THE
AZTEC CALENDAR

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IN the year 1479 A. D., thirteen years before Columbus discovered America, a large stone zodiac was carved at Coyoacan by the Aztecs and brought to ancient Tenochtitlan, the site of the present city of Mexico.

Eighty-five years later Tezozomoc, the native Indian historian, wrote (in 1564) as follows:

"In the year Twelve Rabbit, (that is, 1478 A. D.,) two years before the death of King Axayacatl, who in that epoch ruled the world, it came to pass that the high priests reminded him that he had made a solemn vow and spoke to him after this manner: 'The temple in which the great sacrifices are to be made is nearing completion. Thou, thyself, hast erected it. Thou didst vow to adorn it with monuments of great beauty, that our god, Huitzilopochtli, the sustainer and defender of our race, might there take his seat with pleasure. Time flies and thou canst no longer delay'. 'I think,' replied the King, 'to substitute the Sacrificial stone which my father formerly dedicated to the sun-god, with another new one. Remove the old stone but preserve it carefully. I will give food and raiment to the laborers that will bring me a great rock, and I will give gold, chocolate and painted cloths to the sculptors that will engrave upon it the image of the sun surrounded with our zodiacal sign.'

"Immediately the laborers sallied forth and broke off a great fragment of rock; 5,000 strong men dragged it along. But, when it reached the bridge of Xoloc, the beams were broken into a thousand pieces, and fell into the water, and nobody dared attempt to draw it from the depths of the lake. Then the king was very wroth and said: "Make a new bridge with double beams and stages and tear me out a new fragment from the mountains of Coyoacan; bring also another rock and make of it a vase in which shall be caught the blood that will issue from the Sacrificial stone as an offering of reconciliation to our god."

The historian tells how all this was done; the rocks were torn out of the mountain side, dragged to Tenochtitlan, passed the bridge of Xoloc safely, and were duly dedicated with great festivities and sacrifices. From a painting in the Codex Mendocino we see that this Calendar Stone must have been moved by means of a long file of men who dragged it with ropes over great wooden rollers, in the same manner in which the ancient Egyptians moved enormous blocks of granite for their pyramids.

This zodiac is eleven feet eight inches in diameter. It is a monolith

of dark gray porphyry, and Alexander von Humboldt calculated its weight at 24,400 kilograms, or 53,792 pounds avoirdupois, or over 26 tons. This enormous weight shows the immense difficulties the Aztecs surmounted in transporting it several leagues to their great temple.

The rock was originally placed in a horizontal position in the Eighth House of the great temple of Mexico. King Axayacatl invited all the rulers of all the neighboring friendly nations to be present at the ceremonies of its dedication, which took place in the year Two House, or 1481 A. D. The thirteen priests of the thirteen principal gods of Mexico, armed with their obsidian knives for the sacrifice, ascended the stone before dawn of the day of its inauguration. Seven hundred and twenty-eight captives, reserved from those taken in the battle of Tliliuhtepec, decked with gay plumage, were placed near the stone. At sunrise a priest with a pot of smoking incense marched four times around the stone and then threw the pot upon it to be shattered to pieces.

Immediately King Axayacatl ascended to the rock and began the sacrifice by tearing out the hearts of the victims, throwing them into the stone vase mentioned by the historian Tezozomoc, and now in the National Museum. When he had thus sacrificed fifty-two men, he was followed by the thirteen priests in succession, until the seven hundred and twenty-eight prisoners were slain. Tezozomoc says that Axayacatl drank of the blood and ate of the flesh of the victims to excess, and that his death not long afterwards was the direct result of this debauch.

In the year 1521 the indomitable Cortés, with his little band of Spanish adventurers, concluded the conquest of Mexico by pulling down all the temples. This rock, and many large idols, and other objects of worship, were buried in the surrounding marshes by order of the Christian monks, to hide them from the eyes of the heathen. It came to the surface in 1551, and was reinterred in the year 1558 by order of the Archbishop Montufar, who was greatly shocked at sight of the heathen emblems. After the second interment it was entirely forgotten. During the succeeding 232 years not one of the many writers on Mexican antiquities mentioned its existence. Therefore it was a wondrous revelation when, on the 17th of December, 1790, in lowering the grade of the pavement of the Plaza in front of the Cathedral, in order to make it level with the street, this notable monument was rediscovered. It was found in an old sewer eighteen inches below the surface, at a spot 100 feet north of the Portal de Flores and 220 west of the National Palace. The wardens of the Cathedral begged it of the viceroy, who gave verbal order that it should be delivered to them on condition that it should be preserved and exposed in a public place. They accordingly built it into the base of the southwestern tower of the cathedral, and there it remained until August, 1885. It had however always been considered as the property of the National museum and, for preservation from the elements,

it was finally removed thither. The great mass of stone was carried at the rate of a few feet daily for several weeks until it finally reached its present resting-place, in September, 1885. It stands out in bold relief from the south wall of the lower salon.

