A STUDY OF THE MANUSCRIPT TROANO.

BY CYRUS THOMAS.

CHAPTER I.

THE MANUSCRIPT AND ITS CHARACTER.

This manuscript was found about the year 1866,[1] at Madrid, Spain, by the Abbe Brasseur de Bourbourg, while on a visit to the library of the Royal Historical Academy, and named by him "Manuscript Troano," in honor of its possessor, Don Juan de Tro y Ortolano.

So far as I am aware, nothing more is known in reference to its history; we are not even informed by its last owner where or how he obtained it. In ordinary cases this would be sufficient to arouse our suspicions as to its genuineness, but in this case the work itself is sufficient to dispel all such suspicions, a fact which will become apparent to the reader before reaching the end of the present paper.

This work was reproduced in *fac-simile* by a chromolithographic process, by the *Commission Scientifique du Mexique* under the auspices of the French Government, Brasseur being the editor.

The original is written on a strip of Maguey paper about 14 feet long and 9 inches wide, the surface of which is covered with a white paint or varnish, on which the characters and figures are painted in black, red, blue, and brown. It is folded fan-like into thirty-five folds, presenting, when these are pressed together, the appearance of an ordinary octavo volume. The hieroglyphics and figures cover both sides of the paper, forming seventy pages; the writing and painting of the figures having been ex-

[1] I cannot find that the exact date of the discovery is given anywhere. Bancroft says "about 1865," but a careful examination of Brasseur's Introduction satisfies me it was at least as late as 1866.

ecuted, apparently, after the paper was folded, so that this does not interfere with the writing.

The *fac-simile* edition is divided into two parts, paged separately; the first part containing thirty-five pages or plates, numbered with simple Roman numerals from I to XXXV; the second with Roman numerals accompanied by a star, thus: XII*; but this part has only thirty-four pages, numbered I* to XXXIV*; the first plate, which appears to be—as Brasseur has designated it—the "title page," is not numbered.

The two parts I presume are made to correspond with the two sides of the original; the title page being at the end of one side and forming the page on the first fold.

The lines and columns of written characters are uniformly black, some of the numeral characters red, others black; the pictorial portions are usually red, brown, or blue, but occasionally varied with black, and often simply outline figures. The background of the compartments or spaces on which the figures are painted is usually white, but in some cases it is blue, in others, brown or red. Several of the plates are more or less damaged, all of the imperfections, as it is claimed, being reproduced in the *fac-simile* edition.

Our colored plates, which are reproduced from the *fac-simile* work, will give the reader an idea of the characters and figures.

It is admitted by all who have made the comparison, that the written characters belong to the same class as those given by Landa.

Although there are numerous variations, and also some characters in the manuscript not given by him, yet most of his letter and day characters, especially the latter, can be found identical in form and details. As proof of this I give here the following examples of exact copies after Landa and the Manuscript:

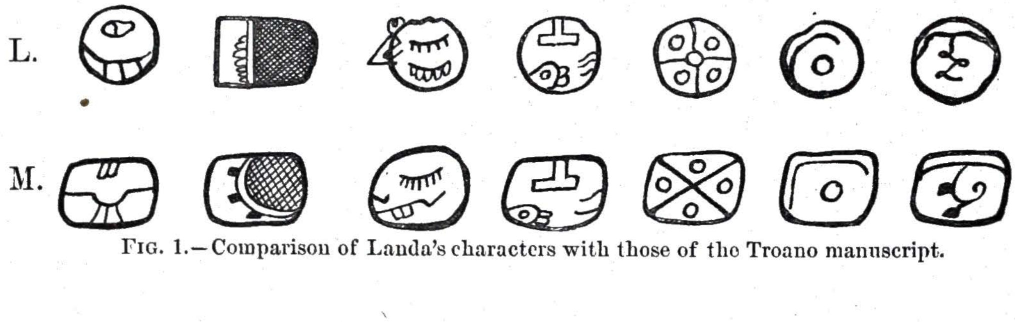

FIG. 1.—Comparison of Landa's characters with those of the Troano manuscript.

This fact is sufficient of itself to authorize us to pronounce it a Maya document, a conclusion which we shall find strengthened as we proceed in our examination of its contents.

As what is known in regard to Mexican and Central American writings has been presented by Dr. Brinton in the Introduction, I will not go over the same ground here, but will confine myself to the special object in view, to wit: an explanation and discussion of what I believe to be real discoveries made during my examination of the contents of this work.

As before stated, an examination of this manuscript is sufficient to convince any one at all familiar with Landa's characters that those here used are substantially the same, be their signification what it may.

On almost every page are to be found columns of characters agreeing precisely with those given by him as representing the Maya days. These are generally placed at the left of the compartments or spaces containing the figures, and as a general rule there are five characters in a column. Another prominent feature is the great number of numeral characters—dots and short straight lines. These are found on every plate, often dozens on a single page.

The frequent occurrence of these day and numeral characters, often in connection, led to the belief that the work was a kind of religious calendar, a belief strongly supported by the character of the figures in the spaces. With this as the only opinion to hamper or aid me, as the case might be, I began the study of the Manuscript.

I was convinced that if I could form a correct idea of the general design of the work it would aid greatly in deciphering its characters. As the day and numeral characters seemed to afford the most direct road to this desired result, I began with these.

Brasseur de Bourbourg has designated the day columns "legends," believing them to contain a summary of what is written, or represented by the figures in the compartments to which they severally belong.

That they are characters representing the Maya days he admitted, but as the names of these characters have each one or more significations, it was his belief that they were used to express this signification, and not simply as the names of days.

To be able to decide positively whether this opinion of the Abbe's was correct or not, would, I felt, be taking one important step toward ascertaining the contents of this mysterious document, as these day columns form a considerable part of it.

The frequent occurrence of numerals in connection with these day characters appeared to indicate dates or the numbering of days, somewhat as we find them in our ordinary calendars.

How to verify or disprove this inference was the first problem that presented itself.

CHAPTER II.

THE MAYA CALENDAR.

The Maya divisions of time (no notice is taken here of the divisions of the day) were as follows: The day, the week, the month, the year, the five intercalated days, the week of years, the Ahau or Katun, the cycle of fifty-two years, and the Ahau Katun or great epoch.

The day ("Kin" or Sun) was used in the ordinary sense, each of the twenty days of the month having its name, as we name the days of our week, and its character or hieroglyph, as follows:

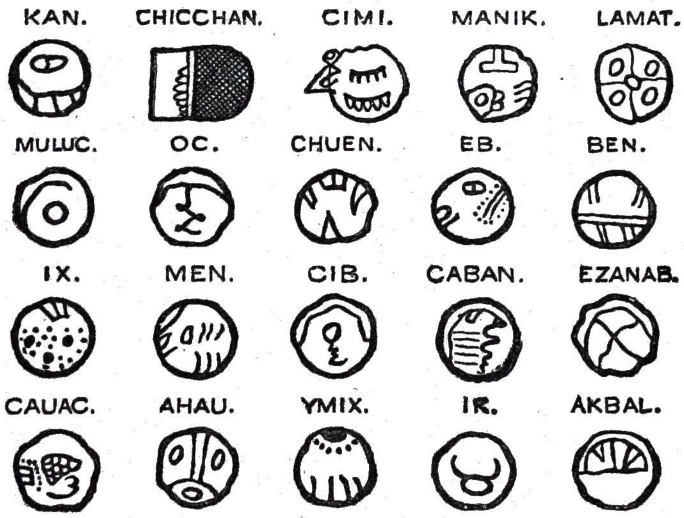

FIG. 2.—Day characters.

The characters here given are copied from Landa's work, our only original authority on this point. There are several important variations from these forms found in the Manuscript, but these, the orthography of the names according to different authors, together with the significations of the names, have been given by others, hence will not be repeated here. Although the month did not always commence with the same day, the order of the days as here given, to wit, Kan, Chicchan, Cimi, Manik, Lamat, Muluc, Oc, Chuen, Eb, Ben, Ix, Men, Cib, Caban, Ezanab, Cauac, Ahau, Ymix, Ik, Akbal, was always preserved. For example, if the month began with Muluc, the second day would be Oc, the third Chuen, and so on to Akbal; then followed Kan, just as we would name seven days commencing, say, with Wednesday, then Thursday, Friday, Saturday, Sunday, Monday, &c.

The Maya year contained 365 days and consisted of two unequal parts, as follows: 360 days, or the year proper, divided into eighteen months of twenty days each; and five intercalary days, which were added at the end in order to complete the number 365.

The eighteen months were named and numbered as follows:

1. Pop; 2. Uo; 3. Zip; 4. Tzoz; 5. Tzec; 6. Xul; 7. Yaxkin; 8. Mol; 9. Chen; 10. Yax; 11. Zac; 12. Ceh; 13. Mac; 14. Kankin; 15. Muan; 16. Pax; 17. Kayab; 18. Cumhu.

FIG. 3.—Month characters.

The year always commenced with the same month—Pop—the others invariably following in the order given, so that the number of the month being given we know its name.

But eighteen months of twenty days each not completing the year, five days were added after the close of Cumhu—not as a part of that month, for no month could have either more or less than twenty days—to complete the number 365, and were called "nameless days" (though in reality named as other days), and were considered unlucky.

If the year began with Kan, the last day of the eighteenth month—Cumhu—would, as a matter of course, be Akbal, the last of the twenty. The five intercalated days were named in regular order following the last of Cumhu, and in this case would be Kan, Chicchan, Cimi, Manik, and Lamat. The next—Muluc—would begin the new year. Muluc being the first day of the month, Lamat would necessarily be the last—the five added days at the end of the year would be Muluc, Oc, Chuen, Eb, and Ben, making Ix the first of the following year. Ix being the first, Ben would be the last of Cumhu, and the added days being Ix, Men, Cib, Caban, and Ezanab, Cauac would be the first of the next year, the added days would close with Akbal, and the following year commence with Kan. It will be seen from this, that the year always commenced with one of the four days, Kan, Muluc, Ix, Cauac, following each other regularly in the order given.

If these were all the peculiarities of the system, the Maya calendar would be comparatively simple and easily understood.

But another method of numbering the days was introduced, doubtless long after the calendar had assumed a regular form, and probably by the priests, for the purpose of complicating it and rendering it as far as possible unintelligible to the people. This was to limit the number to thirteen, or, in other words, to divide the year into periods of thirteen days. I have followed other modern authors in calling this period a week, though it appears the Mayas gave it no name, nor in fact do they seem to have considered it a period, but simply a method of numbering the days and years. As there were twenty names of days to be used, the introduction of this system of thirteen numerals, as the one chiefly adopted in giving dates, necessarily greatly complicated the calendar, and, together with the intercalation of the five days at the end of the year, produced some singular results.

To illustrate this I give first a list of days for one month (Table No. I) numbered according to this system, following it with a table (No. II) numbered in the same way for an entire year—something after the manner of our common counting-house calendar.

TABLE I.

1. Kan.	6. Muluc.	11. Ix.	3. Cauac.
2. Chicchan.	7. Oc.	12. Men.	4. Ahau.
3. Cimi.	8. Chuen.	13. Cib.	5. Ymix.
4. Manik.	9. Eb.	1. Caban.	6. Ik.
5. Lamat.	10. Ben.	2. Ezanab.	7. Akbal.

TABLE II.

Names of the months.	Pop.	Uo.	Zip.	Tzoz.	Tzec.	Xul.	Yaxkin.	Mol.	Chen.	Yax.	Zac.	Ceh.	Mac.	Kankin.	Muan.	Pax.	Kayab.	Cumhu.	Numbers of the days.
Numbers of the months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
Names of the days.																			
Kan........	1	8	2	9	3	10	4	11	5	12	6	13	7	1	8	2	9	3	1
Chicchan...	2	9	3	10	4	11	5	12	6	13	7	1	8	2	9	3	10	4	2
Cimi	3	10	4	11	5	12	6	13	7	1	8	2	9	3	10	4	11	5	3
Manik......	4	11	5	12	6	13	7	1	8	2	9	3	10	4	11	5	12	6	4
Lamat	5	12	6	13	7	1	8	2	9	3	10	4	11	5	12	6	13	7	5
Muluc......	6	13	7	1	8	2	9	3	10	4	11	5	12	6	13	7	1	8	6
Oc	7	1	8	2	9	3	10	4	11	5	12	6	13	7	1	8	2	9	7
Chuen......	8	2	9	3	10	4	11	5	12	6	13	7	1	8	2	9	3	10	8
Eb	9	3	10	4	11	5	12	6	13	7	1	8	2	9	3	10	4	11	9
Ben	10	4	11	5	12	6	13	7	1	8	2	9	3	10	4	11	5	12	10
Ix	11	5	12	6	13	7	1	8	2	9	3	10	4	11	5	12	6	13	11
Men........	12	6	13	7	1	8	2	9	3	10	4	11	5	12	6	13	7	1	12
Cib	13	7	1	8	2	9	3	10	4	11	5	12	6	13	7	1	8	2	13
Caban	1	8	2	9	3	10	4	11	5	12	6	13	7	1	8	2	9	3	14
Ezanab	2	9	3	10	4	11	5	12	6	13	7	1	8	2	9	3	10	4	15
Cauac......	3	10	4	11	5	12	6	13	7	1	8	2	9	3	10	4	11	5	16
Ahau.......	4	11	5	12	6	13	7	1	8	2	9	3	10	4	11	5	12	6	17
Ymix	5	12	6	13	7	1	8	2	9	3	10	4	11	5	12	6	13	7	18
Ik	6	13	7	1	8	2	9	3	10	4	11	5	12	6	13	7	1	8	19
Akbal......	7	1	8	2	9	3	10	4	11	5	12	6	13	7	1	8	2	9	20

Intercalated days.		
	Kan............	10
	Chicchan	11
	Cimi	12
	Manik..........	13
	Lamat	1

It will be seen by examining this table, the year in this case commences with Kan, the other nineteen days following in regular order as heretofore given. They are numbered regularly from *one* until we reach *thirteen*, then we commence again with *one*, the month ending with Akbal 7.

