

The statistical part of this paper will contain detailed information about the number of schools established in each State, their cost, etc., during the year 1895, which complements the information embraced in this chapter.

Libraries.—Many great and noteworthy public and private libraries attest the ineradicable love of learning characteristic of the Mexican people. In 1894 there were in the Republic the National Library, with 200,000 volumes, and 102 other public libraries. There were in that year 22 museums for scientific and educational purposes, and 3 meteorological observatories. Our National Library at the City of Mexico collected all the books possessed by the libraries of the different convents when they were suppressed by the National Government, and has therefore a very large number of rare and valuable books.

Newspapers.—The number of newspapers published was 363, of which 94 are published in the capital: 4 in English, 2 in French, and 1 in German, showing that the Press has not attained there the great development that it has in this country.

THE VALLEY OF MEXICO.

The Valley of Mexico is one of the finest spots in the world. Surrounded by high mountains—almost at the foot of the two highest in the country, Popocatepetl and Ixtaccihuatl—with a very rare and clear atmosphere and a beautiful blue sky, especially after a rain; it is really a centre of magnificent scenery. The rareness of the atmosphere makes distant objects appear to be very near, and when looking from the City of Mexico at the mountains which surround the Valley, one imagines that they are at the end of the City, while some of them are at a distance of forty miles. The view of the Valley from Chapultepec Hill, which is about one hundred and fifty feet high and distant about three miles from the City, towards its western extremity, where our military school now is and where the President has made his summer residence, is one of the most beautiful with which the earth is endowed. I have seen the Bosphorus, Constantinople, the Bay of Naples and other spots in the world which are considered to be most remarkable for their natural beauty, but I think the view of the Valley of Mexico from Chapultepec can be advantageously compared with any of them, if it does not excel them all.

Six lakes are within the limits of the Valley,—Chalco, Zochimilco, Texcoco, Xaltocan, San Cristobal, and Zupango, the two former being of fresh water and the others of salt water—and, as they have no natural outlet the City of Mexico has been deprived for some time of a proper drainage and its health has been affected very materially thereby. But the colossal undertaking of making an artificial outlet is

now practically finished. In an article which I published in the *Engineering Magazine* in January, 1895, I dwelt especially on the work done during four centuries to accomplish that great end.¹

The prevailing wind in the Valley of Mexico is northwest and north-northwest, which blew 250 times during the year 1883; while the southern winds, which are very dry, are rare, as they only blew 51 times in that year; but at the same time they have greater velocity than the others, and the greatest relative velocity of the winds is 3.0. The west and northwest winds are very damp.

At the present stage of industrial development, speaking especially of the Valley of Mexico, the question of a cheaper combustible is the one of supreme importance. In the absence of water-power of importance and permanence of volume, the only solution of the problem so vital to the growth of manufactures there lies in procuring abundant and cheap fuel.

THE CITY OF MEXICO.

The City of Mexico, located in the western end of the valley, on the Anahuac plateau, at an altitude of 7350 feet above the sea level in 19° 26' north latitude and 99° 07' 53" .4 longitude west of Greenwich, covering about twenty square miles, is one of the most ancient cities of this continent, was the capital of the Aztec Empire, of the Spanish Colony of New Spain and now of the Mexican Republic, and of the Federal District of Mexico.

Mexico dates either from the year 1325 or 1327, when the Aztecs, after long wanderings over the plateau were directed by the oracle to settle at this spot. For here had been witnessed the auspicious omen of an eagle perched on a nopal (cactus) and devouring a snake. Hence the original name of the city, Tenochtitlan (cactus on a stone), changed afterwards to Mexico in honor of the war god Mexitli. The eagle holding a snake in her beak and standing on a cactus upon a stone, is the coat-of-arms of the Mexican Republic. With the progress of the Aztec culture the place rapidly improved, and about 1450 the old mud and rush houses were replaced by solid stone structures, erected partly on piles amid the islets of Lake Texcoco, and grouped around the central enclosure of the great teocalli. The city had reached its highest splendor on the arrival of the Spaniards in 1519, when it comprised from 50,000 to 60,000 houses, with perhaps 500,000 inhabitants, and seemed to Cortes, according to Prescott's, "like a thing of fairy creation rather than the work of mortal hands." It was at that time about 12 miles in circumference, everywhere intersected by canals, and connected with the mainland by six long and solidly constructed causeways, as is clearly shown by the plan given in the edition of

¹ That article is appended to this paper.