Within the innermost circle of this zodiac, the great face, its sacred mask, circular ear-drops, stone necklace, protruding tongue, all are a representation now very well known of "Tonatiuh," the sun. The sign 'Ome Acatl', which it bears upon its forehead, refers to the year Two Reed. The symbol One Rabbit with which they formerly began their cycle was considered as an evil omen, because of the mortality occasioned by the great droughts that accidentally occurred on the years corresponding to this symbol. The tribe to remedy this resolved to reform the calendar, transferring to the year "Two Reed" the commencement of each age. This correction was made in the year 1454 A. D.. as here shown.

The second large circle contains four parallelograms, indicating in Aztec mythology that the sun had died four times. These epochs or ages were arranged as follows: Age of Air or wind, Age of Water, Age of Fire, Age of Earth; and may have been interpreted thus:

Age of Air, the glacial epoch, embodying their traditions of the ice-bound lands of the North from which their forefathers had come; Age of Water, the submerging of the continent of Atlantis: Age of Fire, eruptions of the volcanoes with their accompanying earthquakes; Age of the Earth, beginning 4431 years before Christ and ending 1312 A. D.

Using these same four squares to represent the seasons in their complex system,the Aztecs placed Winter in the upper left hand square, and indicated its strength by the head of an ocelotl, or leopard; Spring, which was their warmest season, in the lower left hand square, its head indicated by the sign calli or house, because in the house is the hearth where the fire is preserved; Summer, their season of rains, in the lower right hand square—its waters indicated by the sign acatl or reed; and Autumn, in the upper right hand square—its harvest indicated by the sign tochtli or rabbit. The seasons began at the equinoxes and solstices, just as should our own. With the "deaths" of the first three suns the great catastrophes that placed the race in danger of perishing had ended, and under this aspect the conclusion of the fourth Age was still some cycles distant. But Chavero says the Mexicans, in their pride, made an innovation by inventing a fifth Sun, which should pertain to them alone. They, who wished to have a god of their own, to have a place designated by the gods as a heaven for themselves alone, and to be a chosen and peculiar people, wished also a Sun of their own. Acordingly, in the year 1312, on the day in which they trod for the first time the islet in the lake where the City of Mexico now stands; on the day in which they beheld, in the spot where now is the public fountain in the