The second month—Uo—begins with 8 Kan; when we reach 13, which is now Muluc, we must follow it with 1 Oc, and so on to the end of the year. The last day of Cumhu in this case will be 9 Akbal and the last of the five intercalated days 1 Lamat; it follows therefore that the first day of the next year will be 2 Muluc. If we run through this second year in the same way, commencing it with 2 Muluc followed by 3 Oc, 4 Chuen, and so on, we shall find that the third year will begin with 3 Ix; continuing this process we ascertain that the fourth commences with 4 Cauac, the fifth with 5 Kan, the sixth with 6 Muluc, the seventh with 7 Ix, the eighth with 8 Cauac, the ninth with 9 Kan, the tenth with 10 Muluc, the eleventh with 11 Ix, the twelfth with 12 Cauac, the thirteenth with 13 Kan, the fourteenth with 1 Muluc, the fifteenth with 2 Ix, and so on. From this we see that no year, after the first, commences with a day numbered 1 until thirteen have been completed, thus forming a period of 13 years, or as it is designated, "A week of years" or "Indication." By continuing the above process we shall find that no year will again commence with 1 Kan until 52, (or 13×4,)—are completed.

TABLE III.

KAN TABLE.

Kan.	Muluc.	Ix.	Cauac.
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1*	2
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13

TABLE IV.

CAUAC TABLE.

Cauac.	Kan.	Muluc.	Ix.
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1*
2	3	4	5
6	7	8	9
10	11	12	13

In order to make this as plain as possible I will give here a table of years for one cycle of 52 years. As there is some doubt as to which of the two years—1 Kan or 1 Cauac—the cycle began with, I give tables (Nos. III and IV) for both.

By this time the reader is sufficiently conversant with this sytem to know that if the cycles commence with 1 Kan, as in the left-hand table (No. III), the year following 13 Cauac would be 1 Kan and the commencement of another cycle. If the true method were as given in the right-hand table (No. IV), then 13 Ix would be followed by 1 Cauac, the first year of the next cycle. This follows, as will readily be seen, from the fact that 52 is the least common multiple of 4 and 13.

The importance of knowing which one of these arrangements was that used by the Mayas will be apparent from the following illustration: A certain event is dated a particular day in the year 1 Ix; if the table we have headed 1 Kan be correct it would then be in the 27th year of the cycle; if the other be the true method it would then be in the 40th year of the cycle, or thirteen years later. These years are marked with a star in Tables III and IV.

As this system admits of fifty-two changes in the day on which the year begins, it would require fifty-two different calendars to cover one cycle, just as fourteen calendars are required to suit all the years of our system, seven for the ordinary years and seven for the leap-years. As it would require much time and space to write these out in full, I have adopted the expedient shown in the following table (No. V), of abbreviating the work.

First we have at the left four columns, each containing the names of the twenty days of the month. As I am inclined to believe that the author of the manuscript adopted the system which had Cauac as the first day of the cycle, the first or left-hand column commences with this day, the others, Kan, Muluc, and Ix, following in the order in which they are found in the list of days. The first column is therefore the one to be used for all the Cauac years; the second for all the Kan years; the third for all the Muluc years, and the fourth for all the Ix years. The reader must be careful to remember, that when one day of the month is determined it determines all the rest, and as a consequence all the rest of the year; therefore when we find what the first day of the year is, we can easily determine any day of any month. As each of the four leading days or "year-bearers," as they were called by the Mayas, can have but thirteen different numbers it is unnecessary to extend our columns of numbers further than thirteen.

TABLE V.

Cauac column.	Kan column.	Muluc column.	Ix column.	1 14	2 15	3 16	4 17	5 18	6	7	8	9	10	11	12	13	Nos. of the months.
																	Days of month.
Cauac	Kan........	Muluc......	Ix..........	1	8	2	9	3	10	4	11	5	12	6	13	7	1
Ahau.......	Chicchan...	Oc	Men........	2	9	3	10	4	11	5	12	6	13	7	1	8	2
Ymix.......	Cimi	Chuen......	Cib.........	3	10	4	11	5	12	6	13	7	1	8	2	9	3
Ik	Manik	Eb	Caban......	4	11	5	12	6	13	7	1	8	2	9	3	10	4
Akbal	Lamat......	Ben	Ezanab.....	5	12	6	13	7	1	8	2	9	3	10	4	11	5
Kan	Muluc	Ix..........	Cauac	6	13	7	1	8	2	9	3	10	4	11	5	12	6
Chicchan ...	Oc.........	Men........	Ahau.......	7	1	8	2	9	3	10	4	11	5	12	6	13	7
Cimi.......	Chuen......	Cib.........	Ymix	8	2	9	3	10	4	11	5	12	6	13	7	1	8
Manik	Eb	Caban......	Ik..........	9	3	10	4	11	5	12	6	13	7	1	8	2	9
Lamat......	Ben	Ezanab.....	Akbal......	10	4	11	5	12	6	13	7	1	8	2	9	3	10
Muluc	Ix..........	Cauac	Kan........	11	5	12	6	13	7	1	8	2	9	3	10	4	11
Oc	Men........	Ahau.......	Chicchan...	12	6	13	7	1	8	2	9	3	10	4	11	5	12
Chuen	Cib.........	Ymix	Cimi	13	7	1	8	2	9	3	10	4	11	5	12	6	13
Eb....... ..	Caban......	Ik..........	Manik......	1	8	2	9	3	10	4	11	5	12	6	13	7	14
Ben.........	Ezanab.....	Akbal......	Lamat......	2	9	3	10	4	11	5	12	6	13	7	1	8	15
Ix	Cauac	Kan........	Muluc......	3	10	4	11	5	12	6	13	7	1	8	2	9	16
Men	Ahau	Chicchan...	Oc..........	4	11	5	12	6	13	7	1	8	2	9	3	10	17
Cib.........	Ymix	Cimi	Chuen......	5	12	6	13	7	1	8	2	9	3	10	4	11	18
Caban	Ik..........	Manik	Eb	6	13	7	1	8	2	9	3	10	4	11	5	12	19
Ezanab	Akbal......	Lamat......	Ben	7	1	8	2	9	3	10	4	11	5	12	6	13	20

By referring to the table No. II of days and months we observe that when we have completed the thirteenth column, or the column of the thirteenth month, the next, or fourteenth month, commences with 1; just as the first month; the fifteenth with 8, as the second; the sixteenth with 2, as the third; the seventeenth with 9, as the fourth; and the eighteenth with 3, as the fifth. Instead therefore of having eighteen columns in our table, we need extend it only so as to include the thirteenth, as we can use the first, second, third, fourth, and fifth for the fourteenth, fifteenth, sixteenth, seventeenth, and eighteenth months respectively, as indicated by the numbers of the months which we have placed above the table over the figure columns. The reader must bear in mind that, although we have numbered the months as commencing with the left-hand column, which has 1 for its upper figure, yet this only holds good when the year is 1 Cauac, 1 Kan, 1 Muluc, or 1 Ix, and for none of the other years. The first month of the year may be any one of the thirteen columns, thus: 8 Cauac, 8 Kan, 8 Muluc, and 8 Ix have the second column, which has 8 for its upper figure, as their first month; then the one commencing with 2 will be the second month column, that with 9 the third, with 3 the fourth, with 10 the fifth, with 4 the sixth, with 11 the seventh, with 5 the eighth, with 12 the ninth, with 6 the tenth, with 13 the eleventh, the last or one commencing with 7 the twelfth. Now we go back to the first—commencing with 1—which will be the thirteenth, with 8 the fourteenth, with 2 the fifteenth, with 9 the sixteenth, with 3 the seventeenth, with 10 the eighteenth. Thus we count through and go back to the left, and so continue until we reach the number of the month desired. We will now illustrate the use of this table by some examples, but first we must warn the reader not to confuse *the day of the month with the day of the week;* the numbers of the days of the month are given in the extreme right-hand column of the table, which is not counted as one of the thirteen; the days of the week, as heretofore stated, are always given thus: 3 Ymix, 12 Caban, 7 Oc, &c.

Now, to illustrate the method of using the table, let us find in what months and on what days of the months in the years 11 Cauac, 11 Kan, 11 Muluc, and 11 Ix, the day 8 Ahau will fall. For the year 11 Cauac we must look to the Cauac column. We find here that Ahau is the second day of the month; running our eyes along the second transverse line, we find the figure 8 in the thirteenth column, which has 7 as the top number; going back to the column which has 11 as the upper or top number and counting the columns up to this (that has 7 as the top number), we find it to be the sixth month. We thus ascertain that 8 Ahau of the year 11 Cauac is the second day of the sixth month. To find where it falls in 11 Kan we must first find Ahau in the Kan column. By running our eyes down this column we see that it is the 17th day of the month; then, by looking along the 17th transverse line we find the figure 8 to be in the column which has 5 at the top, which is the second or fifteenth from that with

11 at the top. Therefore 8 Ahau of the year 11 Kan is the 17th day of the second and also of fifteenth month.[1]

In the same way we ascertain that 8 Ahau of the year 11 Muluc is the twelfth day of the twelfth month, but in this case we have to count the columns from the one commencing with 11 (always inclusive) to the right, through to the thirteenth (the one with 7 at the top), and go back to the first and count up to the one in which we find the figure 8 in the twelfth transverse line. We also find that 8 Ahau of the year 11 Ix is the seventh day of the ninth month.

If I have succeeded in making this complicated system thus far intelligible to the reader, I may hope to succeed in conveying a correct idea of what is to follow.

Now let us test our arrangement by a historical example. In the Perez manuscript translated by Stephens and published in his "Yucatan," Vol. II, it is stated that one Ajpula died in the year 4 Kan, the 18th day of the month Zip, on 9 Ymix.

The year 4 Kan commences with the column of our table which has 4 for the top figure. The third month (Zip) will then be the column with 5 at the top; running down this to the eighteenth transverse line we find the figure 9; we also observe that the 18th day in the Kan column of the names of days is Ymix, agreeing exactly with the date given.

In the manuscript Troano there is another method of giving dates which is very common throughout the work. Thus: which, according to my interpretation, the reasons for which will be hereafter given, signifies 13 Ahau of the thirteenth month.

Red.[2]

Black.

FIG. 4.

As neither the year nor the day of the month is given, it is evident that we may find more than one day answering to this date, but let us hunt them out and see where they fall. Referring to our table we will first take the Ahau of the Cauac column, which is in the second transverse line; the 13 in

[1] The reader can readily see from the table why any day found in the *first, second, third, fourth,* or *fifth* month will be found *twice* in the year.

[2] As colors cannot be introduced into these figures, the red numerals will be represented in outline.

this line we observe is in the tenth column (12 at top); counting *back* thirteen months (always including the one from which we start), we find that the first month of the year is the column having 6 at the top. The backward counting is exactly the reverse of the forward method heretofore explained; count to the left until the first column is reached, then go back to the thirteenth.

We thus ascertain that 13 Ahau of the 13th month falls on the second day of the month in the year 6 Cauac. Proceeding in the same way with the Ahau in the Kan, Muluc, and Ix columns, we obtain the seventeenth day of the month in the year 4 Kan, twelfth in 9 Muluc, and seventh in 1 Ix. We thus ascertain that the years are 6 Cauac, 4 Kan, 9 Muluc, and 1 Ix.

If we examine Table III, showing the years of the cycle, we shall find as a matter of course that these years occur but once in the entire period.

In order apparently to further complicate this calendar, which was undoubtedly devised by the priests, as Landa says, "to deceive that simple people," another period called the Ahau or Katun was introduced. This period, according to most authorities, consisted of twenty years, but according to Perez of twenty-four. It is in reference to this period that we find the chief difference between authorities, because upon the proper determination of its length, and the numbering, depends the possibility of identifying dates of the Maya calendar with corresponding ones of the Christian era. In order to settle these points it is necessary not only to determine the length of the Ahau or Katun, but also the number of Katunes contained in the great cycle, the method in which they were numbered, and the proper position of these numbers in this long period. Up to the present time these are the rocks on which all the calculations have been wrecked. My chief object, therefore, so far as the calendar is concerned, will be to settle if possible these disputed points; but will defer the discussion of these questions to a subsequent part of this paper, remarking only for the present that, according to all authorities, these Katunes were numbered as follows, and in the order here given: 13, 11, 9, 7, 5, 3, 1, 12, 10, 8, 6, 4, 2; this number completing the great cycle or Ahau-Katun,[1] which consisted of 260 years if the

[1] I use this compound term for the grand cycle only. *Katun* and *Ahau* are used separately as equivalents and as applying only to the period of 20 or 24 years; *Cycle* for the period of 52 years.

Katun included only 20 years, but of 312 if it contained 24 years, as maintained by Perez.

We are now prepared to discuss the question presented as to whether the numerals and day characters found so frequently in connection with each other are simply dates, somewhat as we find them in our ordinary calendars, or not. The first point to be determined is whether these day characters are used simply to denote days, or because of the signification of the words, as Brasseur supposed. This, as will be readily perceived, also involves the important question as to whether Landa was correct in his statement, that they were the symbols or characters used to denote days.

The argument must therefore be somewhat in a circle; hence the evidence adduced must be strong to support the position assumed, and must agree in the essential points with the Maya calendar so far as positively determined.

In order to decide this point we now turn to the manuscript itself.

Referring to Plate X we find that the left hand column of the middle division (always reading from the top downwards) is composed of the characters representing the following Maya days, in the order here given: Oc, Cib, Ik, Lamat, Ix. If we turn to Table V, containing the list of days, and count on either of the four columns of names, from one of these names to the next, we shall find in each case an interval of just six days; from Oc to Cib six days; from Cib to Ik six days, and so on. The other column, same plate and division, is composed of the characters for Ahau, Cimi, Eb, Ezanab, and Kan, with an interval of six days between each two. Turning now to Plate VI, middle division, we find the days in the left-hand column to be Caban, Ik, Manik, Eb, and Caban, with an interval of just five days between each two. In the upper division of Plate XVII the interval is twelve days; and the same is true in reference to the other columns on this plate. In the left-hand column of the third division of Plate XXXI the interval is sixteen days.

