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A BRIEF STUDY OF THE PALENQUE TABLET.

IN order to assist students in their efforts to interpret the inscription on this tablet, I notice here some discoveries which may possibly lead to valuable results in this direction. However, to bring this article into proper limits and avoid the necessity of introducing tables and diagrams, I must take it for granted that the readers have access to my "Study of the Manuscript Troano" and to Dr. Rau's "Palenque Tablet" and refer them thereto. The only figures referred to are that of the entire tablet, and the photograph of the right slab, both in Dr. Rau's work. A copy of the first will also be found in my "Study MS. Troano." I will also have occasion to refer to the Calendar Table V, p. 11, and the diagram of Dr. Rau's figure of the tablet, on p. 199, of the "Study MS. Troano."

The order in which the characters on the tablet are to be read is as given in the same work, pp. 200–201. That is to say, the columns are taken two and two, commencing at the top and reading from left to right across the two until the bottom is reached, then going to the top of the next two which stand to the right. Thus it will be seen that the character at the bottom of the second column will be followed by the top character of the third column, the bottom one of the fourth by the top one of the fifth. As we will have occasion to refer only to the columns at the sides, it is unnecessary to refer to the central portion.

The particular point to which I wish to call attention at present is that the particular manner of reckoning the days of the month, found in some of the series of the Dresden Codex, notably the extensive one on Plates 46–50, is found on this tablet. The peculiarity of this method is that the day of the month is counted not from the first of the given month, but from the last of the preceding month; thus, the fifteenth day of Pop, beginning the count with the first, will, according to this method, be numbered 16.

I will now refer to the tablet to confirm this statement.

Turning to the right slab and to our diagram (Study MS. Tro., p. 199) we observe that the columns of this part are taken in pairs thus: ST, UV, and WX. The character 10 S is 11 *Lamat*. The little loops by the side of the outer 1 of the 11 are apparently of no significance, being left as mere ornamental supports or protection to the single numeral. I will not stop at present to give the proof of this, as the student will soon learn it for himself. Moreover, it is evident that they form no part of the numerals and hence have no bearing on the question now before us. The character 10 T, immediately to the right of the 11 *Lamat* above mentioned, is beyond question, 6 *Xul*. The two characters taken together are to be interpreted "11 Lamat the 6th day of the month Xul." Turning now to our Calendar Table (Study MS. Tro , p. 11) we see that Lamat is never the 6th day of the month according to the usual method of counting, but is the fifth day of the month in the Kan years. If the count were to begin with the last day of the preceding month it would then be the 6th, as here numbered.

Characters 17 T and 1 U form another pair. The first (17 T) is unquestionably 8 Ahau, but the month symbol, 1 U, has not been determined; however, the number attached to it is clearly 13. Ahau is never the 13th day of the month but is the 12th in Muluc years. Here, again, counting from the last day of the preceding month agrees with the numbering on the tablet. Symbols 17 U and 17 V are 5 Kan the 12th day of the month — ? — (probable Kayab as the character contains the phonetic elements *k* and *b*). Kan is the 11th day of the month in *Ix* years, therefore the same method of numbering is followed in this instance.

We notice a few other examples briefly.

Symbols 5 X and 6 W. — The first 1 Ymix, the second the 4th day of the month — ? —. Ymix is the 3d day of the months in the Cauac years. We refer next to 10 X and 11 W; the first is 7 Kan, the second the 17th day of the month — ? — (possibly *Uo* or *Mol*). Kan is the 16th day of the month in Muluc years. Attention is called next to 8 T and 9 S; where the first is 1 Kan and the other the 2d day of the month, — we have suggested may be Kayab. Kan is of course the first day of Kan years, but is never the second day of a month. In 7 U and 7 V we have 3 Ezanab, the 11th day of the month Xul. Ezanab is the 10th day of the month in Muluc years.

Turning now to the left slab of the tablet we notice the following, though with less assurance than in reference to those named, as here we have no photograph. The first two we call attention to are 16 A and 16 B, the first of these is 1 Ahau, the second the 13th day of the month Xul (?). Ahau is the 12th day of the month in Muluc years. Next 3 D and 4 C. The first of these is 4 Ahau, the second the 8th day of the month — ? — (probably Cumhu). Ahau is the 7th day of the month in the Ix years. Next 9 C and 9 D. Here the first is 13 Ik, the second has no number attached to it, hence we can only guess that it is a month symbol; nevertheless, it is a curious coincidence that precisely the same method of notation is found once on plate 48 and twice on plate 50 of the Dresden Codex, no number-symbol being attached where the day is, according to this method of counting the 20th of the month. As Ik is the 19th day of the month in the Kan years, it would, according to this method, be counted the 20th, and no number-symbol would be given. I think it possible that the symbol 9 D is that of the month Pop. The pair immediately to the right, 9 E and 9 F, in which the first is 9 Ik, present the same peculiarity.

Referring to 1 E and 1 F, we see 9 Ik, and the 15th day of the month. Ik is the 14th day of the month in the Muluc years.

These examples are sufficient to render it more than probable that the method of numbering the days of the month on this tablet is as suggested. If so it limits very greatly the field of search for the interpretation of the unknown characters following the days mentioned, as we have a satisfactory reason for believing they are month symbols.

