

Some new discoveries respecting the dates on the great calendar stone of the ancient Mexicans, with observations on the Mexican cycle of fifty-two years / [E.G. Squier].

Contributors

Squier, E. G. (Ephraim George), 1821-1888

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Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
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ART. X.—*Some New Discoveries respecting the Dates on the great Calendar Stone of the Ancient Mexicans, with Observations on the Mexican Cycle of Fifty-two Years*; by E. G. SQUIER, New York.

THE most interesting monument of antiquity which has been discovered in America, is unquestionably the great Calendar Stone of the Aztecs, which now occupies a place in the walls of the Cathedral of the city of Mexico. It is an immense mass of porphyry, estimated to have weighed originally upwards of thirty tons. Its horizontal face is inscribed with a circle in relief, within which is found a complication of signs and figures, chiefly of an astronomical character, and referring to the motions of the sun. The relative positions and dependencies of these signs cannot be indicated without the aid of an engraving. I shall therefore, without going into a particular account of the stone,—involving, as it necessarily would, a complete analysis of the Aztec Calendar,—simply call attention to some of the results which have attended its study by Gama, Humboldt, Gallatin and others, so as to be able to submit, in a comprehensible manner, some additional discoveries which have followed its investigation, under more favorable circumstances.

The authorities above named, ascertained the existence of five signs upon this stone, referring to the principal annual positions of the sun, viz: the dates of the two transits of the sun by the zenith of Mexico, the dates of the vernal and autumnal equinoxes, and the date of the summer solstice. The summer solstice, according to the stone, occurred on the 22d of June; the

transits on the 22d of May and the 26th of July, and the equinoxes on the 22d of March and the 22d of September. This arrangement, it will be seen, gives 184 days from the vernal to the autumnal, and 181 from the autumnal to the vernal equinox, which, as observed by Mr. Gallatin, "although not strictly correct, shows that the Aztecs had ascertained by observation that the Sun remained longer North than South of the Equator, which is true, since its apparent motion is not uniform, but is accelerated during the time it appears south of the equator."* The transits of the sun, by the zenith of Mexico, were calculated by Gama and found to coincide with the dates engraved on the stone,—demonstrating that the observations which led to the original discovery of the true date were made in Mexico, and indicating that the astronomical knowledge of the Mexicans was of American origin.

These authorities also, from analogy and a consideration of a variety of circumstances which it is unnecessary to recapitulate, arrived at the conclusion that "the winter solstice corresponded with our 22d of December or very near it." None of them were however, able to detect the date of this solstice upon the stone. The supposed deficiency was accounted for, hypothetically, upon the assumption that the dates on the Calendar were calculated only for half of the year, viz: from the vernal to the autumnal equinox. There is nothing however, on which to ground this assumption, but the very deficiency, for which it was intended to account.

The difficulty, in the way of the satisfactory elucidation of the matter, has been the imperfect character of the engraved copy of the stone upon which the investigations of these scholars were founded. Until recently there has been but one drawing in existence, viz: the one which accompanies Gama's work upon the Mexican Calendar. This was reproduced by Humboldt in his "Researches," and is the same which was consulted by himself and Mr. Gallatin in their enquiries. Within a few years, a larger and very beautiful drawing has been made from the original, by M. Nebel, which is inserted in his splendid work on Mexico. This drawing, while it attests the general accuracy of that published by Gama, has enabled me to detect a most important error in the latter, and to clear up the doubt which has heretofore existed as to the date assigned by the Aztecs to the winter solstice.

The central figure upon the Calendar Stone is a symbolical representation of the sun, with protruding tongue, indicating life,—*to talk*: among the Aztecs conveying the same idea of

* "Notes on the semi-civilized Nations of America," Trans. Am. Ethnological Society, vol. i, p. 101; Humboldt's Researches, vol. i, p. 293.

vitality with *to breathe* in our own language, and *to eat* and *to walk*, in those of different stocks. The forehead of this figure is bound with a fillet, upon which, in Gama's drawing, is represented a group of unmeaning ornaments. In place of these, we have, in M. Nebel's copy, the distinct sign of 2 *Acatl*. Above it is an indicating ray, which points to the sign of the year 13 *Acatl*, for which year most of the engraved calculations seem to have been made. The day 2 *Acatl* for year 13 *Acatl*, (which is the 26th of the Aztec cycle,) *coincides with our 21st of December*, and is undoubtedly the hitherto undetermined date of the winter solstice, in the Mexican Calendar.

Fig. 1.



Fig. 2.



Fig. 1, of the accompanying engraving of the sign in question, is from Gama's drawing; Fig. 2, from Nebel's. *Acatl* signifies a reed. The central figure, of the second engraving, is a very common form of this sign, both in the paintings and on the monuments. It will be at once seen that the figures presented by Gama could not by any possibility be supposed to represent 2 *Acatl*, and hence the deficiency remarked by the illustrious investigators above named.