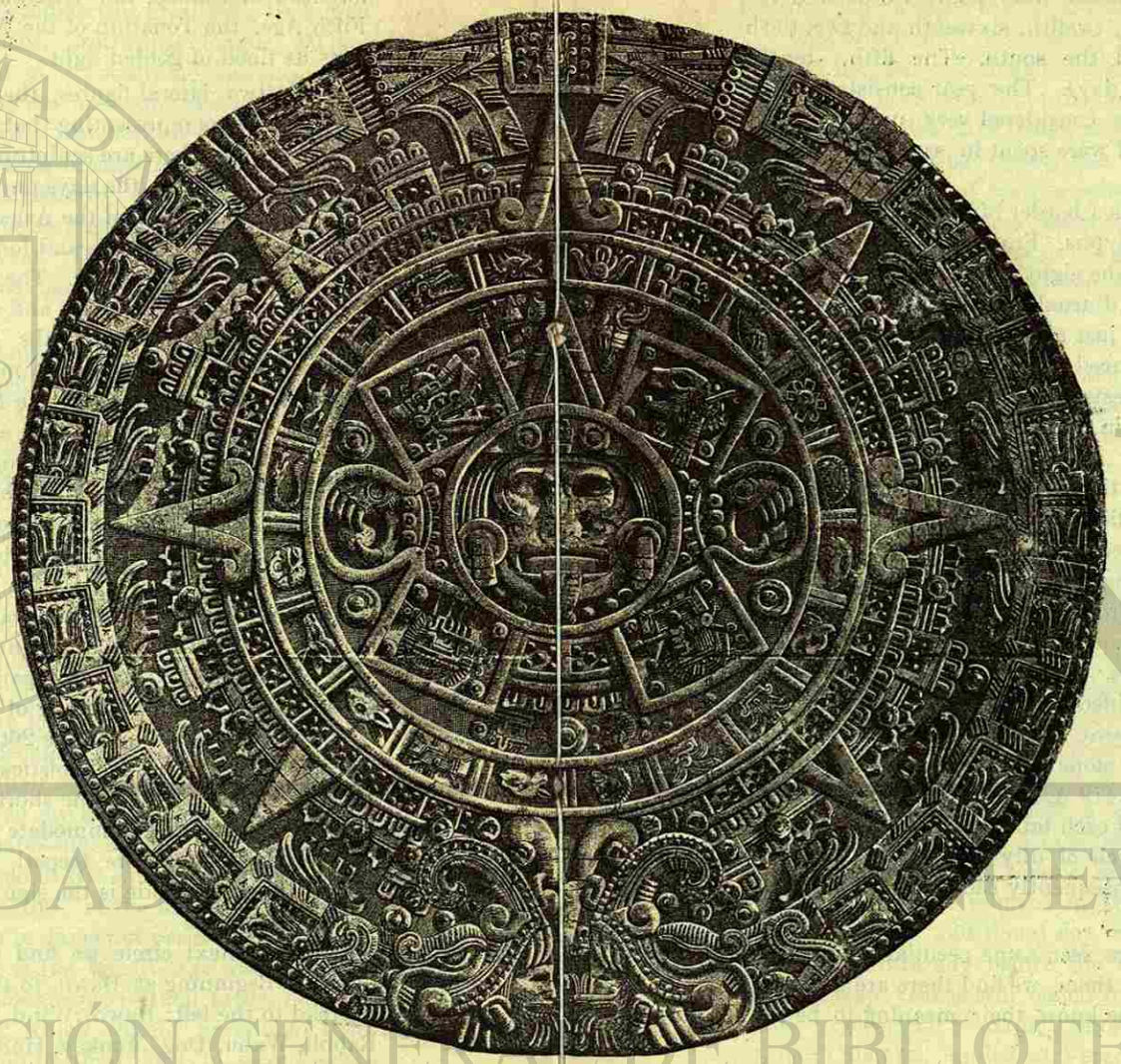
Plaza of Santo Domingo, the eagle poised on the cactus with the serpent in its claws, with the blue sky above and the blue waters beneath; on that day and there, upon the heads of that group of pilgrims, upon the forehead of Tenoch, the venerable chief of their tribe, the Sun of the Fifth Age, the Tonatiuh of the Mexicans, poured from the high heavens its flood of golden light.

The two lateral figures, therefore, at each side of the central face are eagle talons representing that the Sun of the fifth Age is still soaring in the zenith. There are sculptured beneath the face the dates One Rain and Eight Monkey, the days on which the sun passed through the meridian of the Capital of the Aztec Empire in the year 1479. In each claw there are five glyphs and four dots the total of eighteen representing the months of the year. The priests who worshipped Quetzalcoatl, the God of Air, had a secret and sacred Calendar in which the year had but 260 days or twenty months, with thirteen days in each month. It was based upon the apparent movements of the planet Venus, which shone for them 260 days as the Morning Star and 260 as the Evening Star. If we sum up all the dots and glyphs that there are in the central figure, they give us the sacred number seventy-two, which is the number of priests' years that equal the cycle of fifty-two civil years.

Above the face is seen the point of an arrow, representing the meridian of the city of Mexico, and beneath it the feathered shaft containing five glyphs, representing the week of five days. The five large dots are the five extra days of the year.

At the right side of the point of the arrow are seen the signs ce tecpatl, One Flint, and its accompanying tletl, or stone knife, which gave a date falling at the beginning of the tenth month of the priestly calendar, and corresponding to the 26th of June. This day was celebrated by the priests as the summer solstice, or period of the greatest strength of the sun. They sacrificed the short difference which there might be from the true solstice to accommodate the festival to the opening day of a month whose signs were tecpatl, "the Evening Star," and tletl, "the Sun." On the left side is the sign "Two House," 1481 A. D., the year of the dedication.

