. The gold was first found in a small stream which descends to the river below. Adjoining this ravine and near the placers, three elevated crests were discovered, one of them over one hundred varas in height, which were intersected in all directions by small threads or veins of gold-bearing white earth, or rotten quartz, that were so rich that the ore of inferior quality was sold at $12 and $15 per arroba (25 pounds), while the richest sold for $200. These crests have been extensively worked. The gold is nearly pure, the lowest ore being 23 quilates, while it sometimes reached 3½ grains. A number of Indians at first worked the vein by being suspended by ropes from the side of the rocks from the crests above and picking out the earth with wooden sticks and knives. The mines were abandoned some years ago, but have since been denounced by an American company, who are working them so profitably, we understand, that they have lately refused $1,000,000 for them. The ores are reduced by an extensive stamp-mill, located on the Mulatos River, below the mine. This river has sometimes been called the Aribechi and Papigochi.

The district of San Xavier is distant from the port of Guaymas in a north-east direction, and about the same distance from Hermosillo, approachable from both points by an excellent wagon road. This is one of the oldest and richest mineral districts of the state. There are many mines situated within a radius of three miles—namely, Los Bronces, owned by Don Alsua of Guaymas; Las Cruzecitas, Las Aguas, Señor, Las Cumbres, La Division, La Naguilla, La Barranca, Las Animas, La Sierra, and many others. Among the most important, Los Bronces may be mentioned, which is worked by Don Matias Alsua of Guaymas, who has erected extensive reduction works, with stamps, barrels, furnaces, etc. His ores are worked by the German or Freyburg process, and the mine has yielded about $1,000 per day. Near this mine is located the La Barranca, in which a vein of coal was found nine feet in thickness. It is supposed to be anthracite, but this is denied by some experts, who

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claim it is more of the nature of bituminous coal. We examined a piece of this same coal, and it appeared to us to be similar to the bituminous coal of Pennsylvania.

About 200 yards above the Los Bronces mine is situated the Las Cruzecitas, which is owned by the Las Cruzecitas Mining Company. It has been extensively developed, and ten tons have been raised daily; and when further developed, will yield much greater quantities. The vein, which is particularly well defined, increases in width and richness as it descends; and at a depth of 145 feet, the vein was nine feet wide. The ore of the pillars is very rich; while that from the mine averaged over $150 per ton, all through. The "Petanque" has rich sulphurets of silver, which are extracted from the lower excavations, and assay over $3,000 per ton. The Company have erected reduction works at the mines. La Naguilla is situated on the highest hill in this region, in sight of the main road; its ores were formerly abundant, and their "ley" in silver, ten marcs to the carga. It however filled with water, and although an attempt was made to work it out, it was abandoned upon reaching a "caballo." Las Animas is also one of the old mines, and is now choked with earth; the "ley" of its ores was four or five marcs to four arrobas. Its vein was narrow, but contained an abundance of ferruginous ore, which, though rejected by the miners in former times, yield three to four marcs of silver to the carga. The amalgamating ores are also abundant, and of about the same "ley." In Los Afurnos, the vein is half a vara in breadth, and was profitably worked by Castillo. The mines of La Grande were equally rich with the others. The rest of the ores of San Xavier are smelting ores, or reducible by fire, with some exceptions. Enormous quantities of silver were remitted to the City of Mexico from this district, and prove it to have been very rich.

"The mine of Zubiate is situated eleven leagues (33 miles) south-east of Hermosillo. It was discovered in the year 1813. Its first owners were not able to pay their expenses, and sold out to two persons called Monge and Muñoz, who derived a handsome profit from a mine hitherto worthless. Muñoz, having acquired sufficient wealth, sold his interest to Francisco Monteverde, who continued the operation, in company with Monge, until the death of the latter, who left a large fortune. Monteverde then became sole owner of the mine," and worked it up to the time of his death, leaving it to his son, M. Monteverde, ex-Governor

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of Sonora, who is now in this city. "Its average ley did not exceed five to six marcs to three cargas of 300 lbs. each, or about from $36 to $45 per ton; but occasionally ores are found which yield two to three marcs ($3.20 to each marc) per arroba of 25 lbs. each, or from $480 to $720 per ton. Water flows into it, and for some time the sole profits of the owner were derived from furnishing supplies to his workmen." Governor Monteverde informs us, that since the publication of Francisco Velasco's work on Sonora, from which we quote the foregoing, that he has found the mine to become very profitable, and it now assays from $80 up to $1,000 per ton, having reached ores on a lower level that are very rich. This mine is for sale, and can be purchased of Governor Monteverde. He also informs us that $12,000,000 have been extracted from the mine since its discovery, or in a little over 67 years.

San Antonio de la Huerta.

This district is located about 15 miles from San Xavier, and contains La Minas Prietas, Musidora, and other valuable mines, both of gold and silver. The Minas Prietas was purchased of Mr. R. D. Johnson, of Guaymas, by the Jannin Bros., of this city, and sold to a company in New York. The point of location on the maps of this mine is erroneous, and should be at the point marked Haygame, about 35 miles south-east of Hermosillo. A new 40-stamp mill is being erected for this mine. There was an old 10-stamp mill on it, which, with arastras, were used to reduce the ore.

Cieneguita District.

The following official report on the Mineral de la Cieneguita, of Robert L. D'Aumaille, official assayer of Sonora, is copied from the valuable work of Mr. Mowry, "on Sonora and Arizona"; our object being to give all the information available on the mines of Sonora, and also within the limits of the states of Chihuahua, Durango, and Sinaloa. On the mines of this district, his report reads as follows: "About 300 yards from the hacienda is the mine La Carjona, of trifling depth. The metal is plombiferous, vein one foot in width, and assays $16 to the 100 pounds. The water from the rivulet adjoining, has filled the shaft, which is not deep. Two miles distant in same direction, lies the hill that contains the veins of La Chipiona, La Colorada, La Plomosa,

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and another fallen in, whose very name has perished. The veins have been opened in many parts by the Spaniards, who content themselves almost invariably with sinking shafts for the extraction of the superior decomposed ores, abandoning the mine on reaching sulphurets, from ignorance of the process for the extraction of silver. In these sulphurets, and below the old galleries are situated the present workings. La Colorada, on the north side of the spur, is a portion of the Veta Madre (or main vein.) The workings are dry and firm; the galleries 50 feet in length and 45 in width. Another shaft, 22 feet, is opened 80 feet farther down the mountain, where the ores are uncovered to the same width. The vein in the lower places is about 18 feet in width, in parts 30; running north and north-west, with an inclination to the south-east of about 15 degrees, an excellent course and dip in Mexican mines. The assay was $172 silver, per ton, and traces of gold. La Chipiona is also upon the Veta Madre; vein same direction and dip as La Colorada; shafts, two, 30 feet apart; depth 30 feet, and partly full of water. The vein is 20 to 36 inches; same depth, and quality of metal uniform. The ores are more difficult of reduction, being bisulphurets of iron, with a compound sulphuret of silver, lead, iron, and copper; by the German process, assays 160 ounces per ton. The ores of La Colorada by same process, gave 212 to 320 ounces. There is not half the superficial excavations of the ancient mines, which have been cleaned out from this vein, and the falling in of the *labores*. The vein can be traced 250 yards, across the crest of the hill, up to the mouth of the La Colorada. Above the main vein is a cross-vein of 4 to 6 inches, cutting it nearly at right angles. The ore is said to yield 318 ounces of silver per ton. Nine hundred feet distant, in a straight line, in a spur of the same cerro, is the adit of La Plomosa; the upper workings being badly planned, have fallen in from the pressure of rubbish in the old drifts, and the miners have driven a level in the solid rock 150 feet farther down. The ores are argentiferous galenas, with a matrix of stratified 'calishe,' and are said to yield 18 per cent. of lead, and 96 ounces silver, per ton, up to 190 ounces. Both this vein and La Chipiona run across the valley and strike the opposite mountain. Old mining shafts are seen all the way across at different points. These mines can all be drained by a tunnel, as the Chipiona debouches upon an abrupt descent, by many hundred feet. The walls are firm and vein regular, presenting every indication of permanence. A quarter of a mile south-

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west of the Yerba Buena, are the mines of Los Tajos. The hill-side is covered with the buried workings of the ancients, and the superior position of the vein is in a very precarious condition. The vein is something like one-half a yard in width, with a heterogeneous medley of ores. It runs completely through the mountain, as very considerable works are visible on the opposite side; but whether 'en metales,' or not is unknown.

"The ores are said to yield 60 ounces per ton, but they are loaded with titaniferous and zinciferous metals. La Descomulgada is situated about a league west of south-west of the Yerba Buena. Its matrix is a very hard, silicious rock, which crumbles with great rapidity when exposed to air and moisture. The vein is said to be wide, and the superficial ores easily worked, costing $1.00 per 300 lbs., and to be easy of reduction.

"La Yerba Buena is a modern mine, said to have been very rich. The mouths have fallen in a few hundred yards from the Yerba Buena, on the road to the Descomulgada. Nothing more is known concerning it.

"Las Ostimuris, on the road to Yerba Buena, about half way from the Cieneguita, has two open mouths, and is full of water, the drifts running under the brook. Mr. Monge says it was abandoned on the outbreak of the Opatas, and as the shafts were shallow, the vein wide, and the ores yielding 450 oz. per ton, he entered into a contract with a skillful miner and put up whims and machinery for drainage. His partner died just as they were approaching completion; the Apaches drove off their animals; and, being ignorant of mining, he abandoned the mine.

"La Prieta is on the rancho of Matarchi, about six miles east of Cieneguita. The vein is from four to six feet wide. The opening is merely a trial pit. The ores of the outcrop are a melange of different sulphurets, heavily charged with copper.

"El Potrero, 24 miles distant, is said to be an immense 'clavo' of volcanic origin, and unknown extent, at the intersection of two veins. The ore is without alloy of silver, but contains much oxide of lead and spar. It forms an excellent flux for the ores of La Prieta, and Los Tajos. The cost of carriage is the only expense.

"La Viruela, east half a mile from the site of La Armargosa, is a lofty hill, from which large quantities of gold have been extracted, but the whole hill has fallen in.

"La Armagosa, and the rivulet which runs beneath El Re-

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alito, are constantly searched for gold. The water of the creek is not sufficiently abundant for machinery, and an examination was made of La Armagosa, one-quarter mile east, where a stream was found that is permanent and may be conducted by a tunnel. It furnishes a considerable volume of water, with a natural fall of 100 feet within a space of 100 yards in its own valley.

"Yerba Buena is three and a half miles south-east from the real, four and a half from La Chipiona, and four from Los Tajos. This district is located near Sahuaripa, about 50 miles south-east. The river is the Arroyo de los Ostimuris, which is permanent ten months, and sufficient to turn the wheels during the remainder of the year. Wood is abundant, and consists of oak, pine, juniper and ash. Pasturage, everywhere. Animals are said to fatten all the year round. Salt can be purchased at from $8 to $10 per carga of 300 lbs.; wheat, $6 per fanega. Freight from Guaymas, $80 to $90 per ton; from Sahuaripa, $3 per carga. Cattle are purchased from $10 to $15; hides, $1.00 each; mules and horses, dear; powder of the country, $7.00 per 25 lbs; flour, $7 per arroba." The ores are hard and require blasting, but, as seen before, are very rich.

"The Real of the Cieneguita embraces the mines known as La Chipiona, La Colorada, La Cajona, La Prieta, and the vein of copper in Matarchi, La Descomulgada and Los Tajos, La Viruela, and El Realito, San Rafael, Ostimuris, Yerba Buena, and El Potrero. All of these mines are within a radius of three miles.

"The principal vein appears to be that of La Chipiona. The origin of the real is unknown. The general belief is that it is the long-lost Real of Tayopa, famous in the early Spanish annals. The ores of the Chipiona, Colorada, and others, are refractory, being mostly hard ores and sulphurets. The titles to the mines, except those of El Potrero or La Prieta, and the copper vein in Matarchi, are on the ranchos of La Yglesia, a fine grazing estate of eighteen square miles in extent, belonging to and in the occupancy of Don José Yrenco Monge. The title is said to be perfect and undisputed, a Spanish grant of Carlos III. It is wooded and watered, and contains sufficient arable land. The rancho of Matarchi, which bounds it on the westward, is a beautiful pine forest, with some excellent cultivated land, containing nine square miles, well watered, and is likewise a Spanish grant of the last century. It contains the veins of La Prieta and the outcrop of copper.

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"The mines Los Tajos, La Descomulgada, and El Realito, with four pertenencias, El Potrero, and La Viruella, are each the extent of La Chipiona's and La Colorada's possession, which was given by the Prefect of Sahuaripa on the 13th of September; is 1,800 feet in length; width, 600 feet on La Plomosa, and 1,350 feet in width, including all the present workings in the three mines. The sites called El Potrero, La Armagosa, La Cieneguita, and Yerba Buena, were denounced as "Haciendas de Benefico," or position for reduction works. The Real of Cieneguita is situated in a pretty little dell, embosomed among lofty mountains, almost at the foot of the Sierra de San Ignacio, and partly embraced by the unbroken ranges of the great Sierra Madre. These mines are now worked by a 30-stamp mill, and are producing immense profits.

"It is distant, perhaps, by the road, 42 miles south-east of Sahuaripa, nine miles south-east of Tarachi, and 72 miles west of Mulatos. The real contains about 20 acres of cultivated ground, and is supplied by a spring and perpetual brook, which traverses its center. The climate is mild. In winter, the snow falls occasionally two feet, and ice forms two inches thick. The road leads from Sahuaripa through mountain passes. From Aribechi to the real it is all mountain, except the plain of Las Cazadores, in the rancho Aoyua Blanca, and the valley of the Rio de Ostimuris, from which the road runs from Santa Fé to Tarachi. A considerable portion of the real is covered by the foundations of houses and ruins of smelting works, or immense piles of scoriæ and rubbish, proving incontestably to the practical eye the vast extent of the ancient mining operations." And another proof, we might add, of the former richness of these mines. We give this extended description, in order to show how an abandoned mine looks to the traveler as well as the mining engineers, although these same mines have since been reopened and worked by a 30-stamp mill, as before stated.

We are indebted to Mr. John A. Robinson, of this city, for the following:

"Some fifteen miles north-east from the famous gold mine of Mulatos, lies a cluster of mines known as 'Mineral de la Cieneguita.' There are some fifteen mines in all; the principal of them are the Chipiona, the Colorada, and the Plomosa; the two first being very rich in silver and gold, and the last in lead and silver. The country surrounding offers every facility for mining and reduction works. An abundance of water, heavy forests of pine, hemlock, various species

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of oak, juniper, etc. Building-stone and fire-clay in the immediate vicinity, with pasturage for the animals. The mines are at present worked on a small scale by some German gentlemen; but parties are now examining them with the view of establishing reduction works on an extensive scale by the lixiviation process. These mines are extremely rich in 'ley,' and abundant in ores. Some sixty miles to the east of the above are situated those extremely rich copper mines called 'Huacarbo,' in the Barranca de Tarrarique. Here also the facilities for working are great. The river Yaqui runs immediately at the foot of these immense lodes; and the country is thickly covered by heavy timber. The Yaqui River, in places, runs over the copper-vein, leaving the ores in sight for a long distance. Both of the foregoing mining districts were fully explored by Robert L. D'Aumaille, a most famous mining expert, chemist and amalgamist, sent there by Don Juan A. Robinson, formerly United States Consul for Guaymas, Sonora, and at present residing in this city. D'Aumaille reports that the copper vein is intersected in different places, by narrow gold veins of a very rich 'ley.'"

The district of Babicanora was discovered at the end of the last century, eight leagues south-east of Arispe and four from Sonoquipe, in the Sierra, running north and south. It was, at one time, very rich, and had a hacienda for the reduction of ores below Sonoquipe, one mile from the bank of the creek. It was abandoned by its owners some years ago, until Mr. Hunter, an American, lately obtained possession of two of the mines. One is called Mendoza, which has a vein three feet wide, and assays $80 per ton in silver. The other is Santa Ana, and has a vein one vara in width, (33 inches) with an assay similar to the other. Mr. Hunter has erected a ten-stamp mill, and is now working the mines profitably.

The hacienda of Gov. Pesquiera, called Las Delicias, is situated about 20 miles south-west from Arispe, and consists of about 30,000 acres of good land, about one-fifth of which is first-class agricultural land, and being in the neighborhood or west of the Sonora River, the soil is somewhat of the same nature, and produces wheat, corn and other cereals, as other lands on the Sonora River. The balance is good grazing land. The Santa Elena mine is located about four and a half miles from the hacienda, on a ridge of mountains, and is owned by Gov. Pesquiera who erected a ten-stamp mill at the hacienda.

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It is not in working order, and is fast going to pieces. The mine has been mostly worked by arastras, and produced, in one year, $200,000, but has never been properly worked. The best ore assays $5 per ounce bullion, gold and silver. The shaft is about 200 feet in depth, with a varying vein, sometimes reaching 15 feet in width. The mine is dry, with walls of porphyry and quartzite.

The Curcurpe district also contains many mines, among which may be mentioned the ancient mine of El Tajo, which is now full of water and in a ruinous condition, having been destroyed by the gambucinos.

The Santa Teresa de Jesus mining district is located 69 miles south of the boundary line of the United States, on the northern frontier of the State of Sonora, and 36 miles from Magdalena; the latter being only about 140 miles from Tucson.

We copy from a report of Mr. L. Jannin on the mines of this district, which has just been published, the following: "Leaving Cucurpe, and passing by the cultivated fields of its inhabitants, we find the road to the mines leading up the San Miguel River, sometimes emerging into an open plain. After following the course of this river some twelve miles, and passing El Pintor and the deserted Pueblo de Dolores, the road leads us over table-lands and meadows, the former adorned with oak and ash trees, the latter covered with waving grass, until we reach a broad belt of thickly wooded land, where the San Miguel first makes its appearance in the dry season. From this point the river always contains running water. In the rainy season it rushes violently along, sometimes overflowing its banks, but in the dry season it floats along tamely, scarcely covering its bed. All the land between Cucurpe and this point is of the richest description. It is unsurpassed in fertility by any portion of Sonora, and grain of all kinds can be raised without the slightest trouble.

In former times, the whole valley was populated, and the number of cultivated fields and the numerous herds of grazing cattle proclaimed the wealth of the inhabitants. But the continued incursions of the Apaches since 1832, by driving off the unresisting inhabitants and gathering the harvests they had planted, have depopulated and ruined the country. Deserted ranches are met along the road. No one lives here. No one dares to plant grain, and, as it is here, so it is also throughout the northern part of the State. Leaving the belt of wooded land that I have mentioned, the

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road still takes us over meadows and table lands, up the valley of the San Miguel and toward its source, the Cañon de Santa Teresa, a distance of 15 miles. Here, low ranges of hills, isolated peaks, and broken country, becoming more and more frequent, herald our approach to a mountain range, and soon we are in the cañon, with steep hills on each side.

The range of mountains in the foot-hills, in which are the mines of Santa Teresa, is known by the name of Sierra Azul, and its culminating peak is the Cerro Azul, which towers high above all the range, forming a most prominent object for a distance of over forty miles. The general course of the range is north and south, but spurs of the Cerro extend in all directions. The country is mountainous in the extreme. There are no table-lands, no valleys, and no open space of any extent, nor are the ranges of foot-hills continuous, but are broken up by side ravines and cañons, down which, in rainy seasons, the water finds its way to the various arroyos. These arroyos form the circuitous roads by which one point is reached from another. The position of the Mineral de Santa Teresa is correctly indicated by Colonel de Fleury's late map of Sonora. From it can be seen the relative position of the Mineral to the neighboring pueblos, owing to the mountains around it. The only broad road leading to the mines is the one I have described. All others are, and can only be, foot-trails. The mines are upon three distinct veins, known as the Trinidad, San Antonio, and the Santa Biviana. The openings on the Trinidad and San Antonio are in the Real de Santa Teresa, while those on the Santa Biviana vein are in a neighboring real of the same name.

The Real de Santa Teresa is approached by a cañon of that name, and is situated some three miles from its outlet. The bed of this cañon is a dry arroyo, and its sides are formed by a range of foot-hills rising up several hundred feet, and inclined towards the bed at an angle varying from 50 to 70 degrees. The arroyo varies in width from 50 to 300 yards, and forms the only road to the mines. In the rainy season, the water flowing down from the various ravines and from the Salto, (the source of the San Miguel) fills the arroyo and renders freighting in wagons difficult, but does not impede transit by mules and pack-trains. At the time of my visit it was perfectly dry, and generally remains so during nine months of the year.

The Cañon de Santa Teresa has a generally north-easterly

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direction, although subject to many turns. In the neighborhood of the mines, its direction is as indicated, and the vein pursues a nearly parallel course. The mountain mass of this Mineral—in fact, the whole range—is a hard, dark-blue limestone, distinctly stratified, and dipping to the east at an angle of 50 degrees. Its strike is nearly north and south. The course of the veins is contrary to the stratification of the limestone, which forms its walls; and they have all the appearance of being true fissure veins. The walls are generally firm and enduring.

The Trinidad vein crops out at various places on the northerly slope of the cañon. Its general direction is north-east by south-west; but it changes its course with the slope of the hills, and at places it is heaved by faults and cross-veins. The outcroppings can be traced at various heights above the head of the cañon, until it reaches the opening called El Arroyo. Here the vein leaves the northerly slope of the cañon, crossing over the arroyo in a diagonal direction, and finally emerges on the opposite slope, still preserving the same general direction. The San Antonio vein, on the other hand, is entirely on the southerly slope of the cañon. Its general direction is north-east by north, but it also changes its course with the slopes of the hills. These two veins converge toward one another; but although they have been followed for many a weary mile, their point of junction has not been discovered. The general appearance of the outcropping is the same in the two veins, with some slight local differences. It is a hard, compact quartz, sometimes thickly impregnated with peroxyd of manganese, and at others, merely colored by its presence. It is seldom found with a honey-comb structure. At places the veins outcrop boldly to the height of several feet, and at others, disappear beneath the soil. The width of the vein does not remain constant; but the general average may be put down at two-and-a-half to three feet. The San Antonio vein shows somewhat larger at the various openings than does the Trinidad; but the ore in the latter is found more uniformly distributed. Wherever the veins outcrop, openings have been made. On the Trinidad vein there are six in number; and on the San Antonio, there are seven. The different mines opened, are the El Loreto, that assayed, at a depth of 50 feet, $70 to $80 per ton; vein small at surface, broadens out to 2½ feet in the shaft; angle of inclination, 40 deg. north-west. La Cruz lies north-east of the Loreto; depth of shaft, 30 feet; assay, $70 to $90, in first opening; second, depth 60 feet;

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vein 2 to 2½ feet thick; dips about 45 deg.; assay, same as former. La Falda assayed $118 per ton. The Trinidad is the principal mine; shaft 150 feet deep, with some of the pillars extracted; some left standing, that would assay over $80 per ton, while the ore in the lower gallery assays $150. Water comes into the lower levels. The miners, in abandoning the property, have of course left no rich deposit in the mines; but the evidences are that an abundance of rich ore must have been extracted. The Arroyo mine was said to be very rich, and is 70 feet deep; filled with water, but could be cleared for about $600. The San Francisco is 30 feet deep; the ore sometimes occurs in large bunches and pockets (or "bonanzas"); sometimes in small nodules, and sometimes disseminated throughout the mass in minute particles. The vein is never free from metal. The San Antonio vein has seven openings, viz., San Pedro, La Burra, Consolacion, San Antonio, Corazon de Maria, Santa Gertrudis, and Las Animas. Of the first three I can say but little in their present state, as they all need clearing out. The Consolacion is in a better state of preservation than the other two, and a fair average ore can be taken from it. The San Antonio enjoys a great reputation; but at present it is in a dilapidated condition. The mine is filled with rubbish. In the Corazon de Maria the miners left nothing rich in sight. Santa Gertrudis contains good ores, and will assay $200 to $500 per ton. The average value of all I saw at the mouth is $270 per ton. The others will average $80 per ton." By comparing the locations on the map of Col. Fleury on Sonora, Sinaloa, Chihuahua, and Durango, it will be observed that these mines, of which we have reproduced a condensed description from Mr. Jannin's report, are located but a short distance, about forty miles, south-east of Santa Cruz, and in the neighborhood of the richest mineral and agricultural region of the state, outside of the rich lands of the Yaqui River.

La Alameda is situated in the Nacameri district, 21 miles west of the pueblo of Nacameri. This mine was discovered in 1835, and was once extensively worked. The mines of this district are all of silver, with a very good "ley," about $60 per ton.

Batuco also possesses some mines.

The Rio Chico district is in the south-western part of the state, 120 miles from Hermosillo, near the Yaqui River, is one of the most ancient mineral regions of Sonora, and in the last century produced great quantities of gold and silver.

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Placers of gold were also discovered here. The gambucinos are still working some of the mines. El Aguaja is an old mineral region of the last century. Its principal mines are Guillamena, Ubarbol, and La Grande. These mines are mostly abandoned, though worked by gambucinos. Suaque contains many mines of gold and silver, which are but little worked. La Trinidad is one of the oldest mineral regions of the State, situated at the base of the Sierra Madre, on a branch of the river Mayo. Its area is comprised almost entirely of mines, the principal ones of which are worked by Mr. Alsua of Guaymas, by a modern stamp-mill, who is taking out in bullion, monthly, about $100,000. This district is reached by a road from Sahuaripa through Babicanora, south, on the Bapepito River, a branch of the Yaqui ; thence to Conichi, Ouava, Rio Chico, Nury ; thence north-east to Caraja, San Nicolas, Santa Rosa, and Trinidad.

The district of Bacuachi is in the northern part of the State, as well as the copper mines of La Cananea. The gold found in this district is coarse, and pieces were found weighing 25 marcs. In fact, the whole of this region is covered with veins of gold and silver, and are as yet undeveloped. We have called especial attention to this district in another place.

Among the old mines, we may mention the Cajon, six leagues from the San Francisco placers and twelve from Cieneguilla, and those of the hacienda of Santa Rosa, near Cajon, which yielded great quantities of silver from 1798 to 1802. The average proportion of the ley of the best or picked ores was six, eight and twelve marcs to the arroba; of the poorer or second class, two to four marcs. There was a scarcity of ore in the Santa Rosa mines, on account of the hardness and narrowness of the veins. In the mines of San Francisco, water is scarce to the extreme, and could not be obtained nearer than 21 miles, and sold in the dry season at $1 per barrel. The timber, also, in the vicinity, is unfit for building.

These mines are very rich, but the expense is too great to work them profitably. The mines of Vado Seco, to the north of San Ignacio Pueblo, on the road to Tucson, are reported to be rich, as well as the famous placer of Sobia, on the main road to the city of Alamos, half way from Barroyaca.

The Cajon district contains a group of some three or four mines, and are all owned by a New York company. The nephew of General Magruder is the superintendent, and

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owns one-half interest in the mines. The mine contains gold and silver-bearing quartz, which assays, on an average, about $65 to $70 per ton. The deepest shaft is only down about 125 feet. Rich spots are occasionally found in the vein, but after they get down a certain distance, the veins commence to pinch out. Some of the veins have entirely disappeared. The mine has, however, paid well, as they have taken out already enough ore to pay for the claim, mills and expenses, and have now on the dump, in sight, about $50,000 worth of ore. The mill has ten stamps, and is not quite completed, but will shortly commence to reduce the ore.

The Las Cedras, belonging to Don Santo Terminal, is situated in the district of Barroyaca, near the small town of Teropaco, 135 miles from Guaymas, in the direction of Alamos, south-east. This is a very rich mine, and has been extensively worked. It is surrounded by rich, arable lands, and a permanent stream of water flows in the vicinity of the mine. Negotiations are being made to purchase it.

During the years 1863 and 1864, many new mines were opened, among which were Las Cruzecitas, Corral Viejo and El Refugio, the latter on the border of Chihuahua, and the mines of La Cananea.

On the Cerro Prieto, between the ranchos de la Palma and La Casa Pintada, is an old mine, called Tarasca, almost forgotten. Tradition places it very rich, although it has not been worked for over a century. In this same neighborhood are many old mines, and vestiges of buildings may yet be seen on their antiquated sites.

In the district of San Jose de Gracias, a celebrated mine was worked in 1809-1810, by Juan José Carumina, who expended all his capital in bailing out the water from the old shaft, and in two or three hours, after clearing it of water, he took out a lump of ore weighing 75 pounds, which yielded 112 ounces of pure silver. The water began to gain on him again, so that in his effort to keep it down, he broke his bailing apparatus, and having contracted some debts, he could not return to his labor; the mine refilled in six or seven hours, and he abandoned the enterprise. A company afterwards undertook to clear the mine, but after expending a considerable sum, abandoned the mine on account of an accident to one of the workmen," says Velasco. This seems incredible; but for the fact that the mines are mostly worked by Yaqui Indians, who are very superstitious, and believe that devils inhabit the mines, says Ruxton, in his "Adventures in Mexico." The accident to one of their number would prevent

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others from working in a haunted mine, or one inhabited by evil spirits, in their imagination. Velasco further says: "Some of the old inhabitants of San José de Gracia, in speaking of this mine, testify that the vein in many places was of virgin silver; and that in others the ore yielded fifty per cent. of pure silver; also, that there was a stratum of red earth that yielded great quantities of gold, they having frequently witnessed the extraction of two or three hundred marcs on one single occasion. The depth of this mine exceeds one hundred varas." Taking into account the unreliability of traditions, and the extravagance of some Mexicans, still there may be some truth in the tradition, as the famous mines of Batopilas, in Chihuahua, and others, have produced like results. If the mine is still in the condition that Carumina found it, a steam pump would soon reveal its hidden treasures.

The mines of La Cananea, 80 years ago or more, were worked on a large scale with great energy, by the house of Guea, of Chihuahua. We understand that these mines, or the principal ones, are owned and worked by Gov. Pesquiera, of Sonora, and are now bonded by him to Eastern parties. Nevertheless, we give a description of the district from the pen of the celebrated chemist, Robert L. D'Aumaille, mining engineer and official assayer for the State of Sonora.

General Pesquiera has worked five mines in this district, viz: El Ronquillo, La Chivatera, San Rafael, (or La Plomosa) La Terdilla, and La Cobre Grande. The report was written by M. D'Aumaille in 1860, and is as follows: "La Cananea is situated about 36 miles south-west of the Presidio of Santa Cruz, about 54 miles south-east of San Pedro, probably 35 miles southerly from Fort Buchanan, and not far from the American line. The mines worked are seven in number, of which the principal are El Ronquillo, La Chivatera, San Rafael, Santo Domingo, La Mina de Cobre Pobre, and La Mina de Plomo de Arvallo. In addition to these mines are La Mariquilla, (of white copper) El Tajo, (the ancient mine), and others—in fact, the whole region is strongly mineralized and of the most prepossessing exterior. The hacienda de Beneficio y Perez y Arvallo is on the El Ritto, a permanent stream at the foot of the mountains, about a mile and a half from the mines. The greater portion of the road is excellent, and the remainder can be readily made so. The hacienda is a mass of ruins, overgrown with rank vegetation. The machinery was destroyed

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by natives carrying away the iron available. The situation is pleasant, on the border of a vast plain covered with wild mustangs or horses, and which stretches away to San Pedro, and contains much arable, with any quantity of grazing land, and lies immediately around the site. Half a mile or so up the valley brings us to the mine of El Ronquillo, called also from its refractory ores, La Maletiosa, with its ancient hacienda. This mine was the property of Arvallo, but the miners were driven off by the Apaches. El Ronquillo has a thickness of from three and a half to four feet of very good ore, worked to a depth of 80 feet. It has several shafts full of water to the brim, which comes from copious springs in the lower workings, and a ravine which passes across the vein, and from its situation upon the gentle slope of a hill which gradually merges into the plain beneath, it cannot be drained by a tunnel, but recourse must be had to steam machinery. The ore of this mine assayed from $30 to $80 per ton. Passing through the ravine, copper croppings are seen. One-quarter of a mile further, is located the mine of La Chivatera, situated on a steep declivity, admirably adapted to tunnel drainage, and is half full of water. It bears every external evidence of being a powerful vein, but we are told that it is really an irregular deposit. Three hundred yards higher up lies a great open cellar, for I can compare it to nothing else, with a small pile of refuse lying at one side.

This is the mine of Tajo, of San Rafael. Judging from the small amount of earth visible, and the statement of the old administrador, it is nearly a solid mass of ore. You have ore on all sides in the level, so that it is impossible to tell where the vein is. This ore is ductile and most easily reducible. It flows like water in the furnace. The supply is apparently inexhaustible. Further up the glen is the Mina de Plomo de Arvallo, of the same character as San Rafael. The ores of these mines appear to consist principally of oxide and sulphate of lead; although vast masses of galena are found, and are so soft that a single barretero can throw down many tons a day, while the cost of extraction is nothing. The shafts appear of trivial dimensions, yet they have been worked from time immemorial, and the litharge or jugos, from San Rafael, have supplied all northern Sonora with that necessary article; and they have even formed an article of export to Jesus Maria, and other great mining districts of Central Chihuahua. The ore of the Cobre Pobre Mine in the vicinity is boundless in extent, but

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of inferior quality. Near this point is also located the great vein of La Mariquilla. We have been assured that it was in the sierra of La Mariquilla, twelve miles to the north. This mine, from its alleged dimensions, and the richness of its ores, has great interest attached to it, as the cause of its abandonment was the fact of its producing white copper, something like the "paktong" of China, or the white copper of Heidelburghausen, the prototype of German silver. But the accounts of this mine are so obscure, conflicting and contradictory, that nothing can be made of it, but actual discovery of the mine. Some have denied the existence of this mine or vein, and others claim to have smelted it, who pronounced it an alloy of copper and silver.

El Tajo, the most ancient mine, is a huge rent in the earth like the Pamys mine in Iglesia, but the ores changed at the depth of 30 feet, suddenly, into pyrites. It is probable from analogy that these pyrites are argentiferous. Immense masses of black rock were abandoned by the ancient miners in the walls, under the supposition, probably, that they were black slate, which were subsequently assayed and proved to be a semi-stratified silicate of the dinoxide of copper.

Other mines of argentiferous galena, varying from 12 to 320 ounces per ton, are alleged to exist near the Ojo de Agua de Arvalla. Besides the oak, there are vast and most accessible forests of chamunque, a species of pitch pine of great strength and durability, excellently adapted for machinery and building materials.

The mines are accessible by a good wagon road via Santa Cruz from Fort Buchanan, Tubac, La Piedra Parade, and Guaymas, and are surrounded by the great depopulated haciendas of San Bernardino, El Ojo de Agua de Arvalla, another Ojo de Agua, Cuitahaca, El Agua Escondida, Las Animas, and Banamichi.

Another road, called a wagon road, but poorly deserving the name, passes by Bacuachi, Arispe, Ures, and Hermosillo, to Guaymas. Its position is romantic and delightful. Pastures exist green in Bacuachi all the year round, and of the most nutritious quality. Cultivable land of considerable extent is found in the same hacienda, which is the natural feeder of the real. The mines themselves are said, by Felipe Perez, to be on public land, a narrow strip or sobrante between two ranchos. All the necessaries of a great establishment—building material and fluxes—abound in excess. Building stone, granite, fine marble, tepustete, arenillas,

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jugos and syndas are plentiful; and, during the search for the lost mines of Las Lamas, Espiritu Santo, on the road to Banamichi, a vast deposit of most refractory furnace sandstone was found, the first seen in Sonora. The water is good and the locality healthful, and in proximity to the American military stations of Fort Buchanan and Arritoypa," and the Southern Pacific R. R., which passes within about 150 miles of the district.

"ANGE ROBERT L. D. AMUAILLE,
Ensayador Oficial de Estado de Sonora,
29 de Mayo de 1860."

La Basura is the first mining region discovered in the country of the Papajos, and is situated twenty-four miles north-west of Caborca. Its veins are numerous, especially those of gold; but although they are of marvelous richness, this lasts but a short time, as the deposits extend but a short distance below the surface, San Perfecto was the second discovery made in the Papajo country. Quitovac was the third discovery, about seventy miles north-west from Caborca, and the same distance from the town of Guadalupe or Altar. The placers were first worked, they being very abundant in gold, which lay in grains on the surface, as at San Francisco and Cieneguilla, Afterwards many mines were opened to the depth of ten or fifteen varas, (about 33 inches to each vara) some of which yielded from four to eight ounces of gold to the bowl (or "batea"); others not more than a few cents. Occasionally pockets were found of large extent that yielded marvelously. Nuggets of large size were also found; one weighed twenty-one marcs, (each marc weighing 4,608 grains). A large piece of gold-bearing quartz was extracted from a ledge, that was nearly all gold, and weighed over thirty marcs. San Antonio, another placer, about ten miles west of Quitovac, was discovered a few days after the latter, and was exceedingly rich at the surface. The discovery of these placers was owing to Father Faustino Gonzalez, who prevailed upon the Papajo Indians to reveal their locality, in 1835. Gonzalez made a large fortune, and he was soon surrounded by whites and Indians in great numbers. The placer continued rich for several years, and was worked until 1841, when the Papajos rose, and expelled the whites.

After quiet was restored, a few persons returned to Quitovac and worked some mines discovered after the placers, in the neighborhood of an abundant spring, capable of supplying a population of 30,000 or 40,000 inhabitants.

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In the Sonoíca Valley, which is situated about 36 miles north of Quitovac, on the road to Lower California, the gold discovered was very fine and light.

Alamo Muerto, about 48 miles west of Caborca, contains gold and silver mines and placers. It was discovered in the same year as Quitovac, and although its ores yield a fair proportion of silver, the scarcity of quicksilver prevented their being worked to any great extent. There were, however, ten mines in operation at the time of the rising of the Papajos, all of which were abandoned.

Las Palomas, six miles to the south of Alamo Muerto, were rich placers of gold, similar to those of Quitovaca. It was also abandoned for the same reason, and is now frequented by a few gambucinos, (poor miners) who are satisfied with enough to provide them with food.

El Zoñe was discovered in 1844, and contains numerous gold mines, some of them quite rich at the surface. From one of them was taken a mass of quartz of 25 pounds weight, yielding 50 per cent. of pure gold. A mine is located here called Ris Suena; eight or ten shafts are down about 300 feet. Ores are shipped to Aribaca, about 120 miles on the road to Tucson; pays about $200 per ton.

Cajitos is situated about 24 miles north-west from Caborca, and about 70 miles from port La Libertad, inland, north-east from the Gulf of California. The mines located here are in a low range of mountains or foot-hills. The mines were discovered shortly after the other mines in the vicinity, and have been worked in a superficial manner since 1842. In 1868, the hostile Indians drove the miners off, and the mines were abandoned until 1877, when small bodies of armed men returned and worked in the old drifts and inclines for a few weeks, then packed the ore on their mules, and slipped away quietly to Basura, about ten miles east, where reduction works were established. The richest spots were thus only mined until 1879, when the mines were again worked by the primitive arastra. The shafts are sunk on an incline following the course of the ore vein. Instead of using the windlass, the ore is packed on the backs of miners in raw-hide sacks, up ladders made by binding cleats of wood upon an upright pole, with raw-hide thongs. The ore is worked by an iron bar called "barreton," about six feet in length, which is used to throw it down, using it as a hand-drill and lever. One end is shaped like a drill, and the other is hammered flat and sharp like the larger end of a pick. The ore is broken into small pieces and thus trans-

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ported to the surface, to the arastras. For shovels, the horns of cattle are steeped in water and flattened out, and attached to pieces of wood with raw-hide thongs.

In this manner, these mines have been worked for the last 35 years, and about four millions have been extracted from the four mines in the vicinity. The present depth of the shafts is as follows: The Tajilos, 275 feet; Puertecitos, from 90 to 100 feet; Galilea, 80 to 90 feet; Oro Blanco, 180 feet; Santa Rosalia, 200 feet; with two levels and stations.

"The gold has only been extracted, although a large percentage of silver is found in the ore, which has been allowed to waste, owing to the lack of materials to save it. Mr. C. E. Hoffman, mining engineer of this city, although his residence is in San José, some months since was sent to Tucson to examine some mines in Arizona, and while there, met a Mexican, who showed him some of the ore from these mines, which, on being assayed, was found to be very rich. He accompanied the Mexican to the mines, was satisfied with their richness, and purchased the four mines, and thirteen others in the vicinity in the Juarez and Cajitos mining district, for himself and some gentlemen in this city, who subsequently organized the Caborca Mining Co. He returned again last April, and has been superintending their development, building reservoirs, and preparing a site for a 20-stamp mill. The water is abundant in the vicinity, which is caught in reservoirs, and the one now constructed has sufficient water to supply a 20-stamp mill for eighteen months.

"In this district the rancheros irrigate their lands by reservoirs; though grain, if sown in season, and grass, thrive very well without. Mr. Hoffman has in his employ about sixty Yaquis. These Indians perform almost all the labor of Sonora, and are employed at from 50 cents to $1 per day. The ores of these mines assayed on an average $80 per ton. The ores of the Oro Blanco mine in this group, assayed as high as $224.94—about two-thirds being silver. The Santa Rosalia, about four miles from the Oro Blanco, west, went about $151; and the Alberca, $85.75, gold and silver, of about equal proportions. Thus we see the whole of this region surrounding Caborca is one of the richest in the state, and may be worked with enormous results. The price of transportation will not exceed $25 per ton to Port la Libertad, and may there be shipped to San Francisco for $8 per ton additional; although Mr. Hoffman proposes to work the

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ore by a 20-stamp mill, until the mines are further developed; then add to their capacity 40 stamps more. Hay can be purchased at the mines at $16 per ton, and wood at $2.50 and $3.00 per cord. The hill-sides in the vicinity are thickly covered with a heavy growth of iron-wood, mesquite, and palo-verde. The location is such that the mines can be profitably worked, and yield rich returns to the owners. The Santa Felicita mine, twenty miles east of the Cajitos Mining Camp, is owned by Mr. Davis of Chicago, who has erected a 20-stamp mill, and is working in free gold ore. The Cajon mine, twenty miles south-west, is worked by a 10-stamp mill." (From report of Mr. C. E. Hoffman.)

We are indebted to Mr. Benjamin Rountree for the following:

"The principal mine of the mining district of La Barranca, in the jurisdiction of San Javier, is the Tarumari, a silver mine, which is owned by the Barranca Mill and Mining Company, of Guaymas. The owners are, N. Graff, F. R. Rountree, F. Ench, and Arturo Culicuro. This mine has reached a depth of 300 feet, and has produced bullion to the amount of $1,500,000. The width of the vein is from two and a half to four feet. The average assay has been, for all the working ores, about $100 per ton. The lowest workings are upon richer ore, reaching $160 per ton, with a vein at the lowest workings, 18 inches. The ore contains about five per cent. gold in bullion. A 20-stamp mill, concentrator, etc., are located at the mines. The ores are worked by the lixiviate process, or roasting, and then passed through a wet crusher. The ores are rebellious, and, consequently, have to be roasted before treating. This mine is located about 120 miles north-east from Guaymas, and about 100 east from Hermosillo, 10 from Los Bronces, 8 from San Javier." The same company owns the extensive coal beds hereafter mentioned, which are located 1,500 feet from this mine.

The region or mining district of Bolas de la Plata is supposed to be located in the northern part of Sonora, near the boundary line of Arizona. Its importance is chiefly derived from traditions of virgin silver having been found "at the place called Arizona, on a mountain ridge about half a league in extent. The discovery was made by a Yaqui Indian, who revealed it to a trader, and the latter made it public. At a depth of a few varas, masses of pure silver were found, of a globular form, and of one and two arrobas in weight. Several pieces were taken out weighing upwards of 20 arrobas, or 500 pounds; and one found by a person

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from Guadalajara weighed 140 arrobas, or 3,500 pounds," all of which has been quoted and given as a probable fact in many works, and is found referred to as a tradition in many Spanish and English works, and even quoted as a fact; since in the same year of the discovery, 1769, the Presidio of Altar seized upon large masses of silver in the possession of certain persons as the property of the crown, which was denied by the parties interested, and the matter taken into the audience chamber of Guadalajara, and from thence was referred to the court of Madrid. Seven years having elapsed, the crown decided that the silver pertained to the royal patrimony. The facts and all the data, in our opinion, can amount to no more, than that certain rumors were in existence, in relation to the products of one of the rich mines of Sonora, which had been seized by an officer of the crown: and had been found in a melted state in the mountains, at some mythical spot. The fact that the silver was in the shape of balls indicates that they were simply the ordinary products of one of the rich mines, and had been melted into the balls before mentioned, from the fact that formerly the silver in Mexico was thus melted, instead of into bars or bricks, as at present.

The following is copied from the Appendix of "Ward on Mexico," which contains a complete report of the district of Babiacora:

"In the neighborhood of Babiacora there are many silver mines, the most of which contain a greater or less proportion of gold. The principal are Dolores and San Antonio to the south-west of the town; Cerro Gordo, to the south-east, and Cobriza, on the Cerro de San Felipe, in the valley above Babiacora.

"The Cerro Gordo mine is situated four leagues south-east of Babiacora, on a very high hill, and appears to have been of considerable interest, from the great quantities of refuse ores thrown out on its sides. The quantity of water contained in it cannot be ascertained, as there is not any perpendicular shaft. From the steepness of the hill, a tunnel might be driven far below the bottom of the works, from a fine plain. The vein is about one-half yard in width. Some of the rejected ores produce from 12 to 30 marcs per 'monton,' (of ten cargas, or 3,000 lbs.)

"The mine of Cobriza de San Felipe, eight leagues north of Babiacora, and three from the town of Ituapaca, with the haciendas and ranchos of San Felipe, Agua Caliente, and Los Chinos, in its neighborhood, is said to have been aban-

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doned when producing pure silver, which the miners cut out in small pieces by means of large shears and chisels. The Apaches drove the miners away, and, during their absence, the shafts became filled with water, and a large rock fell into the mouth, blocking it completely up." This was in 1827.

The mine of Tacapuchi is three leagues from Babiacora south-east. The ores produce 14 marcs per monton, or about $44.80 per 3,000 lbs.

Dolores, one league from Babiacora, produces silver in the same proportion, with a mixture of gold. These mines are all advantageously situated, with wood and water in abundance adjacent, and are distant about 70 leagues from Guaymas.

About eight leagues from Oposura north-west, are the old and celebrated mines of San Juan Bautista. The Mineral of San Juan is a mountain of itself, encircled by others to the north-west and south of considerably greater elevation. It is 3,000 yards in length from east to west, and 1,500 wide at the broadest point, and is entirely surrounded by a ravine which opens into a large plain. The mountain or hill is 600 feet high, at the summit of which the principal vein, called Santa Ana, crosses from north to south. This is crossed by another vein on the northern slope of the mountain, and is called El Rosario. These mines have produced enormously, but now contain much water.

