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# Eclipse Computation Tables in Sanskrit Astronomy: A Critical Edition of the Tables of the *Karaṇakesarī* of Bhāskara (fl. c. 1681)

Anuj Misra, Clemency Montelle, and Kim Plofker

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## 1 INTRODUCTION

The *Karaṇakesarī* (epoch 1681 CE) comprises a set of astronomical tables (*sāraṇī* or *koṣṭhaka* in Sanskrit) and accompanying versified text on the subject of eclipse computations, written by Bhāskara, son of Rāma, who flourished in the late seventeenth century.<sup>1</sup> In the corpus of Sanskrit astral-mathematical (*jyotiṣa*) literature, astronomical works exclusively devoted to eclipse-reckoning are rare. Known examples include the *Dhīkoṭida* of Śrīpati from 1039 CE which offers a concise description of lunar and solar eclipse computations within its twenty verses (Majumdar 1934). In the South Indian tradition of astronomy we find some texts dedicated to the theory of eclipses, e.g., the *Grahaṇamaṇḍana* (epoch 1411 CE), *Grahaṇanyāyadīpikā*, and *Grahanāṣṭaka* of Parameśvara, and the *Uparāgakriyākrama* and *Uparāgavimśati* (both 1593 CE) of Jyeṣṭadeva.<sup>2</sup> But more usually, lunar and solar eclipses are treated in separate chapters of more general *siddhānta*, *tantra*

1 The versified text of this work has been critically edited and analysed in (Montelle and Plofker 2014) and various features of the tabular data were analysed in (Montelle 2014). It should be noted that the author of the *Karaṇakesarī* is different from his better-known namesakes Bhāskara I (c. seventh century CE) and Bhāskara II (twelfth century CE). See Pingree 1968: 70–72, 1970–1994: 4.328.

2 The *Dhīkoṭida* of Śrīpati was subsequently commented on by authors like Dinakara in 1608 CE and Harikṛṣṇa in 1715 CE (Pingree 1981: 54). For the south Indian authors, see Pingree 1981: 49–51. Also, see Montelle and Plofker (forthcoming) for additional information about table-texts and the role of eclipse tables within them.



and *karaṇa* texts.<sup>3</sup> Likewise, table-texts or *koṣṭhakas* often include eclipse tables as a part of a larger collection of astronomical tables: e.g., the *Makarandasāraṇī* of *Makaranda* (epoch 1478 CE), the *Khecaraśīghrasiddhi* (also called *Grahasāraṇī*) of *Gangādhara* (epoch 1630 CE), or the *Ganitarāja* of *Kevalarāma Pañcānana* (epoch 1728 CE). In some cases, tabular data is verbally encoded in verses in specialised works on eclipse computations: for instance, the numerical data in *Parvadvaya-sādhana* of *Mallāri* (c. 1588 CE) is presented in a mixture of numerical tables and verbal formats.<sup>4</sup>

The text of the *Karanakesarī* is organised into two chapters: the lunar eclipse chapter (*candraparvan*) containing thirteen verses and the solar eclipse chapter (*sūryaparvan*) containing the seven verses. There are three known manuscripts, containing a total of 28 tables associated with this text. We present a critical edition of the numerical data contained in these tables, with variant readings and paratextual material<sup>5</sup> associated with the tables noted separately in the critical apparatus. We discuss some of the main problems we encountered in subjecting tabular data to the scholarly practices associated with critical editing and the ways in which we resolved them. A technical summary of the contents of the tables is also provided in Section 4.

## 2 OVERVIEW OF THE MANUSCRIPTS

In preparing this edition we relied on the following three manuscripts:

| <i>Siglum</i>  | <i>Shelfmark</i>   | <i>Folios</i> |
|----------------|--|---------------|
| P <sub>1</sub> | Poleman 4946 (Smith Indic MB XIV)                          | ff. 3–11      |
| P <sub>2</sub> | Poleman 4946 (Smith Indic MB XXVII)                        | ff. 2–3       |
| R <sub>2</sub> | Rajasthan Oriental Research Institute (RORI) Jodhpur 12792 | ff. 1–8       |

3 Among the technical genres of Sanskrit astronomy, the *siddhānta* and the *tantra* are typically comprehensive expository works reckoning planetary motions from some distant notional epoch, while *karaṇas* are abbreviated practical handbooks with epoch dates close to their date of composition (Pingree 1981: 13–14, 48).

4 MS Oxford CS, d.751(10) (catalogued at Pingree 1984: 30). See Pingree 1981:41–48,

54–55 for information on the Sanskrit astronomical tables.

5 The paratext is the textual content ancillary to the main table-text, sometimes due to later scribes. In our edition, we consider paratext to include any material surrounding the main table, the table headings or the row headers. The basic identification information contained in the table headings and the row headers are indicated separately in the critical apparatus.

The photocopies and digital images of the P manuscripts and R<sub>2</sub> were obtained respectively from the John Hay Library at Brown University (USA) and from the Rajasthan Oriental Research Institute in Jodhpur (India). All three manuscripts are written in Nāgarī script on hand-made paper, with table heading and row header text in Sanskrit and some paratext in an unidentified vernacular, which we have not been able to transliterate or translate with confidence in a consistent manner. Since we have seen only reproductions of the manuscripts, with no details about scale or resolution in the reproduction processes, we cannot vouch for specific data about their physical condition or size: in the individual manuscript descriptions below we have merely quoted this information from published manuscript catalogues. The palaeography of Sanskrit scientific manuscripts of this era, especially in northern Indian scripts, is not yet secure enough for us to infer additional conclusions about the date or location of copying, or even the number of scribes contributing to each manuscript, by looking at the characteristics of the scribal hand.<sup>6</sup>

Moreover, the relation between manuscripts of the *Karaṇakesarī* tables and manuscripts of the accompanying versified instructional text edited by Montelle and Plofker (2014) remains unclear. At present we know of no manuscript that has been confirmed to contain both tables and text of the *Karaṇakesarī* (Montelle and Plofker 2014: 2; Pingree 1970–1994: 4.328, 1968: 70).<sup>7</sup> Since these copies, like most Sanskrit manuscripts, consist of loose leaves, we cannot be sure from their present arrangement as preserved in manuscript libraries exactly what their original content and structure would have been during their working lives of use by practising astronomers. In at least one case, as noted below, the existing foliation suggests an incomplete manuscript.

Brief descriptions of the manuscripts P<sub>1</sub>, P<sub>2</sub>, and R<sub>2</sub> are given below. Note that P<sub>1</sub> and P<sub>2</sub> form part of the so-called ‘Miscellaneous Bundle’ in Columbia University’s Smith Indic manuscript collection, which its original cataloguer described as “a collection of several hundred miscellaneous folios, mostly tables not important enough and not bearing sufficient information to identify at all” (Poleman 1938: 246). These various assorted items consequently may not fully

<sup>6</sup> See, for example, Dani 1963; the earlier work by Bühler (1896) treats only sources prior to the mid-second millennium. Recent efforts to extend and update research on manuscriptology and palaeography of Sanskrit manuscripts face an immense task (e.g., Tripathi 2010). As noted by Salomon (2007: 75), “the palaeographical development of the modern scripts on the basis of manuscript sources is still virtually an untouched field.”

<sup>7</sup> A similar bifurcation between copies of verses and tables is apparent in many manuscripts of another *koshthaka* work we have studied, the *Brahmatulyasāraṇī* (Montelle and Plofker 2015; Misra, Montelle, and Plofker forthcoming; Pingree 1968: 36). It should be noted, however, that at least two manuscripts of this work are known to contain both tables and versified instructions together (Pingree 2003: 46–49).

The image shows a reconstructed photocopy of a manuscript page (MS P1 f. 4v). The page is filled with handwritten text in a traditional Indian script, likely Devanagari. There are several distinct sections of text, some of which are organized into tables with grid-like structures. The text is written in black ink on a light-colored background. Some numbers and symbols are interspersed among the text. The overall layout is dense and structured, typical of ancient astronomical treatises.

Figure 1: A sample image of MS P1 f. 4v (reconstructed from two split images on our photocopy of the manuscript) showing the general palaeographic layout of the manuscript.

preserve their original form. They were identified and assigned individual shelfmarks by Pingree (1968: 9, 27–34), and later catalogued by him in more detail (Pingree 2007).

#### MS P1: POLEMAN 4946 (SMITH INDIC MB XIV), FF. 3–11.

Begins on f. 3r (recto) with Table I (indicating that there were formerly two initial folia which we speculate may have contained the versified *Karaṇakesarī* instructions). 12×27.5 cm (Pingree 2007: 55–56). The black-and-white photocopies available to us contain images of some individual folia split across two sheets. Neatly written with occasional ink blots and smudges, between triple-lined margins. Table grids sometimes include blank cells or extra space, and table content or paratext sometimes spills into the margins; see, e.g., Figure 1.

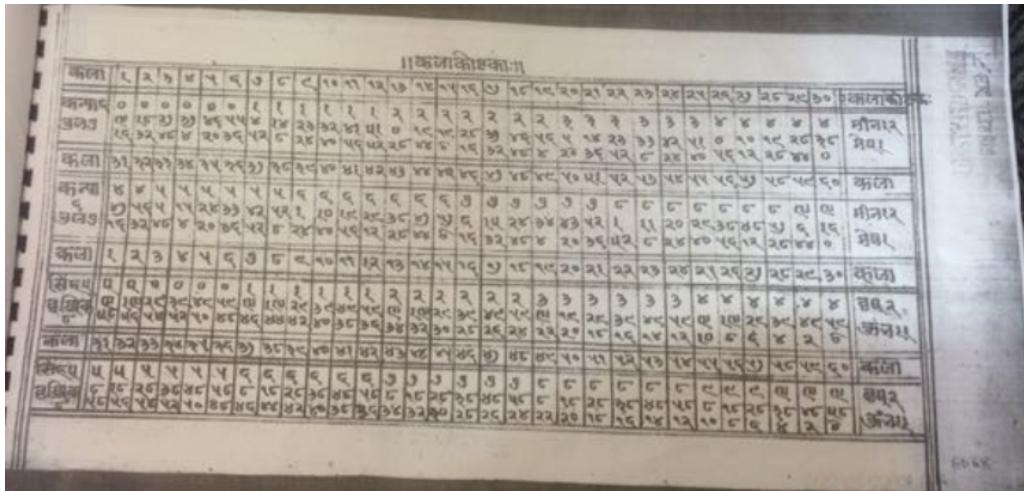


Figure 2: A sample image of MS P<sub>2</sub> f. 2r showing the general palaeographic layout of the manuscript.

**MS P<sub>2</sub>: POLEMAN 4946 (SMITH INDIC MB XXVII), FF. 2–3**

Begins on f. 2r with Table XXII (see Schema 1). Folio 3v (verso) is erroneously foliated as '2' in the bottom-right margin (catalogued as '2b' in Pingree 2007: 56); we have corrected it to '3' in our edition. 11.5×26 cm. Black-and-white photocopies. Features similar to MS P<sub>1</sub> (see Figure 2).



Figure 3: A sample image of MS R<sub>2</sub> f. 3r showing the general palaeographic layout of the manuscript.

**MS R<sub>2</sub>:** RAJASTHAN ORIENTAL RESEARCH INSTITUTE (RORI) JODHPUR  
12792, FF. 1–8

Begins on f. 1r with Table I. 26.2×11.8 cm. Described in catalogue as having 22 lines per page and 31 characters per line (which to us seems inconsistent with its numerical table format), complete, in good condition, dating from the 19<sup>th</sup> century (Jinavijaya 1968: 422–423). Colour digital images. Neatly written with occasional erasures and corrections, as well as marginal corrections and insertions. Double margin lines and table grids in red ink; features similar to MSS P<sub>1</sub> and P<sub>2</sub> (see Figure 3 and Figure 4).

### 3 OVERVIEW OF THE TABLES

The *Karaṇakesarī* table-set, as far as we have been able to determine it, consists of the twenty-eight individual tables listed in Schema 1 (p. 10 below). Our identification of their contents and ordering is based not only on the manuscript witnesses P<sub>1</sub>, P<sub>2</sub> and R<sub>2</sub>, but also on the survey of known *Karaṇakesarī* manuscripts by Pingree (1968: 70–72). Note that the manuscripts do not unanimously agree with all aspects of this identification: see the following list of our main observations about the attested tables, as well as the remarks in Section 6.

1. MS P<sub>2</sub> contains only two tables: Table XXI ff. 3r–3v and Table XXII ff. 2r–2v. While Table XXI is found in all three manuscripts, Table XXII (*ghaṭikās* of right ascension, see Section 4) is unique to MS P<sub>2</sub>.
2. There is surprising uniformity in the layout of the tables in MSS P<sub>1</sub> and R<sub>2</sub>. For example, MS P<sub>1</sub> f. 5r and MS R<sub>2</sub> f. 3r (see Figure 4) show the row headers, paratext, and marginal texts along with the tabulated numerical entries similarly positioned. Based on this commonality, one could infer that one of the manuscripts is a direct and faithful descendant of the other, or perhaps they are both copied from the same manuscript.
3. MS R<sub>2</sub> has Table XXVI out of sequence compared to the ordering in MS P<sub>1</sub>: it appears in the left margin of f. 7v oriented vertically instead of horizontally, see Figure 5. The table's paratext is wrapped around the table as shown in the figure. This positioning may indicate that the scribe of R<sub>2</sub> considered Table XXVI the final table in the *Karaṇakesarī* and squeezed it into available space on a pre-written page (f. 11r) rather than beginning a new folio for it.
4. MS R<sub>2</sub> omits some of the tables contained in MS P<sub>1</sub> (see Schema 1). The omission of Table XI does not significantly affect the tables' use, as it can be easily generated by calculating the differences between successive entries of Table IX.

However, Table XXVII and Table XXVIII require additional astrological data that could not be recomputed from the other tables. We do not know whether the scribe of R<sub>2</sub> left them out inadvertently or deliberately, or simply did not possess them in the manuscript he was copying. His positioning of Table XXVI (see remark 3 above) suggests that he may have considered it the final table in the work.

5. MS P<sub>1</sub> contains a note on the top right of f. 1r (adjacent to the table title) that reads *śloka* 115 ‘verse 115’. This suggests that the scribe was tallying up the copied content, presumably for the purpose of computing his fee, in some units equivalent to verses; see Section 6.

(a) MS P<sub>1</sub> f. 5r.

(b) MS R<sub>2</sub> f. 3r.

Figure 4: The similar layout of the Tables XII, XIII, and XIV (partial) of the *Karaṇakesarī* seen in MS P<sub>1</sub> f. 5r and MS R<sub>2</sub> f. 3r.

Figure 5: MS R<sub>2</sub> f. 7v showing vertically oriented tabulated data with the surrounding paratext.

6. MS P<sub>1</sub> marks the break between the material concerning lunar eclipses and that related to solar eclipses by the phrases *iti candraparvādhikārah* ‘Thus the chapter on lunar eclipses’ at Table XIX and *atha śrīsūryaparvādhikārah* ‘Now the chapter on eclipses of the lord Sun’ at Table XX.
7. Folio 1v of MS R<sub>2</sub> contains the note *kṣepa 0|19|21|34 dhanam* ‘additive [quantity] 0|19|21|34 positive’ to the right of the title of Table II in what appears to be a different hand. Since this quantity  $0^{\circ} 19^{\circ} 21' 34''$  is the constant difference between successive entries in the table, the note may have been added by a user to help with interpolation calculations; see Section 6.
8. MS R<sub>2</sub> includes a colophonic statement (on f. 8v) that reads:

इति श्रीदैवज्ञरामात्मजभास्करविरचिते कणकेशरीग्रन्थे  
चन्द्रसूर्यपर्वाधिकारकोष्ठका संपूर्णमिति

Thus, the tables [concerning] the chapters on lunar and solar eclipses, in the book [called] *Karanakesarī*, composed by Bhāskara, son of Rāma the astrologer, [are] complete.

THE CONTENTS AND ORGANIZATION OF THE TABLES OF THE  
KARANAKESARI IN THE THREE MSS P<sub>1</sub>, P<sub>2</sub>, AND R<sub>2</sub>.

Schema 1: Distribution of tables across folia of each of the editing manuscripts

| Number | Type of Table  | Manuscripts    |                |                |
|--------|--|----------------|----------------|----------------|
|        |  | P <sub>1</sub> | P <sub>2</sub> | R <sub>2</sub> |
| I      | Elongation between the sun and lunar node; argument 1 to 130 periods of 130 years.   | f. 3r          | —              | f. 1r          |
| II     | Elongation between the sun and lunar node; argument 0 to 130 single years.   | f. 3v          | —              | f. 1v          |
| III    | Elongation between the sun and lunar node; argument 1 to 27 <i>avadhis</i> of 14 days.   | f. 4r          | —              | f. 2r          |
| IV     | Digits of lunar latitude; argument 0 to 16 degrees of nodal-lunar elongation.  | f. 4r          | —              | f. 2r          |
| V      | Digits of size of apparent solar disk; argument for twenty values (from 59;56 to 64;42) of minutes of daily nodal-solar elongation.        | f. 4r          | —              | f. 2r          |
| VI     | Digits of apparent lunar diameter and digits of earth shadow diameter; argument 52 to 67 <i>ghaṭikās</i> in a <i>tithi</i> .               | f. 4v          | —              | f. 2v          |
| VII    | Digits of increments to apparent shadow diameter; argument zodiacal sign of solar longitude, from Aries to Virgo and from Libra to Pisces. | f. 4v          | —              | f. 2v          |

## Schema 1 (continued)

| Number | Type of Table  | Manuscripts    |                |                |
|--------|--|----------------|----------------|----------------|
|        |  | P <sub>1</sub> | P <sub>2</sub> | R <sub>2</sub> |
| VIII   | 60-complement of <i>ghaṭikās</i> of half-duration of lunar eclipse totality; argument 1 to 9 digits of excess of earth shadow diameter over lunar disk diameter. | f. 4v          | —              | f. 2v          |
| IX     | 60-complement of <i>ghaṭikās</i> of half-duration of lunar eclipse; argument 1 to 21 digits of lunar obscuration.  | f. 4v          | —              | f. 2v          |
| X      | Degrees of solar longitude and true daily motion; argument 1 to 27 <i>avadhis</i> of 14 days.  | f. 4v          | —              | f. 2v          |
| XI     | Differences between successive entries of Table IX; argument 1 to 21 digits of lunar obscuration.  | f. 4v          | —              | —              |
| XII    | Digits of <i>agnibhāga</i> ‘third part’ of the half-duration; argument 1 to 21 digits of lunar obscuration.  | f. 5r          | —              | f. 3r          |
| XIII   | Latitude-derived half-duration correction; argument 1 to 21 digits of mid-eclipse lunar latitude.  | f. 5r          | —              | f. 3r          |
| XIV    | Degrees of <i>akṣavalana</i> ; argument 0 to 45 degrees of the 45-complement of half the zenith distance.  | ff. 5r–5v      | —              | ff. 3r–3v      |
| XV     | Lords of the <i>parvans</i> ; argument 9 different intervals of eclipse possibility between 0 and 24 months.   | f. 5v          | —              | f. 3v          |

## Schema 1 (continued)

| Number | Type of Table  | Manuscripts    |                |                |
|--------|--|----------------|----------------|----------------|
|        |  | P <sub>1</sub> | P <sub>2</sub> | R <sub>2</sub> |
| XVI    | Degrees of <i>ayanavalana</i> ; argument 0 to 90 degrees of the complement of tropical solar longitude.  | f. 6r          | —              | f. 4r          |
| XVII   | Digits of converted total solar <i>valana</i> ; argument 0 to 47 degrees of combined <i>valana</i> .   | f. 6v          | —              | f. 4v          |
| XVIII  | Digits of converted total lunar <i>valana</i> ; argument 0 to 47 degrees of combined <i>valana</i> .   | f. 6v          | —              | f. 4v          |
| XIX    | <i>ghaṭikās</i> of half-lengths of daylight; argument 0 to 29 degrees of zodiacal sign of tropical solar longitude, from 1/Taurus to 11/Pisces followed by 0/Aries.                            | f. 7r          | —              | f. 5r          |
| XX     | <i>ghaṭikās</i> of cumulative oblique ascension; argument 0 to 29 degrees of zodiacal sign of tropical solar longitude, from 0/Aries to 11/Pisces.   | ff. 7v–8r      | —              | ff. 5v–6r      |
| XXI    | <i>vighaṭikās</i> of oblique ascension; argument 1 to 60 arcminutes of any degree of zodiacal sign of tropical solar longitude, from 1/Aries to 6/Virgo and (decreasing) 12/Pisces to 7/Libra. | ff. 8v–9v      | ff. 3r–3v      | ff. 6v–7v      |

## Schema 1 (continued)

| Number | Type of Table   | Manuscripts    |                |                        |
|--------|---|----------------|----------------|------------------------|
|        |   | P <sub>1</sub> | P <sub>2</sub> | R <sub>2</sub>         |
| XXII   | <i>vighaṭikās</i> of right ascension; argument 1 to 60 arcminutes of any degree of zodiacal sign of tropical solar longitude: 1/Aries–3/Gemini and 7/Libra–9/Sagittarius, and (decreasing) 6/Virgo–4/Cancer and 12/Pisces–10/Capricorn. | –              | ff. 2r–2v      | –                      |
| XXIII  | <i>ghaṭikās</i> of ‘mean’ longitudinal parallax; argument 0 to 91 degrees of elongation between ascendant and sun.  | f. 9v          | –              | f. 7v                  |
| XXIV   | Multiplicative correction to mean longitudinal parallax; argument 0 to 29 degrees of 0 to 11 signs of tropical longitude of ascendant.  | f. 10r         | –              | f. 8r                  |
| XXV    | Digits of latitudinal parallax; argument 0 to 29 degrees of 0 to 11 signs of tropical longitude of ascendant.   | f. 10v         | –              | f. 8v                  |
| XXVI   | <i>ghaṭikās</i> of half-duration of solar eclipse; argument 1 to 12 digits of solar obscuration.  | f. 11r         | –              | f. 7v<br>(left margin) |
| XXVII  | Times [?] beginning with days in horoscopy; argument 1 to 60 arcseconds of planets’ longitudes [?].   | f. 11r         | –              | –                      |
| XXVIII | Birth categories for each of the <i>nakṣatras</i> ; argument (1 to 28) <i>nakṣatras</i> .   | f. 11v         | –              | –                      |

#### 4 A TECHNICAL SUMMARY OF THE TABLES IN THE *KARAṄAKESARI*

**A**s discussed in Sections 5–6, we do not pretend to full understanding of the *Karaṅakesarī*'s table entries or the means used to produce them. We have noted in Montelle and Plofker (2014) that several of the *Karaṅakesarī* algorithms seem to be closely related to those of the 1183 handbook text *Karaṅakutūhala* by the renowned astronomer Bhāskara II (b. 1114). The following descriptions briefly summarize the individual tables and our inferences, if any, about how they were generated. For further information about their nature and use, see the referenced sections in our 2014 publication (Montelle and Plofker 2014) and those of Pingree (1968: 70–72). These proposed reconstructions of the generating algorithms, along with the edited and variant numerical values presented in Section 5, will facilitate more detailed analysis of the tables in future.

##### TABLES I–III

Elongation between the sun and lunar node.

See Montelle and Plofker 2014: § 1.2. The first two tables contain linear function values even though the tabulated elongation appears to involve non-linear true longitude, presumably because the argument intervals are long enough that the average elongation increments are sufficiently accurate.

**Table I** Argument 1 to 130 periods of 130 years.

अथ सूर्यस्य लब्धपञ्चकं १२ राश्यादि ॥

Now the cyclic [elongation value] of the sun for the quotient number [of integer years after division by 130], [modulo] 12 [in] zodiacal signs, etc.

The constant difference between table entries is  $-3^\circ; 16, 20$ .

**Table II** Argument 0 to 130 single years.

अथ श्रीकरणकेसरिग्रन्थे सूर्यस्य शेषपञ्चकम् १२।३० ॥

Now, in the book *Karaṅakesarī*, the cyclic [elongation value] of the sun for the remainder number [of integer years after division by 130], [modulo] 12 [zodiacal signs and] 30 [degrees in a sign].

The constant difference between table entries is  $19^\circ; 21, 34$ . The first entry incorporates an epoch offset of  $6^\circ 29^\circ; 24, 36$  for the start of Śaka 1603.