In the next circle we find the twenty signs of the days of the month. Beginning at Dawn, to the left of the point of the arrowhead, we read to the left: Dawn, Wind, House, Lizard, Serpent, Death, Deer, Rabbit, Water, Dog, Monkey, Herb, Reed,Ocelotl, Eagle, Buzzard, Path of the Sun, Flint Knife, Rain and Flower. Notice the tenth day, Dog. Humboldt remarked that it was the only figure in the zone that had its face turned downwards. Although he saw the original stone, he studied its interpretation from the engraving by Leon y Gama, where it is wrong. In the original it is the same as the rest. The days were divided into four groups with reference to the cardinal points and colors as fol-



The Aztec Calendar.

lows: the first, fifth, ninth, thirteenth and seventeenth were painted red and represented the east; the second, sixth, tenth, fourteenth and eighteenth were painted yellow and represented the north; the third, seventh, eleventh, fifteenth and nineteenth were painted blue and represented the west; the fourth, eighth, twelfth, sixteenth and twentieth were painted green and represented the south. The fifth, tenth, fifteenth and twentieth were market days. The year consisted of 365 days. The five intercalary days, were considered very unlucky, were called "nemontemi" or "useless" and were spent in sacrifices, prayer, penitence and fasting.

Around the days of the months is a border of quadrates, each one with five dots and a small border of glyphs. From amongst the borders issue eight rays of light, representing the eight "hours" as we may call them, of the Aztec night. Thus the diurnal period was divided into sixteen "hours," each "hour" being just ninety minutes in our reckoning of time. The hours were announced from the roofs of temples by means of conch shells blown by priests. The dots and glyphs surrounding the days and hours are 335 in number and evidently refer to the days of the year.

The terminal pentagons between the vanes and rays are fifty-two in number, referring doubtless to the fifty-two years in the cycle.

Beyond the borders last described we see twelve curious raguled figures. They are thought to be the sign, Cipactli or Dawn, expressing the daybreak or approach of the Sun from behind the Volcanoes.

There is finally an outer band of quadrates with the sign Acatl or "Reed" in each, surrounded with dots. Examining it closely the discovery is made that this band is divided into two parts, and that each part forms the body of a bimanous sepent. The heads of these serpents are face to face at the bottom of the stone and their triangular tails point to the date "Thirteen Reed" or 1479 A. D. at the top of the calendar. The four ligatures near the tip of each tail symbolize the four periods of thirteen years each, or the cycle of fifty-two years. There are thirteen vertebrae in each serpent, consequently each snake represents thirteen years or the fourth of a cycle.

In the vertebrae of the serpents are seen some peculiar figures that appear to be rays in groups. Counting them, we find there are fifty-two groups in each serpent, and we at once know their meaning to be the cycle.

At the bottom of the rock the two faces that issue from the open mouths of the serpents are crowned with plumes of stars. The face on the left with protruding tongue is Tonatiuh, the Sun, and he on the right is Quetzalcoatl, the planet Venus. On the apparent movements of these two planets were based the chronological combinations of the Mexicans. The two serpents, themselves, may be called Coatl and Quetzalcoatl. The plumes of stars have been thought to represent the Milky Way.

The entire face of the rock was painted red to indicate that it was dedicated to the Sun—and there are even yet traces of the color remaining after a lapse of four hundred and twenty-seven years.

One of the most interesting evidences of the astronomical knowledge of the Aztecs is their intercalation of five days in the calendar at the close of each year. As the year is composed of nearly six hours more than the 365 days, there still remained an excess, which they adjusted by interposing twenty-five days in every 104 years. This shows a nicer adjustment of civil to solar time than is presented by even the Gregorian Calendar, since more than 5,000 years would have to elapse before the loss of an entire day. But the first intercalation in the Mexican Calendar took place sixteen centuries previous to the arrival of the Spaniards.

The Aztecs began to use their calendar 483 years before the ultimate adoption of the Julian Calendar at Rome. A very good example of the original Roman Calendar, established either by Romulus or Numa, has been brought to light by the excavations in recent years amongst the ruins of Pompeii. It had ten months, and the names of the last four of its months are still retained by us: September, October, November and December.

