

tillery, 2304 ; cavalry, 8454 ; rural guards of police, 2365 ; gendarmerie, 250 ; total, 37,103 ; and was commanded by 11 Major-Generals, 73 Brigadier-Generals, 1041 Colonels, Lieutenant-Colonels, and Majors, and 2335 Commissioned Officers. The total fighting strength, including reserves, is stated to be 132,000 infantry, 25,000 cavalry, and 8000 artillery. Every Mexican capable of carrying arms is liable for military service from his twentieth to his fiftieth year.

Notwithstanding that General Diaz is himself a soldier, he has followed the policy of the Liberal party of reducing the army as much as possible, and in his report of November 30, 1896, in which he informs his fellow citizens of his results of his sixteen years administration, he gives the following figures, showing the reduction he has been able to accomplish in the army since 1888 :

The army had, in 1888, according to President Diaz's report, the following personnel :

Major-Generals.....	16
Brigadier-Generals.....	84
Commissioned Officers.....	1,205
Non-Commissioned Officers.....	2,566
Soldiers.....	29,367
Total.....	33,238

In 1896 the personnel had been reduced in the following numbers :

Generals.....	24
Commissioned Officers.....	166
Non-Commissioned Officers.....	299
Soldiers.....	8,170
Total.....	8,659

The Mexican navy is now in its inception, as it consists of a fleet of two dispatch vessels, launched 1874, each of 425 tons and 425 horsepower, and severally armed with a four-ton muzzle-loading gun, and four small breech-loaders. A steel training ship, the *Zaragoza*, of 1200 tons, was built at Havre, in 1891 ; four gun-boats are building, and a battle-ship and cruiser are projected ; five first-class torpedo-boats have been ordered in England. The fleet is manned by ninety officers and five hundred men.

EDUCATION.

In 1521, the City of Mexico fell into the hands of the conquering Spaniards, and exactly eight years after that event there was established in the City of Mexico the College of San Juan de Letran, for giving secondary education to intelligent Indians as well as to the sons of the

invading race. Thus, ninety years before the landing of the Pilgrims, the City of Mexico had its "Harvard."

Universities Established by the Spanish Government.—The first viceroy of New Spain, as Mexico was called then, fourteen years after the conquest, petitioned the King of Spain to permit him to found a university in Mexico, and, anticipating from his knowledge of the good-will of the Spanish-rulers that the desired permission would be given, the viceroy took the responsibility of establishing certain classes in the higher learning, a fact which does not support the commonly held theory that Spain has always been the enemy of education and of popular enlightenment. Owing to the slow means of communication in those days, and the legal steps necessary to be taken in the mother country, the university was not formally established until 1553, or eighty-three years before Harvard College was opened. The great event of setting on foot the university came under the enlightened rule of the second viceroy, Don Luis de Velasco, who did so many great things for Spain's new dependency.

Later on, in 1573, there were founded in Mexico the colleges of San Gregorio and San Ildefonso, the latter still open, but modernized into the national preparatory school, a really great institution in that city of many schools. A few years later, long before the 17th century had dawned, came the founding of two more colleges and a divinity school, so that in the first sixty-five years of Spain's control in Mexico no less than seven seats of the higher learning had been established on secure foundations.

No wonder that Mexico's capital became known as the Athens of the new world, producing men of great learning, such as Don Juan Ruiz de Alarcon and such notably erudite women as Juana Inez de la Cruz. The extensive library of "Americana," belonging to Don Jose de Agreda, of that city, containing over 4000 books, many of them invaluable, attests the literary, antiquarian, scientific and artistic activity of the Spaniards who planted there in a short space of time so much of learning and such vast institutions dedicated to the instruction in all the higher branches of knowledge.

At the outset the University of Mexico gave instruction only in mathematics, Latin and the arts. Medicine and surgery were not esteemed highly during the middle ages, and it was not until long after the revival of learning in the Renaissance that the physician came to be considered as a true man of science. So it is not to be marvelled at that the University of Mexico waited until 1578 to establish a chair of medicine—the first in the new world discovered by Columbus. The first chair of medicine was a morning class, and a single professor carried his students through a four years' course unaided. In 1599, a second medical professorship was added ; in 1661, anatomy and surgery

were added, and, consequently dissection was authorized. At the outset the viceroys appointed the professors, but after a time the candidates for chairs had to win the coveted prizes through competitive examinations.