**Table III** Argument 1 to 27 *avadhis* of 14 days.

अथ करणकेसरिग्रन्थोक्ते सिद्धान्तरहस्ये सूर्येन्द्रोः पर्वानयनार्थे चन्द्रस्य कोष्ठका  
अवध्योपरि ।

Now, [as] stated in the book *Karaṇakesarī*, for the sake of determining eclipses of the sun and moon [as] in the *Siddhāntarahasya* [*Grahalāghava*], table entries of the moon [?] [with] above [argument] *avadhis*.

See Montelle and Plofker 2014: Tab. 1. The exact algorithms used to generate the table entries are at present unknown, but they appear to represent true solar motion with time corrections, plus mean nodal motion.

Row 1: Non-linear function values of cumulative nodal-solar elongation for each *avadhi*, beginning with  $2^\circ; 19, 55$  at the start of the solar year.

Row 2: Non-linear function values of daily nodal-solar elongation in each *avadhi*, beginning with  $61'; 46$ .

Row 3: Signed integer values (all 0, 1 or 2) whose purpose is unclear, though their signs correspond to increase and decrease of successive values in Row 2.

TABLE IV

Digits of lunar latitude, argument 0 to 16 degrees of nodal-lunar elongation.

अथ भुजांशोपरि शराङ्गुलादि ॥

Now, digits etc. of [lunar] latitude [with] above [argument] degrees of arc.

See Montelle and Plofker 2014: § 1.3.

Row 1: Function values of digits of lunar latitude  $\beta$  for each degree of nodal-lunar elongation  $\Delta\lambda$ , from minimum value of 0 for argument 0 to maximum value of  $24; 45$  for argument 16. The entries for argument values 8 and 16 appear to have been produced by an algorithm close to an attested formula in *Karaṇakutūhala* 4, 5 (Balachandra Rao and Uma 2008: S67–S68) equivalent to the following:

$$\beta \text{ (digits)} = 90 \sin(\Delta\lambda)$$

The remaining entries are derived by linear interpolation.

Row 2: Successive differences between entries in Row 1: the entries for argument values 0 to 8 are either  $1; 34$  or  $1; 35$  (average difference  $1; 34, 30$ ), and the entries for argument values 9 to 16 are  $1; 30$ .

## TABLE V

Digits of size of apparent solar disk, argument twenty values (from 59';56 to 64';42) of minutes of daily nodal-solar elongation.

अथ सपातचन्द्रगत्युपरि रविविम्बाङ्गुलादि ॥

Now, digits etc. of the solar disk [with] above [argument] velocity of the moon plus the node.

See Montelle and Plofker 2014: § 1.3. The exact algorithm used to generate the table entries is at present unknown. The entries vary monotonically from 10;19 digits for the first argument to 11;11 for the last argument. (Note that the given minimum and maximum argument values presumably fall between successive values of daily nodal-solar elongation tabulated in Row 2 of Table III, where the function changes sign.)

## TABLE VI

Digits of apparent lunar diameter and digits of earth shadow diameter, argument 52 to 67 *ghaṭikās* in a *tithi*.

अथ तिथेर्मानघट्योपरि चन्द्रविम्बं तथा भूभाङ्गुलादि ॥

Now, the lunar disk, likewise the digits etc. of the earth shadow, [with] above [argument] the measure in *ghaṭikās* of the *tithi*.

See Montelle and Plofker 2014: § 1.3. The exact algorithms used to generate the table entries are at present unknown, although qualitatively it is clear that the size of both disks varies inversely with the length of the *tithi*.

Row 1: Apparent lunar diameter increases monotonically from 11;57 digits for argument 52 to 9;30 for argument 67.

Row 2: Shadow of the earth likewise increases monotonically from 30;45 digits to 23;11. (The very close values 30;45 and 30;44 in the first two entries probably involve a scribal error somewhere, but without knowing the specific steps used to compute them we have not ventured to emend either of them.)

TABLE VII

Digits of increments to apparent shadow diameter, argument zodiacal signs of solar longitude, from Aries to Virgo and from Libra to Pisces.

रवेव्यञ्जुलादिफलसंस्कृते स्पष्टकुभा ॥

Accurate earth shadow when corrected by the result in digit-sixtieths etc. for the sun.

See Montelle and Plofker 2014:§ 1.3. It is not clear exactly how these entries were determined, although qualitatively the change in the size of the shadow—positive from Aries to (zero in) Virgo, negative from Libra to (zero in) Pisces—agrees with the change in the sun’s longitude and consequently its distance from the earth.

TABLE VIII

60-complement of *ghāṭikās* of half-duration of lunar eclipse totality, argument 1 to 9 digits of excess of earth shadow diameter over lunar disk diameter.

खन्धिन्नाङ्गुलोपरि मर्दघटिकाचकम् ६० ॥

Complement [up to] 60 of the *ghāṭikās* of half-duration of totality, [with] above [argument] digits of sky-obscuration.

See Montelle and Plofker 2014:§ 1.4. These values are to be subtracted from 60 to get the corresponding half-durations; it is unclear why the table compiler did not simply tabulate the half-durations directly. The period of totality is longer when the shadow diameter is much larger than that of the moon’s disk, which qualitatively explains the variation of these non-linear function values from 59;0 *ghāṭikās* for argument 1 digit (i.e., half-totality  $60 - 59;0 = 1;0$  *ghāṭikās*) to 57;45 *ghāṭikās* for argument 9 digits (half-totality  $2;15$  *ghāṭikās*).

TABLE IX

60-complement of *ghāṭikās* of half-duration of lunar eclipse, argument 1 to 21 digits of lunar obscuration.

अथ चन्द्रछिन्नाङ्गुलोपरि चन्द्रस्य मध्यस्थितघटिचकम् ६० ॥

Now, complement [up to] 60 of the *ghaṭikās* of mean half-duration [of the eclipse] of the moon, [with] above [argument] digits of lunar obscuration.

See Montelle and Plofker 2014: § 1.4. The duration of a lunar eclipse depends on the amount of the moon's disk obscured by the shadow; hence the entries for the half-duration complement decrease from 58;30 *ghaṭikās* for argument 1 digit to 55;17 for argument 21 digits.

These values appear to be based on an algorithm equivalent to the formula in *Karaṇakutūhala* 4.10 (Balachandra Rao and Uma 2008: S73) for computing eclipse half-duration in *ghaṭikās*. It can be represented by the following equation:

$$\text{half-duration} = 3 \times 60 \times \frac{\sqrt{(r_{\bullet} + r_{\odot})^2 - \beta^2}}{v_{\mathbb{C}} - v_{\odot}}$$

where  $r_{\bullet}$  and  $r_{\odot}$  are the radii of the disks of the eclipsing and eclipsed bodies respectively (corresponding to the shadow and the moon in the case of a lunar eclipse), while  $v_{\mathbb{C}}$  and  $v_{\odot}$  are the luminaries' daily velocities and  $\beta$  is the lunar latitude. In this case, the table compiler has only divided by the lunar velocity and not the difference in the luminaries' daily velocities.

Our reconstruction of this algorithm employs the approximate lunar velocity value of 790 arcminutes per day and assumes the sum of the moon and shadow disk radii to be about 21 digits.

TABLE X

Degrees of solar longitude and true daily motion, argument 1 to 27 *avadhis* of 14 days.

तिथ्यन्तकालिका ग्रहा वलनार्थे स्पर्शकाले तथा मोक्षकाले साधनं चन्द्रग्रहणे मूर्ध्याङ्के  
भार्घान्वितं कर्तव्यम्। लग्नार्थप्ययम्॥

Planets at the time of the end of a *tithi*: determination for the sake of *valana* at the time of contact, likewise at the time of release, in a lunar eclipse; to the number at the top half the shadow is to be added. This is also for the sake of the ascendant.

See Montelle and Plofker 2014: § 1.4. The algorithms generating these nonlinear function values are not clearly understood, although they seem to represent true

solar longitude with time corrections.<sup>8</sup>

Row 1: Solar longitude; increases from  $0^s, 2^o; 9, 50$  for argument 1 to  $0(= 12)^s, 0^o; 54, 30$  for argument 27.

Row 2: True solar daily velocity; minimum value  $56'; 54$  for argument 7, maximum  $61'; 30$  for argument 20.

Row 3: Signed integer values (all 0, 1 or 2) whose purpose is unclear, though their signs correspond to increase and decrease of successive values in Row 2.

TABLE XI

Differences between successive entries of Table IX, argument 1 to 21 digits of lunar obscuration.

चन्द्रच्छिन्नाङ्गुलोपरि स्थितिनोऽन्तरम् ॥

Difference of the half-duration [with] above [argument] digits of lunar obscuration.

See Montelle and Plofker 2014: § 1.4.

TABLE XII

Digits of ‘third part’ of the half-duration, argument 1 to 21 digits of lunar obscuration.

अथ चन्द्रच्छिन्नाङ्गुलोपरि स्थित्यग्निभागः ॥

Now, the third part of the half-duration, [with] above [argument] digits of lunar obscuration.

These values of the so-called *agnibhāga* (*lit.* ‘third part’ [of the half-duration]) represent the difference  $\Delta\beta$  in digits between values of the lunar latitude at mid-

<sup>8</sup> Note that the description of a hybrid Sanskrit worked example given in the commentary on the edition of the text of the *Karanakesari* (Montelle and Plofker 2014: 22–23) refers to these table values as mean solar longitudes. This appears to be an

error arising from a misunderstanding of the example author’s use of the term *madhya* ‘mean’; what he evidently meant is that each *true* solar longitude in this table is the *average* value for its corresponding *avadhi*.

eclipse and at contact or release,<sup>9</sup> according to an algorithm that can be expressed as follows (see, e.g., *Karaṇakutūhala* 4,17 (Balachandra Rao and Uma 2008: S84–S86)):

$$\Delta\beta \approx \frac{1}{3} \text{ (half-duration in } ghaṭikās)$$

Qualitatively, the equivalence between the half-duration and the change in latitude during the eclipse is apparent: both quantities are small for short partial eclipses with minimal obscuration and large for total eclipses when the obscuration is great.

Each of the table entries has apparently been calculated as one-third of the 60-complement of the corresponding entry in Table IX. None of the algorithms in the *Karaṇakesarī* text directly invoke this table, but it would be required for the construction of an eclipse diagram as described in (Montelle and Plofker 2014: § 1.10–1.11). The table's vernacular paratext explains how to apply  $\Delta\beta$  positively or negatively at contact or release, depending on whether the moon is approaching the node during the eclipse or moving away from it.

TABLE XIII

Latitude-derived half-duration correction, argument 1 to 21 digits of mid-eclipse lunar latitude.

अथ मध्यवाणाङ्गुलोपरि वाणफलम् ॥

Now, the latitude-result, [with] above [argument] digits of mid[-eclipse lunar] latitude.

These table entries determine how the half-duration values tabulated in Table IX should be adjusted to produce the ‘contact half’ and ‘release half’ of the duration, which are unequal because of the above-mentioned relative motion of the moon and the node during the eclipse.<sup>10</sup> Their computation is more or less based on

<sup>9</sup> This is corroborated by a table in the manuscript worked example referred to in the previous note (RORI Jaipur 9597, f. 2v: MS. J in Montelle and Plofker 2014: 2), which includes a mid-eclipse lunar latitude of 12;18 digits and a half-duration of 3;24 *ghaṭikās*. One-third of this half-duration is 1;8, which when applied negatively and positively to the mid-eclipse latitude produces the tabulated contact and release latitudes of 11;10 and 13;26 digits respectively.

<sup>10</sup> Again, we can corroborate this interpretation from the previously-mentioned table in the manuscript worked example (see note 9), in which 1/48 of the stated mid-eclipse lunar latitude of 12;18 digits, i.e., 0;15, 22, 30, has evidently been rounded to 0;15 and applied negatively and positively to the stated mean half-duration of 3;24 *ghaṭikās*. The results are the tabulated contact and release ‘half’-durations of 3;9 and 3;39 *ghaṭikās* respectively.

an algorithm equivalent to the following equation (see, e.g., *Karaṇakutūhala* 4,11 (Balachandra Rao and Uma 2008:S74–S80)):

$$\Delta \text{half-duration in } ghaṭikās \approx \frac{1}{48} \times \beta_m$$

where  $\beta_m$  is the mid-eclipse lunar latitude in digits.

The tabulated values in several cases differ from the expected result of dividing the integer digits in the argument by 48, but we cannot determine to what extent the discrepancies are due to computational choices versus scribal errors, so we have left the edited values as attested in the manuscripts. None of the algorithms in the *Karaṇakesarī* text directly invoke this table, although the unequal ‘half’-durations are mentioned in the context of parallax corrections as described in (Montelle and Plofker 2014:§2.5–2.6).

TABLE XIV

Degrees of *akṣavalana*, argument 0 to 45 degrees of the 45-complement of half the zenith distance.

अथ खाङ्कहतस्वघश्रमानेन भक्ते लब्धं नतांशास्तस्य ताने ४५ शोध्यते शोध्यांशा  
उपर्यक्षारव्यवलनम्॥

Now, when [the hour-angle] is divided by the amount of its own day measure [and] multiplied by 90, [there is] obtained the degrees of [half] the zenith distance. Its [amount] is to be subtracted from 45; the degrees from the subtraction are the above [argument of] the *valana* called latitudinal.

नतंशोपरि अक्षारव्यवलनं पूर्वनते उत्तरे पश्चिमनते दक्षिणे वलनम्॥

The *akṣavalana* [with its] above [argument] degrees of [half] the zenith distance. The *valana* [is to be applied] in the north when the zenith distance [is] eastern, in the south when the zenith distance [is] western.

See Montelle and Plofker 2014:§1.5. The algorithm used is evidently a version of a procedure symbolically represented by the equation:

$$akṣavalana = \arcsin(\sin(90^\circ - \zeta) \times \sin \varphi)$$

where  $\zeta$  is the zenith distance and  $\varphi \approx 22^\circ; 35, 39$  is the local terrestrial latitude. It appears that every fifth value is calculated trigonometrically and the intervening ones derived by linear interpolation.

Row 1: Degrees of *akṣavalana* decreasing from  $22^\circ; 35, 39$  for  $\zeta = 90^\circ$  to 0 for  $\zeta = 0$ .

Row 2: Differences in successive entries of Row 1. The attested and computed differences are not always consistent, but we cannot be sure whether to attribute the inconsistencies to errors in the computation of the Row 1 entries, variations in precision and rounding, scribal errors in Row 1 and/or Row 2 entries, or some combination.

TABLE XV

Lords of *parvans*, argument 9 different intervals of eclipse possibility between 0 and 24 months.

अथ सपातचन्द्रसूर्यराश्युपरि पर्वशज्ञानं राशिमां चकशोध्या विना ॥

Now, [with] above [argument] the zodiacal sign of the sun or moon plus the node, knowledge of the lord of the *parvan* without elimination of the cycle of the zodiacal signs [i.e., not modulo 12].

Non-numerical table assigning a deity or lord of the eclipse to each interval of eclipse possibility (Montelle 2011: 247–248) in the following sequence: 0, 5, 6, 11, 17, 18, 12, 23, and 24 months.

TABLE XVI

Degrees of *ayanavalana*, argument 0 to 90 degrees of the complement of tropical solar longitude.

अथ स्पर्शकले तथा मोक्षकाले सायनग्रहस्य कोट्यंशोपर्यशायमयनजं वलनं  
सायनग्रहकर्कादौ दक्षिणे मकरादावुत्तरे वलनं देयम् ॥

Now, [with] above [argument] degrees of the complement of the precession-added [longitude] of the planet at the time of contact, likewise at the time of release, the *ayanavalana* in degrees etc. The *valana* is to be applied to the south when the precession-corrected planet [is] in [the six signs] beginning with Cancer, to the north when in [the six signs] beginning with Capricorn.

See Montelle and Plofker 2014: § 1.6. The algorithm used is evidently closely re-

lated to the following equation:

$$ayanavalana = \arcsin(\sin(90^\circ - \lambda) \times \sin 24^\circ)$$

where  $\lambda$  is tropical solar longitude. The tabulated values have been computed in this way at every tenth entry, while the intervening values are linearly interpolated.

Row 1: Degrees of *ayanavalana* increasing from 0;0,3 for solar longitude 90° to 24;0,1 for longitude 0°.

Row 2: Differences between successive entries in Row 1 (constant for each set of ten entries).

TABLE XVII

Digits of converted total solar *valana*, argument 0 to 47 degrees of combined *valana*.

अथ सूर्यस्य वलनं स्पष्टम्। अक्षारव्यं तथायनजं वलनयोर्योगान्तरांशोपर्यङ्गुलाद्यं वलनं स्पष्टं सूर्यस्य। सूर्यस्य ग्रासवलनं पश्चिमे देयम्। मोक्षवलनं पूर्वे देयम्। सूर्यस्य स्पर्शवलनं विपरीतं देयम्। उत्तरे जातं दक्षिणे देयम्। दक्षिणे जातमुत्तरे देयम्॥

Now, the accurate *valana* of the sun. The accurate *valana* of the sun in digits etc., [with] above [argument] degrees of the sum or difference of the two *valanas*, [the one] called latitudinal [and] likewise [the one] produced by the *ayana*. The sun's contact *valana* is to be applied to the west; the release *valana* is to be applied to the east. The sun's contact *valana* is to be applied in reverse: occurring in the north, applied to the south; occurring in the south, applied to the north.

See Montelle and Plofker 2014: § 1.6. The values represent the algebraic sum of *akṣavalana* and *ayanavalana* scaled for solar eclipses, ranging from initial minimum of 0;7 to final maximum of 8;2 digits. The exact algorithm used to compute the entries is not known.

TABLE XVIII

Digits of converted total lunar *valana*, argument 0 to 47 degrees of combined *valana*.

अथ चन्द्रस्य वलनं स्पष्टम्। अक्षारव्यवलनं तथायनजं वलनयोर्योगान्तरांशोपर्यङ्गुलाद्यं  
वलनं स्पष्टं चन्द्रग्रहणे। स्पर्शवलनं पूर्वं देयम्। मोक्षवलनं पश्चिमे देयम्। चन्द्रस्य  
मोक्षवलनं विपरीतं देयम्। उत्तरे जातं दक्षिणे देयम्। दक्षिणे जातम् उत्तरे देयम्॥

Now, the accurate *valana* of the moon. The accurate *valana* in a lunar eclipse in digits etc., [with] above [argument] degrees of the sum or difference of the two *valanas*, [the one] called latitudinal [and] likewise [the one] produced by the *ayana*. The contact *valana* is to be applied to the east; the release *valana* is to be applied to the west. The moon's release *valana* is to be applied in reverse: occurring in the north, applied to the south; occurring in the south, applied to the north.

See Montelle and Plofker 2014: § 1.6. The values represent the algebraic sum of *akṣavalana* and *ayanavalana* scaled for lunar eclipses, ranging from initial minimum of 0;4 to final maximum of 13;51 digits. The exact algorithm used to compute the entries is not known.

TABLE XIX

*ghatikās* of half-lengths of daylight, argument 0 to 29 degrees of zodiacal sign of tropical solar longitude, from 1/Taurus to 11/Pisces followed by 0/Aries.

अथ सायनरविराश्युपरि द्युदलम्॥

Now, the half-day [with] above [argument] the zodiacal sign [and degree] of the precession-corrected [longitude of the] sun.

See Montelle and Plofker 2014: § 1.9 and 2.2. These values of half the duration of daylight during the course of the year are derived from the local ascensional differences of the zodiacal signs. The canonical right ascension values for Aries, Taurus and Libra respectively are  $\alpha_1 = 278$ ,  $\alpha_2 = 299$ , and  $\alpha_3 = 323$  *vighatikās*. The ascensional differences at the text's terrestrial latitude of  $\varphi \approx 22^\circ 36'$  were evidently produced by applying the scalar multiples 10, 8, and  $\frac{10}{3}$  to an equinoctial shadow length of 5 digits. The resulting ascensional difference values are  $\omega_1 = 50$ ,  $\omega_2 = 40$ , and  $\omega_3 = 17$  *vighatikās* respectively (Montelle and Plofker forthcoming).

The tabulated half-lengths of daylight for each zodiacal sign appear to have been computed by truncation of linearly interpolated values successively differing by 1/30 of the sign's corresponding ascensional difference. They increase from the initial entry of 15;50 *ghatikās* at Row 1/Taurus  $0^\circ$  to a maximum of 16;47 *ghatikās* at Row 3/Cancer  $0^\circ$ , decrease to a minimum of 13;13 *ghatikās* at Row 9/Capricorn

$0^\circ$ , and increase again to the final entry of  $15; 48$  at Row 0/Aries  $29^\circ$ , implying a longest/shortest day ratio of  $33; 34$  to  $26; 26$  *ghaṭikās*.

TABLE XX

*ghaṭikās* of cumulative oblique ascension, argument 0 to 29 degrees of zodiacal sign of tropical solar longitude, from 0/Aries to 11/Pisces.

अथ श्रीसूर्यपर्वाधिकारः तत्र तावत्प्रथमं सायनरविराश्यंशोपरि सायनलघ्नं करणीयं  
सायनरविराश्यंशोपरि लग्नकोष्ठकाः ॥

Now, the chapter on eclipse of the lord sun: there, just as previously, [with] above [argument] the sign and degree of the precession-corrected [longitude of the] sun, the precession-corrected [oblique] ascension is to be made. Table entries of the ascension [with] above [argument] the sign and degree of the precession-corrected [longitude of the] sun.

Note: The last sentence is repeated as the heading of the second page of Table XX, see p. 56.

See Montelle and Plofker 2014: § 2.2. The values of cumulative oblique ascension for degree 0 of each zodiacal sign, reproduced in Schema 2, were apparently computed by adding up the appropriate rising times, or right ascensions adjusted by the corresponding ascensional differences determined as in the above description of Table XIX. The cumulative oblique ascension values for the intermediate degrees of each sign seem to have been calculated by linear interpolation: they increase from the initial value of  $0; 0, 0$  *ghaṭikās* for 0/Aries  $0^\circ$  to the final value of  $59; 52, 24$  *ghaṭikās* for 11/Pisces  $29^\circ$ .

TABLE XXI

*vighaṭikās* of oblique ascension, argument 1 to 60 arcminutes of any degree of zodiacal sign of tropical solar longitude, from 1/Aries to 6/Virgo and (decreasing) 12/Pisces to 7/Libra.

अथ लग्नस्य कलाकोष्ठकाः ॥

Now, the [oblique] ascension's table entries for arcminutes.

Note: Repeated as the heading of the second page of Table XXI, see p. 58.

| <i>Sign (with rising time)</i> |                         | <i>Oblique ascension</i>                  | $\rho, vighāṭikās$ |
|--------------------------------|-------------------------|---|--------------------|
|                                |                         | ( $\rho$ at $0^\circ$ , <i>ghatikās</i> ) |                    |
| Aries                          | $(\alpha_1 - \omega_1)$ | 0;0,0                                     | 0                  |
| Taurus                         | $(\alpha_2 - \omega_2)$ | 3;48,0                                    | 228                |
| Gemini                         | $(\alpha_3 - \omega_3)$ | 8;7,0                                     | 487                |
| Cancer                         | $(\alpha_3 + \omega_3)$ | 13;13,0                                   | 793                |
| Leo                            | $(\alpha_2 + \omega_2)$ | 18;53,0                                   | 1133               |
| Virgo                          | $(\alpha_1 + \omega_1)$ | 24;32,0                                   | 1472               |
| Libra                          | $(\alpha_1 + \omega_1)$ | 30;0,0                                    | 1800               |
| Scorpio                        | $(\alpha_2 + \omega_2)$ | 35;28,0                                   | 2128               |
| Sagittarius                    | $(\alpha_3 + \omega_3)$ | 41;7,0                                    | 2467               |
| Capricorn                      | $(\alpha_3 - \omega_3)$ | 46;47,0                                   | 2807               |
| Aquarius                       | $(\alpha_2 - \omega_2)$ | 51;53,0                                   | 3113               |
| Pisces                         | $(\alpha_1 - \omega_1)$ | 56;12,0                                   | 3372               |

Schema 2: Cumulative oblique ascensions for the start of each zodiacal sign (Table XX).