Twelve other distinct veins are found, with small threads of virgin silver permeating the centre. The azogues, (ores that contain quicksilver) which are very abundant, are untouched, though they produce from 24 to 96 ounces of pure silver to the carga of 300 lbs. or from $140 to $650 per ton. The ores, by smelting, have yielded 50 per cent. of pure silver.

Tradition says that when they were compelled to abandon Santa Ana from water coming in, they left off in a vein of pure silver one-third of a yard wide.

The twelve veins vary from one yard to six in breadth. The depth to which they were worked is as follows: Santa Ana, 140 varas; Rosario, 60; Cata de la Agua, 5; Guadalupe, 4; Gazapa, 20; Texedora, 20; Santa Catarina, 20; Arpa, 12; Prieta, 12; Bellotita, Coronilla, 12; Fontane, 10. Half a league further to the north of Santa Ana is the mine of Descubridora, with a vein of azogues, (heavily charged with quicksilver) 15 varas wide; depth of mine, 30 feet;

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assay, 96 ounces to the carga of 300 lbs, or about $650 per ton, reduced by the amalgamating process.

One league to the westward is the mine called Bronzosa, or Los Bronces, with an immense vein, which may be traced one mile on the surface. It has been considerably worked, but has water in it. Two leagues further west is the mine called Cobriza, a new mine 20 varas deep. The two last have a good reputation.

The mining district of Nacosari is located 16 leagues from Oposura, and 14 eastward from Arispe. The entrance from the plain of Nacosari is up a narrow glen two leagues in length, through which flows a tolerable stream of water, which is lost in the sand.

About one mile from the entrance, during the rainy season, it reaches to Ojo de la Agua, the source of the Oposura River. Just before you arrive at Nacosari, the glen expands into a beautiful vale, planted over with a variety of ornamental shrubs, fig trees, pomegranates, peaches, and other fruits and plants, which were once arranged with order and taste, but now form a confused thicket. The remains of numerous canals are visible, through which water was conveyed to every part of the vale. This spot was once a residence of Jesuits. The remains of their dwellings and an old church at the upper end of the valley are yet to be seen. The surroundings are picturesque. The mountains on each side rise almost perpendicularly, and are intersected with strata of a great variety of colors. Some of them present a mixture of bright red, yellow, green, and other varied tints.

There are many excavations in the mountains, and the principal mine is called San Pedro de Nacosari. This mine is a phenomenon. The vein runs east and west, and is laid open from the surface for more than 1,000 varas, to the depth of 70 varas. The breadth of the aperture is about two yards; but on each side are immense quantities of rubbish thrown out. Much dirt and sand have washed in and covered the vein; but general report says that the mine has no water in the interior, and that the ores were so rich that the best yielded from 25 to 30 marcs of silver to the arroba (of 25 lbs.).

The mines of Churunibabi, Pinal, Huacal, Aguaje, and many others, are situated to the north and north-east of Nacosari, at no great distance from San Juan del Rio, built upon a stream which falls into the Yaqui. These minerals are equally rich with those already described. Pinal con-

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tains a greater proportion of gold than silver. It is recorded in the archives of Arispe, that the former owner, a lady by name, loaned quite a sum to the government. Churunibabi is a very old mine, worked in the same way as the San Pedro, as, indeed, are all the mines in this part of the country. The direction of the vein is east and west, width two varas. The last persons who undertook to work this mine, were named Escalante, Vasquez, and Coulla. They cleared away the rubbish at one end until they found a pillar left to support some of the old workings, from which they took ores that produced $70,000, and yielded 70 marcs of silver per carga of 300 lbs. The mine is laid open from the surface 400 yards in depth. Tradition says that the first discoverers found the vein of virgin silver one-half vara wide, (or about 16 inches) and that it was abandoned, on account of the Apaches, when the vein was two varas or 66 inches wide, (5½ feet) and the ores assaying 70 marcs per carga, or about $1,500 per ton. The richness of these ores appears almost incredible; but when we consider the great quantities of bars of silver the mines of Sonora, without the aid of quicksilver, have produced, the metals must have been very rich and abundant. Ten leagues to the west and south-west of Nacosari, and six to the north of San Juan, are the mines of Tonbarachi and San Pedro Virguillia, with ores of from six to eight marcs per carga. To the west of Arispe are the mines of Santa Teresa, of gold and silver completely virgin, and the Cerro or Mountain of San Pedro, which contains innumerable mines and veins untouched. In all the districts above described, the roads are only passable from the public roads for horses and mules. The country being very mountainous, but not of very great elevation, none of these mines are more than six or seven leagues from rapid streams of water, sufficiently considerable to work almost any machinery. The mines of Aigame, or Haygame, near Horcositas, are famous for the abundance and richness of their gold-bearing ores. Those of Lam Pozas and Palos Blancos, five leagues west of Tepachi, are likewise good mines, with considerable veins carrying rich ores."

On the Mining Districts of La Carita, La Iglesia, La Chipiona, La Amargosa and Los Mulatos.

All these districts comprise another seven hundred square miles of a very mountainous country, situated around the the head waters of the Rio de Guisamopa and those

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of the creek of Agua Verde, another tributary of the Sahuaripa river; as well as on the Rio de Mulatos, which is the most southern branch of the head waters of the Rio Yaqui, but already a powerful stream, where it rushes past the mining town of Mulatos. Some of these mountain ranges reach heights of 6000 and 7000 feet above the level of the sea. The whole seven hundred square miles are covered with most magnificent forest of pine, oak and a great variety of other trees. Water is in this extensive region by far more abundant than on the western slope of the Sierra Madre. Every now and then one meets a fine stream of crystal water, leaping from rock to rock, as if anxious to become of some use before leaving its birthplace. Grass is also more abundant and much sweeter than in the west, and provisions are full as near as to Trinidad and Guadalupe. But Guaymas is, by fifteen leagues, farther off from these latter districts. As in respects to the proposed Pacific Railroad, the seven hundred miles I here speak of are much easier reached than the seven hundred miles on the western slope of the Sierra, since said railroad would run close along the southern line thereof. The veins found in these districts are even more numerous than those in the more western ones; also more regular and extensive. But the ores, as taken on an average, are less rich and of a more complicated nature in respect to their metallurgical treatment. This is the principal reason why less mining has been carried on here than in the western districts. But the mines I am going to describe are, therefore, of less importance, since they seem to make up in quantity what they fall short in quality, at least as far as veins are concerned. The district of "La Carita," the most western of the group, is situated on the eastern side of the Sierra de San Ignacio, which is in that section of the Sierra Madre, the northern termini of its most western ridge. The principal part of this district is a bulky mountain, about five miles long and 5000 feet high. Its cap of porphyry is more than 1000 feet thick, but does not prevent the green stone porphyry, with its intermixture of iron pyrites as the precursor of the ores, from cropping out in a great number of gulches and ravines, from most of which the interior of the mountain could easily and cheaply be reached. With half a dozen of tunnels, hundreds of thousands of tons of valuable ores would become accessible, and make this mountain one of the most famous of the Sierra Madre. That it is an ore-bearing mountain is, in addition to what I have already said about it, proved by the astonishing number of veins cropping out in

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the cap of porphyry. Only a few of them have been worked, since their existence was but recently discovered. The ore on the surface of these veins is greatly decomposed, and is, therefore, very soft. It enters freely into the Mexican amalgamation process. But after a certain depth has been reached, from twenty to forty yards, the sulphuret of the ore makes its appearance. This, without being roasted, does not enter into the amalgamation. All the worked veins have on this account been abandoned, although the ores had become more abundant than they had been near the surface. The chemical character or compounds of the ore of the La Carita district I could not determine without putting it to an analytical test. In appearance it differs from all other ores in the Sierra Madre. In many of the mines of La Carita gold is found on the surface, and in quantities large enough to be worked for. Being the nearest mining district to the Rio de Sahuaripa, La Carita has all the mining facilities on hand, that is, as far as the country produces them. The small mining village of the same name is situated at the foot of the mountain, and close to the little streamlet which comes out of it. In the east the district of La Carita is joined by that of La Iglesia. About a century ago La Iglesia was a large mining village, but at the present it is but a small *rancho*, with but half a dozen families. As a mining district, La Iglesia calls the attention of the geologist as well as the miner. Its most important geological, or rather mineralogical, feature is, that wherever a vein has been worked, the ores on the surface were rich in silver, but soon changed into the metals, pyrites, with the extraction of which the Mexican miner never troubles himself. The succession of the ore strata is here, as far as it has been tried, the same as in Dios Padre, in Trinidad. Pure galena comes first, then galena and zinc blende, after this galena, zinc blende, and small pockets of gray silver ore. Now, judging by what follows this in Dios Padre, I have a right to infer that the same ore will follow here too, viz.: a rich gray silver ore, with perhaps a little zinc blende and galena. And if this really is the case, as I do believe it is, then immense quantities of pure and rich gray silver ore could be extracted from innumerable veins of the Iglesia district. In the whole district there is not a mountain over 1000 feet high, above the level of the Agua Verde Creek, which divides it into two equal parts. This creek is a powerful stream, with a good deal of fall, and therefore very well adapted to the driving of machinery and for other purposes. On its banks and on the hills near to it thousands of acres of

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land could be cultivated. They are now covered with an abundance of grass or a magnificent forest.

La Igelsia, as a whole, is one of the cosiest spots of the Sierra Madre, and a place on which at some future day a great mining town must spring up. The scenery all around the district is grand, sublime; one mountain rises higher than the other, and all trying to outshine one another with their dense and splendid forests of pine, oak, etc. The whole district of La Igelsia belongs to the same ore-bearing formation as Trinidad and Guadaloupe. One vein or mine of it I have to describe in particular; it is that of "El Tajo." It is situated on an elongated hill, above two hundred feet above the level of the Arroyo del Agua Verde, and but half a mile from its banks. The vein is an extensive one, was from two to three feet wide on the surface, but left in six feet at a depth of one hundred and twenty feet, in which the mine was abandoned some twenty-five years ago. Its history was, therefore, easily to be traced, and the condition in which it it was left ascertained. On and near the surface of the vein large quantities of galena were found, after which, little by little, zinc blende made its appearance, until at the depth of one hundred and twenty feet, nothing but zinc blende, with now and then a small pocket of gray silver ore was found. The vein, as stated, was six feet wide, and consisted of pure ore. Granted, now, that little by little the zinc blende will disappear, again to be replaced by rich gray silver ore. What, if such an event takes place, will be the value of this mine? Millions could be extracted from it every year, and incredible as this may sound, it is nevertheless probable that such should and would be the result if my theory stands good, which it will, since it is not a mere abstract theory, but one founded on a great number of established facts. The future development of the mine will show whether I am in the right or not. The rock of which the hill is composed is a rather soft one, and a shaft alongside the old works of two hundred feet would go a great way in telling what is to come after the zinc blende. The sinking of such a shaft would not cost over $1000.

The mine of Yerba Buena lies opposite that of El Tajo, and on the other side of the Arroyo del Agua Verde. From the surface of its veins rich silver ores were extracted. The saying is that it was abandoned on account of a large stream of water having been struck, but I rather incline to the belief that the appearance of zinc blende was the principal cause thereof.

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A number of other veins have been superficially worked, but their history is more or less the same as that of El Tajo mine. All the mining facilities are here plentiful, and even the agricultural products could be raised alongside of the mines. I come now to one of the largest, most interesting, and most important mining districts in the Sierra Madre; I mean that of "La Chipiona." Unlike La Iglesia, it is formed by groups of mountains, from 4000 to 6000 feet above the level of the sea, but, through its peculiar topography, nevertheless accessible from all sides. Nay, the very height of the mountains and their size will contribute toward their development, in a mining sense of the word. In this district, as a rule, all the mountains are covered or capped by a thick stratum of porphyry. But in all the innumerable gulches and ravines, the green stone porphyry, with its never-failing iron pyrites, stands out in immense masses, and in one spot over twenty five acres of the very gray silver ore can be traced in a thousand small veins, running through the rock in every direction. The veins cropping out through the surface of the "caps" cannot be numbered, and are at the same time the most extensive ores in the Sierra Madre. The district of La Chipiona joins that of La Iglesia. It belongs, like this, to the ore-bearing formation, and even more so, as the description of some of its mines will show. If I say that more than a hundred mines have been worked here I do not say too much, since within six months, while I was residing in La Cienegita (the most inhabited part of the Chipiona mines), I could not visit half of them. Some of the veins I I traced for five or six miles, without coming to their terminal in any direction. They all run from north to south, or near to it, and their thickness lies between two and ten feet, but it increases as they go down, and, I believe, that in a depth of five hundred feet it will vary between ten and fifty feet. The ores of all these veins are, with the exception of a few, the same: a poor, gray silver ore, rich gray copper ore, intermixed with iron pyrities, and in some instances also with copper pyrites. To a depth of from twenty to fifty feet these ores were decomposed—changed into a kind of red or yellow ocre. They freely entered into the smelting as well as into the amalgamation process; but below that depth the sulphurets made their appearance. They are, without being well reverberated, untreatable, and consequently of no use. But I doubt very much whether this will be the process by which these ores can be treated to advantage, since lead is scarce and expensive, not only all through the Sierra Madre, but

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also over the whole of northern Mexico. The appearance of these sulphurets there was the cause why all these mines were abandoned again soon after they had been taken up.

I shall describe some of the most important ores as a mere sample of the nature and importance of the Chipiona district. As some of the most interesting ores, I have to point out a number of veins of the same nature as that of El Tajo mine, in the Iglesia district. The principal one is La Mina Grande, called so from a vein on which it was founded. On the surface it contained large masses of galena, which, little by little, changed into zinc blende. When it was abandoned, the vein was from six to eight feet wide. All I have said of the El Tajo mine, in respect of what it might become, may also be applied to this mine, and perhaps more so, since its veins are not only wider, but also more favorably situated as to working to advantage, running along the side of a high mountain, so as to be opened by the driving of a tunnel. Next to the Mina Grande comes that of Ostemuri, an extensive vein, in which a great deal of work has been carried on. Here, too, zinc blende was the cause of the abandonment. Provided that in either of these three mines, those of El Tajo, La Grande or Ostemuri, the sinking of a shaft or the driving of a tunnel would prove that I am correct in respect to the ores found below the zinc blende, what would these three mines be worth, and what dividends could a company in possession thereof pay ? Millions would stand arrayed against the small risk of $5,000. No further working capital would be required, as each mine, from the day of finding the rich ore, would become at once not only self supporting, but surplus producing. These three mines are so near one another, the greatest distance being but four leagues, that their works could be easily directed trom the some point.

I come now to a description of a mountain peculiarly situated, of a peculiar shape. and peculiarly interesting. It is that of Cerra Colorado, or La Chipiona proper. I might call it a mountain peninsula, since on three sides it is separated from surrounding mountains by deep gulches. On the south side it is connected therewith by a low isthmus or small plateau. From that isthmus it increases in height until its summit is 1,500 feet above the level of the Arroyo de las Bronzas washing past its base. The cap of this isolated mountain is about three hundred feet thick, perhaps less. A very extensive vein (the principal one) crops out on its summit, and, following the ridge, loses itself in the isthmus, to reappear on the mountain coming down from the isthmus. Over

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this second mountain I have followed it for some three miles, without finding its termini. In this vein a considerable amount of work has been carried on, and in some places to no inconsiderable depth. All the ores extracted from it were decomposed ores (originally gray silver ores and iron pyrites). In all parts of the vein the working of it was given up as soon as the sulphurets were reached. Besides this, a hundred mines of the same nature were worked, and for the same cause abandoned.

Seven years ago, when I was for the last time in the Chipiona district, but one mine was miserably worked. I now come to the part of the mountain above described, to to which I would call the special attention of the geologist and miner. It is this: the immense base of it—the circumferance, which comprises six to eight miles. Around all this base greenstone, porphyry with iron pyrites, stand out and on one side, the eastern, a thousand small veins of gray silver ore run in every direction through the rock, through the same kind of rock and in the same way as in the Dios Padre mine of La Trinidad. Besides this, the exterior of both mountains (not in shape) of La Chipiona and La Trinidad is the same. Why, then, should we not infer from all this that the exterior of the mountain bears the same relation to its interior as the exterior of the Dios Padre mine to its interior?

Geology would cease to be a science, and would be of no use if such inferences, based on so many facts, could not be drawn or would not be accepted. I have so far described four mountains, the heads or interior of which must be considered as bearing ore, and of a similar nature as that of the Dios Padre mine. They all four belong to the same formation, the same period of geological creation, and have the same rocks, ores and appearances in common. The most northern of these four mountains is that of La Chipiona; eight leagues from it lies that of La Huerta de Yulapa; four leagues from this that of Dios Padre, and seven leagues from that, the mountain of Guadaloupe Sierra de la Hierra, some eighteen leagues from one extreme to the other. Founded on these facts, since facts they may be considered, I ask the question, of what are the hearts or interiors of all the mountains lying between and around the four mountains mentioned and described composed? I boldly answer, of ore, some in a less and some in a higher degree; some with but very little of it, and some with a great deal; some with ore of a poor and others of a richer nature. The calculation of the sum total of the riches they may contain I leave to some mathema-

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tician who delights in such calculations, as some Americans do in calculating the population the United States will have in 6000 years from now.

All the mountains of which the district of La Chipiona is composed, comprising some two hundred and fifty square miles, are covered with the finest forests in the Sierra Madre.

Oak and pine abound everywhere, from the depth of the gulch to the highest peak of the mountains. Grass is no less abundant, since the whole two hundred and fifty miles form an almost continuous meadow.

Of water, the only stream of any consequence is the Arroyo de las Bronzas, a tributary of the Arroyo de l'Agua Verde. In the dry season it almost dries up, but there are a thousand places where artificial water reservoirs could be constructed, and filled to the brim in the rainy season, when water falls most abundantly. The projected Pacific Railroad touches this district as well as La Iglesia and La Carita.

Agricultural products for the maintenance of a large population could be raised in the low lands of Sonora, and within the mining districts, where good soil abounds.

The distance to Guayamas is seventy leagues. The Indian village of Taharachi lies inside the Chipiona district. In the east of the Chipiona district lies the district of La Cienegita Amargosa. It belongs to the same formation as all the rest of the Sierra Madre districts so far described. In it, too, a great number of veins crop out on the surface, some of them worked. There is one vein I discovered; it is one hundred feet wide, which has never been touched, and promises to lead into the interior of an ore-bearing mountain of great extent.

The surface of all the mountains of the Amargosa Cienegita district is, already stated, gold-bearing (in the description of the Sonora gold mines). The mountain described there as paying $12 per ton of decomposed porphyry and iron pyrites forms the most eastern part of this district. By all I know of the geology and mining of Sonora I am convinced that the interior of this immense mountain is very rich in silver ores, perhaps richer than any of the other ore-bearing mountains heretofore described.

The Arroyos of Amargosa and Cienegita have their rise in this district. They are tributaries to the Arroyo del Agua Verde, and small but permanent streamlets, of the best drinking water, are consequently of much importance in a region

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where most of the waters are impregnated with dissolved mineral substances. The brook of La Amargosa is the emanation of a mineral spring (steel water), and as such highly prized by the surrounding population.

The forests of Cienegita Amargosa district being very dense and the mountains above the elevation, where grass grows freely, this article is scarce in some parts of the district, but found in great abundance in the remaining parts. Leaving the Cienegita Amargosa district and taking the road for Mulatos one has to pass over the highest ridge in that part of the Sierra Madre. It is, like all other high ridges of the mountain ranges, composed of trachyte. Arrived on the other side, one looks down into a deep valley. It is the bed of the Rio de Mulatos, the southern branch of the Yaqui river, coming almost from the plateau of Chihuahua. It is a principal stream, and the day will come when it will be of immense value to mining. On the banks of this stream lies the mining town of Mulatos, with some some 1500 half starved inhabitants, although living on riches uncounted.

The gold mines of Mulatos were once, as I have already said, famous, not only through all Sonora, but also all through Mexico. As a silver mining district I cannot say less of it, since all its mountains showing gold near the surface will change into silver-bearing mountains after certain depths have been reached. There is a vein in the Mulatos district the ores of which produce the white copper heretofore only found in China. What its components are I am not aware of. Veins bearing silver ores on the very surface have so far not been found. Timber, wood and grass are rather scarce in the neighborhood of Mulatos, and all provisions must be brought from the Sahuaripa valley. The egress and ingress from and to the town are very difficult, and since a direct connection with the future Pacific Railroad is almost imposible, a mountain range 7000 feet in height lying between them, I must say that the district of Mulatos lies under great disadvantage. On the Eastern side of the river lies the mining district of Dolores, said to be rich in silver mines; but since I never saw it myself I pass it, and shall continue to pass all the mining districts of which nothing of importance is to be said. All that broad piece of country lying between the districts of La Trinidad and Guadaloupe and the boundary line of Chihuahua belongs to the same ore-bearing formation as all the districts of the Sierra Madre heretofore described.

But as nowhere veins of any nature (some gold-bearing

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veins excepted) crop out on the surface, I shall not consider it a *bona fide* mining ground, although lying between the great eastern and western mining districts, the latter of which I have still to describe. Theoretically speaking, I must look on these hundreds of square miles as ore-bearing, and the future mining will prove that I was entitled to do so.

The most interesting and, perhaps, the richest gold mine of Sonora exists in the Sierra Madre, east of the Sahuaripa river, and behind the most western range of these mountains. It lies in the silver mining district of La Cienegita, and on both sides of the little streamlet of La Amagosa, the waters of which are charged with iron (steel water). This streamlet divides a long, wide and high gold bearing mountain into two parts. On the point where it comes out of it, or from between them, these mountains reach about 2000 feet above the level of the little flat in front of them. The rock which contains the gold is a kind of decomposed green stone porphyry and surcharged with oxide of iron (decomposed iron pyrites). Take away a ton of ore from these mountains wherever you may, and you will find that it pays you from $10 to $12 dollars a ton of 2000 lbs. By describing the geological character of this district when coming to the silver mines of Sonora, I shall refer once more to these two mountains, and tell my readers what their bowels contain. For the present I will add, that what is found on the surface of these two mountains is but an indication of what is sleeping in their interior. On different and exceedingly rich spots large quantities of gold were found, but the bulk of the ore has never been worked.—*The foregoing description of the districts of La Carita, La Chipiona, La Armigosa and Los Mulatos are from a report by Prof. Julius Miller, an engineer and geologist.*

In the Moctezuma district, the La Providencia, originally called La Palmita, mine is situated eighteen miles northeast of Oposura. This mine was discovered in 1803, and was worked by Spaniards up to 1811, by the records. At this date the records were destroyed, and it is uuknown when the mine was last worked. The incline is irregular in the vein; depth, 100 feet; width, 4 feet; assay averages $125 per ton. Some of the surface croppings, we have been told, went as high as $806. The old shafts were abandoned and filled with rubbish; the pillars were extracted by gambucinos, leaving the mine in a ruinous condition. The intention is to sink a new shaft and put up a ten-stamp mill. A trail leads to the

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mine, but no wagon road. This mine was rediscovered by a Russian gentleman, who brought specimens of the ore to Harshaw, in Arizona and had them assayed, and there met a mining expert from this city, who examined the ore and found it rich, and placed the mine with some gentlemen in this city, who are now making preparations to extensively open it.

The San Antonio Mineral, in the Altar district, possesses some good mines. The Descubridora mine is situated in this Mineral, and is owned by the Sigs. Cipriano Ortega and Abelardo Ortiz, and is within the zone of twenty leagues of the frontier boundary upon the Territory of Arizona. The mine is developed by five tunnels. The vein runs north and south, and its width is from one to four feet. The depth reached is 313 metres, with an inclination of vein of twenty degrees. The metals contained in the ore are gold, silver and lead, and the ley is $16 in gold and $82 in silver, and 72 per cent. of lead. The ore is reduced by machinery established in the same Mineral, in which is located the American company, entitled the San Antonio Gold Mining Company. This mill puts in motion two batteries of five stamps each. The laborers engaged in the workings of this mine vary from twenty to thirty.

The mine of Cerro de Oro, or Hill of Gold, is in the Mineral of San Antonio. This mine is owned by Sigs. Cipriano Ortega and Abelardo Ortiz, and is situated within the zone of twenty leagues on the frontier bounding Arizona. The workings consist of two tunnels, the first 41 metres in depth and the second 45. The metals of this mine assay in gold $25 and $56 in silver, and carry 70 per cent of lead. The ore is reduced by the machinery of San Antonio. The vein of this mine runs east and west, with a width of $2\frac{1}{2}$ metres and an inclination of 35 degrees.

The mine of Vieja de Oro is owned by Sigs. Cipriano Ortega and Abelardo Ortiz, in the zone before-mentioned bounding Arizona. The mine is developed by one shaft 22 metres in depth. The assay of the mine reaches $40 per ton in gold. The ore is reduced in the mineral above mentioned. The vein of the mine runs east and west, and is 3 feet in width, with an inclination of 50 degrees.

The Rebozadero mine is owned by the same parties before-mentioned, and is located near the other mines. The mine has been developed by four shafts and one tunnel, and reaches in depth 56 metres. The vein runs southeast and northwest; width from 2 to 5 feet, with inclination of 20 de-

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grees, and assays $15 per ton, gold. The Cobriza is also owned by the same parties, and is located near the others. The mine has one shaft, 12 metres in depth. The vein runs east and west; width, 1 metre; inclination 35 degrees. The assay is $25 per ton, in gold.

The Rosales mine is owned by Sigs. Francisco, Abel and Jose M. del Castillo, and is located adjoining the mines before mentioned, in the San Antonio Mineral. This mine has two shafts and four drifts, which reach the centre of the workings, about 180 feet. The vein runs from south to north, and its width is from 1 to 4 feet; inclination, 35 degrees. The ores by arrastras produce in gold $30 per ton, and is worked by four barreteros, or miners.

The mine of Ruisena is located in the Mineral of Plomosos and in the twenty-league belt, northeast of Altar. The mine is owned by Sr. Don Francisco Lizarraga. The vein courses east and west, and in width reaches 75 centimetres (one metre is 39.37-100 inches, and a centimetre is about .39-100 of an inch). The inclination is 40 degrees. The walls are firm, and the ores carry gold and silver. The workings are new, and consist of one tunnel, reaching the principal vein. The depth attained is 75 metres, and one shaft of 9 metres, and with other workings make in all some 327 metres. The present "labores" are in abundant metal; 25 laborers are employed in the mine. The metals are reduced in the works of the Mineral of Aribaca, in the territory of Arizona, distant from the mine about 30 leagues. The ley of the metal of the third class has assayed $801 per ton.

The mine Providencia is located in the Mineral of Sonoyta. This mine is owned by Sigs. C. Ortega and A. Ortiz, and is located within the 20-league boundary, northwest of Altar. This mine has one shaft and one drift, and the depth reached is 35 metres. The vein runs south and north; width, 1 metre; inclination, 35 degrees, and carries in the ores gold, silver, copper and lead. The ley is $8 gold, $40 silver, $20 in copper and $52 in lead per ton. The ore is reduced in the beneficio of San Antonio. This mine has ten laborers.

The Rosario mine is in the Sonoyta Mineral, and is owned by the same parties last mentioned. This mine has 4 shafts, and depth reached is 50 metres. The vein runs south and north; width, 2 feet—in some places $1\frac{1}{2}$ varas; inclination, 70 degrees. The ore yields $180 per ton silver and is reduced by arastras. The mine is worked by five laborers.

The San Francisco mine is located in the Mineral of the same name. This mine is owned by Don Cipriano Ortega,

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and is also located within the twenty-league belt. The vein extends north and south; width 1 to three feet; inclination, 55 degrees. The ley is $40 per ton gold. The ore is reduced in Fremont, Arizona, about twelve leagues distant. The mine is worked by four shafts; depth reached 225 feet, and employs 30 men.

The San Francisco mine, in the Mineral of Corazon, is owned by Sr. Manuel Escalante and associates, and is situated about 25 leagues from the American line. The workings consist of shafts and drifts, which have reached 240 feet in depth. The vein runs south and north; width, 2½ metres; inclination, 75 degrees, and assays $20 gold and $56 in silver per ton. The ore is reduced by arastras, and occupies eight workmen.

The Mina Grande is located in the Mineral of Juarez. This mine is owned by Sigs. Modesto Borquez, Benigno V. Garcia and Justo Bon. It is located about 42 leagues from the American line. The vein runs southeast to northwest; width, 3 to 12 feet, inclination, 35 degrees. The ores contain gold and silver, and the ley is $50 in gold and $15 in silver per ton. The arastra is used, and 13 workmen are employed. The "labores" are new, and consist of shafts and drifts. The depth reached is 370 feet.

The Juarez mine is located in the Mineral of the same name. This mine is owned by the Sigs. Jesus Castro and Jose O. Velasco, and is about 42 leagues from the American line. The vein runs southeast to northwest; width, 3 to 6 feet; inclination 75 degrees. The ley is $30 per ton silver. The workings are new and consist of 2 shafts, depth 170 feet. The ores are reduced by arastras, and eight workmen are employed in the mine.

The San Felix mine is located in a Mineral of the same name, and is owned by Albert Sturges and brothers, and is within 56 leagues of the American line. The course of the vein is north and south; width, 6 feet; inclination, 15 degrees. The assay runs from $35 to $2000 per ton. The ores are worked at reduction works, called "Las Tanquas," about five leagues from the mine.—["Perito de Minas del Distrito de Altar."]—*From an official report on the mines of Sonora, in the Altar district.*

The Quintera mine is owned by a New York company, who purchased it last September from Mexicans. The principal owners are Messrs. McFarland and Morgan, of New York. The mine cost $210,000—$25,000 in cash, one half

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the balance in six months and remainder in one year. The property is said to be a good one. A 15 stamp mill is now reducing the ore, that has reached as high as $1000 per ton.

The Santa Juliana Mining Co. of New York, lately organized, have purchased the Santa Juliana and Mina del Padre silver mines. These mines are located in the municipality of Baroyeca, district of Alamos, about 65 miles from the city of Alamos, and 24 miles from the Yaqui river. The Santa Juliana is an old mine, formerly worked by the Spaniards and lately by the Mexicans. The old works are the Trojas, Dios Padre, San Francisco, San Juan, Santa Loreto, San Benito, Santa Rosa, Trousou Nuevo, Milagres, Congojas, San Ignacio, Salsipuedes and many others. The ores are docile and contain ruby-silver and sub-sulphides. The old pillars assay from $100 to $107 per ton. The Santa Juliana proper has a general E. 14 degrees N. course, with a dip of 45 degrees N. Its width varies from five to fifteen feet with walls firm and well encased. The gangue is principally quartz. It shows all the phenomena constituting a true vein, as far as explored from the surface to a depth of 700 feet, and in all the lateral works.

The Refugio mines are situated 25 miles east of Hermosillo, and about 25 miles from the Sonora railroad, 95 miles from Guaymas, on the Gulf of California. The mines are connected with Guaymas by the Sonora railroad. These mines were discovered by some prominent merchants of the district about a year ago and were purchased from them by the Refugio Mining Company of Santa Fe, N.M. The mines are situated on the Las Norias ranch, adjoining the celebrated San Juan de Dios mine, abundantly supplied with timber of good quality, and water sufficient for all milling and smelting purposes. The property is about 2700 feet long by 700 feet wide. The vein strikes apparently N. E. and S. W., and dips nearly vertically, although as no walls have, as yet, been encountered, actual data cannot be given. However, at the point where work has been done, the ore body has been proved to exceed 7 feet in width without meeting with the wall rock, indicating at any rate an enormous body of mineral. The surrounding country rock is composed of limestone and porphyry.

The mineral is carbonate of lead, carrying a considerable amount of silver. Numerous assays of the value have been made, varying from 35 to 75 per cent. of lead, and from 40 to 300 ounces of silver, also from $10 to $45 in gold. In the adjoining San Juan de Dios mine there exists an ore body of about 6 feet wide, reaching $1,850 per ton, also 10 feet of solid mineral at the end of the tunnel, none of which has a value of less than 150 ounces of silver.

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It will thus be seen that the ore is essentially a smelting ore, and one that is perhaps more easily reduced than any the miner has to deal with. All necessary works for smelting the ore are now in course of construction within 1½ miles of the mine.

From the reports of W. A. Jones, on the Jesus Maria mines on January 1st, 1881:—"The mine is situated on one of the tributaries of the Mayo river, 40 miles northeast of Alamos, state of Sonora. The mine has a length of 2600 feet, by 600 feet in width, well defined ledge, and is enclosed between limestone and porphyry, the latter being the hanging wall. The ore-bearing material has a width of about 100 feet, samples of which assayed according to report from $\$15\frac{52}{100}$ to $\$19\frac{26}{100}$ per ton. Notwithstanding the low grade of the samples, from the nature and the great extent of the body of the ore, it is a property well worthy of development, with every promise of opening up into a large and valuable mine."

"The principal mine of the Plomo Mineral of the Altar district is the Ruisena gold mine and its continuation. This mine is located four miles from the village of El Plomo, and some 45 miles N. W. of Altar. The vein is a fissure with the hanging and foot wall of granite. Width of vein 3 to 3½ feet at a depth of 270 feet. The old workings cover an extent of over 3000 feet under ground, with surface workings extending over 5000 feet. The ores carry sulphurets of iron and copper and are refractory, with an average result of about $100 per ton. This mine has been worked for the last fifty years. The reduction works are located about four miles distant at El Plomo, and consist of a ten stamp mill, concentrators, and two water jacket furnaces. The refining works have a capacity of 20 tons per day.

This property is worked in connection with a large lead mine called "Abundancia," located near the works, the vein of which averages 4½ feet. The lead ores carry near 50 per cent. lead and 20 oz. silver, and about one oz. in gold.

The property is owned by a company incorporated in Chicago in June, 1882, the majority interests being held by Chicago capitalists. Mr. J. Sherman Hall is the Secretary of the company."—[Report by Mr. D. Tooker, M. E.]

About two miles from the Ruisena mine, a very rich pocket of gold was discovered some 20 years ago that yielded nearly a quarter of a million of dollars, all taken out in about three weeks. Some further prospecting has been done but this is the principal strike of this region.

The "Sonora Chief" mine is located in the Carbonera

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mountains on the east side of San Miguel river, about 9 miles north of San Miguel, Carbonera Mineral, Ures district. The vein is a contact vein, formation, porphyry hanging wall and lime foot wall, width of vein 7 to 10 feet at a depth of 140 feet. The ores carry carbonate of lead and oxide of iron, and is a free smelting ore, carrying about 40 per cent. lead and from 80 to 100 oz. of silver per ton. The intention of the present operators is to ship the ore over Sonora railway direct to San Francisco, or Benson Reduction works.

The Jesus Maria mine is located at a point near Carbo station some seven miles distant, and is a large deposit of carbonate of lead and iron, lying nearly flat, which is developed by several open cuts and shafts, showing ore from 4 to 20 feet in thickness. The ores carry about 30 per cent. lead and 40 oz. of silver per ton. The ore will be shipped to Benson if reasonable rates can be secured.

The "Santa Felicita" mine is situated about 24 miles northwest from the city of Altar, and about 8 miles north of the town of Caborca, in the Altar mining district. The vein is a true fissure; width, from 5 to 18 feet, at a depth of 320 feet. The ore is a free-milling gold, carrying $30 to $80 per ton in gold, and from 70 to 80 ounces in silver. The ore body is decomposed quartz, with hanging wall granite, and foot wall porphyry. This property has been worked from 10 to 12 years. The "Santa Felicita Mining and Milling Co.," of Chicago, own and work the property, reducing the ore by a 20 stamp mill. This mine is said to be one of the most valuable in northwestern Sonora.

The Bonañea gold mine is located about three miles east of the Santa Felicita, and has a vein of ore from two to five feet wide, of the same character and about the same value as that of the Santa Felicita. This mine also belongs to the same company.

The above-named company are being amply remunerated for their investment. Dr. Davis, of Chicago, the Secretary, from whom we obtained the above data, says the net profits upon the working of the property reaches from $24,000 to $30,000 per month, and that the company is so well satisfied with their investment that they refuse to allow its stock to be quoted on the market, or the property to be sold.

In speaking of the old mines of Sonora, Francisco Velasco says that the old Spaniards generally confined themselves to the high grade ores, and when they were no longer in abundance they abandoned the mine, which then became choked or filled with water. "Windlasses or pulleys at that time

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were almost unknown; and where the mine could not be kept free of water by buckets, it was abandoned." All of which plainly indicates that old mines, as a rule, had better be very closely examined before any extensive outlay is entered upon; and since the mineral wealth of Sonora is almost unlimited, a good, new mine, with paying ore, or an old mine with present evidence of its richness, is better than abandoned or exhausted mines with a past reputation of almost fabulous wealth. *When a mine has produced its millions, generally there is not much paying ore left to warrant an extensive reopening.*

The Santa Clara Coal Fields of Sonora.

"These coal fields are situated in the district of Ures, Jurisdiction of San Javier, and Mineral or mining district of La Barranca, about 100 miles due east from Hermosillo, and about 120 miles north-east from the port of Guaymas, four miles east from the Barranca mine, about 12 miles east of the town of San Javier, and about three and a half miles west of the Yaqui River.

"These coal beds were first denounced by William Lubbert, Napoleon Graff, Thomas Mahan, Frank Ench, and Antonio Cubillos, on the 26th day of April, 1872. At the present date the property is owned exclusively by N. Graff, Florence R. Rountree, A. Cubillos, and F. Ench. The title of the above property vests in said parties, and is free from all incumbrances up to Jan. 1st, 1881, when, at that date, the property was bonded to Charles A. McQuesten, of this city. The property is held by the above-named parties as an association.

"The property consists of extensive deposits of anthracite coal," with some appearances of being partly bituminous, which indicates that there must be extensive coal beds of both anthracite and bituminous coal. "The coal beds denounced are contained in one square league of land. Up to the present date two well-defined veins of coal have been exposed.

"The first consists of a vein nine feet six inches thick, that has been developed by explorations and examinations on the side of a mountain.

"In some places, the vein is within about from one to four feet from the surface. This vein can be traced for about 1,000 feet horizontally, and about 500 feet above the base of the mountain, and extending toward the summit of the

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mountain. One extensive tunnel has been run on this vein, following its dip. No explorations have been made above the point above mentioned; but indications show that this vein has a much larger area. The incline of the vein is 20 degrees S. S. E., the dip east by north-east. At a distance of 22 feet below the point of location of the above-mentioned vein is another vein of about seven feet in thickness. This vein is reached by a shaft on the opposite side of the creek, on the side of the mountain opposite. On the side of the mountain, several excavations have determined the thickness of the vein. At the foot of this mountain is a cañon about 100 yards wide, on the opposite side of which rises a high and rugged mountain. This cañon is about six miles long, commencing at the Taramari mine and ending near the Yaqui River. The coal veins are about one-half the distance between these points, or about two and one-half miles from the Yaqui River bottoms.

"The bed of this cañon can be made into a good wagon road with little work, from the coal veins to the river. Water is found in the cañon at a depth of eight feet. In many places in this cañon, slate and many indications of coal are found. The geological formation of the vicinity and the character of the coal is as follows: The mountain ranges in the immediate vicinity of the coal are very rugged, with steep sides, covered with trees, cactus plants, and other tropical vegetation. The average elevation of the range of mountains is about 3,000 feet above the sea level.

"The range of mountains is continuous for over 100 miles running north, and about twenty south, of the location of the coal beds. They form the mountains bordering on both sides of the valley of the Yaqui River. Placers of gold that have yielded very richly, are located near the valley of the Yaqui, one man having in a single season extracted $30,000 from this same cañon where the coal beds are located. The Yaqui River is about three-and-a-half miles from the present workings of the mine; and the coal mine is very easy of access by a road to be constructed through the cañon, up a gentle incline. At present there is no road for wagons. Horses and mules are therefore used to reach the mines. With very little work a wagon-road could be constructed, or even a railroad, direct to the river's bank. For a distance of about ninety miles from the mouth, the Yaqui River is navigable for barges or flat boats; and at this point rocks and rapids impede a further passage, except for small boats, which are carried around the rapids by "carriers," at the

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mouth of the cañon opposite the coal fields. The river at this point is about 200 feet wide and four feet deep, during the dry season; but during the rainy season a considerable increase in the volume of water takes place. Engineers state that the river can be made navigable for barges from the point opposite the cañon before mentioned, to the mouth of the river, a distance, by following the course of the river, of about 120 miles. The Yaqui River lands, for a distance of 100 miles above its mouth, are noted for the richness of the soil, and the large crops, "as before mentioned." "A railroad can easily be built from the mine to the river, and following near the different windings of the river north, to enter the United States near Tombstone, where a market can be found for a large quantity of coal for milling purposes, and also for smelting furnaces, used to smelt the rich argentiferous and galena ores that abound in that region; and also through northern and middle Sonora, where hundreds of mines containing smelting-ore require a coal suitable for smelting purposes; or south, through the rich valley of the Yaqui River bottom, where millions of acres of the finest land in the world are awaiting the emigrant to cultivate its soil; and on to the port of Guaymas, where a market can be found for a large amount of coal for steamers that regularly ply from San Francisco and that port, and for vessels of war of England, United States, and other nations, that regularly touch at Guaymas.

"From Guaymas, barges can ply between that port and Mazatlan, or Cape St. Lucas, in Lower California, where a depot of coal could readily find a sale in supplying ocean steamers that ply between China, Japan, Australia, Panama and San Francisco, with a prospect in the near future of supplying coal to the fleets of steamers that will ply through the Isthmus of Panama Canal. Barges could also take the coal direct from the Yaqui, up the gulf, to the Colorado River, to Yuma; there supplying the steamers on that river, the several railroads that pass over this river, and the mills on and near this river, where steamers now go up a distance of about 200 miles from Yuma. Vessels could also transport this coal direct from the Yaqui to San Francisco, where a ready demand for anthracite coal will result in large sales, as at present all anthracite coal used in San Francisco comes from Pennsylvania." (Extract from the report of Charles A. McQuesten, of this city, on the Santa Clara coal fields of Sonora.) We might add that the Mexican Congress has lately approved of the concession to

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Mr. Robert R. Symon for the construction of a railroad from the above coal fields to El Morrito, on the Bay of Guaymas. Thus it will be seen that this coal will soon be on the market.

Quicksilver, Graphite, Marble, Copper, Lead, Coal, Iron, Etc.

The ores of the mines of Santa Teresa and Santa Ana contain quicksilver, and tradition says that the mineral region of Rio Chico also produces this metal.

In San José de la Pimas there is a small hill entirely composed of graphite or black lead.

In San Javier is a vein of a dark color on the face of a hill, from which is extracted a compact substance which, when dissolved in water, produces a fine ink, which is similar to India ink, from China.

In Oposura, there is a hill composed of excellent marble, of which the altars and churches of Sonora are built.

At Ures, there is also another marble quarry.

The celebrated hill of "La Campana," in the city of Hermosillo, is composed entirely of marble as white as that of Italy, and it is used, in some instances, to pave the streets. Alabaster and jasper are found also at Oposura and Ures. Copper is found in the mountain range of La Cananea, north of Arispe.

Aduaña, (an old region of gold mines) Tonuco, 36 miles west of Hermosillo, and Bacuachi and La Cobriza, west of Horcasitas, all contain copper ores.

Lead abounds in Cieneguilla and Arispe, Batuco, San José de Gracia, Aduaña, and Promontorio.

Agua Caliente and Alamo Muerto contain lead, although it is found in the greatest quantities at Cieneguilla and Arispe.

Coal is found near Los Bronces and La Baranca, before mentioned, where a vein of from seven to nine feet is found.

Iron is found in abundance in the southern part of Arizona, in the range of mountains called Madera, and in the northern part of Sonora, and at Mogollon.

In the neighborhood of Cucurpe there is a vein of incombustible crystal.

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SINALOA.

CHAPTER I.

General Description.

From the river Mayo to Alamos, in Sonora, the country is an extension of rolling hills, and from thence down to the coast and the valley of the river Fuerte, bordering Sinaloa. Here the "tierra caliente" plain is encountered that extends all the way down the coast, through the whole length of the State of Sinaloa. The town of Fuerte is located on the river Fuerte, about 80 miles from the mouth. The river is navigable for flat-boats up to this point. An extensive valley below Alamos extends almost due south, between the mountains on the east and the low range of hills on the west, until it opens into the valley of the Fuerte and the plains located south. The Fuerte River is about 200 miles long, and rises north-east in the Sierra Madre, and flows south-west into the Gulf of California. The next river encountered is the Sinaloa, which rises in the neighborhood of the south-western part of Chihuahua, and flows in a south-westerly course, describing a section of a circle through placers of gold situated east of the town of Sinaloa, about 25 miles. Here the river winds in a curve to the east and again to the west, within a space of about eight miles, then continues its course, passing the town of Sinaloa, situated on its banks, and flows south-west into the gulf. A small peninsula completely hides its mouth from the open waters of the gulf. Another peninsula juts out in an opposite direction, forming a very good harbor for small vessels. The river is about 180 miles in length. The Mocorito Arroyo or creek is next crossed, and another small stream, until the river of Culiacan is reached, which rises in the western part of Durango, near Tamasula, and flows south-west into the gulf, the mouth of which is also hidden behind an island, forming a very good roadstead, called the

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Puerto de Altata. The city of Culiacan is located on the banks of this river, opposite the point where the Rio de Hamaya empties into the Culiacan River. This river is about 150 miles long, and on each side of it spurs of the Sierra Madre jut out into the plain within about 30 miles of the coast; the valley of Culiacan being at this point 15 miles wide. The Rio de San Lorenzo is next reached, that flows south-west direct into the gulf. The great mining district of Cosala lies south-east of this river, near its source; the town of Cosala being about 10 miles south from its banks. This river runs through a valley of narrow width, the whole distance, until it reaches the plains beyond.

A valley branches from the valley of San Lorenzo up to Cosala, with a gentle incline, when it again commences to slope on the other side down a valley or cañon to the Elota River. This river also rises in the western part of Durango, and flows south-west into the gulf. This river is about 110 miles long, and has numerous branches. In the neighborhood of its branches, in its cañons and ravines, and on the slopes of the mountains adjacent, are some of the most celebrated mines of gold and silver in the state. The Rio de Piastla also rises in Durango, in its western part, near the celebrated mines of San Dimas, and flows south-west, passing San Ignacio, and empties into the gulf. The valley of Piastla is also very narrow; but some exceedingly fertile lands are found in its bottoms, as in many other portions of the state.

Another small arroyo is reached, and we enter into the thickly-settled region adjacent to the city of Mazatlan. The port of Mazatlan is located on the coast, about half-way between the mouth of the arroyo last mentioned and the river of Mazatlan. This river also rises in the cañons of Durango, about 20 miles across the border line of the state of Sinaloa, and beyond the mines of Ventañas, and flows south-west about 50 miles, and then takes a course almost due south, and empties into the gulf, or rather Pacific Ocean; the mouth of the Gulf of California being now reached. The point where the river discharges itself into the sea is about 15 miles below Mazatlan City. The Rosario River also rises across the border line of the state, in Durango, and flows south-west, into the ocean, passing El Rosario, in the neighborhood of which are located some very rich mines. Above the mouth of this river, and lying in from the coast, is located the lagoon or lake of El Caimanero, which is about 12 miles long, and about 4 miles in width at its widest point.