Julius Cæsar reformed this Calendar in the year 46 B. C. and introduced the arrangement to have three years of 365 days each followed by one of 366 and dividing the year into months nearly as at present. The months of the Julian Calendar at first alternated from thirty-one to thirty days, with the exception of February; that is to say; January had thirty-one; February, twenty-eight and twenty-nine; March, thirty-one; April, thirty; May, thirty-one; June, thirty; July, thirty-one; August, thirty; September, thirty-one; October, thirty; November, thirty-one; December, thirty. But, a few years later, in order to gratify the vanity of the Emperor Augustus, his month of August was given as many days as Julius Cæsar's month of July. So that instead of six long and six short months in the year we have seven long and five short ones. The additional day in leap year was given to February by calling the fifth day before the calends of March "a second sixth," whence leap year is still called in the almanacs bissextile year, from "bis," twice, and "sextus," sixth. When the Spaniards, who used the Julian Calendar, landed at Veracruz, in 1520, they were ten days behind the correct time—or, in other words, ten days behind the reckoning of the barbarous Aztecs. This most remarkable fact lies in the error of the Julian Calendar which gave the year a length of 365 days and six hours. This is about eleven minutes too much—an error which has now amounted to over thirteen days. The Julian Calendar—now known

as Old Style—is used still in the Russian Empire. For example: a letter written in Russia and adressed to some party in Mexico will be dated, say, "Jan. 1st.—Jan. 14."

Thus, the Julian Calendar goes along with a constantly increasing error of three days in every 400 years, so that in 4,000 years the difference will amount exactly to one month. To rectify this and to so arrange matters that the festivals and saints-days of the Catholic Church would recur as nearly as possible at the same seasons in each year, Pope Gregory XIII, after much thought, long study, and many consultations on the subject, decreed that the 5th day of October, 1582, should be called the 15th. To prevent the intrusion of the same errors in the measurement of time in the future ages, he further ordered that every year whose number is not divisible by four should consist of 365 days, (e. g. 1906, 1907); every year which is so divisible but not divisible by 100 should consist of 366 days, (e. g. 1908); every year which is divisible by 100 but not by 400, of 365 days, (e. g. 1700, 1800, 1900); and every year divisible by 400, of 366 days, (e. g. 1600, 2000.)

The true astronomical or solar year has been calculated to consist of 365 days, 5 hours, 48 minutes and 46 seconds. The Gregorian rule—by which all civilized countries, excepting Russia, are now governed—omitting three leap years in every 400 years, gives to a civil year an average duration of 365 days, 5 hours, 49 minutes and 12 seconds. This exceeds the true soar year by 26 seconds and amounts to the difference of one day in every 3323 years. But in the Aztec Calendar more than 5000 years would have to elapse before the loss of an entire day! It will thus be seen that our Gregorian Calendar is not as near perfection as the Aztec. And see how marvelously simple was the latter! So well adapted to the wants of the people that it could be readily understood and applied without great learning! It merely consisted in inserting twenty-five days into every 104 years. As the Mexican cycle comprised fifty-two years, these twenty-five days had to be fitted into two cycles in some manner; so they cut the Gordian knot by adding thirteen days to the first cycle, twelve days to the second cycle, thirteen to the third, twelve to the fourth, and so on, giving an even number of days to an even-numbered cycle and an odd number of days to the odd cycle.

But, farther: this Mexican cycle was divided into four quarters of thirteen years each. The system of numbers was based upon multiples of four, and not upon a decimal notation, as with nearly all other nations in the world. The names of the years were Tochtli, Rabbit; Acatl, Reed; Tecpatl, Flint; and Calli, House. These repeated constantly would cause the second series of thirteen years to begin with Reed, the third with Flint, the fourth with House—an ingenious arrangement by which any year in the cycle could be clearly designated.

Leon y Gama, whose book on the Calendar and Sacrificial stones was published in 1792, called attention to the fact that eight holes for the insertion of gnomons of dials could be found just outside the outer rim on the face of the stone. He further says that this stone clearly shows the following dates: Vernal equinox, March 22nd; Summer solstice, June 22nd; transits of the sun by the zenith, May 22nd and July 26th; and the the Autumnal equinox, 22nd of September—the first two occurring in the year Thirteen Reed (1479) and the last three in the year One Rabbit (1454.)