See Montelle and Plofker 2014:§2.2. These entries supply increments to oblique ascension per arcminute of solar longitude. The constant difference between tabulated values of *ghatikās* of oblique ascension for successive degrees of any given zodiacal sign in Table XX is used as the total ascensional difference  $\Delta\rho$  for any single degree (60 arcminutes) of the same zodiacal sign in Table XXI; these  $\Delta\rho$  values are reproduced in Schema 3. The tabulated individual cumulative ascensional difference values for each arcminute within a single degree of the given sign are computed by linear interpolation.

So the constant difference between entries for successive arcminutes of a single degree of each zodiacal sign in Table XXI is just one-sixtieth of the constant difference  $\Delta\rho$  in *vighāṭikās* between entries for successive degrees of the corresponding sign in Table XX. The two tables used together thus produce values of cumulative oblique ascension precise to arcminutes of the argument.

TABLE XXII

*vighaṭikās* of right ascension, argument 1 to 60 arcminutes of any degree of zodiacal sign of tropical solar longitude: 1/Aries–3/Gemini and 7/Libra–9/Sagittarius, and (decreasing) 6/Virgo–4/Cancer and 12/Pisces–10/Capricorn.

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Table entries for arcminutes.

See Montelle and Plofker 2014:§ 2.2. These values are the right ascension counterparts to the oblique ascension increments tabulated in Table XXI. The total right ascension difference  $\Delta\alpha$  in *vighaṭikās* for any single degree (60 arcminutes) of a given zodiacal sign is taken to be 1/30 of the canonical right ascension value for that sign. These  $\Delta\alpha$  values are reproduced in Schema 3. The tabulated individual cumulative right-ascensional difference values for each arcminute within a single degree of the given sign are evidently computed by linear interpolation.

Note: Not every tabulated value in Tables XIX–XXII conforms exactly to our reconstruction of a linear interpolation procedure, but we do not know enough about the details of the computation techniques used to feel secure in emending any of the attested entries.

| <i>Signs</i>       | <i>Oblique ascension difference<br/>per degree (<math>\Delta\rho</math>, <i>vighaṭikās</i>)</i> | <i>Right ascension difference<br/>per degree (<math>\Delta\alpha</math>, <i>vighaṭikās</i>)</i> |
|--------------------|---|---|
| Aries/Pisces       | 7;36,0  | 9;16,0  |
| Taurus/Aquarius    | 8;38,0  | 9;58,0  |
| Gemini/Capricorn   | 10;12,0   | 10;46,0   |
| Cancer/Sagittarius | 11;20,0   | 10;46,0   |
| Leo/Scorpio        | 11;18,0   | 9;58,0  |
| Virgo/Libra        | 10;56,0   | 9;16,0  |

Schema 3: Oblique ascension and right ascension differences for a single degree of a given zodiacal sign (Tables XXI and XXII).

TABLE XXIII

*ghaṭikās* of ‘mean’ longitudinal parallax, argument 0 to 91 degrees of elongation between ascendant and sun.

अथ दर्शान्तलभार्क्योर्विवरबाहुभागप्रमिते कोषके मध्यमलम्बनं घटिकादि ॥

Now, in [each] table entry commensurate with the degree of the difference-arc [between the longitudes] of the sun and the ascendant at the end of the *tithi* [i.e., at mid-eclipse], the mid[eclipse] longitudinal parallax in *ghaṭikās* etc.

See Montelle and Plofker 2014: Secs. 2.3–2.4. The longitudinal parallax of the moon, which affects the perceived time and appearance of a solar eclipse when the moon crosses the sun, in Indian astronomy is qualitatively taken to vary as the sine of the ecliptic arc of elongation between the sun and the nonagesimal, which is the point of the ecliptic 90° west of the ascendant, on or near the meridian. This parallax component is usually assumed to be zero when the elongation arc is zero, i.e., when the sun is at the nonagesimal, and to attain its conventional maximum of 4 *ghaṭikās* when the sun is on the horizon with elongation 90°. It is denoted ‘mean’ because it does not take into account the depression of the nonagesimal from the zenith, where total parallax is zero.

These tabulated values of ‘mean’ longitudinal parallax are based on nine values stated at 11° intervals of argument in *Karaṇakutūhala* 5.4–5.5 (Balachandra Rao and Uma 2008:S95–S96), which are modified from the above-mentioned simple sinusoidal interpolation by an adjustment whose nature and purpose are not entirely clear to us. The nine base values, listed in Schema 4, are reversed in the *Karaṇakesarī* table by changing their argument to the elongation between the sun and the ascendant rather than between the sun and the nonagesimal. The remaining table entries appear to have been computed by linear interpolation, increasing from 3;40 *ghaṭikās* at argument 0° to the maximum value of 4 *ghaṭikās* at 24° and subsequently decreasing to 0;1 *ghaṭikās* at argument 90° and 91°.

TABLE XXIV

Multiplicative correction to mean longitudinal parallax, argument 0 to 29 degrees of 0 to 11 signs of tropical longitude of ascendant.

अथ सायनलभरारयंशोपरि लम्बनस्पष्टगुणकाः ॥

| <i>Degree of sun-ascendant elongation, Karanakesari</i> | <i>Mean longitudinal parallax (ghatikās)</i> | <i>Degree of sun-nonagesimal elongation, Karanakutūhala</i> |
|---|--|---|
|   | 3;20   | 99  |
| 2   | 3;44   | 88  |
| 13  | 3;56   | 77  |
| 24  | 4;00   | 66  |
| 35  | 3;55   | 55  |
| 46  | 3;39   | 44  |
| 57  | 3;08   | 33  |
| 68  | 2;21   | 22  |
| 79  | 1;17   | 11  |
| 90  | 0;01   |   |

Schema 4: Mean longitudinal parallax values in the *Karanakesari* derived from the *Karanakutūhala* (Table XXIII).

Now, the multipliers for correcting longitudinal parallax [with] above [argument] the sign and degree of the precession-corrected ascendant.

See Montelle and Plofker 2014: Secs. 2.3–2.4. The mean longitudinal parallax values are adjusted to true ones in *Karanakutūhala* 5.2–5.3 by multiplying them by the cosine of the zenith distance of the nonagesimal, which is approximated as the difference between the local latitude  $\varphi$  and the ecliptic declination  $\delta_N$  of the nonagesimal point (Balachandra Rao and Uma 2008: S92). Qualitatively, this means that as the nonagesimal approaches the zenith the correction factor will tend to zero, so when the nonagesimal coincides with the zenith there will be no longitudinal parallax.

The *Karanakesari*'s tabulated values of this correction factor were apparently calculated such that

$$\text{factor} = 40 \cos(\varphi - \delta_N)$$

where  $\varphi$  as usual is the text's local latitude of approximately 22°;35,39 and  $\delta_N$  equals  $\arcsin(\sin 24^\circ \sin(\lambda_A - 90^\circ))$  with  $\lambda_A$  being the tropical longitude of the ascendant in the table argument. For reasons unknown, each table entry is 40 times larger than the required correction, so the accompanying verse instructs

the user to divide the tabulated correction factor by 40 before applying it to the previously determined mean longitudinal parallax. The entries cycle from 27;22 at the initial argument 0/Aries 0° to the maximum value of 39;59 at 5/Virgo 9–12°, followed by a dip to 39;54 at 5/Virgo 29° and a return to the maximum at 6/Libra 16–21°, decreasing to the minimum value of 27;22 at the final argument 11/Pisces 29°.

TABLE XXV

Digits of latitudinal parallax, argument 0 to 29 degrees of 0 to 11 signs of tropical longitude of ascendant.

अथ सायनलम्बराश्यंशोपरि नत्यङ्गुलादि ॥

Now, the digits etc. of latitudinal parallax [with] above [argument] the sign and degree of the precession-corrected ascendant.

See Montelle and Plofker 2014: § 2.4. These entries are evidently derived via a formula in *Karaṇakutūhala* 5.2–5.3 (Balachandra Rao and Uma 2008:S92–S93). It can be represented symbolically as follows:<sup>11</sup>

$$\text{latitudinal parallax} = \frac{1}{8} \times \frac{13}{12} \times 120 \sin(\delta_N - \varphi)$$

where  $\delta_N$  as before is the ecliptic declination of the nonagesimal. The table entries decrease from the maximum value of 11;46 digits at Aries 0° to the minimum value of 0;1 digits at Virgo 12°, increase to 0;24 at Virgo 29°, decrease to the minimum value again at Libra 18°, and continue increasing to the maximum value at Pisces 19°. They appear to have been computed by the above algorithm at 15° intervals with the intermediate values linearly interpolated.

TABLE XXVI

*ghāṭikās* of half-duration of solar eclipse, argument from 1 to 12 digits of solar obscuration.

अथ रविछन्नाङ्गुलाद्वाध्यस्थितिघटिकादि ॥

11 Note that in the equivalent formula stated by Montelle and Plofker (2014: 44), the expression for  $\delta_N$  is erroneously rendered as

$\arcsin(\sin 24^\circ \sin(\lambda_A + 90^\circ))$  instead of the correct  $\arcsin(\sin 24^\circ \sin(\lambda_A - 90^\circ))$ .

Now, the *ghaṭikās* etc. of the mean half-duration with respect to the digits of solar obscuration.

These values appear to derive from the same algorithm employed in Table IX, except in this case the eclipsing body with disk radius  $r_{\bullet}$  is the moon and  $r_{\odot}$  is the radius of the disk of the Sun.

Our reconstruction of this algorithm employs the approximate lunar and solar mean velocity values of 790 and 59 arcminutes per day and assumes the sum of their disk radii to be about 11 digits or 33 arcminutes, which is also the maximum lunar latitude  $\beta$  at which an eclipse is possible. The amount of obscuration at mid-eclipse is thus  $11 - \beta$  digits, which ought to produce table argument values from 0 to 11.

The actual table contains values increasing monotonically from 1;7 *ghaṭikās* at the initial argument 1 to 2;42 *ghaṭikās* at argument 11, all of which are correctly reproduced by the above formula with the stated parameters (with truncated rather than rounded results) except for the value at argument 10, which should be 2;41 rather than 2;40. However, the table compiler or scribe has also included a half-duration value of 0;0 *ghaṭikās* for a final argument value of 12 digits of obscuration, which as far as we can tell makes no sense astronomically.

TABLE XXVII

Times [?] beginning with days in horoscopy, argument 1 to 60 arcseconds in the second fractional place of planets' longitudes [?].

अथ जातके ग्रहणां विकलानां कोष्टका दिनादि॥

Now in horoscopy, the table entries [are] days etc. [as a function] of the arcseconds [of the longitudes] of the planets.

See Pingree 1968:72. These tabulated values, whose nature and purpose in genethliology are not at all clear to us, appear to assign a time or time-interval in days, *ghaṭikās* etc., to each of the 60 possible values of the arcseconds place in a planetary longitude. They increase with a common difference of 0;1,48 days or 108 *vighaṭikās* from their minimum value of 0;1,48 at argument 1 to the maximum of 1;46,12 at argument 59. The entry for argument 60 (or arcsecond 0 of the following arcminute) is 0;0,0.

## TABLE XXVIII

Birth categories for each of the *naksatras*, argument (1 to 28) *naksatras*.

अथ नक्षत्राणां योनिविचारः ॥

Now, the various birth categories of the *naksatras*.

See Pingree 1968:72. This table lists the various members of three genethlialogical categories pertaining to each of the *naksatras* or lunar mansions associated with the birth of the native.

Row 1: *yoni* or animal assigned to the *nakṣatra*.

Row 2: Order of being or ‘world’ (divine, demonic or human).

Row 3: Altitude (high, middle or low).

## 5 EDITION OF THE NUMERICAL TABLES

Various challenges, standards and practices concerning the preparation of a critical edition of tabular data have been explored by Misra, Montelle, and Plofker (forthcoming). Following the guidelines developed in that study, our edition of the numerical tables of the *Karaṇakesarī* considers an individual table rather than a page to be its fundamental unit element or object. Consequently, we have presented each edited table separately with any paratext and marginalia pertaining to it, accompanied by its own critical apparatus including numerical and textual variants and notes.

We have attempted to reproduce as far as possible in the edition the tables’ original layout features such as vertical stacking of sexagesimal digits, placement of row headers, row breaks, and (for tables that extend over multiple pages in the manuscripts) page breaks. However, accompanying marginalia and paratext other than table headings are recorded only in the critical apparatus.

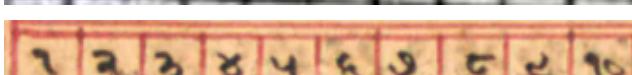
The morphology of the individual Sanskrit words or phrases used as row headers in the tables varies inconsistently between inflected and stem forms. For example, the row header *kalāḥ* in Table XXI is written *kalā* in MSS P<sub>1</sub> (f.8v) and P<sub>2</sub> (f.2r) whereas MS R<sub>2</sub> has *kalā* or *ka* o as the row headers on the same folio (f.6v). Likewise, the word *amśāḥ* (degree) in Table XIX appears as *am* in MS P<sub>1</sub> (f.7r) and *'mśā* in MS R<sub>2</sub> (f.5r). In our edition we have chosen to represent these words in

their inflected forms; e.g., *gatiḥ* in Table III or *valanam* in Table XIV.

We have been much less draconian in regularizing the numerical content of the table entries. Since discrepancies between attested and recomputed values of tabulated quantities may be caused by different computation techniques as well as by outright errors in copying or calculating (see Section 6), we have resisted emending apparently incorrect values except in very unambiguous cases. For example, where a sequence of table entries forms a clearly identifiable and consistent linear progression except for one anomalous number, we have edited the outlier to conform to the rest of the sequence. E.g., the value (in *ghaṭikās* and *vighaṭikās*) of the mean longitudinal parallax for 24° of elongation between ascendant and the Sun is taken as 4;0 in Table XXIII instead of 3;0 seen in both MSS P<sub>1</sub> and R<sub>2</sub>: see Table XXIII description in Section 4. However, in any case where doubts about the compiler's choice of computational algorithm, approximation technique, rounding practices, etc., render it somewhat uncertain what the recorded number was intended to be, we have retained the attested value, no matter how mathematically improbable it may appear. Where the manuscripts disagree, we have tended to follow the witness that appears more mathematically correct as well as textually faithful. E.g., the value of the daily nodal-solar elongation (*gatiḥ*, denoted S) corresponding to the 12<sup>th</sup> *avadhi* is taken as 61;42 following MS R<sub>2</sub> instead of 62;42 seen in MS P<sub>1</sub>, in order to form the consistent monotonically increasing sequence S(11): 61;11, S(12): 61;42, and S(13): 62;14.

In the edited tables and in our introductory commentary, we employ the following additional conventions:

1. All Nāgarī text is transcribed in Roman script using the IAST transliteration. Decimal place-value Nāgarī numerals are represented by their modern Indo-Arabic equivalents; see Schema 5 for some typical examples of the Nāgarī numerals in our manuscripts.
2. Vernacular and/or hybrid Sanskrit text has been converted to Roman script to the best of our ability, but we make no pretence to reliable consistency or accuracy in transcribing it. Consequently, we've accompanied all such transcriptions with images of these passages in the manuscripts; a complete set of images of all these manuscript pages is provided in Section 7.
3. Square brackets [ ] indicate an editorial addition or proposed reconstruction of missing text.
4. Angle brackets < > indicate manuscript readings that we discard as incorrect.
5. Scribal variants of Nāgarī orthography which are emended silently and not noted in the critical apparatus (except where the meaning of the ori-

| <i>Manuscript</i> | <i>Folio</i> | <i>Excerpt showing handwritten numbers from 1 to 10</i>                            |
|-------------------|--------------|--|
| P <sub>1</sub>    | f. 4r        |  |
| P <sub>2</sub>    | f. 3r        |  |
| R <sub>2</sub>    | f. 6v        |  |

Schema 5: A sample of the handwritten numbers: 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 (१, २, ३, ४, ५, ६, ७, ८, ९, and १० in Devanāgarī) from the manuscripts MSS P<sub>1</sub>, P<sub>2</sub> and R<sub>2</sub>.

ginal reading may be ambiguous) include the following: *virāma*, *avagraha*, misplaced *dañdas*, reversed conjunct consonants (e.g., *ladhba* for *labdha*), conjunct consonants that we cannot reproduce in our Nāgarī typesetting, doubled consonants after *r* or across a *pāda* break, routinely confused consonant pairs (e.g., *ba* for *va*, *sa* for *kha*), and all forms of *koṣṭa* for *koṣṭha* ‘table entry’. However, the *anusvāra* (for a conjoined nasals) and omitted *visarga* have been noted explicitly in the critical apparatus.

6. Fragments of Sanskrit words or compounds in Nāgarī are indicated with a small circle ◦ at the breakpoint.
7. In the critical apparatus, text followed by a single square close-bracket ] indicates the edited version of the manuscript reading that follows it.
8. The symbol *x* within Nāgarī text indicates an *akṣara* (syllable) that is illegible in the manuscript.
9. Numerals in sexagesimal or base-60 place-value notation in our commentary are shown with a semicolon separating their integer and fractional parts, and commas separating their successive sexagesimal digits. The superscripts <sup>s</sup>, <sup>o</sup>, <sup>,</sup>, and <sup>"</sup> indicate zodiacal signs (i.e., 30-degree arcs of longitude), degree, minute, and second of arc, respectively.
10. A few technical Latin terms (abbreviated at times) are used to express the peculiarities of the variants when compared to the base text. Their meanings with examples are as follow:

*om. (omisit):* omitted.

Example from Table XX: MS P<sub>1</sub>: first column of signs: ...ma 9 ] om.

This means that the entry ma 9 is omitted in MS P<sub>1</sub>.

*prius*: earlier (of the two).

Example from Table XXI: kalah ] ...prius ka◦ in row II, alibi kalā R<sub>2</sub>

This means that the first entry is ka ◦ in row II, while everywhere else in row II it is kalā in MS R<sub>2</sub>.

*alibi*: elsewhere.

*alterum*: the other.

Example from Table XXI: dhanus 9 ] ...alterum dhanah 9 P<sub>2</sub>

This means that the other entry (not the first) is dhanah 9 in MS P<sub>2</sub>.

*transposuit*: transposed

Example from Table XXI: alterum tula 7  
kanyā 6 transposuit kanyā 6  
tula 7 in P<sub>2</sub>

This means that the second entry tula 7  
kanyā 6 is transposed in its word

ordering to kanyā 6  
tula 7 in MS P<sub>2</sub>.

Table I

| atha śūryasya labdhaphatnikākramam 12 rāśyādi |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|---|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1   | 2  | 3  | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  |     |     |
| 11  | 11 | 11 | 11  | 11  | 11  | 11  | 11  | 11  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 9   | 9   | 9   | 9   | 9   | 9   | 9   | 9   | 9   | 8   | 8   | 8   | 8   |     |     |     |
| 26  | 23 | 20 | 16  | 13  | 10  | 7   | 3   | 0   | 27  | 24  | 20  | 17  | 14  | 10  | 7   | 4   | 1   | 27  | 24  | 21  | 18  | 14  | 11  | 8   | 4   | 1   | 28  | 25  | 21  | 18  | 15  | rā  |     |
| 43  | 27 | 11 | 54  | 38  | 22  | 5   | 49  | 33  | 16  | 0   | 44  | 27  | 11  | 55  | 38  | 22  | 6   | 49  | 33  | 17  | 0   | 44  | 28  | 11  | 55  | 39  | 22  | 6   | 50  | 33  | 17  | ka  |     |
| 40  | 20 | 0  | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | vi  |     |     |     |
| 33  | 34 | 35 | 36  | 37  | 38  | 39  | 40  | 41  | 42  | 43  | 44  | 45  | 46  | 47  | 48  | 49  | 50  | 51  | 52  | 53  | 54  | 55  | 56  | 57  | 58  | 59  | 60  | 61  | 62  | 63  | 64  |     |     |
| 8   | 8  | 8  | 7   | 7   | 7   | 7   | 7   | 7   | 7   | 7   | 7   | 6   | 6   | 6   | 6   | 6   | 6   | 6   | 6   | 6   | 6   | 6   | 6   | 5   | 5   | 5   | 5   | 5   | 5   | 5   | 5   | rā  |     |
| 12  | 8  | 5  | 2   | 28  | 25  | 22  | 19  | 15  | 12  | 9   | 6   | 2   | 29  | 26  | 22  | 19  | 16  | 13  | 9   | 6   | 3   | 0   | 26  | 23  | 20  | 16  | 13  | 10  | 7   | 3   | 0   | am  |     |
| 1   | 44 | 28 | 12  | 55  | 39  | 23  | 6   | 50  | 34  | 17  | 1   | 45  | 28  | 12  | 56  | 39  | 23  | 7   | 50  | 34  | 18  | 1   | 45  | 29  | 12  | 56  | 40  | 23  | 7   | 51  | 34  | ka  |     |
| 0   | 40 | 20 | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | vi  |     |     |
| 65  | 66 | 67 | 68  | 69  | 70  | 71  | 72  | 73  | 74  | 75  | 76  | 77  | 78  | 79  | 80  | 81  | 82  | 83  | 84  | 85  | 86  | 87  | 88  | 89  | 90  | 91  | 92  | 93  | 94  | 95  | 96  |     |     |
| 4   | 4  | 4  | 4   | 4   | 4   | 4   | 4   | 4   | 3   | 3   | 3   | 3   | 3   | 3   | 3   | 3   | 3   | 2   | 2   | 2   | 2   | 2   | 2   | 2   | 1   | 1   | 1   | 1   | 1   | 1   | 1   | rā  |     |
| 27  | 24 | 20 | 17  | 14  | 10  | 7   | 4   | 1   | 27  | 24  | 21  | 18  | 14  | 11  | 8   | 4   | 1   | 28  | 25  | 21  | 18  | 15  | 12  | 8   | 5   | 2   | 28  | 25  | 22  | 19  | 15  | am  |     |
| 18  | 2  | 45 | 29  | 13  | 56  | 40  | 24  | 7   | 51  | 35  | 18  | 2   | 46  | 29  | 13  | 57  | 40  | 24  | 8   | 51  | 35  | 19  | 2   | 46  | 30  | 13  | 57  | 41  | 24  | 8   | 52  | ka  |     |
| 20  | 0  | 40 | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | vi  |     |
| 97  | 98 | 99 | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 |
| 1   | 1  | 1  | 1   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 11  | 11  | 11  | 11  | 11  | 11  | 11  | 11  | 11  | 11  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 9   | 9   |
| 12  | 9  | 6  | 2   | 29  | 26  | 22  | 19  | 16  | 13  | 9   | 6   | 3   | 0   | 26  | 23  | 20  | 16  | 13  | 10  | 7   | 3   | 0   | 27  | 24  | 20  | 17  | 14  | 10  | 7   | 4   | 1   | 27  |     |
| 35  | 19 | 3  | 46  | 30  | 14  | 57  | 41  | 25  | 8   | 52  | 36  | 19  | 3   | 47  | 30  | 14  | 58  | 41  | 25  | 9   | 52  | 36  | 20  | 3   | 47  | 31  | 14  | 58  | 42  | 25  | 9   | 53  | 36  |
| 40  | 20 | 0  | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  | 20  | 0   | 40  |

ॐ क्रतुं रात्रिं

P1: EL.s(2) 19; EL.m(3) 21; EL.s(3) 1; EL.d(4) 13; EL.s(4) 20; EL.m(8) 59; EL.d(7) 40; EL.s(25) 20; EL.s(33) 40; EL.d(41) 25; EL.d(68) 7; EL.m(75) 31; EL.d(68) 7; EL.m(97) 33; EL.s(106) 45; EL.d(15) 15; EL.s(122) 28.

R2: EL.s(2) 19; EL.m(3) 21; EL.s(3) 1; EL.d(5) 23; EL.m(5) 38; EL.m(8) 59; EL.s(33) 40.

MS R<sub>1</sub> does not have row headers. It has the words śloka 115 is written in a different handwriting to the left of the title.  
MS R<sub>2</sub> has ṣ in instead of am in the row header for EL.dMS R<sub>2</sub> does not contain this table.