The early students were not railroaded through. They had to study four years to obtain the diploma of a bachelor of medicine; then went out into active life, and, on gaining practical knowledge, received, passing a fresh examination, the diploma of licentiate of medicine, and, later, that of doctor of medicine.

School of Medicine.—In 1768 a decree was issued for the establishment in the City of Mexico of a royal college for surgeons, similar to institutions in Cadiz and Barcelona. This college was a very complete one, instruction being given in anatomy and dissection, in physiology, operations, clinical surgery, and medical jurisprudence. There were graduated also from the college all the dentists, bone-setters, phlebotomists, and midwives. A knowledge of Latin was not essential to receive a medical degree until 1803.

In 1821, Mexico having achieved her independence, the same careful watch over education continued, and in 1833 a general revision of educational institutions was ordered under the administration of Don Valentin Gomez Farias a leader of the Liberal party and the university was closed, because it was considered to have conservative tendencies, and a general board of education organized, which, among other things established what was called the School of Medical Science, with ten professors, giving a remarkably complete and modern course. On account of a revolution which occurred in 1834 which overthrew the Gomez Farias Government, the new school of medicine was closed, and the old university reopened; but, as the officials of the university, on making a careful study of the conditions of the new school of medicine rendered an impartial report, setting forth its manifold advantages it was decided to keep open the institution.

The incessant revolutions and consequent changes of government brought many evil things to pass, and the medical professors at times found themselves without salaries, and nobly devoted themselves to their classes without remuneration. They at one time were deprived of their building and literally thrown into the street. Better times came, however, the successive governments began to give substantial aid to the school, and in 1845 it took the name it still bears, the National School of Medicine. After more vicissitudes, many movings and trials which bore hard on the enthusiastic professors, the National School of Medicine finally was located where it now remains, in a part of the enormous edifice belonging formerly to the Inquisition.

In the chaos of succeeding revolutions the salaries of the professors were often unpaid, but the devoted men of science struggled on,

assisted by wealthier students and contributing often out of their own slender means to keep the school alive; but, in 1857, a better era commenced, and not since then, with rare exceptions, have there been any interruptions in financial aid from the various governments. All the other institutions of learning suffered the same fate and were exposed to similar ups and downs.

School of Engineering.—Our mining college is the best in Spanish America, and it was established when engineering was hardly taught, and endowed by a portion of the taxes levied by the Spanish Government on mines. Its edifice is one of the best built by the Spaniards in their colonies, and still stands as a great monument, embellishing the City of Mexico.

The above given facts will show how early did Mexico open great schools for the higher education, and how solicitous was the Spanish government to maintain them. But, three centuries of devotion to learning, antedating the war for independence, planted there firmly a love of knowledge which is now exhibited in the great government schools, in a city full of students, in innumerable private schools, in the well-filled public primary institutions, in night schools for adults, and in the thirty-five bookstores of that city.

Mexican Technical Schools in the Present Time.—The edifice of the first University in America, founded by the Spanish crown in 1551, is to-day occupied by the National Conservatory of Music. The National Academy of Art, ancient Academy of San Carlos, stands where Fray Pedro de Gante founded, in 1524, the first school of the New World—a school for Indians. The Normal School for males, with its six hundred pupils and its first-class German equipment, occupies the old convent of Santa Teresa, (1678). The Normal School for females has fourteen hundred pupils, an expensive building of 1648. The fine old Jesuit College of San Ildefonso, erected in 1749 at a cost of \$400,000 is now filled with a thousand pupils of the National Preparatory School. The National College of Medicine is housed in the old home of the Inquisition (1732), an edifice whose four hanging arches at each corner of the lower corridor are famous. The building was taken for its present purpose in this century, the Holy Office dying in America with the Independence, but the medical college was established by royal decree of 1768. It has now several hundred pupils. San Lorenzo (1598) is now the manual training-school where poor boys are gratuitously taught lithography, engraving, printing, carpentry, and many other trades. The similar institution for girls is of course modern, dating only from 1874. The National Library, with its 200,000 volumes, dwells in the splendid sequestered Church of San Agustin. The National Museum occupies part of the million-dollar building erected in 1731 for the royal mint. And so on