Although the interval is generally the same throughout a column, yet there are occasional departures from this rule; for example, on Plate XIII, the left-hand column of the upper division is composed of the characters for the following days: Kan, Oc, Cib, Ahau, and Ik. From Kan to Oc is an interval of six days; from Oc to Cib six; from Cib to Ahau four; from Ahau to Ik two

Here we may be allowed to digress for a moment from the direct line of our argument in order to show how the discovery of this fact may enable us to determine an uncertain or obliterated character.[1] The right-hand column of the middle division of this plate (XIII) contains an unusual character bearing little if any resemblance to any of Landa's day characters. The days of this column, in the order they stand, are as follows: Oc, Ik, Ix, , and Ezanab. From Oc to Ik is an interval of twelve days; from Ik to Ix twelve days; from Ix to ?(Cimi) twelve days, and from Cimi to Ezanab twelve days. We may therefore feel pretty well assured that this unusual character is a variant of Cimi[2] and not of Ahau, as Brasseur supposed.[3]

The right-hand column of the lower division of the same plate contains the same unusual character which, if counted as Cimi, gives an interval of six days between each two.

This regularity in the order of the days is sufficient to prove, beyond any reasonable doubt, that they were not used on account of the significa- tion of the words. In some cases the combination, if interpreted according to the usual meaning of the words, may, by a somewhat strained interpre- tation, be formed into a sentence, but such cases are exceedingly rare, only one having, so far, been observed, and here it is purely accidental.

The agreement between the characters found in the Manuscript and the order of the days as found in the Maya calendar is also a strong proof that Landa was correct in the characters assigned and in the order of the days as he has given them. It would be impossible to find such a large number of agreements—more than 200 columns and over 1,000 days—if Landa were wrong in either respect, or if we were wrong in our interpre-

[1] This was written before I had seen Charency's papers on this subject.

[2] In a plate of the "Book of Chilan Balam of Káua," copied by Dr. Brinton in his article on the Books of Chilan Balam, presented to the Numis. and Antiq. Soc. of Phila., Jan., 1882, p. 16, one character for Lamat differs from this only in the middle stroke sloping to the left instead of to the right as this does. Leon de Rosny (Essay Dechiff. Ecrit. Hierat., 1st Livr., 17) interprets it as I do.

[3] Nor of Caban as interpreted by Charency (Dechif. des Ecrit. Calcul, Mayas, &c., 1879, p. 26).

tation. I shall therefore consider the following points settled, and shall henceforth proceed upon that basis:

1st. That the Manuscript is a Maya document.

2d. That Landa has given the order of the days and their symbols correctly.

3d. That the day characters in these columns are used simply to indicate the days they represent, and not the signification of the words.

It is now generally conceded by all who have studied these hieroglyphics that the Maya method of designating numbers was by the use of lines and dots, thus: one dot signifying 1, two dots 2, and so on up to 4; that five was represented by a single short straight line; ten by two lines, and so on. According to this system, a straight line and a dot, thus  would signify 6; two straight lines and two dots, thus , would stand for 12.

As heretofore remarked, these numeral characters are found on every page of the manuscript, and if we judge by the color, some being red and others black, they belong to two different classes, or at least are used for two different purposes. As they are generally associated with the day characters, the latter in fact never being without them, the natural inference is that they are used to denote dates.

As there are two classes, it is not probable that more than one of these is used to number the days.

If we examine the red numerals on all the plates of the manuscript, we shall find that—except on the title-page, which is evidently peculiar—they never indicate a greater number than 13 (there is one apparent exception where the number appears to be fourteen, but the additional dot is imperfect, and is either a blotch or evident mistake). In some places we find such red numerals as this , apparently denoting 14, but a more careful study of the plates on which these are found satisfies me that there are two numbers here, 13 and 1. From this fact I infer that the red numerals are used here to designate the days or years of the Maya week, which, as I have shown, consisted of thirteen days or years, especially in the computation of time in reference to religious feasts and ceremonies.

But there is still stronger evidence on this point, which I will now introduce.

For this purpose I will have to ask the reader to observe carefully our colored Plates I, II, III, and IV, which are exact copies of XX–XXIII of the Manuscript. He will notice that the extreme left-hand column of Plate IV (Man. XXIII) contains only the character for Cauac, which is repeated thirteen times, and that over each is a red numeral. Near the top are certain other characters with which we have nothing to do at present.

TABLE VI.

Cauac.	Kan.	Muluc.	Ix.
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13

TABLE VII.

Kan.	Muluc.	Ix.	Cauac.
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13

Commencing with the upper Cauac and moving down the column we find the numbers over them, so far as they can be made out, as follows: 10, 1, 5, 9, 13, 4, 8, 12, (?), 7, (?), 2, 6. If these numbers relate here to the days of the week, why this peculiar order? If we refer to Table II of the days of the months and year, and run our eyes along the transverse line opposite Cauac, we shall find the order to be as follows: 1, 8, 2, 9, 3, 10, 4, 11, 5, 12, 6, 13, 7, wholly different from what we see here. If we construct a table of years similar to those already given (III and IV), but extended over two complete cycles of 52 years each, we shall be able to explain this mystery. We give here, for the reasons heretofore stated, two tables, one with Cauac as the initial day (VI) and the other with Kan (VII). Running our eyes down the Cauac column of either table to 10, we find thirteen numbers from this downwards, as follows, and in the order here given: 10, 1, 5, 9, 13, 4, 8, 12, 3, 7, 11, 2, 6, precisely as they are on the plate of the manuscript.

On Plate XXII (our Plate III) the repeated character of the left-hand column is Kan, the numerals over which (reading from the top downwards) are as follows: 11, 2, 6, 10, 1, 5, 9, (?), 4, 8, 12, 3, 7, 11, precisely the same and in the same order as we find them in the Kan column of our tables; the obliterated one being, as we see from this, 13. On Plate XX (our Plate I) the repeated character of the left-hand column is Ix. The numbers here, so far as they can be made out, are 13, (?), 8, 12, 3, 7, 11, 2, 6, 10, 1, 5, 9, precisely the same and in the same order as in the Ix column of our tables.

The repeated character on Plate XXI (our Plate II) is Muluc; the numbers are 12, 3, 6, 10, 1, 5, 9, 13, 4, 8, 2, 7, 3. If we compare these with the Muluc column of our tables, we find that after the first two numbers there is a skip of three numbers before we reach the 6 which should follow according to the plate. But what appears here as a contradiction of my supposition is, as I believe, the strongest evidence of its correctness. If we examine the tables carefully we will observe that after reaching the second figure,—3,—in the Muluc column, the next figure in the adjoining column is 6, and from thence to 8 the same as on the plate. From this I am led to believe the writer had before him a table similar to those I have given, except that it was written in their numeral characters, and that, by mistake in copying, his eye fell on the wrong column. That such tables were used by them is rendered probable by the following quotation which Perez makes from an ancient manuscript in his possession: "They had another number which they called *Ua Katun*, which served them as a key to find the Katunes and according to the order of their march, it falls on the two days of the *Uayebhaab* and revolves to the end of certain years: Katunes 13, 9, 5, 1, 10, 6, 2, 11, 7, 3, 12, 8, 4." By commencing at the bottom of the right-hand column of either table of years and running up we find precisely these numbers and in the order given. It is scarcely possible these could have been obtained except by a table similar to those I have given.

We know that tables of days of this form are to be found in some two or three of the Mexican Codices; something similar is also to be found in the Dresden Codex, and by placing the columns of these four plates of the Manuscript side by side we will have just such a table.[1]

But be this as it may, the exact agreement in the other three columns, and the fact that the years named and numbered appear to belong to *one continuous period of time*—an all-important point in this connection—show, as we think, conclusively that our explanation of these numerals and the day characters, and of the use here made of them, is correct. If so, then the red numerals are used to number the days and years of the week, or, in other words, to number the days and years exactly as the various writers have stated was the usual custom. We have marked this period on the tables of years with waved lines so as to be seen at a glance, as we shall have occasion hereafter to refer to it.

As further proof that these red numerals are limited to the thirteen series, I now call attention to certain short columns found in the middle division of Plates VII*–X*. These consist of three days each—Cib, Caban, and Ezanab—and each day has a numeral over it, as follows (I give here the exact order in which they stand on the plates, although I have doubts as to the correctness of Brasseur's paging):

6. Cib.	13. Cib.	4. Cib.	11. Cib.	5. Cib.	12. Cib.	2. Cib.
7. Caban.	1. Caban.	5. Caban.	12. Caban.	6. Caban.	13. Caban.	3. Caban.
8. Ezanab.	2. Ezanab.	6. Ezanab.	13. Ezanab.	7. Ezanab.	1. Ezanab.	4. Ezanab.

[1] Since the above was written, I have been so fortunate as to procure a copy of Leon De Rosny's *Essai sur le Déchiffrement de L'Ecriture Hieratique de L'Amerique Centrale*, in which I find a copy of a plate of the CODEX CORTESIANUS, and also of one plate of the CODEX PERESIANUS. In the former is part of a table of days arranged precisely as in my table, except that they are placed horizontally, as here shown, instead of in columns:

Muluc.	Oc.	Chuen.	Eb.	Been.	Ix.	Men.	Cib.	Caban.
Ix.	Men.	Cib.	Caban.	Ezanab.	Cauac.	Ahau.	Imix.	Ik.
Cauac.	Ahau.	Ymix.	Ik.	Akbal.	Kan.	Chicchan.	Cimi.	Manik
Kan.	Chicchan.	Cimi.	Manik.	Lamat.	Muluc.	Oc.	Chuen.	Eb.

Whether or not this fragment contains the commencement, I am unable to say; that it does not contain the conclusion, I am satisfied. We have here proof that the order when in lines is from the left to the right. The other plate (from the Codex Peresianus) contains a column similar to those in the four plates of the Manuscript Troano, but here the repeated day (*Been*) is the last of one of the years as in the Dresden Codex.

9. Cib.	3. Cib.	10. Cib.	7. Cib.	1. Cib.	8. Cib.
10. Caban.	4. Caban.	11. Caban.	8. Caban.	2. Caban.	9. Caban.
11. Ezanab.	5. Ezanab.	12. Ezanab.	9. Ezanab.	3. Ezanab.	10. Ezanab.

If we turn to our condensed calendar, Table V, we see that these three days follow each other as shown here, and by examining the different columns we can find all the numbers here given. This fact, together with the method of numbering, is sufficient of itself to establish the correctness of the opinion I have advanced in reference to these red numerals.

That they are here used to number the days is evident from the fact that they are applied to those days which are never used to name the years. From what has been shown in reference to Plates XX–XXIII (our Plates I, II, III, and IV) we see that they are also used to denote the years of the week or "Indication."

The next point to be determined is the use of the black numerals. Here we shall find the task more difficult, but it is necessary to determine this before we can proceed in our effort to fix the dates, which are given in great numbers in the Manuscript, and by means of which we hope to settle the disputed points in regard to the calendar.

I shall at present omit any reference to the "title-page," which, as I have said, is peculiar, and cannot therefore be used in the present investigation. As we find repeatedly throughout the work black numeral characters denoting 14, 15, 16, 17, and 18, it is evident they do not refer to the days or years of the week. They must therefore be used to denote the numbers of the *months*, or of the *days* of the *months*. That they are not used to number the Ahaues or the years of these periods is evident from the fact that these are always numbered by the thirteen series, or, in other words, never have applied to them any number exceeding 13; the years are also designated by the four days Cauac, Kan, Muluc, and Ix.

But in order that the reader may see clearly the difficulty of deciding this point satisfactorily it will be necessary for me to illustrate it by examples from the Manuscript.

As before mentioned, the day characters are nearly always in columns—

usually of five characters each—at the left of the compartments or spaces,

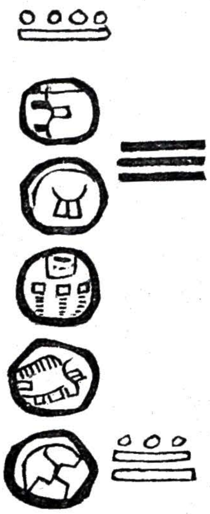

FIG. 5.

each column usually with a red numeral over it. For example, in the lowest division of V* the column consists of five characters, as shown here (Fig. 5), which denote the days (reading from the top downward) Oc, Ik, Ix, Cimi, and Ezanab. The red numeral at the top is 9. The black numeral at the side in the space is three lines or 15. (In this case there is but one of these black numerals in the space or compartment, but usually there are several, and also several red ones.) Now, I take for granted that placing the red numeral at the top of the column is equivalent to applying it to each day in the column, thus: 9 Oc, 9 Ik, 9 Ix, 9 Cimi, and 9 Ezanab. There is also one red numeral—13—in the space, as shown in the annexed cut.

Leaving this last out of consideration for the present, let us proceed upon the supposition that the black numeral signifies *the day of the month.* Examining our condensed calendar (Table V), we see that of the five days Ezanab is the only one that ever falls on the 15th of the month. As this will be found true of at least two columns out of every three throughout the Manuscript it is apparent that these numerals are not used here for this purpose; but even could all be found on the proper day of the month we would still be without any fixed date. Take, for instance, Ezanab in this case, which does fall on the 15th day of the month in the years commencing with Kan; the figure 9 in the fifteenth transverse line is found in the second column. What month? In the year 1 Kan it is in the second month, in the year 8 Kan it is in the first month, in the year 2 Kan it is in the thirteenth month, and so on throughout the thirteen Kan years. Some may contend that it was not the intention to fix the years, as this is possibly the date of some feast or religious ceremony to be observed each year. I answer that, laying aside the insuperable objection already given, even this supposition would be erroneous—first, because in the case before us Ezanab falls on the 15th day of the month only once every four years, and with each year the month is changed. But it is unnecessary to discuss this supposition further, as not one day out of three ever falls on the day given if these black numerals denote the days of the month.