Table II

| atha ūtakarana katesarīgṛanṭha suryasyā seśapankti tākram 12   30 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |    |    |    |     |      |      |      |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|-----|------|------|------|
| 0   | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29 | 30 | 31 | 32  | 33   |      |      |
| 6   | 7   | 8   | 9   | 10  | 11  | 0   | 1   | 2   | 3   | 4   | 4   | 5   | 5   | 6   | 7   | 7   | 8   | 9   | 9   | 10  | 11  | 11  | 0   | 1   | 1   | 2   | 2   | 3   | 4  |    |    |     |      |      |      |
| 29  | 18  | 8   | 27  | 16  | 6   | 25  | 14  | 4   | 23  | 13  | 2   | 21  | 11  | 0   | 19  | 9   | 28  | 17  | 7   | 26  | 15  | 5   | 24  | 14  | 3   | 22  | 12  | 1   | 20 | 10 | 29 | 18  | 8    |      |      |
| 24  | 46  | 7   | 29  | 50  | 12  | 34  | 55  | 17  | 38  | 0   | 21  | 43  | 4   | 26  | 48  | 9   | 31  | 52  | 14  | 35  | 57  | 19  | 40  | 2   | 23  | 45  | 6   | 28  | 50 | 11 | 33 | 54  | 16   | EL.m |      |
| 36  | 10  | 44  | 18  | 52  | 26  | 0   | 34  | 8   | 42  | 16  | 50  | 24  | 58  | 32  | 6   | 40  | 14  | 48  | 22  | 56  | 30  | 4   | 38  | 12  | 46  | 20  | 54  | 28  | 2  | 36 | 10 | 44  | 18   | EL.s |      |
| 34  | 35  | 36  | 37  | 38  | 39  | 40  | 41  | 42  | 43  | 44  | 45  | 46  | 47  | 48  | 49  | 50  | 51  | 52  | 53  | 54  | 55  | 56  | 57  | 58  | 59  | 60  | 61  | 62  | 63 | 64 | 65 | 66  | 67   |      |      |
| 4   | 5   | 6   | 6   | 7   | 8   | 8   | 9   | 10  | 11  | 0   | 0   | 1   | 1   | 2   | 3   | 3   | 4   | 5   | 5   | 6   | 7   | 7   | 8   | 9   | 9   | 10  | 10  | 11  | 0  | 0  | 1  | 2   | EL.z |      |      |
| 27  | 16  | 6   | 25  | 15  | 4   | 23  | 13  | 2   | 21  | 11  | 0   | 19  | 9   | 28  | 18  | 7   | 26  | 16  | 5   | 24  | 14  | 3   | 22  | 12  | 1   | 20  | 10  | 29  | 19 | 8  | 27 | 17  | 6    | EL.d |      |
| 37  | 59  | 21  | 42  | 4   | 25  | 47  | 8   | 30  | 51  | 13  | 35  | 56  | 18  | 39  | 1   | 22  | 44  | 6   | 27  | 49  | 10  | 32  | 53  | 15  | 37  | 58  | 20  | 41  | 3  | 24 | 46 | 8   | 29   | EL.m |      |
| 52  | 26  | 0   | 34  | 8   | 42  | 16  | 50  | 24  | 58  | 32  | 6   | 40  | 14  | 48  | 22  | 56  | 30  | 4   | 38  | 12  | 46  | 20  | 54  | 28  | 2   | 36  | 10  | 44  | 18 | 52 | 26 | 0   | 34   | EL.s |      |
| 68  | 69  | 70  | 71  | 72  | 73  | 74  | 75  | 76  | 77  | 78  | 79  | 80  | 81  | 82  | 83  | 84  | 85  | 86  | 87  | 88  | 89  | 90  | 91  | 92  | 93  | 94  | 95  | 96  | 97 | 98 | 99 | 100 | 101  |      |      |
| 2   | 3   | 4   | 4   | 5   | 6   | 6   | 7   | 8   | 8   | 9   | 9   | 10  | 11  | 0   | 1   | 1   | 2   | 3   | 3   | 4   | 5   | 5   | 6   | 6   | 7   | 8   | 9   | 9   | 10 | 10 | 11 | 0   | 1    | 2    | EL.z |
| 25  | 15  | 4   | 23  | 13  | 2   | 22  | 11  | 0   | 20  | 9   | 28  | 18  | 7   | 26  | 16  | 5   | 24  | 14  | 3   | 23  | 12  | 1   | 21  | 10  | 29  | 19  | 8   | 27  | 17 | 6  | 25 | 15  | 4    | EL.d |      |
| 51  | 12  | 34  | 55  | 17  | 38  | 0   | 22  | 43  | 5   | 26  | 48  | 9   | 31  | 53  | 14  | 36  | 57  | 19  | 40  | 2   | 24  | 45  | 7   | 28  | 50  | 11  | 33  | 55  | 16 | 38 | 59 | 21  | 42   | EL.m |      |
| 8   | 42  | 16  | 50  | 24  | 58  | 32  | 6   | 40  | 14  | 48  | 22  | 56  | 30  | 4   | 38  | 12  | 46  | 20  | 54  | 28  | 2   | 36  | 10  | 44  | 18  | 52  | 26  | 0   | 34 | 8  | 42 | 16  | 50   | EL.s |      |
| 102   | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 |    |    |    |     |      |      |      |
| 0   | 1   | 2   | 2   | 3   | 4   | 4   | 5   | 5   | 6   | 7   | 7   | 8   | 9   | 9   | 10  | 11  | 0   | 1   | 1   | 2   | 2   | 3   | 4   | 4   | 5   | 5   | 6   | 6   |    |    |    |     |      |      |      |
| 24  | 13  | 2   | 22  | 11  | 0   | 20  | 9   | 28  | 18  | 7   | 27  | 16  | 5   | 25  | 14  | 3   | 23  | 12  | 1   | 21  | 20  | 19  | 10  | 8   | 28  | 17  | 6   | 29  | 34 | 25 | 46 | 2   |      |      |      |
| 4   | 25  | 47  | 9   | 30  | 52  | 13  | 35  | 56  | 18  | 40  | 1   | 23  | 44  | 6   | 27  | 49  | 15  | 32  | 54  | 15  | 37  | 58  | 20  | 42  | 3   | 25  | 46  | 2   |    |    |    |     |      |      |      |
| 24  | 58  | 32  | 6   | 40  | 14  | 48  | 22  | 56  | 30  | 4   | 38  | 12  | 46  | 20  | 54  | 28  | 2   | 36  | 10  | 44  | 18  | 52  | 26  | 0   | 34  | 8   | 42  | 16  |    |    |    |     |      |      |      |

• kēśāgṛanṭhe • pambūtī cakrām • P<sub>1</sub> • karnakēśāgṛanṭhe • pāmkticakrām • R<sub>2</sub>

P<sub>1</sub>: EL.s(1) 11; EL.s(21) 31; EL.d(27) 17; EL.d(27) 17; EL.s(35) 56; EL.m(35) 56; EL.s(40) 13; EL.s(41) 48; EL.d(44) 12; EL.s(44) 31; EL.m(59) 27; EL.s(59) 56; EL.s(79) 26; EL.s(80) 59; EL.m(81) 21; EL.s(85) 47; EL.m(107) 42; EL.m(109) 33; EL.s(116) 24; EL.s(117) 59; EL.s(121) 50; EL.s(122) 44; EL.d(124) 29; EL.s(130) 10; EL.s(127) 40; EL.s(128) 40; EL.s(129) 11; EL.s(129) 51; EL.m(29) 51; EL.s(21) 31; EL.s(44) 31; EL.s(44) 48; EL.s(41) 48; EL.s(40) 13; EL.s(38) 7; EL.s(35) 56; EL.m(35) 56; EL.s(35) 59; EL.s(116) 24; EL.s(117) 59; EL.s(118) 24; EL.d(124) 29; EL.d(125) 19; EL.s(127) 40.

MS P<sub>1</sub> has the entries corresponding to argument 38, i.e., 

|    |   |    |   |   |
|----|---|----|---|---|
| 38 | 7 | 15 | 4 | 8 |
|----|---|----|---|---|

 repeated twice in adjacent columns.

MS R<sub>2</sub> has scribal corrections for entries of arguments 29 and 79 written in the top and bottom margins respectively. Also, MS R<sub>2</sub> does not have an entry corresponding to argument 130. kṣepa 0 | 19 | 21 | 34 dhanam is written in a different handwriting to the right of the title in MS R<sub>2</sub>.

MS P<sub>2</sub> does not contain this table.

Table III

|    |    | candraśaya koṣṭhikā avadhyopari           |    |    |    |     |    |    |    |    |    |    |    |    |     |    |    |    |    |    |    |    |    |       |
|----|----|---|----|----|----|-----|----|----|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|-------|
|    |    | parvāyanārthī siddhāntarahasye śuryendvoḥ |    |    |    |     |    |    |    |    |    |    |    |    |     |    |    |    |    |    |    |    |    |       |
|    |    | alha karana kalesa grāntha hōte           |    |    |    |     |    |    |    |    |    |    |    |    |     |    |    |    |    |    |    |    |    |       |
| 1  | 2  | 3   | 4  | 5  | 6  | 7   | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16  | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25    |
| 0  | 0  | 1   | 1  | 1  | 2  | 2   | 3  | 3  | 4  | 4  | 5  | 5  | 6  | 6  | 7   | 7  | 8  | 8  | 9  | 9  | 10 | 10 | 11 | 11    |
| 2  | 16 | 0   | 15 | 29 | 13 | 27  | 11 | 25 | 9  | 23 | 8  | 22 | 7  | 21 | 6   | 21 | 6  | 21 | 6  | 21 | 6  | 21 | 5  | 20    |
| 19 | 41 | 56  | 5  | 10 | 12 | 14  | 16 | 16 | 20 | 28 | 42 | 3  | 30 | 5  | 48  | 37 | 33 | 33 | 35 | 39 | 43 | 43 | 46 | 31    |
| 55 | 1  | 10  | 26 | 35 | 50 | 8   | 1  | 26 | 57 | 48 | 0  | 39 | 27 | 7  | 34  | 11 | 34 | 47 | 40 | 21 | 21 | 16 | 35 | 25    |
| 61 | 61 | 60  | 60 | 60 | 60 | 60  | 60 | 60 | 61 | 61 | 62 | 62 | 63 | 63 | 64  | 64 | 64 | 64 | 63 | 63 | 62 | 62 | 61 | gatiḥ |
| 46 | 21 | 53  | 26 | 16 | 7  | 5   | 13 | 26 | 53 | 11 | 42 | 14 | 51 | 18 | 44  | 7  | 31 | 33 | 41 | 30 | 16 | 59 | 21 | 56    |
| 11 | 2  | 2   | 1  | 0  | 0  | 1   | 1  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2   | 2  | 0  | 0  | 1  | 1  | 1  | 1  | 2  | 1×    |
| x  |    |   |    |    |    | dha | x  |    |    |    |    |    |    |    | dha | x  |    |    |    |    |    |    |    | SD    |

° granthoḥ siddhānta °...° śuryedvoḥ parvana °...° candraśaya koṣṭhikā avadhyopari || śrī P<sub>1</sub> • atha °...° kēśarigranthoḥ siddhānta °...° śuryendvoḥ parvanyāhārī sāptacandrasya koṣṭakāḥ tātkālikā avadhyopari || R<sub>2</sub>

avadhyayah ] vadhyaya R<sub>2</sub> • gatiḥ ] gati R<sub>2</sub> • gatyantarām ] gatyantara R<sub>2</sub>

P<sub>1</sub>: Sa(12) 62; EL.d(13) 2; Sa(23) 64.

R<sub>2</sub>: EL.s(22) 53; EL.m(23) 40; Sa(23) 64.

MS R<sub>2</sub> has the right marginal column entry (vertically written): pa ma 8 | da |

MS P<sub>2</sub> does not contain this table.

Table IV

| atha bhujāñśopari śarāṅgulādi |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
|                               | 0  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 0                             | 1  | 3  | 4  | 6  | 7  | 9  | 11 | 12 | 14 | 15 | 17 | 18 | 20 | 21 | 23 | 24 |    |
| 0                             | 34 | 9  | 43 | 18 | 52 | 27 | 1  | 36 | 10 | 46 | 15 | 45 | 15 | 45 | 15 | 45 |    |
| 1                             | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |    |
| 34                            | 34 | 35 | 34 | 34 | 34 | 34 | 35 | 34 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |    |

śrāṅgulādi ] || omitted  $P_1$  • ḍrāṅgulādi | śarāṁtara āvēntēbhujākalāvīkālgomutrāyādīgunya ||  $R_2$

śarāṅgulādi ] śarāṅgulādi  $P_i$ ; śarāṅgulādi  $R_2$  & śarāṁtarah ] ṣtarāśada dhanam ||  $P_i$ , śarāṁtarah  $R_2$

$P_1$ ; LL.b(0) 10.

$R_2$ ; LL.b(0) 10; LD(9) 34.

MSP<sub>1</sub> has left marginal entry: || tasya bhujāñśopari śarāṅgulādi, amtarām sadā dhanam śaragolopari dignānam meṣadyāv uttaro golas tulādau dakṣṇāḥ smṛta ||

MSP<sub>2</sub> does not contain this table.

Table V

| ॥ atha sapātacandraगत्युपरि ravibimbāङ्गलादि ॥ |    |    |    |    |    |    |    |    |    |    |    |
|--|----|----|----|----|----|----|----|----|----|----|----|
| 59   | 60 | 60 | 60 | 60 | 60 | 61 | 61 | 62 | 62 | 63 | 63 |
| 56   | 6  | 12 | 26 | 39 | 59 | 19 | 46 | 6  | 19 | 32 | 52 |
| 10   | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| 19   | 21 | 22 | 24 | 27 | 31 | 34 | 39 | 42 | 45 | 47 | 51 |
|  |    |    |    |    |    |    |    |    |    |    |    |
| sapātaygatih                                   |    |    |    |    |    |    |    |    |    |    |    |
| sapātacandraगतिः                               |    |    |    |    |    |    |    |    |    |    |    |
| ravibimbāङ्गलादि ॥                             |    |    |    |    |    |    |    |    |    |    |    |

o candra o bimbāङ्गलादि ॥ P<sub>1</sub> and R<sub>2</sub>

P<sub>1</sub>: Argument 63:59 is 53:59.

R<sub>2</sub>: Argument 59:56 is 59:59 and Argument 64:26 is 64:16.

P<sub>1</sub> has additional row headers placed to the right of the table in the margin as seen below:

|              |               |
|--------------|---------------|
| परिक्रमा     | परिक्रमा      |
| उत्तरोकीर्णे | स्थूलाशेषाद्य |

MS P<sub>1</sub> has the following text typeset to the right of the table on the folio: atha sapātacandraभूमिस्पारि अग्नुलाद्य शारह गोलपरि द्विजनाम मेषद्याव उत्तरे गोला ॥ तुलादौ दक्षिणा स्मितह ॥ कन्द्राम्बिपाश

प्रकारबेदाद् ग्रहास्य ॥ 14 सुधिकंद्रग्रहाहा तृष्ण भूजान्स्य ॥ 8 सुधिराग्रहाहा तृष्ण ॥

मन्द्राम्बिपाशवेद् भिगा ॥ कन्द्रग्रहान्स्य ॥ 14 सुधिकंद्रग्रहान्स्य ॥ 8 सुधिराग्रहान्स्य ॥

MS R<sub>2</sub> has the following text typeset to the right of the table on the folio: ॥ अथ सपातान्त्रिकान्स्य ॥ 14

मेषद्याव उत्तरे गोलपरि द्विजनाम भूमिस्पारि अग्नुलाद्य शारह गोलपरि द्विजनाम ॥ मेषद्याव उत्तरे गोलपरि द्विजनाम ॥ 14

मन्द्राम्बिपाशवेद् भिगा ॥ कन्द्रग्रहान्स्य ॥ 8 सुधिराग्रहान्स्य ॥ 8 सुधिराग्रहान्स्य ॥ 14

अद्यापि त्रिपात्रान्तरे एवं विवरणात् ॥

|  |  |
|--|--|
| परिक्रमा   | परिक्रमा   |
| उत्तरोकीर्णे   | स्थूलाशेषाद्य  |
| प्रकारबेदाद् ग्रहास्य ॥ 14 सुधिराग्रहान्स्य ॥ 8 सुधिराग्रहान्स्य ॥ | प्रकारबेदाद् ग्रहास्य ॥ 14 सुधिराग्रहान्स्य ॥ 8 सुधिराग्रहान्स्य ॥ |
| मन्द्राम्बिपाशवेद् भिगा ॥ कन्द्रग्रहान्स्य ॥ 8 सुधिराग्रहान्स्य ॥  | मन्द्राम्बिपाशवेद् भिगा ॥ कन्द्रग्रहान्स्य ॥ 8 सुधिराग्रहान्स्य ॥  |

MS P<sub>1</sub> has the following text (vernacular mixed with Sanskrit) to the right of the table on f. 4v:

|  |  |
|--|--|
| परिक्रमा   | परिक्रमा   |
| उत्तरोकीर्णे   | स्थूलाशेषाद्य  |
| प्रकारबेदाद् ग्रहास्य ॥ 14 सुधिराग्रहान्स्य ॥ 8 सुधिराग्रहान्स्य ॥ | प्रकारबेदाद् ग्रहास्य ॥ 14 सुधिराग्रहान्स्य ॥ 8 सुधिराग्रहान्स्य ॥ |
| मन्द्राम्बिपाशवेद् भिगा ॥ कन्द्रग्रहान्स्य ॥ 8 सुधिराग्रहान्स्य ॥  | मन्द्राम्बिपाशवेद् भिगा ॥ कन्द्रग्रहान्स्य ॥ 8 सुधिराग्रहान्स्य ॥  |

MS P<sub>2</sub> does not contain this table.

Table VI

| atha tīther mānaghaṭyopari candraśīmbaṇ tathā bhūbhāṅgulādi |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 52  | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 |
| 11  | 11 | 11 | 11 | 11 | 11 | 11 | 10 | 10 | 10 | 10 | 10 | 9  | 9  | 9  | 9  |
| 57  | 47 | 35 | 23 | 12 | 1  | 51 | 41 | 31 | 21 | 13 | 4  | 55 | 47 | 39 | 30 |
| 30  | 30 | 30 | 29 | 28 | 28 | 27 | 26 | 26 | 25 | 25 | 24 | 24 | 23 | 23 |    |
| 45  | 44 | 2  | 22 | 44 | 7  | 32 | 56 | 26 | 52 | 25 | 56 | 25 | 2  | 36 | 11 |

◦ titīr ◦...◦ candraśīmbaṇ tathā bhūtāngu ◦ P<sub>1</sub> • ◦ candraśīmbatathā ◦ R<sub>2</sub>

P<sub>1</sub>; ES.b(56) 7; ES.a(57) 27, ES.b(57) 32; ES.a(58) 56; ES.b(58) 26; ES.a(59) 25, ES.b(59) 26; ES.a(60) 25; ES.b(60) 25.

R<sub>2</sub>; LD.a(58) 11; ES.a(60) 25.

MS P<sub>2</sub> does not contain this table.

Table VII

| raver vyāngulādiphalasam̄skr̄te spāṣṭakubhā |      |      |      |      |      |               |
|---|------|------|------|------|------|---------------|
| me  | vr̄  | mi   | ka   | sim̄ | kām̄ | saṃkrāntayah̄ |
| [m̄]  | [v̄] | [m̄] | [k̄] | [s̄] | [k̄] |               |
| 0   | 0    | 0    | 0    | 0    | 0    |               |
| 11  | 16   | 20   | 16   | 11   | 0    | dhanabhūbhā   |
| tu  | vr̄  | dha  | ma   | kum̄ | mī   | saṃkrāntayah̄ |
| [t̄]  | [v̄] | [d̄] | [m̄] | [k̄] | [m̄] |               |
| 0   | 0    | 0    | 0    | 0    | 0    | m̄abhbūbhā    |
| 11  | 16   | 20   | 16   | 11   | 0    |               |

- vyāngulā ◦ ... ◦ spāṣṭakutā P<sub>1</sub> • ◦ vyāngula ◦ R<sub>2</sub>
- m̄a bhūbhā ] rāṇa bhūbhā P<sub>1</sub>

P<sub>1</sub>: Argument kām̄ is kām̄ and Argument mī is mī; AD.b(sim̄) 16.

R<sub>2</sub>: Argument kā is rk̄a [perhaps rk̄]; AD.b(kām̄) 16; AD.b(mī) 16.

MS R<sub>2</sub> has seventh column entries as sam̄ o dhanam̄ samkrānta m̄a

MS P<sub>2</sub> does not contain this table.

Table VIII

|  |    | khacchinnāṅgulopari mardaghatiśkācakram   60 |    |    |    |    |    |    |    |
|--|----|--|----|----|----|----|----|----|----|
|  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  |
|  | 59 | 58   | 58 | 58 | 58 | 58 | 57 | 57 | 57 |
|  | 0  | 40   | 27 | 15 | 8  | 3  | 57 | 55 | 54 |
|  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |

khacchinnāṅgu •...• cakram • P<sub>1</sub> and R<sub>2</sub>

P<sub>1</sub>; HD.a(6) 57.

MS P<sub>2</sub> does not contain this table.

Table IX

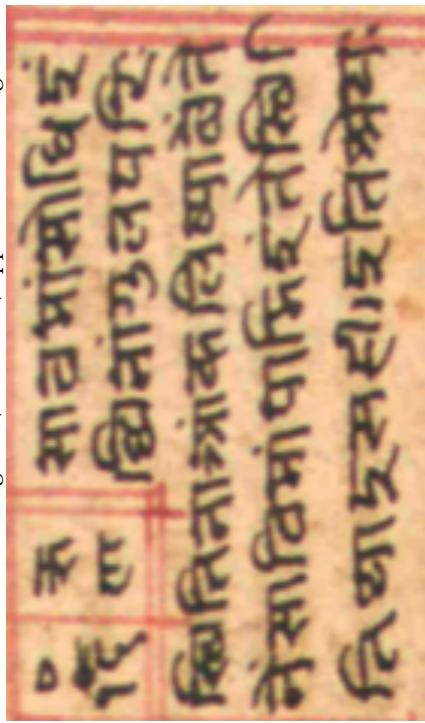
| atha candra-chināṅgulopari candra-sya madhyasthitīghatīcakram 60 |    |    |    |    |    |    |    |    |    |    |    | HD.a |    |    |    |    |    |    |    |    |      |  |
|--|----|----|----|----|----|----|----|----|----|----|----|------|----|----|----|----|----|----|----|----|------|--|
| 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13   | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | HD.b |  |
| 58   | 57 | 57 | 57 | 56 | 56 | 56 | 56 | 56 | 55 | 55 | 55 | 55   | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | HD.a |  |
| 30   | 55 | 29 | 8  | 51 | 36 | 23 | 12 | 2  | 53 | 45 | 39 | 34   | 29 | 26 | 23 | 21 | 20 | 19 | 18 | 17 | HD.b |  |

◦ candra-chināṅgulopari candra ◦...◦ cakram ◦ P<sub>1</sub> • • candra-chināṅgulopari candra ◦...◦ ghatikādicakram 60 R<sub>2</sub>

P<sub>1</sub>; HD.a(1) 57; HD.a(5) 57.

R<sub>2</sub>; HD.a(1) 57.

MS R<sub>2</sub> has the following text (vermacular) appended to the right of the table on f.2v:



MS P<sub>2</sub> does not contain this table.

Table X

| tithyantakālīkā grahā valanārthe sparsākāle sādhanam moksakāle sādhanam candra grahanē bhārdhāvitam kartavyam   lagnārthe pī ayam |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |         |
|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------|
| 1   | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | avadhiḥ |
| 0   | 0  | 0  | 1  | 1  | 2  | 2  | 3  | 3  | 4  | 4  | 5  | 5  | 6  | 6  | 7  | 7  | 8  | 8  | 9  | 9  | 10 | 11 | 11 | 0  |    |    |         |
| 2   | 15 | 29 | 12 | 26 | 9  | 22 | 5  | 19 | 2  | 16 | 29 | 13 | 27 | 11 | 25 | 9  | 23 | 8  | 22 | 6  | 20 | 5  | 19 | 3  | 17 | 0  |         |
| 9   | 46 | 17 | 41 | 2  | 20 | 26 | 54 | 14 | 38 | 7  | 43 | 26 | 16 | 14 | 19 | 30 | 45 | 4  | 23 | 42 | 58 | 10 | 17 | 17 | 10 | 54 | grahah̄ |
| 50  | 25 | 3  | 47 | 25 | 9  | 55 | 17 | 11 | 10 | 20 | 10 | 18 | 35 | 43 | 40 | 35 | 43 | 13 | 40 | 50 | 50 | 42 | 30 | 49 | 13 | 30 |         |
| 58  | 58 | 57 | 57 | 56 | 56 | 56 | 57 | 57 | 58 | 58 | 59 | 59 | 60 | 60 | 60 | 61 | 61 | 61 | 61 | 60 | 60 | 59 | 59 | 58 |    |    |         |
| 40  | 10 | 42 | 15 | 5  | 56 | 54 | 1  | 15 | 40 | 0  | 31 | 3  | 40 | 7  | 33 | 56 | 21 | 22 | 30 | 19 | 5  | 48 | 10 | 45 | 45 | 45 | gatih̄  |
| 1   | 1  | 2  | 2  | 1  | 0  | 0  | 0  | 1  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 1  | 1  | 1  | 1  | 1  | x  | antarā  |
| ×   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |         |

tithyatāmkāgrahāḥ •...• candra •...• dhri amke bhārdhāḥ •...• karitavyam lagnārthe pī ayam P<sub>1</sub> • • tithyāmtakālikāgrahāḥ •...• candragrahanem mūchni amke •...• karttavyam • R<sub>2</sub>  
 lagnārthe pī ayam om. R<sub>2</sub>

avadhiḥ ] vadhi P<sub>1</sub> & antarah ] intara P<sub>1</sub>

P<sub>1</sub>: DFa(27)×1.