This, however, is not the only advantage gained. Take, for example, the symbols 10 S and 10 T, in regard to which there is no reasonable doubt. These indicate 11 Lamat, the 6th (5th) day of the month Xul. This combination can only occur once in a cycle of fifty-two years, to wit, in the year 10 Kan. From this and what is stated above we can safely infer that the four-year system and consequently the year of 365 days was in use in this ancient city when the tablet was made. These facts, if such they be, and the evidence of the peculiar method of numbering the days of the month, lead to the inference that there were intimate relations between the people of this city and those where the Dresden Codex was written, and that there is no very great difference in the ages of the two documents.

I can give other data in reference to the interpretation of this noted inscription, but will not ask further space in *Science* at this time. I will simply add that the phonetic value of the *hand* symbol which so frequently occurs is probably *Ch*.

CYRUS THOMAS.

THE NEW ELEMENT, MASRIUM.[1]

FURTHER details concerning the new element, whose probable existence was announced in a paper communicated to the Chemical Society at their meeting on April 21, are contributed to the number of the *Chemiker Zeitung* dated May 11. The mineral containing the new substance was discovered in 1890 by Johnson Pacha in the bed of an old river in Upper Egypt long since dried up, but of the former existence of which there are records dating back some 6000 years. Indeed, the name by which it is known in the neighborhood is "Bahr-bela-Mā," or "river without water." Here and there in the track of the old watercourse are small lakes whose water is of considerable repute for its medicinal value. Specimens of the mineral were sent by Johnson Pacha to the Khedivial Laboratory at Cairo, where it was examined by Messrs. H. Droop Richmond and Hussein Off, the authors of the paper laid before the Chemical Society. The mineral is found to be a fibrous variety of a mixed aluminium and iron alum containing ferrous, manganous, and cobaltous oxides. In addition, however, to these ordinary constituents, a small quantity of the oxide of another element would appear to be present, having properties entirely different from those of any yet known. This element the discoverers have termed *masrium*, from the Arabic name for Egypt, and the mineral has accordingly received the name of *masrite*. The symbol adopted for masrium is Ms.

The composition of masrite may be expressed by the formula $(Al, Fe)_2O_3 . (Ms, Mn, Co, Fe)O . 4SO_3 . 20H_2O$. The amount of masrium present is very small, averaging only about 0.2 per cent, but by working upon fifteen kilograms of the mineral a considerable quantity of the element in the form of various salts has been accumulated A typical analysis of masrite published in the Proceedings of the Chemical Society is as follows:—

Water	40.35
Insoluble matter	2.61
Alumina	10.62
Ferric oxide	1.63
Masrium oxide	0.20
Manganous oxide	2.56
Cobaltous oxide	1.02
Ferrous oxide	4.23
Sulphuric oxide	36.78
	100.00

Suspicions that the mineral contained some hitherto unknown constituent were first aroused by the fact that when it was dissolved in water, and sulphuretted hydrogen was passed slowly through the solution in presence of acetic acid, instead of the expected black precipitate of sulphide of cobalt a white insoluble substance was first precipitated. This white precipitate continued to form until the new substance in the solution was all used up, when black sulphide of cobalt began to be thrown down. By decantation before the formation of the latter, and subsequent washing with dilute hydrochloric acid, the white substance was isolated in a state of tolerable purity. It was found to dissolve in boiling nitrohydrochloric acid. The solution in *aqua regia* was evaporated in order to remove the excess of acid, and ammonium hydrate added, when a voluminous white precipitate of the hydrate of the new metal was thrown down. The hydrate was washed by decantation, and subsequently dissolved in the minimum excess of sulphuric acid. The solution of the sulphate of the new metal was next evaporated to syrupy consistency, water was added until complete solution was just effected, and the solution mixed with an equal bulk of alcohol. The effect of this addition of alcohol was to cause immediate precipitation of crystals of the sulphate of the new metal, a further crop of which was also obtained upon evaporation. By repeated recrystallization most of the small quantity of iron present was removed. In order to eliminate the last traces of admixed ferrous sulphate, the crystals were redissolved in water, and excess of sodium hydrate added. As the hydrate of the new metal is soluble in excess of soda, the hydrated oxide of iron was readily removed by filtration. Upon the addition of ammonium chloride the white hydrate was precipitated in a gelatinous form; the hydrate was redissolved in hydrochloric acid, and again precipitated and washed. The almost perfectly pure hydrate so obtained was then finally converted to chloride by solution in hydrochloric acid.

In order to obtain data as to the atomic weight of masrium the following determinations were made. A known quantity of the chloride solution was precipitated by ammonia, and the hydrate thus obtained was ignited, and the remaining oxide weighed. A second portion was precipitated by a solution of microcosmic salt in presence of ammonia, and the phosphate obtained ignited and weighed. The chlorine contained in a third portion was determined by means of silver nitrate in the ordinary manner. From the numbers so obtained the equivalent of masrium was calculated. A pure preparation of masrium oxalate was also obtained by precipitating the neutral solution of the chloride with ammonium oxalate, masrium oxalate resembling the oxalate of calcium in being insoluble under such conditions. The precipitated oxalate was washed, dried, and ignited in a combustion tube whose forward end was filled with copper oxide, when the salt was decomposed with elimination of its water of crystallization, which was absorbed and weighed in the usual manner. The residual oxide was also weighed,

[1] From Nature.