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The Surya-Siddhanta

Bāpūdeva Śāstrī

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Chapter XI. Called Patadhikara which treats of rules for finding the time at which the declinations of the sun and moon become equal.

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(and in the diagram) change the direction of the BĀHU and show the dark portion of the Moon in the west.

End of the tenth Chapter called S'ringonnatī which treats of the phases of the moon.

CHAPTER XI.

Called PĀTADHIKĀRA which treats of the Rules for finding the time at which the declinations of the Sun and Moon become equal.

VAIDHRĪTA.

1. It is called VAIDHRĪTA when the Sun and Moon are in the same AYANA (i. e. when they are both in the ascending or descending signs), the sum of their longitudes equal to 12 signs (nearly) and their declinations equal.

VYĀTĪPĀTA.

2. It is called VYĀTĪPĀTA when the Moon and the Sun are in different AYANAS, the sum of their longitudes equal to 6 signs (nearly) and their declinations equal.

3. The Fire (named PĀTA) which arises from the mixture of the rays of the sun and the moon in equal quantities, being burnt by the air called PRAVAHA produces evil to mankind.

4. Since the (said) PĀTA frequently destroys people at the time (when the declinations of the Sun and Moon become equal) it is called VYĀTĪPĀTA. It is also called VAIDHRĪTA.

5. This PĀTA is of black colour and hard body, red eyed and gorbellied, destroyer of all people and horrible: it happens frequently.

6. When the sum of the places of the Sun and Moon, applied with the degrees of the precession of the equinoxes as found by observation, is 12 or 6 signs find their declinations.

7. Now, if the Moon's mean declination (i. e. the declination of her corresponding point in the ecliptic) with her latitude applied (i. e. her true declination) be greater than that of the Sun, when the Moon is in an odd (1st or 3rd) quarter of the ecliptic, the PĀTA (or the instant when the declinations of the Sun and Moon become equal) is past.

8. And (if the Moon's declination be) less, (the PĀTA is future. But when the place of the Moon is in an even i. e. 2nd or 4th) quarter (of the ecliptic) the reverse of this takes place (i. e. if the Moon's true declination be greater than that of the Sun the PĀTA is future, and if less the PĀTA is past).

When the Moon's (mean) declination is subtracted from her latitude (for her true declination change the name of the Moon's quarter.

9. Multiply the sines of the declinations (as found in the 6th S'LOKA) by the radius and divide the products by the sine of the greatest declination (i. e. 24°): take the arcs whose sines are equal to the quotients, and add the difference or half the difference of the arcs to the Moon's place when the PĀTA is future. (This result which is just applied to the Moon's place is called the moon's change).

10. But when the PĀTA is past, subtract the Moon's change from her place. The Moon's change multiplied by the true daily motion of the Sun and divided by that of the Moon gives the Sun's change: apply it to the Sun's place as in the case of the Moon.

11. Find the change of the Moon's ascending node in the same way (i. e. multiply the Moon's change by the daily motion of the node and divide the product by the Moon's true daily motion): apply this change inversely to the node's place. Find the declinations of the Sun and the Moon again (from their places with their changes applied) and apply the same process (mentioned in the preceding S'LOKAS) repeatedly until you get their declinations equal.

To find when a PÁTA is past or to be past.

12. The PATA is that instant at which the declinations (of the Sun and the Moon) become equal. Now, according as the Moon's true place found at the PATA by applying the Moon's change (as mentioned before) is less or greater than that found at mid-night (of that day), the PATA is before or after (the mid-night.)

To find the true time of the PÁTA.

13. The difference, in minutes, between the Moon's true places found at the PÁTA and the mid-night, multiplied by 60 and divided by the true daily motion of the Moon gives the GHATIKAS between the PATA and the mid-night. (Then you will get the time of the PATA by adding or subtracting the GHATIKAS, just found, to or from the mid-night according as the PATA is past or future).

To find half the duration of the PÁTAKÁLA.

14. (Find the semi-diameters, in minutes, of the Sun and the Moon by the Rule mentioned in the 4th Chapter.) The sum of the semi-diameters of the Sun and the Moon multiplied by 60 and divided by the Moon's true daily motion from the Sun gives half the duration of the PÁTA-KÁLA.*

To find the beginning, middle and end of the PÁTA.

15. The true time of the PATA (found in the 13th S'LOKA) is called the middle of the PÁTA: This time diminished by half the duration of the PÁTA, just found, gives the beginning of the PÁTA and increased by half the duration gives the end of the PÁTA.

16. The interval between the beginning and end of a PÁTA is horrible; being in the form of burning fire, all rites are prohibited during its continuance.

Form of the PÁTA-KÁLA.

17. As long as the distance of any point of the sun's disc (from the equinoctial) is equal to that of any point of the Moon's disc, the

* The PÁTA-KÁLA, or duration of the PÁTA, is the time during which the declination of any point of the Sun's disc and that of any point in the Moon's are equal.—B. D.

PĀTA-KĀLA lasts and destroys the (happy results of) all rites (performed during that time).

18. People get very great religious merits from such (virtuous) acts as bathing, alms-giving, prayers, funeral ceremonies, religious obligations, burnt offerings, &c. (performed in the PĀTA-KĀLA), as well as from the knowledge of that time.

19. When the (mean) declinations of the Sun and the Moon become equal, near the equinoctial points, the PĀTA of the two kinds (i. e. VYATĪPĀTA and VAIDHRĪTA) happens twice: contrariwise (i. e. when the mean declinations become equal near the solstitial points, and the true declination of the Moon is less than that of the Sun) no PĀTA happens.

Third PĀTA.

20. There becomes a third PĀTA called (also) VYATĪPĀTA* when the minutes, contained in the sum of the places of the Moon and the Sun, divided by the BHABHOGA (or 800) give a quotient which terminates in 17 (i. e. which is more than 16 and less than 17).

21. The last quarters of the NAK-
GANDĀ'NTA and BHASANDHI.
SHATRAS† AS'LESHA, JYESTHA and
REVATĪ are called the BHASANDHI (or junctions of NAKSHATRAS) and the first quarter of each of their following ones (i. e. MAGHA, MŪLA and AS'WINĪ) is called the GANDĀNTA.

22. During the three frightful VYATĪPAS, GANDĀNTAS and BHASANDHĪS (just mentioned), all (joyful) acts are prohibited.

23. (O Maya,) thus far have I told you the excellent, virtuous, useful secret and great knowledge of Astronomy, what more do you want to hear?

End of the 11th Chapter called PĀTADHIKĀRA.

End of the First Part of the SŪRYA-SIDDHĀNTA.

* This is the YOGA or the period of time in which the sum of the places of the Sun and the Moon increases by 800'. This YOGA is the 17th reckoned from VISHKAMBHA. See 65th S'LOKA of the second CHAPTER.—B. D.

† These are the periods 9th, 18th and 27th from AS'WINĪ: they are found from the Moon's place by the Rule mentioned in the 64th S'LOKA of the 2nd CHAPTER.—B. D.