R<sub>2</sub>: SL.s(18)53.

MS R<sub>2</sub> has kali v (in a different handwriting) in the left margin as a correction to the table title on f. 2vC. Also, the row headers: avadhiḥ, gatih̄, gatih, and antaram, are absent in MS R<sub>2</sub>

MS R<sub>2</sub> has a correction for entry DM.b(26) as  
 59  
 15  
 4

MS P<sub>2</sub> does not contain this table.

Table XI

|    | candrāchinnāṅgulopari sthitino ṣṭitaram |    |    |    |    |    |    |   |    |    |    |    |    |    |    |    |    |    |    |    |      |
|----|---|----|----|----|----|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|------|
| 1  | 2                                       | 3  | 4  | 5  | 6  | 7  | 8  | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |      |
| 0  | 0                                       | 0  | 0  | 0  | 0  | 0  | 0  | 0 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | DF.a |
| 35 | 26                                      | 21 | 17 | 15 | 13 | 11 | 10 | 9 | 8  | 6  | 5  | 5  | 3  | 3  | 2  | 1  | 1  | 1  | 1  | 0  | DF.b |

MS P<sub>1</sub> has the following marginal texts alongside the table:

Left Margin: candrāchinnāṅgulopari sthitino ṣṭitaramāṁmyo chaiteyam tra e che ||

Right Margin: ḍṇakaravochinnahavaivagulaho etenena karī amṛtaranem gaṇam māthēm bhāga cabāvīlādhāra vikālādikaphalatosthitimān ṣṭitaram

MS P<sub>1</sub> has some vernacular text (transcribed above) to the left of the table on f. 4v:

MS P<sub>1</sub> has the same vernacular text (transcribed above) to the right of the table on f. 4v:

MSS P<sub>2</sub> and R<sub>2</sub> do not contain this table.

Table XII

|    |    |    |    |   |   |    |    |    |    |    |    | atha candrachinnāṅgulopari sthitiyagnihāgah |    |    |    |    |    |    |    |    |                    |  |  |
|----|----|----|----|---|---|----|----|----|----|----|----|---|----|----|----|----|----|----|----|----|--------------------|--|--|
|    |    |    |    |   |   |    |    |    |    |    |    | candrachinnāṅgulah                          |    |    |    |    |    |    |    |    |                    |  |  |
| 1  | 2  | 3  | 4  | 5 | 6 | 7  | 8  | 9  | 10 | 11 | 12 | 13  | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | candrachinnāṅgulah |  |  |
| 0  | 0  | 0  | 0  | 1 | 1 | 1  | 1  | 1  | 1  | 1  | 1  | 1   | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | sthitiyagnihāgah   |  |  |
| 31 | 42 | 50 | 57 | 3 | 8 | 12 | 16 | 19 | 22 | 25 | 27 | 30  | 31 | 31 | 33 | 33 | 34 | 34 | 35 |    |                    |  |  |

atha candrachinnāṅgulopari sthitiyagnihāgah, madhyāśaresu dhananam kāryam sapātacandra opapade ho yato dhanā kijai te moksabāna thājō yugmapade sapāta ho yato madhyāśaramāṇī dhana kijai te sparsābānāthai, anem rna kijai to mokṣa thai || 0 | 1 | 2 opapada 3 | 4 | 5 yu 6 | 7 | 8 opa 9 | 10 | 11 yu || P<sub>1</sub>  
 || atha candrachinnāṅgulopari sthitiyagnihāgah madhyāśaresu dhananam kāryam sapātacandra opapade ho yento dhana kiemte moksabāna thāyem rnakiente sparsābānāthai, rna kijemto moksabānāthai, rna kijemto moksabānāthai, rna kijemto moksabānāthai || 0 | 1 | 2 opapada 3 | 4 | 5 yugmapade o 6 | 7 | 8 | opapada 9 | 10 | 11 yugmapade || R<sub>2</sub>

candrachinnāṅgulah ] candrachinnāṅgula P<sub>1</sub> • candrachinnāṅgula R<sub>2</sub>

P<sub>1</sub>: ABb(4) 3; ABb(20) 24.

R<sub>2</sub>: ABb(16) 32.

The table titles in MSS P<sub>1</sub> and R<sub>2</sub> appear to be in a vernacular language (transcribed above), the images of which are shown below:  
f. 5v of MS P<sub>1</sub>

|   |   |   |
|---|---|---|
| अथ संज्ञिति श्रूत्युक्तो पवित्रित्वाद्विज्ञानः ॥  | सध्यग्राहे त्रुष्टुतेऽकार्यं सपात्वद्विज्ञप्ते लोयोते धनकीजितेमोक्षं व्याप्तं आयोऽस्मण् | उत्तरपट्टैर्भृत्याग्निः ॥                           |
| कीजितेस्त्वश्च वायाथार्द्धं जोच्छमपट्टेसपात्वद्विज्ञानं धनकीजितेस्त्वश्च वायाथार्द्धं जोच्छमपट्टेसपात्वद्विज्ञानः ॥ | सपात्वद्विज्ञानं धनकीजितेस्त्वश्च वायाथार्द्धं जोच्छमपट्टेसपात्वद्विज्ञानः ॥            | उत्तरपट्टैर्भृत्याग्निः ॥                           |
| २ ३ ४ ५ ६ ७ ८ ९ १० ११ १२ १३ १४ १५ १६ १७ १८ १९ २० २१ २२ २३ २४ २५   | १० ११ १२ १३ १४ १५ १६ १७ १८ १९ २० २१ २२ २३ २४ २५   | १० ११ १२ १३ १४ १५ १६ १७ १८ १९ २० २१ २२ २३ २४ २५     |
| ० ० ० ० ३   | १   | १     |
| ३१ ४२ ५०                                       | २                                   | २ |

f. 3v of MS R<sub>2</sub>

|   |   |   |
|---|---|---|
| ॥ अथ संज्ञिति श्रूत्युक्तो पवित्रित्वाद्विज्ञानः ॥  | सध्यग्राहे त्रुष्टुतेऽकार्यं सपात्वद्विज्ञप्ते लोयोते धनकीजितेमोक्षं व्याप्तं आयोऽस्मण् | उत्तरपट्टैर्भृत्याग्निः ॥                         |
| कीजितेस्त्वश्च वायाथार्द्धं जोच्छमपट्टेसपात्वद्विज्ञानं धनकीजितेस्त्वश्च वायाथार्द्धं जोच्छमपट्टेसपात्वद्विज्ञानः ॥ | सपात्वद्विज्ञानं धनकीजितेस्त्वश्च वायाथार्द्धं जोच्छमपट्टेसपात्वद्विज्ञानः ॥            | उत्तरपट्टैर्भृत्याग्निः ॥                         |
| २ ३ ४ ५ ६ ७ ८ ९ १० ११ १२ १३ १४ १५ १६ १७ १८ १९ २० २१ २२ २३ २४ २५   | १० ११ १२ १३ १४ १५ १६ १७ १८ १९ २० २१ २२ २३ २४ २५   | १० ११ १२ १३ १४ १५ १६ १७ १८ १९ २० २१ २२ २३ २४ २५   |
| ० ० ० ० ३   | १   | १   |
| ३१ ४२ ५०                                    | २                                     | २ |

MS P<sub>2</sub> does not contain this table.

Table XIII

| atha madhyabāññāngulopari bāñaphalam |   |   |   |   |   |   |    |    |    |    |    |    |    |    | LR.a | LR.b |
|--------------------------------------|---|---|---|---|---|---|----|----|----|----|----|----|----|----|------|------|
| 1                                    | 2 | 3 | 4 | 5 | 6 | 7 | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 |      |      |
| 0                                    | 0 | 0 | 0 | 0 | 0 | 0 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0    |
| 1                                    | 2 | 3 | 4 | 5 | 7 | 7 | 10 | 11 | 12 | 14 | 15 | 15 | 17 | 19 | 21   | 27   |
|                                      |   |   |   |   |   |   |    |    |    |    |    |    |    |    |      |      |

atha madhyabāññāngulopari bāñaphalamadhyasthitū ūnaki jai te sparśasthitī anem madhyasthitī māñ bheli ēte moksasthitī thāi evam sapāta ojapade ho yato 'mayoh sapātayigmapade ho yato madhyasthitī māñ dhana kijai sparsasthitī thāi || P<sub>1</sub> || atha madhyabāññāngulopari bāñaphalam || madhyasthitū ūnaki jete sparsasthitī anem madhyasthitimāñ bheli īmte mokṣa sthitī thāi evam sapāta ojapaden ho īmto | anayoḥ sapātayugmapaden ho īmto madhyasthitimāñ dhanakijente sparsasthitī anem unakijente mokṣasthitī thāim || R<sub>2</sub>

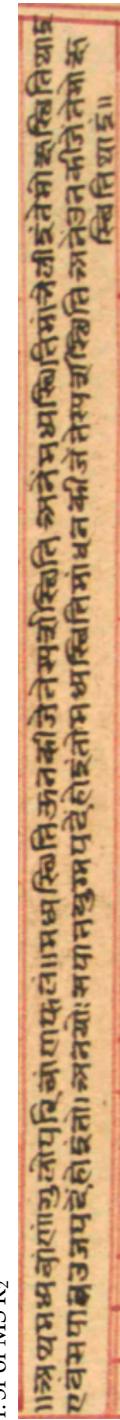
śaraphalam om. R<sub>2</sub>

The table titles in MSS P<sub>1</sub> and R<sub>2</sub> appear to be in a vernacular language (transcribed above), the images of which are shown below:

f.5r of MS P<sub>1</sub>



f.3r of MS R<sub>2</sub>



MS P<sub>2</sub> does not contain this table.

Table XIV

| atha khanakhatavasvoghasramanena bhakte labdham natamātasya tasya line 45 sedhyate śodhyamāna upary akṣayavalanam    natamśopari taksikyavalanam pūrvanate utare pāścimānate daksine valanam |      |      |      |      |      |    |      |      |      |      |      |    |      |      |      |      |      |
|--|------|------|------|------|------|----|------|------|------|------|------|----|------|------|------|------|------|
|  | VL.d | VL.m | VL.s | DF.m | DF.s |    | VL.d | VL.m | VL.s | DF.m | DF.s |    | VL.d | VL.m | VL.s | DF.m | DF.s |
| 0  | 1    | 2    | 3    | 4    | 5    | 6  | 7    | 8    | 9    | 10   | 11   | 12 | 13   | 14   | 15   | 16   | 17   |
| 22   | 22   | 22   | 22   | 22   | 21   | 21 | 21   | 20   | 20   | 19   | 19   | 19 | 18   | 18   | 17   | 17   | 21   |
| 35   | 31   | 26   | 22   | 17   | 13   | 1  | 50   | 39   | 27   | 16   | 56   | 35 | 15   | 55   | 34   | 46   | 16   |
| 39   | 23   | 36   | 5    | 34   | 3    | 45 | 28   | 9    | 52   | 34   | 14   | 55 | 33   | 14   | 53   | 46   | 19   |
| 4 <sub>x</sub>   | 4    | 4    | 4    | 4    | 11   | 11 | 11   | 11   | 20   | 20   | 20   | 20 | 20   | 20   | 20   | 20   | 26   |
| 36   | 32   | 32   | 31   | 32   | 30   | 40 | 38   | 39   | 20   | 20   | 20   | 20 | 20   | 20   | 20   | 20   | 26   |
| 23   | 24   | 25   | 26   | 27   | 28   | 29 | 30   | 31   | 32   | 33   | 34   | 35 | 36   | 37   | 38   | 39   | 40   |
| 15   | 15   | 14   | 13   | 12   | 11   | 10 | 9    | 9    | 8    | 7    | 6    | 6  | 5    | 4    | 3    | 3    | 44   |
| 37   | 3    | 29   | 51   | 13   | 34   | 56 | 17   | 34   | 51   | 9    | 26   | 43 | 57   | 12   | 27   | 42   | 0    |
| 39   | 45   | 53   | 30   | 3    | 39   | 14 | 49   | 54   | 57   | 2    | 4    | 10 | 59   | 48   | 36   | 25   | 14   |
| 33 <sub>x</sub>  | 33   | 38   | 38   | 38   | 38   | 42 | 42   | 42   | 42   | 42   | 42   | 45 | 45   | 45   | 47   | 47   | 45   |
| 44   | 54   | 53   | 24   | 24   | 26   | 26 | 56   | 56   | 56   | 56   | 56   | 12 | 12   | 12   | 12   | 12   | 27   |
|  |      |      |      |      |      |    |      |      |      |      |      |    |      |      |      |      |      |

atha khanakhatam śā o... o labhdhanatāṁśatasya o... o upari akṣayavalanam pūrvanate utare pāścimānate daksine valanam bhavati || < f. 5r> || natāṁśo o... o valanam || < f. 5v> P<sub>1</sub>

ohatāṁśca o... o natāṁśa tasya tanāt o... o upari akṣa khyā valanam< f. 3r> || natāṁśo o... o valanam || < f. 3v> R<sub>2</sub>

natāṁśah ] natāṁśa < f. 5r>, natāṁśa || < f. 5v> P<sub>1</sub>, natāṁśa < f. 3v> R<sub>2</sub> ~ antaram ] valana P<sub>1</sub> and R<sub>2</sub> ~ antaram ] antara < f. 5r>, natāṁśadā[ī]ham < f. 5v> P<sub>1</sub>, antara < f. 3r> antaram~ < f. 3v> R<sub>2</sub>

MSP<sub>1</sub>; VL.m(33) 2.

MS R<sub>2</sub>; VL.s(19) 26; DF.s(23) 54; DF.s(41) 27; DF.s(42) 26; DF.s(43) 27.

MS R<sub>2</sub> has additional entries DF.m(45) 47~ and DF.s(45) 26. Also, in MS R<sub>2</sub> the original values for DF.m(30) 42 and DF.s(30) 38 are corrected to 56 to 26 respectively, and in the bottom margin DF.m(35) 45 and DF.s(35) 12 are corrected to 42 and 56 respectively, and DF.m(40) 47 and DF.s(40) 26 are corrected to 45 and 12 respectively.

MSS P<sub>1</sub> and R<sub>2</sub> run over two folia, with MS P<sub>1</sub> having cells 1 to 22 on f. 5r and 23 to 45 on f. 5v, and MS R<sub>2</sub> having cells 1 to 22 on f. 3r and 23 to 45 on f. 3v. MS P<sub>1</sub> has a right marginal comment on < f. 5r> next to the row entries for difference (antaram) that reads [ī]ham

MS P<sub>2</sub> does not contain this table.

Table XV

| P  |      |       |      |        |       |          |
|--|------|-------|------|--------|-------|----------|
| atha sapātacandraśuryatāśyupari parveśajñānam rāśinām cakrasodhyā vīnā |      |       |      |        |       |          |
| 0  | 5    | 6     | 11   | 17     | 18    | 23       |
| varuṇa   | śaśi | indra | yama | varuṇa | agni  | brahma   |
|  |      |       |      |        | indra | kubera   |
|  |      |       |      |        |       | parveśāḥ |

• caṃdra •...• rāśyum •...• parveśam •...• rāśimāṃ • P<sub>1</sub> • sapātāśurya •, -caṃdra- om. R<sub>2</sub>

MS P<sub>1</sub>: P(6) imdra; P(12) brahma; P(23) imdra.

MS R<sub>2</sub>: P(6) imdra; P(23) imdra.

MS R<sub>2</sub> has the table heading placed to the right of the table.

MS P<sub>2</sub> does not contain this table.

Table XVI

| atha sparśakale tathā noksakale sāyanagrāhasya kōtyāṁśopary anśīdyaṁ ayanajām valanam sāyanagrāhakārḍau daksheṇe makārāḍav uttare valano deyam |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |       |        |        |       |
|--|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-------|--------|--------|-------|
|  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |       |        |        |       |
| 0  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27    | 28     | 29     | 30    |
| 0  | 0  | 0  | 1  | 1  | 2  | 2  | 3  | 3  | 4  | 4  | 5  | 5  | 6  | 6  | 7  | 7  | 8  | 8  | 9  | 9  | 10 | 10 | 10 | 11 | 11 | 12 | V.L.d |        |        |       |
| 0  | 25 | 50 | 15 | 40 | 6  | 31 | 56 | 21 | 46 | 12 | 36 | 0  | 24 | 48 | 12 | 36 | 0  | 24 | 48 | 12 | 34 | 56 | 20 | 43 | 6  | 28 | 51    | 14     | 37     | 0     |
| 3  | 13 | 24 | 36 | 48 | 1  | 12 | 24 | 36 | 48 | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 36 | 24    | 12     | 0      |       |
| 25   | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 22 | 22 | 22 | 22 | 22 | 22    | 22     | 20     |       |
| 12   | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12    | 12     | DF.s   |       |
| 31   | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58    | 59     | 60     |       |
| 12   | 12 | 13 | 13 | 14 | 14 | 14 | 15 | 15 | 16 | 16 | 16 | 17 | 17 | 17 | 17 | 18 | 18 | 18 | 18 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 20    | 20     | 20     |       |
| 20   | 40 | 1  | 21 | 42 | 2  | 22 | 43 | 3  | 24 | 42 | 0  | 18 | 36 | 54 | 12 | 30 | 48 | 6  | 24 | 36 | 52 | 7  | 20 | 36 | 50 | 4  | 19    | 33     | 48     | V.L.m |
| 24   | 48 | 12 | 36 | 1  | 24 | 48 | 12 | 36 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 24 | 48 | 12 | 39 | 0  | 24 | 48 | 12    | 36     | 0      |       |
| 20   | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14    | 14     | dhanam |       |
| 24   | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24    | 24     | DF.m   |       |
| 61   | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88    | 89     | 90     |       |
| 20   | 21 | 21 | 21 | 21 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23    | 24     | V.L.d  |       |
| 58   | 9  | 20 | 31 | 42 | 52 | 3  | 14 | 25 | 36 | 42 | 48 | 54 | 0  | 6  | 12 | 18 | 24 | 30 | 36 | 38 | 40 | 43 | 45 | 48 | 50 | 52 | 55    | 57     | 0      | V.L.m |
| 48   | 36 | 24 | 11 | 0  | 48 | 36 | 24 | 12 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 24 | 48 | 12 | 36 | 0  | 24 | 48 | 12    | 36     | 1      | V.L.s |
| 10   | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 6  | 6  | 6  | 6  | 6  | 6  | 6  | 6  | 6  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 0     | dhanam |        |       |
| 48   | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48    | 48     | DF.s   |       |

◦ kōtyāṁśopari anśādyan āyanajām ◦... sāyanasahakārḍau daksheṇe makārāḍav uttare valano deyam || P<sub>1</sub> • ◦ kōtyāṁśopari anśādyan āyanajām ◦... karkādau daksheṇe makārāḍau uttare valano deyam || R<sub>2</sub>

dhanam ] dhanam P<sub>1</sub> and R<sub>2</sub> for DF entries corresponding to 0 to 30 and 31 to 60, om. for P<sub>1</sub> and R<sub>2</sub> for DF entries corresponding to 61 to 90.

MSP<sub>1</sub>; VL.s(23) 34; VL.d(48) 18.

MSR<sub>2</sub>; DF.(0) 12 dha; VL.s(23) 24; DF.s(30) 24 dha., VL.s(39) 0; VL.d(41) 16; VL.d(48) 18; DF.m(51) 0; DF.s(60) dha24; DF.m(90) 2.

MS P<sub>1</sub> has the left marginal entries; dha◦ adjacent to the row of DF entries corresponding to the values 0 to 30 and dhana adjacent to the row of DF entries corresponding to the values 31 to 60. It also has a right marginal entry dhanam additional to the row header dhanam for DF entries corresponding to the values 0 to 30.

MSP<sub>2</sub> does not contain this table.

Table XVII

| atha sūryasya valanam spastam   aksikhyam tathāyanam valanayor yogāntarāṁśopary aṅgulādayam valanam spastam sūryasya   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |      |      |
|--|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|------|------|
| sūryasya grāsavalanam pacime deyam   mokṣavalanam pūrve deyam   sūryasya sparsavalanam vipartam deyam   uttare-jātam dāsine deyam   dakṣine-jātam uttare deyam |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |      |      |
|  |    | 0  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22   | 23   |
| 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 2  | 2  | 2  | 2  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 4  | 4    | SF.a |
| 7  | 14 | 24 | 34 | 46 | 59 | 8  | 21 | 33 | 44 | 56 | 12 | 27 | 39 | 49 | 0  | 1  | 11 | 23 | 35 | 45 | 57 | 7  | 16 | SF.b |      |
| 24   | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | SF.a |      |
| 4  | 4  | 4  | 5  | 5  | 5  | 5  | 5  | 6  | 6  | 6  | 6  | 6  | 6  | 6  | 6  | 6  | 7  | 7  | 7  | 7  | 7  | 7  | 7  | 8    |      |
| 27   | 39 | 50 | 0  | 9  | 21 | 30 | 39 | 50 | 0  | 6  | 18 | 26 | 35 | 45 | 55 | 3  | 12 | 20 | 26 | 36 | 45 | 53 | 2  | SF.b |      |

• spastam | aksikhyam tathā āyanalam o...o āyanānam o...o yogāntarāṁśo | pari angulā o...o grāsa o...o paścime deyam | o...o pūrve deyam | o...o vipartam deyam | o...o daksine jātam uttare deyam | o...o daksine jātam uttare deyam | o...o vipartitam deyam | o...o daksine jātam uttare deyam | o...o sūryasya grāsavalanam pāścime deyam mokṣa o...o deyam sūryasya o...o deyam sūryasya o...o vipartitam deyam v daksine jātam uttare deyam v uttare jātam v right marginal insertion on f.4v R<sub>2</sub>

MS P<sub>1</sub>; SFb(29) 26.MS R<sub>2</sub>; SFb(5) 49; SFb(7) 12.MS P<sub>2</sub> has sūryasya grāsavalanam pāścimato deyam mokṣavalanam pūrvato deyam | in the left margin of f.6v.Marginal text in MS P<sub>1</sub> f.6v.MS P<sub>2</sub> does not contain this table.

