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INTRODUCTION

Among the sixty-four aṅgas of the large recension of the *Gārgīyajyotiṣa* (also known as the *Gargasaṃhitā*), the greatest portion of the text is occupied by celestial omens and planetary science, including astrology and other astral narratives. Some of these materials are widely attested in works such as Varāhamihira's *Bṛhatsaṃhitā*, and Buddhist works such as the *Śārdūlakarṇāvadāna* and Amoghavajra's *Xiuyao jing*, and may be considered some of the oldest sources of an early, pre-siddhāntic variety of Indian astral science. In this paper, I shall highlight some unique characteristics of this hitherto unedited work, with a focus on the different treatments of the two bodies of astral materials, early and late Vedic, characterised respectively by *nakṣatras* and *grahas*.[1]

1 THE ASTRAL SCIENCE IN THE *GĀRGĪYAJYOTIṢA*

In the mahābhārata śāntiparvan, Garga is referred to as the *sāṃvatsara*, that is, one who has the knowledge of time, or an astronomer/astrologer.[2] In another passage of the same work, one refers to a work of Garga in sixty-four divisions (*catuḥṣaṣṭyaṅgam*),[3]

1 This paper was presented in the special panel "Frontier research on the *Gārgīyajyotiṣa*," at the 17th World Sanskrit Conference, University of British Columbia, Vancouver, Canada, on July 12, 2018. Part of the paper was based on another paper titled "Garga and the Astronomical Chapters of the *Gārgīyajyotiṣa*," presented at the 228th meeting of the American Oriental Society, Pittsburgh, U.S., March 17, 2018.
For a review of the previous scholarly works related to this text and past attempts to transcribe, edit, and decipher various sections of the work, see Geslani et al. 2017: 154–55. The Gargasaṃhitā Workgroup was established in 2017 by the four aforementioned authors together with Koji Kumagai, with the purpose to advance all studies related to this important text, and with the goal to produce a complete edition and translation of the work through international collaboration. R. N. Iyengar of Jain University, Bangalore, recently informed me that he had formed an independent team with two young Sanskritists to produce also an edition of the text.

2 *Mahābhārata*, *Śāntiparvan* 12.59.117cd (Sukthankar, Belvalkar, et al. 1933–59: v. 13, 274): महर्षिर्भगवान्गर्गस्तस्य सांवत्सरोऽभवत्.

3 *Mahābhārata*, *Anuśāsanaparvan* 13.18.25 (Sukthankar, Belvalkar, et al. 1933–59: v. 17.1, 150) गार्ग्य उवाच। चतुःषष्ट्यङ्गमददात्कालज्ञानं महाद्भुतम्। सरस्वत्यास्तटे तुष्टो मनोयज्ञेन पाण्डव॥

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a description that is identical to the one given in the second introductory section of the *Gārgīyajyotiṣa* (G1),[4] suggesting likely that this recension was fairly well-known and had a wide circulation. Among the sixty-four divisions or *aṅga*s of the *Gārgīyajyotiṣa*, twenty-five of them deal with astronomy and celestial omens (1–12, 20–22, 51), planetary astrology (25–29, 31–32) and miscellaneous astral narratives (30, 44).[5] As a whole, these chapters show no overarching structure and appear to form only aggregates of loosely related materials.[6] The astral science contained in these chapters may be described as late Vedic and pre-Siddhāntic, though certain some early Vedic materials are certainly embedded within the work, such as those dealing with the lore of *nakṣatras* in the first *aṅga* as we shall see. Overall, the *Gārgīyajyotiṣa* is concerned with an astral science that is closely connected with an emerging world-view that focuses on kingship and the ritualism of the late Vedic period. The way this knowledge was conveyed suggests that its author did not intend to compose a treatise that deals exclusively with specific topics on mathematical astronomy as in the case of the later Siddhānta-s. Rather, various topics associated with mathematical astronomy are scattered throughout the work, placed under the larger topics of time units and individual planets, which deal also with topics such as omens and rituals. In this sense, the *Gārgīyajyotiṣa* should be distinguished from other Siddhānta-like astronomical works associated with the name of Garga.[7] Furthermore, it is pre-Siddhāntic in the sense that it lacks some of the key elements of the Siddhāntas such as the system of planetary revolution within a given cosmic cycle and the method of day reckoning (*ahargaṇa*). These techniques which eventually become standard procedures for later Hindu astronomers are either unknown or unimportant to the author of the *Gārgīyajyotiṣa*.