We will next proceed on the supposition that these indicate the months. In that case the dates given in the present example will be 9 Oc, 9 Ik, 9 Ix, 9 Cimi, and 9 Ezanab of the 15th month (Muan). In this the feast, religious ceremony, or whatever the date refers to, occurs always in the same month, and so far agrees with what is left on record in reference to religious ceremonies and observances. As only the day and month are given, it is possible, as heretofore stated, to find four dates to each day. Now, let us hunt out, by the use of our condensed calendar, the years on which these several dates fall. Commencing with 9 Oc, we look first for this day in the Cauac column; having found it to be the twelfth day of the month, we run our eyes along the twelfth transverse line of figures until we reach the figure 9, which we find to be in the eighth column (the one with 11 at the top); counting back fifteen months (including the one 9 is in) we reach the column with 4 at the top The year is therefore 4 Cauac. We next find Oc in the Kan column; it is here the seventh day of the month, and 9 is in the fifth column (the one with 3 at the top); counting back fifteen months (going towards the left until we reach the first column, and then to the thirteenth, and moving back toward the left), we reach the fourth column (with 9 at the top). The year is therefore 9 Kan. We next find Oc in the Muluc column, and by the same process obtain the year 1 Muluc. Next we find Oc in the Ix column, and by the same process ascertain the year to be 12 Ix.

Pursuing the same method with the other days, we obtain the following result:

	9 *Oc.*	9 *Ik.*	9 *Ix.*	9 *Cimi.*	9 *Ezanab.*
Years....	4 Cauac.	12 Cauac.	13 Cauac.	8 Cauac.	9 Cauac.
Years....	9 Kan.	10 Kan.	5 Kan.	13 Kan.	1 Kan.
Years....	1 Muluc.	2 Muluc.	10 Muluc.	11 Muluc.	6 Muluc.
Years....	12 Ix.	7 Ix.	2 Ix.	3 Ix.	11 Ix.

Now, let us construct a table (No. VIII) of years for one cycle, as this includes all possible variations in the numbers and names of the years, and see where those obtained will fall. Marking each of the years with a star, we find that they belong to one continuous period. So far the result is favorable, and what will probably attract the attention of those who have devoted some time to the study of this subject is the fact that the period embraced is precisely that which is supposed by most authorities to constitute one Ahau. But let me here warn such reader against a too hasty conclusion.

Supposing we are so far correct, what use are we to make of the red numeral—13—in the space? Let us suppose that it is also to be applied to the days as the other red numeral, using the same month. This gives us the following years:

	13 *Oc.*	13 *Ik.*	13 *Ix.*	13 *Cimi.*	13 *Ezanab.*
Years....	8 Cauac.	3 Cauac.	4 Cauac.	12 Cauac.	13 Cauac.
Years....	13 Kan.	1 Kan.	9 Kan.	4 Kan.	5 Kan.
Years....	5 Muluc.	6 Muluc.	1 Muluc.	2 Muluc.	10 Muluc.
Years....	3 Ix.	11 Ix.	6 Ix.	7 Ix.	2 Ix.

If we attempt to locate these in the same cycle as the preceding period, we shall find that the two clash with each other—that is, that some of the years of the first are the same as some of the second; but it is evident they may be located in another cycle.

Table VIII.

Cauac.	Kan.	Muluc.	Ix.
1	2	3	4
5	6	7	8
9*	10*	11*	12*
13*	1*	2*	3*
4*	5*	6*	7*
8*	9*	10*	11*
12*	13*	1*	2*
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13

Before proceeding further with the discussion of this difficult question, we must remind the reader of what possibly he has already inferred—that in our allusion to the "intervals" between the days of the columns, our object then was simply to show a regularity not consistent with the idea that they were used on account of the signification of the words, and not to lead him to suppose that the real interval intended was only the number of days mentioned. We also wish to call his attention to another fact which is becoming more and more apparent as we proceed—that the regularity of the intervals which seems apparent, whatever may be our final conclusion as to what the black numerals refer to, and the great number of dates as compared with the text, preclude the supposition that the work is historical. I shall therefore proceed upon the theory that it is, to a large extent at least, a kind of religious calendar—not with any particular desire to maintain this opinion, but simply because I find the evidence pointing in this direction, and also that it is next to impossible to advance farther without having some theory.

TABLE IX.

Cauac.	Kan.	Muluc.	Ix.
1	2	3	4
5	6	7	8
9	10	11	12
13	1*	2*	3*
4*	5*	6*	7*
8*	9*	10*	11*
12*	13*	1*	2*
3*	4*	5*	6*
7*	8	9	10
11	12*	13*	1*
2*	3*	4*	5*
6*	7*	8*	9*
10*	11*	12*	13*
1*	2*	3*	4*
5*	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11

From what has been shown it is apparent that the interpretation I have given is a possible one, the chief objections to which are, *first*, the large number of dates in the Manuscript that this plan would give us, which, according to a rough calculation I have made, would amount to something like ten thousand; *second*, the extent of time these dates must necessarily cover, which cannot be less than one great cycle of 312 years.

The Dresden Codex, which is evidently similar in character to the Manuscript Troano, presents, if possible, still greater difficulties to the settlement of this question, as here we find the black numeral for 19 frequently connected directly with the red ones. But so far as I have examined dates of this kind they do not appear to be necessarily associated with the day characters on the same page. In this codex the dates are also much more numerous than in the Tro. Ms., a number of pages being filled almost exclusively with numerals and day characters. Month characters are also introduced; hence it is probable the *day of the month* is often given.

On page II (Tro. Ms.), in the left column, middle division (see fig. 99), the days (counting from the top downwards) are Manik, Cauac,[1] Chuen, Akbal, Men, the red numeral over the column 1. In the space are three black numerals 6, 11, and 9, also two red ones 10 and 3. Using the red 1 and the black 6, as heretofore, we find the years to be as follows:

	1 *Manik.*	1 *Cauac.*	1 *Chuen.*	1 *Akbal.*	1 *Men.*
Years....	10 Cauac.	5 Cauac.	6 Cauac.	1 Cauac.	2 Cauac.
Years....	2 Kan.	3 Kan.	11 Kan.	12 Kan.	7 Kan.
Years....	13 Muluc.	8 Muluc.	3 Muluc.	4 Muluc.	12 Muluc.
Years....	5 Ix.	13 Ix.	1 Ix.	9 Ix.	4 Ix.

The period is found to be continuous, and is surrounded on the annexed table (No. IX) by a continuous dark line. In this case it commences with

[1] Cauac is represented here by an unusual character.

Kan. If we use the red 3 and the black 6 the result will be as shown in the group surrounded on the table by the dotted line. As the reader is perhaps by this time aware, it might be located below the first by extending the table, but still would give us no clue to the proper position of the Ahaues.

There are two other possible suppositions, to wit: that the red numeral over the column refers to the number of the Ahau, and that in the space to the number of the days; and, second, just the reverse of this, that the red number in the space refers to the Ahau and that over the column to the number of the days, the black one in each case denoting the number of the month.

As it will be impossible for us to decide in reference to these suppositions until we can locate the Ahaues and determine their numbers, I will postpone further discussion of the point for the present, proceeding for the time being upon the only plan so far found consistent with what is known of the Maya calendar.

As heretofore stated, the greater number of the day columns contain just five characters. Why this number? If we use the numerals as shown by the above examples, this will give us for each red numeral twenty years, agreeing with the number counted to the Ahau, whether we follow most authorities or Perez; for, according to the latter, who holds that there are twenty-four years in this period, only twenty are usually "counted"; four being generally omitted as unlucky, or for some other reason. That something of this kind, arising from the system itself, was the cause of placing five days in so many columns is more than probable. If I am correct in this supposition, it not only agrees with the method of using the numerals above suggested, but it will also determine the years that form the different Ahaues.

Following up this suggestion, let us see if it is possible to determine from the Manuscript the length of the Ahau as understood by the author.

As the most likely method of deciding this question, I will select a number of the day columns, find from them the years indicated according to the plan heretofore given, and locate them in tables of years. We can then see what relation they bear to each other.

The first I select is found in the lower division of Plate XXVI. The column is as here shown—Fig. 6—the days are Ahau, Eb, Kan, Cib, Lamat.

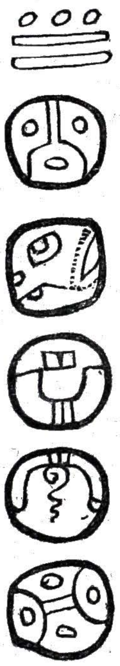

Fig. 6.

In addition to these red numerals, we find in the space occupied by the figures five black and five red numerals, each thirteen. Why there should be five pairs of numerals, each denoting the same number, I confess myself unable to decide; I shall therefore leave this question to be discussed hereafter, if I find any reasonable explanation. According to the interpretation already given, the red numerals indicate the days, the black the months. Hunting out the years as in the preceding example we find them to be as follows:

	13 *Ahau.*	13 *Eb.*	13 *Kan.*	13 *Cib.*	13 *Lamat.*
Years..	6 Cauac.	7 Cauac.	2 Cauac.	3 Cauac.	11 Cauac.
Years..	4 Kan.	12 Kan.	7 Kan.	8 Kan.	3 Kan.
Years..	9 Muluc.	4 Muluc.	5 Muluc.	13 Muluc.	1 Muluc.
Years..	1 Ix.	2 Ix.	10 Ix.	5 Ix.	6 Ix.

These years are marked with a star and the group surrounded by a continuous dark line on the annexed table of years, No. X. For reasons hereafter given I adopt the system which commences the cycle with 1 Cauac.

TABLE X.

Cauac.	Kan.	Muluc.	Ix.
10	11	12*	13*
1*	2*	3*	4*
5*	6*	7*	8*
9*	10*	11*	12*
13*	1*	2*	3*
4*	5*	6	7
8	9	10	11
12	13	1*	2*
3*	4*	5*	6*
7*	8*	9*	10*
11*	12*	13*	1*
2*	3*	4*	5*
6*	7*	8	9
10	11	12*	13*
1*	2*	3*	4*
5*	6*	7*	8*
9*	10*	11*	12*
13*	1*	2*	3*
4*	5*	6	7
8	9	10	11

As Plate XXVII relates obviously to the same general subject, I select the left-hand day column of its upper division as our next example. The days are Ahau, Eb, Kan, Cib, and Lamat, the same as in the preceding example, the red or day numeral 11, the black or month numeral 13.

These give us the following years:

Days....	11 *Ahau.*	11 *Eb.*	11 *Kan.*	11 *Cib.*	11 *Lamat.*
Years....	4 Cauac.	5 Cauac.	13 Cauac.	1 Cauac.	9 Cauac.
Years....	2 Kan.	10 Kan.	5 Kan.	6 Kan.	1 Kan.
Years....	7 Muluc.	2 Muluc.	3 Muluc.	11 Muluc.	12 Muluc.
Years....	12 Ix.	13 Ix.	8 Ix.	3 Ix.	4 Ix.

These are also marked on the annexed table with a star, but the group is surrounded by a dotted line. In order to enable the reader to understand what I mean by "properly locating" these periods, I have extended the table so as to include one complete cycle, the close of another, and the commencement of another. I have also located this last period—as a matter of course according to the years obtained—in the only two possible positions in the table; surrounding each by a dotted line. If the table had been extended it could of course have been located in other cycles. I call attention to the fact that both these periods commence with a Muluc year, which would render it impossible for the commencement or ending of an Ahau, if these are Ahaues, to coincide with the commencement or ending of a cycle or grand cycle. If we suppose the Ahau to contain twenty-four years, and the periods marked on Table X to omit two years at the commencement and two at the close; in other words, extend the upper and lower lines bounding the groups, across the table, we will then have no difficulty in making all the periods agree with each other and with the cycles. After all, we are not yet authorized to say positively that these periods are Ahaues, or that they are even embraced in or coincide with them; still, the oft-repeated five-character day columns, and the resulting groups of years, justify us in assuming that they do at least coincide with them.

Before proceeding further in our discussion of the Manuscript it will be necessary for us to decide in reference to the following points relating to the calendar upon which we have incidentally touched:

First. The number of years contained in an Ahau.

Second. The position of these periods in the grand cycle or Ahau-Katun.

Third. The respective numbers of these periods as thus fixed in the Ahau-Katun.

Fourth. With which one of the four days (year bearers) the grand cycle begins.

That the older authorities, so far as we are aware, without exception, give 20 years as the length of an Ahau, is admitted. Landa, for example, says (in § XLI), "The Indians had not only the computation of the year and the months, but they had also a certain manner of computing the times and events by ages. This they did by 20 and 20 years, computing 13 twenties with one of the twenty letters of their month called *Ahau*, but without order, and alternate only as on the boundary of the wheel aforesaid."

Cogolludo (Hist. de Yucathan, Lib. IV, Cap. 5) says:

"They compute their eras and ages, which they write down in their books, by 20 and 20 years and by lustres of 4 and 4. They fix the first year at the east, to which they give the name *Cuch-haab*. The second, at the west, is called *Hiix;* the third, at the south, is named *Cauac*, and the fourth, *Muluc*, at the north. Five of these lustres being completed, make twenty years; this is what they call a *Katun*. They place a sculptured stone upon another stone, equally sculptured, fixed with lime and sand in the walls of the temples."

The Perez manuscript, as is well known, counts twenty years to an Ahau. Most of the recent writers have also decided in favor of the same number. Two or three of the most recent authorities, as Dr. Brinton, Charency, and Rosny, are disposed to follow the opinion of Perez, that it contained twenty-four years. I am satisfied that the opinion which holds twenty-four years to be the number is the correct one, and will now proceed to give the proof I have been able to obtain bearing upon this point.

First. If I am correct in my interpretation of the numerals, then the groups of years obtained by using these, as heretofore shown, will necessarily require twenty-four years to the Ahau, no matter with which of the four year-bearing days we begin the cycle; for, although these groups contain but twenty years there is an interval of four years between each two that is not counted.