Table XVIII

| sparśāvalanam pūrve deyam   moksāvalanam pāscīne deyam   candraśya moksāvalanam vipariṭam deyam   uttare jātan daksīne deyam   daksīne jātan uttare deyam |    |    |    |    |    |    |    |    |    |    |    | candraśahane |    |    |    |    |    |    |    |    |    |    |    |
|---|----|----|----|----|----|----|----|----|----|----|----|--------------|----|----|----|----|----|----|----|----|----|----|----|
| sparśāvalanam pūrve deyam   aksākhyavalanam tathāyanajam valanayor yogāntarāṁśopary angulādyam valanam spastam   candraśahane                             |    |    |    |    |    |    |    |    |    |    |    |              |    |    |    |    |    |    |    |    |    |    |    |
| 0   | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12           | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 0   | 0  | 0  | 1  | 1  | 1  | 2  | 2  | 3  | 3  | 3  | 3  | 4            | 4  | 4  | 4  | 5  | 5  | 5  | 5  | 6  | 6  | 7  | 7  |
| 4   | 21 | 40 | 1  | 20 | 40 | 1  | 19 | 40 | 5  | 19 | 39 | 58           | 17 | 40 | 55 | 19 | 22 | 33 | 0  | 40 | 47 | 8  | 24 |
| 24  | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36           | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 |
| 7   | 8  | 8  | 8  | 9  | 9  | 9  | 10 | 10 | 10 | 10 | 11 | 11           | 11 | 11 | 11 | 12 | 12 | 12 | 12 | 13 | 13 | 13 | 13 |
| 42  | 3  | 21 | 38 | 0  | 19 | 46 | 59 | 3  | 16 | 35 | 53 | 6            | 20 | 37 | 55 | 10 | 27 | 41 | 53 | 7  | 24 | 35 | 51 |
|   |    |    |    |    |    |    |    |    |    |    |    |              |    |    |    |    |    |    |    |    |    |    |    |
|   |    |    |    |    |    |    |    |    |    |    |    |              |    |    |    |    |    |    |    |    |    |    |    |
|   |    |    |    |    |    |    |    |    |    |    |    |              |    |    |    |    |    |    |    |    |    |    |    |

• candra • • spastam aksākhyā •...• tathā āyanajam valanayo | ryogaṁtarāṁśopari angulādyam •...• spastam candra •...• purvadeyam mokṣa •...• pāscīne deyam candraśya •...• vipariṭam deyam uttare •...• daksīne deyam •...• daksīne alṣākhyā •...• spastam alṣākhyā •...• tathā āyanajam valanayor yogāntarāṁśopari angulādyam •...• spastam candraśahane •...• purvadeyam mokṣa •...• pāscīne deyam candraśya •...• vipariṭam deyam uttare •...• daksīne deyam daksīne • R<sub>2</sub>

MS P<sub>1</sub>; SF.b(17) 33; SF.b(18) 22; SF.a(35) 11.

MS R<sub>2</sub>; SF.b(17) 33; SF.b(18) 22.

MS P<sub>1</sub> has double entries for arguments 29 and 30: the correct ones are as seen above, the incorrect ones are SF.a(29) 9, SF.b(29) 46 and SF.a(30) 9, SF.b(30) 9.

MS P<sub>2</sub> does not contain this table.

Table XIX

|       |    | atha sāyanaravirāśyupari dyudalam |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |       |       |       |
|-------|----|-----------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-------|-------|-------|
| amśah |    | 0                                 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | amśah |       |       |
| 1     | 15 | 15                                | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16    | amśah |       |
| 2     | 16 | 16                                | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16    | amśah |       |
| 3     | 16 | 16                                | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16    | amśah |       |
| 4     | 16 | 16                                | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16    | amśah |       |
| 5     | 15 | 15                                | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15    | amśah |       |
| 6     | 15 | 14                                | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14    | amśah |       |
| 7     | 14 | 14                                | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14    | amśah |       |
| 8     | 13 | 13                                | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13    | amśah |       |
| 9     | 13 | 13                                | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13    | amśah |       |
| 10    | 13 | 13                                | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13    | amśah |       |
| 11    | 14 | 14                                | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14    | amśah |       |
| 0     | 0  | 1                                 | 3  | 5  | 6  | 8  | 10 | 11 | 13 | 15 | 16 | 18 | 20 | 21 | 23 | 25 | 26 | 28 | 30 | 31 | 32 | 35 | 36 | 38 | 40 | 41 | 43 | 45 | 46 | 48 | 48 | 48    | 48    | amśah |

• rāśyopari dyudalam P<sub>1</sub>, iti campraparvādhikāraḥ added to the left of the title in P<sub>1</sub>

amśah ] am P<sub>1</sub>; hiśa R<sub>2</sub>

MS P<sub>1</sub>: HL.v(1.5) 58; HL.v(1.9) 3; HL.v(1.22) 29; HL.v(2.11) 35; HL.v(2.12) 35; HL.v(3.17) 38; HL.v(3.24) 33; HL.v(7.29) 36; HL.v(8.22) 18; HL.g(10.23) 13.

MS R<sub>2</sub>: HL.g(1.8) 15; HL.v(2.17) 19; HL.v(4.23) 49; HL.v(6.27) 5.

MSP<sub>2</sub> does not contain this table.

The abbreviated zodiacal signs in the last column of the table stand for the following zodiacal constellations, only seen in MS R<sub>2</sub>:

|   |         |         |   |         |       |   |         |         |    |         |        |
|---|---------|---------|---|---------|-------|---|---------|---------|----|---------|--------|
| 1 | vr̄ [४] | vṛṣabha | 4 | sim [३] | simha | 7 | vr̄ [३] | vṛśčika | 10 | kum [४] | kumbha |
| 2 | mi [१]  | mithuna | 5 | ka [१]  | kanya | 8 | dha [१] | dhanuṣa | 11 | ni [१]  | niśa   |
| 3 | ka [२]  | karkata | 6 | tu [१]  | tula  | 9 | ma [१]  | makara  | 0  | me [१]  | meṣa   |

Table XX

|         |    | atha śāstṛiyaparvādhikārāt tata tāvatprathamam sāyanāravīśaṇyōṣparī sāyanālagnam kāraṇīyam sāyanāravīśaṇyōṣparī lagnakosthakāḥ |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |       |       |
|---------|----|--|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-------|-------|
| amsah   |    | 0  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28    | 29    |
| [?] me  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 2  | 2  | 2  | 2  | 3  | 3  | 3  | 3     | amsah |
| [?] 0   | 0  | 7  | 15 | 22 | 30 | 38 | 45 | 53 | 0  | 8  | 16 | 23 | 31 | 38 | 46 | 54 | 1  | 9  | 16 | 24 | 32 | 39 | 47 | 54 | 2  | 10 | 17 | 25 | 32 | 40    |       |
| [?] 0   | 0  | 36   | 12 | 48 | 24 | 0  | 36 | 12 | 48 | 24 | 0  | 36 | 12 | 48 | 24 | 0  | 36 | 12 | 48 | 24 | 0  | 36 | 12 | 48 | 24 | 0  | 36 | 12 | 48 | 24    |       |
| [?] vr  | 1  | 48   | 56 | 5  | 13 | 22 | 31 | 39 | 48 | 57 | 5  | 14 | 22 | 31 | 40 | 48 | 57 | 6  | 14 | 23 | 32 | 40 | 49 | 57 | 6  | 15 | 23 | 32 | 41 | 58    |       |
| [?] 1   | 0  | 38   | 16 | 54 | 32 | 10 | 48 | 26 | 4  | 42 | 20 | 58 | 36 | 14 | 52 | 30 | 8  | 46 | 24 | 2  | 40 | 18 | 56 | 34 | 12 | 50 | 28 | 6  | 44 | 22    |       |
| [?] mi  | 2  | 8  | 8  | 8  | 8  | 8  | 9  | 9  | 9  | 9  | 10 | 10 | 10 | 10 | 10 | 10 | 11 | 11 | 11 | 11 | 11 | 11 | 12 | 12 | 12 | 12 | 12 | 12 | 13 | mi    |       |
| [?] 2   | 0  | 12   | 24 | 36 | 48 | 0  | 12 | 24 | 36 | 48 | 0  | 12 | 24 | 36 | 48 | 0  | 12 | 24 | 36 | 48 | 0  | 12 | 24 | 36 | 48 | 0  | 12 | 24 | 36 | 48    |       |
| [?] ka  | 3  | 13   | 13 | 13 | 13 | 14 | 14 | 14 | 14 | 14 | 15 | 15 | 15 | 15 | 15 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 17 | 17 | 17 | 17 | 18 | 18 | 18 | 18    |       |
| [?] 3   | 13 | 24   | 35 | 47 | 58 | 9  | 21 | 32 | 43 | 55 | 6  | 17 | 29 | 40 | 51 | 3  | 14 | 25 | 37 | 48 | 59 | 11 | 22 | 33 | 45 | 56 | 7  | 19 | 30 | 41    |       |
| [?] 0   | 20 | 40   | 0  | 20 | 40 | 0  | 20 | 40 | 0  | 20 | 40 | 0  | 20 | 40 | 0  | 20 | 40 | 0  | 20 | 40 | 0  | 20 | 40 | 0  | 20 | 40 | 0  | 20 | 40 |       |       |
| [?] sim | 4  | 18   | 19 | 19 | 19 | 19 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 21 | 21 | 21 | 21 | 22 | 22 | 22 | 22 | 22 | 23 | 23 | 23 | 23 | 23 | 24 | 24    |       |
| [?] 4   | 53 | 4  | 15 | 26 | 38 | 49 | 0  | 12 | 23 | 34 | 46 | 57 | 8  | 19 | 31 | 42 | 53 | 5  | 16 | 27 | 39 | 50 | 1  | 12 | 24 | 35 | 46 | 58 | 9  | 20    | sim   |
| [?] 5   | 0  | 18   | 36 | 54 | 12 | 30 | 48 | 6  | 24 | 42 | 0  | 18 | 36 | 54 | 12 | 30 | 48 | 6  | 24 | 42 | 0  | 18 | 36 | 54 | 12 | 30 | 48 | 6  | 24 | 42    |       |
| [?] kam | 24 | 24   | 24 | 25 | 25 | 25 | 25 | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 28 | 28 | 28 | 28 | 28 | 29 | 29 | 29 | kam   |       |
| [?] 5   | 0  | 32   | 42 | 53 | 4  | 15 | 26 | 37 | 48 | 59 | 10 | 21 | 32 | 43 | 54 | 5  | 16 | 26 | 37 | 48 | 59 | 10 | 12 | 21 | 32 | 43 | 54 | 5  | 16 | 27    | 28    |
| [?] 0   | 56 | 12   | 48 | 44 | 40 | 36 | 32 | 28 | 24 | 20 | 16 | 12 | 8  | 4  | 0  | 56 | 32 | 48 | 44 | 40 | 36 | 36 | 32 | 28 | 24 | 20 | 16 | 12 | 8  | amsah |       |

• lagnakosthakāḥ || P<sub>1</sub> • • śopari lagnam kara o... o lagnakosthakāḥ R<sub>2</sub>MS P<sub>1</sub>: first column of signs: amsah [ am; me0 ] rāśi 0; vr 1 ] 1; ml 2 ] 2; ka 3 ] 3; sim 4 ] 4; kam 5 ] 5 last column of signs: omittedMS R<sub>2</sub>: first column of signs: amsah [ am; ka 3 ] kar 3 last column of signs: amsah ] mMS P<sub>1</sub>: OA,g(3,3) 23; OA,(3,14) 50; OA,v(3,24) [-5 OA,(5,5) 4]; OA,(5,6) [-6; OA,v(5,21) 21; OA,v(5,22) 32; OA,(5,23) 43; OA,(5,24) 54, OA,(5,25) 5, OA,(5,25) 24; OA,v(5,26) 16, OA,(5,27) 17, OA,(5,27) 27, OA,(5,28) 38; OA,(5,29) 49, OA,(5,29) 4, MS R<sub>2</sub>: OA,(0,2) 22; OA,v(2,10) 48; OA,v(2,11) 58; OA,(2,28) 56; OA,v(3,8) 53; OA,(5,2) 52.MS P<sub>1</sub> has the following entries (or part thereof) illegibly smudged: OA,v(3,24), OA,(5,5), OA,(5,6), OA,(5,23), and OA,(5,27).  
MS P<sub>2</sub> does not contain this table.

Table XX

|       |     | sāyanavatīrśyamśopari lagnakosṭhakāḥ |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |      |          |         |         |
|-------|-----|--------------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|------|----------|---------|---------|
| ansāḥ | 0   | 1                                    | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28   | 29       | ansāḥ   |         |
| [Ω]   | tu  | 30                                   | 30 | 30 | 30 | 30 | 31 | 31 | 31 | 31 | 31 | 31 | 32 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 34 | 34 | 34 | 34 | 34 | 35 | 35 | OA,g |          |         |         |
| [M]   | 6   | 0                                    | 10 | 21 | 32 | 43 | 54 | 5  | 16 | 27 | 38 | 49 | 0  | 11 | 22 | 33 | 44 | 54 | 5  | 16 | 27 | 38 | 49 | 0  | 11 | 22 | 33 | 44 | 55   | 6        | 17      | tu<br>6 |
| [V]   | vṛ  | 35                                   | 35 | 35 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 37 | 37 | 37 | 37 | 37 | 38 | 38 | 38 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39   | vṛ<br>7  |         |         |
| [X]   | dha | 41                                   | 41 | 41 | 41 | 41 | 42 | 42 | 42 | 42 | 42 | 42 | 43 | 43 | 43 | 43 | 43 | 44 | 44 | 44 | 44 | 44 | 44 | 45 | 45 | 45 | 45 | 46 | 46   | dha<br>8 |         |         |
| [E]   | ma  | 46                                   | 46 | 47 | 47 | 47 | 47 | 47 | 47 | 48 | 48 | 48 | 48 | 48 | 48 | 49 | 49 | 49 | 49 | 49 | 49 | 49 | 49 | 50 | 50 | 50 | 50 | 50 | 51   | 51       | ma<br>9 |         |
| [K]   | kum | 51                                   | 52 | 52 | 52 | 52 | 52 | 52 | 52 | 52 | 52 | 53 | 53 | 53 | 53 | 53 | 54 | 54 | 54 | 54 | 54 | 54 | 54 | 55 | 55 | 55 | 55 | 55 | 56   | 56       | OA,g    |         |
| [R]   | mī  | 53                                   | 1  | 10 | 18 | 27 | 36 | 44 | 53 | 2  | 10 | 19 | 27 | 36 | 45 | 53 | 2  | 11 | 19 | 28 | 37 | 45 | 54 | 2  | 11 | 20 | 28 | 37 | 46   | 46       | 3       | OA,v    |
| [H]   | tu  | 0                                    | 38 | 16 | 54 | 32 | 10 | 48 | 26 | 4  | 42 | 20 | 58 | 36 | 14 | 52 | 30 | 8  | 46 | 24 | 2  | 40 | 18 | 56 | 34 | 12 | 50 | 38 | 6    | 44       | 22      | OA,1    |
|       |     |                                      |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | OA,g |          |         |         |
|       |     |                                      |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | OA,v |          |         |         |
|       |     |                                      |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | OA,1 |          |         |         |

◦ rāśyāṁśopari • P<sub>1</sub> • ◦ lagnakosṭhakāḥ || P<sub>1</sub> and R<sub>2</sub>

MS P<sub>1</sub>: first column of signs: ansāḥ [ am; vṛ 7 ] 7; dha 8 ] 8; ma 9 ] 9; kum 10 ] 10; mī 11 ] 11 last column of signs: ansāḥ [ am; tu 6 ] rā 6; vṛ 7 ] 7; dha 8 ] 8; ma 9 ] om.; kum 10 ] om.; mī 11 ] om.

MS R<sub>2</sub>: first column of signs: ansāḥ [ ansāḥ; tu 6 ] tula 6; vṛ 7 ] vr̄ci 7; dha 8 ] dhana 8; ma 9 ] ma 9; kum 10 ] kum 10; mī 11 ] mī 11 last column of signs: omitted

MSP<sub>1</sub>: OA,g(6,2) 31; OA,g(6,25) 33; OA,1(8,5) 4; OA,1(8,17) 20; OA,v(9,2) 17; OA,1(9,23) 48; OA,g(10,3) 58; OA,v(11,26) 26.

MS R<sub>2</sub>: OA,1(6,25) 26; OA,v(9,1) 47; OA,1(9,2) 14; OA,1(9,23) 48; OA,g(9,25) 50; OA,1(9,28) 46; OA,v(10,2) 17; OA,1(10,23) 24; OA,1(10,26) 28; OA,1(11,3) 38; OA,1(11,14) 22.

MSP<sub>2</sub> does not contain this table.

The abbreviated names of the zodiacal signs are described in full in the critical apparatus of Table XIX.

Table XXI

|     |    | atha laghnasya kalākosthakāḥ |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |           |           |           |      |
|-----|----|------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----------|-----------|-----------|------|
|     |    | 1                            | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30        | kalāḥ     |           |      |
|     |    | 0                            | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 2  | 2  | 2  | 2  | 2  | 3  | 3  | 3  | 3         | 3         | mina 12   |      |
| I   | 1  | 7                            | 15 | 22 | 30 | 38 | 45 | 53 | 0  | 8  | 16 | 23 | 31 | 38 | 46 | 54 | 1  | 9  | 16 | 24 | 32 | 39 | 47 | 54 | 2  | 10 | 17 | 25 | 32 | 40 | 48        | mesa 1    |           |      |
|     |    | 36                           | 12 | 48 | 24 | 0  | 36 | 12 | 48 | 24 | 0  | 36 | 12 | 48 | 24 | 0  | 36 | 12 | 48 | 24 | 0  | 36 | 12 | 48 | 24 | 0  | 36 | 12 | 48 | 24 | 0         |           |           |      |
|     |    | 31                           | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60        | kalāḥ     |           |      |
|     |    | 3                            | 4  | 4  | 4  | 4  | 4  | 4  | 4  | 4  | 4  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 6  | 6  | 6  | 6  | 6  | 6  | 6  | 7  | 7  | 7  | 7         | mina 12   |           |      |
| I   | 55 | 3                            | 10 | 18 | 26 | 33 | 41 | 48 | 56 | 4  | 11 | 19 | 26 | 34 | 42 | 49 | 57 | 4  | 12 | 20 | 27 | 35 | 42 | 50 | 58 | 5  | 13 | 20 | 28 | 36 | 36        | mesa 1    |           |      |
|     |    | 36                           | 12 | 48 | 24 | 0  | 36 | 12 | 48 | 24 | 0  | 36 | 12 | 48 | 24 | 0  | 36 | 12 | 48 | 24 | 0  | 36 | 12 | 48 | 24 | 0  | 36 | 12 | 48 | 24 | 0         |           |           |      |
| II  | 1  | 2                            | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | kalāḥ     |           |           |      |
|     |    | 0                            | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 2  | 2  | 2  | 2  | 2  | 3  | 3  | 3         | 3         | 3         | OA,g |
|     |    | 8                            | 17 | 25 | 34 | 43 | 51 | 0  | 9  | 17 | 26 | 34 | 43 | 52 | 0  | 9  | 18 | 26 | 35 | 44 | 52 | 1  | 9  | 18 | 27 | 35 | 44 | 53 | 1  | 10 | 19        | vsra 2    |           |      |
|     |    | 38                           | 16 | 56 | 32 | 10 | 48 | 26 | 4  | 42 | 20 | 58 | 36 | 14 | 52 | 30 | 8  | 46 | 14 | 2  | 40 | 18 | 56 | 34 | 12 | 50 | 28 | 6  | 44 | 22 | 0         | kumbha 11 |           |      |
|     |    | 31                           | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60        | kalāḥ     |           |      |
|     |    | 4                            | 4  | 4  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 6  | 6  | 6  | 6  | 6  | 6  | 6  | 7  | 7  | 7  | 7  | 7  | 7  | 7  | 8  | 8  | 8  | 8  | 8  | 8         | vsra 2    |           |      |
| II  | 27 | 36                           | 44 | 53 | 2  | 10 | 19 | 28 | 36 | 45 | 53 | 2  | 11 | 19 | 28 | 37 | 45 | 54 | 3  | 11 | 20 | 28 | 37 | 46 | 54 | 3  | 12 | 20 | 29 | 38 | kumbha 11 |           |           |      |
|     |    | 38                           | 16 | 54 | 32 | 10 | 48 | 26 | 4  | 42 | 20 | 58 | 36 | 14 | 52 | 30 | 8  | 6  | 24 | 2  | 40 | 18 | 56 | 34 | 12 | 50 | 28 | 6  | 44 | 22 | 0         |           |           |      |
| III | 1  | 2                            | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | kalāḥ     |           |           |      |
|     |    | 0                            | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 2  | 2  | 2  | 2  | 3  | 3  | 3  | 4         | 4         | OA,g      |      |
|     |    | 10                           | 20 | 30 | 40 | 51 | 1  | 11 | 21 | 31 | 42 | 52 | 2  | 12 | 22 | 33 | 43 | 53 | 3  | 13 | 24 | 34 | 44 | 54 | 4  | 15 | 25 | 35 | 45 | 55 | 6         | mithuna 3 |           |      |
|     |    | 12                           | 24 | 36 | 48 | 0  | 12 | 24 | 36 | 48 | 0  | 12 | 24 | 36 | 48 | 0  | 12 | 24 | 36 | 48 | 0  | 12 | 24 | 36 | 48 | 0  | 12 | 24 | 36 | 48 | 0         |           |           |      |
|     |    | 31                           | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60        | kalāḥ     |           |      |
|     |    | 5                            | 5  | 5  | 5  | 6  | 6  | 6  | 6  | 6  | 6  | 6  | 7  | 7  | 7  | 7  | 7  | 7  | 7  | 8  | 8  | 8  | 8  | 9  | 9  | 9  | 9  | 9  | 9  | 9  | 9         | 9         | makara 10 |      |
| III | 16 | 26                           | 36 | 46 | 57 | 7  | 17 | 27 | 37 | 48 | 58 | 8  | 18 | 39 | 59 | 79 | 9  | 19 | 30 | 40 | 50 | 59 | 79 | 9  | 10 | 21 | 31 | 42 | 52 | 1  | 12        | 46        | 48        | 0    |
|     |    | 12                           | 24 | 36 | 48 | 0  | 12 | 24 | 36 | 48 | 0  | 12 | 24 | 36 | 48 | 0  | 12 | 24 | 36 | 48 | 0  | 12 | 24 | 36 | 48 | 0  | 12 | 24 | 36 | 48 | 0         |           |           |      |

◦ koṣṭakā || | P<sub>1</sub> and P<sub>2</sub> • atha om. P<sub>2</sub>  
 kalāḥ ] kalā P<sub>1</sub>; prius ka • in row II, alibi kalā R<sub>2</sub> & kumbha P<sub>1</sub>, P<sub>2</sub>, and R<sub>2</sub>

MSP<sub>1</sub>; OA,g(I,23) 3; OA,I(II,16) 18; OA,v(II,17) 16;

MSP<sub>2</sub>; OA,v(II,24) 14; OA,g(III,11) 2; OA,I(II,11) 0.

MS R<sub>2</sub>; OA,(I,12) 32; OA,v(I,13) 31; OA,I(II,29) 14; OA,I(II,52) 5; OA,I(II,57) 22; OA,I(II,42) 12; OA,v(II,26) 8; OA,v(II,45) 34; OA,I(II,53) 26.

MSP<sub>2</sub> has 60 kalāḥ entries corresponding to each pair of zodiacal signs tabulated in two unequal successive rows of 31 columns (1 to 31) and 29 columns (32 to 60).

MS R<sub>2</sub> has no table title.