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The Rio de las Cañas, at the southern border of the State, separating Sinaloa from Jalisco, flows in the same direction as the Rosario River, and empties into the bay or lagoon of Boca de Tecopan, a narrow inlet of the sea which winds into the plain about five miles, and then spreads north in a narrow body of water about ten miles, and south about thirty-five miles, into an extensive body of water in the southern part. It is said it may be made one of the finest harbors in the world, and would contain all the fleets of the globe. With such a harbor as this at Mazatlan the most powerful city of the Pacific Coast would spring up upon its shores. This harbor is located about fifty miles below Mazatlan. The Tierra Caliente plain, before referred to, is about 300 miles long, and intersected by the rivers and streams before mentioned; and at its widest part is about forty miles in width, with extensive valleys branching up the banks of the rivers, some of which are 100 miles in length—the valley of the Fuerte being the largest. The foot-hills of the mountains are covered with timber, such as cedar, and the varieties of oak. The State of Sinaloa extends over an area of nearly 3,600 square miles, and has a population of about 200,000. The surface of the plains of the coast is low and somewhat sandy, though the soil is very fertile. Its productions are similar to Sonora, though to a less extent. Dye-woods abound on the coast and toward the Sierra Madre, and on the eastern frontier there abound extensive forests of pine and cedar covering the mountain sides adjacent to the streams. The rivers flowing into the gulf are used to irrigate adjacent land during the dry season. The state is divided into nine districts, viz., Mazatlan, Rosario, Concordia, Cosala, San Ignacio, Mocorito, Fuerte, Sinaloa, and Culiacan. The state is bounded on the north and north-west by Sonora; and north and north-east by Chihuahua; and east by Durango; and south-east by Jalisco; on the south-west by the mouth of the Gulf of California. The north and north-eastern portion is very mountainous, while it is more level on the coast, which is drained, as well as the mountains adjacent in the north-east, by the rivers before named. The interior contains mines of considerable extent, some of which are very rich, to which we will give some attention hereafter. The interior valleys are very fertile, especially the valley of Piastla, on the Piastla River, and the valley of Rosario, about twenty miles south-east of Mazatlan. There are about 100 towns in the state, and out of the latter, Mazatlan, Culiacan, Cosala, Rosario, Fuerte, and Sinaloa, are

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the most prominent. The first town reached of any importance is the town of El Fuerte.

The situation of the town is charming, being on the south bank of the Fuerte River. This river is about a quarter of a mile wide, and passes along the foot of a plateau that is elevated about 90 feet above its bed. There is a fair view both up and down the river, from this plateau. The town of Fuerte has about 1,000 inhabitants, and should be the principal inland town of the State.

There is no commerce at Fuerte, from the fact that its advantageous natural position is no protection from the competition of Alamos on the north and Mazatlan on the south. The valley in which the town is located is one that might be one of the most fertile in the State and can be easily irrigated from the river, and will raise corn, wheat, sugar-cane, cotton, and the various cereals, but the inhabitants prefer to use this magnificent valley for grazing purposes, and raise chiefly stock. The mules raised here have the reputation of being the best in the State. The road from Fuerte is of the same character to Mazatlan, passing through Mocorita and Sinaloa.

The principal family at Fuerte are the descendants of A. Ybarra.

Ward, in his celebrated work on "Mexico," says of Fuerte:

"The situation is not particularly favorable, as, notwithstanding the vicinity of the river, the country about the town is unproductive, and the heat in summer intolerable.

"The Tierra Caliente of Sinaloa extends from El Fuerte, or rather from Alamos, to the confines of Guadalajara (Jalisco). It is one vast, sandy plain, destitute of vegetation, except in the rainy season, or in spots where the vicinity of the mountains or the confluence of two large streams insure a constant supply of water.

"This is the case at Culiacan, the most ancient and populous town in Sinaloa, situated upon a river of the same name, 80 leagues south of El Fuerte. It contains 11,000 inhabitants, and the country about it is well watered and highly productive."

Of Cosala, he says: "Cosala, 35 leagues south of Culiacan, is the next town of any note on the road to Jalisco. It derives its importance entirely from its mines, one of which, called Nuestra Señora de Guadalupe, is very celebrated. Guadalupe is free from water, and situated at a considerable elevation above the plain. It contains a vein of gold of consid-

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erable breadth, and its produce might be increased to ten times its present amount, etc."

From Cosala to the capital or City of Mexico, or the Central States of the Republic, there are two routes, the one by Rosario, the Cañas and Guadalajara, which is impassable during the rainy season, and the other due east from Cosala across the Sierra Madre to Durango. The distance from Alamos to Fuerte is 35 miles. This place was originally a military station, but the military are now removed to Mazatlan.

The town of Sinaloa is located on the river of the same name, and has about 1,500 to 2,000 inhabitants. The principal business of this place is in the production of Indian corn, pork, and lard, which is exported. The principal business men are Francisco T. Penna and N. Nuñez, who are in both the wholesale and retail trade, and H. Carubbio. The town of Sinaloa is located on a small river, and in the winter or dry season it dwindles to a very small stream. The seasons are reversed in the State. They have their dry season while we have our wet, and the reverse. The district around is fertile, and produces the usual agricultural productions, though the principal trade is as we have stated.

The town has but one street. The ladies of this town are celebrated for their beauty in the whole State, as those of Hermosillo are famous in Sonora.

Roads of the State.

A stage runs from Guaymas to Alamos over the old road, which runs east back of the bay, or north of the inlet formed by the mouth of the Yaqui River, crossing the small stream of San José, and the river Matape which flows into the gulf; thence to Torin on the banks of the Yaqui River, a distance of about 80 miles. The river is here crossed by a ferry in wet seasons, and forded in dry seasons, to Bocam, and thence north, following the course of the Yaqui, to Cocori, about 20 miles; thence to El Baihoca and south to Coraque, due east of Bocam, and distant in a straight line only about 15 miles. This short cut can be taken and save about 35 miles of useless travel. From Coraque the road runs south-east to Camoa on the opposite side of the Mayo River, which is here crossed at a distance of about 35 miles from Coraque; thence to Alamos, about 12 miles. From Alamos to El Fuerte the distance is about 35 miles, where the Fuerte River is crossed; thence almost due south to Sinaloa,

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about 60 miles; thence across the Sinaloa River and on to the Mocorito River and the small town of Mocorito; thence south-east through Palmas to La Morita; and thence taking a more southerly course to Culiacan across the Culiacan River, distant from Sinaloa about 85 or 90 miles. Here two routes are presented to Mazatlan, one by way of Cosala, which takes a south-east course through the small towns and ranchos of Las Arayanes, Las Flechas, El Vichi, Las Milpas, Santa Anita, and Casa Blanca on the small stream of San Lorenzo; thence crossing the stream east to Las Vegas, Carriscal, Higuiera, and Cosala, a distance of about 60 miles; thence south, passing Calafanta, Conitaca, Salado, crossing a small branch of the Elota River; thence to Laguna and Elota, about 40 miles from Cosala. The other route from Culiacan runs south to Aguarita and El Carriscal, El Salado, and San Lorenzo on the river of that name. The river is here crossed and a south-east course taken to Avaya, Vinapa, Higuerita, and thence east to Elota on the Elota River. The former route is the most traveled, though longer, as it passes through the rich mining region of Cosala. The latter route is over a stretch of about 80 miles, while the former is about 100 miles. From Elota the road is direct to Mazatlan, distant about 55 miles south-east, crossing the Elota River, and Piastla River at Piastla; thence to Coyotitan, Quebrachi, Quelite, Comacho, Aval, Los Otates, and Mazatlan. From Mazatlan a road runs south-east to the Presidio of Mazatlan, and east to El Rosario on the Rosario River; thence south-east into the state of Jalisco to Guadalajara and on to the capital of Mexico.

The road from Fuerte to Mazatlan and Rosario is a good one, to which we have referred already, and is used for wagons and a stage line constantly during the dry season, but it is impassable during the wet season on account of the lack of the bridges over rivers that are swollen to a dangerous depth and swiftness, and the roads being of clay and sand become boggy. Another road, or rather mule trail, leads from Mazatlan through San Sebastian east and then north, passing many ranchos on the Mazatlan River, to Morito and east, where the river Mazatlan is crossed twice on account of a bend in the river, and on up the Mazatlan Valley into Durango; passing Favor in Sinaloa and Saulito in Durango, and other towns up the cañon to the mines of San Antonio de las Ventañas, and the celebrated mines of Guarisamay, and from thence on to Durango, about 150 miles distant from Mazatlan.

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CHAPTER II.

Mazatlan.

The coast adjacent to Mazatlan, with its mountain peaks in the background, presents a grand and imposing scenery; and during the rainy season, when the valleys, hills and mountains are covered with verdure, it is one of the most beautiful spots on the coast. The small sugar-loaf mountains rise frequently, near and in the distance, presenting a variety of scenery to the eye that is very pleasing, and to lovers of scenery, it is delightful.

The port of Mazatlan is not capacious, nor surrounded by those safe landmarks characteristic of many of the ports on the Pacific Coast. For fear of the southerly or south-west winds, no vessels can be anchored long in the harbor, as the land is low adjacent, and on the south-west mostly open to the ocean. For this reason, vessels only stop long enough to unload, and proceed on their way. The inner harbor is far from admitting heavy merchant-vessels like the clipper ships arriving in the port of San Francisco. The approach is safe, however, for ocean steamers to approach and retreat when touching at this port. Larger ships anchor under the lee of the island of Creston, which is rather small, but much elevated. In this harbor there are two other islands, called Venado and Pajoros. The dangers to vessels during the stormy season detract much from the commercial position and advantages of Mazatlan; and, for that reason, Guaymas, in Sonora, will be the principal port for the vessels passing up the Gulf of California.

The city of Mazatlan is nearly surrounded by water, a mere tongue connecting it to the mainland. Near the water's edge, and back half a mile, the surface of the site is even, and also to the limits of the city, from the fort on the west, for more than a mile eastward; yet, farther back, it is uneven and ungraded. The fort commanding the inner harbor to the city is located on the side of an elevated plateau, near 1,500 feet above the sea. On its summit, one may enjoy the beautiful scenery spread out before him—a panorama of mountains, low undulating hills, and valleys. In this fort are planted some antiquated cannon, commanding the city and harbor. The streets are not laid out regularly. One main street runs from the water front out into the country beyond, on which are located both retail and wholesale business houses. Some are also situated on the streets of

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the water front. The whole number of shops and stores reach as many as 500. The buildings are mostly constructed of soft brick, one foot square, and, in some instances, there are stone buildings. Adobe houses are mostly occupied by the poorer classes in the suburbs. Most of the buildings are one-story; yet, in some few instances, the houses built by foreigners are two stories high. The houses are constructed roughly, and plastered inside and out, and afterwards penciled. The roofs and floors are made of brick. For the floor, the ground is raised, and surface leveled, and bricks laid in cement, which makes the floors both durable and cool in the summer. When the floors are carpeted, wool or common cotton is laid down first, then the carpet. Among the poorer classes, no carpet is used, but a native mat. Heavy joists and close together are laid across the walls of the building for the roof, and on these a tight floor of boards is laid, and on this the bricks are laid, one foot in thickness, cemented completely water-tight. The walls are commonly three feet thick, making each house a complete fortress, and, withal, very cool in the summer season.

The style of architecture is a mixture of the Moorish and Gothic. The doors are clumsy and large, generally fastened inside by wooden bars. The windows have mostly iron gratings of three quarters of an inch in diameter, and sometimes shutters, making the city look like a city of prisons. The inside walls are frequently papered, and the houses well and even elegantly furnished.

Most of the goods sold here are imported directly from Europe, and German houses seem rather to take the lead in commercial pursuits throughout the country. There are about 100 foreigners in the city, mostly engaged in commercial pursuits, and they are said to own most of the real estate in the city.

Gold, silver, and copper, and dye-woods are shipped from this point in large quantities. Many ship-loads are packed in from the interior on the backs of mules. "Burros," or she-asses, are used, to some extent, to pack mortar, bricks, lumber, etc.; but freight wagons and carts are also used, drawn by mules.

The streets are mostly paved with round cobble-stones, and in a concave form, so that the water drains off in the center. These stones are laid in cement, and become quite firm, so that they are not easily misplaced, except during the rainy season. The sidewalks are narrow, some made of hewn timbers, and laid so that two persons can walk side by

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side. Others are constructed of soft burnt bricks and flagstone. On any of them, but two persons can walk side by side.

The government buildings, such as the custom houses, forts, and arsenals, are well constructed, airy, and remarkably adapted to the torrid zone. These, as well as private buildings, have a species of rain spouts, which, in the rainy season, scarcely extend the dripping waters from the sidewalks. There is one church in Mazatlan. The composite architecture of beautiful constructions of arches and pillars give some of the buildings quite an imposing appearance. There are two principal hotels, kept by Frenchmen, who charge about $2.00 per day. Inside the court-yards, flowering shrubs, rare bushes, the hyacinth, and the trailing vine are frequently seen. The delicate and refined taste of the ladies of Mazatlan is well known in the republic, and their beauty rivals the maids of Hermosillo. A public plaza is tastefully laid out, with seats on the sides of the square, made of brick, having brick sides, and painted red, with brick walks through the center, coinciding with either point of the compass, and with a circular brick walk inside the seats around the whole circuit of the plaza; and to enhance the beauty of this, every 15 feet orange trees are set on the inside edge of this circular walk, which truly adds beauty to the whole scene. A beautiful fountain of crystal water plays day and night.

The marketing is done principally on Sunday morning on the market square, where purchases are made from the country people for the week. Indian corn, beans, Irish potatoes, sweet potatoes, eggs, red peppers, bananas, plantains, oranges, limes, several species of custard apples, squashes, pumpkins, watermelons, muskmelons, chickens, turkeys, and a variety of gallinaceous birds, such as the "hoco" or "curassow" and pheasants; also, crockery ware, chairs, and other articles are not unfrequently exhibited for sale. After the sales are ended, to the inhabitants of the city, the balance are bought by local hucksters at a reduced price. A theater is in the city, where the beauty and *élite* gather to listen to Spanish plays of love and tragedy.

Mazatlan is now a commanding commercial city of rapidly growing importance to Lower California, southern Sonora, Chihuahua, Durango, and northern Jalisco, and the state of Sinaloa.

Vast regions of agricultural, grazing and mineral lands are adjacent, untouched, that await development by foreign

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capital and industry. Most of the trade of all this region passes through Mazatlan.

This city has but few equals for its surrounding advantages, and invites to her municipal confines an intelligent class of immigrants, who will develop her latent energies and resources.

Sailing-vessels go leisurely up the gulf, carrying the productions of the south, though the greater part of the carrying is now done by steamers. The principal freight is sugar, coffee, rice and tobacco, with foreign and domestic merchandise. These are exchanged for flour, fruits, gold and silver, copper, pearls, salt, hides, and tallow. Some considerable sugar, cotton, rice, corn, beans, etc., and tropical fruits are produced in the rear of Mazatlan, in the Mazatlan Valley, which is 45 miles wide in its widest part, nearly one hundred miles in length, and well watered by the Mazatlan River.

Land can be cultivated three miles on each side of the river, on the river bottom lands. There are about 17,000 inhabitants in the town. The river, which empties into the sea, is 100 yards wide in rainy seasons, and is navigable for large barges, for five months, some distance up the river. The stage crosses in barges. The country east of Mazatlan is mostly level to the base of the mountains, diversified by rolling ground. There is one large cotton factory in the city, which manufactures the cotton raised in the vicinity, into goods that are purchased by the inhabitants of the region surrounding. This is a great cotton country, and timber is plentiful.

Coal has been found seventy-five miles from the city with a vein cropping out three feet in width, something like anthracite. An interior valley, of 30 to 40 miles in width, at the widest point, lies beyond the Sierra Madre, east of the city, 40 miles from the river Mazatlan. Rich mines have been found near Cosala. Grazing is carried on extensively. The city commands the trade and supplies the wants of the country people and the inland towns within two-thirds of a circle from 200 to 1,000 miles in the interior.

Rich merchants come in from the country with pack-trains, who have extensive haciendas, gold or silver mines, or who are exclusively engaged in commercial pursuits. The roads, or rather trails, through the mountain districts are not very good; and the rivers, in the rainy season, being mostly without bridges, present serious obstacles during that season for travel in the interior. The rainy season commonly in-

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cludes the months of June, July, August, September, and a part of October; and during most of this time it rains a little nearly every day. Most of the flour used in Mazatlan, Tepic, and Colima, and the ports of San Blas and Manzanillo, is exported from Guaymas, in Sonora. The flour is nearly as white, possessing the same qualities, as California flour. From Mazatlan to the mouth of the Rio Grande, in Texas, near that point it is nearly six hundred miles; and a railroad from this city to the mouth of that river is practicable, and can be made by passing over a distance of 1,000 miles. To Loredo, in Tamaulipas, on the Rio Grande, it is not much more; the latter point being the point of connection with an eastern road running from the City of Mexico, almost due north. A better route, however, might pass Guadalajara, and connect with that road south of Loredo. The City of Mazatlan will be unquestionably a powerful rival of San Francisco. On the low land there is not much cultivation on a level with the sea.

The hacienda or rancho Tamaulipas of Piastla, on the road to Culiacan, contains about 30,000 acres, and is situated on the Piastla River, about seven miles from the coast, the whole of which can be cultivated, and is easily irrigated from the river. The stream, during the wet season, is navigable as far as the rancho. This rancho is owned by the Laveagas, but is not for sale. There are small ranchos, however, in the vicinity for sale. There are also very fertile lands near the Rio de Rosario, twenty miles south-east from Mazatlan. On this river, and throughout the country, land is cheap. Haciendas of one, two, and three leagues in extent, can be purchased for one, two, three and four thousand dollars.

Corn sells from 50 cents to $1 per bushel; beans, $9 per carga; oranges and limes $10 per thousand; sweet potatoes, 6 to 10 cents per lb.; beef, pork, and mutton, from 6 to 10 cents per lb. Poultry and eggs are high. Butter is sent here from Guaymas, but it is of a whitish color, and almost tasteless. The cheese is no better. Lower California furnishes large quantities of this cheese for the market of Mazatlan. An industrious American might settle in the vicinity of Mazatlan, and following most any pursuit, such as gardening, keeping a dairy, or even agriculture, he could accumulate a snug fortune, and in a short time retire from business, living in comparative ease and affluence.

The principal business houses are: Rogers & Marshall, Juan Cristobal Farber, Edward Coffey, Budwig & Rasch, Isaac V. Coppall, Charpentier, Reynard & Co., Peña & Co.,

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Bartning Hermanos y Cia, Cannobio Hermanos, Diaz de Leon Hermanos, J. Kelly y Cia, Echeguren y Hijos y Sobrinos, James Hermanos, Federico Koerdell y Cia, J. De la Quintana, Jesus Escobar, Joaquin Redo, Haas y Aguiar, Tepia y Ceballos, Gonzales Hermanos, Vicente Ferreira y Cia, Charpentier, Reynaud y Cia, Dubagan y Cia, Melchers Successores, Felton Hermanos, and Juan Somelleria y Cia.

The implements used in husbandry are of the most primitive character in some portions of the state. The plow consists of two poles, one six feet long, and the other fifteen feet, fastened together by the means of a mortice and tenon, at an angle of sixty-five degrees. Through, and near the end of the short pole, there is a pin to steady the plow; and on its end there is attached a pointed iron or steel shoe to prevent it from readily wearing out. The yoke has no bows, but is fastened on the heads of the cattle by means of raw-hide thongs, and so is the tongue of the plow to the yoke. With this rude instrument the ground is merely scratched over about three inches in depth, and yet the soil yields marvelously. The scythe, the cradle or the sickle, even, are unknown in some places, with the hoe, or any other common implement of husbandry. Reapers and threshing machines are not even dreamed of in some isolated instances; but they have been introduced in many of the states of the republic. Here is a rare chance for our agricultural implement manufacturers almost at their doors.

About one-twelfth of the population of Mazatlan is white, and can trace their origin back to their Spanish ancestors. Many blondes are seen who are direct descendants of the old Castilians. In this city there are several wealthy merchants, of different nations, who import goods largely from Europe, many of which we have mentioned already. There are also Mexican capitalists who have extensive ranchos and haciendas in the country, even one hundred miles back in the interior, and pass a part of their time in town. English and German goods seem to be most used, and generally in demand; also French brandies and wines; but few articles manufactured in the United States are shipped into any of the Mexican ports on the Pacific, although an extensive trade with New York, Philadelphia, and Boston is springing up by vessels and is landed at the ports on the eastern coast or Gulf of Mexico. On the completion of the Texas and Pacific

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and other railroads connecting with the east, a large trade will be established with the large eastern cities of the United States.

The principal business houses are engaged in both a wholesale and retail trade, dividing their stores into two departments. The principal buildings are the custom-house, a new church, municipalidad or city hall, containing court-rooms, etc.; Cuartel de Artilleria or barracks for the military, a cotton factory, gas works, and the hotels "Iturbide" and "Nacional."

Some trade has been carried on with San Francisco; in fact, much more than is suspected by many of our merchants. Two iron foundries are located here that have considerable trade.

Rosario.

The town has 6,000 inhabitants and takes its name from the Rosario mines in the vicinity. These mines are some of the oldest in the republic, and have produced an immense treasure for the owners. The shafts are now full of water. The Tajo mine by its richness is a great source of wealth to the town. This town is a place of considerable importance, and at one time was the depot of merchandise of Mazatlan. The merchants resorted to it to purchase their stock of goods and dispose of produce. It was the residence of the Commissary General of the state, and others high in official authority. The streets are narrow but well paved, and the houses built principally of stone. The town is located in a ravine, and much confined. The Rosario River, a small stream, runs below the town and empties into the Pacific a few miles further below. This stream is navigable for canoes from Rosario, by which people frequently go to Mazatlan, the distance by water being shorter. This town has considerable trade with Durango and some from Guadalajara. The distance to Mazatlan is 20 leagues or 60 miles, the Presidio of Mazatlan being a kind of half-way house or posta. The place is simply a large square surrounded by merchants' houses. The distance to Mazatlan Presidio is about 30 miles. In the northern part of the state the road from Alamos in Sonora runs over a level plain when it leaves the rolling hills, and requires no repairing, as the soil is made of sandy clay, almost without a pebble, and is perfectly even and smooth. The surface is level and excellent for coaches. The distance from Alamos to Fuerte is about 35 miles.

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Culiacan.

The capital of the state of Sinaloa, Culiacan, is situated on a river of the same name, in the midst of a beautiful and rich agricultural country. The population of the city is about 10,000; its streets, with a great plaza, are laid out regularly, and it possesses much inland trade. The architecture and buildings are much the same as at Mazatlan.

The state government is located here, and during the session of the legislature, it presents a more lively appearance. The distance from Mazatlan is about 155 miles, and the intervening distance between, over the route by Cosala, is rough and mountainous, with but few ranchos on the line of travel. Cotton, sugar-cane, corn, beans, and rice, and vegetables of various kinds, and fruits common to this climate and a low latitude, are grown in great abundance in the vicinity. There are also some mines in the neighborhood. Coffee is also raised in the state, and brings from 30 to 40 cents per pound. The importation of coffee has at times been forbidden, in order to develop this industry in the state.

There is a cotton factory in Culiacan, owned by Redo, who resides in the same town, and is one of the principal capitalists. A stage road runs from Alamos, in Sonora, to Mazatlan—a five days' trip—also to Culiacan, as before stated.

There is also a mint in Culiacan. The principal business houses are, Redo, Valadez, O. Salmon, Robert R. Symon & Co., and Angel Urrea. Considerable business is transacted here. The road, after leaving Alamos, which is mountainous, or a rolling region, becomes almost level as it goes south to Fuerte, and passes down the interior about 60 miles from the coast, through the same level country, to Mazatlan. It also passes down a valley in the interior, beyond the mountains east of the former road, to Culiacan, over a very level road.

The Presidio of Mazatlan is located on the road to Rosario, and was formerly the principal place of residence for the merchants and custom house officers, who removed to Mazatlan, and left it almost deserted, with the exception of a large cotton factory which is there, owned by Echeguren & Co., of Mazatlan; and besides the operatives, the town has but few inhabitants.

The ladies of Culiacan are truly celebrated for their fair complexion, graceful forms, and modest demeanor. They

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are very fond of music and dancing, and play very skillfully on the harp, and are, withal, as intelligent and captivating as any of the famous beauties of the republic. On the road to Culiacan from Fuerte are situated Sinaloa, and Mocorito, and La Muerito.

Cosala.

The town of Cosala is situated about 60 miles from Culiacan, to the south-east, and nearly 100 miles from Mazatlan. The town extends over nearly as much ground as the latter; but it is more interspersed with flower-gardens and small orchards. The town is well built; but the streets are somewhat irregular. The number of inhabitants reaches 5,000. Cosala is a mining district. Within about 20 miles of the town, is located the Guadalupe mine, which is perfectly dry, and at a good elevation from the plain.

The mines of Copala, Panucho, San Dimas, and San Ignacio are the principal ones located in the vicinity. The Saragossa mine is situated north-east from Mazatlan and north of Cosala. This mine is celebrated for its beautiful specimens of virgin silver.

In this town, a peculiar disease that is attributed to the water used exists, and is called "buche," and is known with us as goitre, or swelled neck. One traveler describes its unfortunate inhabitants as looking like pelicans.

From Cosala to foot of mountains, the distance is 15 miles due east. Santa Ana, a small rancho, and some others, are located on the road. There are some six mines near, bearing silver and magistral, and about one and a half miles from the town, the celebrated Golconda gold mine.

The principal business of the state is mining, grazing, and the raising of herds of cattle, horses, mules, sheep, etc., although the agricultural productions are considerable. The mines of the state produce a large revenue. The Xocihuistita mine, situated near Rosario, was bonded for three months at $60,000, and the parties who had bonded it refused to renew the bond. In a short time afterward the owners sold a one-half interest for $500,000 to American capitalists of San Francisco, who are now taking out from $50,000 to $60,000 per month. Some ladies at Mazatlan were the ow ers. Estacata is another old mine near Cosala that was once extremely rich. Tradition says that its owners were so rich and realized such fortunes from its possession that they used to lay down silver bricks for their ladies to tread

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upon on their way to church, and then take them up again by their servants—a piece of extravagant gallantry somewhat unheard of, even among the descendants of the Moctezumas. Some of the mines of Mexico are worked in what we would term an extravagant manner. The shafts in some instances are walled with timbers that are placed there for their imperishable qualities, and often the wood selected is of the most valuable character, and being the nearest at hand is used with a prodigal hand. One old mine, we are told by a gentleman who explored it, to which he gave the name of the old San José mine, was literally lined with ebony. He showed us a piece of this wood which he extracted from the mine, and had made into a rough cane. The timbers were as sound almost as when they were placed in the mine, and were laid one upon the other along the walls of the shaft, and some 15 to 20 feet in length. The origin of the mine was unknown, and the mouth of the shaft had fallen in, covering it up entirely until another drift from a mine near it in search of a vein of ore was run until they came to the ebony walls of the shaft of the old mine. It was cleaned out—rubbish, etc., removed—and found to be very rich. The ebony alone would be worth a small fortune in this country. The hacienda of La Labor, owned by the Laveagas, is situated about four miles from San Ignacio and contains 40,000 acres, about one-third of which can be cultivated. Sugar-cane, wheat, corn, and other productions have been raised upon its arable lands. It is located on the San Ignacio River, and the soil is very fertile.

Mining Districts and Mines of Sinaloa.

Rosario District.—The most important mine of this district is the celebrated Tajo mine, which is the second best producing mine in the state, and is located in a rolling country on the bank of the Rosario River. The depth reached two years ago was 1,200 feet, when Mr. Geo. S. Montgomery, of this city, visited it, and we herewith give his representation of the mines of this district, and some others.

This mine produces fair milling ore, with 60 per cent. gold; the balance, silver. The vein is six feet wide, until a bonanza is reached, that widens out the vein to about 100 feet. They were then taking out ore in a bonanza that assayed, on an average, $120 per ton, and ran sometimes in first-class ore up to $1,000. This mine is owned by Mr.

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Bradbury, of Oakland, and Mr. Kelly and other merchants of Mazatlan. This is one of the best equipped mines in the state. One stamp-mill of 30 stamps was working the ore, and since, a 20-stamp mill has been added. The 30-stamp mill was then working 40 tons per day, which, with the 20-stamp mill now, is working about 60 to 70 tons per day. This mine is supporting about 6,000 population. There are other mines in this district of minor importance. The distance to Mazatlan is about 80 miles, in a north-westerly direction.

Plomosas District.—The principal mine is the Plomosa, located in this district near the border of Durango, and is owned by a Mazatlan Company, with the controlling interest in the hands of merchants of that city. The mine is valued at $1,200,000, and is divided into 24 shares, the usual number in Mexican mines. Mr. La Madrid was the former owner. The depth of the mine is over 800 feet; width of vein, 20 to 25 feet, well defined and apparently permanent. This mine has paid from the start, although the ore is somewhat rebellious, which could not be worked as easily as within the last year. The ores carried galena and zinc. The average assay was about $80 to $90 per ton, and is worked by a 20-stamp mill at the mine. This district is about 120 miles south-east from Mazatlan.

The Abundancia mine, in Plomosas, is situated in the gap which descends from the rancheria of Plomositas in a precipituous decline towards the northeast. The mountain on which the works are established, as well as the neighboring one of the Potrero Las Escaleras and El Arco, are of stratified rock, affected by metamorphism, and repose on the dyoritic formation in this locality. The aspect of all this zone, from the decline of the ground, from the elevated central table, is of a very favorable geological character for ores.

The Abundancia metaliferous lode detaches itself in part from the mountain that incloses it in a compact and elevated cliff, which has been prospected in great part by the ancients. The broad-vein prospect shows a horizontal breadth of at least ten metres. It is to be noted that where the matrix is found to be more quartzified are seen the best or more abundant ores, and as soon as the limestone aspect appears in small veins it seems that galena follows it, but without the concise relation taking place. I cannot consider the Abundancia lode as being a vein, properly so called, nor as an altogether irregular lode, for there appears a transition between both in its character.

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The situation of the cliff above the adit is recognizable by the old shafts which communicate with the interior. It can be perceived from the pillars and some of the intervals that the ancients worked through means of a regular alloy, and the extent of these workings indicate the considerable quantities of ores that they extracted. Up to December 21st, 1881, the mine had yielded 27,354 cargas of different ores, containing, as per mining assay, 332,474 ounces of silver, averaging about 12.15-100 ounces per extracted carga. Of these, 554, averaging 65 ounces alloy, which has been exported, corresponding to two per cent. of the total in weight, and 10.08-100 in value.—*Extract from Report of Pedro L. Mouray on the Plomosas La Abundancia Mines.*

The Jocuistita Mine.

(*From a Report by Wm. Ashburner, M. E., May 24, 1880.*)

"The mining property known as the 'Negociacion Mineria de Jocuistita' is situated in the San Ignacio mining district, State of Sinaloa, Mexico, about 100 miles northerly from the port of Mazatlan. The property includes a group of nine silver-bearing lodes, lying within a short distance of one another, and on all of which work has been done sufficient to prove their mineral character. Of these, the principal one, so far as demonstrated, is known as "El Carmen." A narrow ravine extends northerly from the town of Jocuistita, down which runs a perennial spring of water, sufficient for about ten stamps in the dryest time, while during the rainy season the supply is indefinitely increased. The mill, or hacienda, is situated at the mouth of this ravine, while higher up, on the west side and less than half a mile distant, is the Carmen vein. This is the only vein now worked upon the property, and in it has recently been developed a body of ore which exceeds in richness and extent anything previously discovered. This vein has an east and west direction, running towards a steep outlying flank of the main mountain range, which rises abruptly to a height of several hundred feet, forming a sharp crest or divide. There apears little doubt that the lode will be also found extending to the east, upon the opposite side of the ravine, as from what was told me, a small shaft about 4½ feet deep was sunk 400 feet from the mouth of the Carmen mine, from which about one ton of ore was extracted, and worked with a milling result of 266 ounces of silver per ton. Subsequently, this shaft was filled, and a tunnel was commenced for the purpose of cross-

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cutting in depth several of the less known veins, so I was unable to verify the statement by sampling the shaft. The country rock is greenstone porphyry, lying in close proximity to a reddish trachyte. The vein dips toward the north at an angle of 83 degrees, and in places, particularly where the ore bodies are found, there is a well-defined clay wall; its width varies from a few feet to 17 and 18 feet. The ore is somewhat complex, containing frequently, besides sulphuret of silver and native silver, zinc, copper, iron and lead, in form of sulphurets, associated with a quartz gangue. Notwithstanding the presence of these base metals, the results obtained by amalgamation appear to be very satisfactory. As the ore comes from the mine it is first assorted by hand, richer portion being selected for shipment to Europe, while what is called the ordinary ore is sent to the mill. At the time of my visit, this shipping ore was estimated as being worth, by assay, about 750 ounces per ton, while the mill, running only fair samples, was producing nearly or quite $1800 per day. The proportion which the shipping ore bears to the milling ore bears to the milling ore is very variable, and depends upon the extent to which the former is segregated from the latter in the vein itself. The mine is worked by a vertical shaft, eight by ten feet, and which is now 133 feet deep. The ore is hoisted to the surface by means of a whim. From this shaft drifts 10 metres or 33 feet apart have been extended westerly on the course of the vein; leaving behind, however, in the form of pillars, most of the ore, which is of much lower grade than that recently developed in the west end of the mine, and under the mountain which rises above it."

A one-half interest in this mine was purchased for $500,000 by San Francisco capitalists. The ore of this mine has assayed about 50-per cent. silver. The vein, at a depth of about 250 feet, is 40 feet wide, and contains a small percentage of gold and galena. The mine has been worked for some years by Mexicans. The superintendent of the Guadalupe de Los Reyes negotiated the sale of this mine, being the principal owner. They have worked the mine by a 10-stamp mill, but are now erecting a 20-stamp mill, and are by the old stamp mill producing from $50,000 to $60,000 per month. The ore is rebellious, and is consequently more expensive to work than the ores of many other mines in the State, but the large percentage of silver makes it a very profitable mine. The distance from this mine to Mazatlan is about 80 miles.

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"The mineral districts of San Ignacio and Cosala, in the State of Sinaloa, have in times past given millions of dollars yearly in silver and gold. The mines of Cosala, more particularly, have and still are, yielding large quantities of the precious metal. The ores are very rich and the veins very wide. These as a general rule will yield $500 per ton. The Guadalupe de los Reyes is surprisingly rich in gold and silver. For years this mine has been the source of many quarrels and numberless bloody fights between two families who claimed its ownership. The mine has been held in possession by the Vega family, whose wealth and political power enabled them to control not only this very rich mine, but the whole State of Sinaloa. The liberal party at length caused the political downfall of this family; they did not yield possession of this mine, however, to its rightful owners. An English company once offered Vega for this mine one million dollars, which he refused, saying that he did not want any money at that time, and if he did he had only to work his mine, and that would yield him any number of millions —which was true."—*Chipman's Mineral Resources of Northern Mexico.*

"The district of Panuco is situated in the southern portion of Sinaloa. In this locality there are several mines; these, before the independence of Mexico, belonged to the Marquis of Panuco. The Marquis obtained from them many millions of dollars in silver. The ores of the richest class are argentiferous, and yield from $500 to $600 per ton. The ores that are treated by amalgamation (which forms the greater portion of the ores found) by the Mexican mode of treating them yield $200 per ton. After the death of the Marquis, the mines fell into the hands of a merchant of Mazatlan, by the name of Machado. He worked the mines very successfully for many years, until his death some 15 years ago, since which time his family have alternately worked them, squandered the products and ran them in debt, and finally abandoned them.

"A few miles northwest from Panuco, in the State of Sinaloa, and distant from the Pacific Coast some 30 miles, lies the famous mine of Tajo, situate in a town called Rosario. This mine owes its discovery to a herdsman of cattle. One day while chasing some wild cattle through the woods, a twig of a tree caught the rosary he had suspended to his neck and jerked it from him. Not wishing to lose it nor the animal he was in pursuit of, he threw off his hat to des-

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ignate the spot. Upon his return night overtook him before he could find his animal; thereupon he concluded to spend the night. He built a fire and waited until morning to look for his rosary by daylight. In lighting his cigarette by the coals of his fire he noticed something which glistened in the ashes. Upon examination of this substance by his employer or master it proved to be pure silver. Excavations were made and a splendidly-formed vein was found, rich in silver and gold. The mine was worked and regularly opened, and for sixty years yielded immense treasures to the owners. Upon the expulsion of the Spaniards from the conntry, the mine was left unworked for many years. The church of Santo Domingo stands immediately over some of the prinprincipal workings of the mine, and is now 110 years old. The ores of this mine yield an average of $120 per ton. The mine is now worked by an American company, whose headquarters are in San Francisco.

A few miles east from Rosario, in the State of Sinaloa, is located a mine called Plomosa. This mine was opened and worked many years ago to a depth of 250 feet by the Mexicans, producing while it was worked large amounts of silver. The ores gave $250 per ton. A large influx of water suddenly put a stop to operations, since which time nothing has been done to place the mine in working condition. It is a well-attested fact that the mine was yielding largely at the time of its abandonment. Nearly two years ago the mine was denounced, and possession given to some Americans, who now own it.

Northwest from Plomosa but a few miles, and in the same State, we find the Mineral of Copala. There are a great number of silver-bearing veins found in this locality, upon which many mines of good reputation are now being worked. Several American companies have erected reduction works here, and but for the advent of the French intervention would have been successfully prosecuting their operations. The ores are abundant, and give about $175 per ton.

Distant from the coast of the Pacific 150 miles we find the District of Ventanas. At this place some six or seven American companies are working, some with success, and all with good prospects, according to their respective means and skillful or unskillful management. The lodes are very numerous, and all the mines that have been worked gave good results. The average yield of the ores may be safely calculated to be $100 per ton.

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The placer of the "Canoda de Banazagua" is situated about 16 leagues southeast of Alamos, in Sonora, on the north side of a tributary to the Fuerte River. The placer extends for about 12 miles in the canon, and has been worked to a considerable extent in the time of the Spaniards. The hillsides for all this distance have been perforated in many places, and shafts sunk and drifts run. Some of the works are recent, but the miners not being acquainted with the modes of getting out the water by pumps and flumes, have done all their work by washing in wooden bowls, and abandoning the shaft on encountering water. At the head of the canon drifting has been done to a considerable extent. The soil is composed of a red clay and decomposed quartz; the ore is worked by arastras. The mountain region of the Fuerte is so exceedingly rough and precipitous that no wagon road has ever been (or ever will be) made through it. All carriage is performed on mules, and a man is better off on foot than with an animal under him.

Mines of the Fuerte.

From Baneyagua east to Las Garobas is three leagues. This is a small place, but gold and silver mining is done here to some extent. Four leagues still further east is the Real del Rosario, another mining place, owned by Sr. Don Bruno Esquessa. The mine is situated on the side of a mountain, on the north side of the hacienda, and the diggings are surface diggings or excavations. The annual revenue of this mine, in net profits, is $70,000. There are some gold placers in the vicinity of Chinipas, about 30 leagues north, and the inhabitants are engaged in washing gold.

Palmarejo is a silver mine, distant about six leagues from Chinipas. It is worked by Don Miguel Urea of Alamos. This mine is worked on a more extensive scale than any in this section of the country. There are 20,000 ounces of silver taken out of it monthly. The ore is taken out by improvised forcing machinery. A four-stamp mill is run by water-power to reduce the ore. Abundance of water and timber is adjacent; the roughness of the country compels the owner to carry the ore on mules' backs for nine miles to the mill site.

Chois is situated in the valley of the stream of the same name, which empties into the Fuerte River. Its situation is very beautiful, being on a fine plain, with a very pretty view. This town is the natural outlet for all the mines of that coun-

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try in the northern part of Sinaloa, and is one of the richest mineral districts of Mexico. Its situation at the base of the mountains, its easy access by good roads from the farms and ranchos of the lower valley, and its facility for communication with the Gulf, must make it an important place for trade as well as industry. The whole surrounding country is rich in gold placers, and even the spot on which Chois stands furnishes gold by washing the soil. All the streams in the neighborhood show the color on washing the loose soil of the banks. The town is about four miles from the junction of the stream with the Fuerte River.

Las Iglesias is located four leagues up the Chois, where the stream makes a bend, inclosing a mesa, or table land, of some 25 acres, which is perforated with shafts from 15 to 20 feet in depth, where gold has been sought after. There is plenty of it, and the dirt all pays alike, but the gold is so fine that the natives cannot save it. Above Las Iglesias, one league on the south side of the river, the Arroyo Sabina, or Cypress creek, is encountered, which runs a course due north; following it for four leagues, a branch of the same stream, called Los Pillos, is reached, where the valley bed forms a natural reservoir of waters. This stream heads, in an easterly direction, toward a high mountain, ranging north and south, A rich placer is also located here, which has been slightly worked by Indians. Placers have been found also on the Bayemene creek and at Yucorati. At this latter place are old Spanish diggings, the ruins of their works showing that here has once been a large population of gold-seekers. The country adjacent is perforated with shafts and drifts. The quicksands in the bed of the creek have hitherto prevented miners from reaching the ledge where the gold may be found.

The Mount Serat mine is located in the vicinity of Realito, one league distant. This is a famous silver mine, and is owned and worked by Sr. Don Juan Migloria. Its elevation on a high mountain makes it a very prominent object. Mount Serat has been extensively worked, and all around it, in the mountains, shafts have been sunk and drifts run. It is still worked on a small scale. Some of the most prominent mines are Todos Santos, All Saints Mine, San Jose and Santa Catarina.

The gold placers of Baconbirito are located at the junction of the tributaries of the Sinaloa River. The soil is apparently full of gold, and extends over a horseshoe bend of the river for some miles. The gold is coarse, and pays $18 per

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ounce. Many shafts have been sunk here; water and timber are in abundance. These placers have been considerably worked, and are undoubtedly not exhausted.

"The Candelaria mine is located nine miles northeast of the town of Rosario, Sinaloa, and is on the same belt as the celebrated Tajo mine—distant therefrom only some three leagues. The mining location embraces 2400 feet in length, by 600 in width. The mine was opened in 1860, and the only explorations consist of a shaft sunk to the depth of 100 feet, and the mine being filled water, I was unable to examine it. Samples of ore from the pillars yielded from $58 17 per ton to $583 20, Assay. In the process of sinking 100 feet and the stopes from the same, $35,000 was abstracted from the ore. The width of the vein is said to be from five to six feet, The conditions for cheap and econominal work are very favorable—both wood and water, the former of the very best quality—being close at hand."—*Thomas Price's Report on said Mine, April 14th, 1881.*

The San Francisco mine belongs to the family of Maria, and is located in the northwestern part of Sinaloa, upon the northern spur of the Chihuahua range of the Sierra Madre, about midway on the mountain, at an elevation of about 600 feet above the plain of that region. The mine is an old one, developed by shafts, with a depth of about 185 feet in the deepest shaft. The veins are numerous, cropping out of the mountain side, and can be readily traced.

The Veta Madre as about three feet wide, carrying free gold and some silver. From $40 to $500 is produced from the ore upon assays made by a competent expert. The average assay is said to be about $70 or $80. We are also informed by an engineer who examined the property, to whom we are indebted for the foregoing, that the mine is now worked by Mexicans, with some six or seven arastras. Besides the foregoing, a very rich gold mine has been discovered near San Ignacio, in this State.

The Panuco District.—This district possesses some very rich mines. The Panuco mines, especially, have lately been favorably reported upon by a mining engineer sent from San Francisco, and the mines have been bonded, with a view to to purchase and development. Dr. Holland has this report in his possession, and we are informed by him that the gentlemen interested are perfectly satisfied, and are assured that they have made not only a safe but profitable investment. Not having the data at hand we are not able to give the ex-

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act figures of the assay and the report is omitted, but we present in lieu thereof the following:

From a report by Mark Cornish of Nov. 3, 1881.—The Panuco Mining District, situated in the State of Sinaloa, Mexico, sixty-five miles from the port of Mazatlan, is surrounded by good agricultural lands, supplying all kinds of produce at the lowest prices. The climate is healthy, the temperature ranges from 60 to 75 degrees Fahrenheit, and the location 2,000 feet above the sea level. Work must have been commenced in the different mines of the above mining district as far back as the beginning of last century, because about fifty years later an Indian by the name of Vizcarra discovered the mine called "Faizan," and out of its profits built the churches at Rosario, Concordia, Copala, Panuco and Guadalupe, using in their construction hewn stone and cement, at an expenditure of over five hundred thousand dollars. The silver bullion of this district was at one time the main support of the Royal Treasury at Rosario, where there was an office for the collection of revenue to be paid to the Spanish Crown, on all bullion extracted from the mines. The following are the names of the mines of the district: "Animas Viejas," Faizan, S'ta Eduviges, Estufa, Covalenga, Cuevillas, Bomba, Chinanate, Nieves, Refugio, Amaloton Burrion, Animas Nueves, Faizanito, Santa Rosa, Fronteras, Las Remedias, Cuevillas de Charcas, Palo Blanco, Tiempo, Toro, Piojo, Dolores, and San Cayetano, and may be a few more of which we don't remember the names at present. Along the Panuco mine there are still six mills in a ruined state. "The San Nicolas" mill, which must have cost a good deal over $200,000, has, during six or eight months of the year, a water power of 150 horses.

The Panuco property also comprises 13 square leagues of the land surrounding the mining district, with plenty of water, abundant pasturage, and covered with pine, oak, and other kinds of timber.

We know but very little of the workings of these mines in olden times. By tradition we know of a Mr. Zambrano, who worked some of the Panuco mines at the end of the last century. This gentleman became famous for having erected, in Durango, a palatial mansion, covering a block 600 feet long by 400 feet wide, which is used as a capitol of the State Government at the present time. But what made him world-renowned was his extravagance in constructing the railing of all the balconies of solid silver. But the King ordered him to have them taken down, as, in the order, he said, that even

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his Royal Majesty would not permit himself to display such magnificence.