This discovery verifies the correctness of Gama's Analysis of the Aztec Calendar, at the same time that it furnishes us with an explication of certain religious observances, of a very remarkable character, prescribed, at fixed intervals, by the Aztec ritual.

The civil year of the ancient Mexicans was a solar year of three hundred and sixty days made up of eighteen months of twenty days each. To these were yearly added five complementary days, called *Nemontemi* or "*dead days*," which were deemed unlucky, and during which all religious observances were suspended. They were not counted as belonging to the year, but fell between the end of one year and the commencement of another. Four periods (*Tlalpilli*) of thirteen years each, made a cycle (*Xiuhmolpilli*) of fifty-two years. It will be seen that the fractional part of a day, which in our calendar is provided for by the intercalation of one day every fourth year, would in the course of fifty-two years, amount to *thirteen days*. That number of days was accordingly intercalated at the end of every cycle, so that each cycle commenced and ended upon corresponding days. Gama determined that the first year of the cycle (which was always *one Tochtli*) commenced on a day corresponding with our 9th of January. On account of the different modes of intercalation, it will be at once evident that, as compared with ours, the Mexi-

can year receded one day with every fourth revolution. So that the fifth year of the cycle commenced on a day corresponding with our 8th of January; the ninth year on a day corresponding with the 7th of that month, etc. By this constant recession, the last year of the cycle commenced on a day corresponding with our 26th of December, and consequently (deducting the five "*dead days*") must have terminated on the 21st of December, the precise date, as we have already seen, of the winter solstice.

This then may be laid down as the rule, in the scheme of the Aztecs. *That the cycle terminated when the last day of the year coincided with the date of the winter solstice.* And when we consider the influence which such a conjunction would be likely to have in a system with which the superstitions of the Aztecs were so closely interwoven, we shall be less disposed to look for the reason which determined the selection of the number of years constituting the cycle, in its multiples, however singular their combinations, than in the circumstance of the very conjunction here named.

No doubt a close dependence, I am not prepared to say how intimate, existed between this conjunction and the great secular festival of the Aztecs, celebrated at the end of every cycle. They believed that at the termination of one of these periods, the sun would never return, and the end of the world take place. This belief which was common to most primitive nations addicted to Sabianism, was, as observed by Humboldt, in the case of the Mexicans, "connected with the Toltic tradition of four *suns* or *ages*, at which periods the earth had undergone four great revolutions." Three of these destructions had taken place, according to the traditions, at the ends of cycles. At the end of each cycle therefore the deepest consternation prevailed. The five supplementary days were passed in great fear. On the fifth, the fires in the temples and houses were extinguished, the household utensils broken, garments rent, and whatever was deemed most precious destroyed. On the evening of this day, the priests dressed in the robes of the gods, followed by an immense procession of the people, went in solemn silence to the top of a high mountain near the city of Mexico, there to attempt the lighting of the new fire. The success of the attempt was an evidence of safety and of the benevolence of the gods. The fire was lighted, at midnight, by friction, upon the breast of a human victim sacrificed for the occasion. A great fire was then built and the sacred flame again distributed to the temples and houses. When the blaze was seen by the anxious spectators, the most extravagant joy was manifested, which was much augmented when the sun itself arose on the following morning, dissipating all fears with its effulgence.

The existence of this superstition, joined to the circumstance of the year terminating at a time when the recession of the sun was greatest, may have invested this period with so much importance as to make it a chronological era, from whence to date the years anew. However this may be, the conjunctions here noticed offer a better explanation of the singular selection of fifty-two years for the cycle, than is furnished by any analysis of the multiples of which that number is made up. It is not impossible however, that the further circumstance that the sacred numbers four and thirteen were multiples of fifty-two, may have had a secondary weight in the length of the cycle.

Passing by this question, we find that the discovery of the missing date of the winter solstice completes the circle of the sun's principal positions, as engraved upon the great Calendar Stone—a monument which still furnishes an interesting object of study, and the full understanding of which would no doubt tend greatly to increase our estimate of the astronomical knowledge and the ingenuity of the aboriginal Mexicans.

NOTE.—The apprehension of the extinguishment of the sun, at the winter solstice, is mentioned by Humboldt as affording a striking instance of the analogy which existed between the superstitions and religious observances of the ancient Mexicans, and the primitive nations of the old world. “When the Egyptians,” says Achilles Tatius, “saw the sun descend from the Crab towards Capricorn, and the days gradually diminish, they were accustomed to sorrow from the apprehension that the sun was to abandon them entirely. This Epocha coincided with the festival of Isis: but when the orb began to reappear, and the days grew longer, they robed themselves in white garments, and crowned themselves with flowers.”—*Humboldt's Res.*, vol. i, p. 383.