Second. The method of numbering these periods cannot, as I believe, be accounted for on any other supposition. According to all authorities who have mentioned the subject they were numbered, as I have already stated, thus: 13, 11, 9, 7, 5, 3, 1, 12, 10, 8, 6, 4, 2, the number 13 being the first, 11 the next, and so on. It is not reasonable to suppose that this singular series was wholly an arbitrary selection; on the contrary, it is more than probable that it was obtained in some way through the use of the "13 series." If we examine the table of years, No. XVII, we will see that, commence where we may, and divide it into periods of twenty-four years by transverse lines, the first years of these periods taken in the order they come will accord exactly with this series. Take for example the

Ahaues as there given: the first commences with the year 1 Cauac, the second with 12 Cauac, the third with 10 Cauac, and so on. As the great cycle contains thirteen of these periods, it follows that we shall find all these numbers in it by thus dividing it. It is true this does not prove that the first period was numbered 13; moreover it is possible (though I do not think probable) that the number was not taken from that of the first day of the year, but from the second, as suggested by Perez. According to the theory advanced by this author these periods were numbered from the second day of the Cauac years, which would necessarily be Ahau, because, as he supposes, some notable event in their history occurred on that day. Even on this supposition the series could not commence with the first period of the grand cycle, as this would be Ahau No. 2, but would begin with the second, which would be Ahau No. 13.

It may not be improper to call attention at this point to a remark made by Dr. Valentini in his article on the Perez manuscript (Proc. Am. Ant. Soc. No. 74): "Nor do we understand the reason why, just here, the topic of the succession of the numbers 13, 11, 9, 7, 5, 3, 1, 12, 10, 8, 6, 4, 2, was introduced. Could it have been with the intention of showing that this singular enumeration of alternating Ahaues, which we shall hereafter speak of, occurred only in cycles of twenty-four years, and that therefrom a proof might be derived for establishing the pretended cycle of twenty-four and three hundred and twelve years? Evidence of this should have been given by a table showing the series, and by still another table in which should be shown that such an alternating succession did not occur in cycles composed of twenty years. Not one single fact can be detected in Señor Perez's text by which the long established assumption of a twenty years' cycle has been disproved."

The object Señor Perez had in view in introducing this series at this point was for the very purpose of showing that this "singular enumeration" could be obtained only by dividing the series into periods of twenty-four years. As he was not fortunate enough to hit upon the plan of a table that would bring this clearly before the eye, I call attention to Table XVII, which meets precisely the requirements of Dr. Valentini. Dividing it into periods of twenty-four years will give this singular enumeration, while dividing it into periods of twenty years will not.

Third. Additional proof to the same effect I think is also to be derived from a symbolical figure in the Manuscript itself The most notable figure in the upper compartment of Plate XXIII (our Plate IV) is the blue one in the upper left-hand corner on a black background surrounded by a white border, the latter crossed by dotted rays, each ray terminating with a little ring; a dagger is piercing the eye of the blue sitting figure. If we count these clubbed rays we shall find there are twenty-three of them, but exactly where the dagger crosses the border there is room for *one more* According to my interpretation the whole of this figure taken together is a symbol of the Katun or Ahau, the inner blue figure probably denoting the year.[1] If I am correct in this interpretation, then we have here positive evidence that Perez was right in holding that the Ahau consisted of twenty-four years. The whole figure is therefore intended to indicate the close of an Ahau;—when one more year has expired the light of another Ahau will be forever extinguished and the new one will begin its course.

We find, as I think, something similar to this method of marking the missing year on Plates 75 and 76 of the Borgian Codex. These two plates, which are evidently parts of one picture, 76 being the upper and 75 the lower part, are symbolic representations of periods of time. The figures around the central circle of 76 are probably intended to represent the marching years. There are only twelve of them, but in the pathway at the bottom we see the footsteps of one that has passed on. At the four corners outside the circle we see the four "year-bearers."[2]

On Plate 75 the chief figure is that of Kingsborough's supposed crucified Quetzalcoatl; on the body is a large sun or circular disk with seven points, but in the lower margin, where there is the proper space for another, the circle is pierced by the obsidian knife of the priest who holds the withdrawn heart in his hand. Around the figure are similar but smaller disks; counting these we find there are *eight*, the exact number of points required to complete the central disk, and the number of periods (Indications) in an age. Possibly other periods are intended, as I have not studied the Mexican Calendar with sufficient care to express any decided opinion on this point;

[1] Fortunately, the correctness of this supposition, which I mentioned in an article in the American Naturalist for August, 1881, has since been verified by Dr. D. G. Brinton—"The Books of Chilan Balam," p. 15.

[2] Not those usually given, but those evidently used for this purpose in this and other codices.

my only object in referring to these plates being to illustrate the idea advanced in regard to the meaning of the dagger piercing the eye of the blue figure on Plate XXIII of the Manuscript Troano.

The next point to be determined is the position of the several Ahaues in the grand cycle. This larger group, as admitted by all authorities, consisted of thirteen Ahaues; as $24 \times 13 = 312$, it follows that, assuming the Ahau to be a period of 24 years, this longer period would consist of 312 years. If the first year of the grand cycle coincided with the first year of an Ahau, the position of these latter groups would be determined by simply dividing the former into groups of 24 years, as shown in Table No. XVI, where the dark transverse lines mark the divisions between the Ahaues as thus obtained. This conclusion is so natural that it would seem to follow as a matter of course from the numbers used, and from the fact that the number of years in a grand cycle is an exact multiple of the number of years in an Ahau.

But as Señor Perez, who is our chief authority for what pertains to the Maya calendar, has advanced a different opinion, and as his suggestion affords a means of escape from a very serious difficulty, I will call attention to it before deciding as to which I believe to be the true method of locating these periods. But in order that his theory may be clearly understood it is necessary for us first to determine the dominical day with which the first years of the Ahaues commenced; for it is evident, whether we count twenty or twenty-four years to these periods—as each is a multiple of 4—that if they followed each other in regular order the first year of each would begin with the same dominical day though not the same number. In other words, if one of the series began with a Kan year all the rest would begin with a Kan year. If the first year of a cycle were also the first year of an Ahau, as we would naturally presume, then determining the first year of any one will determine all the others.

In the manuscript discovered by Perez and translated into English by Stephens (from the Spanish translation of the discoverer), we find the following statement: "In the 13th Ahau Chief Ajpula died. *Six. years were wanting to complete the 13th Ahau.* This year was counted toward the east of the wheel and began on the 4th Kan. Ajpula died on the 18th day of the month Zip on the 9th Ymix." Taking for granted that the day, the number of the day, and the month as given here are correct, it is easy to determine from our condensed calendar that the year must necessarily have been 4 Kan. As there were twenty-four years in an Ahau, and six were yet wanting to complete that referred to in the quotation, it follows of necessity this 4 Kan was the 18th and that this Ahau must have commenced with the year 13 Cauac and ended with 10 Ix. This will be seen by making a list of the years in regular succession, so that 4 Kan shall be the 18th. We give such a list here (Table No. XI), marking in italics the 4 Kan.

TABLE XI.

1—13 Cauac.
2— 1 Kan.
3— 2 Muluc.
4— 3 Ix.
5— 4 Cauac.
6— 5 Kan.
7— 6 Muluc.
8— 7 Ix.
9— 8 Cauac.
10— 9 Kan.
11—10 Muluc.
12—11 Ix.
13—12 Cauac.
14—13 Kan.
15— 1 Muluc.
16— 2 Ix.
17— 3 Cauac.
18— 4 *Kan.*
19— 5 Muluc.
20— 6 Ix.
21— 7 Cauac.
22— 8 Kan.
23— 9 Muluc.
24—10 Ix.

If we place these years in tabular form, as heretofore given, the Ahau will be in the form shown in the annexed table (XII). Here, then, we have positive evidence, if to be relied on, that this Ahau at least commenced with a Cauac year (whether the Ahau contained 24 or 20 years), and, if so, all the others of the series.

A somewhat careful examination of Señor Perez's *Cronologia Antigua* satisfies me that his whole scheme was based upon what he believed to be two established facts: *first*, that the Ahaues commenced with a Cauac year; and, *second*, that they were numbered from the second day of these years.

TABLE XII.

Cauac.	Kan.	Muluc.	Ix.
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4*	5	6
7	8	9	10

I am pretty well satisfied from some things observable in the Manuscript Troano that it recognizes Cauac as the dominical day of the first year of the Ahaues. *First.* The order of the four plates XX–XXIII, which refer exclusively to the four dominical days. That Brasseur has paged these plates in exactly the reverse order to what they should be, I think is evident from the following facts: As now paged they bring these days in the following order: Ix, Muluc, Kan, Cauac, exactly the reverse of that in which they come in the calendar. This alone is sufficient to cause us to suspect a reversal. But it is not the only reason for believing this. If we follow the order of the plates in marking the years, we obtain no continuous period, as is evident from the annexed Table XIII.

Second. The numeral (1), over the second Cauac character on Plate XXIII (our Plate IV) and also that over the fifth Muluc character on Plate XXI (our Plate II) is surrounded in each case with a circle of minute dots. Although there are other numeral characters on these four plates denoting *one*, none except these two are thus distinguished. What is this intended to signify? My answer is, it signifies that those two years are the first of important periods that are included in, or at least begin in, the time embraced by these four plates. Now let us test this by giving two tables embracing the period covered by them, marking the Ahaues on one according to the plan I have given, and on the other according to Señor Perez's method.

Table XIV commences with a Cauac year, and is of the usual form, as heretofore given. Table XV begins with a Kan year, and is made in accordance with the theory advanced by Perez, who holds that the cycle began with a Kan year, although contending that the Ahaues commenced

TABLE XIII.

Ix.	Muluc.	Kan.	Cauac.
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13

TABLE XIV.

Cauac.	Kan.	Muluc.	Ix.
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13
——:o:——			
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13

TABLE XV.

Kan.	Muluc.	Ix.	Cauac.
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13
——:o:——			
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13

with a Cauac year. On each, the divisions between the Ahaues are marked by solid, heavy, black lines; the usually counted twenty years of each are surrounded by a single dotted line, and the period covered by the four plates by a continuous waved line. The point at which the grand cycle begins is marked thus: ——:o:——. If we examine Table XIV we see that 1 Cauac is the first year of a cycle, and 1 Muluc the first of the usually "counted years" of an Ahau, and that both are within the period covered by the four plates; each is surrounded by a ring in order to designate it. As a matter of course, each is the first year of an "Indication" or week of years; so are 1 Kan and 1 Ix in the same period, yet neither of these is thus distinguished.

If we turn now to Table XV, in which the cycle begins with a Kan year, we can see no reason why either the 1 Cauac or the 1 Muluc in the period embraced by the waved line should have any special mark of distinction.

It is proper to state here that unit numerals surrounded in a similar manner by a circle of dots, are to be found on other plates where it is difficult to apply the theory here advanced.

Another difficulty which arises, if we adopt Perez's theory, is that the last Ahau of a grand cycle does not close with the end of that period, but includes one or more years of the following, according to the place the division begins.

Taking all these facts into consideration, it appears that the calendar system followed by the author of the Troano Manuscript commenced the cycles and the Ahaues with a Cauac year. I think, therefore, the evidence that the Ahaues at least began with a Cauac year is too strong to leave any doubt on this point.

As bearing upon, and, as I believe, tending strongly to confirm this conclusion, I will introduce here some examples from the Manuscript.

In the second division of Plates XXX and XXXI, commencing on the left half of the former and continuing through the latter, we observe a series of figures all similar to each other, except the one to the right on Plate XXX, which is the long-nosed god.

Over each figure, except one, there is a red numeral, but these differ from each other in the numbers indicated. In front of each face is the black numeral character for 11. The red numerals are (?), 9, 7, 5, 3. The first is obliterated, but if we judge by the space it would be 1, if by the order, 11; but since the result will be the same, except as to the position of the period obtained by this one in the table of years, it makes no particular difference for the present purpose which we assume is correct. Assuming 11 to be the missing one, the numbers of the days will then be 11, 9, 7, 5, 3.

The days in the column at the left of the compartment on Plate XXXI are Kan, Cib, Lamat, Ahau, and Eb. Hunting out the years in the manner heretofore described, we find them to be as follows:

		11 Kan.	*11 Cib.*	*11 Lamat.*	*11 Ahau.*	*11 Eb.*
(11)	Years	1 Cauac.	2 Cauac.	10 Cauac.	5 Cauac.	6 Cauac.
	Years	6 Kan.	7 Kan.	2 Kan.	3 Kan.	11 Kan.
	Years	4 Muluc.	12 Muluc.	13 Muluc.	8 Muluc.	3 Muluc.
	Years	9 Ix.	4 Ix.	5 Ix.	13 Ix.	1 Ix.
		9 Kan.	*9 Cib.*	*9 Lamat.*	*9 Ahau.*	*9 Eb.*
(9)	Years	12 Cauac.	13 Cauac.	8 Cauac.	3 Cauac.	4 Cauac.
	Years	4 Kan.	5 Kan.	13 Kan.	1 Kan.	9 Kan.
	Years	2 Muluc.	10 Muluc.	11 Muluc.	6 Muluc.	1 Muluc.
	Years	7 Ix.	2 Ix.	3 Ix.	11 Ix.	12 Ix.
		7 Kan.	*7 Cib.*	*7 Lamat.*	*7 Ahau.*	*7 Eb.*
(7)	Years	10 Cauac.	11 Cauac.	6 Cauac.	1 Cauac.	2 Cauac.
	Years	2 Kan.	3 Kan.	11 Kan.	12 Kan.	7 Kan.
	Years	13 Muluc.	8 Muluc.	9 Muluc.	4 Muluc.	12 Muluc.
	Years	5 Ix.	13 Ix.	1 Ix.	9 Ix.	10 Ix.
		5 Kan.	*5 Cib.*	*5 Lamat.*	*5 Ahau.*	*5 Eb.*
(5)	Years	8 Cauac.	9 Cauac.	4 Cauac.	12 Cauac.	13 Cauac.
	Years	13 Kan.	1 Kan.	9 Kan.	10 Kan.	5 Kan.
	Years	11 Muluc.	6 Muluc.	7 Muluc.	2 Muluc.	10 Muluc.
	Years	3 Ix.	11 Ix.	12 Ix.	7 Ix.	8 Ix.
		3 Kan.	*3 Cib.*	*3 Lamat.*	*3 Ahau.*	*3 Eb.*
(3)	Years	6 Cauac.	7 Cauac.	2 Cauac.	10 Cauac.	11 Cauac.
	Years	11 Kan.	12 Kan.	7 Kan.	8 Kan.	3 Kan.
	Years	9 Muluc.	4 Muluc.	5 Muluc.	13 Muluc.	8 Muluc.
	Years	1 Ix.	9 Ix.	10 Ix.	5 Ix.	6 Ix.