Regarding the workings of the present century, we know that a Mr. Remus, whose heirs reside in the city of Guadalajara, worked, from 1820 to 1830, the "Santa Eduviges" and "Santa Rosa" claims, with very satisfactory results. Mr. Remus conveyed some of these mines to Mr. Ornezagay, of Durango, and this last one to Messrs. Flores & Gadea, of Tepie. In the year 1844 they were conveyed to Mr. Juan P. Machado, who also bought several other claims, intending to develop more extensively the mining industry of the district. He worked these mines until he died, in 1848. The other mines have been worked by various parties, with excellent results. The average assays from the "Faizan" mine pay $70 per ton, which is the same as in the "Animas," "Santa Rosa," "Santa Eduviges," "Faizanito," "Fronteras" and "Mina Grande" mines. Rock has been taken out from the Faizan mine which assayed as high as $2,000 per ton, but there is not enough of it. The "Estufa" mine turns out a large amount of ore, but the assays don't average over $40 per ton. The ores from almost all the Panuco mines are free milling, with the exception of those of the "Covalenga." The Panuco mines generally have but little water, and the greatest depth attained in any of them is not more than 600 feet.

From a report by Mr. Frederic Weidner, Mining Engineer, on July 15th, 1881.—The gold mine "La Union" or Boles mine was worked during the first decade of this century; and whilst there is no official record of what it yielded, the unanimous testimony of surviving contemporaneous residents attest the fact that the mine was very rich, and only abandoned in consequence of the war of independence. A few years ago it was re-located and worked for a while by parties without means enough, who conveyed it to its present owners, viz.: Messrs. Maxemin Hermanos, Roman and Adelaide Osund, and successors of C. Fairbanks, who entered into legal possession in November last (1881), recording it under the name of "Union Mine." The mine is situated in the district of Mazatlan, 55 miles N.E. of this port (Mazatlan), on the western slope of a mountain range forming one of the first steppes of the Sierra Madre, near the source of the Nacaral and Guaymas creeks, which flow through the ravine called the San Juan, and empty into the Mazatlan river. Its summit rears 200 feet above the entrance to the mine, at an elevation of 1,550 feet above the sea, thus insuring a temperate, agreeable and healthful climate. The mine is situated in the heart of a forest of valuable timber, such as venadillo, mora, fig tree,

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apomo, and other species, affording an inexhaustible supply for building and fuel. Within a radius of a few miles, on both banks of the Mazatlan river, there are ranchos, farms, and grazing fields, which furnish supplies at reasonable prices. For instance: corn at $5.00 per carga (300 lbs.); beans, $3.00; cattle, $10.00 per head. Good labor for the mine and carriers for precious metals are readily secured at the neighboring town of La Noria.

The mountain containing the ledges of the Boles mine is granite, the same as the surrounding region. This kind of rock has the property here of decomposing or crumbling easily; on the surface forming a peculiar gravel, called by the native Indians "tucurubay," which is easily reduced by the point of the bar or "talacha;" but at a depth of 3 or 4 metres this same rock is so hard and solid that excavations of six or more metres in extent may be cut out, unsupported by timber and without fear of caving in. A considerable number of veins are traceable on the out-croppings. The only ones which have been worked heretofore are two, both quite irregular and varying in width and depth. The width ranges from 1 to 5 feet. The body of the ledge is composed almost exclusively of white, compact quartz, with a bluish tinge, containing more or less gold; it being a noticeable fact that the gold occurs here disseminated in invisibly small particles, foliated, or in round or angular masses, varying from fine powder to grains like rice. In some eyes and threads of the vein the quartz is accompanied by pyrites of iron (commonly called "bronce amarillo"), and talc of a dark cloudy green hue, resembling sometimes slate of chlorite, again serpentine, and in these cases these ores are always auriferous, and contain from twice to four times as much metal as the pure quartz. In addition to this auriferous ore, properly so called, there are found in the lower levels pockets of auri-argentiferous ore, containing antimonial sulphuret of lead, with a great deal of gold and some silver.

The owners of the mine are now building a new and improved mill, costing $5,000, in the same ravine which comes down from the mine at only 600 or 800 paces from the shaft. The machinery comprises a steam engine (8 x 16), 18-horse power, driving 5-stamp mill of 650 lbs., an apron, concentrator, Frue patent, and other auxiliary appliances. The yield by the arrastra from 1,204 cargas of the ore was $12,217.60, or over $10.00 per carga.

La Joya Mining District.—The group of mines comprised within the boundaries of the "La Joya" property are known as the "Refugio" or "S'ta Eduviges," the "San Juan," the

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"Gloria," the "Rosario," the "Hilos," the "Relis," the "Virginia," and the "San Eugenio" mines. They are situated in the mining district of La Joya, prefecture of Sinaloa, State of Sinaloa, and distant about 120 miles from Culiacan, capital of the State, or 60 miles from the city of Sinaloa, and 90 miles from Plaza Colorado, a safe port in the Gulf of California, through which all high grade ores from the mines are exported, and where mining machinery and materials destined for La Joya are regularly landed. The climate is exceedingly healthy, the temperature ranging from 60° to 75° Fahrenheit. Grain and produce abound in the neighborhood, at very moderate prices, the property being located within 4 leagues (10 miles) of the best agricultural lands in the country.

The width of the veins (of the above property) vary somewhat in the different mines. Thus the "S'ta Eduviges" or "Refugio" averages from 7 to 13 feet; the "San Juan," 13 feet; the "Gloria," from 6 to 14 feet, and the "Rosario" more than the "Refugio." The veins are encased between good solid walls of dioritic porphyry intercepted by crystallized poryhyry, in small quantities, combined with decomposed granite in large masses. Along the entire length of the location numberless small veins crop out and traverse the ground in different directions, but no evidence is shown that the main lodes are broken anywhere upon the surface. Mr. Muñoz lays great stress upon the fact that the geological formation of this district favors the production of extensive bodies of rich ores. He decribes the same as appertaining to the trappeanic period, which is of a porphyritic nature, showing a greater ejection of precious metals than other metalliferous zones.

The two most interesting mines are the "S'ta Eduviges" and "Rosario." They have been somewhat extensively opened and much valuable ore taken out of them, and still it is easily shown that their mineral wealth is merely skimmed, as the average depth of the works does not exceed 420 feet. At this depth the veins are more defined, and the ore chutes become more regular and permanent, and the ore averages a greater richness than nearer the surface.

Mexicans never touch a vein which does not pay from its very surface, and then they only follow the ore body encountered, until the excavations become dangerous or expensive from want of ventilation or drainage. No dead work of any consequence is ever done. Perpendicular or hoisting shafts are seldom met with in any mining district; no explorations underground are undertaken to any extent, with a view to discover ore chutes other than the one originally followed in the

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same vein. No matter what treasures a mine may contain in its lower levels, no cross-cuts are made, and it is simply by accident that more than one ore body is developed in a single vein. And then how often do we see a mine with many mouths or openings, started one after the other, abandoned as the ore body in the previous excavation would pinch or break off, or as water would be encountered.

The ores contain mainly silver with a small percentage of gold. The expense of milling does not exceed $1.31 per carga of 300 lbs., including freightage from the mine. The yield varies according to the quality of the ores, but only such ores are worked as assay a minimum of 40 ounces of silver to the ton, of which there are always great quantities.

There is never any scarcity of workmen. The *Barreteros* or drill-men get $1.00 per diem, and the same wages are paid to timberers. The ore carriers get 75 cents per day, and all other common laborers at the mill only 50 cents for 10 hours' work. The workmen are paid weekly, and receive 75 per cent. of their wages in merchandise and 25 per cent. in coin. The present owners keep a store for the purpose, and reap a benefit of 75 per cent. upon their investment. The ores exported, for account of Messr. Martinez de Castro, show a total of 8,818 sacks, weighing, net, 1,263,447 lbs. The same foot up a gross yield of £55,771 (sterling), 8s., 3d., and equal to about $269,931.64.

San Francisco, May 15th, 1882.

From a report of Mr. J. C. Turner, made on Feb. 12th, 1881, to the Mexican Exploring and Mining Syndicate, we quote the following:—The Cuatro Señores mine is situated in Copala mining district, judicial district of Concordia, 65 miles from the port of Mazatlan. Work was first commenced on this mine August, 1868, and has since been carried forward, and it has never failed to yield ore in paying quantities. The ledge crops out about 600 feet below the apex of a very high mountain, elevation being 6,000 feet above sea level. The croppings can be easily traced for a distance of 4,000 feet. A tunnel was run in from a point 200 feet below the croppings, cutting the ore vein at a distance of 300 feet. At this point the ledge was found to be dipping at an angle of 60° to the north, the course of the vein being east and west. At the point where the ore was first encountered in the tunnel, it was extracted by opening a large chamber, which is still being continued, and at the present time extends in length on a line with the vein 300 feet, following the foot wall on the south side across the vein for a distance of 170 feet, with ore still in

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the face and no appearance of any hanging wall as yet. The highest place of the chamber or stope is 70 feet above the tunnel, through the entire face of the slope. The vein looks well and yields large quantities of high grade ore. The ore has run from $50 to $364 per ton. An eight-stamp mill is reducing the ore on the Panuco river at the rate of ten tons per day. The mill is about one and a half miles from the mine, and the ore is transported by pack mules from the mine. This mine is one of the valuable properties of Sinaloa, and is mostly owned by Mexicans residing in Mazatlan.

The Nuestra Señores mine is located north-east of Cosala, on the Elota River, near the source, and almost on the boundary line, and is owned by Mauricio La Madrid, and is about 20 miles from Cosala. This mine contains two classes of ore; one being lead and silver, while the other is free milling silver ore. The depth attained is about 200 feet. The lead-bearing ore assays about $80 per ton, and the free-milling ore nearly $120, on an average. This mine is reported to have reached a "bonanza" that assays as high as $1,000 per ton. An attempt was lately made to purchase this mine for $500,000, an expert having been sent to examine the property, who reported very favorably upon it. A small, four-stamp prospecting mill, for the purpose of prospecting the mine, has been reducing the ore, and the result is said to have been very satisfactory. This is an old mine, and very celebrated; and Mr. Ward tells us that its former owner, Don Francisco Iriarte, at one time (in 1825) refused an offer of $1,000,000 for the privilege of working this mine for three years, by a foreign association. The mine is free from water, and situated at a considerable elevation above the plain. It contains a vein of gold of considerable breadth, and its former reputation was fabulous.

Barreteras Mine.—This mine is celebrated. The town of Cosala was built up by it, and a church founded upon its productions. The mine has produced many bonanzas, yielding rich results. The character of the ore is native silver. The mine is developed by a shaft of 500 feet in depth, and by a tunnel over 1100 feet in length, from the side of the mountain into the heart of the vein. The mine is located at the summit of the mountain, in the Sierra Madre, distant from Cosala about six miles west. The view is grand from this point, extending over a hundred miles, as far as the eye can reach, over mountain-tops. The vein is about two feet in ore deposits. It reaches only six or eight inches with seams of native silver, that are extracted by the

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barraton, or a chisel. The pockets reach, sometimes, 20 or 30 feet along the vein at irregular distances. The mine is owned and worked by Mexicans. The character of the rock surrounding the vein is a granite formation, easily worked. The ore is smelted by furnaces. The ore is almost virgin silver, as at Batopilas. The lower levels are filled with water.

At one extremity of the district of Cosala is found a great number of gold and silver bearing quartz mines that are said to be very rich. The ore carrying gold is mostly free milling, and the mines have yielded very largely in the past. They have been worked extensively by natives and Spaniards; but on reaching water, could not go any farther, in the absence of machinery, and the mines were consequently abandoned, after a large expenditure of capital upon them. Another cause of abandonment was continual revolutions, or organized robbery, that forced the owners to pay a tribute on their wealth, and at last drove them away; and either fearing to return, or finding lucrative employment and mines elsewhere, the mines, consequently, became entirely abandoned and filled with water.

There are many of these old mines closely grouped together that are not adjacent to any settlements, but in the midst of one of the wildest regions of the mountains, that is hardly ever entered, save in the search for lost cattle. A good wagon-road may be constructed from these mines to the river, and reach a railroad that is to be built, passing within 15 miles of the mines. Wood is abundant, and water sufficient to run an ordinary mill the year round.

There are quite a number of extensive veins of rich gold and silver bearing ores in this region that have yielded largely wherever they have been worked, within a radius of 12 miles, and all contain ores easy of reduction.

To the east of this locality is located another rich mineral region, called Vetillas, from the large number of rich veins that have been found in the neighborhood. The ores are more uneven and rebellious; but the location is good, with a perpetual stream passing through the district and adjacent to the location of the mines. The mountains are of high elevation, with hard-wood trees covering their sides that would be valuable for timbering the mines, etc. Here are located furnaces for smelting the ores, which were abandoned with the mines by the former owners.

The celebrated Guadalupe de Los Reyes mine is located within about 24 miles of these antiquated haciendas, north-

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east, and other mines that are being worked with good results. This is an old mining region, that was worked by Spaniards under the Spanish regime; but the owners were obliged to flee in the war for independence. The ruins of ancient arastras and furnaces are numerous, and prove the locality to have been extensively worked. These mines have not been worked for about 70 years. The old mill-site could be restored, and the mines reopened, providing an expert should deem the enterprise profitable. The arastras were run by water power, and the veins opened as close as possible to the stream, which naturally filled the shafts with water. One of these old mines was called Mina de Plata. The residents nearest to these mines report that they were very rich, and contained bonanzas.

The adjacent river bottoms are planted with orange, lime, and plantain trees in different places, with other tropical fruits.

A wagon-road can be constructed from this point to Mazatlan, at a small cost, passing through or near large ranchos that are cultivated extensively, producing corn, beans, sugar-cane, and other productions. This region is located north from Mazatlan, distant about 70 miles.

The Palmarajo is another old district; also, the ancient mining district situated in the northern part of the State near the boundary line of Sonora, called the De Chois and Ycora districts, that were, at one time, extensively worked, and contains some good mines; also, the celebrated ancient mining district of San José de Gracias, which is located in the midst of an almost inaccessible mountainous region, in the northern part of the State. Since their abandonment years ago, they have scarcely been worked but by gambucinos. This region formerly had a fabulous reputation.

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CHIHUAHUA.

CHAPTER I.

General Description.

The State of Chihuahua is bounded on the west and south by Sonora, west by Sinaloa, on the north by New Mexico and Texas, and on the north-east by Texas along the Rio Grande, and on the south by Sinaloa and Durango, and on the east by Coahuila. The area of the State extends over 100,000 square miles, with a sparse population of about 190,000.

The state is divided into 18 cantons or departments, as follows: Iturbide, Aldama, Abasolo, Victorio, Rosales, Meoqui, Morelos, Bravos, Hidalgo, Allende, Camargo, Balleza, Jimenez, Guerrero, Galeana, Rayon, Matamoras, and Arteaga.

The great plateau west of the Rio Grande region consists of undulating prairies, with here and there a conical shaped hill, and extends to the Sierra Madre mountains on the west and south-west. There are some depressions in the plains which, if opened, would supply water. Then we have the large body of water south-west of El Paso, known as Lake Guzman, and the River Mimbres. This river rises in the Rocky Mountains, in New Mexico, and, after coursing through the plateau, discharges itself when full into Lake Guzman. It seldom reaches the lake, however, its waters being absorbed or lost in the sandy plains. Its sources have never been traced out, as far as known. It must flow about 130 miles, when full.

Lake Guzman, during the wet season, is about 30 miles long and from five to six miles wide, and seldom dries out entirely, although it is almost surrounded by sterile tracts of land covered with sand plains and alkali, interspersed with sand-hills. It is located about 60 miles south-west of El Paso, more in a westerly direction. These sand plains extend the most of this distance, after leaving the Rio Grande region, until the neighboring lands of the lake are reached.

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The whole water system of the state embraces, besides Lake Guzman, four other small lakes or pools, called Maria, Candelaria, St. Martin, and Patos, and are all located north of the central part of the state, in depressions of the table lands, with the exception of lakes St. Martin and Candelaria, nearer the center and south and south-west of the sand plains. In the mountain ranges and spurs of the Sierra which are cut with deep gorges and cañons, and which are located in the western, south-western and southern part of the state, there are many mines of the precious and useful metals, containing gold, silver, copper, lead, iron, tin, saltpeter, bituminous coal, and cinnabar. This region is also noted for forest trees of great value which cover the mountain sides, especially near the water-courses and between the ranges. The Sierra Madre range extends along the western boundary of the state, and is almost impassable except at the northern and western, south-western, and southern, part of the state, through the cañons of these localities. The Mulatos River, sometimes called the Papigochi, which is a branch of the Yaqui River in Sonora, rises in the Sierra Madre, south-west of Chihuahua City, and flows north-west through a pass in the mountains east of, and near Aribechi in Sonora. The tributaries from the neighboring valleys flow into this stream (Mulatos) near the pass. The river Buenaventura also rises in the Sierra Madre and flows north of the Presidio of Buenaventura into the small lake or pool of St. Maria, while another small stream loses its waters in the table lands near the Presidio de Janos, which is connected with a road to Bapispe in Sonora on the west, about 40 miles distant. The river Carmen rises west of lake St. Martin and empties into lake Patos in a northerly direction. South-east of lake Patos is located another extensive sand and alkali plain on the table lands that reache to the hills bordering on the valley of the Rio Grande and the river Conchos, over a territory of about 120 miles long and 40 wide. The latter river has many tributaries taking their rise in the mountains south of the central part of the state, and flows by Santa Rosalia, San Pablo, and other towns in a northerly course, with many windings, into the Rio Grande at the Presidio del Norte, and is about 300 miles long. East and south-east of the river Conchos and south of the Rio Grande extends the vast desert called "Bolson de Mapimi," which embraces all the extreme eastern part of the state south of the Rio Grande and also a portion of the state of Coahuila on the east. In this plain are dried-up lakes, and the whole is completely

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covered up with a vast tract of sand and alkali plains which are sterile and completely deserted, and entirely destitute of water. Near the rugged sierras are mesquite-covered plains, but beyond them lies the vast desert of Bolson de Mapimi, extending over 250 miles from north to south and 100 miles in width, through which no traveler ever passes, as the road to Durango and Mexico lies to the south-west. Thus it will be seen that a large portion of Chihuahua is absorbed on the east by the desert lands, and north-east and the south-west by mountains and broken regions, the latter taking up about one-third of the state, and the former, or about one-fourth, is desert wilds. The balance of the region on the Mexican side of the Rio Grande to the Gulf of Mexico is mountainous through Coahuila, New Leon, and Tamaulipas, bordering on table lands that are intersected with rivers flowing through small valleys into the Rio Grande, and is very sparsely settled until the slope toward the gulf is reached.

On the Rio Grande is located Laredo in the state of Tamaulipas, which has assumed some importance on account of the Mexican Central terminating at that point, passing through Monterey, New Leon, and other cities on the direct route to Mexico City.

Mr. Ruxton says that "the State of Chihuahua produces gold, silver, copper, iron, saltpetre, and other minerals; but it is productive of mineral wealth alone, for the soil is thin and poor, and there is everywhere a scarcity of water; but it is a paradise for sportsmen. In the sierras and mountains are found the black and grizzly bear of the Rocky Mountains, the latter of which is very abundant in the neighborhood of Chihuahua. The big horn, or Rocky Mountain sheep, and black-tailed deer, the 'cola prieta,' (a large species of fallow deer) a species of pheasant and quail in abundance, and birds of brilliant plumage are found. Among the reptiles are the rattlesnake and copper-head, and scorpion, the latter of which is found all over the republic. The characteristic shrub of the elevated plains of Chihuahua is the mesquite, a species of acacia, which grows to the height of 10 to 12 feet. The seeds contained in a small pod are used by the Apaches to make a kind of bread or cake, which is sweet or succulent to the taste. The wood is extremely hard and heavy.

"In Durango and Chihuahua, the ranchos are supplied with such simple goods as they require by small traders, resident in the capitals of those states, who trade from one village to

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another, with two or three wagons, which, when their goods are sold, they freight with supplies for the cities or mines."

There are about 200 villages and towns in the state, the principal ones being Chihuahua and El Paso del Norte. The former is the capital, and is located south of the central portion of the state, about 230 miles from El Paso del Norte and El Paso Texas on the Rio Grande.

Soil, Productions, and Grazing.

The soil is fertile, especially on the water courses between the mountain ranges and along the Rio Grande. Outside of mining, grazing forms the principal pursuit; though the vine, wheat, corn, peas, beans, barley, cotton, and sugar-cane, are cultivated to some extent. This is a great grazing state, abounding in stock, which are disposed of in Texas and Kentucky. Good grazing is found on the table lands in many places, where immense herds of stock of all kinds are raised: although along the water-courses the best grazing is found. Along the Las Casas Grandes, and Conchas, and other streams, which almost entirely disappear in the sands during the dry season, immense herds of stock are raised. In the neighborhood of Chihuahua, about 170 to 180 miles south-east of Lake Guzman, are located extensive ranchos. One of these is owned by Don Encinallas. This rancho has about 300,000 head of cattle, sheep, horses and mules, on its grazing lands. Some agricultural productions are also raised in the state on the banks of the streams which are used to irrigate the lands.

The mines of the State constitute almost its sole feature of importance, outside of the grazing or raising of stock on the fertile table lands and banks of the water-courses. The climate of Chihuahua is varied; cold in the winter, and in the mountainous districts it reaches the freezing point; and snow falls about two feet deep. In the valleys the temperature varies from the cool and pleasant in winter to heat in the extreme. The climate of the state on the whole can be said to be much cooler than either that of Sonora or Sinaloa.

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CHAPTER II.

Chihuahua.

The city of Chihuahua is the capital of the State, and is located west of the Conchos River near the center of the state, and is distant from Mexico, in a direct line, about 1,250 miles; from El Paso, in a south-west direction, about 230 miles; and from Guaymas, by way of Baleza, in Chihuahua, and Alamos, in Sonora, 500 miles. It is reached by a stage or wagon road from El Paso, on the north, and Laredo on the Rio Grande, on the east in Tamaulipas—the projected terminus of the Mexican Central R. R.—by way of Durango; and Mexico on the south-east, by way of Durango, a direct line of communication being opened to all of these points. From Alamos, through Batopilas, it is about 230 miles.

The road through to Alamos has not yet been put into complete condition for wagons; hence, the most of the travel in that direction is on the back of mules. The city of Chihuahua was built toward the close of the seventeenth century, although the State was originally inhabited and occupied at Las Casas Grandes by the Aztecs many centuries ago. No one knows the date, farther than by the records of the ancients, which say that the state was occupied by the Aztecs at that place in 1160, or over seven centuries ago.

The city of Chihuahua is well laid out, with the streets crossing each other at right angles. They are broad, well paved, and kept quite clean. The square called the Plaza Mayor is quite extensive, and ornamented on one side by the famous cathedral, which has been pronounced by American traders to be one of the finest structures in the world. This building cost $800,000, and is constructed of brown stone masonry. It is surmounted with a dome and two towers, and is in imitation of the modern Gothic, mingled with the Moorish style of architecture. It is a large building, having a handsome façade embellished with statues of the Twelve Apostles.

On the other side of the Plaza, there are public and private buildings, including the ancient State House.

The unfinished Convent of San Francisco also looms up from the other buildings, a "conspicuous mass of masonry and bad taste," says Mr. Ruxton. In the center of the plaza, which is adorned with flowers and orange and other trop-

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ical trees and shrubs, a beautiful fountain plays day and night, which is supplied with water continually by a well-constructed aqueduct a little over three miles long, which carries water from a tributary of the Conchos River or stream. This aqueduct supplies the town with water, and is supported on several stupendous arcades, which adds much to the massive architecture in the town.

The large cathedral was built out of the proceeds from one mine in the vicinity, which struck a bonanza that continued for nine years, and was apparently inexhaustible. One real was laid aside for each marc of silver produced, and a fund was formed, out of which this magnificent cathedral of Chihuahua was built, and a reserve fund formed of $100,000. A mint is also located here. Much trade is carried on between this city and San Antonio, Texas, and St. Louis, and Santa Fé. It is also the resort of many strangers from New Mexico, California, Texas, Sonora, and Sinaloa. The city contains about 18,000 inhabitants. The Jesuit Convent of San Francisco before mentioned is celebrated as having been the place of confinement of the patriot Hidalgo, the Mexican Hampden, who was executed in a yard behind the building, in 1811. A monument has been erected to his memory in the Plaza de Armas, and is a pyramid of stone, with an inscription eulogistic of his character and patriotic record.

The shops are filled with goods from the various points before mentioned, and it is not unusual to find the finest of imported silks, and other costly articles from Europe and India. Traders arriving in Chihuahua either sell their goods in bulk to resident merchants, or open out a store on their own account. The goods are brought across the border from the United States in wagons; and some years ago, a law was passed by the state, charging a duty of $500 for each wagon-load, without taking into account the value or nature of the articles. The result was, that one wagon was made to carry three loads, to evade the duty on two loads. This has been abolished since, we understand, and the laws relating to duties are general throughout the republic. The city of Chihuahua supplies all the surrounding country.

Las Casas Grandes and its Legend.

The famous Las Casas Grandes, or Great Houses, are located towards the north-western part of the state, on the west bank of the Las Casas Grandes River, which flows into

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Rio los Conchos. Here lie, decomposing and moldering under the luxuriance of vegetable growth, the ruins of Aztec greatness.

A legend is related by Spanish historians of the migration of the Aztecs to Chihuahua and Arizona, where a portion also located and built the Casas Grandes, ruins of which are now seen in that territory. The legend is found in the work of Antonio Garcia Cubas, and in the works of many other Spanish writers, and is as follows:

"Huitziton, a person of great authority among the Aztecs, heard in the branches of a tree the trilling of a small bird, which in its song repeated the sound 'tihuc,' the literal meaning of which is, 'let us go.' Huitziton being struck at this, and communicating his impressions to another personage, called Tecpaltzin, they both induced the Aztecs to leave their country, interpreting the song as a mandate from divinity. Even to the present day, there is a bird known among the Mexicans by the name of 'Tihuitochan' (Let us go home).

"In 1160 they commenced their peregrination, and passing by a large river in which historians concur in being the Colorado and which discharges itself into the Gulf of California, they advanced toward the river Gila, after remaining for some time at a place known to-day by the name of Casa Grande, not far from the shores of that river. From thence they continued their road and again took up quarters at a place to the north-west of Chihuahua, now called like the previous stopping place, Las Casas Grandes, and whose ruins show the vast proportions of the ancient building and fortress. Leaving behind them the wide "Sierra de la Tarahumara," they afterward went to Hueycolhuacan, now Culiacan, capital of the state of Sinaloa, and there remained for three years, during which time they made the statue of their god Huitzilopochtli, which was to accompany them in their expedition.

"During their peregrination the tribe was divided into two factions, one faction settling on a sandy promontory called Tlaltelolco. The name of Mexico was given to the new city, in honor of their god who was born of a virgin belonging to the family of Citli, and he was cradled in the heart of a maguey plant (or metl); hence the name 'Mecitli,' afterward changed into 'Mexico.' The popular drink of the Mexican people is made from this same plant, and is called 'mescal,' a strong intoxicating liquor."

From the appearance of the Las Casas Grandes or the

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great houses, it would seem that their outer proportions were the lowest, and not above one story high; while the central ones were from three to six stories high. The ruins are constructed of adobe, though these are much larger than those in use among the Mexicans at the present day. From a report touching a close examination of Las Casas Grandes, it is to be inferred that they occupied a space of at least 800 feet from north to south, and from east to west near 250. On the south side a regular and continuous wall or fortification may be traced, while the eastern and western fronts are extremely irregular, leaving projecting walls. Within the inclosure there appear to have been several court-yards of greater or less dimensions. Las Casas Grandes here resemble those near the Pimo villages on the Gila in Arizona. The town near, of the same name, has about 1,500 inhabitants.

CHAPTER III.

RIO GRANDE REGION.

Near El Paso del Norte there is a good agricultural country. This town is located in the extreme north-western portion of the state on the Rio Grande. The products of this region are grapes, fruit, wheat, Indian corn, and other cereals. The bottom lands along the Rio Grande are extremely rich, and extend back from the river about one mile; beyond this rolling hills into the table-lands, which continue until broken by the valleys of the four lakes and their streams before mentioned. About 70 or 80 miles from El Paso del Norte, in the interior, in a southern direction, the land is sterile, as before mentioned. Then as the country nears Baranca, a small town situated east of Las Casas Grandes, the country grows better, and the soil extremely rich, in places. South of these sand plains there is a good grazing country. There is no water to be found near these sand plains, and water has to be carried in crossing them. The Rio Grande region extends along the Rio Grande the whole extent of the north-western boundary, and small towns are occasionally met with on the road, among which may be mentioned El Presidio del Norte, and San Vicente. Much stock is raised all along this region, and some agricultural productions.

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From El Paso to the City of Chihuahua.

Mr. Julius Froebel recounts as follows a trip from El Paso to Chihuahua City in 1859. He was in company with some merchants, and we give his description for the benefit of our readers:

"For the first five or six days journey from El Paso to Chihuahua, a choice of two roads is presented. The one is considerably shorter, but dangerous and difficult, as it takes a southern direction over the notorious medanos, or quicksand hills, the other avoids these by following the course of the river two days journey' as far as the village Guadalupe, and again joins the high road somewhat to the north of Carrizal. We chose the last, and our caravan proceeded down the valley to Guadalupe.

The road, at first, passed close along the base of the alluvial terrace, through thickets of mezquite and a scrubby plant of the order of compositae, then it wound up the terrace, which consists of sand-gravel and fragments of rocks overgrown with mezquite, larrea, fouquiera, artemesia, shrubby labiate, cacti yuccas, etc. In some places the river had formed its channel close to the terrace, forming a perpendicular sand cliff, rendering the road at its very edge in no slight degree dangerous."

The town of Guadalupe is reached in three days travel from El Paso. About six miles lower down the river, a new village named San Ygnacio has been founded by the settlement of New Mexico immigrants.

From hence (Guadalupe,) the Sierra de Cantarrecio on the left and the Sierra Guadalupe on the right, the road rises gradually to the higher ground south of the Rio Grande. The space between the above named mountains is a plain rising somewhat to the south, and covered with the common chapparral of these localities. At noon we stopped at Cantarrecio, a watering-place, where we found only a tittle muddy water. In the evening, when dark, we passed—turning to the west, by a slow ascending plain of firm clayey soil, which contracted to a small mountain pass—the chain of hills, by which the terrace of Centarrecio is separated from that of the medanos, and encamped for the night on the opposlte side, on a grass covered plain. The mountain peaks, near the pass, are bare, rocky and in some places of grotesque form. On the right an opening passes through the rock from one side of the mountain to the other, and one of our Mexican drivers told me that this part of the mountain is

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named from this circumstance Sierra de la Ventana, "Window Mountain.', This name, however, did not appear to be generally used, for a gentleman, who had accompanied us from El Paso, called it Sierra de los Medanos, or Sandhill Mountain. Behind this road, as we approached it from the East, the needles and peaks of the Sierra de la Rancheria, which bears a striking resemblance to the Sierra de las Organos. Farther on eastward appears another similar mountain group called Sierra del Candelario. In the plain at the back of the former are the Charcos del Grado, pools surrounded by mimbre bushes. (Mimbre is a beautiful shrub which in Northern Mexico, from Rio Grande to California, flourishes on the banks of intermitting streams. It is a biquoniaceous plant, with piuk and white blossoms, and long pendant lanceolate leaves—a chilopsis.)

In the afternoon we distinguished as we thought, the smokc of five fires in a southerly direction, but the next day we discovered that they had been clouds of dust caused by whirlwinds. In the evening we advanced over a level plain towards a mountain chain of perpendicular rocks, anong which one remarkably angular and definod in its form, the Cerro de Lucerr o attracts attention. We encamped next morning at Ojo de Lucerro, a spring near the Laguna de las Patos. This is a lake on the left of the road. The plain is mostly covered with grass, but near the Cerro de Lucerro tracts of clay or sand are covercd with an effervescence apparently of carbonate of soda.

One road, at least, took us over places of this nature, and from appearances, it seemed probable that, to the right of the road, they existed to a considerable extent. It was over this portion of the plain, that we had seen, and now saw more closely, those columns of dust. Their recurrence in the same locality may be accounted for by the nature of the soil.

At no great distance from the Ojo de Lucerro we met with another spring, Ojo del Coyote, remarkable as rising in the summit of a sandhill about twenty or thirty feet high. This curious clrcumstance is however easily explained, the sandhill being built up by the spring. It is surrounded by the same kind of efflorescence. The Mexicans call this salt, which they collect for soap-boiling, "Tequesquite," evidently an Aztec word. A few miles farther, at no great distance from the Laguno de los Patos, a warm spring rises in several eddies from the white sand. It forms a clear, tepid brook, which flows into a piece of water, surrounded by tall

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reeds, on the side of the road. This place was frequented by numbers of waterfowl—ducks, coots and a large black, web-footed bird, with very long legs, long neck and long bill, called by the Mexicans "Gallareda." They flew, when disturbed, in wedge-shaped flocks, with outstretched necks, like geese. The spring and piece of water are called Ojo de la Laguna. The water is slightly alkali, and a white efflorescence collected at its edge. In eight days travel Carrizal is reached.

The situation of Carrizal is one of the most beautiful on the North Mexican table land. An extensive plain, watered by several streams, is surrounded in the distance by a girdle of bare, steep mountains. A clear mountain stream, dispensing fertility to field and meadow in its course, flows through lands between varied banks for miles through the plain, its course marked by rows of poplars. Twenty years ago herds of many hundreds of thousands of cattle grazed upon the plain; now they have dwindled to the mere shadow of their former numbers, and, comparing this locality with the wealth it was known formerly to possess, the conclusion is irresistable that, of all destructive animals, man is the worst. The place, indeed, is full of ruins, and lies on a raised platform, consisting of hard red clay, with pebbles and fragments of sandstone, evidently changed by the influence of heat; black sloamaceous lava, yellow and green sienna, much resembling pumice, and numerous pebbles of chalcedon. The country is bare of trees, with the exception of the poplars along the irrigating canals, so that they are literally the only trees visible throughout the whole journey from the Rio Grande to Chihuahua. We reached towards evening, two days later, a warm spring of rather high temperature, named Ojo Caliente, which rises at the base of a group of phonolitic hills. The water, which is clear and pure in taste, forms a considerable stream, but I am not sure whether it reaches the Laguna de los Patos, or is retained in the plain for purposes of irrigation. Numerous fish sported in its waters.

We traveled next day from morning till evening between bare mountains, over rocky, treeless, but grass-covered hills, and passed a portion of the night on the broad, level pass of Chinate, a notorious place, where numerous bones of men and animals warned us not to leave hold of our arms. Many parties of travelers have been attacked here by the Indians, with much loss of life.. The rocks consist of a green and grey hard phonolitic porphyry. We started at two o'clock

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in the morning, in order to reach the Laguna de Encinillas without a halt. Toward eight o'clock we came to a descent in the rocks which, from the name of a hacienda on the other side of the mountain, is called the descent of Agua Nueva, and leads to the lower level of the lake. The hacienda of Agua Nueva is one of the few large grazing estates in North Mexico, where the herds still exist on the old Mexican scale of cattle keeping.

As we descended the hill, the largest herd of antelopes passed, that I have ever seen. It must have numbered more than 1,000, and extended from one mountain to another straight across the valley, vanishing as quick almost as thought from our sight. The plain in which the Lake of Encinillas lies, is surruounded by steep mountains, and is one of the richest and most valuable localities in the world for cattle grazing, in times past supporting inumerable herds; now it is almost a dessert. The trip consumed fourteen days.

Los Medanos.

The medanos or sand-hillls are a peculiar feature of the northern part of Chihuahua, and are enconntered on the road from El Paso to Chihuahua City. These hills stretch in a line from northwest to southeast for some twenty miles, and are about six miles across from northeast to southwest. Nearly destitute of vegetation, their light yellow-whitish appearance presents a strong contrast to the deep brown of the adjacent mountains during the dry season. This sand is very light and fine and forms deep ridges resembling the waves of the ocean, which are continually shifted about by the winds. entirely obliterating the tracks of passing caravans or stage. The whitened bones of mules and cattle project here and there from the sand, with an occasional carcase which was dried up before the wolves discovered it. Although this route is the shortest by some sixty miles it is invariably avoided by trains or loaded wagons. These, take the river route which passes entirely beyond their farthest southern extremity. Persons on horseback, pack-mules and light pleasure wagons, or the stage, alone attempt to cross the hills. This place is also attended with great danger from the attacks of the Apaches, who well know the helpless condition of animals passing and take the opportunity to attack parties.

From Correlitos there is no other road to El Paso for wagons, except by making a complete circuit around these hills.

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This point is one of the favorite places of attack of the Apaches, and is peculiarly dangerous on account of the late hostile demonstrations by these murderous bands of savages. Travelers are warned to avoid this point of all others while traveling through Chihuahua.

From Chihuahua to Durango.

The distance between the cities of Chihuahua and Durango is from 390 to 400 miles. The most of this distance is only traveled by mule pack trains, although a wagon road could be easily opened. The direct route leads through small towns and villages. The trail takes a southeast direction over the plain, about 40 miles when a small pond or lake called La Cieneguilla and a small stream that empties into the Rio Florido a branch of the Rio Conchos, about 30 miles traveled, reaches the rancho Alamito, which is situated about 8 to 10 miles from the banks of another stream emptying into the Florido. A stretch of about 55 miles takes the traveler to Hidalgo, at one time quite an important town. The trail then continues almost due south to San Jose del Parral, distant, about 35 miles. Here the line of travel takes a southwest course, crossing the headwaters of the Rio Florido, about 25 miles further. The Fuerte Cerro Gordo is reached about 8 miles beyond. The distance to Las Pinoles is near fifty miles, over a dry barren region. The trail following the same course, it here takes a southerly course to Fuerte de Gallo, nearly 30 miles distant, 35 miles further reaches the Rio Mapimi, near which is located on the road the rancho San Lorenzo. Crossing the valley of the Mapimi, taking a southerly course, brings us to Cuencame, a stretch of 40 miles.

Cuencame is a busy little place, whose industry makes it flourishing. Large smelting furnaces are here in operation for the smelting of the ores of silver which abound in the mountains. The furnaces are well built, of brick, on the English plan. The inhabitants are engaged at their different occupations in the most assiduous manner, quite different from most Mexican villagers. It is fifty leagues to Durango in a southwest direction. The first portion of the road is over a range of volcanic hills, and the latter is along an elevated table land. It is easy for the traveler to come from Eagle Pass, on the Rio Grande, to Cuencame by wagon, but to Durango from this place a good riding mule or sure-footed horse is much better, and for the conveyance of bag-

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gage pack animals will be necessary. Animals can be purchased cheaply at Cuencame, and those that are used to strong, rocky ground, as the country there is very gravelly. The first twenty miles after leaving Cuencame are pretty rough traveling and bring us to a stock-raising rancho, where plenty of mules are bred of a fine quality. Here water is elevated to the surface by a drum propelled by mule power. Twenty miles north of this place is a valley where cotton is raised, and where there are some factories at work manufacturing the "manta," an unbleached cotton cloth much used by the Mexicans. It is a flourishing little place. From here the road leads over a valley covered with a growth of the vinasgas, whose fruit is much relished by the people of the country. The valley also affords fine grazing, but water and timber are very scarce. Twenty-five miles takes us to a fine prairie, at the lowest part of which is a deserted rancho called El Saucito, or "The Willow." A large willow tree shading a spring of cool, refreshing water gives the place its name. From El Saucito to El Sauz is twelve miles, over a high country slightly timbered. El Sauz is in sight for ten miles before reaching it. This is a stock and grain rancho, as is also Laguna, twelve miles on the road, where a lake or lagoon is found. The next forty miles of road are over an undulating country. There are four miles of road in one place so stony that you are forced to dismount and lead your mule. It appears that a hail storm of stones had fallen on those four miles. Beyond this bad road are some water wells, but the water is brackish. A little further on is the haicenda of Los Chonos, or the Water Spout, where water flows abundantly out of the ground. This is really a fine place, built of solid masonry and whitewashed. There are large droves of sheep and mules on this rancho The residence of the "Amo," or owner, is a pretty piece of architecture, the colonades being in the Corinthian style and all else about it showing unusual refinement. The country around Los Chonos is thickly wooded with mesquit and the soil rich. One or two farms may be discovered in the clearings. From this place to Durango is thirty miles. Three leagues from Durango is the crossing of the Rio de Hautruipi, near which is situated a fine hacienda, but it is not visible from the road. Between this one and Durango is a large haicenda, said to be one of the richest in the State. From here a fine road leads into Durango, which is seen at a distance from the plain.

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El Paso del Norte.

This town was named from the ford on the river and the pass between the mountains, and literally means the "passage of the nor h." This is the oldest settlement in the northern part of Mexico. A mission was established here by El Padre Fray Augustin Ruiz, one of the Franciscan monks, about 1585. The colony was composed of twelve families from Old Castile, under the leadership of Don Juan Oñate. Several years after the first settlement the Spanish colonists of New Mexico were driven to this settlement, where they erected a fortification and maintained themselves until the arrival of reinforcements from Mexico. The population of the place has not increased much since the year 1848, as there were then 5,000 to 6,000 inhabitants — about the same number as now. The colony divided the lands bordering the banks of the river, into small plats of twenty acres each, and gave one to each family, on which they raised corn, potatoes, beans, and vegetables, and planted small vineyards and fruit trees; and the river was dammed up in dry seasons, about a mile above the ford, and water conveyed by an aqueduct or main canal to irrigate the bottom lands. The whole settlement was intersected in every direction with dikes. They manufactured the grapes into wine and brandy, or "aguadiente," the latter of which is much esteemed in Chihuahua and Durango. Under proper management, wine-making here might become a very profitable branch of industry, for the soil is especially adapted for the vine, and the interior is supplied with French wines at an enormous price. Wine may be made of the El Paso grape, equal to the best growth of France or Spain. The river bottom is timbered with cottonwoods, where it is not cultivated for a few hundred yards on each side of the stream.

The town of El Paso del Norte is located opposite the town of El Paso, Texas, on the American side, and runs down the river about three miles, and back one mile. The region is thickly settled for several miles farther down, and back five miles from the river. There are a number of vineyards in a high state of cultivation. The town has two or three principal streets, on which most of the business is transacted. The streets are narrow, irregular and dusty. The houses are built of adobe, and the windows are barred with iron gratings. The doors are fastened with wooden bars inside, and are clumsy affairs. Carts with large wheels, hewn from logs, are still used here—the same clumsy and heavy vehicles so often seen in Mexico.

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This town, although presenting a somewhat unsightly appearance to the visitor, is destined to be one of great importance, and will soon serve as the distributing point for the whole of north-western Mexico, including Sonora, Chihuahua, Sinaloa, and Durango, on the completion of the railroads centering here.

The Rio Grande River is a shallow, muddy, sluggish stream, and not over two or three feet deep at this point, during the dry season, but assumes large proportions in the wet season. The banks are low and sandy, and the course of the stream often changes, and, for this reason, the towns on its banks are mostly situated high up on its banks and on the neighboring plateaus or bluffs. The water in the river is very good for drinking and cooking purposes, and not so impregnated with alkali as the well water in use by the inhabitants.

The river, at this point, is small, but in the time of the rainy season it swells to six times its width in the dry season. It is fordable in almost any part, but from the shifting bars and quicksands, the passage is always difficult for loaded wagons, and often very dangerous. The stream abounds in large fish of an excellent flavor, and large eels. During the rainy season the ford is crossed by a ferry-boat. The settlements extend down the river some distance, in little groups or towns, for some 15 miles, and are mostly inhabited by Mexicans, with here and there some few exceptions. Some enterprising Americans having planted vineyards, are carrying on a very good trade in wine and brandy with the interior.

Mining Districts and Mines of Chihuahua.

The principal mining districts of Chihuahua are, the Guadalupe y Calvo, Zapuri, Batopilas, Urique, Guazaparez, Jesus Maria, and Potrero, Morellos, Chinapa, Pinos Altos, Concepcion, Cusihurriachic, Magurichic, Hidalgo y Tenorivo, San Francisco del Oro, and Hidalgo del Parral.

The Guadalupe y Calvo mines, which are located in the southern part of the state, are mostly owned by a New York company, who purchased them from an English company, who obtained vast profits from working them. The mines of this district obtained their great reputation from the immense wealth brought to their English owners. The Zapuri District is also very rich, and is owned by Becerra Hermaños. The mines of this district, which are now being

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worked, are said to be the richest in the state of Chihuahua. The Batopilas District is mostly owned by several American companies and individuals, and is located in the south-western part of the state, about 90 miles from Fuerte, in a north-east direction.

The celebrated San Miguel mine is owned by the Batopilas Consolidated Mining Company, of New York, with other mines in this district. Mr. Shepard, of Washington City, owns the controlling interest of this company, which is amassing immense profits from their mines.

The San Miguel, which is now yielding from $7,000 to $8,000 per day, is located near this point; and while working the mine, they reached one of three veins that produced bonanzas of from 50 to 90 per cent. pure silver; the rich places being found sometimes in one ledge, then in another.

The Santo Domingo, which is located on one side of the San Miguel, and is owned by Mr. Kirk, of Philadelphia, struck a bonanza upon the same ledge that was passed through by the San Miguel, without finding rich ore, though the latter mine struck a bonanza on the next vein beyond.

The Nevada Tunnel Company's mine, owned by Becerra Hermaños & Co., was opened near the converging point of the different veins, expecting to strike it rich on the other side, to the right of the San Miguel mine; they reasoning that if the veins all converge at this point, which the angles of the ledges or veins indicate, they will find one solid bonanza of all the veins in one. If this is true, the result will be millions to the owners. These mines are all located in the Batopilas district, the veins of which produce virgin silver, with little or no alloy with copper or base metals. We were shown specimens of ore taken from these mines, and found them to be from 50 to 90 per cent of virgin silver. These specimens are to be seen at Mr. J. F. Schleiden's office, of this city, who very kindly gave us valuable information in relation to the mines of Sinaloa, Chihuahua, and Durango.

The Urique District contains many rich mines, and is owned by the Becerra Hermanos.

The Chinipas District is on the road to the Guazaparez district, and possesses some very good mines. The latter district contains some rich mines, and is entirely owned by Mexicans.

The Jesus Maria District may be mentioned next, to which we have given special attention in the reports of

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assayers and mining experts; the greater part of which information is found in the valuable book of Mr. Mowry, on Arizona and Sonora. The mines of this district are all owned by Mexicans, and are now worked to great advantage.

The Pinos Altos District is mostly owned by English and American companies.

The district of Morelos is also, with the Pinos Altos, very rich in ores that yield marvelously.