Cortez's letters published at Nuremberg in 1524.¹ After its almost destruction in November, 1521, Cortez employed some 400,000 natives in rebuilding it on the same site; but since then the lake seems to have considerably subsided, for although still 50 square miles in extent, it is very shallow and has retired two and a half miles from the city.

During the Spanish rule the chief event was the revolt in 1692, when the municipal buildings were destroyed. Since then Mexico has been the scene of many revolutions, was captured by the United States Army after the battle of Chapultepec, on September 13, 1847, and by the French Army under Marshall Forey in 1863. But since the overthrow of Maximilian, and the French Intervention in 1867, peace has been established and it has become a great centre of civilizing influences for the surrounding peoples.

The City of Mexico is 263 miles by rail from Veracruz on the Atlantic, 290 from Acapulco on the Pacific, 285 from Oaxaca, 863 from Matamoros on the frontier with the United States, and 1224 miles from El Paso. Mexico is the largest and finest city in Spanish America, and at one time larger than Madrid, the capital of Spain, forming a square of nearly 3 miles both ways, and laid out with perfect regularity, all its six hundred streets and lanes running at right angles north to south and east to west, and covering within the walls an area of about ten square miles, with a population now of 539,935.

The present City of Mexico is almost twice as large as the old one, it having increased towards the northwest, and, strange to say, the new portion is not laid out as regularly as the old one. All the main thoroughfares converge on the central Plaza de Armas, or Main Square, which covers 14 acres, and is tastefully laid out with shady trees, garden plots, marble fountains, and seats. Here also are grouped most of the public buildings, towering above which is the Cathedral, the largest and most sumptuous church in America, which stands on the north side of the plaza on the site of the great pyramidal teocalli or temple of Huitzilopochtli, titular god of the Aztecs. This church, which was founded in 1573 and finished in 1657, at a cost of \$2,000,000, for the walls alone, forms a Greek cross, 426 feet long and 203 feet wide, with two great naves and three aisles, twenty side chapels, and a magnificent high altar supported by marble columns, and surrounded by a tumbago balustrade with sixty-two statues of the same rich gold, silver, and copper alloy serving as candelabra. The elaborately carved choir was also enclosed by tumbago railings made in Macao, weighing twenty-six tons, and valued at about \$1,500,000. In the interior, the Doric style prevails, and Renaissance in the exterior, which is adorned by five domes and two open towers 218 feet high. At the foot of the

¹ Reproduced in vol. iv. of H. H. Bancroft's *History of the Pacific States*, San Francisco, 1833, p. 280.

left tower was placed the famous calendar stone, the most interesting relic of Aztec culture, which is now at the National Museum.

The east side of the plaza is occupied by the old vice-regal residence, now the National Palace, with 675 feet frontage, containing most of the Government offices, ministerial, cabinet, treasury, military headquarters, archives, meteorological department with observatory, and the spacious halls of ambassadors, with some remarkable paintings by Miranda and native artists. North of the National Palace, and forming portions of it, are the post-office and the national museum of natural history and antiquities, with a priceless collection of Mexican relics.

Close to the cathedral stands the Monte de Piedad, or national pawnshop, a useful institution, endowed in 1744 by Don Manuel Romero de Terreros with \$375,000, and now possessing nearly \$10,000,000 of accumulated funds. Facing the cathedral is the Palacio Municipal, or City Hall, 252 feet by 122, rebuilt in 1792 at a cost of \$150,000, and containing the city and district offices, and the merchant's exchange.