In order to show the position of these groups in the series of years, and how they stand in reference to each other, I give here a table (XVI) covering one entire grand cycle, and including the last cycle of the pre-

TABLE XVI.

Cauac.	Kan.	Muluc.	Ix.
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13
:o:			
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13

(8) (6) (4) (2)

Cauac.	Kan.	Muluc.	Ix.
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13

(13) (11) (9) (7)

Cauac.	Kan.	Muluc.	Ix.
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13

(5) (3)

Cauac.	Kan.	Muluc.	Ix.
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13
:o:			
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13

ceding and the first cycle of the following grand cycles. As I have assumed that the cycle (and hence the great cycle) commenced with the year 1 Cauac, it follows that, in carrying out the above supposition, the first Ahau of the series must also begin with this year. The divisions between the Ahaues are marked on the table by transverse solid black lines. The point at which the first great cycle ends and the next (which is given complete) begins is marked thus: ——:o:——. I next locate the foregoing groups of years so as, if possible, not to clash with each other, and also in such a manner that the period represented by a group shall fall within one of the Ahaues marked off on the table.

Each group is surrounded by a continuous dark line, so as to be easily distinguished from other periods marked on the same table; they are also numbered at the sides thus: (11), (9), (7), (5), (3), these numbers corresponding with the day numbers by which the different groups were obtained.

These groups, each consisting of twenty years, not only fall within the lines marking the Katunes, but come in regular succession, leaving four uncounted years between each two periods—two belonging to one and two to that which follows. In other words, while the Katun or Ahau as a whole, according to the theory upon which I am now proceeding, always commenced with a Cauac year, the twenty "counted years" in the present example begin with a Muluc year. But, as appears from what has already been shown, this is not always true in regard to these periods, yet it is generally the case.

If we observe carefully the five figures in the first or uppermost division of the plates under consideration, we see that they correspond in character to those in the second division to which we have just alluded, and that the black numeral is also the same, (11). The only red numerals recognizable are the 13 over the long-nosed god on Plate XXX, the 8 facing the left-hand figure on Plate XXXI, and the 2 over the left-hand figure on Plate XXX. According to the arrangement of the numbers in the second division, those in this division would be 8, 6, 4, 2, 13, reading from left to right. If we assume these numbers to be correct, and the days to be Eb, Kan, Cib, Lamat, and Ahau, as shown by those not obliterated, the years would be as follows:

		13 *Eb.*	13 *Kan.*	13 *Cib.*	13 *Lamat.*	13 *Ahau.*
13	Years....	8 Cauac.	3 Cauac.	4 Cauac.	12 Cauac.	7 Cauac.
	Years....	13 Kan.	8 Kan.	9 Kan.	4 Kan.	5 Kan.
	Years....	5 Muluc.	6 Muluc.	1 Muluc.	2 Muluc.	10 Muluc.
	Years....	3 Ix.	11 Ix.	6 Ix.	7 Ix.	2 Ix.

		8 *Eb.*	8 *Kan.*	8 *Cib.*	8 *Lamat.*	8 *Ahau.*
8	Years....	3 Cauac.	11 Cauac.	12 Cauac.	7 Cauac.	2 Cauac.
	Years....	8 Kan.	3 Kan.	4 Kan.	12 Kan.	13 Kan.
	Years....	13 Muluc.	1 Muluc.	9 Muluc.	10 Muluc.	5 Muluc.
	Years....	11 Ix.	6 Ix.	1 Ix.	2 Ix.	10 Ix.

		6 *Eb.*	6 *Kan.*	6 *Cib.*	6 *Lamat.*	6 *Ahau.*
6	Years....	1 Cauac.	9 Cauac.	10 Cauac.	5 Cauac.	13 Cauac.
	Years....	6 Kan.	1 Kan.	2 Kan.	10 Kan.	11 Kan.
	Years....	11 Muluc.	12 Muluc.	7 Muluc.	8 Muluc.	3 Muluc.
	Years ...	9 Ix.	4 Ix.	12 Ix.	13 Ix.	8 Ix.

		4 *Eb.*	4 *Kan.*	4 *Cib.*	4 *Lamat.*	4 *Ahau.*
4	Years....	12 Cauac.	7 Cauac.	8 Cauac.	3 Cauac.	11 Cauac.
	Years....	4 Kan.	12 Kan.	13 Kan.	8 Kan.	9 Kan.
	Years....	9 Muluc.	10 Muluc.	5 Muluc.	6 Muluc.	1 Muluc.
	Years....	7 Ix.	2 Ix.	10 Ix.	11 Ix.	6 Ix.

		2 *Eb.*	2 *Kan.*	2 *Cib.*	2 *Lamat.*	2 *Ahau.*
2	Years....	10 Cauac.	5 Cauac.	6 Cauac.	1 Cauac.	9 Cauac.
	Years....	2 Kan.	10 Kan.	11 Kan.	6 Kan.	7 Kan.
	Years....	7 Muluc.	8 Muluc.	3 Muluc.	4 Muluc.	12 Muluc.
	Years....	5 Ix.	13 Ix.	8 Ix.	9 Ix.	4 Ix.

Locating these on the same table (XVI) as shown by the groups surrounded by dotted lines, we find that they follow each other in precisely the same order as the other groups. As these groups all fit into the Ahaues as I have divided them off, we have in this fact a strong presumption that our division is correct; still, it is proper to state here, as will be shown hereafter, that all these periods will also fit into the Ahaues if the grand cycle is divided according to the theory advanced by Señor Perez. Yet, even on this plan, these periods begin with Cauac years and have the same numbers; the only difference between the plans, so far as this matter is concerned, is that equivalents do not occupy precisely the same position in the grand cycle, but overlap each other three years.

Whether the Dresden Codex commences the series with the same year as the Manuscript Troano is a point not yet decided; but from what is shown on Plates 25–28, Kan does not appear to be the first. I think there can be no doubt that these four plates represent the fetes and ceremonies of the supplementary days described by Landa (Relac. de las cosas, §§ XXXV–XXXVIII). The reasons for this opinion will be given hereafter. It is evident from the day-characters in the left-hand column that the plates are numbered in the proper order. These days—of which there are but two on a plate, though each is repeated thirteen times—are probably the last two of the supplementary days of the year. As those on Plate 25 are Eb and Been the year denoted must be Muluc or Ix; that is, the closing Muluc year or commencing Ix year. It is quite plain that the year Kan is not the one denoted. As I will refer more at length to these plates hereafter I will not undertake to determine anything further concerning them here, my only object at present being to show that neither Codex appears to commence the series of years with Kan.

Before closing the discussion in reference to the dominical day of the first year of the Ahau, it is proper to call attention to what Cogulludo says on this point. According to his statement in a quotation from his work, found elsewhere in this paper, the Indians fixed the first year of these periods to the east, to which they gave the name *Cuch-haab;* the second, called *Hiix*, they placed at the west; the third, named *Cauac*, at the south, and the fourth, *Muluc*, at the north. It is evident that Cuch-haab here is the equivalent of Kan, and if we take the numbers as this author gives them, Kan would be the first, but the order in which the other three follow each other would not agree with that found in the calendar. If we commence with Kan and follow the order of these years as given in the calendar, the order of the cardinal points would then be east, north, west, south. It is apparent therefore that this statement throws but little if any light on the subject. It is well known that the south, at which Cauac was placed, was, to some of the Maya nations at least, the point of departure or chief cardinal point. We have therefore as much authority for assuming it as the first of these periods as the simple fact that Cogulludo gives Kan as the first, especially as the number he gives applied to the lusters.

Our next step is to determine the respective numbers of the Ahaues as located in the grand cycle.

We start as a matter of course with the understanding that the numbers were as heretofore stated—13, 11, 9, 7, 5, 3, 1, 12, 10, 8, 6, 4, 2—and that they always followed each other in the order here given; that is to say, 1 always followed 3, 12 always followed 1, and so on.

On folios 71, 72, and 73 of the Dresden Codex we find the following figures placed in one continuous line (Fig. 7); (a sufficient number for illustration only are given):

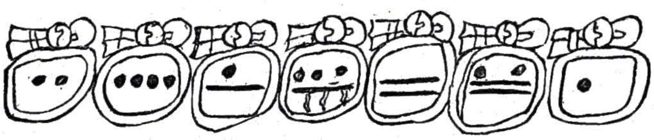

FIG. 7.

Commencing with the left-hand figure and reading to the right, the numbers given in them are 11, 13, 2, 4, 6, 8, 10, 12, 1, 3, 5, 7; in the lower right-hand corner of page 73 we find the missing 9. The fact that the order is here reversed, if read from left to right, is no evidence that this is the order in which the Ahaues (if these figures refer to these periods) followed each other, as it is possible they should be read from right to left. But the fact that we here find thirteen peculiar figures, with the knot denoting the tying of years or period of years, with numbers following each other in the order, whether direct or reversed, of those used in numbering the Ahaues, is sufficient to justify us in believing that they refer to these periods. The only reason I see for any doubt as to the correctness of this conclusion is that on pages 62 and 63 we find similar figures containing numeral characters for 16, 15, 17, and 19, numbers that cannot refer to the Ahaues. Possibly they may be used to designate the years of the Ahaues, but be this as it may, a close inspection of the knots will show that they are different from those on pages 71, 72, and 73.

Knowing the order in which they follow each other, it is evident that if we can determine the number of any one in the series it is a very simple matter to number all the rest.

As the possibility of our being able to compare dates of the Maya system with those of the Christian era depends on the correct determination of this point, I will give not only my own conclusion, illustrating it by means of a table (XVII), but will also show the result of following out

Señor Perez's theory, the only other possible one, so far as I am able to see, illustrating it also by tables (XVIII and XIX).

According to the statement in the Perez manuscript already quoted, Chief Ajpula died in the 13th Ahau in the year 4 Kan, and there were six years wanting to complete this Ahau. As it appears more than probable, judging by the contents of the manuscript itself, that it was written soon after the Spaniards came into possession of the peninsula, we may, I think, rely upon this date as correctly given, although the manuscript is evidently confused and, in some respects, inaccurate and even contradictory.

If the grand cycle was divided into Ahaues of twenty-four years each, as heretofore suggested, and as shown in the annexed table (XVII), it follows that the one in which this event occurred must necessarily have been that which I have numbered XIII, as there is no other one in the entire grand cycle that has six years remaining after the year 4 Kan.

Each of the tables (XVII, XVIII, XIX) includes one entire grand cycle, also one cycle of the preceding and one of the following grand cycles. The commencement and ending of the grand cycles are marked thus: ——:o:——; the divisions between the Ahaues are marked by solid black transverse lines, each group of the usually counted years is surrounded by a single dotted line; the period embraced by Plates XX–XXIII (our Plates I–IV) is surrounded by a single waved line; the Ahaues are numbered with Roman numerals.

Table XVII begins with a Cauac year, and is made in accordance with the theory I have advanced. Tables XVIII and XIX commence with a Kan year, and are made in accordance with the theory advanced by Perez; XIX, upon the assumption that the first Ahau commenced with the fourth year of the grand cycle; XVIII, upon the theory that it began with the last year of the preceding grand cycle, as one of these two plans must be adopted to carry out his theory.

Table XVII.

Cauac.	Kan.	Muluc.	Ix.
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
(1327) 3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13
—:0:—			
(1351) 1	2	3	4
5	6	7	8
9	10	11	12
	I		
13	1	2	3
4	5	6	7
8	9	10	11
(1375) 12	13	1	2
3	4	5	6
7	8	9	10
	XII		
11	12	13	1
2	3	4	5
6	7	8	9
(1399) 10	11	12	13

Cauac.	Kan.	Muluc.	Ix.
1	2	3	4
5	6	7	8
	X		
9	10	11	12
13	1	2	3
4	5	6	7
(1423) 8	9	10	11
12	13	1	2
3	4	5	6
	VIII		
*7	8	9	10
11	12	13	1
2	3	4	5
(1447) 6	7	8	9
10	11	12	13
	VI		
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
(1471) 4	5	6	7
8	9	10	11
12	13	1	2
	IV		
3	4	5	6
7	8	9	10
11	12	13	1
(1495) 2	3	4	5
6	7	8	9
	II		
10	11	12	13

Cauac.	Kan.	Muluc.	Ix.
1	2	3	4
	II		
5	6	7	8
9	10	11	12
(1519) 13	1	2	3
4	5	6	7
8	9	10	11
	XIII		
12	13	1	2
3	†4	5	6
7	8	9	10
(1543) 11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13
	XI		
1	2	3	4
5	6	7	8
(1567) 9	10	11	12
13	1	2	3
4	5	6	7
	IX		
8	9	10	11
12	13	1	2
3	4	5	6
(1591) 7	8	9	10
11	12	13	1
2	3	4	5
	VII		
6	7	8	9
10	11	12	13

Cauac.	Kan.	Muluc.	Ix.
1	2	3	4
(1615) 5	6	7	8
9	10	11	12
13	1	2	3
	V		
4	5	6	7
8	9	10	11
12	13	1	2
(1639) 3	4	5	6
7	8	9	10
11	12	13	1
	III		
2	3	4	5
6	7	8	9
10	11	12	13
—:0:—			
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13

* Year 1435. † 1536, year Ajpula died.