We might add that the Batopilas district is completely surrounded with mountains containing milling ores. The silver is almost entirely native in this whole region. The celebrated Tajos mine is located in the Batopilas district, and is famous for its beautiful specimens of ores. This mine is also owned by the Bacerra Hermaños. There is another silver mine in Parral, that has a shaft 300 feet deep, that pays $175 per ton, according to the assay of Salazar, assayist, of Tucson, Arizona. This mine is located in the southern part of Chihuahua, in the Sierra Madre range, in the vicinity of other silver mines. The vein, Mr. C. Orcilla, the owner, who is now in this city, says, is from 12 to 24 feet wide, and is located in the town of Parral, that has 6,000 inhabitants. The river, or Parral Creek, runs through the town. There is good grazing in the vicinity, and it is surrounded by cattle ranchos. It is in a region well settled. The mine is an old one, and the extent of possession is 600 by 200 varas. The ore is milled near the same place by the primitive arastra. The ore is carried to the arastras on the backs of mules. The mine is for sale, and can be purchased of Mr. Orcilla. The *El Minero Mexicano*, of December 9th, says that the mines of Hidalgo del Parral might be explored by the expenditure of $500,000.

Mines of Jesus Maria and San Jose Districts.

"The Nuestra Señora del Rayo mine, in the district of Jesus Maria, was discovered shortly after the discovery of the mine of Jesus Maria, from which the mining town derived its name, in the year 1823, and is situated in the western range of mountains of the creek of Jesus Maria, at one-and-a-half miles from the town.

"The Rayo was discovered at the same time as the celebrated Santa Juliana Mine, from which it is about 500 varas distant. Its first owners were Messrs. Tomas Suza and Tomas Rivera, who worked it successfully, with good re

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sults, in gold and silver. It was abandoned on the discovery of a bonanza in the Santa Juliana mine, of which they were part owners. This happened in 1826. It was afterwards worked by the Siquerio Bros. until it became filled with bad air, caused by careless management. The mine was afterwards almost ruined by gambucinos. Sr. J. C. Henriquez, in 1858, denounced it to restore it, which he subsequently did, and it is now being worked.

The extent of possession of this mine is 700 varas vertically, the vein having an inclination of from 15 to 20 degrees, and running east and west. A drift shaft 25 varas long and 5 wide has been opened, with firm walls, from whence two shafts have been sunk, leaving a pillar of 14 to 15 varas between. A drift was run from them of large extent.

There is also a vein of auriferous, argentiferous quartz in the vein proper. It runs from 2 to 10 inches in thickness in four different veins, running parallel with each other. The ley of the ores was 24 ounces of auriferous silver per carga, or 160 ounces per ton. The intrinsic value of the silver of this mine, according to the statement of the government assayer of the district was 11 d. 2 gr. silver, 100 gr. gold, realizing 11 d. per marc at Jesus Maria prices.

The ore discovered in widening the walls, when these auriferous veins were first discovered, contained more silver than gold, yielding at the rate of $1,500 silver to $100 gold per carga of 300 lbs. It afterwards changed into more gold, and yielded over $100,000 per ton. Later, this vein changed into its former state. More or less rich pockets are found at uncertain intervals. The ores are easily reduced under the common Spanish amalgamation process. This Rayo mine is situated near the top of a mountain range, from 300 to 500 varas above the creek. The entrance to the mine is on an almost perpendicular side of the mountain. Timber is abundant, and at three miles distant. It is hardly half a mile to the hacienda of Quintana.

Santa Margarita is situated at the Rosario, about three miles distant from Jesus Maria, and was formerly owned by Messrs. Gutierrez, Guerreña & Co. The vein is steep, slanting from one-half to one vara wide, its gangue being limespattle with virgin gold of 960 m. ley per ton. The vein runs east to west 2 degrees, incline north ; extent of possession, 800 varas. The mine has filled with water, and has three shafts. The common ore always paid $72 per ton. The better class reached $25,961 per ton, and the best ore,

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$71,680 per ton, with gold selling at Jesus Maria at $12 to $14 per ounce. The improvements on the mine are one stone building—a "malacate," or large horse-windlass. An outlay of $4,000 to $5,000 would put the mine in working condition, providing the malacate windlass was used.

"**San Jose.**—The Rosario gold mine is adjoining the Santa Margarita mine, and is supposed to be the same vein. The vein is almost perpendicular, and from one-half to one vara in width. Several shafts and drifts have been run. The best and second-class ore has paid a similar ley as that of the Santa Margarita, while the common and inferior ley pays from $3 to $4 per carga, or from $20 to $25 per ton, while the heavy residue of the ground and worked ore pays six ounces to the arroba, of 25 lbs. "Zaroche" is the name for gold of low color, containing silver. On one occasion, a carga of 300 lbs realized $10,000, having reached a rich pocket. Extent of possession, 800 varas. This mine is now full of water.

"The Candelaria mine is situated about half a mile from the town of Jesus Maria. The vein runs almost perpendicular from one to two feet wide, The ore is hard, but docile under the amalgamation process. The lowest yield has never been less than $48 per arroba of 300 lbs—$320 to $3243 per ton as the highest.

"The gold of this mine sells at Jesus Maria at $10 per ounce. The mine is on the top of a mountain range 400 varas above the creek, and was full of rain water; extent of possession, 800 varas.

"The San Rafael mine is distant three-quarters of a mile from Jesus Maria town. The vein is nearly perpendicular, direction south to north, inclination from 15° to 20° east, and is about one and a half feet wide, on an average. The gambucinos filled up the most of the shafts with rubbish and destroyed them. The balance of the shafts from the first drift are filled with water. The lowest ley has never been less than one marc to the cargo, the residue or "polvillos" paying from two to three marcs silver per arroba, or about $110 per ton. This silver is auriferous, and sells at Jesus Maria at $16 per marc; extent of possession, 800 varas.

"The Hacienda Quintana is the point established for the reduction of the ores, and is situated in the center of the mining town Jesus Maria. It consists of three stamps and eight arastras, all the machinery of which is moved by an overshot wheel run by water. The hacienda reduces three and a half tons per 24 hours, and is fed by the creek Jesus Maria."

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The principal mines of El Parral, situated at the city of Parral, are six in number, known as the Prieta, Mercaderas, Tajo, San Antonio, Leona and Ronquilla. These mines are famous in history and have a national reputation, having yielded over $60,000,000 in silver, and are with those of Batopilas and Jesus Maria the most important in the state of Chihuahua. The mines are located on a small mountain of the foot-hills of the Sierra Madre range called "Cerro la Cruz," which overlooks and is within walking distance of the city. The Prieta and Tajo mines have been extensively worked by the Spaniards and Mexicans. The workings in the former, following the body of the ore, have left an immense hall or chamber, showing the amount of ore that has been extracted. The height of the chamber reaches 260 feet and width following the vein, extends from seven feet two inches to over twenty feet, and length from 150 to 200 feet. At the bottom the vein is from seven feet two inches to fifteen feet wide. At the extreme north end the ore as shown by assays made last year carried 67 ounces of silver to the ton, a few feet further south 82 ounces, in other parts 146 ounces, 77 ounces, 66 ounces, 139 and 180 ounces. The Mercaderas mine is next to the Prieta, not being however connected with it. At the point where is situated the Mercaderas mine the same vein is narrower, but from this mine a very large quantity of silver was taken, very rich ore having been found. At the Tajo, however, the vein is wider than it is at the Prieta, having in the Tajo, and from there to the Ronquilla a width of from twenty-five to sixty feet, the ore being quite as rich as that found in the Prieta.

The above described property was bought by Hon. Joseph Knotts while U. S. Consul at the city of Chihuahua, from different parties and consolidated by the company known as the Knotts Mexican Silver Mining Company of Chicago. A ten stamp mill has been erected with suitable storehouse buildings and all the necessary appurtenances in the shape of furnaces, pumps, etc.

The city of Parral, which is called Hidalgo del Parral, is a place of about 10,000 inhabitants and is over 200 years old. It is as orderly and quiet as any city of its size in the United States and has a considerable trade in supplying mines in the vicinity. The foregoing report upon the mines of Parral is taken from a report of A. J. Howell on the consolidated mines of Parral.

From a report on "Pastrana," in the Batopilas district, by Jno. C. F. Randolph, M. E., we quote the following data:

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"The diorite is the rock in which the productive silver veins in this locality are found. Extending from the northeast corner to the southwest corner of the belt, a distance of perhaps four and a half miles, there seems to be a bonanza line of white panina, on which all the great bonanza veins of Batopilas lie. No great bonanza veins have as yet been found outside of this line.

The peculiarity of this district lies in its containing veins of calc spar in the diorite carrying native silver. This occurrence is only known in one other locality in the world, while near the surface chlorides of silver, black silver and ruby silver are found. The eventual ore has always been found to be native silver highly crystallized and often massive. This ore is richer and more cheaply and easily treated than any other ore of silver. In this district the cases are many in which veins have gone into bonanza over and over again, and this indeed is the usual experience with bonanza veins. These veins do not bear one blossom and then stop bearing. This is notably the case with the Veta Grande vein on the property whose history has been given (San Miguel of the Consolidated Batopilas S. M. Co.). This vein gave a bonanza netting in four years almost $3,000,000. Within eighty feet of this bonanza, a new bonanza was struck into last year which has already produced $200,000 to very slight efforts, and in the portion already developed contains upward of $400,000 more in place, waiting for the arrival of a mill to treat it. The rule with all the mines of this district has been that, although they may carry chloride of silver on the surface, the eventual ore at a depth is native silver in all its grades of massive, Brossa, Cispeado, Clavo, and Azogue."—[J. C. F. R. in "Silver Mines of Batopilas."]

From same: "At the greatest depth as yet attained by any mine in the district, viz.: 200 feet below the level of the river and 900 feet below the actual surface, this native silver still remains the final ore, and that no other class of ore will be found is undoubted. The classes of ore of this district are different from anything else in the world: 1st, Massive silver in pieces of 100 pounds and upwards; 2d, Brossa silver, three-quarters silver and one-quarter calc spar, $20,000 per ton, and daily produced in the district; 3d, Cispeado silver, one-third silver and two-thirds calc spar, $10,000 per ton, and daily produced in paying quantities in the district; 4th, Clavo silver, calc spar carrying isolated nails of silver, $500 to $5,000 per ton; 5th, Azogue, or amalgamating ore, with finely disseminated native silver, from $50 to $500 per ton, in large

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quantities. The veins which have up to date (October, 1881) produced the principal bonanzas are the Pastrana, Carmen, San Antonio, Veta Grande, Arbetrios, Roncesvalles, Camuchin, Descubridora, San Antonio de las Tachos, Santa Teresa, Guadalupe and Trinidad. All these bonanza mines are found on a diagonal line running from the northeast corner to the southwest corner of the belt, and are embraced within an area of a few hundred feet in width and some four miles in length.

The most convenient connection for supplies is from San Francisco to Mazatlan by steamer, thence by schooner to Agiabampo, on the Gulf of California, and from thence to Batopilas by pack train. Lines of stages make regular trips from El Paso and San Antonio to Chihuahua, and on the Pacific side from Mazatlan to El Fuerte. The cost of shipping silver from Batopilas to New York, including insurance against every risk, is but 3½ per cent."

"The Todos Santos Mining Company own two mines, the Todos Santos and Arbetrios. The first was denounced in 1875 and a shaft was sunk to the depth of 150 feet with six levels, and which worked by Mexican processes yielded nearly $120,000. It is said a lump of silver ore which assayed over 90 per cent. weighing 285 pounds, was taken from this mine. Another now in the company's office in New York weighs over 65 pounds, extracted in the early part of 1881, is estimated to be at least one-half silver in weight. The company now are driving a tunnel into the side of the mountain 150 feet below the old works, to tap the vein. The other mine, Arbetrios, is an old mine, that, according to the mining records of Batopilas district, in one year produced over $500,000." —[From prospectus of the Todos Santos Silver Mining Co.]

Twelve miles east of Chihuahua, Mexico, is the marvelous Santa Eulalia silver mountain, from which $447,000,000 have been taken in times past. It is now in the hands of New York and Philadelphia capitalists. The El Paso *Times* has a description of the mine at present, from which we quote as follows: "A road has been built through a very deep arroyo leading to some of the old mines, while another one has been completed thence to the hacienda, along which a ditch has been run, bringing up the water of the Chihuahua river to the works for reduction purposes. Another gigantic operation is the cutting of two tunnels, one of five miles in length and the other ten miles, which are to pierce the old mines. Even before reaching any pockets, or leads proper, the ore taken out already is of sufficient value to pay the expenses of this colossal work as it progresses. Two hundred men are now em-

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ployed, and when the hoisting works, stamp mills, etc., are completed, the former yield, fabulous as it may appear, will be easily surpassed. The records of the Tribunal of Mines and the Mint at Chihuahua, show that this mine, first opened in 1703, has yielded the enormous sum of $447,000,000 in silver. But the church records of the Cathedral of Chihuahua would lead one to believe that even more was extracted. That cathedral was built by a tax on this mine exclusively. A sum equal to 7 cents on every marca ($8) of silver taken from the Santa Eulalia constituted the only building fund for this cathedral; and when it is borne in mind that this edifice cost not less than $900,000, as estimated by the ecclesiastical and civil officials, $447,000,000 is a modest figure.

In speaking of this region, Ward, in his work entitled "Mexico in 1827," says: "Near the surface of the earth all the lodes contain a considerable quantity of gold. This diminishes as the workings increase in depth, while the proportion of silver augments." And of the Santa Eulalia: "To the north of El Parral, and about five leagues to the southeast of the city of Chihuahua, is the ancient mining district of Santa Eulalia. It has been long abandoned, and the mines are in a ruinous condition. The ores were generally found in loose earth, filling immense caverns, of which some are stated to be sufficiently large to contain the cathedral of the City of Mexico; but there can be little doubt of their magnitude, since the last bonanza extracted from one of them continued for nine years." "The ores of Santa Eulalia are generally mixed with a considerable quantity of galena, which renders them fit for smelting."

Intending investors in mines in this country should only buy mines that, at least, have been partially explored and show metal. It is impossible for anyone to see into the ground, and no one is competent to state specifically the value of an undeveloped property. Good miners judge of the value of a mine by the amount of ore in sight, and from the indications of vein, rock, etc., draw inferences as to the amount that is hidden. A vein is more likely to extend than to "peter out" suddenly from a good prospect.

While there are many rich mines in Mexico one cannot be too careful in investing. As a case in point: A mining company in San Francisco purchased an inaccessible mine which they could not reach with expensive machinery which they had purchased, and a 10 stamp mill now lies scattered along the sides of a mountain in Chihuahua, in a ruinous condition, and the property was totally abandoned after some $90,-

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000 were expended in the experiment. These mines are undoubtedly good mines, but are inaccessible, and therefore will not pay the expenses of working them.

Guadalupe y Calvo, in the Guadalupe y Calvo District, is the largest mine in the State of Chihuahua. It was leased in former years to an English company for a period of 20 years, and supported a population of 10,000 people. This is a celebrated mine, on account of its producing immense fortunes for the English company. When the lease expired, the original owners, who are Mexicans, took possession, with all the improvements, and continued to work it. While it was in possession of the English company, they secured the erection of a mint by the Mexican government, to save the expense of transportation. A 20-stamp mill was used to reduce the ore, and about 80 arastras. The latter were run by Mexicans on shares. The depth reached in the mine is about 900 feet. The width of the vein averages from 20 to 25 feet, and is well defined. The average assay was about $200—the lowest, $40, and the highest, $2,000. The ore was free milling. The mine is located on the side of a mountain, 500 feet above the creek; but it is now abandoned, and the shafts and drifts are filled with water on the lower levels.

The Carmen mine is located just beyond the border line of Sinaloa, in the State of Chihuahua, on the side of a mountain near the summit, in the main range of the Sierra Madre. The depth of the mine is about 300 feet or more; width of the vein about 5 feet. The average assay about $120 per ton, and the ore runs pretty even from $80 to $300 per ton. It is owned by a Mexican. The ore is rebellious, and contains but a small percentage of gold. The mine is not a mile distant from the border, and about 25 miles from the town of Cosala in Sinaloa.

The Pinos and Altos is worked by an English company, Mr. Hepburn is the principal owner. A 15-stamp mill is now reducing the ore and arrangements are being made for another 15 stamp mill. The depth attained is 800 feet. The average assay is about $100 per ton. This mine is situated on the top of a mountain about 15 miles from Jesus Maria Northwest. Several shafts, crosscuts and tunnels have been run. The present owners have worked the mine for about three years. The mine was purchased from Mexicans. The ore produces a larger percentage of gold than silver.

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The La Soledad has reached a dept of about 90 feet, and and width of the vein about 15 feet; average assay, about $100 per ton. This is developed by a shaft but a short distance above the Arroyo, and about 20 feet from the bank of the stream. The mine eonsequently became filled with water and was abandoned.

Santo Domitius mine is situated southwest of Jesus Maria, about five miles. The mine is developed by a shaft at the surface, and a tunnel at the foot of the mountain, tapping the vein. The principal owner is Jesus Solis. A ten-stamp mill is being erected to reduce the ore at the mine. A small five-stamp prospecting mill has hitherto been used. The tunnel reaches the heart of the vein and is over 1200 feet in length. The ore is abundant and assays on an average about $75 per ton.

Good accounts contiuue to come from the Batopilas mines in Chihuahua. Ex-Govenor Shepherd writes that he has ready over $600,000 worth of ore, and that the mines are working now in "bonanza." A piece of ore, weighing 148 pounds, and valued at $1,680 has been forwarded as a sample of the mine's production. It is stated that the Batopilas mine, during its first year, without machinery, paid $160,000 besides the sum ot $57,000 set apart for mills, and a balance of $180,000 retained in its treasury, Mr. Robinson, formerly of Durango, whom I met recently, fully confirms the reports of the richness of the Batopilas mines.

The San Jose de Bravo mine is located 23 miles form Jesus Maria, in a southwest direction. This mine was first discovered and worked about thirty-two years ago, by Sigs Devaley Y Lopez Y Cia. Reliable information as to the history of the mine is difficult to obtain. It is reported that $700,000 were extracted from this mine in two years, while in bonanza. The population of Bravo at that time was about 1000. The owners of the mine squandered the proceeds, and died in comparative poverty- The manner of working, was the usual Mexican style of extracting the rich ores only, and on the abandonment of the property, the gambucinos completed its ruin by extracting the pillars and thereby causing the destruction of the workings. The mine is now owned by Mr. Hepburn.

The Pertenencia extends 2400 feet. Eighteen hundred N. N. E. of the mouth of the lower tunnels, and Six hundred feet in a S. S. W. direction. There are three parallel veins, named respectively; San Franguilino, San Bonifacio and San Antonio. The first has an average width of 8 to 14 feet

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of ore varying in richness. The second is completely covered with the veins of the old workings, so that no exact report can be had of it. The third vein is also in like manner covered. A tunnel 250 feet long, and two or three shafts have been sunk. One of these shafts is called the San Franguilino, and the other the San Bonifacio. One of the workings was called the Dolores, and the other Dulces Nombres. The first is about 200 feet above the Arroyo Bravo, and the second about 500 feet. The assay reaches from $20 to over $2,500 per ton. Abundance of wood and water are adjacent.

The La Soledad is about three milles due north of Jesus Maria. The vein of this mine runs southwest and northeast, and dips southerly at an angle of 40°. The walls are more or less well defined, and are of porphyhy and green serpentine. An old mine, called the Jesus Maria mine adjoins the Pertenencia, that carries a low grade ore in great abundance, assaying from $30 to $35 per ton. Tunnels and shafts have been sunk on the vein of La Soledad, but they are filled with water, and mostly caved in. Mr. Theo. A. P. Brown who reported on this mine from which we obtain the data states in his opinion "that there exists still large quantities of ore, and of considerable value, there is not the slightest doubt . The tunnel of Soledad commences about 15 feet above the Arroyo, It is run on the vein which is about 6 feet wide, but pay ore is only found on the foot wall. and is about 12 inches wide throughout the upper works. At bottom of mine, now under water, the owner says the pay ore is a vara wide. I have made an average assay of 400 cargas, equivalent to 60 tons, the result of which was silver, $67 86; gold, $19 94; total, $87 80. Later assays by same report, showed as high as $196 from mouth of tunnel."

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DURANGO.

CHAPTER I.

Physical Features.

A large proportion of the state of Durango is situated upon the table-lands, and the capital, though surrounded in most maps by mountains, lies in the midst of a vast plain, which, to the north-east, extends, with few interruptions, as far as Chihuahua and Santa Fé, in New Mexico. To the west, both north and south, the Sierra Madre extends, forming a barrier upon the Pacific side, and the hot low lands of Sinaloa occupy the space between the foot of the mountains and the Pacific Ocean. The state is bounded on the north and north-west by Chihuahua, and on the east by Coahuila, and on the south-east by Zacatecas, and on the south by Jalisco, and south-west by Sinaloa. It is completely surrounded by Mexican territory, and is not considered as one of the border states, though we have included it in our work on account of its location and important interests connected with those states on the frontier.

The state of Durango is divided into 13 districts, as follows: Durango, Nombre de Dios, Mesquital, Cuencame, Uzas, Mapime, San Juan de Guadalupe, San Juan del Rio; Indee, Papasquiero, El Oro, Tamasula, and San Dimas. The state has but few manufactures. Its riches consist almost entirely in mines and agricultural produce, which last is so considerable that the lands already brought into cultivation are supposed to be sufficient for the support of a population five times as large as the State now contains. Consequently, it has considerable trade with the surrounding region.

The raising of stock is carried on extensively also; most of the estates, besides being devoted to agricultural products, are also devoted to the raising of large herds of horned cattle, horses, mules, and sheep, of which last 150,000 are sent every year to the Mexican market. The Hacienda de la Sarca alone possesses a stock of 200,000 sheep and 40,000

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mules and horses. That of Ramas, which consists of 400 "sitios" or sheep ranches, has 80,000 sheep, and the Guatimape 40,000 oxen and cows. The valley of Poanos, about 45 miles from the capital east, contains nothing but corn lands. It is watered by a river which runs through the center of the valley, and on this river are nine "haciendas de triego" (corn estates) in immediate succession, which supply the capital with flour of the very best quality, at from $6 to $8 per fanega. Sugar might be extensively raised in the valley of the Sierra Madre, where water abounds and climate might also be selected at pleasure. Sugar is at present brought from the valley of Cuencame at a distance of 250 leagues. It sells at an enormous price — $5 per arroba, and often at $10. Indigo and coffee might likewise be reckoned among the natural productions, as they are found wild in the barrancas or ravines of the Sierra. Sugar, we believe, is raised to a small extent in some of the valleys.

Mr. Ruxton describes the ranchos and haciendas as follows: "The ranchos and haciendas in Durango and Chihuahua are all inclosed by a high wall, flanked at the corners by circular bastions loop-holed for musketry. The entrance is by a large gate which is closed at night, and on the azates or flat roof of the building a sentry is constantly posted day and night during Indian troubles. Round the corral are the dwellings of the peones, the casa grande or proprietor's house being generally at one end and occupying one or more sides of the square." He goes on to speak of large herds of cattle and horses to be found on the plains, but of one district he says: "From El Gallo to Mapimi a mule track leads the traveler through a most wild and broken country, perfectly deserted, rugged sierras rising from the mesquite-covered plains, which are sterile and entirely destitute of water. This part of the country is far out of the beaten track from Durango to Chihuahua." Thus it is seen that sterile tracts are also to be found in this state. The whole of the state is mountainous and contains no rivers, except a few small streams.

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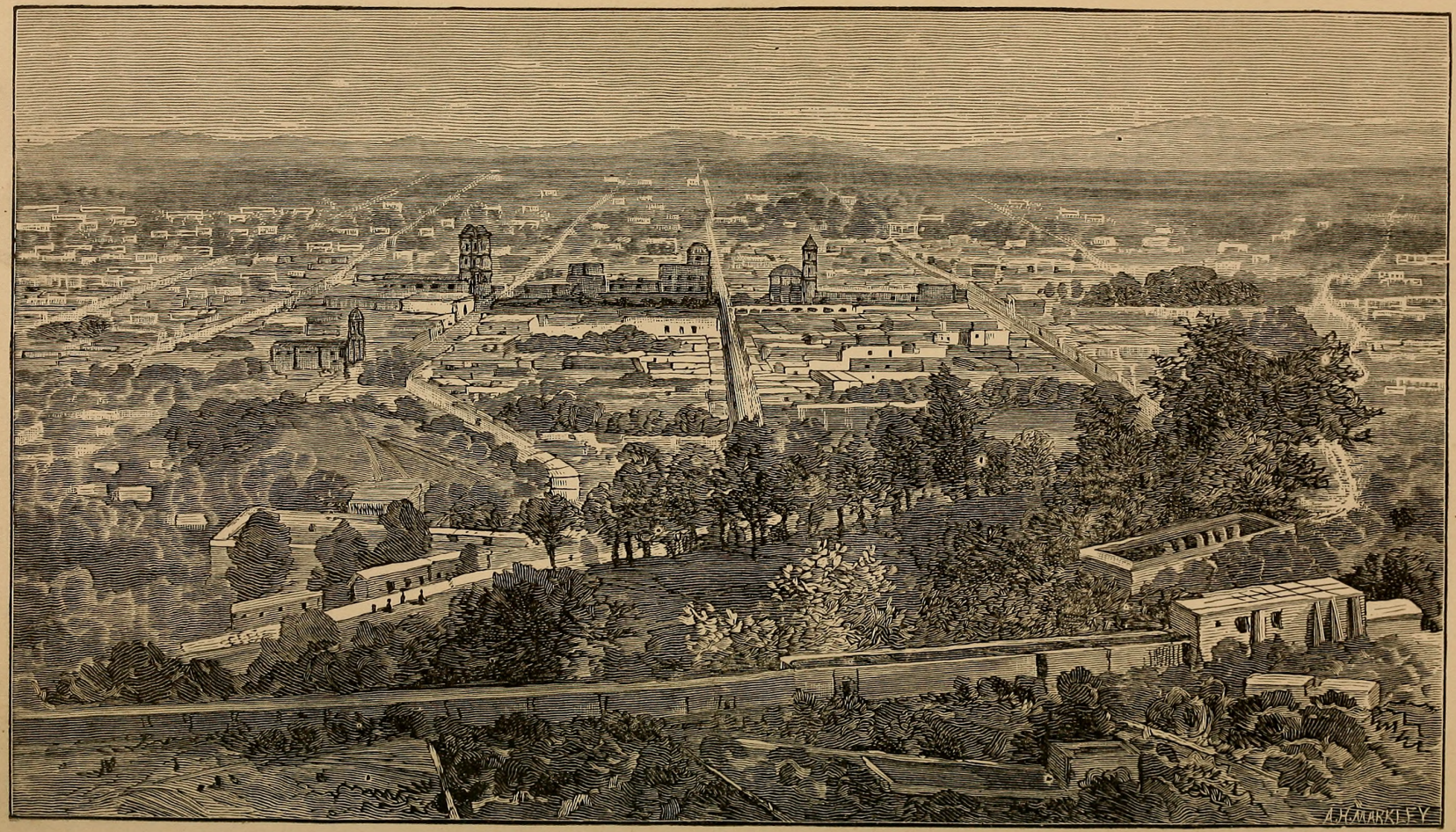

CITY OF DURANGO, MEXICO.

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CHAPTER II.

City of Durango.

Of the City of Durango he says: "The City of Durango was founded by Velasco el Primero, and it may be considered the 'ultima thule' of the civilized portion of Mexico. Beyond it to the north and north-west stretch away the vast uncultivated and unpeopled plains of Chihuahua, the Bolson de Mapimi, and the arid deserts of the Gila." The distance to Mexico City is 650 miles from Durango, the capital of the state, which is situated 65 leagues north-west of Zacatecas. The population is 22,000. The state had, in 1876, 185,000. Both the city of Victoria and most of the other towns of Durango—Tamasula, Sianori, Mapimi, San Dimas, Canelas, Cuencame—take their origin from the mines.

The town of Victoria, or Durango, is situated in the plain heretofore mentioned, and is the principal town of the state. The streets are pretty regular, and the town contains a large plaza called the Plaza Mayor, one theater and other public buildings, which were built by Zambraño, a rich mine-owner, who is supposed to have extracted from his mines at San Dimas and Guarisamey, upwards of thirty millions of dollars.

The capitol is located here, a mint, and the Casa del Apartado, (a place for the separation of gold from silver) a glass manufactory, a tannery, and a fabrica de tobacos. The police of the town is well organized, and robberies almost unknown. Legal proceedings are summary, the legislature having passed a law which concludes legal proceedings in three days, in cases of robbery.

Tobacco is produced, also, in the State, to some extent.

There is much trade at this point, principally in bullion from the mines, and among the principal business firms may be mentioned, Julio Hildebrand Succesores, Doorman & Co., Giron, Stahlknecht & Co., Francisco Gurza & Co., Juambels Hermaños, and Francisco Alvarez & Co.

The towns of Villa del Nombre de Dios, San Juan del Rio, and Cinco Señores de Nazas, are almost the only cities in the State connected with mines. The two first are supported by an extensive trade in "vino mescal," (a sort of brandy distilled from the maguey or American aloe, sometimes called the century plant, which requires from seven to ten years to develop.

The last-named town is supported by the cotton planta-

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tions situated upon the banks of the river Nazas. The alacran (or small scorpion) excepted, Durango is very pleasant, and the climate is delightful and healthy, and the people fairer and finer-looking than in any part of Mexico I have yet seen.

Bath Houses of Durango.

We are indebted to Dr. Benjamin of San Jose, for the following. "The hot springs located at the upper part of the city, furnish water for nearly the whole city. A stone aqueduct conducts the water through the centre of the principal streets. The stream is about three feet wide, by one and one-half feet deep. Near the source of this stream, are built a great many bath houses, all built of stone. The bath tubs are of masonry and a number of them are 12 by 12 feet in diameter and 5 or 6 feet deep. The temperature of the water is about 80°. You can take a bath in the large rooms for twenty-five cents, There are a great many small rooms—prices, six to twelve cents. The population are very fond of bathing, and I do not wonder, when I remember how fine and clean are the bath tubs, and how pleasant is the temperature of the water."

From Durango to Mazatlan.

Further than Durango no wheeled vehicle can go, so we disposed of our ambulances, and took it mule back, paying at the rate of $12 per mule for passenger and baggage. Four miles from Durango the wagon road gave out, and we took a path which wound up rugged cliffs until near camp. When we came to a mountain mesa. Our course lay to the westward, and for the first few miles, our road was good and we had a comprehensive view. In consequence of the dangers which beset the road, it is customary for travelers to rendezvous at Durango, and travel in large parties. We made a terrific descent to-day, at the bottom of which dashed a beautiful mountain stream, and up we climbed again to the top of another mountain. Our camp is among beautiful pines, and flocks of noisy parrots are flying over us, on their passage from the nut forests. Here is said to begin our dangerous road; near by are the skulls and bones of some murdered travelers, placed on a pile of stones. The road next morning is quite rough; in fact, a mere path, winding through dark woods, and over precepitous heights. These wild soli-

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tudes are charming, the pine forming arches over head, the earth carpeted with green grass, and at short intervals cool springs of water. The days are warm, the night cool. On the next day we camped in a beautiful pine grove, on an eminence, overlooking a pretty little vale. In the midst of the grove stands a high rude cross, said to mark the spot where the banished bishop of Durango performed mass. A grand temple, whose pillars are the forest-monarchs, and whose dome blue Heaven. The next day our path passed through a beautiful mountain country of pine woods and gushing streams, our every step still beset with the melancholy sight of human skulls. Our next encampment, was in the bend of a beautiful bold mountain stream,—a desirable location for a settlement, soil good, building material abundant, and a natural site for a mill. Shortly after leaving camp the next morning, the foot passengers and some of the horse-men separated from us, taking a nearer but rougher route to Mazatlan.

The roads parted near the piloncillos, a collection of curious, cone-shaped rocks. Among the footmen were some mountain cargadores now carrying loads of apples. They carry their loads on their backs, keeping them in place by means of a strap across the foreheads. These men are employed to carry heavy machinery where it is impossible to use animals; they also carry the mails between Durango and Mazatlan, making the round trip in eight days, for which they are paid $15. They keep up a brisk trot all day, munching their tortillas as they run, pursuing their way over places impassable for even the sure-footed mule. They do not wear shoes, but sandals or guaraches, as do also the muleteers, merely pieces of rawhide cut to fit the sole of the foot, and kept in place by thongs; these they prefer to shoes, their feet becoming very hardy, suffering neither from cold nor the gravel which is continually sifting between the sandals and their feet. We had traveled but four hours the next day before the order to halt was given. We have reached the jumping-off place and must give the mules a good rest for the morning's arduous task. For the last five days we have been shut up in dark primeval forests, pursuing our rough path over heights and along ravines, but now we have reached the pinnacle to which we have been ascending ever since we left Durango, and in the morning will commence to descend.

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A Grand View.

By ascending a little eminence near camp, and walking a short distance through the woods, I came upon one of the grandest and most sublime displays of mountain scenery, I ever beheld. Standing on a rocky peak, I hung, as it were, over an abyss extending below me for thousands of feet—I may say for miles—I could see a stream, which resembled a silver thread, and farms along its bank; it seemed I could throw a stone so that it would fall within their peaceful premises; far below hung white clouds, and the blue ether seemed to envelop me, and on every hand, rose mountain peak on mountain peak, in awful sublimity. But, from my lofty perch, I could command them all, and far to the westward the mountains sank away and the sun's slanting rays reflected from the Pacific Ocean. From this place, although our destination is almost within the scope of our vision, it will take us seven days to reach it, and truly when I cast my eye over this rough vista, it seems the mountain barriers could never be passed.

We began the next morning to descend from our lofty eminence, and reached Duraznito about 2 o'clock P. M. Our road was a winding, terrific stairway of twelve miles; the glimpses of the grand and beautiful filled me with awe and ecstasy. We have changed climates in the course of a few hours. This morning we were shivering from cold, and now we seek the shade of the fig tree and bless the soft wind. Peach trees are in bloom about us. This little place is situated, as it were, on a shelf of the mountain, by which it is shadowed, and still beneath it lies a deep gorge or valley. We are now in one of the finest gold and silver-bearing regions in Mexico.

A short distance from Duraznito, and at the foot of the mountain, we found ripe blackberries. Upon reaching the summit of the mountain we had a fine view. Far beneath us was Duraznito, the smoke of its humble, tile-roofed domicils ascending in spiral columns, and the deep valley still further down, and the grand mountains, that seemed like the giants of creation, basking in the rosy dawn. Here is certainly mountain scenery unrivaled by any in the world. The lakes of Switzerland would be but drops in the infinity of the natural grandeur about us. A narrow trail winds for the most part along the sides of immense mountains, which is just wide enough to admit our mules single file, with tremendous heights rising perpendicularly above us—an awful

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gulf of space below us. One false step would cost a life. The sun was intensely hot whenever we were exposed to it, but for the most part we were protected by the shadow of the mountains, around and over which we were winding, looking, in comparison, like a procession of ants upon the dome of St. Peter's, Rome. This tiresome and perilous road was cheered by the sound of laughing rivulets and there is something exquisitely pleasant about these mountain solitudes. We had traveled hardly an hour along a more fearful trail than ever, a portion of the road called Buenos Ayres, when one of the mules lost his footing and fell, bounding down the mountain side as an india rubber ball would down a flight of stairs, and dashing to pieces below. The train moved on as if nothing had happened, it not being an unusual occurence, and camped for the night upon a level eminence a short distance further on.

We broke camp early next morning, and commenced our day's travel by ascending, as usual, and passing along more frightful cliffs—warily, from yesterday's accident. Passed Piedra Gorda, quite a rancho, beyond which we came in view of a mountain called El Pyramido, or The Pyramid, a magnificent freak of nature; the base is covered with dark woods, from which shoots up a shaft of solid bare stone, tapering gradually to the top. It is certainly grander than all the pyramids of Egypt combined.

As we descended the climate became warmer, and instead of pines, we passed through groves of flowering trees and lemon trees bending with yellow fruit. By midday we had reached the bottom of the gorge, or base, as it were, of the main range of the Sierra Madre, and on the banks of a stream running westward. Our road lay along this stream, crossing and recrossing it several times; we camped at Agua Caliente. Before reaching camp we passed some mud huts and by El Favor, where an arastra, or atana, was in operation, working silver ore. It is sunset, and thousands of parrots and flocks of birds of beautiful plumage are floating down from the adjacent mountains to roost in the woods along the stream. We started early next morning, to take advantage of the cool of the day, to cross the El Espinaso del Diablo, or "The Devil's Backbone"—(hereafter described) a fearful mountain ridge, and said to be the last of our very bad road, camping on the river at El Palmar. The next day our trail lay, for the most part, through dense tropical woods. Our attention was attracted by the strange varieties of trees, and especially the banyan, whose roots

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spring from the upper branches, and trend down to the earth and then take root. Great numbers of parrots flocked through the woods, almost deafening us with their screams. Our party shot several, and we made a feast of parrot, which we found very palatable—in fact delicious.

After a warm day's travel we arrived next day at Puerto San Marcos, our road pursuing the river all day. We camped at a miserable little rancho, one day's travel from Mazatlan. The weather was quite warm, but the trail was more tolerable, passing several ranchos and plantain groves, and fields enclosed with hedges of orgona cactus, planted like posts in the ground. On the next day we reached a broad wagon road, within a few miles of Mazatlan, and on an eminence near the city the sea broke upon our view. Just before entering the city we underwent the scrutiny of the Custom-House officers.—*From a traveler's report.*

The Devil's Backbone.

On the road from Durango to Mazatlan one of the grandest scenes presented by nature is the ridge that juts out from one mountain to another, called "El Espinaso del Diablo." It seems that the surroundings suggested the not very euphonious connection with the anatomy of his Satanic Majesty. The traveler cautiously picks his way over a road over this ridge with precipices falling almost perpendicularly for thousands of feet on either side. The trail is very narrow and over hard, smooth rocks that the storms of thousands of years have failed to wear away. It gives the traveler a sensation that he will never forget, as he looks upon either side into an abyss yawning at his very feet, and the sight is so fearful that he hastens over, shuddering at depths that make the stoutest fear to peer into. One traveler describes his feelings by saying that he involuntarily closed his eyes to shut off the fearful sight before him. Another says the precipices on either side are immense chasms or clefts in the mountains, which are so deep that you can hardly see the bottom if the attempt is made to peer into their depths. In every direction high and lofty peaks extend as far as the eye can reach, lifting their rugged mountain tops with bare rocky summits heavenwards for hundreds of miles. This high ridge is really the summit of one of the mountains and presents the only route practicable for pack trains over the mountains. It is the highway that has been used for many years. In fact

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ever since communication was opened in this direction between Durango and Mazatlan. A former soldier in the Mexican army says that he was in a company that went over this ronte, and while crossing the ridge the soldiers were ordered to cross on a run. Singularly no accident occurred, though he said he shudders yet as he recalls his feelings while keeping his place in file with his comrades rushing behind him.

The Short Route to Mazatlan.

One of the early pioneers, who came to California at an early day by way of Durango and Mazatlan, describes a trip he made in taking the short route from Durango to Mazatlan. This same gentleman is one of the prominent citizens of Sacramento, and from his own lips we learned the following Says he: We had heard that there was a shorter route, and, being impatient, concluded to risk the trip. We had heard that it was a fearful ride and too dangerous for horses or even mules, and that none but cargadores, or footmen, dared to undertake the trip, but we concluded that we could go anywhere a Mexican could, and so started upon the route, the narrator acting as leader. We found that the road was rough enough at the start, and that it led along a trail on the side of very precipitous mountains, so narrow that it was impossible to pass should any one be met on horseback. At last the trail seemed to dwindle to almost nothing upon the side of one of the steepest mountains; in fact a fearful precipice yawned at our very feet on one side, on the other and above us rose an almost perpendicular wall. Just ahead a smooth, slanting rock jutted out with its slippery, polished surface inclining into the abyss beneath us. I did not see it until I had passed around a jutting portion of the mountain, and my horse stood upon such a narrow ledge that I dare not dismount; I knew that if I did that my horse might topple over and we both be hurled to destruction, so I concluded I must take my chances and make my horse climb over that smooth surface that appeared almost certain death, although my hair stood on end, as my horse, a faithful and sure-footed animal picked his way carefully across. I arrived safely, but it was the most foolhardy act of my life. Fortunately my companions had not yet arrived at the narrowest point and I was enabled to warn them to dismount and lead their animals across. He concluded by saying that he found after-

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ward that a Mexican and his mule had tumbled off that same rock only a few days before. The balance of the road was the roughest we had ever traveled, in some places covered with large boulders that it seemed almost impossible for a horse or even a mule to cross over them. We publish this as a warning to the many travelers who might by mistake undertake to travel over this same route,

Rancho de Morteros.

The greatest part of Durango is mountainous in the extreme. In but few instances throughout the whole of the State are ranches found that make any pretenses at agriculture, the principal object being to supply the immediate wants of the owner of the property, and perhaps a limited local trade. Cattle-raising and mining form the principal pursuit. The buildings are mostly of adobe. Among the exceptions to this rule may be mentioned the buildings upon the Rancho de Morteros. All of the improvements are of solid masonry and were built by one of the Spanish nobility long before the independence of Mexico drove its wealthy occupants from their possessions. This rancho is situated in the southern part of Durango, some twenty miles north of Nombre de Dios. The main buildings contain two stories and are built of solid freestone masonry, and form an immense square with eighty rooms, the largest of which are twenty feet square. The floor is inlaid with tiles of burnt clay, both on the upper and lower floors. The whole building has the appearance of a fortress or square castle with bastions on each corner loopholed for musketry. The only entrance is through a door of solid timbers four inches thick protected completely with nail heads, entirely coverering the outside. An inner square, or court, with no roof is in the center of the structure, with a porch bounding it on all sides, the roof of the porch being supported by solid stone pillars about one foot in diameter. This court admits the only light into the building through inner windows. The upper story is reached by a stone staircase from the lower floor. The ceiling is made of massive timbers, upon which are laid the tiles of the upper floor. The roof is covered with tiles of the same material, and is flat with barely enough incline to drain the water from the roof. Adjoining this building is the church, also of solid masonry, with tower containing four bells. Stone acqueducts extending for two miles conduct water from a spring to the haci-

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enda and also to a large mill built of the same durable material. The corral for the stock, and even the fences extending for miles, are all built of stone. Six large granaries 20x100 feet each are constructed for the grain that is grown on this ranch. The grain patio or threshing floor is also of solid masonry. The huts of the peons surround this feudal castle who labor for their master in the fields surrounding. These large cornfields extend for miles and are cultivated in the primitive Mexican fashion with immense returns to the owners. Dr. Benjamin Cory, of San Jose, while visiting Durango, stopped for some time at this rancho, and we are indebted to him for the above description. The Doctor was much pleased with his visit to this princely estate and rode over the land wtth a view to its purchase for parties in San Jose. He describes it as the most desirable of any property he found in the State of Durango.

Mines of Durango.

The gold mine of La Republicana is located on the side of a high mountain near Guadalupe. It is said to be a very valuable mine, as far as richness is concerned, but the vein is narrow and the rock of the greatest possible hardness. It is owned by the Yriarte family, who, unable to work it for lack of capital, merely keep the mine worked just enough to hold possession. The mine might pay well, as one traveler reports its assays at abont 70 per cent. Five leagues southeast by south of Guadalupe is the old mine of Espiritos Santo, another mine of the Spanish times now under water. There are several other old mines in the vicinity of Guadalupe, but they are so filled up with rubbish that it is difficult to speak of their richness with any certainty, although fabulous stories are told of some of them, which seem probable enough from the fact that Guadalupe stands in their midst, a proof of mineral wealth and successful mining.

The Vaca San Marcus and Bismarck mines are described by Dr. Benjamin Cory of San Jose, as follows. "These mines are located in the district of Parrillis, about sixty miles south of the city of Durango and about twelve miles from the town of Nombre de Dios. In 1848 these mines yielded in silver ore $700,000, according to a certificate which I have from the Superintendent of the Mint in Durango. The owners at that time were only 450 feet deep in

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the mine, but were forced to abandon the works on account of the quantity of water. Our company organized in Sacramento some three years ago have denounced the mine and have been in active prosecution of the work ever since the denouncement. We have steam hoisting-works and pump in operation, the first ever seen in the State of Durango. By the latest news our pump has lowered the water about 400 feet below the surface, and we expect to get into the old bonanza in a short time. We have but a few weeks since shipped from Sacramento a pump of large capacity. We have at the mine an engineer, four California miners, a carpenter, a blacksmith and a number of Mexicans employed in and about the mine. Wood and timber, we find, is very cheaply and easily obtained. I had two assays made of the ore from our mines, one by the Professor of Chemistry in Santa Clara College, who reports his assay at $250.08 per ton and lead 43 per cent. Thomas Price, of San Francisco, assayed a piece for me, and he gives as a net result: silver, $325.02 per ton."

Dr. B. Cory, from whom we obtained the foregoing, is one of the directors of the company, as he states, organized three years ago under the name of the "Vaca, San Marcus and Bismarck Mining Company," with Mr. Fred. Werner as President; P. A. Grace, Secretary; and E. R. Lyle, Lewis Goodwin, Geo. W. Chesley, Dr. B. Cory and Fred. Werner as Directors.

Guarisamey. The Guarisamey mines are located north of the mines "There are eight mines in this mineral district which are known as Serano, Copalaja, Enciuillas, Cobres, La Gallera, Baragon, and several others, belonging to Mr. Frank McManus, an American resident of Chihuahua. These mines yield ore, the average of which gives $140 per ton. The last person who worked them regularly, Mr. Sanchez, extracted yearly a profit of $78,000 in silver. His mode of working was in the old Mexican patio amalgamating manner—grinding his ores with the arastra. Still, with all the disadvantages attending the want of proper machinery he was, as can be seen from the figures above, enabled to realize a handsome yearly profit. Upon the advent of Maximilian he sided with the Imperialists and took flight to save his life, having sold his mines for a mere pittance. Some tin placers are also found in this State.

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SMELTING WORKS OF THE DURANGO MAPIMI MINING COMPANY.

(Looking Northeast.)

SITUATED IN MAPIMI, STATE OF DURANGO, MEXICO.

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SMELTING WORKS OF THE DURANGO MAPIMI MINING COMPANY.

(Looking South.)

SITUATED IN MAPIMI, STATE OF DURANGO, MEXICO.

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The principal mining districts of Durango are : San Dimas, Gavilanes, Guarisamey, Tamasula, Canelas, Sianori, Topia, Picachos, Biramoa, Bajada, Papasquiera, Guanacevi, Indee El Oro, Cuencamé and Mapimi. The other mining districts given by Garcia Cubas are: Topia, Tominil, Corpus, Comitala, Durango, Noria, Avino and Coneto.

The Mapimi mines have been worked for centuries, enriching their owners for several generations. Originally these mines were worked largely by the Spaniards, until their expulsion in 1829. Since that time they have been worked by the Mexicans until a few years ago, when they were purchased by Mr. A. B. Sawyer, and have since been worked by him with very gratifying results. The following statement of Mr. Sawyer we herewith present as his report upon the Mapimi mines, that have been consolidated by the Durango Mapimi Mining Company of Council Bluffs, incorporated at Council Bluffs, Iowa:

There are eight separate mines consolidated and owned by this company, viz.: Ojuela, San Vicente, Socobon, Santa Rita, El Carmen, Santa Maria, La Soledad and San Judas.