Around the Plaza San Domingo were grouped the convent of that name, which contained vast treasures buried within its walls, the old inquisition, now the school of medicine, and for some time the Custom House, which has now been removed to the city boundary. In the same neighborhood are the Church of the Jesuits and the School of Arts, which is, in the language of Brocklehurst, "an immense workshop, including iron and brass foundries, carriage and cart mending, building and masonry, various branches of joinery and upholstery work, and silk and cotton hand-weaving."

Other noteworthy buildings are the national picture gallery of San Carlos, the finest in America, in which the Florentine and Flemish schools are well represented, and which contains the famous *Las Casas*, by Felix Parra; the national library of St. Augustine, with over 200,000 volumes, numerous MSS., and many rare old Spanish books; the mint,¹ which since 1690 has issued coinage, chiefly silver, to the amount of nearly \$3,000,000,000; the Iturbide Hotel, formerly the residence of the Emperor Iturbide; the Minería, or schools of mines, with lecture-rooms, laboratories, rich mineralogical and geological specimens, and a fossil horse, three feet high, of the Pleistocene period.

¹ The Spanish Government intended during last century to build a spacious, costly, and magnificent mint in the City of Mexico, and its plans and specifications were approved by the king, but by a mistake of the clerks in Madrid, they were forwarded to Santiago, Chili, instead of being sent to the City of Mexico, and it was in consequence built there. The building was so fine that, not having any mint at Santiago, it was used as the Government House, and it is now the Executive Mansion and Departments, and it is called "La Moneda," an abbreviation of "La Casa de Moneda," which is the Spanish name for mint.

Among the twenty scientific institutes, mention should be made of the Geographical and Statistical Society, whose meteorological department issues charts and maps of unsurpassed excellence.

Owing to the spongy nature of the soil, the Minería and many other structures have settled out of the perpendicular, thus often presenting irregular lines and a rickety appearance.

Before 1860 half of the city consisted of churches, convents, and other ecclesiastical structures, most of which have been sequestered and converted into libraries, stores, warehouses, hotels, and even stables, or pulled down for civic improvements. Nevertheless there still remain fourteen parish and thirty other churches, some of large size, with towers and domes. San Francisco Street is the leading thoroughfare, and is rivalled in splendor only by the new Cinco de Mayo Street, running from the National Theatre to the cathedral.

It would take a great deal more space than it is convenient to give in this paper, should I attempt to make a longer description of the City of Mexico which, being one of the oldest on this continent and the largest and principal one during the three centuries of the Spanish rule, it has quite a number of remarkable buildings and monuments and a very important history, a great deal of romance being connected with it.

The City of Mexico is not only the capital of the country, but the real head of the Republic; and the aim of all other Mexican cities is to follow in its footsteps and imitate as much as possible the City of Mexico, which to them is a beau ideal and a real paradise.

The City of Mexico is now literally encircled with a belt of factories—cotton, paper, linen, etc., packing houses, brick works, cork factories, soap works, etc., and cheaper fuel will add largely to their number. They have been able to show profits under the load of a dear combustible, and they will welcome the introduction of any fuel, which will enable them to work even more successfully.

Climate.—From the official reports of Professor Mariano Barcena, Director of the National Meteorological Observatory of the City of Mexico, of the weather conditions in 1895, it appears that there were 121 cloudy days. But the rains were mostly at night or late in the afternoon, of short duration, and immediately succeeded by sunshine showers. Long periods of rainy weather are unknown there. The total rainfall for the year, less than twenty inches, will convey a fair idea of the dryness of the climate. The mean temperature in the shade for 1895 was 60 degrees, the highest being 65, reached in April, and the lowest 53, in January, a temperature rather which avoids both extremities. The mean temperature for the summer months were: June, 64 degrees; July, 62; August, 62; September, 61.

The table on page 112, prepared by the Weather Bureau of the City

of Mexico, contains the average annual climatological data of that city from the years 1877 to 1895.