Table No. XVIII.

Kan.	Muluc.	Ix.	Cauac.
1	2	3	4 (1272)
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2 (1296)
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13 (1320)
	:o:		
1	2	3	4
5	6	7	8
9	10	11	12
	I		
13	1	2	3
4	5	6	7
8	9	10	11 (1344)
12	13	1	2
3	4	5	6
7	8	9	10
	XII		
11	12	13	1
2	3	4	5
6	7	8	9 (1368)
10	11	12	13

Kan.	Muluc.	Ix.	Cauac.
1	2	3	4
5	6	7	8
	X		
9	10	11	12
13	1	2	3
4	5	6	7 (1392)
8	9	10	11
12	13	1	2
3	4	5	6
	VIII		
7	8	9	10
11	12	13	1
2	3	4	5 (1416)
6	7	8	9
10	11	12	13
	VI		
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3 (1440)
4	5	6	7
8	9	10	11
12	13	1	2
	IV		
3	4	5	6
7	8	9	10
11	12	13	1 (1464)
2	3	4	5
6	7	8	9
	II		
10	11	12	13

Kan.	Muluc.	Ix.	Cauac.
1	2	3	4
	II		
5	6	7	8
9	10	11	12 (1488)
13	1	2	3
4*	5	6	7
8	9	10	11
	XIII		
12	13	1	2
3	4	5	6
7	8	9	10 (1512)
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13
	XI		
1	2	3	4
5	6	7	8 (1536)
9	10	11	12
13†	1	2	3
4	5	6	7
	IX		
8	9	10	11
12	13	1	2
3	4	5	6 (1560)
7	8	9	10
11	12	13	1
2	3	4	5
	VII		
6	7	8	9
10	11	12	13

Kan.	Muluc.	Ix.	Cauac.
1	2	3	4 (1584)
5	6	7	8
9	10	11	12
13	1	2	3
	V		
4	5	6	7
8	9	10	11
12	13	1	2 (1608)
3	4	5	6
7	8	9	10
11	12	13	1
	III		
2	3	4	5
6	7	8	9
10	11	12	13 (1632)
	:o:		
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11 (1656)
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13

* 1493.

† 1541.

TABLE XIX.

Kan.	Muluc.	Ix.	Cauac.
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13
	——:0:——		
1	2	3	4
5	6	7	8
9	10	11	12
13	1	12	3
	V		
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
	III		
2	3	4	5
6	7	8	9
10	11	12	13

Kan.	Muluc.	Ix.	Cauac.
1	2	3	4
5	6	7	8
	I		
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
	XII		
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13
1	2	3	4
5	6	7	8
	X		
9	10	11	12
13	1	2	3
4	5	6	1392 7*
8	9	10	11
12	13	1	2
3	4	5	6
	VIII		
7	8	9	10
11	12	13	1
2	3	4	1416 5
6	7	8	9
	VI		
10	11	12	13

Kan.	Muluc.	Ix.	Cauac.
1	2	3	4
5	6	7	8
	VI		
9	10	11	12
13	1	2	1440 3
4	5	6	7
8	9	10	11
12	13	1	2
	IV		
3	4	5	6
7	8	9	10
11	12	13	1464 1
2	3	4	5
6	7	8	9
10	11	12	13
	II		
1	2	3	4
5	6	7	8
9	10	11	1488 12
13	1	2	3
4*	5	6	7
8	9	10	11
	XIII		
12	13	1	2
3	4	5	6
7	8	9	1512 10
11	12	13	1
2	3	4	5
	XI		
6	7	8	9
10	11	12	13

Kan.	Muluc.	Ix.	Cauac.
1	2	3	4
5	6	7	1536 8
9	10	11	12
13	1	2	3
4	5	6	7
	IX		
8	9	10	11
12	13	1	2
3	4	5	1560 6
7	8	9	10
11	12	13	1
2	3	4	5
	VII		
6	7	8	9
10	11	12	13
	——:0:——		
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13

If I am correct in the plan of the table given, and the division into Ahaues, it follows that the rest of these periods in the grand cycle would be numbered as shown by the Roman numerals on Table XVII. These numbers agree precisely with the numbers of the first years of the respective Ahaues, and furnish, as heretofore suggested, an explanation of the singular method of enumerating these periods. If we now turn to Table XVI, showing the periods obtained from the dates on Plates XXX and XXXI of the Manuscript, we will see that their position and numbers agree exactly with those given in Table XVII.

As tending to confirm this conclusion, it will be necessary for me to introduce here a comparison of Maya dates with those of the Christian era.

As the designated 4 Kan corresponds, according to the manuscript quoted, with the year 1536, the last year of that Ahau (10 Ix) was 1542. Taking this as a starting point, I have given on the table the year of our era corresponding with the first year of each Ahau. Now let us test this result by the two or three additional dates found on record, and which the authorities have failed to make agree with any explanation of the Maya calendar heretofore given.

Bishop Landa (Relacion de Cosas, § 41) states that "the Indians say, for example, that the Spaniards arrived in the City of Merida in the year of the nativity of our Lord and Master, 1541, which was precisely the *first* year of the 11th Ahau." We may assume as certain that the Indians gave the bishop no such date as 1541, or any other year of the Christian era or Gregorian Calendar, as they were wholly unacquainted with that system; the year given must have been according to their method of designating dates, or by counting back the years.

As he understood the twenty "counted years" to constitute an Ahau, and supposed one of these periods to follow another without any intervening years, he would probably take 9 Muluc of the 13th Ahau as the first of the 11th, which, as will be seen by reference to the table, is 1541, exactly the date required.

It is evident that either he or the author of the Perez manuscript was mistaken, for according to the latter the 13th Ahau ended with the year

1542 (whether we count 20 or 21 years to the Ahau), while according to Landa it closed with 1540.

He asserts, while writing his work in Spain in 1566, that: "It is now 120 years since Mayapan was destroyed." As this number could have been obtained only by counting Ahaues, it must have been understood by him as covering just six of these periods, and hence the correct number would be 144 years instead of 120. This number carries us back to the year 1422 or 1423, the last of the Xth or first of the VIIIth Ahau. Cogulludo places the destruction of Mayapan about 1420 of the Christian era; the Perez manuscript places it in the 8th Ahau. As the above calculation places it in the last of the tenth or the first of the eighth, the discrepancy is but slight, and the agreement as close as could be expected in an attempt to reconcile such general statements.

Señor Perez seems to have taken as his chief authority, in comparing dates of the two systems, the statements of certain writers to the effect that the year 1392 of our era corresponded with the year 7 Cauac of the 8th Ahau of the Maya system.[1]

Unfortunately he mentions but one of these authorities—Don Cosme de Burgos—whose work he informs us "has been lost."

---

[1] "Serie de los años corridos en dos Ahau Katun, tomando su principio en 1392 en que pasó segun los manuscritos el 8 Ahau en el año 7 Cauac:

8e Ahau Katun.

1392 .... 7 Cauac.	1398 ....13 Muluc.	1404 .... 6 Cauac.	1410 ....12 Muluc.
1393 .... 8 Kan.	1399 .... 1 Hix.	1405 .... 7 Kan.	1411 ....13 Hix.
1394 .... 9 Muluc.	1400 .... 2 Cauac.	1406 .... 8 Muluc.	1412 .... 1 Cauac.
1395 ....10 Hix.	1401 .... 3 Kan.	1407 .... 9 Hix.	1413 .... 2 Kan.
1396 ....11 Cauac.	1402 .... 4 Muluc.	1408 ....10 Cauac.	1414 .... 3 Muluc.
1397 ....12 Kan.	1403 .... 5 Hix.	1409 ....11 Kan.	1415 .... 4 Hix.

6e Ahau Katun.

1416 .... 5 Cauac.	1422 ....11 Muluc.	1428 .... 4 Cauac.	1434 ....10 Muluc.
1417 .... 6 Kan.	1423 ....12 Hix.	1429 .... 5 Kan.	1435 ....11 Hix.
1418 .... 7 Muluc.	1424 ....13 Cauac.	1430 .... 6 Muluc.	1436 ....12 Cauac.
1419 .... 8 Hix.	1425 .... 1 Kan.	1431 .... 7 Hix.	1437 ....13 Kan.
1420 .... 9 Cauac.	1426 .... 2 Muluc.	1432 .... 8 Cauac.	1438 .... 1 Muluc.
1421 ....10 Kan.	1427 .... 3 Hix.	1433 .... 9 Kan.	1439 .... 2 Hix.

"El punto de apoyo de que se valen para acomodar los *Ahau Katunes* á los años de la era Cristiana y contar los periodos y siglos que en ella han pasade, y entender y saber concordar los años que citan los indios en sus historias con los que corresponden á los de dicha era, es el año de 1392, el cual segun todos los manuscritos, y algunos de ellos ápoyándose en el testimonio de D. Cosme de Burgos escritor y conquistador de esta peninsula cuyos escritos se han perdido, fué el referido año, en el cual cayó 7 Cauac y dió principio en se segundo dia el 8 Ahau; y de este como de un trunco se ordenan todos los que antecedieron y sucedieron segun el orden numerico que guardan y va espuesto: y como con este concuerdan todas las séries que se hallan en los manuscritos, es necesario creerlo como incontrovertible."

We are therefore left in doubt as to whether the calculation necessary in comparing the date in one system with the same date in the other was made by his authorities or was his own. It is evident that it must have been made by them or by him, as it could not have been given by the Indians. Be this as it may, it is based upon the theory that the 7 Cauac mentioned was the *first year* of the Ahau in which the event noted occurred, a supposition by no means necessary.

Following out this supposition, he is compelled to place the death of Ajpula in the year 1493, thus antedating this event by 43 years. It also leads him into the absurdity of placing the first arrival of the Spaniards on the coast of Yucatan—which occurred in the 2d Ahau—between the years 1464 and 1488.

In order to make this plain, I refer to the Tables XVIII and XIX constructed on his theory, and also to the continuous list of years covering the 8th, 6th, 4th, 2d, and 13th Ahaues (Table XX). The year 1392 and that in which he places the death of Ajpula (1493) are designated on the tables and on the list by a star.

TABLE XX.

VIIIth Ahau.		VIth Ahau.		IVth Ahau.	
7 Cauac	1392*	5 Cauac	1416	3 Cauac	1440
8 Kan	1393	6 Kan	1417	4 Kan	1441
9 Muluc	1394	7 Muluc	1418	5 Muluc	1442
10 Ix	1395	8 Ix	1419	6 Ix	1443
11 Cauac	1396	9 Cauac	1420	7 Cauac	1444
12 Kan	1397	10 Kan	1421	8 Kan	1445
13 Muluc	1398	11 Muluc	1422	9 Muluc	1446
1 Ix	1399	12 Ix	1423	10 Ix	1447
2 Cauac	1400	13 Cauac	1424	11 Cauac	1448
3 Kan	1401	1 Kan	1425	12 Kan	1449
4 Muluc	1402	2 Muluc	1426	13 Muluc	1450
5 Ix	1403	3 Ix	1427	1 Ix	1451
6 Cauac	1404	4 Cauac	1428	2 Cauac	1452
7 Kan	1405	5 Kan	1429	3 Kan	1453
8 Muluc	1406	6 Muluc	1430	4 Muluc	1454
9 Ix	1407	7 Ix	1431	5 Ix	1455
10 Cauac	1408	8 Cauac	1432	6 Cauac	1456
11 Kan	1409	9 Kan	1433	7 Kan	1457
12 Muluc	1410	10 Muluc	1434	8 Muluc	1458
13 Ix	1411	11 Ix	1435	9 Ix	1559
1 Cauac	1412	12 Cauac	1436	10 Cauac	1460
2 Kan	1413	13 Kan	1437	11 Kan	1461
3 Muluc	1414	1 Muluc	1438	12 Muluc	1462
4 Ix	1415	2 Ix	1439	13 Ix	1463

IId Ahau.

1 Cauac	1464
2 Kan	1465
3 Muluc	1466
4 Ix	1467
5 Cauac	1468
6 Kan	1469
7 Muluc	1470
8 Ix	1471
9 Cauac	1472
10 Kan	1473
11 Muluc	1474
12 Ix	1475
13 Cauac	1476
1 Kan	1477
2 Muluc	1478
3 Ix	1479
4 Cauac	1480
5 Kan	1481
6 Muluc	1482
7 Ix	1483
8 Cauac	1484
9 Kan	1485
10 Muluc	1486
11 Ix	1487

XIIIth Ahau.

12 Cauac	1488
13 Kan	1489
1 Muluc	1490
2 Ix	1491
3 Cauac	1492
4 Kan	*1493
5 Muluc	1494
6 Ix	1495
7 Cauac	1496
8 Kan	1497
9 Muluc	1498
10 Ix	1499
11 Cauac	1500
12 Kan	1501
13 Muluc	1502
1 Ix	1503
2 Cauac	1504
3 Kan	1505
4 Muluc	1506
5 Ix	1507
6 Cauac	1508
7 Kan	1509
8 Muluc	1510
9 Ix	1511

XIth Ahau.

10 Cauac	1512
11 Kan	1513
12 Muluc	1514
13 Ix	1515
1 Cauac	1516
2 Kan	1517
3 Muluc	1518
4 Ix	1519
5 Cauac	1520
6 Kan	1521
7 Muluc	1522
8 Ix	1523
9 Cauac	1524
10 Kan	1525
11 Muluc	1526
12 Ix	1527
13 Cauac	1528
1 Kan	1529
2 Muluc	1530
3 Ix	1531
4 Cauac	1532
5 Kan	1533
6 Muluc	1534
7 Ix	1535

IXth Ahau.

8 Cauac	1536
9 Kan	1537
10 Muluc	1538
11 Ix	1539
12 Cauac	1540
13 Kan	1541

Following out this theory we will have to place the taking of Merida by the Spaniards (1541) in the sixth year of the IXth Ahau, instead of the first of the XIth. As Landa went to Yucatan about the year 1549, we are not warranted in supposing that he made an error of thirty years in reference to an event that occurred but a few years before his arrival.