Ojuela mine is situated five (5) miles from the works, and is 870 feet in depth, with a shaft 768 feet deep. It is a great deposit of lead carbonates from eight (8) to one hundred (100) feet in width, and carries gold from $5.00 to $6.00, and silver from 24 to 33 ounces, and lead 15 per cent. to the ton.

San Vicente is similar ore, lying about 360 yards to the south. This mine is 675 feet deep, and carries from 15 ounces to 42 ounces in silver, and from $2.50 to $9.00 in gold. The ore body is from five (5) to fifty (50) feet wide.

Socobon is situated two hundred yards south-east of Ojuela, and yields from fifteen (15) to twenty-eight (28) ounces in silver, and carries from $3.00 to $4.50 in gold, and runs from 15 per cent. to 50 per cent. in lead. This mine has a tunnel 150 feet long, and has a depth of about 825 feet. At the bottom of the shaft, on the Ojuela mine, at a small expense, this mine can be made to communicate by a "cross cut," and also with the San Vicente, working advantageously these three mines through this one shaft, saving two additional shafts.

Santa Rita, one of the principal mines, is a continuation of the Socobon, and connected with it; yields from twenty (20) to seventy (70) ounces of silver, and carries from $2.50 to $20.00 in gold to the ton. The ore body is from three (3) to forty (40) feet wide, with a depth of from 300 to 450 feet.

El Carmen is quartz and carbonate of lead; new mine; yields from 50 ounces to 140 ounces in silver, with an ore

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body from two (2) to ten (10) feet wide. This mine has been worked to the depth of 75 feet, and is located six miles from the works.

Santa Maria or Tecolotes is a new mine of quartz ore, worked to the depth of twenty-five (25) feet. It is situated in the main body of the Bufa Mountains, with an ore body from one (1) to four (4) feet wide. This mine has yielded very rich ore, as high as 1,000 ounces to the ton. However, as will be seen, but little work has been done so far on this property.

La Soledad and Las Arcos, one mine with two entrances, not communicating one with the other, is quartz ore, and yields from 24 to 120 ounces of silver per ton, and is from three (3) to eight (8) feet wide, and in some places twenty (20) feet wide, and is about 300 feet deep, lying to the south-east of the Santa Rita.

San Judas is lead carbonates, ranging from 15 to 24 ounces per ton in silver. It is a great body of ore communicating with the Santa Rita. It carries gold from $2.00 to $4.50 per ton, and has been worked to the depth of 900 feet.

The company in possession of the above property are making extensive preparations for the thorough working of their mines. They have purchased a large engine, two large boilers, two No. 5 Baker blowers, and three large smelting furnaces, with all the outfit, to be sent to their mines, which have cost the company about $50,000. This, with the smelters and works they already have at the mines, should make a handsome return from the investment. We have herein given illustrations of the works at these mines, that are among the most celebrated of Durango.

"Guarisamey, the head of the surrounding district, owes its discovery to the lode of Tecolota, which crosses the high road to Cosala, in Sinaloa. The abundance and richness of its ores soon brought prospectors, who discovered the veins of Araña, Cinco Señores, Bolanos, Pisamide, Candelaria, Dolores, and Topia, with many others, every one of which was worked profitably. These lodes, or the most of them, were denounced by Zambraño, and all produced bonanzas, some of which were very rich.

"The mine of Araña was remarkable for containing between two small strips of rich ore, a cavity filled (like the bovedas of the mine in Zavala at Catorce) with a rich metalliferous dust, composed almost entirely of gold and silver. It was also distinguished by many of those rich spots commonly called 'clavos,' which, although of small extent in a hori-

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zontal position, were constant in perpendicular depth. The 'clavos' were worked to the depth of 180 varas, though the mine had no shaft; and during the whole of this space, the most ordinary ores yielded from 10 to 15 marcs to the monton of fifteen quintals, while the richest are said to have produced from 70 to 105."—[Ward on Mexico in 1827.]

The tin mines of Durango have lately been opened by the Durango Tin Mining Co., a large amount of capital having been invested. It is stated that the Durango Tin Mining Co. is working some 75 men, and in March last began smelting. No shipments of tin have yet been made. Mexican wagon freighters have offered to put the tin down at Laredo, Texas, for two and a half cents per pound, and a German firm has offered to deliver it to New York from the mines at four and a half cents per pound. The Mexican Central Railroad will reach the mines during the present year, and another, the Mexican National, at a later period. When these roads are completed the company can ship its tin by way of El Paso, Eagle Pass, or Laredo. Some specimens of the ore assay as high as 75 per cent. pure tin.

Iron Mines of Durango.—The *Journal of Charcoal Iron Workers* furnishes the following interesting account of the Piedra Azul (Blue Stone) Iron Works, situated on the banks of the Rio Tunal, some five miles south of Durango, Mexico. These works consist of a blast furnace, 35 x 8 inches; a heating furnace, a puddling furnace, one train of rolls, two sinking fires, one wooden helve hammer, and three smith fires. Power is obtained from a masonry dam across the Rio Tunal, giving a head and fall of 17 feet. There are four wheels—two over-shot, one under-shot and one turbine.

The blast furnace is built of stone. The bottom of the crucible is 24 inches square; the top, which is 5 feet 6 inches higher, is 32 inches square. The bosh then slopes, at an angle of 55° from the vertical, to 96 inches diameter. The crucible and bosh are built of sandstone, brought by wagons 200 miles. The shaft of the furnace is constructed of a silica fire-brick, made from clay and crushed quartz. It runs nearly straight for the first ten feet above the bosh, and is then drawn in by curved lines to the open top, 32 inches in diameter.

Blast is delivered cold from two $2\frac{1}{2}$-inch open tuyeres, the air being supplied by two iron blast cylinders, 60 inches diameter and 5 feet stroke, placed horizontally, and operated by an over-shot wheel. The charge is raised by hand winch, on an inclined plane, to the tunnel head, and consists of one buggy of oak charcoal, seven to ten "batteas" of ore, two batteas of a

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rotten limestone, and one-half battea of clay. These batteas are wooden dishes, and each contains two arrovas (50lbs.) of ore.

The charge may, therefore, be considered at from 350 to 500 lbs. of ore, 50 lbs. of limestone, 15 lbs. of clay to 20 bushels of charcoal.

The average daily product of the furnace is 60 quintals (6,000 lbs.) pig iron, the ore yielding 60 per cent. in the furnace, and requiring one and three-quarter quintals of charcoal to one of iron = to 175 bushels of 20 lbs. to one ton (2,000 lbs.) of pig iron.

Connected with the furnace plant there is a puddling furnace and a heating furnace, in both of which pine wood is used for fuel. There are also two sinking fires, in which pig iron and scrap can be converted into blooms. A short wooden helve trip hammer, raised by four cams on a wheel revolving at right angles to the hammer helve, is used for shingling the loupes and puddle balls. The cams strike the helve back of the hammer head, and a spring piece assists in intensifying the force of the blow.

The smith fires use pine charcoal for fuel. The charcoal is made in the Sierra Madre Mountains in small heaps, by Indians, and most of it is brought in upon the backs of burros. As these animals carry only 8 to 10 arrovas (200 to 250 lbs.), and in some instances can make but a trip to and from the iron works in three days, it is not surprising that oak charcoal sells at 12½ cents, and pine charcoal at 15 cents per arrova. Reduced to a bushel of 20 lbs., this would equal 10 cents per bushel for oak, and 12 cents for pine charcoal.

The charcoal is of good quality, but much reduced in size by handling and transportation. The price of the charcoal could be considerably reduced if the iron works produced its own fuel from wood more convenient to it.

Besides the iron works before described, the Iron Mountain Company, of Durango, Mexico, was incorporated in New York, and now proposes to erect extensive works, consisting of a blast furnace, with capacity of 200 tons of iron per week, and a large foundry. This last-named company hold the title to the whole of this immense iron deposit, called the Iron Mountain, near Durango, with the exception of one seventy-third, which is held by the former company.

Ward, in his work on Mexico, in 1821, says, in speaking of the iron mines of Durango: "Durango might in two years be rendered the depot of iron for Sombrerete, Zacatecas, Catorce, Batopilas, and all the mining districts south of Chihuahua [We might add, for the whole Republic], nor would the suc

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cess of the iron mines already taken up at Encarnacion interfere with this prospect, as their market would be confined to the central mining states, beyond which, from the difficulties of communication, their operations would hardly be extended." (Ward on "Mexico," in 1827.)

This subject has attained more importance since the construction of railroads has been commenced throughout the Republic, and the cost of iron imported for rails is as follows, taken from the "El Minero Mexicano" of December 9th, 1880:

	Per Ton.
Steel rails in England	$28.00
" United States	31.00

COST OF RAILS IN MEXICO.

Price in England	$28.00
Freight to Vera Cruz	9.00
Landing	2.00
Freight to Mexico according to tariff	54.32
Total	$93.32

COST OF RAILS IN SAN LUIS POTOSI.

In England	$28.00
Freight to Tampico	9.00
Landing	4.00
Freight to San Luis Potosi	60.00
Total	$101.00

Cost of rails in New York	$31.00
Freight to Tampico	15.00
Landing	4.00
Freight to San Luis Potosi	60.00
Total	$110.00

The *El Minero Mexicano* very naturally deduces from this that the rails had better be purchased in England, and imported to the ports of the republic, on account of the difference in the price of the rails as well as the freight. But if the extensive iron mines of Durango were developed the rails could be manufactured in the republic at a less price than they can be imported from either of the points mentioned, since the rails could be transported over the table lands of Durango, south-east to Mexico, over a railroad now

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being built on a highway that is comparatively level, that puts the state in direct communication with the City of Mexico and the numerous railroads that are being built from that point throughout the republic. Then the rails could also be transported north to the Southern Pacific or Texas railways and shipped to El Paso, and from thence to Guaymas and Mazatlan, or to Chihuahua, to the railroad that is being built from that point to El Paso, and through a practicable pass in the mountains to Mazatlan, by way of Fuerte and Culiacan, or to Alamos and Guaymas. A large proportion of the territory of Durango, as we have seen, is situated upon the table lands, and the capital is in the midst of a vast plain, or rather in the south-western portion of the plain, that opens up a communication both to the north-east, and south-east to the points designated. On the west, however, and the south-west, the Sierra Madre extends, reaching the valleys and plains of Sinaloa by immense steppes or elevated plateaus, one above the other, which forms a barrier that is almost inaccessible, although a pass is reached on the north-west leading into Chihuahua, where the descent is more gradual, making communication practicable with Chihuahua and Alamos, in Sonora, thence to Fuerte, and from thence to Culiacan and Mazatlan, and Cosala, a new wagon road having lately been built from Mazatlan to Cosala. The iron industry is a most important one to Mexico; and foreign capital, invested properly, would be of great value to the republic, as well as very remunerative to the owners. A foundry could be built at the mines, and rails manufactured, and all kinds of mining machinery, and thus a vast trade could be opened. Says Mr. Ward:

"Iron abounds within a quarter of a league of the gates of Durango. The Cerro de Mercado is entirely composed of iron ores, of two distinct qualities, (crystallized and magnetic) but almost equally rich, as they both contain from 60 to 75 per cent. of pure iron. The operation of smelting these ores is attended with considerable difficulty. An iron foundry, lately set up upon the banks of the river, one league from Durango, has failed, from the want of knowledge of the proper mode of treating the ores. A hacienda has been built in a situation where there is both water for machinery and an abundant supply of timber and charcoal; but as the proprietors do not possess the means of constructing a road for carts, (although from the nature of the ground, it might be accomplished with a very inconsiderable outlay) the conveyance of the ores on mules to the

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reduction works materially diminishes the profits of the speculation. With regard to the difficulty of working them, it might undoubtedly be overcome, as from the affinity of the iron of El Mercado to that of Dannemora, Swedish forgemen would understand the nature of the process at once."

Since the writing of Mr. Ward's book, the ore has been successfully treated, and manufactured into excellent mining tools, etc.

Mr. Geo. F. Ruxton, in his valuable work, entitled, "Adventures in Mexico and the Rocky Mountains," published in 1848, says that "this enormous mass of malleable iron, as he terms it, is isolated on the plain, and is supposed to be an aerolite, and is, consequently, not connected with any ledge or bed of ore. He also says its composition and physical character is identified with certain aerolites which fell in 1751, in Hungary. It contains 75 per cent. of pure iron, according to the analysis of a Mexican chemist, and some specimens which Humboldt procured were analyzed by the celebrated Klaproth, with about the same result."

We obtain the following data from a valuable pamphlet published in Mexico in 1878, entitled, "El Cerro de Mercado de Durango por Federico Weidner," in which the writer compares very justly the difference of the price of iron used in the foundry at Mazatlan with the price in England and also at Durango, as follows:

"At the port of Mazatlan, for example, in all iron of second fusion (pig iron) which is used in the establishment of Señor D. Joaquin Redo, as well as first material (or iron ore) the price per ton of 2,240 lbs. which is manufactured or melted in England, is as follows:

First price of the invoice, per ton.....	$15 to $25
Freight by water, per ton	5 to 7
Unloading and carriage by mules, per ton...	5
Custom house duties, at 30 cts. per hundred,	5
Total.....	$36

a little more or less per ton, or $1.60 per quintal.

"In the place of English iron, if they want to use Durango iron, the cost at the foundry of Flores would be $3 to $4 per quintal, or $60 to $80 per ton.

"Adding to this the freight between Mazatlan and Durango at $3.50 per quintal, or $80 per ton, with the purchase price

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at Mazatlan, at $60 to $80 per ton, makes a total of $156 per ton, more or less, or $7 per quintal."

The iron of Mazatlan, at $6 to $10 per quintal, when cast by the piece, costs $12 to $16 for complicated work; but when half-finished or plain, it costs $8 per quintal, or $180 per ton; so that in Durango, the minimum price is $15 per quintal, or $336 per ton. Adding to this the freight to Mazatlan, makes the minimum price for finished iron $20 per quintal, or $448 per ton."

This is sufficient argument, we take it, for the establishment of a foundry at Durango alongside of the Cerro de Mercado, or mountain of iron, in the immediate vicinity. The author goes on to show that since the first cost in England is $20 per ton while it can be procured in their neighborhood for $4 to $6 in ore, and carriage to a foundry erected would not make it more than $5 to $7. He also mentions the existence of furnaces, retorts, and other apparatus which were abandoned by various parties up to 1856, on account of their being unable to successfully reduce the ore, and points out the fact that the ore of the Cerro de Mercado can be successfully treated and manufactured at a very great profit. He also publishes a scientific examination of the ore and the surrounding locality, its extent and analysis, which we condense below. He goes on to explode an error that exists on the part of travelers and scientific men that this immense mass of iron is an aerolite, and publishes in the pamphlet the geological structure or formation around and underneath it, and pronounces the aerolite theory a *cabal* on the Cerro de Mercado, and further that it is of volcanic origin; and points out the fact that the iron mines of England have produced 15,000,000 of quintals annually for the last 330 years, amounting to $9,900,000,000, or more than seven times the amount of gold and silver coined from all the mines of Mexico from 1690 to 1803. He says the Cerro de Mercado is 1,750 varas in length from east to west, and 400 varas in width, and the height from the surface of the plain of San Antonio 234 varas, which cuts it, as it were, in the middle horizontally, and the resulting estimate in cubic measurement is 60,000,000 cubic varas, and by analysis of the contents or percentage of pure iron it contains, estimates the amount of ore in the whole mass at more than 5,000,000,000 of quintals, from which he calculates that, taking the percentage of pure iron to be 50 per cent., although it assays 75 per cent., the whole mass will then produce 2,500,000,000 quintals of metallic or pure

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iron, and, estimating its value at $5 per quintal, it would represent not less than the enormous sum of $12,500,000,000, or more than three times all the products of the mines of Mexico since 1772 to 1880, which we have estimated to be about $4,000,000,000.

Further, in order to fully comprehend the immense amount of iron in this solid mass, by calculating the amount produced in England at fifteen millions of quintals annually for the last 330 years, the whole amount produced is 4,950 millions of quintals, or only a little over one-third of the amount of pure iron contained in the Cerro de Mercado, which has been aptly termed a mountain of iron, and lies almost untouched, while the same metal now so much in demand within the boundaries of the republic, is imported from England, as we have already shown; the difference in freight, as well as first cost, giving the trade to England

Curious Caves of Durango.

From Cosala, in Sinaloa, to the foot of the mountains, a distance of five leagues due east, Santa Ana, a small rancho, is situated, and near it are some mines of silver and magistral. The road here enters a cañon, and the traveler soon gets enveloped in the mountains, which rise almost perpendicularly. Strata of porphyry, granite, limestone and alabaster are found on each side.

A small stream runs along the bottom of the cañon, and leads up to the table-land, which soon commences. On the boundaries of Durango, immense herds of cattle are seen grazing on the plains, mingling with elk and the fallow deer, and black-tailed deer; the latter, however, frequents mostly the inaccessible mountains.

The celebrated caves of the state are located 30 leagues from San Antonio, and 16 leagues from Cosala, or about 48 miles. The caves are situated in a small circular valley or basin 100 yards in diameter. The road lies down the cañon, 14 leagues below, to this basin.

The caves are called Las Cuevas de San Miguel. The largest is called San Miguel, and is 240 feet in length and 80 feet high, and 150 feet wide, forming a large room. The roof is a regular arch in formation or curvature. In the back wall, opposite the entrance, are found openings of different sizes. One of them was penetrated by a traveler, who describes them in a book entitled, "The North-western Part of Mexico." He says, he penetrated 130 feet, and found intricate windings and subdivisions or openings on each side.

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The origin of the caves is unknown, but it is supposed that they were inhabited by the aborigines or ancient Aztecs. They have never been completely explored, as near as we can ascertain, and the attention of antiquarians is called to them, as relics of the former inhabitants might be found. From the caves, the distance to Plomosas is 40 leagues, and to the city of Durango, 40.

Coahuila.

The state of Coahuila is divided into five districts: Saltillo, Parras, Viezca, Monclova and Rio Grande. The state is extremely mountainous, and the vast plains called the Bolson de Mapimi extend throughout the western portion, a deserted region covered with sands and alkali. The principal mountains in the north are El Pico Etereo, La Sierra del Carmen, and Lomerios de Peyotes. In the center, the Sierra of Santa Rosalia, San Marcos, La Fragua, La Paila, Sierra Azul, Coahuila, Chiflon, Angostura, and Sierra Madre. Saltillo is the capital, with 8,000 inhabitants.

The whole state is very sparsely settled, and, as yet, is almost entirely undeveloped, on account of its lack of sufficient water and the constant incursions of the Apaches upon the settlements.

The principal productions of the state are stock, and agricultural products, such as grapes and fruits of various kinds. Some mines are also worked.

Nuevo Leon.

The state of New Leon is bounded on the north and north-east by Tamaulipas, and on the west, north, and south by Coahuila, and on the west and south by San Luis Potosi. In the western part, the state is traversed by the Sierra Mountains, extending from north to south, and in the north-east it is occupied by extensive table lands broken by mountain peaks extending from the base of the mountains toward the north-eastern border where the table lands break into cañons traversed by arroyos. From the center of the state to the eastern border an extensive plain stretches from the base of the mountains. This extensive valley or plain is traversed by the river San Juan, which rises in the mountains in the western part of the state and passes Monterey, the capital, which is situated on its banks, and flows in a north-easterly direction across the border into Tamaulipas

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and then into the Rio Grande. This is the only river in the state, and its main branches are the Pesquiera and the Rio Pilon.

The valley of the San Juan is very fertile on the river bottoms and produces the usual tropical productions. Stock-raising and agriculture constitute the principal trade of the state. The capital (Monterey) has about 13,500 inhabitants, and the state is divided into 44 municipalities, with a population of about 200,000.

Tamaulipas.

The state of Tamaulipas consists of the extreme north-eastern portion of Mexico, and is divided into four districts —namely, Del Norte, Del Centre, Del Sur, and Cuarto Distrito. The principal ports are Matamoras, on the bank of the Rio Bravo or Rio Grande, near its mouth; Tampico, on the Tampico, Soto la Marina. Victoria is the capital of the state; inhabitants, 6,000. The south-eastern po tion of this state is broken with the spurs of the Sierra Madre, while the northern and north-eastern portion is covered with plains. It is bounded on the north-east by the Rio Grande River and Texas opposite, and on the east by the Gulf of Mexico, and south by Vera Cruz and San Luis Potosi, on the west by New Leon. A small strip of the state extends along the Rio Grande on the north-west.

The town of New Loredo is the proposed northern terminus of the Mexican Central Railroad, and is situated in the narrow strip of the state before mentioned, in the extreme north-western part of the state. The city of Matamoras and Tampico are its principal sea-ports, and the chief business of the state is stock-raising and some agricultural productions. Matamoras is located on the Rio Grande about 20 miles from the mouth of the river, and Tampico is located at the extreme south-eastern portion of the state, on the Barra de Tampico.

Arts and Manufactures.

To fully comprehend the progress made by Mexico in arts and manufactures, we append the following information from the work of the learned and able writer, Antonio Garcia Cubas, published in Mexico, in 1876, from which we have obtained most of our information concerning the resources of Mexico. The following statements of facts will open the

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eyes of many who think the people of Mexico a barbarous and half-civilized people; and it may as well be stated here, that although rude implements of agriculture and mining are found to some extent in portions of the republic, yet vast improvements have been going on, as the following from the pen of Cubas will verify. The work has been translated by Mr. George Henderson, of Mexico:

"Carved work and filigree work in gold and silver yield in little or nothing to similar productions from abroad. The carriages and household furniture made in Mexico, with the exception of silk stuffs, can compare in taste and solid workmanship with the best that can be imported from foreign countries.

"In the fine arts, both in painting, as well as sculpture and architecture, our Academy of San Carlos, reported by travelers to be the first in America, displays the progress they have acquired. Some of their works will be exhibited to the public at the Philadelphia Exposition. The fabrication of texturas, as well as other manufactures, has increased astonishingly. Several factories, sugar-mills, and distilleries, are established in the states of Mexico, Pueblo, Vera Cruz, Jalisco, Morelos, Guerrero, Tobasco, Oaxaca, and Yucatan.

"Earthenware is made in Guanajuato, Mexico, and Pueblo in the state of Jalisco; and in the valley of Mexico there are various paper mills; also, some glass factories in Mexico and Pueblo; also, (at Durango) cotton factories in the greater part of the states; silk factories in Guanajuato, Queretaro, and Mexico. The number of cotton factories in the republic exceeds seventy. The states that may be considered as manufacturing districts, being those of Pueblo, Jalisco, Queretaro, Mexico, and Vera Cruz."

This number of factories existed in 1875, and, since that time, many others have been built in Sinaloa, Sonora, and other states. Also, flour-mills, glass and paper factories have since sprung up, and we only give the data in regard to flour-mills of the state of Sonora, obtained from Mr. David B. Blair, acquired by him through Mr. Ortiz, of this city.

Total number of flour-mills on the line of the Sonora R. R., 31. There are, besides, many small mills that manufacture flour for local consumption. The total amount of tons of flour produced is 9,100 tons, from the various haciendas in Sonora. Besides this, the production of numberless other wheat-producing regions never reaches the port of Guaymas.

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Imports and Exports.

The Mexican government maintains mercantile relations with England, France, the United States of America, Germany, Spain, and the Island of Cuba, Belgium, Italy, Central America, the United States of Colombia, and the Equator.

According to the Annual Reports, the value of the importations may be estimated at 29,000,000 of dollars, as follows:

	For 1875.
Cotton and cotton goods	$10,500,000
Groceries, wines and spirits	5,000,000
Articles free of duty	3,300,000
Hardware and ironmongery	2,100,000
Miscellaneous	2,000,000
Linen and hemp goods	1,400,000
Woolen goods	1,400,000
Mixed goods	1,400,000
Silks	1,000,000
Earthenware, glass and crystal ware	600,000
Drugs and chemicals	300,000
Total	$29,000,000

This amount was imported from the following countries:

	For 1875.
England	$10,200,000
United States of America	7,500,000
France	4,780,000
Germany	3,800,000
Spain and the Island of Cuba	1,400,000
United States of Colombia	1,200,000
Central America	100,000
Italy, Belgium, and American Republics	20,000
Total	$29,000,000

The exportations amounted to 32,300,000 of dollars, as follows:

	For 1875.
Gold and siver coin	$24,000,000
Ores and minerals	1,800,000
Hides and skins in general	1,800,000
Henequen, Ixtle and cordage	1,000,000

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Timber and dye woods	$1,000,000
Coffee	600,000
Vanilla	400,000
Cochineal	300,000
Cattle	200,000
Tobacco	150,000
Orchilla	130,000
Fine pearls	110,000
Caoutchouc or Indian Rubber	100,000
Sarsaparilla	90,000
Wool	90,000
Sole and upper leather	80,000
Indigo	80,000
Jalap root	80,000
"Coquita," small cocoanut	50,000
Frijoles (beans)	40,000
Cotton	30,000
Mother of pearl	25,000
Starch	25,000
Wheat	20,000
Other agricultural and industrial productions	100,000
Total	$32,300,000

These exports are made to the following countries:

	For 1875.
England, to the amount of	$12,500,000
United States of America	12,000,000
France	5,000,000
Germany	1,500,000
Spain, and the Island of Cuba	800,000
Central America	150,000
Italy and Belgium	50,000
	$32,000,000.
The balance goes to other countries	300,000
Total	$32,300,000

[The above estimates we obtain from the valuable work of Antonio Garcia Cubas entitled "The Republic of Mexico," published in 1876 in the city of Mexico.]

Thus we see by a comparison of the tables that England imports nearly $300,000 more than the United States of America, and that only about one-quarter of the entire im-

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ports of Mexico come from the United States, while England, in her little island from her warehouses at Liverpool and London, imports nearly one-third of the entire trade, and Germany imports less than either the United States or England.

Of the exports, England still commands $500,000 more than the United States, though they are nearly equal, each absorbing over one-third of the entire trade. The balance of trade we also see is in favor of Mexico, the exports being in excess of the imports some $3,000,000. The lesson of this table we leave with our readers. It is plain to be seen that with a little effort the United States may take the lead and eventually supply the most of this trade, or by establishing warehouses in the manner stated elsewhere, command eventually the greater proportion of the $30,000,000 or $40,000,000 imports annual trade of Mexico. This trade, however, we thus see in its infancy, and as it increases it would prove of rich profit to our ports.

Through the Mexican Consul we have obtained the following data from the "Memoria de Hacienda y Credito Publico," dated January 12, 1879, and issued as a public document at the City of Mexico: "The exportations for the year 1877 to 1878 reaches the amount, according to the balances respectively, of $28,777,508.07 (No. 5, Part IV). The legal importations of merchandise for the year 1877–78, may be estimated at the value of $21,462,621. Probably during the present economical year (1879) there will be less importations of foreign merchandise. It is calculated that more in value (about $4,000,000) are exported annually than imported by foreign merchants. In the past few years it has been notable that emigration to the capital has increased in Mexico and diminished the production of former years." From the same work we gather that Mexico is now supplying her own trade to a considerable amount by home manufactures, which has not failed to reduce the foreign trade. The same report says the falling off has been caused by the general effects of revolutions, and calculates the falling off from 1867 to 1877 at about $12,000,000. The work was printed in 1878, and consequently the last two years' report has not yet reached the public, but from the large importations of railroad accouterments which are now being shipped principally from England and Hamburg, with the brisk reopening of her mines, will undoubtedly bring her commerce of the present year up to in the neighborhood of former years, if it does not exceed them. One notable fact ap-

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pears, however, that the balance of trade is undoubtedly in favor of Mexico, as she claims, of about $4,000,000, as a liberal estimate. The amount of smuggling will nearly balance the imports and exports either way of that class, but calculating even that the smuggling of imports vastly exceeds the exports unlawfully shipped and transported from her borders, yet it cannot exceed it more than the allowance made of about $3,000,000; hence, in any event, it is apparent that Mexico is not being impoverished, but is gaining continually against the commerce of other nations.

From the "Hacienda y Credito Publico" of January 12th, 1879, we also obtain the following interesting data: From 1874 to 1875, the exports to England from Mexico in various goods was $768,411.37; in metals, $7,612,788.57; and other merchandise, $838,637.96. Total, $9,219,873.40. The same to United States: various goods, $3,476,774.53; in metals, $6,696,538.55; other merchandise, $184,854.82. Total, $10,358,167.80. Total amount of exports in that year was $27,318,788, of which the United States received $1,138,294.40 more than England, and over one-third of all the exports of Mexico. The imports from New York City alone in three years and six months amounted to $3,158,-216.48.

The "Boletin de Sociedad Agricola Mexicana," of December 11th, 1880, an official paper, published in Mexico, calculates the amount of exportations for the year 1880, in round numbers, at about $35,000,000, of which amount the same paper credits the productions of the mines at about $30,000,000—an increased activity having taken place during the last year—and the balance, or about $5,000,000, is the value of the other productions exported.

The vast amount of material being imported for the construction of railroads makes it almost impossible to reach a calculation of the probable amount of imports, until all the official reports are returned to the general government, and given to the public, for the past year.

These data are sufficient to encourage our merchants to make an effort to secure this valuable trade, which may be increased almost indefinitely on the development of the vast resources of Mexico.

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How to Reach the Northern Part of Mexico.

The Americans as a general thing, know but little of the northern part of Mexico, and still less how the traveler, for pleasure or business, can best visit there. There are various routes that can be traveled, occupying more or less time, and accompanied with greater or less risk.

First, the route from the east by way of Vera Cruz to the City of Mexico, and thence by stage or diligence to San Luis Potosi and Zacatecas; from thence to the city of Durango; from Durango the traveler can proceed to Mazatlan on the Pacific or the city of Chihuahua. From either of these places he can visit in detail or at his leisure the whole length and breadth of the Sierra Madre and Sierra Caliente or Hot Country. The old route by stage from San Antonio to El Paso is no longer necessary, since the traveler can reach El Paso by the Atchison, Topeka and Santa Fe railroad, or by the Texas and Missouri Pacific and Iron Mountain R. R. The completion of the Mexican Central to the city of Chihuahua and from thence to Durango will also be an improvement upon the stage traveling over the same route. From Durango the stage may be taken to Zacatecas, via Nombre de Dios, Sombrerete and Fresnillo. From Zacatecas connection by stage may be made for San Luis, and from thence to Mexico City or to Tampico on the Gulf. Or stage may be taken from Zacatecas to Lagos and from thence to Guadalajara. In fact from the principal cities over the whole Republic stage communication may be found.

While it is not desirable to travel over the hot lands of the Gulf during the sickly season, yet if the traveler desires he may start from Brownsville, Texas, and travel by stage by way of Matamoras, Camargo, Mier, Monterey, Saltillo, through to Mexico City, or to Zacatecas, and from thence to Durango, Chihuahua and El Paso.

For the northwestern part of the Republic, some travelers prefer to take the steamer from San Francisco to Mazatlan or Guaymas. This steamer leaves San Francisco for the aforesaid Mexican ports, touching at Cape St. Lucas and La Paz in Lower California, Mazatlan and Guaymas in Sinaloa and Sonora. From Mazatlan the voyager can find conveyances to any part of Sinaloa, Sonora, Durango, or Chihuahua. Besides the stage routes before mentioned we might add that the traveler can go from San Antonio, Texas, by rail to El Paso, and from thence to Chihuahua, Alamos and Mazatlan, the fare from Alamos over this route to the city of

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Mazatlan being $40 for the trip of five days, with one day besides at Culiacan. The price of meals ranges from 75 cents to $1 besides the fare by stage, and lodgings $2 including bed and breakfast. Prices are naturally high with the advent of increase in travel. The completion of the connection between the Atchison, Topeka and Santa Fe route and the Southern Pacific Railroad now opens a route in that direction, doing away with the necessity of stage from San Antonio to El Paso. There are three principal routes, one by El Paso by stage, one by Tucson to Guaymas and from thence to the various points, and the other is by taking the steamer at San Francisco for the various ports on the sea coast. On the eastern coast of Mexico the principal route is by steamer to Vera Cruz and rail to Mexico City and from thence by Mexican diligence. The Mexicans are proverbially fond of demanding extortionate charges for everything required by travelers, and it is necessary for one to keep his wits about him, or he will have to pay two or three prices for everything. In Mexico foreigners are always considered legitimate prey, and the only way to avoid extortion is to learn the prices of exerything. This may be learned to some extent in the papers or from resident foreigners who can be trusted. After learning this, never ask: "How much do you charge?" but always say: "If you have so and to sell, at such a price, I will take it." They universally ask more than they expect to get, and fall to the regular price.

In traveling, buy your ticket at the stage office, and if you are to travel off of the regular stage route a mule can be hired for a very small amount, whereas a team may cost you considerably. The prices of meals are generally cheap, except on the regular stage routes, where they reach as high as before mentioned in many places.

The nearest and most convenient route for travelers from the Northern and Eastern States by steamer to Mexico City is by the line of F. Alexander & Sons from New York. Fare to Vera Cruz, first class, $80; second class, $60. From Vera Cruz, by rail, first class, $16; second class, $12; third class, $7. From New Orleans, first class, $60; second class, $45. From San Francisco, by Mexican Steamship Line, to Mazatlan, first class, $75; to Guaymas, first class, $90.

Everyone goes armed for emergencies while traveling. On the public highways comparative safety reigns; but it is always safer to travel in companies, and not forget the American's pocket protector. Small bands of savages, most-

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ly Apaches, still rove in the mountains and over the plains occasionally, and are ready to commit murder and robbery. Brigandage is not entirely done away with; and if the traveler is alone, he must, in dangerous places, keep on the lookout for lurking savages or brigands. Sometimes a solitary brigand will not hesitate to attack a traveler, and the manner of attack is often very singular. As a case in point, a traveler is responsible for the following. While traveling along one of the highways in northern Sonora, he was startled by the "click" of a horse's hoofs behind him, and the peculiar "swish" through the air of a lariat, which fell over his shoulders; and before he knew it almost, his arms were pinioned to his sides. Fortunately, he had the presence of mind to turn his horse's head, being well mounted, and spur his horse in pursuit of the brigand, or he would have been unhorsed in an instant. It took but a moment to free himself from the lariat and draw his pistol and shoot the brigand dead on the spot. The object was to drag him from his horse and over the ground until he was insensible, and then rob him, and possibly murder him. We give this only as an illustration of the perils of solitary traveling. Camping out is often romantic, and very agreeable; but if one intends to travel in Mexico at present, he must expect to endure some hardships. It is necessary to acquire the Spanish language, or sufficient to converse readily, and also to be provided with letters of introduction, either from some well-known Mexican citizen, or foreigner located in Mexico, in order to avoid many unpleasant and aggravating occurrences. The people are hospitable and courteous, and expect foreigners to respect their institutions, and reserve their comments on the government and politics to themselves.

Revolutions.

The disturbances and overthrow of the civil authorities were, at one time, quite serious affairs in Mexico. Small bands of robbers would enter the town, take possession, and levy a tribute on all the citizens. This style of robbery has been dignified with the name of revolution, when it is nothing more than the pranks of highwaymen. The most of these revolutions, so-called, are this and nothing more. Some years ago another style of revolution was adopted, that savored more of a conspiracy to defraud the government than anything else. Some of the large business houses, on the approach of their vessels laden with cargoes would pay

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a small band of ruffians to put up a disturbance and overthrow the civil authorities, often in collusion with them, until the vessel had landed her cargo and the goods were started away; in this manner evading the duties. Some of the oldest and most respectable business houses have often engaged in this revolutionary fraud, and acquired immense wealth thereby. This was stopped about seven years ago by the severity of the general government in ferreting out and punishing the perpetrators. Restitution was demanded in one instance, that cost the firm $150,000 more than they had ever made by it. This severity was exercised in other instances, and it put a stop to this species of speculation. In some instances during these disturbances, to give color to their innocence, a compromise was effected with the custom-house officers, and about one-fourth of the legal duties were paid. The prompt and effective punishment of this class of offenders by the late governors and chief executives of the republic has stopped the most of this marauding, and the republic is now comparatively safe for travelers and settlers. Foreigners who do not mix in political discussions or squabbles, and keep a close mouth in relation to the affairs of the republic or states, are mostly left undisturbed, as their presence is recognized as desirable.

From the sentiments expressed in the editorials of the Mexican press, we gather the fact that immigration is desired on the part of the Mexican people, and they are opening their hospitable doors to the immense number of immigrants that are now flocking over the border-lines of the frontier. The old fashioned immigrant wagons are again seen on the road, crossing the frontier at El Paso, and remind old "49-ers" of the early days of California. Capitalists are flocking by the hundreds from all parts of the United States into Tucson, and from thence into Mexico; also, at El Paso. These four states are fast being settled by these immigrants, and yet there is room in all that vast expanse of territory for the miner, settler, and capitalist.

One great advantage, besides numerous others, will be in the effective stopping of every class of marauding revolutions; while the country will be settled up, new mines will be opened, and abandoned haciendas be made to pay rich returns for their management. Mexico will be the gainer in numerous ways; her soil will be extensively cultivated, and her mines produce an enormous annual revenue; her towns will be more flourishing, and her exports consequently increased. This will again benefit the nations who may be

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in commercial relations with her inhabitants. The more producing element to develop her vast resources, the more extensive her trade with foreign nations will become. There are yet some facts to be taken into serious consideration in relation to the settlement of Mexican territory by American citizens, that will be particularly referred to hereafter in the question of the acquisition of property in any of the states of Mexico by aliens.

Annexation.

In order to disabuse the minds of some persons who may think that any of the northern states of Mexico will at an early period be annexed to the United States, we present the following facts. There is a strong feeling among the Mexican people akin to patriotism, which very positively declares that not another inch of the territory of the Moctezumas shall be ceded to the United States or any other power. This is not the only reason that exists unfavorable to annexation; there are others of importance, the principal one being that capitalists who reside in the United States and Europe who have invested in mines and lands in Mexico will be opposed to annexation, since their property under the laws of Mexico escapes free from taxation, and their influence will be against it. Secondly, the large property owners in these four states for the same reason will be opposed to it. Thirdly, a large element in the United States, located mostly in the South, who cultivate, in common with Mexico, cotton and sugar-cane and other productions of the tropics, are opposed to it. Also, the additional federal taxes to support the governments in the additional territory, should it be annexed, makes the scheme an expensive one; besides the enormous price that would be demanded by the Mexican government for this territory, which contains the richest mines in the republic, would present an additional obstacle. Again, the advantages received would not repay the enormous outlay that would add to our already overburdened national government debt. Lastly, the cultivation of friendly business interests and relations between the two republics will reduce the duties, so that when iron bands have joined their commerce, friendly and mutual interchanges will banish the idea of annexation. We think the advantages will be the same, but without the disadvantages that would be necessarily incurred.

The influx of immigration will add to the security of

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property and person, which is all that settlers in a foreign country generally desire. Mexico is a great nation, and is well known to be the richest nation in the world in mineral resources. If they are developed by intelligent and well-directed labor, her future is a brilliant one. The telegraph and railway are already carrying into her limits the advantages that will make her one of the most powerful nations on the globe.

Steam engines are plying in her gold and silver mines, imported by foreign capital. Soon her seaports will be thrown open on both sides, and she will command the commerce of the world. Far be it from the American people to covet her vast territory, with all her riches, though undeveloped they be. Rather let us extend to her a friendly hand, assisting her to take a place among the advanced nations of the earth, with liberty inscribed on her flag, and prosperity extending throughout her limits.

Her form of government is Republican, let us remember; and she too, with our own republic, is solving the question of self-government. Stormy though her career has been, yet, with all her revolutions she has claims still upon our friendly interest; and with a commendable spirit of patriotism she is attempting to educate her people and develop her vast resources under a Republican form of government.

As Americans love their soil and take pride in their institutions, so does Mexico, in like manner, believe in her nation, her people, and looks forward to an era of prosperity equal to any nation on earth.

For centuries she has been bowed down under the weight of an antiquated despotism, and is but passing through her childhood as a republic. With the fall of Napoleon, in France, Mexico awoke to put off the shackles of her Spanish conquerors. Hernando Cortez found her a half barbaric but magnificent empire, ruled by the native princes, who wielded a despotic power in the palaces of the Moctezumas. Spain left her a ruined empire, with half of her people without the aid of the basis of modern civilization.

Ignorance spread its pall upon her future as a republic, and storms of revolution after revolution was the natural result. But a new era is now dawning, that gives the promise of a magnificent future. She is favorably situated for commerce—perhaps more favorably than any other country in the world; for she touches two oceans and a hundred islands, and stands midway between North and South

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America, and midway between all the commerce of Asia and Europe. We boast of our mines in California, Nevada, and the territories, when we have but the border of the vast mineral region that nestles in her bosom. She possesses the matrix of all our mines of gold, and silver, and copper, and other minerals, while we have but the outcroppings. Her mines have for centuries yielded vast riches, and are almost untouched in comparison with her hidden treasures that are yet to be developed. It is no wonder that capitalists are turning their eyes upon Mexico from all parts of the world. England, and Germany, and France have for years been quietly gathering the flower of her commerce; and even now the parties interested in Mexico from these nations are attempting to discourage American capitalists from invading their special favored commercial territory, as they are pleased to term it: but although they denounce the Mexican government and people, they take care to continue their quiet absorption of her wealth. It is time American capitalists should be vigilant; and if any nation is to develop the vast resources of Mexico, and profit thereby, the energetic American people are to contribute their share in this great and remunerative work.

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Roads of Northern Mexico.

From Colonel E. de Fleury's Map.

SONORA.

From Guaymas to Hermosillo, 96 miles, good wagon road.
From Hermosillo to Ures, 45 miles, " " "
From Hermosillo to Santa Cruz, by north road to Tucson, 138 miles, good wagon road.
From Santa Cruz to Fronteras, road to El Paso del Norte, 80 miles, good wagon road.
From Fronteras to El Paso del Norte by Cañon de Guadalupe, 155 miles, good wagon road.
From Ures to Altar, 140 miles, good wagon road.
From Ures to Arispe, by road along Sonora river, 73 miles, mule trail.
From Arispe to Fronteras, 55 miles, mule trail.
From Ures to Moctezuma, 70 miles, mule trail.
From Ures to Sahuaripa, 130 miles, mule trail.
From Ures to La Trinidad Mine, road to Chihuahua, 140 miles, mule trail.
From Trinidad to Chihuahua City, 180 miles, mule trail.
From Ures to Alamos, 182 miles, mule trail.
From Alamos to El Fuerte, 40 miles, mule train.
From Guaymas to El Paso del Norte (line of projected railroad), 470 miles, wagon road.

CHIHUAHUA.

From Chihuahua to El Paso del Norte, 250 miles, wagon road.
From Chihuahua to Alamos, 220 miles, mule trail.

SINALOA.

From El Fuerte to town of Sinaloa, 58 miles, wagon road.
From Sinaloa to Culiacan, 35 miles, wagon road.
From Cualican to Cosala, 65 miles, wagon road.
From Cualiacan to Mazatlan, 150 miles.

LOWER CALIFORNIA.

From Mulejé to San Diego road to California, water at long intervals, 550 miles.
From Mulejé to La Paz, 335 miles, water at long intervals.
From La Paz to Todos Santos, 76 miles, water at long intervals.
From La Paz to San Jose, 60 miles, water at long intervals.

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Manner of Acquiring Real Estate.

Land is acquired in Mexico by denouncement, purchase, donation, accession, prescription, adjudication and inheritance. The law relating to public lands limits the acquiring of said lands to 2,500 hectares (about 2½ acres to each hectare) to each denouncer, but this may be increased by Government grant.

The following legal opinion touching the denouncement of vacant lands, by Hon. Judge Carlos F. Galan, one of the magistates of the Snpreme tribunal of Sinaloa and Lower California, but now practicing law In this city, is given to the public with the permission of Judge Galan:

"A petition is presented to the District Judge (Federal), describing the lands by metes and bounds. The Judge orders the denouncement to be published in a newspaper for the period of three weeks. If no opposition is made, the Judge orders a survey of the land denounced, to be paid for by the denouncer, but in accordance with certain rules given by the government. That done and presented to the Judge, the expediente is given for examination to the District Attorney, who objects or not, as the case may be. In case of objection, the Judge orders a new survey, or whatever may be needed, in accordance with the District Attorney's opinion. When all is correct, the Judge adjudicates the land to the denouncer; a certified copy of all the proceedings is taken at the expense of the denouncer, and sent to the Governor of the State where the land is situated. He reports favorably or otherwise, and sends the papers, always at the expense of the denouncer, to the Minister of Fomento, in Mexico, and there the papers remain till their turn comes, and the Minister may or may not issue a patent. That issued, it is sent to the District Judge, who gives the judicial possession of the land, (not gratis, however) and the patent is delivered after paying for the land."

The question of the right of foreigners to acquire real estate in the Republic is an extensive one, and we shall content ourselves with the following brief summary and refer our readers to the work entitled "Hamilton's Mexican Law," in which we have elaborately discussed this subject, and quoted all the laws extant relating thereto, together with the Mexican Constitution and decisions of Mexican tribunals.

The law to-day in relation to foreigners may be said to prohibit:

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First—Acquisition of private lands within twenty leagues of the boundary line by foreigners without express permission from the Supreme Government.

Second—Denouncement of public lands by natives or naturalized citizens of the adjoining nations in any of the frontier States or Territory.

Third—Acquisition of real estate in any part of the Republic, unless the foreigner is either a resident of Mexico, or admitted to local privileges, or has become a naturalized Mexican citizen.

Mexican Mining Law.

The manner of denouncing mines is briefly as follows: The discoverer presents himself with a written statement before the Mining Deputation of that district, or Prefect, setting forth his name, place of birth, residence, profession or trade, the distinguishing marks of the site, hill or vein of the property. The statement is entered in a book of registry with the hour of discoverer's application, and returned endorsed to the discoverer for his security. Public notice is then posted on the doors of the church, or in other public places, and within ninety days a shaft 1½ varas in diameter at the mouth and 10 varas in depth is sunk. One of the deputies, or the Perito, and a notary then personally inspect the bearings and direction of the vein, its width, inclinations, its hardness or softness, solidity of its walls, nature and indications of the mineral, adding their report to the record with the certificate of possession, which is then given, upon fixing the dimensions of the claim and stakes or boundaries. Official copy of all of which constitute the title to the mine.

Failure to work the mines four consecutive months with four regularly paid miners forfeits the mine, and it may then be denounced by another. Neglect to work the mine in the manner prescribed by law eight months in the year, counting from date of possession, although during said eight months, several days or weeks are interspersed, loses the right to the mine, unless this time is extended, or pestilence, famine or war intervene in the district where the mine is located, or within twenty leagues thereof. The mining ordinance, with all its latest modifications and mining decisions of Mexican tribunals, will be found complete in the work last before mentioned.