Table XXI

|     |    | atha lagasya kalākosthakāḥ |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |         |            |    |
|-----|----|----------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------|------------|----|
|     |    | 1                          | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29      | 30         |    |
| IV  | 11 | 22                         | 34 | 45 | 56 | 8  | 19 | 30 | 42 | 53 | 4  | 16 | 27 | 38 | 50 | 1  | 12 | 24 | 35 | 46 | 58 | 9  | 20 | 32 | 43 | 54 | 6  | 17 | 28 | 5       | 5          |    |
| IV  | 20 | 40                         | 0  | 20 | 40 | 0  | 20 | 40 | 0  | 20 | 40 | 0  | 20 | 40 | 0  | 20 | 40 | 0  | 20 | 40 | 0  | 20 | 40 | 0  | 20 | 40 | 0  | 20 | 40 | 0       |            |    |
|     | 31 | 32                         | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60      |            |    |
| IV  | 51 | 6                          | 6  | 6  | 6  | 7  | 7  | 7  | 8  | 8  | 8  | 8  | 8  | 8  | 8  | 8  | 8  | 8  | 8  | 9  | 9  | 9  | 10 | 10 | 10 | 10 | 11 | 11 | 11 | 11      | 11         |    |
| IV  | 20 | 40                         | 0  | 20 | 40 | 0  | 20 | 40 | 0  | 20 | 40 | 0  | 20 | 40 | 0  | 20 | 40 | 0  | 20 | 40 | 0  | 20 | 40 | 0  | 20 | 40 | 0  | 20 | 40 | 0       |            |    |
|     | 1  | 2                          | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30      |            |    |
| V   | 0  | 0                          | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 2  | 2  | 2  | 3  | 3  | 3  | 3  | 4  | 4  | 4  | 4  | 4  | 4  | 4       | 4          | 4  |
| V   | 11 | 22                         | 33 | 45 | 56 | 7  | 19 | 30 | 41 | 53 | 4  | 15 | 26 | 38 | 49 | 0  | 12 | 23 | 34 | 46 | 57 | 8  | 19 | 31 | 42 | 53 | 5  | 16 | 27 | 39      | 5          |    |
| V   | 36 | 54                         | 12 | 30 | 48 | 6  | 24 | 32 | 42 | 0  | 18 | 36 | 54 | 12 | 30 | 48 | 6  | 24 | 42 | 0  | 18 | 36 | 54 | 12 | 30 | 48 | 6  | 24 | 42 | 0       |            |    |
|     | 31 | 32                         | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60      |            |    |
| V   | 5  | 6                          | 6  | 6  | 6  | 7  | 7  | 7  | 8  | 8  | 8  | 8  | 8  | 8  | 8  | 8  | 9  | 9  | 9  | 9  | 9  | 9  | 10 | 10 | 10 | 10 | 10 | 10 | 11 | 11      | 11         | 11 |
| V   | 50 | 1                          | 12 | 24 | 35 | 46 | 58 | 9  | 20 | 32 | 43 | 54 | 5  | 17 | 28 | 39 | 51 | 2  | 13 | 25 | 36 | 47 | 58 | 10 | 21 | 32 | 44 | 55 | 6  | 18      | vr̄scīka 8 |    |
| V   | 18 | 36                         | 54 | 12 | 30 | 48 | 6  | 24 | 42 | 0  | 18 | 36 | 54 | 12 | 30 | 48 | 6  | 24 | 42 | 0  | 18 | 36 | 54 | 12 | 30 | 48 | 6  | 24 | 42 | 0       |            |    |
|     | 1  | 2                          | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30      |            |    |
| VII | 0  | 0                          | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 2  | 2  | 2  | 3  | 3  | 3  | 3  | 4  | 4  | 4  | 4  | 4  | 4  | 4       | 4          | 4  |
| VII | 10 | 21                         | 32 | 43 | 54 | 5  | 16 | 27 | 38 | 49 | 0  | 11 | 22 | 33 | 44 | 5  | 16 | 27 | 38 | 49 | 0  | 11 | 22 | 33 | 44 | 55 | 6  | 17 | 28 | kanyā 6 |            |    |
| VII | 56 | 52                         | 48 | 44 | 40 | 36 | 32 | 28 | 24 | 20 | 16 | 12 | 8  | 4  | 0  | 56 | 52 | 48 | 44 | 40 | 36 | 32 | 28 | 24 | 20 | 16 | 12 | 8  | 4  | 0       |            |    |
|     | 31 | 32                         | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60      |            |    |
| VII | 5  | 5                          | 6  | 6  | 6  | 6  | 6  | 6  | 6  | 6  | 7  | 7  | 7  | 7  | 8  | 8  | 8  | 8  | 8  | 9  | 9  | 9  | 9  | 10 | 10 | 10 | 10 | 10 | 10 | 10      | 10         | 10 |
| VII | 38 | 49                         | 0  | 11 | 22 | 33 | 44 | 55 | 6  | 17 | 28 | 39 | 50 | 1  | 12 | 22 | 33 | 44 | 55 | 6  | 17 | 28 | 39 | 50 | 1  | 12 | 23 | 34 | 45 | 56      |            |    |
| VII | 56 | 52                         | 48 | 44 | 40 | 36 | 32 | 28 | 24 | 20 | 16 | 12 | 8  | 4  | 0  | 56 | 52 | 48 | 44 | 40 | 36 | 32 | 28 | 24 | 20 | 16 | 12 | 8  | 4  | 0       |            |    |
|     | 1  | 2                          | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30      |            |    |
|     |    |                            |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |         |            |    |

◦ koṣṭakāḥ || P<sub>1</sub> and P<sub>2</sub> • atha om. P<sub>2</sub>  
kalāḥ P<sub>1</sub>, P<sub>2</sub>, and R<sub>2</sub> ~ dhanas 9, dhanas 9, prius dhanas 9 P<sub>1</sub>; dhanas 9 R<sub>2</sub>; ~ tula 7 P<sub>1</sub>; tula 7 prius tulā 7 P<sub>1</sub>; kanyā 6 R<sub>2</sub>

alterum tula 7 kanyā 6 transpositū in tula 7

MS P<sub>1</sub>: OA.I(V.47) 3; OA.I(VL 7) 38; OA.I(VL 21) 35; OA.I(VL 57) 13.

MS R<sub>2</sub>: OA.I(V.19) 40; OA.g(V.38) 6; OA.v(V.38) 59; OA.v(V.15) 59; OA.v(V.19) 24; OA.I(VL 11) 26; OA.I(VL 19) 24; OA.I(VL 34) 34.

MS P<sub>2</sub> has entries for OA.v(4.55), OA.I(4.55), OA.v(5.25), OA.I(5.54) illegibly smudged.  
MS R<sub>2</sub> has no table title.

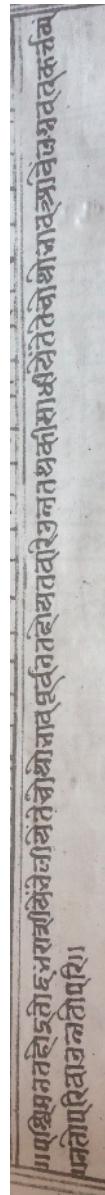
Table XXII

|     |         | kalākosthakāḥ |    |    |    |    |    |    |    |    |    |    |    |    |    |               |
|-----|---------|---------------|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|
|     |         | kalāḥ         | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | kalākosthakāḥ |
| I   | kanyā   | 6             | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | OA,g          |
|     | tula    | 7             | 9  | 18 | 27 | 37 | 46 | 55 | 4  | 14 | 23 | 32 | 41 | 50 | 59 | OA,v          |
|     | kalāḥ   | 31            | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | OA,I          |
| I   | kanyā   | 6             | 4  | 4  | 5  | 5  | 5  | 5  | 5  | 6  | 6  | 6  | 6  | 6  | 7  | OA,g          |
|     | tula    | 7             | 16 | 32 | 48 | 4  | 20 | 36 | 52 | 8  | 24 | 40 | 56 | 12 | 28 | OA,v          |
|     | kalāḥ   | 31            | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | OA,I          |
| II  | śimha   | 5             | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | kalāḥ         |
|     | vṛścīka | 8             | 58 | 56 | 54 | 52 | 50 | 48 | 46 | 44 | 42 | 40 | 38 | 36 | 34 | vṛśa,2        |
|     | kalāḥ   | 31            | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | kumbha,11     |
| II  | śimha   | 5             | 5  | 5  | 5  | 5  | 5  | 6  | 6  | 6  | 6  | 6  | 6  | 7  | 7  | kalāḥ         |
|     | vṛścīka | 8             | 58 | 56 | 54 | 52 | 50 | 48 | 46 | 44 | 42 | 40 | 38 | 36 | 34 | vṛśa,2        |
|     | kalāḥ   | 31            | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | kumbha,11     |
| III | karka   | 4             | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | kalāḥ         |
|     | dhanus  | 9             | 10 | 21 | 32 | 43 | 53 | 4  | 15 | 26 | 36 | 47 | 58 | 9  | 19 | mithuna,3     |
|     | kalāḥ   | 31            | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | makara,10     |
| III | karka   | 4             | 5  | 5  | 6  | 6  | 6  | 6  | 7  | 7  | 7  | 7  | 7  | 8  | 8  | kalāḥ         |
|     | dhanus  | 9             | 33 | 44 | 55 | 6  | 16 | 27 | 38 | 49 | 59 | 11 | 22 | 32 | 33 | mithuna,3     |

• koṣṭakāḥ || <ff.3rv>P<sub>2</sub>  
 kalāḥ ] kala P<sub>2</sub>; kalākosthakāḥ ] *prius* kalākosthakāḥ on f.3v, *alterum* kalākosthakāḥ on f.3v P<sub>2</sub>, ~ kumbha 11 P<sub>2</sub> ~ dhanus 9 ] dhana 9 P<sub>2</sub>

MSP<sub>2</sub>; OA,v(14); OA,g(III, 39) 7

MSP<sub>2</sub> includes this table on two folia: f.3v with two blocks of kalāḥ values corresponding to twin pairs of zodiacal signs and f.3v with one block of kalāḥ values corresponding to twin pairs of zodiacal signs.  
 MS P<sub>1</sub> has the the following (vernacular) text at the bottom of the table on f.3v: pascimanaḥ ho i to dvapharāśiyem meliyem te cothobhāva purvataḥ hoyatavāre unmataḥthakā sādhyiye tē cothobhāva avēm lagnavadā kartavyām, matopariā umatopari ||



MSS P<sub>1</sub> and R<sub>2</sub> do not contain this table.

Table XXIII

|    |    | atha darsāntalagnākayor vivarabāhulbhāgapramite koṣṭhalake madhyamalambanam ghatikādi |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |      |      |
|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|------|------|
|    |    | 0   | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | LP.g | LP.v |
| 31 | 32 | 33  | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 |    |    |      |      |
| 3  | 3  | 3   | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 2  | 2  | 2  |    |      |      |
| 57 | 56 | 56  | 55 | 55 | 53 | 52 | 50 | 49 | 47 | 46 | 44 | 43 | 42 | 42 | 43 | 42 | 42 | 42 | 39 | 36 | 33 | 30 | 27 | 25 | 23 | 19 | 16 | 13 | 11 | 8  | 4  | 59 | 55   | 56   |
| 62 | 63 | 64  | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 |    |    |    |      |      |
| 2  | 2  | 2   | 2  | 2  | 2  | 2  | 2  | 2  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |      |      |
| 56 | 42 | 38  | 34 | 29 | 25 | 21 | 15 | 9  | 4  | 58 | 52 | 46 | 40 | 40 | 29 | 23 | 17 | 10 | 3  | 56 | 49 | 42 | 35 | 28 | 21 | 14 | 7  | 1  | 1  |    |    |    |      |      |

- darsānta ◦...◦ koṣṭake ◦...◦ lam̄banan̄ ◦ P<sub>1</sub>
- ◦ darsānta ◦...◦ yor vi [x] ra vāhu ◦...◦ koṣṭake◦...◦ mañ̄ lam̄banan̄ ◦ R<sub>2</sub>

MS P<sub>1</sub>: LP.g(24) 3; LP.v(37) 53; LP.v(59) 59; LP.v(61) 59.

MS R<sub>2</sub>: LP.v(8) 50; LP.v(9) 52; LP.v(10) 53; LP.v(11) 54; LP.v(12) 55; LP.v(15) 57; LP.g(24) 3; LP.v(45) 40; LP.v(59) 59; LP.v(64) 39.

MS P<sub>1</sub> has LP.v(46), LP.v(48), LP.v(49), and LP.v(50) illegibly smudged.

MS P<sub>1</sub> repeats the argument 55 twice instead of 55 and 56.

MS P<sub>2</sub> does not contain this table.

Table XXIV

|         |    | ॥ atha sāyanalagmarāśyāparī lambanaspastagunakah ॥ |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|---------|----|--|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| anśa    | 0  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| 0 [०]   | 27 | 27   | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 |
| 1 [१]   | 22 | 24   | 26 | 27 | 29 | 31 | 32 | 34 | 36 | 38 | 39 | 41 | 43 | 45 | 46 | 48 | 53 | 58 | 3  | 8  | 13 | 18 | 23 | 28 | 33 | 38 | 43 | 48 | 53 | 58 |
| 2 [॥]   | 29 | 29   | 29 | 29 | 29 | 29 | 29 | 29 | 29 | 29 | 30 | 30 | 30 | 30 | 30 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 |
| 3 [३]   | 3  | 11   | 19 | 27 | 35 | 43 | 50 | 58 | 5  | 13 | 22 | 30 | 38 | 47 | 54 | 1  | 5  | 13 | 21 | 29 | 37 | 45 | 53 | 1  | 9  | 17 | 25 | 33 | 41 | 50 |
| 4 [४]   | 32 | 33   | 33 | 33 | 33 | 33 | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 34 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 36 | 36 | 36 | 36 | 36 | 36 | 36 |    |
| 5 [५]   | 57 | 6  | 15 | 24 | 32 | 42 | 51 | 0  | 9  | 18 | 27 | 38 | 45 | 54 | 0  | 5  | 12 | 19 | 26 | 33 | 41 | 48 | 56 | 3  | 10 | 17 | 24 | 31 | 39 | 48 |
| 6 [६]   | 36 | 37   | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 39 | 39 |    |
| 7 [७]   | 39 | 39   | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 |    |
| 8 [८]   | 52 | 53   | 53 | 54 | 55 | 56 | 56 | 56 | 57 | 58 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 |    |
| 9 [९]   | 39 | 39   | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 39 |    |
| 10 [१०] | 52 | 51   | 50 | 49 | 48 | 47 | 46 | 45 | 44 | 42 | 42 | 41 | 40 | 39 | 39 | 38 | 36 | 35 | 33 | 32 | 30 | 28 | 26 | 25 | 23 | 21 | 19 | 17 | 15 |    |
| 11 [११] | 32 | 32   | 32 | 32 | 32 | 32 | 32 | 32 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 29 | 29 | 29 | 29 | 29 | 29 |    |
| 12 [१२] | 56 | 48   | 40 | 32 | 20 | 9  | 1  | 52 | 43 | 36 | 25 | 21 | 13 | 5  | 1  | 53 | 46 | 37 | 30 | 22 | 13 | 6  | 58 | 50 | 52 | 35 | 27 | 18 | 11 |    |
| 13 [१३] | 29 | 28   | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 27 |    |
| 14 [१४] | 3  | 58   | 53 | 48 | 43 | 38 | 33 | 28 | 23 | 18 | 13 | 28 | 3  | 59 | 53 | 48 | 46 | 44 | 43 | 41 | 39 | 39 | 38 | 37 | 31 | 29 | 27 | 24 | 21 |    |

◦ sayana ◦ .. ◦ lampana ◦ P<sub>1</sub> • atha ya! lambanam sve gunake gunyamitum jneyam || R<sub>2</sub>

MS P<sub>1</sub>: SFb(0, 12) 46; SFb(0, 22) 28; SFb(2, 19) 23; SFb(4, 16) 38; SFb(5, 1) 53 om.; SFb(6, 5) 55; SFb(6, 16) 59; SFb(6, 21) 59; SFb(6, 22) 58; SFb(6, 23) 57; SFb(6, 24) 56; SFb(6, 27) 54; SFb(8, 16) 59; SFb(8, 17) 52; SFb(9, 6) 16; SFb(9, 13) 29; SFb(9, 15) 5 om.; SFb(10, 3) 33; SFb(11, 23) 34.

MS R<sub>2</sub>: SFb(7, 7) 44; SFab(8, 4) 39; SFb(9, 19) 46; SFb(11, 14) 3.

MSP<sub>1</sub> has entries for SFb(5,1) and SFb(9, 15) blank.

MSP<sub>2</sub> does not contain this table.

Table XXV

|        |    | atha sāvalagñarāśyāṁśopari nātyahulgūḍī |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |      |      |      |      |    |
|--------|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|------|------|------|------|----|
| ansah  |    | 0                                       | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24   | 25   | 26   | 27   | 28 |
| 0 [र]  | 46 | 45                                      | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 33 | 29 | 27 | 25 | 23 | 21 | 19 | 17 | 15 | 13 | 11 | 9  | 7  | SF.a | SF.b |      |      |    |
| 1 [४]  | 11 | 11                                      | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 9  | 9  | 9  | 9  | 9  | 9  | 9  | 9  | 9  | 9  | 9  | SF.a | SF.b |      |      |    |
| 2 [II] | 9  | 9                                       | 8  | 8  | 8  | 8  | 8  | 8  | 8  | 8  | 8  | 7  | 7  | 7  | 7  | 7  | 7  | 7  | 7  | 6  | 6  | 6  | 6  | 6  | 6  | SF.a | SF.b |      |      |    |
| 3 [ঃ]  | 6  | 6                                       | 6  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 4  | 4  | 4  | 4  | 4  | 4  | 4  | 4  | 4  | 4  | 3  | 3  | 3  | 3  | 3  | SF.a | SF.b |      |      |    |
| 4 [ঃ]  | 3  | 2                                       | 2  | 2  | 2  | 2  | 2  | 2  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 0  | 0  | SF.a | SF.b |      |      |    |
| 5 [ঃ]  | 0  | 0                                       | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | SF.a | SF.b |      |      |    |
| 6 [Ω]  | 0  | 0                                       | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | SF.a | SF.b |      |      |    |
| 7 [ঃ]  | 33 | 38                                      | 42 | 47 | 51 | 56 | 0  | 4  | 9  | 13 | 18 | 22 | 27 | 31 | 36 | 40 | 46 | 52 | 57 | 3  | 10 | 14 | 20 | 26 | 31 | 37   | 43   | 48   | 54   |    |
| 8 [√]  | 3  | 3                                       | 3  | 3  | 3  | 3  | 3  | 4  | 4  | 4  | 4  | 4  | 4  | 4  | 4  | 4  | 4  | 4  | 4  | 5  | 5  | 5  | 5  | 5  | 5  | 5    | 5    | 6    | SF.a |    |
| 9 [৩]  | 6  | 6                                       | 6  | 6  | 6  | 6  | 6  | 7  | 7  | 7  | 7  | 7  | 7  | 7  | 7  | 7  | 7  | 7  | 8  | 8  | 8  | 8  | 8  | 8  | 8  | 8    | 9    | SF.a |      |    |
| 10 [ঃ] | 9  | 9                                       | 9  | 9  | 9  | 9  | 9  | 9  | 9  | 9  | 9  | 9  | 9  | 9  | 9  | 9  | 9  | 9  | 9  | 9  | 9  | 9  | 9  | 9  | 9  | 9    | 9    | SF.b |      |    |
| 11 [ঃ] | 11 | 16                                      | 20 | 25 | 30 | 34 | 39 | 44 | 48 | 53 | 57 | 3  | 6  | 11 | 16 | 19 | 23 | 26 | 29 | 33 | 36 | 39 | 39 | 40 | 41 | 42   | 44   | 46   | SF.b |    |

o sāyanam o...o nati angulādi kanyānāṁ ansa 11 tha kī tulanā mṣa 19 lagñai uttare anyathā sarvadakṣine || P<sub>1</sub> • o natiamgulādi kamṇyāmnanāṁ ansa 11 tha kī te tulanā mṣa 19 lagñam uttarem hyathā sarvadakṣine || R<sub>2</sub>

ansah ] am P<sub>1</sub>; mṣa R<sub>2</sub>.

MS P<sub>1</sub>; SFb(0,24)17; SFb(0,25)13; SFb(2,2)56; SFb(2,28)25; SFb(3,8)33; SFb(3,23)44; SFb(3,29)11; SFb(4,28)43; SFb(5,11) u-om.; SFb(6,19) u-om.; SFa(6,20) 0-om.; SFb(6,20) da and kṣa om.; SFb(9,7)50; SFb(9,12)11; SFa(10,12)0.

MS R<sub>2</sub>; SFb(3,7)39; SFb(7,18)27; SFb(7,25)39.

MS P<sub>1</sub> has da o at the end of the table to the right of SF entry for (11,29) in a right-adjacent cell.

MS R<sub>2</sub> has the following text in the bottom margin. || iti śrīdaivajñāraṁṭajahāskaraviracite karnakeśarigrāṁthe canḍrasuryaparvādhikārakotṣakā sampūrṇam iti ||

MS P<sub>1</sub> has entry for SFb(0,22) illegibly smudged.

MS R<sub>2</sub> does not contain this table.

Table XXVI

| atha ravichannāṅgulād madhyasthitighatikādi |    |    |   |    |    |    |    |    |    |    |    |      |  |
|---|----|----|---|----|----|----|----|----|----|----|----|------|--|
| 1   | 2  | 3  | 4 | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | śrīḥ |  |
| 1   | 1  | 1  | 2 | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 0  | śrīḥ |  |
| 7   | 33 | 51 | 5 | 16 | 24 | 31 | 36 | 39 | 40 | 42 | 0  |      |  |

FD.a  
FD.b

laṁbanaspaṣṭam guṇakena 2 gunitam pūrṇanigamair bhakte labdhām spaṣṭalamībanam sa tat-sam lambanam gaṇītā gatadarśe dhanam ḥnam karttavyam yada suryalagnayor vivaratribhāto trirāśito hīnas tadā darśaghaṭipaleśu laṁbanam ḥnam karttavyam yadā trirāśito amṛtarām adhikamīs tadā darśaghaṭīśu laṁbanam dhanam kāryam evam krte spaṣṭamadhyakālo bhavati || ityādi ||

◦ raviḥ cchannāṅgulāt ◦...◦ ghatikādi raver madhyasthitisparśakāle gaṇītā gatakāle darśe hīnam mokṣakāle yutam paścā laṁbanam deyam || śrī || P<sub>1</sub> • ◦ raviḥ channamgulāt ◦...◦ ghatikādi ravimadhyasthitisparśakāle gaṇītagatakāle darśe hīnam mokṣakāle yutam | paścāl laṁbanam deyam || R<sub>2</sub>

◦ spaṣṭaguṇakena gunitam pūrṇaniga[xx]kte labdhām ◦...◦ sa tatlamībanam gaṇītā gatada[xxx]nam ◦...◦ suryalagnayor vivaratribhāto ◦...◦ trirāśito amṛtarām amṛtarām adhikas tadā ◦...◦ kāryammevam ◦...◦ bhavati || P<sub>1</sub>; ityādi || om. P<sub>1</sub>

◦ ḥnam karttavyamī yadā trirāśito amṛtarām amṛtarām adhikastadā◦ R<sub>2</sub>

śrīḥ om. R<sub>2</sub>; column header 12 ] 0 R<sub>2</sub>

MS R<sub>2</sub> has the table written in the left margin of <f. 7v>, with heading text wrapping in-line along the table to the right and further extending below the table.

MS P<sub>1</sub> has the marginal text to the right of the table, whereas MS R<sub>2</sub> has the marginal text to the right margin on f. 7v.

MS P<sub>2</sub> does not contain this table.

Table XXVII

|    |    |    | atha jātakे grahāṇāṁ vikalāṇāṁ koṣṭhakā dinādi |    |    |    |    |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |    |    |    |    |    |   |      |  |  |  |
|----|----|----|--|----|----|----|----|----|----|----|----|----|----|----|----|----|------|----|----|----|----|----|----|----|----|----|----|----|----|---|------|--|--|--|
|    |    |    | AS.a   |    |    |    |    |    |    |    |    |    |    |    |    |    | AS.b |    |    |    |    |    |    |    |    |    |    |    |    |   | AS.c |  |  |  |
| 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18   | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |   |      |  |  |  |
| 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0 | 0    |  |  |  |
| 1  | 3  | 5  | 7  | 9  | 10 | 12 | 14 | 16 | 18 | 19 | 21 | 23 | 25 | 27 | 28 | 30 | 32   | 34 | 36 | 37 | 39 | 41 | 43 | 45 | 46 | 48 | 50 | 52 | 54 |   |      |  |  |  |
| 48 | 36 | 24 | 12   | 0  | 48 | 36 | 24 | 12 | 0  | 48 | 36 | 24 | 12 | 0  | 48 | 36 | 24   | 12 | 0  | 48 | 36 | 24 | 12 | 0  | 48 | 36 | 24 | 12 | 0  |   |      |  |  |  |
| 31 | 32 | 33 | 34   | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48   | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |   |      |  |  |  |
| 0  | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1    | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1 | 0    |  |  |  |
| 55 | 57 | 59 | 1  | 3  | 4  | 6  | 8  | 10 | 12 | 13 | 15 | 17 | 19 | 21 | 22 | 24 | 26   | 28 | 30 | 31 | 33 | 35 | 37 | 39 | 40 | 42 | 44 | 46 | 0  |   |      |  |  |  |
| 48 | 36 | 24 | 12   | 12 | 48 | 36 | 24 | 12 | 0  | 48 | 36 | 24 | 12 | 0  | 48 | 36 | 24   | 12 | 0  | 48 | 36 | 24 | 12 | 0  | 48 | 36 | 24 | 12 | 0  |   |      |  |  |  |

o koṣṭhakā o P<sub>1</sub>

MSP<sub>1</sub>: AS.c(32) 37; AS.b(53) 25.

MSS P<sub>2</sub> and R<sub>2</sub> do not contain this table.