It is apparent from these facts that, assuming, as Perez does, that the year 1392 was the year 7 Cauac, and the first of an Ahau, conflicts with every other date left on record.

I think we may therefore take for granted that there was some error in the calculation by which this author, or those from whom he quotes, obtained this date. As this calculation antedates the death of Ajpula just 43 years, let us add that number to 1392: This gives us 1435. If we turn now to Table XVII, made according to my theory, we find that 7 Cauac of the 8th Ahau is the year 1435, and that by adding the 43 years—the number Perez has antedated the death of Ajpula—all the dates agree substantially, and also drop into their proper places in the Maya Calendar.

As the authorities to whom Perez refers obtained their information from the Indians, the date was as a matter of course given according to the Maya method of reckoning time; hence the "year 7 Cauac and 8th Ahau" are most likely to be correct. It is very probable this was the date of some notable event in the history of that people, and as it gives when corrected the year 1435, I am of the opinion it relates to the destruction of Mayapan, which, according to the manuscript translated by Stephens, occurred in the 8th Ahau.

Another error arising from this mistake on the part of Perez was that he was forced to place the death of Ajpula in the 6th year of the 13th Ahau, instead of in the 18th as given by his manuscript, in order to get it in 4 Kan. An examination of Tables No. XVIII and XIX, which are constructed according to his theory, will show that there is no Ahau but number I, in which 4 Kan is the 18th year. This is true no matter where we commence dividing the grand cycle, according to his idea.

As Table XVIII commences the division with the last year of a grand cycle, I have given at the same place another (XIX) on his plan, commencing with the fourth year of this period, in order to illustrate the above statement.

Taking into consideration all the evidence I can obtain bearing upon the points now under consideration I am forced to the following conclusions:

1st. That the series of years began with Cauac.

2d. That the first year of a grand cycle was also the first year of an Ahau.

3d. That the thirteen Ahaues of a grand cycle were numbered as shown in Table XVII.

4th. That they were numbered according to the number of their first years respectively.

But it is best perhaps for me to call attention here to the following facts in reference to the numbering of these periods.

First. That the division of the grand cycle according to the plan I have adopted, which is repeated on the annexed Table XXI, does not preclude us from accepting Perez's theory that they were numbered from the second day of the first year, which, as the periods begin with Cauac, would be Ahau. This would change the position of the Ahaues so far as their numbers are concerned, and they would then stand as shown in this table; that is, the first one in the grand cycle would be No. II, the next XIII, and so on in the usual order. But one very serious objection to this plan of numbering is that 4 Kan of the XIIIth Ahau would be the sixth instead of the eighteenth year.

I am of the opinion that the only foundation Perez had for thus numbering these periods is the fact that the name "Ahau" was applied to them. It is probable that it was sometimes so applied on account of their importance, but a careful study of the language of Landa and Cogulludo lead me to believe that *Katun* was the name by which they were usually designated. The latter author gives this term only. Landa simply remarks that "they counted 13 twenties with one of the twenty letters of their month which is called *Ahau*, without order and alternate only as on the border of the wheel above; they called these, in their language, *Katunes*."[1]

The most serious objection which, so far as I see, can be urged against my theory is that the series of Ahaues does not begin with XIII, or, in other words, that the first of the grand cycle is not XIII. But this objection applies with equal force to Perez's scheme. If we adopt the division shown in Table XVIII, and suppose the numbering to correspond with the first year (Cauac) of each period, we would then commence the grand cycle with the XIIIth Ahau. To illustrate this I give a table (XXII) similar to XVIII so far as the division of the grand cycle is concerned, but numbered as above suggested.

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[1] "No solo tenian los indios cuenta en el año y meses, como queda dicho, y señâlado atras pero tenian cierto modo de contar los tiempos y sus cosas por edades, las quales hazian de veynte en veynte años, contando XIII veyntes con una de las XX letras de los meses que llaman *Ahau*, sin orden sino retruecanados como pareceran en la siguiente raya redonda; llaman les a estos en su lengua *Katunes*, y con ellos tenian a maravilla cuenta con sus edades, y la fue assi facil al viejo de quien en el primero capitulo dixe avia trescientos años accordarse dellos." (Landa, Relacion de las Cosas, § XLI.)

Table XXI.

Cauac.	Kan.	Muluc.	Ix.
1	2	3	4
5	6	7	8
9	10	11	12
	VI		
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
	IV		
2	3	4	5
6	7	8	9
10	11	12	13
	:o:		
1	2	3	4
5	6	7	8
	II		
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
	XIII		
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13

Cauac.	Kan.	Muluc.	Ix.
1	2	3	4
5	6	7	8
	XI		
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
	IX		
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13
	VII		
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
	V		
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
	III		
10	11	12	13

Cauac.	Kan.	Muluc.	Ix.
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
	I		
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
	XII		
10	11	12	13
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
	X		
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
	VIII		
2	3	4	5
6	7	8	9
10	11	12	13

Cauac.	Kan.	Muluc.	Ix.
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
	VI		
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
	IV		
2	3	4	5
6	7	8	9
10	11	12	13
	:o:		
1	2	3	4
5	6	7	8
9	10	11	12
	II		
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
	XIII		
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13

This plan has this fact in its favor: it not only throws the XIIIth Ahau at the commencement of the grand cycle, but 4 Kan is also its 18th year.

TABLE XXII.

Kan.	Muluc.	Ix.	Cauac.
1	2	3	1159 4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2 1183
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	1207 13
:0:			
1	2	3	4
5	6	7	8
9	10	11	12
13	XIII 1	2	3
4	5	6	7
8	9	10	1231 11
12	13	1	2
3	4	5	6
7	XI 8	9	10
11	12	13	1
2	3	4	5
6	7	8	1255 9
10	11	12	13

Kan.	Muluc.	Ix.	Cauac.
1	2	3	4
5	6	7	8
9	IX 10	11	12
13	1	2	3
4	5	6	1279 7
8	9	10	11
12	13	1	2
3	4	5	6
7	VII 8	9	10
11	12	13	1
2	3	4	1303 5
6	7	8	9
10	11	12	13
	V		
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	1327 3
4	5	6	7
8	9	10	11
12	13	1	2
3	III 4	5	6
7	8	9	10
11	12	13	1351 1
2	3	4	5
6	7	8	9
10	I 11	12	13

Kan.	Muluc.	Ix.	Cauac.
1	2	3	4
5	I 6	7	8
9	10	11	1375 12
13	1	2	3
4	5	6	7
8	9	10	11
12	XII 13	1	2
3	4	5	6
7	8	9	1399 10
11	12	13	1
2	3	4	5
6	7	8	9
10	X 11	12	13
1	2	3	4
5	6	7	1423 8
9	10	11	12
13	1	2	3
4	5	6	7*
8	VIII 9	10	11
12	13	1	2
3	4	5	1447 6
7	8	9	10
11	12	13	1
2	3	4	5
6	VI 7	8	9
10	11	12	13

Kan.	Muluc.	Ix.	Cauac.
1	2	3	4 1471
5	6	7	8
9	10	11	12
13	1	2	3
4	IV 5	6	7
8	9	10	11
12	13	1	1495 2
3	4	5	6
7	8	9	10
11	12	13	1
2	II 3	4	5
6	7	8	9
10	11	12	1519 13
:0:			
1	2	3	4
5	6	7	8
9	10	11	12
13	XIII 1	2	3
4†	5	6	7
8	9	10	1543 11
12	13	1	2
3	4	5	6
7	8	9	10
11	XI 12	13	1
2	3	4	5
6	7	8	9
10	11	12	13

* 1435.

† 1536.

Be this as it may, there is nothing in Maya history or the calendar which makes it necessary that the grand cycle should commence with the XIIIth Ahau. As suggested by Perez and Dr. Valentini, this number of the series may have been selected as the one with which to begin their count because of some notable event in their history occurring in it. The serious objection to the plan of Table XXII is that it requires the XIIIth Ahau to begin with the last year of a grand cycle, which, I think, is sufficient to condemn it.

Perez's statement bearing on this subject is as follows:

"As the Indians considered the number 13 as the initial number, it is probable that some remarkable event had happened in that year, because, when the Spaniards arrived in the Peninsula, the Indians then counted the 8th as the 1st, that being the date at which their ancestors came to settle there; and an Indian writer proposed that they should abandon that order also, and begin counting from the 11th, solely because the conquest had happened in that Ahau." (Cron. Antig., § IX, Valentini's Trans.)[1]

I have already quoted from Perez, as pertaining to the calendar, the statement in reference to what he believes to be another kind of cycle or method of computation. I called attention to the fact that the numbers given might be found by running up the columns of our table of years. I will now explain what I believe to have been the object and use of these numbers.

"They had another number which they called *Ua Katun*, which served them as a key by which to adjust and find the Katunes, and following the order of their march, it falls on the two[2] days of *Uayeb haab* and revolves to the end of certain years; Katunes 13, 9, 5, 1, 10, 6, 2, 11, 7, 3, 12, 8, 4."

Perez quotes this, as he states, in the exact words of his authority (unfortunately not given). As Bancroft's translation omits the "two" before "days," I have given here a translation of the original as found in Perez's *Cronologie Antigua*."

[1] As neither Valentini's nor Brasseurs' translation is literal, I will give the original:

"Es probable que principio en el numero 13 por haber acontecido en el algun suceso notable pues despues se contaban por el 8; y acabada la conquista de esta peninsula propúso un escritor indio comenzasen á contar en lo sucesivo estas épocas por el 11 *Ahau* por que en el se verificó aquella."

[2] Not the "*second day of the Uayeb haab*" as Perez seems, as appears from his comment, to have understood the expression. It is strange that he should have so perversely misinterpreted his own manuscripts.

We see by reference to the annexed table of years (XXIII), which contains exactly one cycle, that by commencing at the bottom of the right-hand or Ix column and running up, we find the numbers given in the quotation and in precisely the same order. As these figures mark the terminal years of the lustres it is evident that the authority quoted applied the name "Katun" to these periods, and that this word is not used here as an equivalent of "Ahau."

TABLE XXIII.

Cauac.	Kan.	Muluc.	Ix.
1	2	3	4
5	6	7	8
9	10	11	12
13	1	2	3
4	5	6	7
8	9	10	11
12	13	1	2
3	4	5	6
7	8	9	10
11	12	13	1
2	3	4	5
6	7	8	9
10	11	12	13

If the series began with Cauac, as shown by this table, these numbers would then denote Ix years; but if it commenced with Kan they would then be Cauac years. In either case it is evident that by remembering these numbers and their order it would be an easy matter to locate or give the number of any year in the cycle, and in the grand cycle also, if they had any method of numbering the cycles. But I am unable to see how this could be of much service in counting the Ahaues, and am therefore inclined to believe that this method of counting back was chiefly in vogue among the common people, they being unable to fully understand and use the complicated calendar of the priests. Although Landa, when speaking of the facility with which they counted back the years, evidently alludes to the Ahaues, yet it is quite probable the old Indian who traced back their history for three hundred years did so by the use of this key, unless he was a priest.

It is difficult to understand what is meant by the expression "they fall on the *two days* of *Uayeb haab*" [intercalated days].

In the four plates of the Dresden Codex heretofore mentioned (25–28), which certainly refer to the feasts of the intercalated days, we notice that the left-hand column of each contains the characters of but two days—the 25th the days Eb and Ben, the last two of the intercalated days of the Muluc years; the 26th, Caban and Ezanab, the last two of the Ix years, and so on.

Although these, as here noted, may not have any reference to this method of counting, their use in this manner shows that they were considered important.

If the lustres ended with an Ix year, as I have assumed, Ezanab would be the last of the intercalated days. Now as will be seen by carefully examining the calendar for one year as given in Table II, page 8, the number of the last intercalated day will always be the same as the first day of the year. Having thus determined the name and number of the year, and remembering the series as given in the quotation, it was an easy matter to count back to any desired year. Let me illustrate this: Suppose that at the close of an annual feast of *Uayeb haab* which has ended on Ezanab, an Indian was desirous of determining what year of the cycle had just terminated. Knowing the day to be 1 Ezanab, he knows by this that the year was 1 Ix; remembering the numbers of the key, he commences his count with 1, and running back thus: 1, 10, 6, 2, 11, 7, 3, 12, 8, 4, ascertains that the year is the 40th of the cycle (10×4).

A little careful study of this subject will suffice to convince any one at all acquainted with this calendar that by simply knowing the number and name of the last intercalated day of any year will be sufficient to enable him to determine what year of the cycle it is If he forgets the key he can easily find it by the continued subtraction of 4, commencing with 13, adding 13 when the number to be subtracted from is 4 or less than 4. The only thing necessary to be remembered is that the years Cauac, Kan, Muluc, Ix terminate, respectively, with the days Akbal, Lamat, Ben, and Ezanab.

Suppose the last day of a certain year to be 9 Lamat, this gives 9 Kan as the year; the next year would be 10 Muluc, the next 11 Ix, the last of the lustre. If we remember the key, we count back the following numbers or lustres: 11, 7, 3, 12, 8, 4, showing that 11 Ix would be the 24th year of the cycle and 9 Kan the 22d. These calculations are based upon the supposition that Cauac was the first year of the cycle, but the same rule will apply with Kan or any other as the first of the series.

I think it probable that this will furnish an explanation of the phrase "they fall in the two days of *Uayeb haab* and return to the end of certain years." The manuscript from which this statement was taken by Perez was evidently written by one not thoroughly familiar with the system.

On the title-page and on Plates XX–XXIII (see Plates I–IV) are certain red semicircular or crescent-shaped figures like this , which we have good reasons for believing served as characters to denote one of the Maya periods, either the Ahau, Cycle, Indication, or part of the grand cycle. This is the proper place to discuss their signification; but as this can be done more satisfactorily after we have learned what we can in reference to the figures given on these plates and the subjects to which they relate, I will now proceed to give such interpretations of the figures and characters on them as I believe are warranted by the discoveries I have made.