The present law originally prohibited foreigners not nat-

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uralized or allowed by special license, from acquring or working mines. This provision was repealed by subsequent laws and circulars, and now foreigners legally may acquire mines in all parts of the Republic, provided one of the partners resides within the limits of Mexico. On this subject see "Hamilton's Mexican Law," in which is discussed the right of foreigners to acquire mines within the prohibited belt, with the laws and circulars quoted therein. This right is withheld from foreigners by an unjust interpretation of the law applicable to foreigners.

Mexican Railroad Concessions.

So many inquiries have been made, and are being made, respecting the concessions granted by the Mexican government, and under which railways are being built or will be built, that the following condensed statement of the same will be of value. This list contains the grants made from August, 1877 to 1881, and embraces what are known as the "live" grants.

In the statement, the abbreviation "kil." stands for kilometer, one kilometer being equal to 62-135ths of an English mile. "S. G." stands for standard gauge, and "N. G." for narrow gauge. "Con." stands for the party to whom the concession has been granted.

National railroad from Tehuacan to La Esperanza. S. G. Con., general government. Length, 50 kils. Total cost, $298,500. Completed.

Celaya to Leon and Guanajuato. N. G. Con., State of Guanajuato. Length, 125 kils. Built, 60. Total subvention, $1,000,000.

Mexico to Toluca and Cuautitlan. N. G. Con., an anonymous Company. Length, 115 kils. Built, 46¼. Total subvention, $832,000.

Salamanca to the Pacific Coast. N. G. Con., State of Michoacan. Length, 660 kils. None constructed. Total subvention, $5,280,000.

Ometusco to Pachuca and Tulancingo. N. G. Con., State of Hidalgo. Length, 209 kils. Built, 25. Total subvention, $736,000.

San Luis Potosi to Tantoyuquita. N. G. Con., State of Lan Luis Potosi. Length, 209 kils. Built, 6. Total subvention, $1,672,000.

Lagos and Guadalajara to San Blas. N. G. Con., State of Jalisco. Length, 737 kils. Built, none. Total subvention, $5,896,000.

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Celaya to San Juan del Rio. N. G. Con., State of Queretaro. Length, 104 kils. Built, none. Total subvention. $832,000.

Tehuacan to Puerto Angel through Oaxaca. N. G. Con., State of Oaxaca. Length, 519 kils. Built, none. Total-subvention, $4,152,000.

Vera Cruz to Alvarado. N. G. Con., State of Vera Cruz, Length, 132 kils. Built, 9. Total subvention, $1,056,000.

Tantoyuquita and boundary of the States of San Luis and Tamaulipas. N. G. Con., State of Tamaulipas. Length, 105 kils. Built, none. Total subvention, $840,000.

Merida to Peto via Ticul and Tekax, N. G. Con., State of Yucatan. Length 126 kils. Built, 10. Total subvention. $756,000.

Zacatecas to San Luis, Aguascalientes and Lagos. N. G. Con., States of Zacatecas, San Luis, Aguascalientes and Jalisco. Length. 448 kils. Built, 6½ Total subvention, $3.854,000.

Port of Manzanillo to Tonila. N. G. Con., State of Colima. Length 104 kils. Built none. Total subvention, $832,000.

Mexico to the shore of the Amacuzac. N. G. Con. State of Morelos, Length, 395 kils. Built, 96. Total subvention, $3,160,000.

Matamoras Izucar. N. G. Con., State of Puebla. Length 57 kils. Built. 11. Total subvention, $456,000.

San Martin Texmelucan. S. G. Con., general government. Length, 37 kils, Built, 2. No subvention,

Cuautitlan to Salto. N. G. Con., the Toluca Company. Length, 63 kils. Built, 38. Total subvention, $441,000.

Tehuantepec. S. G. Con., Edward Learned. Length, 200 kils. Built. 5. Total subvention, $1.500,000.

Matamoras to Monterey. N. G. Con. state of Tamaulipas. Length, 400 kils. Built none Total subvention, $3.200,000

Mexico to Acapulco. N. G. Con., State of Guerrero. Length, 453 kils. Built, none. Total snbvention,.... .. $3.720,000.

Chihuahua to Villa del Paso or to Villa Ojinaga. N. G. Con., State of Chihuahua. Length, 350 kils. Built, none Total subvention, $2.800,000.

Patzcuaro to Morelia and Salamanca. N. G. Con., State of Michoacan. Length, 169 kils. Built, none. Total subventien, $1.352,000.

Culiacan to the Port of Altata and Durango. N. G. Con., State of Sinaloa. Length, 440 kils. Built, none. Total subvention, $3,520,000.

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Anton Lizardo to Huatulco and Puerto Angel. N. G. Con., State of Oaxaca. Length, 450 kils. Built, none. Total subvention, $3,600,000.

Jalapa to San Andres Chalchicomula. N. G. Con., States of Puebla and Vera Cruz. Length, 80 kils. Built, none. Total subvention, $640,000.

San Agustin to Huehuetoca. N. G. Con., State of Hidalgo. Length, 50 kils. Bnilt, none. Total subvention, $400,000.

Central International & Interoceanic (Boston Company.) S. G. Con., limited Company, represented by S. Camacho and R. Guzman. Length, 2,435 kils. Built, 54. Nearly ready 24 kils. additional. Must build within 1 year, 3 months and 22 days. 354 kils. Time allowed for construction, not counting first year, 9 years, 7 months, 22 days. Sum which the government must pay in one year from the date of concession, $600,000. Total subvention, $23,132,500.

Mexican National Construction Company (Palmer & Sullivan.) N. G. Con., Company represented by Palmer & Sullivan. Length, 1,043 line to frontier, 915 line to Pacific. Built, none. Preparatory work being rapidly pushed. Subvention per kil. to Pacific, $7,000; to United States, $6,500.

This Company must build 450 kils. every two years. It is allowed four years, not counting first year, to reach the Pacific, and seven to reach the United States line. Total subvention, $13,184,500.

San Martin to the Ft. of Hidalgo Tlaxcala. N. G. Con., State of Tlaxcala. Length, 55 kils. Built, none. Total subvention, $520,000.

Puebla to San Marcos. N. G. Con., State of Puebla. Length, 51 kils. Built, none. Total subvention, $408,000.

Merida to Kalkini and Celestum. N. G. Con., state of Yucatan. Length, 145 kils. Built, none. Total subvention, $852,000.

Sonora (Guaymas to the northern frontier.) S. G. Con., limited company represented by S. Camacho and D. Ferguson. Length, 457 kils. Built, 30. After first year this road must be constructed at rate of 200 kils. in two years. Total subvention, $3,199,000.

Patzcuaro to the Pacific. N. G. Con., state of Michoacan. Length, 342 kils. Built, none. Total subvention, $2,736,000.

Toluca to the mine of Ixtapa del Oro. N. G. Con., José Maria Amat. Length not stated. No subvention.

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Link uniting the Morelos and Mexican. N. G. Con., state of Morelos. Length not stated.

Coal Lands railway, from Rio Yaqui to the Morrito. S. G. Con., Robert R. Symon. Length not given. No subvention.

Merida to Valladolid, N. G. Con., Francisco Canton. Length, 160 kils. Built, none. Total subvention, $960,000.

Jalapa to Vera Cruz. N. G. Con., Ramon Zangroniz. Length, 114 kils. Built, none. Total subvention, $912,000.

Salto to Maravatio via Tepeji and Jilotepec. N. G. Con., Pedro del Valle. Length not given.

San Luis Potosi to the Mexican Central at Aguascalièntes. N. G. Con., states of San Luis and Aguascalientes. Length, 150 kils. Built, none. Total subvention, $1,200,000.

Estacion company and town of Tlalmanalco. Con., state of Mexico. Built, none. Length not stated.

General Grant's R. R. is to start from the City of Mexico, passing by the Cities of Puebla and Oaxaca, and by Tehauntepec and to take there the best route for the frontier of Mexico with Guatemala. One branch to come from Vera Cruz and Anton Lizardo and another to go to Huatulco. The company has the right to build a line to Tuxtla, Chiapa, San Cristobal and Comitan in the State of Chiapa.

The railroad movement which has recently taken place in that country is so remarkable, that, according to the return received at the Department of Public Works, 1097½ kilometres of railroad have already been built, and in every one of the different lines, works are being carried on with the utmost activity.

The Mexican Railroad, which runs between the capital and the port of Vera Cruz, with branches to Puebla and Jalapa, carried, during the year 1879,—287,326 passengers, and 177,834½ tons of freight. During the year 1880, there has been a larger traffic, and the number of passengers amounted to 313,348 while the freight transported reached the amount of 223,359 tons and 315 kilogrammes.

Mexican Tariff and Trade Regulations.

The Mexican tariff by its excessive rates, and the governmental regulations controlling foreign intercourse and trade, have long been a source of annoyance to foreign merchants, and the primary cause of official delinquencies. The high rates have not alone been the cause of smuggling, but the peculiar intricacy of the custom house regulations, which

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have caused the confiscation of goods of well-meaning merchants, has also added to the temptation to evade the revenue officers and thus defraud the Mexican government. Independent of the annoyances attending a new trade, it will repay our merchants to examine carefully the following facts in connection with the list of goods mostly exported from the United States to Mexico. The duties thereon are calculated by the French standard of weights and measures. A metre is 39 inches, a kilogram is $2\frac{1}{5}$ pounds. The figures enclosed in parentheses is an additional charge per 100 kilograms, gross weight, imposed by the law of June 25, 1881.

Wine, white, of all kinds, in bottles or demijohns, without allowing breakage, kil. net wt. (50 cts.)	$ .29
Wine, white, of all kinds, in wooden vessels, without allowing leakage, kil. net wt. (50 cts.)	.19¾
Wine, claret, all kinds, in bottles or demijohns, without allowing breakage, kil. net wt. (50 cts.)	.18½
Wine, claret, all kinds, in wooden vessels, without allowing leakage, kil. net wt. (50 cts.)	.11¾
Wines, medicinal, all substances, and authors, kil. net wt. (50 cts.)	1.00
Liquors in bottles or jars, without allowing breakage, kil. gross wt., .23 and .08 additional net, (50 cts.)	
Acids, of all kinds, either gaseous or liquid, kil. net wt. including inside packing, (50 cts.)	.25
Acids, powdered or in glass vessels, kil. net wt., including inside packing, (50 cts.)	1.00
Billiard tables of any material, not including cloth, upon appraisement, 55 per cent.	
Billiard balls, kil. gross wt. (50 cts.)	3.72
Billiard sticks and caps, kil. gross wt. (50 cts.)	.43
Books, bound in velvet, shell, tortoise, ivory or metal, kil. gross wt. (50 cts.)	1.15
Blankets, cotton, plain or stamped, square metre, (50 cts.)	.48
Blankets, wool, not stamped or figured, square metre, (50 cts.)	.96
Blankets, cotton and wool mixed in average proportion, plain or stamped, square metre, (75 cts.)	.72
Brushes, scrubbing, shoe blacking and horse cleaning, gross wt. (50 cts.)	.19
Brushes for table, clothing, hair, teeth, nails and hats, set on wood, bone, horn, or gutta percha, gross wt. (50 cts.)	.29
Same, set on ivory, shell, tortoise, or gilded or silver plated metal, gross wt. ($1.00)	.86

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Bags and sacks, ready-made, common, of any material, upon appraisement, 55 per cent. (50 cts.)	
Clocks, fine, not gold or silver, gross wt. ($1.00)	.86
Clocks, common, with or without wooden box, gross wt. (75 cts.)	.29
Coffee, net wt. (75 cts.)	.10
Cloves and spices, net wt. (50 cts.)	.60
Cotton, ginned, gross wt. (50 cts.)	.07
Cotton, seed, gross wt. (75 cts.)	.02
Curry-combs and iron combs, gross wt. (50 cts.)	.19
Codfish, dried or smoked, and any other fish prepared in the same manner, net wt. (75 cts.)	.10
Combs, Chinese cane, all kinds, gross wt. ($1.00)	.23
Combs, ladies' varnished iron, horn, gutta-percha, bone, or wood, with or without common metal, gross wt. (50 cts.)	.29
Cloth, all kinds and colors, with woolen base and woof, plain, figured or striped, sq. metre (75 cts.)	1.56
Cotton goods, common white and colored, sq. metre ($1.00)	.09
Cotton goods, white and colored, not embroidered or perforated, sq. metre (50 cts.)	.16
Cotton goods, plain, brown, unbleached, sq. metre (50 cts.)	.09 40/100
Cotton goods, bleached or unbleached, serged or twilled, sq. metre (50 cts.)	.16
Cotton goods or textures, white or colored, embroidered or perforated, sq. metre ($1.00)	.19
Thread, per doz. ($1.00)	.20
Cassimeres and similar woolen goods, sq. metre ($1.00)	.80
Carriages, open, and coupés, each (50 cts.)	176.00
Coaches, phaetons, landaus, each (50 cts.)	396.00
Buggies, each (50 cts.)	132.00
Sulkies, each (50 cts.)	33.00
Wagons, each (50 cts.)	66.00
Harness for carriages, fine, kil., gross wt. (75 cts.)	2.00
Harness for wagons, ordinary, kil., gross wt. (75 cts.)	.86
Furniture, 55 per cent. *ad valorem* (50 cts.)	
Pianos, kil., gross wt. (75 cts.)	.43
Drugs, medicines, natural and chemical products, and vessels and commodities used therefor not specified in tariff, 88 per cent. *ad valorem* ($1.00)	
Earthenware and porcelain, except those specified, and toys, gross wt., without allowing breakage (50 cts.)	.14
Same, ornamented with white or yellow metal (75 cts.)	**.29**

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Flour, kil. net. wt., (50c)	10
Wheat, kil., net wt., (50c)	04
Barley, kil., net wt., (50c)	03
Rice, kil., net wt., (50c)	07
Hops, kil., net wt., (50c)	18
Hams, smoked, net wt., (50c)	25
Meats, salt and smoked, net wt., (50c)	24
Lard, kil., net wt., (50c)	18
Butter, kil., net wt., (50c)	24
Cheese, kil., net wt., (50c)	14
Candles, tallow, gross wt., (50c)	08
Candles, stearine, gross wt., (50c)	19
Candles, parafine, gross wt., (50c)	38
Crackers, gross wt., (50c)	12
Canned fruit, cans included, net wt., (50c)	50
Canned meats and fish, cans included, net wt., (50c)	72
Pickles, jars included, kil., net wt., (50c)	48
Soap, toilet, kil., gross wt., (75c)	1 15
Soap, common, kil., gross wt., (50c)	15
Glass, common, kil., gross wt., (50c)	24
Gun powder, kil., goss wt., (75c)	2 00
Nails of all kinds, iron, kil., gross wt., (50c)	12
Tools, iron. steel and wood, kil., gross wt., (50c)	19
Clothing, ready-made, all kinds, per suit, ($1) 132 per cent.	
India rubber clothing, kil., gross wt. (75c)	1 43
India rubber shoes, etc., kil., gross wt., (50c)	43
India rubber cloth, for tables, kil., gross wt., (50c)	29
Oil cloth, for floors kil., gross wt., (50c)	29
Leather, boots, yellow, dozen, ($1)	16 50
Leather boots, calf or morocco, dozen, ($1)	27 00
Leather shoes, common, men's, dozen, ($1)	7 00
Leather shoes, fine, men's, dozen, ($1)	16 50
Leather shoes, women's dozen, ($1)	10 00
Leather shoes, women's common, dozen, (75c)	5 50
Carpets, two and three-ply, sq. metre, ($1)	80
Carpets, Brussels, sq. metre, ($1)	97
Carpets, velvet, sq. metre, ($1)	1 40
Cocoa matting, kil., gross wt., (50c)	16
Vinegar, barrels, kil., net wt., (50)	05
Vinegar, bottles, kil., net wt., (50c)	10
Whisky, barrels, kil., net wt., (50c)	37½
Whisky, bottles, net wt., (50c)	46
Beer, barrels, kil.. net wt., (50c)	10½
Beer, bottles, kil., net wt., (50c)	21

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Petroleum, cans included, kil., net wt., (50c).....	09
Resin, kil., gross wt., (50c).....	25
Tar, kil., gross wt., (50c).....	03
Salt, kil., gross wt., (50c(.....	05
Potatoes, kil., gross wt., (50c).....	02
Onions, kil., gross wt., (50c).....	02

Free List.

Articles exempt from import duties at the Maritime and Frontier Custom houses of Mexico, as revised in accordance with the law of 1st of June 1880, and also with the law of June 25th, 1881.

ART. 16.—The following articles are exempt from duties on their importation into the Republic, except in amounts as follows:

	Gross Weight per 100 kils.
1.—Armament for the States, provided that the exemption be solicited from the Executive of the Union, by the Governors, with the consent of their respective Legislatures.....	
2.—Telegraph wire, the destination of which must be accredited at the Maritime Custom houses, by the respective parties interested.....	
3.—Wire, of iron or steel for carding from No 26 upwards.....	50
4.—Alabaster in the rough.....	50
5.—Animals of all kinds, alive or stuffed for cabinets of Natural History—with the exception of gelded horses.....	50
6.—Ploughs and ploughshares.....	50
7.—Masts and anchors for large or small vessels.....	50
8.—Oats, in grain or in the straw.....	50
9.—Quicksilver	50
10.—Sulphur	50
11.—Steel crowbars for mines, cylindrical or octagon, from 4 to 6 centimeters in diameter and from 75 to 175 centimetres in length...	50
12.—Fire engines and *common pumps* of all classes, and materials for irrigation and other purposes.	50
13.—Hoes, "machetes" [common chopping knives for sugar cane] without sheaths, scythes, sickles, rakes, harrows, spades, shovels, picks and pickaxes for agricultural purpose.....	75

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	Gross Weight per 100 kils.
14.—Hydraulic lime	50
15.—Tubing of all classes, materials and dimensions, without considering as comprised in this exemption, copper tubes or those of other metals that do not come soldered or closed with joints or rivets in their whole length, which shall be subject to the payment of duties, acording to the material	50
16.—Cardclothing of wire, in sheets for machinery and sheep cards	50
17.—Wheelbarrows, hand, of one and two wheels, and hods	50
18.—Crucibles of all materials and sizes	50
19.—Railway cars, coaches and wagons	
20.—Coal of all kinds	
21.—Collections, mineralogical and geological, and of all branches of Natural History	
22.—Houses, of wood or of iron, complete	
23.—Whalebone, unmanufactured	50
24.—Designs and models of machinery, buildings, monuments and ships or vessels	50
25.—Staves and heads for barrels	50
26.—Vessels, ships, boats, etc., of all classes and forms, in their naturalization or for sale, or on their introduction for navigating the bays, lakes, canals and rivers of the Republic	
27.—Iron and steel, manufactured into rails for railways	
28.—Fruit and vegetables, fresh, with the exception of those specified in the schedule of duties	50
29—Guano	50
30.—Ice	50
31.—Hiposulphate of Soda	50
32,—Corn meal, made from maize, and handmills for grinding it	50
33.—Instruments, scientific	1 00
34.—Books, printed, bound or unbound	1 00
35.—Firewood	50
36.—Bricks and clay, refractory	50
37.—Type, letter, gussets, spaces, lines, vignettes and every kind of printing type	50
38.—Box wood	50
39.—Timber, common, for construction	50
40.—Maize, Indian Corn	50

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	Gross Weight per 100 kils.
41.—Maps and globes	1 00
42.—Machinery—I. Machines and apparatus of every kind adapted to industrial purposes, to agriculture, mining and the arts and sciences, with their separate and duplicate parts	50
II. Loose pieces of machinery and apparatus, coming together with or apart therefrom, are included in this exemption, but this exemption does not comprise the leather or rubber belting that serves for communicating motion, when it is not imported at the same time as the machinery to which it is to be applied	1 00
III. Those articles of which a separate use can be made, distinct from the machinery or apparatus, such as pig iron, hoop iron in bars or rods, stuffs of woollen or other material and tanned or untanned leather, even when they come jointly with the machinery shall be subject to the payment of duties, in accordance with the rates of the respective Tariff	
43.—Steam engines and locomotives, iron or wooden sleepers, and the other accessories for building railways	
44.—Marble in the rough and in slabs of all dimensions for floors or pavement	50
45.—Fuse and matches for mines	50
46.—Ores of precious metals, in bulk or in powder	
47.—Moulds and patterns for the arts	50
48.—Legal coin of silver or gold of all nations	
49.—Coins,—collections of,—of all classes	1 00
50.—Natural History—Specimens of—for museums and cabinets	50
51.—Fodder—dry, in the straw	50
52.—I. Plants and seeds for the improvements of agriculture exceeding 115 kilograms of each kind of seed	50
II. In order that the seeds be comprised in this exemption, it must be expressed in the respective Consular Invoices, that they are imported for the improvement of agriculture	
53.—Lithographic Stones	50
54.—Slates for roofing and floors	50
55.—Powder—common, for the use of mines and dynamite for the same purposes	50

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	Gross Weight per 100 kils.
56.—Vaccine matter	50
57.—Oars for boats and barges	50
58.—Common salt, imported through "Paso del Norte."	50
59.—Saltpetre	50
60.—Sulphate of copper	50
61.—Anvils for silver smiths	50
62.—Printing Ink	50
63.—Type, wooden, and other materials for lithography	50
64.—Rays of all kinds for manufacturing powder	50
65.—Joists, of iron for roofs, provided no use can be made of them for other purposes in which iron is employed	50
66.—Anvils, Blacksmith's	50

Article 17th—The Executive of the Union can concede a dispensation of import duties, to the amount of one hundred dollars, on the articles brought in by the States of the Federation, which are intended for the encouragement of material improvements and for the aid of public charities.

Note of the Translator.—Notwithstanding the paragraph No. 42 declares machinery free of duties, iron shoes and dies for mortars and stamping mills are made to pay 6 cents per kilogram, gross weight, and iron stamps for crushing mills the same rate, as per paragraph of the Schedule of duties No. 448. *George F. Henderson*, Translator.

One small trunk containing necessary wearing apparel, two watches and chains, one hundred cigars, forty small bunches of cigars, one-half a kilogram of snuff, one-half a kilogram of tobacco for pipe, one pair of pistols with their accesories up to 200 cartridges, one rifle, *escopeta* or carbine with accesories up to 200 cartridges, one pair of musical instruments, except pianos and organs.

Formerly the Federal Government of Mexico had four or five additional duties, but these have all been consolidated into the tariff (which is one cause of its high rate), and one other duty paid to the Custom House in Mexico City of two per cent. on the tariff rate when the goods are shipped to Mexico City. There exists also a municipal and State duty on foreign goods, so that when the goods are landed at Vera Cruz they pass through the Custom House and pay the tariff, then another tax is laid upon them by the municipality,

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when they leave Vera Cruz. All foreign goods must be passed regularly through the custom house at Vera Cruz, when consigned to Mexico City by way of Vera Cruz. Upon their arrival in Mexico City the goods have to again go through the custom house in that city, the packages subjected to another opening, the local tax to be paid, and more charges for stamps, stevedores, etc. In spite of all this annoyance, the merchants find the trade very profitable. It may be well to note that there is no bonded warehouse system under the Mexican tariff laws, and hence all goods must pay the duties when imported, one month being the time allowed for adjusting all questions of difference and payment.

Before the goods are shipped: 1st, Consult the Mexican consul at your port on the regulations, and follow his instructions to the letter carefully, obtaining the forms to be filled out from him; 2d, Invoice the goods, procuring the Mexican consul's authentication to the same, or in the absence of a consul or vice-consul, authentication by two responsible merchants; 3d, Manifest the goods with one or the other above specified authentications; 4th, Obtain the Mexican consul's receipt, when it can be obtained, on separate paper, for the fees paid on authentication, invoice and manifest; 5th, Send all documents with the goods to whoever is to conduct the entry of the goods into Mexico; 6th, See that the manifest and invoice is made in triplicate and contain an exact detail of quantity, kind, quality and value of everything in the cargo to be entered. Unless this rule is strictly complied with a heavy fine will be incurred; 7th, In packing the goods put each class as classified by the tariff in separate packages, those calculated by net weight of a certain specified value in one, those by gross weight in another, and those by square metre in another, and those by ad valorem in another, and when different rates are attached to different kinds of merchandise, whether appraised by net or gross weight, or square metre or ad valorem, place the goods with the same tariff rates in their respective packages, classifying the respective goods by values of rates as well as by the manner of appraisement. The classification by value is as necessary as the others from the fact that when different classes of values are packed promiscuously, the appraisement will be made upon the whole package at the rate corresponding to the highest rate of any article contained therein; 8th, In packing goods to be appraised by square metre, every package should contain the same number of yards. This will save the opening of packages, and the calculation can be made much easier for the invoice.

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Trade with Mexico.

To thoroughly understand the present prospect of trade with Mexico outside of her promise of future development, it will be well to note the following facts:

In 1876, Antonio Garcia Cubas, one of the most reliable of Mexican writers, summed up the population of Mexico at 9,495,157, as the census of 1875, of which 20 per cent. were of the European race and nearest descendants of the Spaniards, or 1,899,031. Of the remaining population 43 per cent. were of the mixed race, or 4,082,918, and 37 per cent. of the native Indian race, or 3,513,208.

Within the last seven years the population has increased considerably, and especially within the last two years, the increase being through colonies and the natural development arising from the unexampled progress made in railroad building. The population of some of the larger cities are as follows: The City of Mexico, 280,000, which is larger than Rome in Italy, which has 244,484, or Lisbon with 253,000, San Luis Potosi 45,000, Puebla 76,817, Leon, in the state of Guanajuato, 100,000, Guanajuato 63,000, Guadalajara 93,875, Toluca 11,376, Colima 31,774, Zacatecas 62,000, Merida, capital of the state of Yucatan, 56,000, Aguas Calientes 35,000, Morelia 25,000, Campeche 26,000, Saltillo 17,000, Chihuahua 18,000, Durango 22,000, Pachuca 15,000, Mazatlan 13,000, Oaxaca 26,708, Queretaro 48,000, and Tlaxcala 36,463. It may be seen from the foregoing that the cities and towns of Mexico will compare favorably with other nations, and that she is almost as thickly settled in proportion to the extent of her territory as the United States, since the latter has only 13.91 inhabitants to the square mile, while Mexico has about 12.21 inhabitants to the square mile.

"There are 146 cities, 372 towns, 4,486 villages, 6 missions, 5,869 haciendas, 14,705 ranches, besides 2,248 collections or groups of houses denominated "congregaciones," "barrios," "rancherias," "cuadrillas," "riberas," and "estancias."

Value of private real estate, rural,	$ 773,000,000
Private real estate in cities,	2,558,036,000
Live Stock of all kinds belonging to individuals,	123,060,000
Property belonging to the nation,	340,000,000
Total property, without including other personal property and mines, coasts, ports, lakes, bays, rivers, etc.	$3,794,060,000

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The annual agricultural production of the Republic reaches to 6,569,524,903 kilograms, valued at $177,451,986. The harvest of corn alone reaches $112,164,424. The products of industrial establishments (manufactories, etc.) are estimated at from $13,000,000 to $14,000,000.

There are 324 mining districts, 23 placers, and 1,694 mines (worked), which produce 2,567,306 cargas (300 lbs. to the carga) of metal per year, reaching the annual value of $29,713,355; and the number of persons engaged in the mining industry, 102,240.

The exportations from July 1st, 1877, to June 30th, 1878, were $28,777,508.07; and importations, $34,005,299.12.

The above valuable information has been ably compiled by Señor D. Emilliano del Busto, and is recognized as authoritative in Mexico.

The Department of Agriculture and Commerce has published a report upon the wheat yield of Mexico, from which we note the following:

The amount of land cultivated for wheat is officially announced at 6,909,932 hectares (2.48 acres per hectare) in 1880, and in 1879 at 6,876,975 hectares. In 1880 the amount of wheat raised was 68,725,075 metric quintals. From 1871 to 1877, inclusive, the total production of wheat was 701,323,052 hectolitres; and the amount consumed during the same period was 731,341,554 hectolitres, or necessitating an importation of 30,018,502 hectolitres. During the year 1880 the production was 101,081,836 hectolitres, and the amount imported for home consumption was 3,395,529 hectolitres (each hectolitre being $2\frac{3}{4}$ bushels), or 9,337,704$\frac{3}{4}$ bushels of wheat imported in 1880.

The following table shows that the trade of the United States with Mexico, exports to, and imports from, for the fiscal years 1879, 1880 and 1881, has moved as follows:

	1879.	1880.	1881.
Exports	$ 6,761,284	$ 7,869,864	$11,172,738
Imports	14,047,819	16,325,417	17,454,126
	$20,809,103	$24,195,281	$28,926,864

Exports from the United States to Mexico:

ARTICLES.	1880.	1881.
Cotton	$1,176,067	$1,494,101
Cotton goods	832,000	1,018,600
Machinery	365,200	988,800
Other iron manufactures	390,000	913,000

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Quicksilver	377,825	462,159
Indian corn	68,872	240,182
Fire-arms	209,467	224,301
Chemicals, drugs, etc.	142,237	209,953
Builders' lumber	130,506	183,436
Sewing machines	135,823	179,555
Petroleum	155,328	173,155
Gunpowder	49,627	145,397
Edge tools	97,936	138,469
Total	$4,130,888	$6,371,108

The imports into the United States from Mexico of coffee, since 1875, run as follows :

	POUNDS.	
1875	2,691,889	$ 485,489
1876	3,941,229	713,833
1877	6,789,693	1,265,970
1878	6,337,063	1,082,272
1879	8,307,040	1,371,979
1880	9,818,525	1,523,658

According to the Treasury statistics of 1879, the articles which we are exporting to Mexico are as follows :—Acids, agricultural implements, live animals (principally sheep), beer, ale and porter, billiard tables, blacking, books, pamphlets, brass manufactures, breadstuffs, brooms, brushes, candles, carriages, railway cars, clocks, coffee and spices, coal, combs, copper manufactures, cordage, raw cotton, cotton piece goods, drugs, chemicals, earthen and chinaware, fancy articles, fruit (green and preserved), glass and glassware, hats and caps, hemp manufactures, hides and skins, kips, india-rubber goods, iron manufactures, steel manufactures, lead manufactures, leather manufactures, lime and cement, musical and scientific instruments, matches, naval stores, oil, ordnance stores, paintings, paper and stationery, perfumery, plated ware, printing presses and types, provisions, quicksilver, rice, scales and balances, seeds, sewing machines, soap, spirits, starch, steam fire engines, sugar (refined), candles, tallow, tinware, tobacco, trunks and valises, varnish, watches, wearing apparel, wine, wood manufactures, and some miscellaneous articles. The direction in which large gains are to be made is in the articles which Mexico imports from Europe. The great bulk of the trade which Mexico has with England is in cotton goods. Changes of an economic rather than of a political character are going on, which are destined to enlarge our commercial intercourse

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with Mexico. In the first place, we are manufacturing many articles which the Mexicans prefer to those imported from Europe, either because of their greater cheapness or adaptability. In the next place, a railroad development is projected which will bring the two Republics under the same transportation system.

The greatest demand for American manufactured goods will come from the white and mixed races, which constitute the wealthy and middle classes. Some of the business houses in the large cities have branch establishments in several cities, and are worth many millions. These classes wield the power of the Republic, and to-day are anxious to have brought to their doors that business energy and material progress that will give them the comforts and luxuries, as well as the business facilities, enjoyed in Europe and the United States. Many of the old houses have chartered vessels and brought their cargoes of goods from Europe.

A large proportion of the wholesale trade, however, is in the hands of German and English houses, who have been struggling to obtain the control, and have battled with each other until the Germans have obtained the ascendancy. At present the greater proportion of the wholesale trade is under the control of a powerful ring of German importers and merchants, although a good proportion of the wholesale trade is yet in the hands of old Spanish and Mexican merchants, who are looking to the United States for a large future trade.

The native races, or Indians constitute almost exclusively the laboring classes of the Republic, and the assertion that they do not consume foreign goods is not borne out by the facts, although the manufacturing industry in Mexico to-day is by no means insignificant. There are over 70 cotton factories, which produce mostly a brown, coarse cotton, locally known as mantas, not a little of the raw material for which is imported from the United States. In fact, over 21,000 bales of cotton annually are exported to Mexico from the United States. Although some 4,000,000 pieces of 33 yards each per annum are produced by the Mexican manufacturers, and 9 print works that turn out annually 400,000 pieces, and 10 woolen mills that produce annually 2,000,000 pieces of cassimere and woolen cloth,—still Mexican manufacturers are unable to supply the home demand, and the American coarse cotton goods, cloths, blankets and calicoes, on account of their better designs and greater durability, are being preferred. The finer grades of woolen continue to come from France and England.

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These classes of goods are consumed by the laboring classes, and the peon wears foreign cotton quite as often as the fabrics produced by the home manufacturers, while his tools and fire-arms and the showy dress of his wife come from the United States or Europe. The cheap black and white shawls, or "rebosos," universally worn instead of bonnets by the women of the lower classes, are largely in demand and are almost entirely manufactured in Mexico.

An internal revenue tax has been put upon the products of the Mexican mills by the influence of the importers of foreign fabrics, but the cotton industry is well patronized and more mills are built every year. The production of cotton yarn by Mexican mills alone reaches to about 18,000,000 lbs. annually. The large national demand for cotton goods is such that a large importation of foreign cloths occurs annually. During the year 1875, out of $29,000,000 imports, $10,500,000 in cotton and cotton goods alone were imported. In 1881 the United States exported to Mexico $11,172,738 of goods, of which $2,512,701 was in cotton and cotton goods; of the latter, $1,018,600, and the balance in raw material.

In 1880, England exported to Mexico in cotton goods, plain, printed and mixed, $2,406,000; while the United States exported of the same class of goods only $832,000. England has had the advantages of experience in the trade, and consequently manufactures to suit the Mexican taste, and pays particular attention to packing, which is necessary in order to hold the trade. Cotton goods should be packed either in stout bales or in boxes, which will allow of their being placed on the backs of mules. This is important, since Mexican merchants complain that our manufacturers are indifferent as to the tastes of their customers, and often forget that the goods are to be transported upon mules; while the English, who are acknowledged to produce inferior goods, carefully study the varying tastes of their Mexican patrons, as well as their customers in all parts of the globe, and pack their goods as their customers prefer. A better assortment of colors and fineness of finish is demanded by the Mexican traders. The quality of our goods is undisputed. When they become known to the purchasing community they continue to be demanded, and very easily supersede the British goods.

The British manufacturers buy their raw material in the United States, carry it across the Atlantic, manufacture it into calicoes and woolens, and then ship it across the ocean to Mexico, and undersell our manufacturers. The cotton goods of coarse texture are sized to such a degree that the finish

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completely disguises the quality, until a soaking rain reduces the fabric to the condition of a straining cloth. Here the durability of the American goods makes a revelation to the Mexican that he has been swindled, and the result is but natural.

Along the Rio Grande the Mexicans are large buyers of our groceries, hardware and general supplies. American calicoes are gaining ground on the border, and Connecticut clocks may often be found throughout Mexico, while our improved fire-arms are largely sold in the chief cities of the Republic. Our type, printing presses and printing ink have found a market in the country, and even the improved type writer is known to some extent. There is but one electrotype foundry in the Republic, and that is in Mexico City. Among other articles of exportation to Mexico are tools, cans, kerosene, soap, refined sugar, quicksilver, nails, lamps, boots and shoes, bacon, butter, cotton-seed oil, gunpowder and blasting powder, perfumery and paints. American patent medicines are well known in Mexico, and even the "pad" is not a stranger in the Republic. Lager beer, common wines, liquors and our finer brands of champagne and brandy are competing with the French wines and brandies, and the universal Mexican drinks, "mescal" and "pulque." An "American furniture warehouse" is one of the sights of the Mexican metropolis. Much of the furniture now sold in the country comes from Cincinnati, Ohio, St. Louis, Mo., and Chicago. The mining machinery now being sent into the country comes from San Francisco, Philadelphia and New York, and Pittsburgh and Chicago. Agricultural implements are being shipped from San Francisco, Chicago, New York and Philadelphia. Hardware of all kinds is also shipped from the same points. Wooden ware is being supplied by St. Louis and New York.

The trade in sewing machines is becoming an extensive one and the prominent cities of the Union are all becoming more or less interested in this trade with Mexico. The greater part of the sales in cotton and woolen fabrics are exported from New York and Boston, Chicago, St. Louis and New Orleans. Overalls, custom clothing and woolens are shipped from New York, Boston, Chicago and San Francisco. San Francisco supplies with St. Louis canned goods, and San Francisco alone supplies Mexico her wheat supply that is demanded in excess of her own production, while New Orleans and San Antonio and Galveston export to the Republic her needed supplies of raw cotton over that of her own production. Tucson, Arizona, furnishes a large part of the mining supplies for

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the northern part of the Republic, assisted by Santa Fe and San Francisco, with a small proportion from New York.

The western manufacturers of Chicago and San Francisco will eventually control the manufacture of agricultural implements, with possibly some competition with New York and St. Louis, with the odds in favor of Chicago. The balance of the trade will be distributed in proportion to the energy of the business houses in the several cities with the elements of the cost of transportation and the productions of certain localities playing important parts.

That the trade is valuable with great possibilities is admitted, and the extensive investments of American railroad capitalists who have carefully studied the probabilities of future profit upon their capital invested, is significant. The work of Mexican railroad development, however, is not altogether an experiment, as appears from the publication of the receipts and expenditures of the English company operating a road from Vera Cruz to the City of Mexico. This road was completed in 1873 and is 263 miles in length, and its gross earnings for the first year were $2,117,553. In 1881 its gross earnings were $4,831,215, or more than doubled. This does not include the generous government subventions. The gross earnings we thus see were in 1881 at the rate of $16,484 per mile and the net earnings nearly $10,000 per mile. For the years 1879, 1880 and the first half of 1881 the working expenses averaged only 41.93 per cent. of the gross traffic.

During the nine years in which the road has been in practical operation the net profits foot up over $12,700,000 exclusive of government subsidies. In 1880 the profits amounted to $2,147,589, which increased in 1881 to $2,958,720, or an increase in one year of $811,131 or an increase of $67,594.25 per month in the net profits.

The Merida and Progreso railway is only 28 miles in length, the traffic over which increased eighteen-fold in ten years. The railroad cost about $300,000 and now earns at least fifty per cent. per annum, by official report of the company. The traffic in hemp alone amounts to $90,000 per annum.

This is sufficient to show that with transportation facilities the trade of Mexico will reach magnificent proportions. This trade will soon be under the control of American capitalists as well as the transportation facilities, and the first in the field are the men who will secure the confidence and the patronage of the merchants of Mexico, and consequently will be entitled to the profits of a continually increasing trade.

As before mentioned the greater part of the wholesale trade

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of Mexico is now controlled by German importers and merchants, while the balance is in the hands of English, French, Spanish and Mexican merchants. The retail trade is principally controlled by foreigners, for although native Mexican storekeepers are found in every village, town and city, the finest and best stocked stores are owned by Spaniards, the majority of whom are not even citizens of the republic. These small dealers are controlled, with an iron hand, by German firms who in turn are held in commercial bondage by the great business houses of Germany, of which the Mexican houses are but branches.

The German merchants wrested this commerce from the English by the means of a system of long credits they extended to the smaller dealers. Once in the clutches of these gentry the Spanish and Mexican retailers find it difficult to escape, and go on, from year to year, the mere commercial slaves of these haughty merchant autocrats.

But within the last two years the influx of foreign capital into Mexico, through the medium of the railroad movement which is now sweeping over the republic, has injured the influence and the commercial power of the Germans. As this foreign capital enters the country and is disbursed by enterprises that are under American influence, the latter obtain with the masses the credit of bringing this treasure into the republic, and the Mexican people are thus led to look with a more friendly eye on Americans and commercial relations with the United States. The greater part of this foreign money finds its way into the tills of the retail dealers; by consequence they are enabled to buy on shorter time for less price than formerly, and thereby lessen their interest account with the importers.

The merchants have to pay an exorbitant interest to their creditors. The amount advanced is charged with from 8 to 12 and at times even 18 per cent. per annum, while they have at last come to see that this extravagance more than counterbalances the advantage gained from buying on long time, and are meditating a change of base to a cash system. The time, then, has come for American houses to enter this great commercial field and compete with the German merchants in the very market they have so long controlled. The same causes which enabled the Germans to capture the commerce from the English and French, will put it in the power of American merchants to displace the Germans in their turn. For the retailers have begun to rebel against the commercial bondage they have so long suffered, and have learned that the long

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credit system, with the exorbitant interest that attends it, eats away their capital and leaves them at the mercy of their terrible creditors.

As money becomes more plentiful, trade will be correspondingly livelier. New retailers will open stores along the line of the various railroads, and in the vicinity of the newly opened mines that there are now strong hopes of seeing developed. These new merchants will take warning from the experience of those for whom they formerly may have worked, and whose position they are acquainted with, and will be only too glad to eschew long credits, and shun the illusive friendship and offers of the German commercial rulers of Mexico.

A new era has dawned upon awakened and rejuvenated Mexico—an era of material and social improvement. The Mexicans have seen the foreign merchants who make the republic their mere camping-ground; who come to the country to make their fortunes and then leave it, send millions of treasure annually to Germany in payment for goods which, in many cases, can be purchased much cheaper in the United States, and have concluded to change their tactics and buy for themselves in the markets most convenient for them.

They imagine they can find the line of goods they want in this country, and to a great extent they can; thus it depends entirely upon the merchants of this section to send agents to Mexico with samples of goods suitable for that trade during the coming winter, and they will be rewarded for their enterprise by the establishment of a constantly increasing and valuable trade.

How to Secure Mexican Trade.

The "Two Republics," published in Mexico City, in an editorial says: "It would doubtless be a good plan for American manufacturers and merchants to send intelligent agents into Mexico to deal directly with purchasers; indeed, all or nearly all the agents of this character who have come to Mexico have been rewarded with success. However, merchants doing business here complain that the orders sent to the United States or given to American agents here are not always filled with exactitude. Sometimes the articles are not the same as those ordered and at others the quantity sent is in excess of the order. Such recklessness as this is unknown in business here, our merchants do not fancy it, and will not submit to it except as a last resort. The merchant knows when he sends an order to England, France or Germany that exactly

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what he wants will be sent him, and he runs no risk of having a lot of goods unsuited to the market thrust upon him.

"Merchants in Mexico insist upon having their dry goods sent them in bales; for this they assign various reasons. European shippers comply with this desire, but Americans, with rare exceptions, will use nothing but boxes.

"European shippers make the Mexican tariff and custom-house laws a study; Americans do not consider such small matters worthy of their attention. The goods sent by Europeans pass through the Mexican custom-houses without the slightest trouble; those sent by American manufacturers and merchants are often subject to double or triple duties, on account of irregularities of the manifests, arising from ignorance of the Mexican custom-house laws.

Agents sent by American houses to Mexico should not confine their studies to the market; they should carry their investigations much farther, and completely master the manner of doing business in this country. In order to do this, more time is required than is usually at the disposition of traveling agents, therefore, a permanent agency would be an improvement on the present custom of sending agents into the country periodically, and the establishment of a branch house would doubtless prove more successful in the end than either system."

We take the following extract from a letter written from Mexico to a Boston paper: "There are four methods of seeking the Mexican trade: 1st, Through the medium of commission merchants in the United States, who are intrusted by merchants here with the purchase of such American goods as they require, and who will forward to their correspondents such samples as may be given them for that purpose; 2d, By sending to commission merchants here, samples and catalogues with the idea that they will make such representations as will result in business; 3d, By reaching directly, through the medium of such a publication as yours, the dealers here, and, as I stated in the beginning of this letter, the value of such a medium depends altogether upon carrying out a perfect system of distribution; and if that proposed by you is carried out, the object is attained. The merchants will communicate with the manufacturers or their selling agents—they prefer to do so,—saving thereby the middleman's percentage; *then* the samples, catalogues, and prices can be sent, and if found necessary, the fourth and last method, or final effort, can be made, viz.: sending here the very best representatives to do the business,—men who understand fully the de-

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tail of manufacture, and whose address and bearing will secure such a reception as a gentleman will command. The person sent must expect to spend some time making acquaintances, inspiring respect, and studying the wants and peculiarities of this market. If what he represents possesses excellence, novelty and co-operative cheapness, it will succeed; and the only thing then necessary to drive in the last rivet is by sending out here *just what was sold.*

There is a market for all kinds of hardware, agricultural implements, carriages, harnesses, pianos and organs, fine cotton goods, mill and mining tools and machinery, American flannels, hosiery, woolens for gentlemen's wear, glassware, lamps and gas-fixtures, furniture, fine leather, hats, trunks and valises, surgical and scientific instruments, fire-arms, etc.

In addition to the statements of the commercial traveler, we would call attention to some further important facts: *First*, Under Mexican law it is necessary that an agent should be appointed with two separate powers of attorney, issued in accordance with the formalities of Mexican law, who *is a resident of Mexico*, one with power to transact business, and the other to collect, and if necessary, to bring suit in a Mexican court for the claim that may result from any commercial contracts. Unless this is complied with, no contract made by a foreigner who is not a resident of Mexico, and matriculated, can be enforced in a Mexican court.

Second, No judgment by default obtained in a foreign court will be recognized by Mexican courts, and in every case a trial must either be had in the foreign country, with the defendant, or his representative in court, before the execution can be issued from a Mexican court, or the trial must be held in the Mexican court, the case having been commenced by a representative who is a resident of Mexico and duly authorized by the foreign house, in which case only a judgment by default, or upon trial, can be legally had.

Third, Contracts made by commercial travelers for foreign houses not established in the Republic, or through commission merchants, unless duly authorized agents, can only be legally enforced by placing said claims in the hands of an agent duly authorized, who is a resident of Mexico.

Fourth, Commercial travelers should be matriculated before taking any orders.

Fifth, The safest and quickest manner of collecting claims in Mexico is to communicate with the American consul of the nearest port in Mexico as soon as an order is filled, making inquiry for a reliable person who may act as agent, and send

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on authority for collection and to commence suit to enforce the claim, if necessary. This should be done as a measure of precaution to save delay.

The American consul in many instances acts as the agent. The formalities required by Mexican law in granting power of attorney may be found, as well as the Mexican commercial and civil law, in "Hamilton's Mexican Law."

Sixth, In filling orders, either upon samples or without, *send only what is ordered.* This is important, for the purchaser, under Mexican law, is obliged to receive only the goods that correspond in kind and quality with the order, and upon his refusal to accept the consignment, delays and expense in recovery of the goods will be costly.

Seventh, Carefully follow the tariff regulations as to invoice, marking, packing, etc., consulting with the Mexican consul upon all questions of doubt.