Table XXXVIII

| atha nakṣatranām yonivicārah |          |          |          |          |          |          |          |         |        |          |          |          |          |
|------------------------------|----------|----------|----------|----------|----------|----------|----------|---------|--------|----------|----------|----------|----------|
| i                            | ii       | iii      | iv       | v        | vi       | vii      | viii     | ix      | x      | xii      | xiii     | xiv      | nakṣatra |
| a                            | bha      | kṛ       | ro       | mṛ       | ā        | pu       | ā        | ma      | pū     | u        | ha       | ci       | A        |
| āsva                         | gaja     | chāga    | sarpa    | śvāna    | māṇjāra  | chāga    | māṇjāra  | mūṣaka  | dhenu  | mahiṣa   | vṛyāghra | mahiṣa   | B        |
| devagana                     | mānavā   | rāksasa  | mānavā   | devagana | mānavā   | devagana | rāksasa  | rāksasa | mānava | mānava   | devagana | rāksasa  | C        |
| adhamā                       | madhyama | ūrdhva   | madhyama | adhamā   | adhamā   | madhyama | adhamā   | adhamā  | ūrdhva | madhyama | adhamā   | madhyama |          |
| xv                           | xvi      | xvii     | xviii    | xix      | xx       | xxi      | xxii     | xxiii   | xxiv   | xxv      | xxvi     | xxvii    | xxviii   |
| sva                          | vi       | a        | jye      | mū       | pū       | u        | a        | śra     | dha    | śa       | pū       | u        | re       |
| vṛyāghra                     | mṛga     | śvāna    | vānara   | nakula   | vānara   | vānara   | śvāna    | śimha   | śimha  | śimha    | śimha    | śimha    | A        |
| devagana                     | rāksasa  | devagana | rāksasa  | mānavā   | devagana | mānavā   | devagana | rāksasa | mānava | mānava   | devagana | mānava   | B        |
| ūrdhva                       | madhyama | adhamā   | adhamā   | madhyama | ūrdhva   | ūrdhva   | madhyama | adhamā  | adhamā | adhamā   | madhyama | madhyama | C        |

MS P<sub>1</sub> has the following text at the bottom of the table: || atha padivānau candra-deśa i vānadeśāyate ṣaṭparīñānam || nānād 9 dīg 10 śā 11 manu 14 śodāśa 16 nāgacandra 18 | candra-kabha-gavivare yadi

cāṃśakah syuh dṛṣyas tadā bhavati śīnamayikhanālī || mesādike dinakare ghaṭabhbādvilomanam || 1 || śrī. ||

MS P<sub>1</sub>: B(xv) mānavā; B(xvi) mānavā; C(vii) thama; A(vii) māniara; B(ix) rāksa; C(ix) urdhva; B(x) rāksa; B(xi) mānavā; C(xii) dhama; B(xii) deva; C(xiii) dhama; B(xiv) rāksa; B(xv) rāksa; B(xvi) dhama; C(xvii) rāksa; C(xviii) dhama; B(xix) mānavā; B(xx) mānavā; B(xxii) mānavā.

MSS P<sub>2</sub> and R<sub>2</sub> do not contain this table.

The abbreviated nakṣatra names in the table stand for the following constellations:

| i   | a   | āsvinī    | vii  | pu | punarvasuāśvini | xiii  | ha      | hasta    | ix    | mūla | xv          | śā    | śatabhisaj       |
|-----|-----|-----------|------|----|-----------------|-------|---------|----------|-------|------|-------------|-------|------------------|
| ii  | bha | bharanī   | viii | pu | puṣya           | xiv   | ci      | ciitrā   | xx    | pū   | pūrvāśadāḥ  | xvi   | pūrvabhadrapadā  |
| iii | kṛ  | kṛitikā   | ix   | ā  | āślesā          | xv    | svāti   | svāti    | xxi   | u    | uttarāśadāḥ | xvii  | uttarabhadrapadā |
| iv  | ro  | rohiṇī    | x    | ma | moghā           | xvi   | vi      | viśkākā  | xxii  | a    | abhibijit   | xviii | revati           |
| v   | mṛ  | mrgaśīras | xi   | pū | pūrvaphālganī   | xvii  | a       | anuādhāḥ | xxiii | śā   | śravāna     |       |                  |
| vi  | ā   | āndrā     | xii  | u  | uttaraphālganī  | xviii | jyeṣṭhā | ūrdhva   | xiv   | diha | dhanīshāḥ   |       |                  |

## 6 CONCLUDING REMARKS

Astronomical table-texts complicate still further the already contentious issue of the nature and goals of critical editions in Sanskrit textual scholarship (Csérel and Patte 2009; Phillips-Rodriguez 2007; Witzel 2014). It is well understood that even the most conscientious critical edition cannot replicate ‘the original’ form of a text, even though it may successfully restore ‘an earlier’ version of the textual tradition. Naively, we might expect that a table-text consisting mostly of numerical data would simplify this issue somewhat, as the algorithms used to produce the data provide an independent check on what they are ‘supposed’ to be. The following list of questions that we have formulated in our analysis of the *Karaṇakesarī* tables reveals the folly of any such expectation, and shows us how much remains to be done in gaining a better understanding of the long-neglected Sanskrit *kōṣṭhaka/sāraṇī* genre.

### QUESTIONS

**How were attested table entries generated, and how should editors decide whether and when to correct apparently erroneous entries or to select one variant reading over another?**

As illustrated in our brief analysis of individual tables in Section 4, it is not always clear from the numbers in a table exactly what computations the original compiler performed to produce them, nor are the computational techniques always consistent: e.g., a few key values may be determined by a trigonometric formula and the intervening values filled in by linear interpolation. Even if the generating algorithm is confidently identified, it may be impossible to determine what rounding (or truncating) practices or arithmetic methods the compiler used and how they affected the end result. Finally, the table compiler may have simply miscalculated in carrying out the procedures: should the ‘authoritative’ value be the one that was actually produced or the one that was presumably intended?

Checking table entries by recomputing them from the generating algorithm is not always a straightforward process, even if the algorithm is known. Differences in accuracy and precision between historical and modern trigonometric procedures, or between sexagesimal numbers and decimal approximations, can often introduce more confusion into the analysis of attested values. Table reconstruction must be carefully designed and documented if it is to serve as a justification for emending the tabulated values.

### **What was the role of scribes in producing or incorporating additional table data?**

We have described in Section 3 the inclusion of various tables in some of the *Karaṇakesarī* manuscripts but not in others. What choices are scribes and/or their patrons making about the selection of tables that constitute a particular text? Are scribes sometimes responsible for adding new content to existing tables, e.g., writing the differences between successive table entries in a separate row? How do specifically astrological tables, such as the ones in MS P<sub>1</sub> of the *Karaṇakesarī*, fit into these practices? We might speculate that the selection and inclusion of such specialized tables may have been part of a process of ‘customizing’ a table-text for individual users.

### **How is table paratext determined and distributed?**

The authorship of paratextual content in and around tables—table headings and row headers, notes, etc.—is not always easy to determine. Are table headings, for example, passed down along with the versified user instructions as composed by the original compiler of the tables? Or are they sometimes amplified or modified by scribes, along the lines of the brief chapter or subject introductions interspersed throughout verse texts (and generally beginning, like table headings, with the standard transition *atha* ‘Now’)?

We have seen in Section 3 that some paratextual notes in a vernacular language are recorded in both our manuscripts of the *Karaṇakesarī* tables. Did they originate with the tables themselves or were they contributed by an earlier scribe, or user, and subsequently absorbed into the manuscript tradition? Does the placement of paratext, e.g., in headings as opposed to margins, signify anything about its authorship?

### **What is the impact of the table-text genre on Sanskrit technical vocabulary?**

The use of standard technical terms like *upari* for ‘argument’, *koṣṭhaka* for ‘table entry’ or ‘table cell’, *pramita* ‘measured by’, ‘commensurate with’ to indicate the dependence of the tabulated value on the argument, etc., deserves further scrutiny (and is discussed in more depth in (Montelle and Ploker forthcoming)). When did these particular meanings of these terms emerge in scientific Sanskrit, and are there variations in their use that shed light on the evolution of this genre?

### **How were scribal copying practices adjusted to accommodate tabular data?**

Palaeographic study of manuscripts of Sanskrit versified texts reveals the fundamentally linear nature of the standard copying process (Murthy 2012): the suc-

cessive syllables of the verses stream across lines and pages, punctuated by vertical bars (*dandas*) where appropriate. Spaces may be left for rubricated chapter introductions, diagrams, displayed mathematics, etc., but these are just temporary interruptions of the continuous flow of characters. The *kōsthaka* form, on the other hand, creates a graphical structure that the scribe must fit the content into, and at present we know very little about the details of the process (Montelle and Plofker forthcoming).

It is clear that scribes would begin the task of reproducing a table by laying out the table grid, but did they then fill in the numbers by individual argument value, or by copying streams of digits all the way across a row or down a column, or some combination? Can we reconstruct from scribal errors the details of these scribal practices?

And how was table content quantified for the purpose of determining scribes' fees? Typically, a manuscript copyist would be paid according to the number of some standard textual units transcribed: the unit might be a line or a page, but typically a verse (*śloka*). As noted in Section 3, one of the *Karaṇakesarī* manuscripts contains the note '*śloka* 115', suggesting that the scribe had copied 115 of some table-content units considered equivalent to a verse. We can only suppose that scribes adopted some convention of assigning to tabular content a *śloka* amount to create a common unit of copying for their payments.

### **What do *kōsthaka* manuscripts reveal about the professional activities of their users?**

We remarked in Section 3 the presence of a marginal note in one of the *Karaṇakesarī* manuscripts, in what appears to be a different hand from the copyist's, recording the common difference between entries in the accompanying table. It may be that this was added by a user to facilitate interpolating linearly between table entries in an astronomical calculation.

All of these open questions make the endeavour to produce a critical edition of *kōsthaka* tables a rather ambitious project, and we cannot claim to have established a version of the *Karaṇakesarī* tables content that is in any way definitive. They do, however, reveal the importance of such texts for understanding the evolution of second-millennium Sanskrit astronomy, and the vast amount of that evolution that took place within the *kōsthaka/sāraṇī* genre.

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## 7 APPENDIX

We present here images of certain folia from the manuscripts that contain paratextual information in an unidentified vernacular language written in Nāgarī.

The image shows a page from a manuscript containing two tables of astronomical data. The top table is labeled "परिवर्तनात्मक सिद्धिरत्नसंस्कृतम्" and the bottom table is labeled "परिवर्तनात्मक सिद्धिरत्नसंस्कृतम्". Both tables have columns for various parameters such as time intervals and numerical values. The text around the tables includes headings like "अवधयः", "परिवर्तनः", and "प्रतिवर्तनः". There are also several lines of explanatory text in Nāgarī script on the right side of the page.

f. 4r of MSP<sub>1</sub> with TABLE V and associated vernacular paratext.

MS R2 (Left): A grid of numbers (0-99) in red ink, organized into four columns and 10 rows. The first column contains 10 rows of 2-digit numbers. The second column contains 9 rows of 2-digit numbers. The third column contains 9 rows of 2-digit numbers. The fourth column contains 9 rows of 2-digit numbers.

MS R2 (Right): A grid of numbers (0-99) in red ink, organized into four columns and 10 rows. The first column contains 10 rows of 2-digit numbers. The second column contains 9 rows of 2-digit numbers. The third column contains 9 rows of 2-digit numbers. The fourth column contains 9 rows of 2-digit numbers.

Table V (Top): A grid of numbers (0-99) in red ink, organized into four columns and 10 rows. The first column contains 10 rows of 2-digit numbers. The second column contains 9 rows of 2-digit numbers. The third column contains 9 rows of 2-digit numbers. The fourth column contains 9 rows of 2-digit numbers.

Table V (Bottom): A grid of numbers (0-99) in red ink, organized into four columns and 10 rows. The first column contains 10 rows of 2-digit numbers. The second column contains 9 rows of 2-digit numbers. The third column contains 9 rows of 2-digit numbers. The fourth column contains 9 rows of 2-digit numbers.

Vernacular Paratext (Top): A block of text in Devanagari script, likely a title or heading, followed by several lines of explanatory text.

Vernacular Paratext (Bottom): A block of text in Devanagari script, likely a title or heading, followed by several lines of explanatory text.

f. 2r of MS R2 with TABLE V and associated vernacular paratext.

**Table IX:**

*॥त्रयोदशं त्रिवृताद्योपस्थित्वर्णिवत्तमन्तर्गतो चूलादिति॥*

| १२ | ५८ | ५७ | ५६ | ५५ | ५४ | ५३ | ५२ | ५१ | ५० | ५९ | ५८ | ५७ |
|----|----|----|----|----|----|----|----|----|----|----|----|----|
| ११ | ११ | ११ | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० |
| ५१ | ५१ | ५१ | ५१ | ५१ | ५१ | ५१ | ५१ | ५१ | ५१ | ५१ | ५१ | ५१ |
| ३१ | ३१ | ३१ | ३१ | ३१ | ३१ | ३१ | ३१ | ३१ | ३१ | ३१ | ३१ | ३१ |
| ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० |
| ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ |

*॥त्रिभारतवकाशाभिप्रवर्णालीवर्णकाटे वर्णालीवर्णकाटे॥*

| २  | २  | ३  | ४  | ५  | ६  | ७  | ८  | ९  | १० | ११ | १२ | १३ | १४ | १५ | १६ | १७ | १८ | १९ | २० | २१ | २२ | २३ | २४ | २५ | २६ |    |    |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| ०  | ०  | ०  | १  | १  | १  | २  | २  | ३  | ३  | ४  | ४  | ५  | ५  | ५  | ६  | ६  | ७  | ७  | ८  | ८  | ९  | ९  | १० | १० | १० |    |    |
| २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  |    |
| २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  |    |
| १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० |    |
| ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ |    |
| ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० |
| ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ |

**Table R<sub>2</sub>:**

*॥त्रिभारतवकाशाभिप्रवर्णालीवर्णकाटे वर्णालीवर्णकाटे॥*

| १  | २  | ३  | ४  | ५  | ६  | ७  | ८  | ९  | १० | ११ | १२ | १३ | १४ | १५ | १६ | १७ | १८ | १९ | २० | २१ | २२ | २३ | २४ | २५ | २६ |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| २  | २  | ३  | ४  | ५  | ६  | ७  | ८  | ९  | १० | ११ | १२ | १३ | १४ | १५ | १६ | १७ | १८ | १९ | २० | २१ | २२ | २३ | २४ | २५ | २६ | २७ | २८ |    |    |
| ०  | ०  | ०  | १  | १  | १  | २  | २  | ३  | ३  | ४  | ४  | ५  | ५  | ५  | ६  | ६  | ७  | ७  | ८  | ८  | ९  | ९  | १० | १० | १० | १० | १० |    |    |
| २  | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ |    |    |
| २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  |    |    |
| २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  | २  |    |    |
| १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० | १० |    |
| ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ | ५८ |    |
| ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० | ३० |
| ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ | ११ |

f. 2v of MS R<sub>2</sub> with TABLE IX and associated vernacular paratext.

f. 4v of MS P<sub>1</sub> with TABLE XI and associated vernacular paratext.



२३। अभ्युप्र  
पद्मा द्वारा  
संज्ञापद्धति  
गणना करने की  
मिति अनुसार  
अभ्युप्र पद्मा  
का उपयोग  
करने की विधि  
में संलग्न है।

अभ्युप्र का उपयोग  
करने की विधि  
में संलग्न है।

२४। अभ्युप्र  
पद्मा द्वारा  
संज्ञापद्धति  
गणना करने की  
मिति अनुसार  
अभ्युप्र पद्मा  
का उपयोग  
करने की विधि  
में संलग्न है।

अभ्युप्र का उपयोग  
करने की विधि  
में संलग्न है।

|    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |    |
|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| १  | २  | ३  | ४  | ५  | ६  | ७  | ८  | ९   | १०  | ११  | १२  | १३  | १४  | १५  | १६  | १७  | १८  | १९  | २०  | २१ |
| ०  | ०  | ०  | ०  | १  | २  | ३  | ४  | ५   | ६   | ७   | ८   | ९   | १०  | ११  | १२  | १३  | १४  | १५  | १६  | १७ |
| १२ | ४२ | ५० | ५७ | ६३ | ७२ | ८५ | ९२ | १०५ | ११८ | १३२ | १४५ | १५२ | १६२ | १७२ | १८२ | १९२ | २०२ | २१२ | २२२ |    |
| ०  | १  | २  | ३  | ४  | ५  | ६  | ७  | ८   | ९   | १०  | ११  | १२  | १३  | १४  | १५  | १६  | १७  | १८  | १९  | २० |
| १  | २  | ३  | ४  | ५  | ६  | ७  | ८  | ९   | १०  | ११  | १२  | १३  | १४  | १५  | १६  | १७  | १८  | १९  | २०  | २१ |
| १  | २  | ३  | ४  | ५  | ६  | ७  | ८  | ९   | १०  | ११  | १२  | १३  | १४  | १५  | १६  | १७  | १८  | १९  | २०  | २१ |
| ०  | १  | २  | ३  | ४  | ५  | ६  | ७  | ८   | ९   | १०  | ११  | १२  | १३  | १४  | १५  | १६  | १७  | १८  | १९  | २० |
| १  | २  | ३  | ४  | ५  | ६  | ७  | ८  | ९   | १०  | ११  | १२  | १३  | १४  | १५  | १६  | १७  | १८  | १९  | २०  | २१ |
| १  | २  | ३  | ४  | ५  | ६  | ७  | ८  | ९   | १०  | ११  | १२  | १३  | १४  | १५  | १६  | १७  | १८  | १९  | २०  | २१ |
| ०  | १  | २  | ३  | ४  | ५  | ६  | ७  | ८   | ९   | १०  | ११  | १२  | १३  | १४  | १५  | १६  | १७  | १८  | १९  | २० |
| १  | २  | ३  | ४  | ५  | ६  | ७  | ८  | ९   | १०  | ११  | १२  | १३  | १४  | १५  | १६  | १७  | १८  | १९  | २०  | २१ |
| १  | २  | ३  | ४  | ५  | ६  | ७  | ८  | ९   | १०  | ११  | १२  | १३  | १४  | १५  | १६  | १७  | १८  | १९  | २०  | २१ |
| ०  | १  | २  | ३  | ४  | ५  | ६  | ७  | ८   | ९   | १०  | ११  | १२  | १३  | १४  | १५  | १६  | १७  | १८  | १९  | २० |
| २२ | २२ | २२ | २२ | २२ | २२ | २२ | २२ | २२  | २२  | २२  | २२  | २२  | २२  | २२  | २२  | २२  | २२  | २२  | २२  | २२ |
| ३१ | ३१ | ३१ | ३१ | ३१ | ३१ | ३१ | ३१ | ३१  | ३१  | ३१  | ३१  | ३१  | ३१  | ३१  | ३१  | ३१  | ३१  | ३१  | ३१  | ३१ |
| ३२ | ३२ | ३२ | ३२ | ३२ | ३२ | ३२ | ३२ | ३२  | ३२  | ३२  | ३२  | ३२  | ३२  | ३२  | ३२  | ३२  | ३२  | ३२  | ३२  | ३२ |
| ४५ | ४५ | ४५ | ४५ | ४५ | ४५ | ४५ | ४५ | ४५  | ४५  | ४५  | ४५  | ४५  | ४५  | ४५  | ४५  | ४५  | ४५  | ४५  | ४५  | ४५ |
| ३५ | ३५ | ३५ | ३५ | ३५ | ३५ | ३५ | ३५ | ३५  | ३५  | ३५  | ३५  | ३५  | ३५  | ३५  | ३५  | ३५  | ३५  | ३५  | ३५  | ३५ |

f. 3r of MS R<sub>2</sub> with TABLE XII and XIII along with their associated vernacular paratext.

अथ स्वर्कम्ब वलं तेषां। श्वास॒ न्युत्था श्वाय॒ अते वस्तुत्यो युर्गं तर्सं वृग्नि अंगुलायं वलन्त्या उत्पादेत् यावत्ते दक्षिणे देयावृक्तिज्ञाते इति।

श्वर्यम्भवं देयो कोक्षवेत्तत्र वर्तेदिव्या। श्वर्यम्भवं विलं विपरीतं देयावृक्तिज्ञाते इति।

| श्वर्यम्भवं विलं विपरीतं देयावृक्तिज्ञाते इति।   |    |    |    |    |    |    |    |    |    |    |    |    |    |
|--|----|----|----|----|----|----|----|----|----|----|----|----|----|
| ०  | १  | २  | ३  | ४  | ५  | ६  | ७  | ८  | ९  | १० | ११ | १२ | १३ |
| ०  | ०  | १  | २  | ३  | ४  | ५  | ६  | ७  | ८  | ९  | १० | ११ | १२ |
| १५   | २४ | २५ | २६ | २७ | २८ | २९ | ३० | ३१ | ३२ | ३३ | ३४ | ३५ | ३६ |
| १४   | २३ | २४ | २५ | २६ | २७ | २८ | २९ | ३० | ३१ | ३२ | ३३ | ३४ | ३५ |
| १३   | २२ | २३ | २४ | २५ | २६ | २७ | २८ | २९ | ३० | ३१ | ३२ | ३३ | ३४ |
| १२   | २१ | २२ | २३ | २४ | २५ | २६ | २७ | २८ | २९ | ३० | ३१ | ३२ | ३३ |
| ११   | २० | २१ | २२ | २३ | २४ | २५ | २६ | २७ | २८ | २९ | ३० | ३१ | ३२ |
| १०   | १९ | २० | २१ | २२ | २३ | २४ | २५ | २६ | २७ | २८ | २९ | ३० | ३१ |
| ९  | १८ | १९ | २० | २१ | २२ | २३ | २४ | २५ | २६ | २७ | २८ | २९ | ३० |
| ८  | १७ | १८ | १९ | २० | २१ | २२ | २३ | २४ | २५ | २६ | २७ | २८ | २९ |
| ७  | १६ | १७ | १८ | १९ | २० | २१ | २२ | २३ | २४ | २५ | २६ | २७ | २८ |
| ६  | १५ | १६ | १७ | १८ | १९ | २० | २१ | २२ | २३ | २४ | २५ | २६ | २७ |
| ५  | १४ | १५ | १६ | १७ | १८ | १९ | २० | २१ | २२ | २३ | २४ | २५ | २६ |
| ४  | १३ | १४ | १५ | १६ | १७ | १८ | १९ | २० | २१ | २२ | २३ | २४ | २५ |
| ३  | १२ | १३ | १४ | १५ | १६ | १७ | १८ | १९ | २० | २१ | २२ | २३ | २४ |
| २  | ११ | १२ | १३ | १४ | १५ | १६ | १७ | १८ | १९ | २० | २१ | २२ | २३ |
| १  | १० | ११ | १२ | १३ | १४ | १५ | १६ | १७ | १८ | १९ | २० | २१ | २२ |
| ०  | ९  | १० | ११ | १२ | १३ | १४ | १५ | १६ | १७ | १८ | १९ | २० | २१ |
| श्वर्यम्भवं देयो कोक्षवेत्तत्र वर्तेदिव्या। श्वर्यम्भवं विलं विपरीतं देयावृक्तिज्ञाते इति। |    |    |    |    |    |    |    |    |    |    |    |    |    |
| श्वर्यम्भवं विलं विपरीतं देयावृक्तिज्ञाते इति।   |    |    |    |    |    |    |    |    |    |    |    |    |    |

f. 6v of MS P<sub>1</sub> with TABLE XVII and associated vernacular marginal text.

The image shows folio 3v of manuscript MS P<sub>2</sub>. At the top left is a large rectangular grid of numbers, likely a table of values. Above this grid, the text '॥ नक्षत्रालंगनास्त्रै॥' is written vertically. To the right of the grid, there is a vertical column of text in Devanagari script. Below this column, there is an orange banner containing the following text:

॥पश्चिमतोऽक्षोऽन्यत्रिकोटि चेति श्रवणा सर्वतो गुणात् विकृतिर्मातृकं तत्त्वात् विद्युते कर्त्तव्यं॥  
विद्युते परिवर्त्या ऋकोपम्॥

f.3v of MS P<sub>2</sub> with TABLE XII and associated vernacular paratext.

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Please write to [⟨wujastyk@ualberta.ca⟩](mailto:wujastyk@ualberta.ca) to file bugs/problem reports, feature requests and to get involved.  
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