More detailed data about the climatological conditions of the City of Mexico during the year 1896, prepared also by our Weather Bureau, is appended on page 113.

Mortality in the City of Mexico.—During the year 1896 the total mortality in the City of Mexico, under a recorded population of 330,698, was 15,567, not including 1275 still-births, equivalent to 4.70 per cent. The principal diseases which caused that mortality were those affecting

¹ A BRIEF HISTORICAL SKETCH OF THE METEOROLOGY IN THE MEXICAN REPUBLIC.

Priest José Antonio Alzate stands in the first place among those who have cultivated the meteorological science in our country, being he who first devoted himself to its study, and made regular observations during more than eight years, as he himself says in his *Descripción topográfica de México* (1738 to 1799). Of these observations, he, unfortunately, only published those belonging to the last nine months of the year 1769, in his famous *Gaceta de Literatura de México*, 1788 to 1795. He also published many articles describing some phenomena and instruments, climates of towns, value and usefulness of observations, as he had done in others of his publications: *Diario Literario de México*, 1768; *Asuntos varios sobre Ciencias y Artes*, 1772 to 1773; and *Observaciones sobre la Física Historia Natural y Artes útiles*, 1787. He was the first in determining the height of the City of Mexico.

After these labors of Father Alzate, we find in the journal *El Sol* regular series of observations published, daily, from the 14th of June, 1824, to the 14th of January, 1828. Dr. John Burkart in 1826; Sr. Francisco Gerolt from 1833 to 1834, at the School of Mines; Sr. José Gómez de la Cortina, Conde de la Cortina, from 1841 to 1845; the members of the Geographical Section of the Army Staff from 1842 to 1843; the Astronomer Sr. Francisco Jiménez in 1858; the School of Mines in the years 1850, 1856, 1857, and 1858; Sr. Ignacio Cornejo, M.E., at the same school from 1865 to 1866; and Sr. Juan de Mier y Terán at the "Escuela Preparatoria" from 1868 to 1875, respectively, made some meteorological observations.

A series of observations from 1855 to 1875 were made at the Hacienda de San Nicolás Buenavista, and another one at the city of Córdoba from 1859 to 1863, by Dr. José Apolinario Nieto; Sr. Carlos Sartorius at the Hacienda del Mirador (State of Veracruz); Sr. Miguel Velázquez de León, and his sons, Joaquín and Luis, engineers, from 1869 up to the present, at the Hacienda del Pabellón; Sr. Gregorio Barreto from 1869 to 1880, at the city of Colima; General Mariano Reyes, Sr. José María Romero, engineer, and Sr. Pascual Alcocer, from 1870 to the present date, at the city of Querétaro; Sr. Lázaro Pérez from 1874 to 1885, at the city of Guadalajara; Sr. Isidoro Epstein at the City of Monterrey, 1855; Sr. Vicente Reyes, a civil engineer and architect, at the city of Cuernavaca, 1873, 1874, and 1876; Sr. Joaquín de Mendizabal Tamborrel, an engineer, at the city of Puebla, 1872 to 1873; Sr. Augustin Galindo at the same city, 1875; Professor Manuel M. Cházaro at San Juan Michapa (State of Veracruz), 1872 to 1873; Priest Pedro Spina, S. J., at the city of Puebla, 1876, and perhaps many others from whom we have no notice, have devoted themselves to making meteorological observations.

The "Sociedad de Geografía y Estadística" the most ancient scientific society in Mexico, distributed, in 1862, some instruments and instructions to observers.

Finally, on the 6th of March, 1877, being President of the Republic, General

CLIMATOLOGICAL DATA OF THE CITY OF MEXICO. ANNUAL SUMMARIES AND GENERAL SYNOPSIS, 1877-1895.

(ENGLISH MEASURES.)

Long. W., Greenwich 6 h. 36 m. 31 s., 56 or 99° 87' 53" 4.

Height, 7472 (Eng. feet).