Importance of Matriculation.

The attention of citizens of the United States residing in Mexico is called to the fact that the laws of Mexico require that all foreigners shall be matriculated at the Department for Foreign Affairs in order that they may have a recognized foreign nationality.

Application for matriculation papers should be made through the Consulate General at Mexico, and through the consular officials in other parts of the Republic. This is important in the event of any complications between individuals and the government.

Not only is this important in relation to any complications, but it is absolutely necessary in order that a foreigner may have any standing in a court of justice in the Republic.

No act performed prior to the fact of matriculation can be remedied or benefited by subsequent matriculation. Hence the protection awarded by this law must be sought, before any business is transacted by a foreign resident in the Republic. See "Hamilton's Mexican Law," subject: "matriculation."

Importance of Securing Patents for Inventions and Improvements in Mexico.

The present demand for all classes of machinery in Mexico is unexampled in the history of any nation. The slow growth of Mexico heretofore has debarred machinery of all kinds, and inventors and improvers have consequently omitted to secure

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patents in the Republic. This state of affairs no longer exists, and if it is desirable that the results of inventive skill in the United States are to be preserved by those who hold patents, it may be as well to call their attention to this large field that demands to-day the results of their labors.

Patents may be easily secured in Mexico, and it is sheer folly to neglect to take the necessary precautions to preserve the results of years of toil and experiment, that may be utilized in the Republic.

Mexico must have machinery of all kinds used in the United States or Europe, sooner or later. Here is the great market, let it be remembered, for years to come, and inventions or improvements must follow the path of progress. Manufacturers are finding a foothold in Mexico, in the shape of cotton manufactories, which may be seen by the article upon "The Trade with Mexico," herein, and machine shops are now turning out machinery of different kinds in Mexico. Foundries have been established at Durango, Mazatlan, Guaymas and Puebla, and others will be established in different portions of the Republic. Manufactories of agricultural implements are also being established, one already being in Mexico City and another in Puebla. This is sufficient to patentees to show them that Mexico is awake, and with her vast fields of coal at Laredo, and on the Yaqui river in Sonora, near Cosala in Sinaloa, and at Santa Rosa and Piedras Negras in Coahuila, Mexico will in the near future be able to establish a large manufacturing industry. Manufactories and machine shops may be easily established, and produce, with the aid of these immense coal fields, all kinds of machinery. The duties and freights, added to the cost of the articles, that now prevail offer too strong a temptation to manufacture the various kinds of machinery, including agricultural implements and various utensils that are to-day needed in Mexico. This suggestion is sufficient, for the patentee will readily see that unless he secures his patent in Mexico, unscrupulous manufacturers may manufacture machinery without the payment of a royalty in Mexico, and imitate every class of inventions and compete so successfully with American machinery, that the patentee will be debarred from the Republic. This becomes the more obvious when it is considered that the Mexican or foreign manufacturer in the Mexican market has no duties to pay, nor freight for foreign transportation. Hence his advantage over the foreign manufacturer.

Full and complete protection may be secured under the patent laws of Mexico by any foreigner who has secured a patent

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in his own country. The complete patent law applicable to foreigners may be found in "Hamilton's Mexican Law." In addition to which, we herewith give a statement from Mr. D. V. Whiting, a patent solicitor of Chicago, whose experience and ability are unquestioned. The following decision was received by Mr. Whiting from Minister Fernandez:

Department of Public works, Colonization, Manufactories and Commerce.
Section 2, No. 276.—Sr. David Whiting:

Sir:—Your letter of the 5th instant has been received by this department, in which as the attorney for Sr. John S. Adams, you solicit a patent for certain improvements which you say have been introduced into the construction of towers (*torres*) for the electric light, wind-mills, etc., accompanied with their respective drawings and specifications.

In reply to which, and upon consultation with the President of the Republic, it is declared to you that although the law in force only concedes patents for inventions made in the Republic, the Congress has been pleased to concede the same to foreign inventors; but in future cases it will be necessary that the said inventions be accredited with the patent issued in their own country.

Liberty and the Constitution.

MEXICO, July 17, 1882. M. FERNANDEZ.

In connection with the above we present the following statement of Mr. Whiting:

"The patent laws of Mexico are being so modified that patents for inventions and improvements will be issued for fifteen years upon the payment of a patent fee of $150. Patents will also issue for five or ten years upon the payment of a patent fee of $50 and $100 respectively. They will also be issued for the unexpired term of a foreign patent upon the payment of a patent fee of $10 per annum during the term the foreign patent has to run. Application for a patent from a foreigner must in all cases be accompanied by the patent issued by the government of which he is a citizen. Drawings and specifications must be in the Spanish language, and in duplicate. One copy is returned with the patent, if issued, to the applicant or his attorney, and the other remains on file in the Department of Public Works. Internal revenue stamps to the amount of twenty dollars are to be affixed to the patent when issued. Translations cost about $1.00 per hundred words, and the duplicate Spanish copy about 40c. per 100

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words. Attorneys' fees vary from $150 to $500, according to the nature and intricacy of the case.

DAVID V. WHITING,
Attorney and Solicitor of Mexican Patents,
102 Washington St., Chicago, Ill.

Treaties between Mexico and the United States.

The following has been officially published by the Department of Foreign Affairs:

"The treaty of navigation and commerce celebrated between Mexico and the United States of America on April 5th, 1831, was withdrawn from, by the Government of Mexico on the 30th of November, 1880, in accordance with the stipulations of part 1st of article XXXIV. of the said treaty, and of article XVII. of that of February 2, 1848, which ratified the former.

The convention entered into between Mexico and the United States of America on July 10th, 1868, regarding the naturalization and citizenship of parties who emigrate from one country to the other, was withdrawn from by the government of Mexico on the 10th of February, 1881, in accordance with the stipulations of Article V. of the same.

The said treaties ceased to have force, the former on the 31st of November, 1881, and the latter on the 11th of February, 1882.

By order of the Secretary for Foreign Affairs, the present notice is published for the information of the authorities and of the public generally.

MEXICO, June 5, 1882.

(Signed) JOSÉ FERNANDEZ,
Chief Clerk.

An Important Decree.

From the Budget-laws recently passed by Congress and formally promulgated by the President, in the form of a decree, the following is translated:

"From the 1st of November next gold and silver coin, in bars, bullion, ore, or in any other form, shall be free of duty for circulation in the interior or for exportation. In order to compensate the suppression of the duties referred to in this clause, from the above date an increase of two per cent. shall be enforced on the duties now fixed on the importation of foreign goods, but in the meantime the export duties on

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gold and silver shall be collected in accordance with the laws in force during the present fiscal year."

* * * * * * *

"The following articles are hereby excepted from the payment of package duties (*derecho de bulto,*) imposed by the laws of May 31st and June 25th, 1881:

Plows and plow-points.
Masts, tackle and anchors for shipping.
Quicksilver.
Live animals.
Bricks and tiles of all kinds.
Common timber for building purposes.
Cotton, tobacco, coffee, and sugar-cane seeds.
Slates for roofs.
Vaccine matter.

If Mexico means to profit by American enterprise and capital, she must make great reduction in her tariff. She has already gone too far in tempting foreign capital to investment in developing her interior transportation facilities to attempt to recede from the path of progress upon which she has entered. This she cannot do without betraying men who are animated with the liveliest feelings in behalf of her development, and who have not hesitated to pour American capital into her bosom and infuse energy throughout her channels of trade. Millions have been invested in her mines and building railroads, and this is but the beginning of continuous development that will lead the emigrant to a land awaiting his coming. Americans are aggressive in business affairs, and when once the temptation to investment has met with a response by millions of capital, no attempt by unfriendly legislation will deter or hinder but temporarily the sweeping changes now being inaugurated. We are satisfied the more intelligent classes of Mexicans are perfectly willing and are even anxious that their country shall keep pace with modern civilization and that they will ultimately remove every obstacle to the commercial and political reciprocity that should bind two sister Republics together with indissoluble ties of friendship and mutual commerce.

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ANNEX.

SINCE the issue of the first edition of this work, the author has received a large number of inquiries relating to some portions of Mexico not included appropriately under the head of Border States, more especially to that route by which Americans have heretofore reached the national capital of the sister republic, beginning at Vera Cruz, where the steamer from New York is met, and crossing the elevated passes at the base of the great mountain, Orizaba. The writer, not professing thorough acquaintance with this portion of Mexico, and desiring to meet this demand by readers, has arranged with *Messrs. Leve & Alden, 207 Broadway, New York, the Tourist Managers*, whose sub-offices are well known throughout the United States, to furnish the descriptions and statements following, the entire accuracy of which may be vouched for. Messrs. *Leve & Alden* have done much to acquaint the American traveling public with this beautiful tour. The matter is largely a compilation of the correspondence of Mr. Frank H. Taylor, a writer and artist to whom this duty has been assigned by *Leve & Alden*, who accompanied General Grant upon his trip to Mexico some three winters ago as artist for a leading illustrated paper. Under such conditions, exceptionally favorable opportunities were enjoyed for observing the regions traversed and the character of the people met.

It should be stated that two routes by sea are now open between the United States and Vera Cruz. The first is from New York via Havana upon one of the superb steamships of the Alexandre Line, and the second from New Orleans via either the bi-monthly steamer of the same line or upon one of the boats of the Morgan fleet of Gulf steamships.

The former route gives the traveler a fine foretaste of life in Spanish-American countries, at Havana, where a stop of two or more days is usually made. The voyager is quickly passed through the custom-house, and may either make his headquarters upon the steamer or at one of the large and excellent hotels which are now to be found in the Cuban capital. The Telegrapho is recommended, being central and much resorted to by Americans. The local attractions of Havana, together with the glimpses of surrounding country obtained during a short stay by the stranger, often result in the determination to return

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by Havana after taking a look at Mexico. Indeed, the whole round trip may be made upon the same ship, which remains in port at Vera Cruz nearly a week discharging and taking on cargo. So the passenger may enjoy the grand ride across the mountains, see Mexico City, and reach Vera Cruz in ample time to regain the ship. Notice is given by wire a full day in advance of sailing at the hotels in the capital. The trains upon the Mexican Railway are composed of English coaches of the compartment style, and the schedule is so arranged that the portion of the route traversed in going up at night is covered by daylight in returning.

The steamer stops at several ports both ways, the ports, however, being only such in name, as the vessel is anchored in the open Gulf, the passengers and freight being transferred to and from the ship in heavy surf boats. When the weather is favorable, passengers are enabled to go ashore in the ship's boats. The ports touched are Progreso, State of Yucatan, Campeche and Frontera. Natives often come on board at these points with trinkets of native manufacture for sale. Here we will allow the artist to rehearse the story of the experiences of the distinguished party—events which, in a greater or less degree, await all observant travelers to the land of the Aztecs:

THE LAST NIGHT AT SEA.

The evening of the 17th was the last at sea. Everybody was well and the quarter-deck was not deserted until a late hour. A group of musicians, men and women, sang, chiefly for their own pleasure, a series of Spanish airs, wild and plaintive. I have heard something like them in "Carmen." The Southern cross, that rare constellation of the lower hemisphere, was visible low in the heavens, and other stars new to most of us twinkled out upon our port.

At a very early hour this morning all hands were on deck to get a first look at Vera Cruz and the famous peak of Orizaba. There they were, both of them, sure enough. Our ship was drifting quietly outside of the reef. A norther had been predicted, which should keep us on board any number of days, for Vera Cruz has no harbor to speak of; but the sea was as unruffled as the face of a Madonna. Orizaba, seventy miles inland, stood up against the western sky, with the cap of eternal snow, seemingly, less than a day's walk distant, the walled "City of the True Cross" stretched along the shore, compactly set within its gates. That famous fortress, San Juan de Ulua, which Humboldt says cost $50,000,000, seemed a part of the town. As we looked, a cannon and another and another boomed a welcome across to us, counting out the salute to a General. A steam corvette came out of the smoke toward us, bringing the committee of reception, Mr. Foster, the United States Minister at Mexico, and Dr. Trowbridge, the Vice-Consul at Vera Cruz. In a short time they were on board, and the usual speech was read, after which both ships steamed to an anchorage between the fortress and the city. Barges left the City of Al-

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exandria half an hour later, conveying the guests and committee to the mole, which was densely packed, as were many of the housetops, with townspeople. The shipping in the harbor was bright with bunting, especially a large French steamer.

Vera Cruz is a city without carriages to speak of, and the little procession took its way afoot through the streets, jostled on all sides by an eager but respectful multitude. After making several turns, we entered the Vice-Consular residence, and a formal reception was tendered by the Governor of the province, Gen. Teran. There is a street railway—a genuine bell-punch affair—in Vera Cruz, and the party next embarked on one or more of the cars to see the town. It was hot, superlatively so. While they were gone, I ransacked the photographers' shops for "vistas," and found a lot of good views, getting some glimpses in my search of the queer inner life of the Mexican seaport. Things are Moorish to the last degree. Nobody ever builds here. It is a completed city. They have to repair sometimes; for instance, when one party gets into the fortress and another faction into the city, they shell each other unmercifully. They kept up a game of battledore once in that way for twenty-two months. If a man don't like the inside arrangement of a house, he puts in more archways and ballustrades and tile-work, and hangs slanted awnings about and sticks flower-pots in all sorts of corners, with a fountain, perhaps, in his court. The whole makes up a picturesque result, and no two are alike. Then the Indian servants—they are swathed in all the colors of the paint-box, and group among the flowers and against the tile-facings like Chinese pictures. There is a palace and a cathedral, both fronting on the Plaza de la Constitucion. Pretty much every Spanish town has an acre or so in the center adorned with this name. The palace looks from open arches out upon a very inviting spot with seats and shade trees. The cathedral has the usual high tower and complement of silvery bells hung inside. The whole building looks brand-new, though it is about as old as Cortez, having been freshly calcined. Cannon, out of commission, are planted for turning-posts at the street-corners. The Health Commissioners, in the shape of numerous black and tidy-looking buzzards, hold perpetual session upon the eaves of the houses.

Vera Cruz seems a very neat city. Perhaps a closer inspection would dispel this notion.

A REMARKABLE RAILROAD.

At 11 a. m. breakfast was announced at the Vice-Consulate. and at 12.30 the train (a special, of course), was taken for Orizaba. The ladies especially suffered from the intense heat, and it was therefore decided to forego a proposed official banquet and a general illumination of the city in favor of a cooler region. Our coaches resembled those used upon the English railways, the doors being at the side, with a foot-way along the base. The locomotive looked like two American engines melted into one. A huge stack adorned either end. The tender was in the middle; there were four cylinders and sets of cranks, and reared high

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above the whole, like the burden on a "burro's" back, was the fuel—cut-wood in great cages over the boilers. This railway is owned by an English company, and was constructed by English and American engineers in the face of marvelous obstacles. After having passed over its length, I will detail some of its engineering peculiarities. It is enough now to say that it is regarded as one of the most remarkable railways in the world. Our first stop was made at the little town of Soledad, which goes down to history as the scene of the tripartite treaty between the English, Spanish and French in '62. We were in the heart of the Tierras Calientes (Hot Lands), a rolling sandy country, covered with mesquit and cactus. At the stations the fruit peddlers and maimed beggars were equally numerous. Soon we passed into a richer and higher region. The foremost of the mountain ranges began to show in detail and color of foliage. We twisted and turned among the foot-hills. In old deserted fields are the ruins of haciendas. This was once the garden of the Gulf slope, but it was under Spanish rule and not in the days of the republic. The lavish earth makes a sport of production here, and grows her wild fruit only to let it waste unfound at the roots of the parent stock.

About this point of our journey we bought big and luscious pine-apples for less than a nickel each. Now came coffee plantations, where the taller plantain shades the plants with their burden of reddish berries from an over-hot sun. Then broad tobacco fields, with Indian laborers. Every tree is burdened with the parasitic orchids and weighed down with flowering vines. We stopped a moment where the mountains were fairly entered to look down upon one of the most perfect cataracts I have ever seen. The Fall of Atoyac pours through a rift in a mountain spur whose sides are deeply lined with moist and dripping verdure, and a thousand feet above the gorge has broadened so we have a glimpse of peaks and crags beyond.

Please suppose that all of that region of Pennsylvania, of which Altoona is the central town, was planted with palms on every hillside, with jungles of banana plants and dogwood down every slope, and the valleys heaped with impenetrable thickets, composed of myriad forms of strange and tropic verdure, the whole peopled with long-feathered songsters and overshadowed with cliffs, reaching into the regions of zero, and you will have a good general idea of what we saw from the car windows of the Mexican Railway in the intermediate plateau dividing the Hot Lands from the mountain table.

THE ARRIVAL AT ORIZABA.

At four o'clock we reached Cordova. The clouds drifted low and hid Orizaba, the mountain, from view completely, but an hour later Orizaba, the city, loomed up in our pathway, and our trip was at an end for a couple of days at least. Here, at last, is the September we have so ardently longed for in the superheated days spent at Havana, or in riding idly at anchor off impracticable seaports of Yucatan. To-night,

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for the first time in two months, a blanket is invested with interest in our eyes. Orizaba has no summer and no winter. It is always just about one thing. Light goods for spring wear, and the newest thing in ulsters don't disturb the contented citizen of Orizaba. Sometimes they get the edge of a norther, but, on the whole, these Mexican Switzers have a decided advantage in the matter of climate. Orizaba has seen us, because we came into town in a street-car from the depot, and all Orizaba was out on the curb; but we have not yet seen Orizaba, for it was dark by the time we were established.

I would like to quote something poetical at the opening of this chapter of travel, but I can't think of anything that would do justice to the occasion. We have been for two days in the hands of the people of this Piedmont city and its sister to the eastward, the town of Cordova, and I, for one, am thoroughly in love with the sweet-voiced, courteous natives, and full of admiration for the climate and the surpassingly beautiful cordon of mountains which hem in these little Mexican metropoli. However, perhaps, this may be slightly premature. We haven't been through a norther, when this is said to be a congealed perdition. Nor have we had the Mexican variety of earthquake, which is particularly lively and capricious just hereabouts. They haven't felt one for three weeks or more, and it's nearly time for another, by the average. You see, there is a sort of subterranean telegraphic line between the two white-headed and burnt-out old volcanoes Orizaba and Popocatepetl, through which they indulge in occasional growls. Now, the city of Orizaba is set directly over this line.

MARKET DAY.

The morning following our arrival happened to be market day, and the Americans, escorted by several English speaking residents, went to the plaza devoted to the purpose, taking a round-about route, either purposely in order to see the town, or because the foremost guide had left his compass at home. This is an open question. At any rate the market was finally reached by a reduced number of visitors, several having dropped by the wayside, under the allurements of strange goods displayed in the stores. These, in time, found their way back to the corner, where two big omnibusses were in waiting to take us to the country. The market of Orizaba differs from its French namesake at New Orleans, because it has no roof, and from that at Havana in the fact that it don't smell badly. The large plaza is covered, as closely as their wares will permit, with about a thousand Indians and Mexicans. They overflow into the side streets, and the little native "burros," or native mules, with their heavy packs, looking like ants under a grain of corn, are anchored all about for squares. The first comers, I suppose, stake out a claim wherever they like; then they stick a pole into the ground, at the upper end of which is a framework supporting a piece of matting about as big as a Jersey bed-quilt. As every merchant sets up his own sunshade, the plaza grows to have the appear-

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ance of a bed of toadstools, which, after the manner of sunflowers, follow the sun across the meridian. After the roof has been thus arranged, the flooring is put down in the shape of more matting. Then the merchandise is set out in the most attractive style and business begins. Everything is in baskets or pots—deep baskets, shallow baskets and long baskets, round pots and grotesque ones. Some are like fish. The articles on sale include all the tropic fruits, fresh and dried; heaps of unsavory crumbs of charred meat, sold by the pint; long, cigar-shaped stones for grinding corn, and wooden bowls to hold the meal; toys, jewelry, and dry goods; shoes of buff leather, and sombreros weighty with silver braid; garlic, pickles, tortillas, and pulke. The latter is a decoction, fermented from the maguey plant, looking and tasting like very second-rate skim milk—not very bad, being too weak for badness, nor very good, being kept in hog skins lately vacated by the former tenant. Out upon a side street is the dry goods and feminine decorative quarter. All the walls of the buildings are draped in streaming yards of bright cloths, sashes, and handkerchiefs. The cobbles are carpeted with dress goods of large figure and flashy tone. The copper-tinted buyers and sellers squat or stand about in all sorts of postures, and little black-and-tan babies, scores of them, lose themselves in the general hub-bub. Some of the party tossed small silver to the fat and tired infants, earning an unwarrantable reputation for great wealth. After that there was no chance to make sketches, and I left the field.

Orizaba will always bear the impress of a Yankee town in our memories in at least this particular—that they fed us on corned beef and cabbage. We left that hospitable mountain metropolis on the morning of the 21st, soon after 9 o'clock, resuming the special train which had brought the excursionists thus far. The engine used was of the same pattern as the one already described, known as the Fairlie locomotive, being a double machine of probably sixty tons weight and exceedingly well adapted to the heavy grades of the road. These engines are used upon the Peruvian railroads. They are supplied with the Westinghouse air-brake, but the coaches are checked by the old-fashioned method of hand-brakes, the men sitting perched upon the roofs of the cars. It has been found impossible to use the air-brake upon the cars, as the natives at once appropriated the brass couplings and rubber tubing. Each first-class car is provided with a double roof to modify the terrible heat of the lowlands.

A MEXICAN RAILROAD.

The history of this iron pathway over the mountains is a romance ante-dating, by several years, the Presidency of Santa Anna, and extending to its completion in 1873, since which time it has been in successful operation, with the single drawback of the necessity of rebuilding some bridges and getting new rolling stock after every revolution. Previous to 1857 but little resulted from all the agitation of the project

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for a transmontane railway but talk, subventions and concessions. In that year a survey was made by a number of English and American engineers, practically establishing the present route, and two short sections of road purchased, which had been undertaken with Mexican capital. Another revolution stopped everything again until 1861, when some further progress was made. During the short-lived Empire under the energetic influence of Maximilian, the line was constructed eastward across the valley of Mexico to Apizaco eighty-six miles, and westward from Vera Cruz some forty-seven miles. When the republic was established, Juarez found it worth while to induce English skill and capital to wrestle with the problem of a mountain division uniting the two portions of the railway already in operation. A branch line from Apizaco to Puebla, opening up a rich and populous region, was first completed, and finally the entire line was inaugurated with great pomp by Lerdo de Tejada, then President, upon the first of January, 1873. The railway cost about $30,000,000, and is said to earn at the present time a net of about $3,000,000 per annum.

The course taken by the railway westward from Orizaba led at the start through a valley hemmed in by volcanic steeps and watered by numerous rivulets which came down from greater heights through alcoves in the cliffs, leaving trails of luxuriant and vivid green to mark their course. Nestled in these nooks, where the shadows rested half the day, were frequent little towns, always centering upon a church of the universal moresque pattern, plentifully decorated with stucco statuary upon its exterior, and emulated with bits of tiling to the very cross which crowned its belfry. These gaudy, but now half-ruined churches, were all out of proportion to the little one-story thatched and adobe huts clustered about them.

CLIMBING A CLIFF.

The train, after running perhaps ten miles reached the upper end of the valley, and, turning a semi-circle to the left, began to mount the cliff over a grade of surprising departure from the horizontal. The only parallel to this case in the United States that I can recall is at Leadville. Seated upon the broad pilot of the laboring engine, several of us prepared to enjoy the unfolding of the scenes along the most picturesque railway in the world. Looking far above us we saw the frail, web-like bridges and tunnels we were yet to traverse, and below the valley out of which we had just passed. Between two cliffs a mountain torrent rushes down from the upper valley, and past its noisy cascades a shelf has been hewn hundreds of feet above the narrow level of its bed, just wide enough to build a track. This is El Infernillo (the little hell). Now all traces of tropic vegetation were left behind. We were 5,500 feet above the sea, and when a few minutes later we stopped at Maltrata, the city of the upper vale, the Mexicans had donned their zarapes and ponchos, for it was getting cold. Across the valley of Maltrata the train sped by a series of tangents, stopping but

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once to heap on more fuel and take a draught of water, and another rocky barrier of 3,000 feet, or nearly that, was to be surmounted.

After an hour of travel we looked down from a point directly above the city of Maltrata, but at a height from which I have never gazed, except when in the wicker basket of a balloon. Had our coaches jumped the track the fragments might have been picked up in the central plaza, where little dots of white denoted the presence of a population. Ragged spurs projected down the grand slopes, pierced with frequent tunnels. Just beyond No. 16, the last of these, we attained to nearly the highest point of altitude, and bidding good-bye to the checkered vale passed through a rock-cutting, emerging at the station of Bocadel Monte, 7,922 feet above and 107 miles from Vera Cruz. It was cold enough now. Even we of the North looked after our overcoats, and the Mexicans, who crowded about to get a glimpse of the American General, shivered in their blankets. This plateau is a vast grazing land. Herds of horses, cattle and sheep dot the plain.

THE VALLEY OF MEXICO.

While taking a cup of coffee the "Fairlie" was replaced by an ordinary engine, as the grades gradually lead downward from this point to the Valley of Mexico. Nineteen miles beyond is the town of San Andres Chalchicomula, the nearest point to the great peak of Orizaba, whose snowy cap was in full view all day. Now the grassy plains gave place to a great dusty desert, where nothing but haystacks, occasional haciendas and creeping caravans break the monotone of the vista clear to the northward peaks. We were obliged to close every window, preferring suffocation to the all-pervading dust. About the stations were groups of huts, the poorest and meanest human habitations I have ever seen, and peopled with beings hopelessly below the plane of ordinary poverty.

Lunch was served at Apizaco in good style, the viands having been sent up from the City of Mexico by the morning train. This occupied an hour. The run to the capital might have been made in three hours, but the reception committee had telegraphed for a delay of arrival until 8 p. m. So the train loafed along at twenty miles an hour, making occasional stops, and at one point pushing a freight, which had been stalled on an up grade, to the next siding. At all of the stations detachments of infantry or cavalry were drawn up, the latter looking like business in their picturesque uniforms and seated upon such superb horses. The natives all seemed alive to the coming of Grant, and every platform was packed with expectant throngs. At some points decorations were indulged in.

At sunset we passed a number of Aztec pyramids, and long after the sudden leave-taking of daylight (they have no twilight in this latitude) the snow-caps of the mountains stood out in bright rose color above a wreath of storm clouds, which dropped with the cooling atmosphere toward the valley.

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AT THE CAPITAL.

Now dust brushes were in demand, stray bits of baggage were collected, and promptly at 8 p. m. the Americans alighted at the Vera Cruz depot in the City of Mexico.

Pressing through brilliant ranks of officials to waiting carriages, the guests were at once whirled away cityward. A grand archway had been erected bearing numerous lanterns and calcium fires, with the word welcome surmounted by the initial "G." Stretching for some distance from this and dependent from lances bearing pennants were festoons of colored lights. Three thousand cavalrymen, composing the Guarde Rurale, the finest troops of the republic, led the way, every man bearing a torch. Unfortunately, the effect of the reception was spoiled by this arrangement, which left all of the carriages, reception committee's and all, hopelessly entangled among the thousands of cabs and private carriages which blocked the way. So the General reached his residence some time in advance of the balance of the party.

THE FIRST THREE DAYS.

This is the fourth day since our arrival, and the events to date may be detailed within a column. Sunday evening found everybody upon the Paseo, the fashionable drive, where all the handsomest vehicles in town hold a sort of grand review, passing along the broad avenue and returning in close procession at a walk. Unfortunately for the effect most of the carriages are closed and one gets but a fleeting glimpses of fair faces and elaborate costumes. The ladies have a cute fashion of twinkling their ungloved fingers toward acquaintances. The space between the two opposing lines of carriages is gay with caballeros. It is quite the thing to wear a broad sombrero, heavy with silver bullion, a sash and slashed leather breeches when riding with a Mexican saddle. I find that all the young Americans have adopted the fashion, and they are numerous here. I hope to be able to borrow such a get-up before leaving, for I may never hope to own one. The saddles proper are generally covered with cougar skins, embossed, gold-mounted and silver-plated. The adjuncts include a brilliant shawl, streaming over the horse's flank, with side pieces of bear-skin reaching nearly to the ground. In the country a lasso and carbine are added. The people are polite to the last extreme, and find, I am afraid, frequent cause for grief in the abrupt manners of their Anglo-Saxon visitors. It is quite common for a gentleman to say to his friend, "My house is yours, take it." A senor said as much to me. I thanked him, of course, as well as I knew how, and remarked that I would have a door-plate made. When it was too late I discovered that the proper reply was: "Thanks, it is already in good hands."

AT MOLINO DEL REY.

Tuesday afternoon carriages were taken to Molino del Rey, which means simply "King's Mills." It was at the portal in the wall surrounding these buildings that the desperate assault was made by the

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Americans which drove the Mexicans out like rats toward Chapultepec, half a mile away, and immortalized the spot in our national annals. The ancient walls plainly show the rain marks of bullets and of cannon balls. A plain monument upon the crest of a hill gives due token of the event. It was here that General Grant, then a young lieutenant, won his captaincy. As he stood up in the carriage, General Sheridan and others of the party standing upon the ground, he told us about the fight, and his face wore an expression of eager animation such as I have never observed through its mask of immobility before. Just before sunset we stood upon the balcony of the palace of Chapultepec. I have derived all of my previous impressions of the place from the huge canvas pendant in the stairway of the Capitol at Washington. You will remember the cliff-like proportions of the rock and fortress-like structures above. It is neither steep nor high. One day we rode horses down the declivity at random. Chapultepec is simply a palace half ruined, set upon a rocky hillock. Here Maximilian had his home in 1864. He built a splendid avenue straight into the city, and if he had lived to work out his plans I believe Mexico City would now be the Paris of the Western hemisphere instead of its Madrid. The commune of Mexico destroyed everything possible to ruin at Chapultepec when they shot the Austrian. They even tore out the entire room where he spent his private hours. Everything is being "restored" now—a tedious and expensive process. The view from the balconied promenade of the Valley of Mexico is simply a marvel of tropic beauty. It is a realized panorama of cities, lakes and mountains. The dead past glimmers through the evening shadows, and obtrudes the memories of its horrors and its half-learned romances upon us, and we forget, as we gaze, that we are in and a part of the nineteenth century. It is easy to conjure the thousand sacrificial altars of the Aztecs, crowned with their perennial fires; to see the little army of Cortes, five hundred plucky, cruel Spaniards subjugating a nation, driving before them the cohorts of the Indian princes, and finally, with the help of Tlascalan allies, capturing another and a greater city than the modern Mexico before our eyes, of which not a stone is left unturned; to picture another army in our own times, when the legions of Scott swept about the base of this very citadel; to—but the party has vanished; they are already in the carriages.

We rode down the winding avenue through a grove where some of the trees are as large nearly as those of the Yosemite, passing a spring which has bubbled unfailingly for three centuries. A few minutes' drive brought us to Tacubaya, a sort of select Chestnut Hill of the city, a suburb embracing several park-like domains of the wealthy. The rich are marvelously rich in Mexico, and the poor too poor to know how miserable they are. The country house of Señor Escandon holds the concentration of elegant bijouterie and upholstery drawn from the most luxurious cities of Europe and America. It is a vision of a home; but it is unoccupied. The family live in another place in

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town. So we roamed through its saloons unquestioned. It was dark when we came upon the Paseo, and a squadron of cavalry which had come swiftly out of the city surrounded the carriage like a cloud, protecting us from the harms of the night, which I am coming to believe are fabled. In the city proper, at any rate, life should be safe enough. Look along the streets. Every fifty feet there is a lantern set in the middle of the carriage way. Every lantern counts a policeman. Every policeman bears a sword, a carbine, and a revolver. With the hood of his coat drawn over his head, the Mexican policeman (sereno) looks like a monk; but he is a good fellow, and will pass the stranger along the lines safely to the hotel. Whenever a row occurs with a "cabby" about fares, and that's every time one rides, the sereno drops down upon the argument, and, looking at the driver's time-card, sends him about his business. Our home police could learn something from these Mexicans. During the night the hours are heralded by the serenos by a whistle of the most doleful note. It is a sort of a cross between a whip-poor-will and a tree-toad.

THE BREAD AND COFFEE.

There are two other institutions here which will be left behind with regret, *i. e.*, the bread and the coffee. I wish a half-dozen of our Philadelphia bakers could be sent to Mexico to learn the art of bread-making. But then, after they had learned, they couldn't get the flour, for our millers bolt all the virtue out of it in order to make it fine and white. Mexican flour is coarse. We dose our bread with all sorts of patent yeast powders. Here the bread comes on the table with a shell as hard as that of a land-turtle, but this once cracked, the interior is nutritious and palatable to a degree of which we of the Quaker City know nothing. As to the coffee, any house-keeper can make it in the Mexican style with very little trouble. The pot used is a two-story affair. At the base of the upper half is a disc perforated with numerous fine holes. The coffee, ground very fine, is placed in the top half, boiling water poured in and the syrup-like extract of the fruit is soon in the lower receptacle. A long spout projects from the base, provided with a tin cap. A horizontal wooden handle completes the apparatus. The milk is kept hot in another pot, and introduced into the cup at the same time as the coffee. A couple of lumps of the light gray sugar of the region are added, and you have coffee as they make it where it grows. Mexico is a perennial magazine of surprises. The Capital is built upon the bed of a former lake, in the worst possible location in the whole valley. It has no drainage, and nothing but the altitude and resultant rarification of atmosphere prevents a sweeping and constant epidemic. The water works consist of lively fellows, who rush about the streets with globular tanks "fore-and-aft," supported by straps over the head.

They peddle the fluid at so much a quart, I suppose. Egg merchants bring hen fruit in large panniers. Flower sellers border the plaza in

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front of the great Cathedral, which, by the way, is the largest and most ornate this side of Europe. Upon Sunday morning this plaza is gay with promenaders, listening to the music of a military band. Señoritas, pretty and otherwise, parade in couples, with watchful mothers six paces in the rear. The Almandares, another plaza, densely shaded, is provided with a roadway or path upon its borders, so equestrians may make the circuit at full speed—a happy idea.

All Americans are taken to see the Aztec calendar stone, now set up against the Cathedral, by means of which that astute race kept track of fleeting time, and the sacrificial stone in the museum. Prescott, the historian, says that 60,000 persons were slaughtered upon this stone in in one year, but it's my private opinion that nobody took the trouble to keep count.

Madame Testa, a favorite and sparkling prima donna, not unknown in Philadelphia, tells me some curious things. They always produce "Don Juan" upon "All Souls' Day" here. Why? Because, after having visited the cemeteries, distributed miniature coffins, skulls, and other cheerful emblems among the children, the population flock to the theatre, there being a graveyard scene in "Don Juan."

THE NEWSPAPERS.

Mexico blooms with newspapers, printed in half a dozen languages. They are largely given to casting political horoscopes. Bona fide news and sensations are of secondary importance. This is the sort of "send off" they give to a man who has had the mild misfortune to be murdered: "Senor ——, of ——, was assassinated in his own house upon the night of the 20th of February. He was the founder and leading citizen of the town. The culprits escaped."

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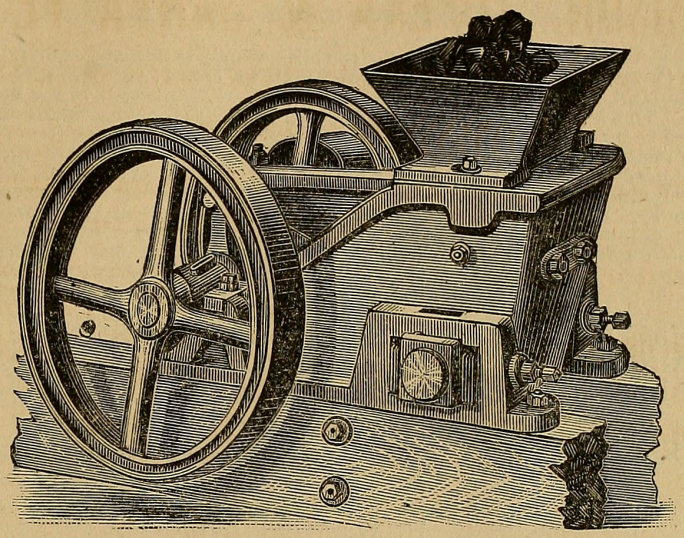

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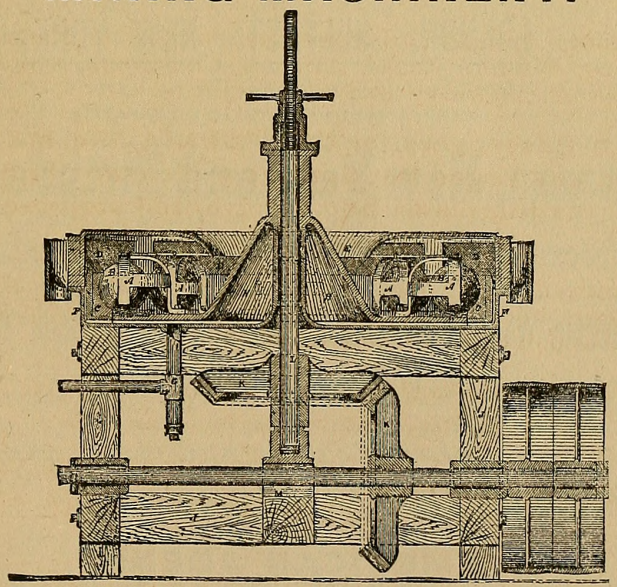

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HAMILTON'S MEXICAN LAW

A COMPLETE COMPILATION OF THE

LAWS OF MEXICO,

Including Commercial Law, Civil Law, Laws Relating to Foreigners, and Mexican Mining Law, with Annotations and Decisions.

By LEONIDAS HAMILTON, Attorney at Law,

Author of "Border States of Mexico."

San Francisco, 1882: One Volume, 8vo. Law Binding: Price, $6.00.

This is the first work on Mexican Law that has been published for nearly thirty years, and contains the laws in force to-day in Mexico, and supplies a want greatly felt by the Legal Profession, Business Men and Mining Men, who have long desired just such a work as is now presented—compact, comprehensive and authoritative.

The work is divided into ten parts, as follows:

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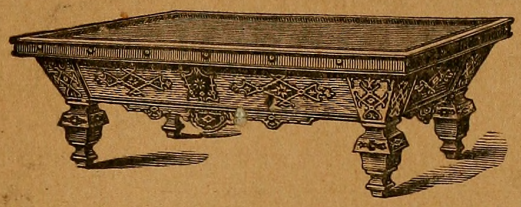

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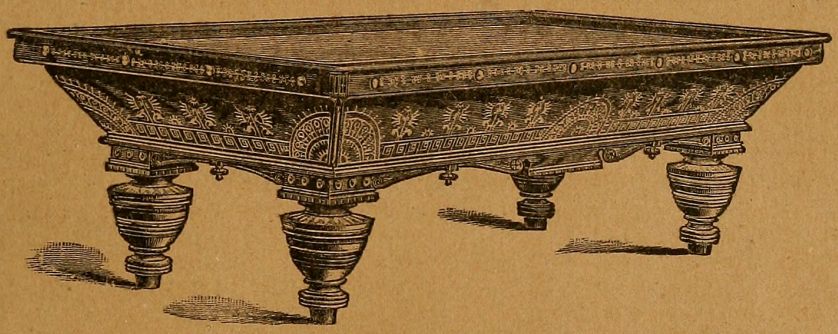

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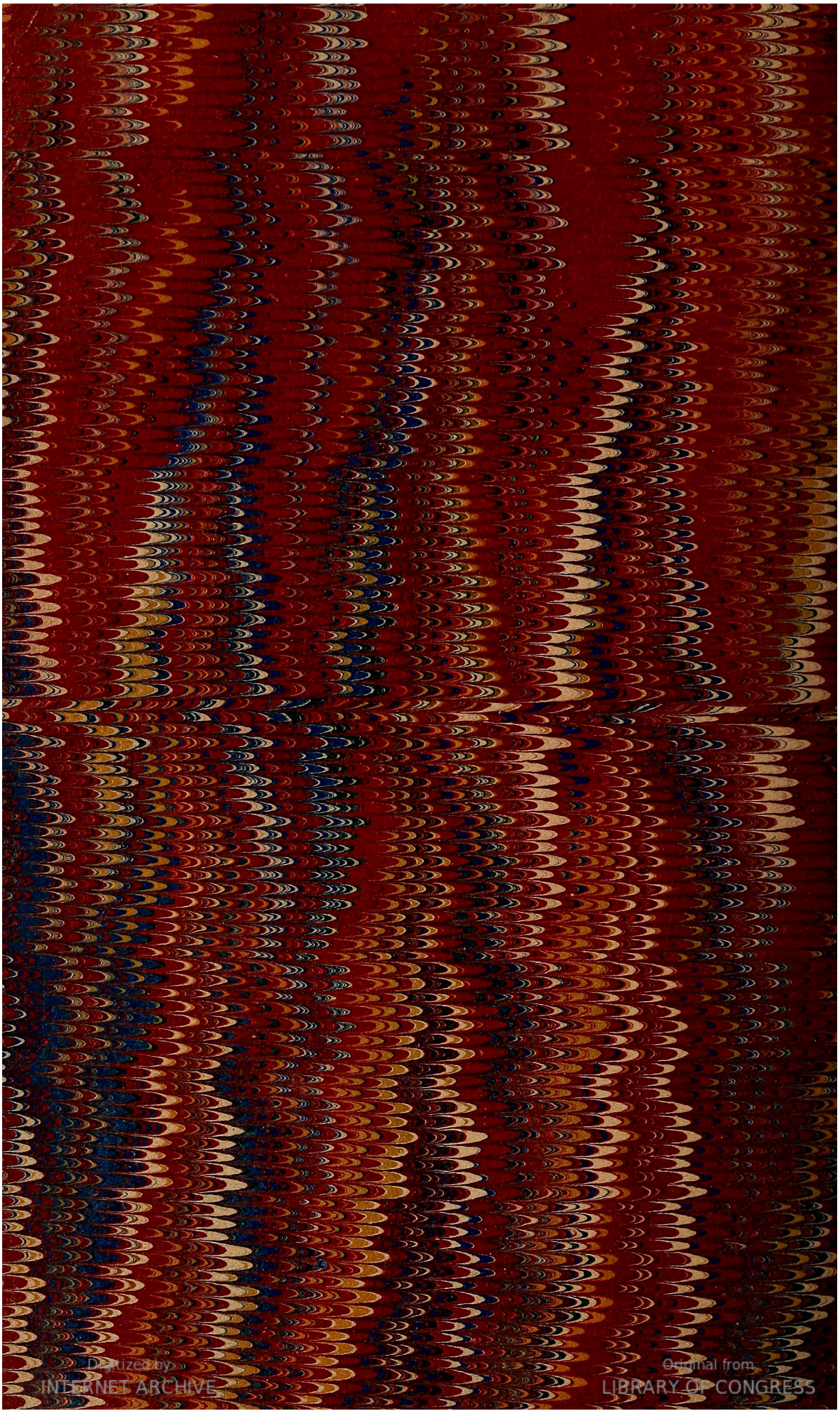

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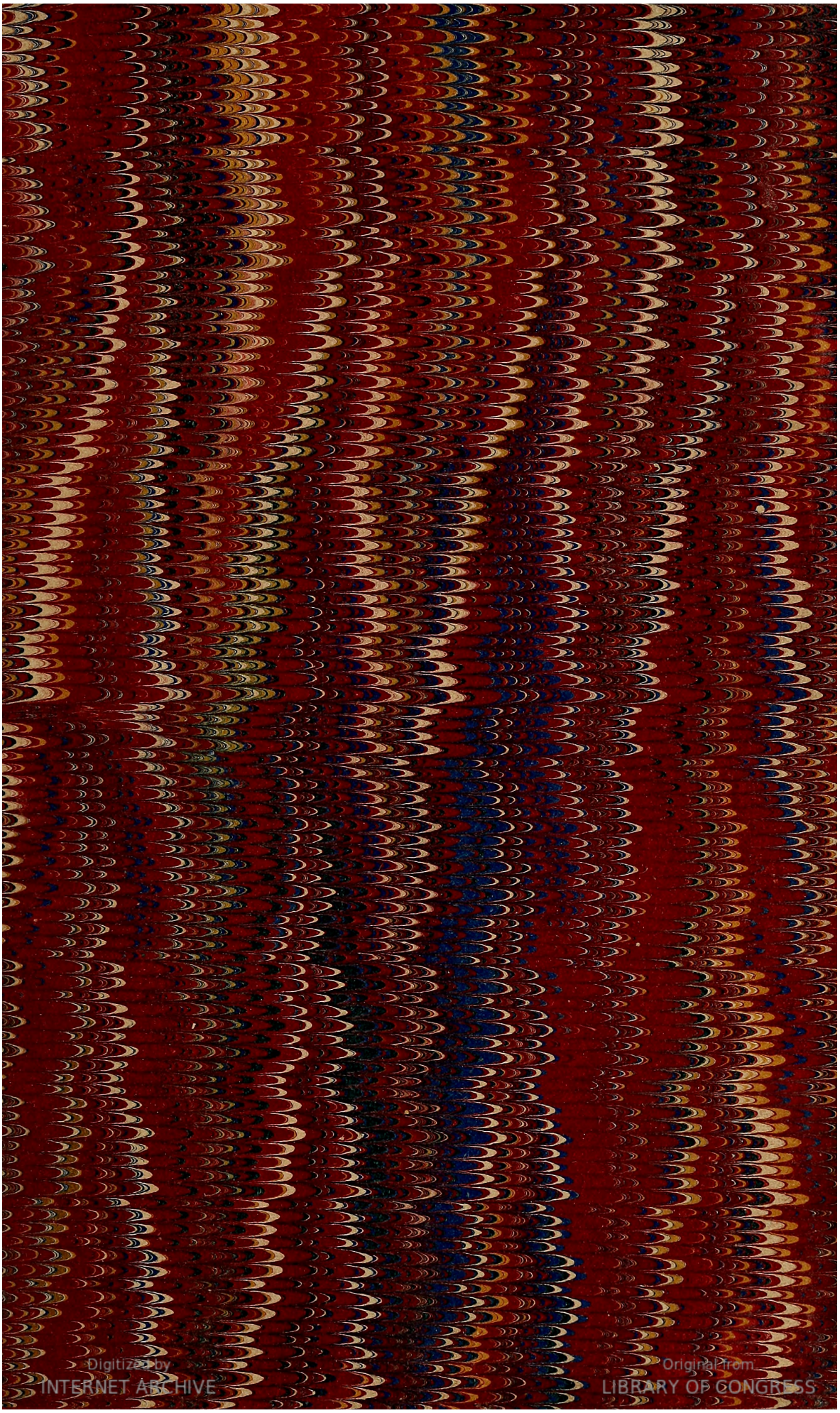

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