While archaeologists do not all agree with Leon y Gama nevertheless it seems evident that when the rock was placed in its proper horizontal position, with its meridian arrow pointing to the south, styles fitted perpendicularly into the four outermost holes could be made to give the following results: The tip of the nose in the central face being assumed as the central point in the stone and to correspond with the latitude of Mexico—an east-and-west line between the two northern styles represented the tropic of Cancer. An east-and-west line between the two southern styles—being farther from the center—represented the Tropic of Capricorn. In the summer solstice the shadow of the north-eastern style at sunrise fell on the central point, and at sunset of the same day the shadow of the northwestern style also fell on the central point. The same thing also occurred with the other two styles during their winter solstices. Threads stretched between the northern styles in summer and between the southern styles in winter, would on the solsticial days throw a shadow falling exactly in the centre of the stone from east to west. During the equinoxes the shadows of one style would strike its companion style at sunrise and sunset and lie exactly beneath the thread. Thus the dates of the solstices and equinoxes could be accurately ascertained. To fix the passage of the sun—to express it thus—through the zenith of the City of Mexico, it sufficed to stretch threads from the northeast to the southwest style, and from the northwest to the southeast style, since the shadow of the point of intersection of the two threads would fall at midday in the centre of the stone, and the four styles would give forth no shadows.

The resemblance between the Aztec Calendar and those used by the Oriental nations is striking. The Chinese had sixty years in their cycle, in five divisions of twelve years each, and the names of the years were: 1, Mouse; 2, Ox; 3, Leopard; 4, Rabbit; 5, Crocodile; 6, Serpent; 7, House; 8, Sheep; 9, Monkey; 10, Hen; 11, Dog; 12, Hog. The Tartars, Japanese and Thibetans have nearly the same, but substituting: 3, Tiger; 5, Dragon: 8, Goat. In the Mexican signs for the days we meet with Rabbit, Serpent, Monkey, Dog. Instead of Leopard, Crocodile and Hen they had Ocelotl, Lizard and Eagle. Both the Asiatics and Aztecs indicated the year by its sign, as the "year of the Rabbit," etc. In the

lunar calendar of the Hindoos seven of the terms agree with the Aztecs, viz: Serpent, Reed, Monkey, Flint Knife, Path of the Sun, Dog and House.

The Java Islanders also regulated their markets by a week of five days—having, besides, one week of seven. The Persians had a cycle of 120 years of 365 days each—at the end of which they intercalated thirty days. The ancient Etruscans arranged their calendar in cycles of 110 solar years, and reckoned the year at 365 days, 5 hours, 40 minutes.

It is a curious fact that the number of sacred months of thirteen days each, contained in a Mexican cycle of fifty-two years with the intercalation, should correspond precisely with the number of years in the great Sothic or dog-star period of the Egyptians, namely 1461, a period in which the seasons and festivals came round to the same place in the year again. The coincidence may be accidental—but Prescott well says that a people employing periodical series and astrological calculations have generally some meaning in the numbers they select and the combinations to which they lead.

The feast most notable amongst the Aztecs was that made on the first day of the cycle. From susperstitious motives they feared, (at the terminus of each one of these periods,) the end of the world; and the last night they passed in a state of expectation and the greatest consternation. They destroyed all their household untensils and furniture, supposing them to be useless. All fires were extinguished, both in the temples and in the houses. Three hours before midnight an immense procession, headed by the priests, marched to the Hill of the Star, near the village of Ixtapalapan, 5 or 6 miles south of the present City of Mexico. There, on its summit, when the Constellation of the Pleiades had reached its zenith, upon the breast of a prisoner of war selected for this sacrifice, they kindled with two sticks of wood the new fire. Then the victim and the blazing fagots were cast into a pile of combustibles, and, as the flames leaped up, they were received by the assembled multitude with shouts of gladness. The signal fire on the mountain top was seen all over the valley, and the people hailed the emblem of light, life and fruition as a blessed omen of the restored favor of their gods and the preservation of the race for another cycle. The priests, at sunrise, carried the new fire to the temple of Huitzilopochtli, and in every temple and dwelling it was rekindled from the sacred source. The fortunate event was celebrated through several days in succession—all the inhabitants delivering themselves to rejoicing and forgetting at once their past fears.

Their last celebration was in the year 1507 A. D., They felt themselves secure for another age, but as a nation, they were already doomed. All unknown to them, three years previously, westward bound, there had landed in the West Indies, from Spain, a youth nineteen years of age, Hernan Cortés, their future Conqueror.

IMPRENTA DEL DAILY RECORD.