Lat. N. 19° 26'.

Table with columns for meteorological data (1877-1895) and average data (1877-1895). Rows include: Mean barometrical height reduced to the freezing point, Maximum barometrical height, Minimum barometrical height, Mean temperature in shade, Mean temperature in open air, Maximum temperature in shade, Maximum temperature in open air, Minimum temperature in shade, Minimum temperature in open air, Mean humidity of the air, per cent., in shade, in open air, Mean vapor tension in shade, Mean vapor tension in open air, Mean evaporation of water in shade, Mean evaporation of water in open air, Days of rain, total amount, Rainfall, total amount, Greatest precipitation in 24 hours, Average cloudiness, Prevailing direction of clouds, Amount of cloudy days, Amount of clear days, Prevailing wind, Mean velocity of wind, per hour (miles), Maximum velocity of wind, per hour (miles), Direction of the wind of maximum velocity, Ozone (mean) (0-10), Amount of lightning days.

MARIANO BÁRCENA, Director.

JOSÉ ZENDEJAS, Vice-Director.

GENERAL SUMMARY OF THE METEOROLOGICAL OBSERVATIONS TAKEN IN THE CENTRAL OBSERVATORY OF THE CITY OF MEXICO DURING THE YEAR 1896.

Lat. N. 19° 26'. Long. W. of Greenwich, 6 h. 36 m. 31 s. 56 or 99° 07' 53" 4. Height of the barometer above sea level, 7472.25 (Eng. feet).

Table with columns for meteorological data by month (Jan-Dec) and average data (1896). Rows include: Mean barometrical height, reduced to freezing point, Maximum barometrical height, Minimum barometrical height, Mean temperature in shade, Mean temperature in open air, Maximum temperature in shade, Maximum temperature in open air, Minimum temperature in shade, Minimum temperature in open air, Mean humidity of the air, per cent., in shade, in open air, Mean vapor tension in shade, Mean vapor tension in open air, Mean evaporation of water in shade, Mean evaporation of water in open air, Days of rain, total amount, Rainfall, total amount, Greatest fall in 24 hours, Mean amount of clouds (0-10), Prevailing direction of clouds, Amount of cloudy days, Amount of clear days, Prevailing wind, Mean velocity of wind, per hour (miles), Maximum velocity of wind, per hour (miles), Direction of the wind of maximum velocity, Ozone (mean) (0-10), Amount of lightning days.

MARIANO BÁRCENA, Director.

JOSÉ ZENDEJAS, Vice-Director.

the digestive and respiratory organs, the former amounting to 4472 or 1.35 per cent. of the population and the latter to 3904 or 1.18 per cent. of the population, and both causing 8376 deaths or 53.81 per cent. of the total number of deaths. Deaths by typhus and typhoid fevers and small-pox, which are supposed to make such great ravages in the City of Mexico, were in reality insignificant, the deaths by the former amounting in that year to 480 or 0.14 per cent. of the population, and the deaths by small-pox were, in the Federal District, embracing the City of Mexico and twenty-three suburban towns, 217 or 0.047 per cent. of the population of the District which is 473,820. Small-pox only attacks the very poor people, and, strange to say, also foreigners, even in case they have been vaccinated in their country, and to be free from small-pox they must be vaccinated in Mexico.

The months of the greatest mortality during the same year were from February to May, and of the smallest the month of August, showing that the unhealthy months are the dry months, that is before the rains set in.

The mortality in the City of Mexico is indeed very large, and it is due principally to two causes, first, the want of proper drainage and sewerage for the refuse of the city, a trouble which is now almost com-

Porfirio Díaz, and by the suggestion of General Vicente Riva Palacio, then Secretary of Public Works, the Central Meteorological Observatory was established. From that date up to the present, an uninterrupted hourly observation is regularly taken during the day and the night in the Central Meteorological Observatory. Some magnetical observations have also been made, and the Observatory is now thought of being removed to a more suitable spot.

