leave you to work out the thoughts I have all too briefly put before you, and I trust, that in doing so, I have also answered my friend's question, "What is the use of it?"

W. J. SIMMONS.

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The Determination of Ancient Dates from Astronomical Data.

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IN some of the ancient Sanskrit writings statements of the positions of the planets at the time of notable occurrences have sometimes been given. If these data are reliable we have at once a means of determining the dates of those events at any subsequent time, since the motions of the planets are now known with sufficient accuracy, and the number of planets observed makes up for the inexactness of the observations.

We have examined the data quoted in the "Mahabharat," verses 14 to 17 of Chapter III of Bhishmaparva (Bombay Edition), referring to the first day of the Mahabharat war. The (geocentric) positions are defined by the lunar asterism (nakshatra) which each planet occupied. In order to be able to convert these into angular heliocentric positions we must know two things—

(1) The system of asterisms in use at that time.

(2) The initial point of the zodiac from which the asterisms were counted.

With regard to the initial point of the zodiac, we have a means of confirming any value we adopt by an additional statement given later in the book fixing the vernal equinox of that period. Knowing the rate of precession of the equinoxes the distance of the initial point from the present vernal equinox could then be confirmed.

The first difficulty is, however, a serious one if the system of asterisms is not identical with the one at present in use. We have assumed that the asterisms mentioned in the Mahabharat were those to which the same names now apply, and

that the order and total number * was the same. The data, however, are not mutually consistent on this assumption. For example, in the case quoted the elongation of Venus from the Sun was at least 67°, whereas the maximum possible is 47°; again, the motion of Mars was stated to have been retrograde, but in the position obtained it must have been direct. We were consequently forced to the conclusion either that the systems of asterisms then and now in use are not identical or that the data probably based on tradition are not trustworthy.

Notwithstanding this disappointing conclusion, we were led by our interest in the problem to examine the nature of the solution, whether the data given were sufficient to give a single valued solution without ambiguity. The method of calculation is fairly simple (for perturbations may be left out of account) and is analogous to that of clock sums of our school days. We considered the Sun and the four planets—Saturn, Jupiter, Mars, and the Earth,—assuming that the positions were known to within the limits of one asterism ($13\frac{1}{3}°$). We found that there would generally be one solution every 850 years, which would be accurate within a few tenths of a year, even assuming a possible variation of the initial point of the zodiac of 3° from its probable position. Actually we found two values at an interval of 854 years which were the only solutions in about 25 centuries. Any additional datum, such as the position of the Moon's nodes (which was also given), would decide between these two solutions. The numerical result we obtained for the date of the Mahabharat war depends on the assumed identity of the ancient system of asterisms with the present one, and we think it has no historical value in consequence of the failure of the tests applied as already mentioned.

Although we were disappointed in not arriving at any trustworthy result for the date of the Mahabharat war, we have thought it would be of interest to point out how far four simple astronomical observations made without any pretence of accuracy thirty centuries ago would suffice to fix their date accurately without any other assistance.

One of us is searching in the Mahabharat for other statements of planetary positions with a view to obtaining further light on this matter in application of the method outlined in this paper. It is obviously a matter of historical importance to be able to fix definitely dates which at present can only be conjectured.

* One more or less would make little difference.