through a list that would rival that of any other country. The School of Mines and Engineering, however, stands as one of the first. Its magnificent building of Chiluca, the nearest to granite the valley affords, was built for it by Tolsa in 1793, and cost three millions. The institution named the Colegio de la Paz, better known as the Vizcainas is one of the principal establishments for the education of young women, founded in 1734, at a cost for construction alone of about \$2,000,000, subscribed by three Spanish merchants, who also provided funds for its support. These funds, when insufficient to meet expenses, are supplemented by the Federal Government. We have also a very high grade Military School located at the historical grounds of Chapultepec, which educates fine soldiers.

As late as 1824 Humboldt declared, "No city of the New Continent, not excepting those of the United States, presents scientific establishments so great and solid as those of the capital of Mexico." Except as to the buildings, of course, so much could not be said today, as wealth and numbers have made other countries take more rapid strides in higher education. Some of the universities of the United States pay even \$10,000 a year to professors and they therefore can secure the best talent.

From the time of the Spanish domination in Mexico to but a few years ago, the Mexican Government considered itself bound to give to the people free secondary education, and for this purpose colleges for all literary and scientific professions were established in the City of Mexico, and each State did the same in its respective capital, in so far as its means allowed it, so that anybody who intended to follow a scientific career could do so without any expense to himself.

The result of the free technical schools has been that most of the young men of well-to-do families in Mexico follow a literary career and that does not cost them anything, and we have more lawyers, doctors, engineers than we really need for the country.

Reorganization of the Technical Colleges.—We had before 1868 several higher colleges and in each of them the same careers were taught, as law, medicine, engineering, etc., but in the reorganization of our national colleges which took place in that year, it was thought proper to establish a special college for each career, and a preparatory college for such elementary studies as would be required for all careers, such as elementary mathematics, physics, chemistry, etc., etc., so that we now have in the City of Mexico, supported by the Federal Government a special school for engineering, one for law, one for medicine, another for agriculture, etc., etc., but each State generally supports one technical college where all literary careers are taught.

Primary Education.—Comparatively little attention was paid to the primary education, and the public schools were so deficient that

parents of some means did not send their children to them, but to private schools where they were better attended to. The fact that the elevation of the people depends on their primary education has caused common schools to be established in the country, and now the States vie with each other for the purpose of establishing the best system of common schools and increasing their number.

The Mexican Government has been too much disturbed since its independence to earnestly promote the education of the Indians. I consider that one of the first duties of Mexico is to educate the large number of Indians which we have, and when that is accomplished the whole condition of the country will change, as it will be able in a few years to increase by several millions its productive and consuming population.

In 1896 the Federal Congress of Mexico passed a law which was promulgated on June 3d of that year, making primary education obligatory on all the inhabitants of the Federal District and Territories, and placing public education under the control of the Federal Government, having been before under the respective municipalities.

In almost all the States education is free and compulsory, but the law has not been strictly enforced. Primary instruction is mostly at the expense of the municipalities, but the Federal Government makes frequent grants, and many schools are under the care of the beneficent societies.

School Statistics.—Statistical reports on public instruction for 1876 showed an aggregate of 8165 primary schools, with an attendance of 368,754 children of both sexes throughout the Republic. Reports for 1895 show a total number of public schools for both sexes throughout the Republic amounting to 10,915, in which are instructed 722,435 scholars, at an aggregate cost of \$5,455,549.60. The proportion of children of both sexes attending the school is, with respect to the general population, nearly five per cent., and that of the children of school age, actually attending school about 27 per cent. with an average yearly outlay per capita of \$7.55. The entire number of private schools for both sexes, including those supported by religious and civil associations, is 2585, with a total attendance of 81,221. Adding these to the preceding figures we have an aggregate of 13,500 schools with an attendance of 803,656 scholars. The number of schools in the country for professional technical education is 136, attended by 16,809 pupils of both sexes.

In the Federal District there are 454 public primary schools with an attendance of 44,776 pupils, and 247 private schools with an attendance of 19,334 pupils. In the matter of education Mexico now stands upon a plane as high, if not higher, than any of the Spanish American Republics, out-ranking even Chili and the Argentine Republic, both of which greatly surpassed her in former years.

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.