After the establishment of the Central Meteorological Observatory, some official or private meteorological stations have also been established as follows: Aguascalientes (Instituto del Estado); Guadalajara (Escuela de Ingenieros), observer, Agustín V. Pascal; Guanajuato (Colegio del Estado), observer, Genaro Montes de Oca; León (Escuela Secundaria), observer, Mariano Leal; Mazatlán (Observatorio Astronómico y Meteorológico), observer, N. González; Oaxaca (Colegio del Estado), observer, Dr. A. Domínguez; Pachuca (Instituto del Estado), observer, Dr. N. Andrade; Puebla (Colegio Católico and Colegio del Estado), observers, Priest P. Spina and B. G. González respectively; Querétaro (Colegio Civil), observer, J. B. Alcocer; San Luis Potosí (Instituto del Estado), observer, Dr. G. Barroeta; Toluca (Instituto del Estado), observer, S. Enríquez; Veracruz, observer, G. Baturoni; Zacatecas (Instituto), J. A. Bonilla. Dr. Manuel Andrade, of Huejutla; Dr. Matienzo, of Tampico; Father Pérez, of Morelia; Father Arreola, of Colima; Father Castellanos, of Zapotlán; Sr. Pascual Borbón, of Tacámbaro, are enlightened observers to whom the Central Meteorological Observatory is indebted for their valuable co-operation, and also to the telegraph operators of the "Telegraph system," who send, daily, some weather observations to this office.

The staff of the Central Meteorological Observatory is now as follows: Director, Mariano Bárcena; Vice-Director, José Zendejas, C.E.; Second Observer, Francisco Toro; Assistants, Rafael Aguilar, Francisco Quiroga, Angel Robelo, José Torres, and J. I. Vázquez.

pletely remedied, and the second, the unhygienic way of living of the poor classes, among whom takes place the largest mortality.

The very large number of still-births which occurred in the City of Mexico in 1896, almost exclusively among the poor classes, shows the little care that the poor women take of themselves, and is enough to explain the present large mortality.

RAILWAYS.

For many years the government earnestly endeavored to further the construction of railroads in Mexico, but the broken surface of the country made the building of these roads very expensive. Until 1873 the means of internal locomotion were mainly limited to a few wagon roads, over which travelled twenty-four regular lines of diligences, under one management; and bridle-paths from the central plateau over the sierras and terrace lands down to a few points on both coasts.

In 1854 the first railroad was finished, connecting the City of Mexico with Guadalupe, about three miles in length, and another from Veracruz to Tejeria towards the City of Mexico about twelve miles in length; these being the only railroads that were built, up to 1861. During the French Intervention the French army extended the Tejeria road to Paso del Macho, about thirty-five miles further, to the foot of the mountain, so as to be able to transport their army, with the shortest delay possible, out of the yellow-fever zone, toward the central plateau; and an English Company, which had a grant for a road from the City of Mexico to Veracruz, which was supposed at the time to be the only one that could be built in Mexico, extended the Guadalupe road to Apizaco in the direction of Veracruz and not far from Puebla.

No construction of consequence was done immediately after the French Intervention, because the country was generally in a disturbed condition, although several efforts were made in that direction by President Juárez, under whose administration a new and very liberal grant was given to the Veracruz railway company. The Veracruz road was finished in 1873, during Señor Lerdo de Tejada's Presidency, and when General Díaz became President in 1876 he earnestly promoted railroad building; and we now have two trunk lines connecting the City of Mexico with the United States—the Mexican Central to El Paso, Texas, with a branch from San Luis Potosí to the port of Tampico, and another from Irapuato to Guadalajara, which has recently been extended to Ameca, towards the Pacific; and the Mexican National to Laredo, Texas, with several branches. Another trunk line from Eagle Pass to Torreon and Durango, which it is intended shall finally reach the Pacific, has also been built by Mr. C. P. Huntington and his associates. There is besides a line from Nogales to Guaymas, built and owned by the Atchison, Topeka, and Santa Fé