The style of the *Gārgīyajyotiṣa* is typically Purāṇic, noted for its penchant for dialogues and the multi-level narrative frames. The interlocutors in the astronomical chapters in the *Gārgīyajyotiṣa* are Garga (called also Vṛddhagarga) and Kroṣṭuki (or Krauṣṭuki), described elsewhere in the text as the former's eldest son.[8] As the astral omens are often associated with the royal household and the military campaign (*yātrā*), it appears that the author of the *Gārgīyajyotiṣa* intends to frame the narrative as Garga's instruction to his son on the astral knowledge required under royal patronage. The predictions presented in the *Gārgīyajyotiṣa* in some cases concern the birth and character of the individuals, and while others concern the welfare of the native's country, or more generally, of countries and peoples both here and afar. In the Venus Chapter (Śukracāra) of the *Gārgīyajyotiṣa*,

4 *jyotiṣām ayanāṅgāni catuḥṣaṣṭis tathā paṭhet*// (Mitchiner 1986: 102).

5 Geslani et al. 2017: 184–5 (Appendix A).

6 Topics dealing with rituals are on the other hand generally thematically connect to each other (32–33, 37–38, 45). See Geslani's discussion on ritual sequence in the chapter on Indravajra (Geslani 2016: 307–8; 2018: 64–5, 133–4). Elements of Garga's organizational principle are mechanically reproduced in Varāhamihira's *Bṛhatsaṃhitā*, though not without some innovations by the latter author.

7 One example of such astronomical Garga (G4) was examined by Yano in Geslani et al. 2017: 173–183; also Yano's recent work on the "Indian Sine Table of 36 Entries" (Yano 2019). See also Pingree 1973: 3. The Siddhānta of Garga (known also as *Gārgyasiddhānta*) has been described in some sources as one of the eight Praśnas; other Siddhāntas include Sūrya, Brahma, Pauliśa, Soma, Romaka, Bṛhatspati and Vāsiṣṭha (Dhavale 1996: x). Among these Siddhānta, a synopsis of a version of the Sūrya, Brahma (= Paitāmaha), Pauliśa, Romaka and Vāsiṣṭha are preserved in Varāhamihira's *Pañcasiddhāntikā*.

8 **वृद्धगार्ग्यज्येष्ठपुत्रः क्रोष्टुकि नामा** (Rāhucāra).

foreign names such as Yavana, Hūṇa and Kāṃboja are found, along with the more familiar ones such as Kāśmīra, providing us not only a glimpse of this broader worldview of power and politics, but also interesting clues with regard to the provenance of the text.[9]

The popularity the *Gargīyajyotiṣa* was largely eclipsed by Varāhamihira's works from the sixth century CE onward. The astral materials described in the *Gārgīyajyotiṣa*, on the other hand, may be dated back to centuries before the first century CE, a tentative date Pingree and Mitchiner gave on the grounds of the Yavana incursion described in the Chapter of *Yugapurāṇa* (*aṅga* 41).[10] Many of the astral omens described in the *Gārgīyajyotiṣa* are corroborated by the long list of "vile" knowledges (*tiracchānavijjā*, literally "bestial knowledge") refuted by the Buddha in the Pāli *Sāmaññaphalasutta*.[11] Rather ironically, the same techniques were progressively incorporated into the Indic Buddhist texts and later Chinese translations such as the Mahāyāna narrative *Śārdūlakarṇāvadāna* (*Modengjia jing* 摩登伽經) and Amoghavajra's *Xiuyao jing* 宿曜經, an eighth-century Chinese compilation of Indian astral science that had a widespread influence in East Asia.[12] where Brahmanical astral texts such the *Gārgīyajyotiṣa* might have been translated and circulated centuries before, apart from the Buddhist transmission.[13] Within the Brahmanical

9 Śukracāra vv. 89–91 Pingree 1987*b*: 302:

अत्र चैवोदितः शुक्रश्चारोहेदपरग्रहः।
यवनान्पारदांश्चैव कौकरेयान्ससैंहिकान्॥89॥
विरान्हूणान्तुषारांश्च पारनादीवनांस्तथा।
एतेषां तु तदा क्षिप्रं दारुणं भयमादिशेत्॥90.1॥
मघादीनि तु चत्वारि तृतीयं शुक्रमण्डलं।
अत्र यद्युदयं कुर्यादस्तं वा भार्गवः पुनः॥90.2॥
सौराष्ट्रां म्रियते राजा शाकानामनयं स्पृशेत्।
यत्र चैवोदितः शुक्र आरोहेदपरो ग्रहः॥90.3॥
यवनानां च काश्मीरान्तथा क्षुद्रं कमालवान्।
शुकनाशान्किरातांश्च क्षिप्रमेव भयंस्पृशेत्॥91॥

[89] (If) Venus rises in [a *nakṣatra* of the second *maṇḍala*] and another planet "occults" [it], [misfortune will touch] the Yavanas, Pāradas, Kaukkureyas and the Saindhavas, [90.1] the [tribes of] Virāṭ, the Hūṇas, the Tuṣāras, and those from the farthest rivers and forests; it will then quickly bring harsh fear for them. [90.2] The Third Maṇḍala of Venus consists of four [nakṣatras] beginning with Maghā. If Venus rises in it or sets in it again, [90.3] the king of Saurāṣṭra will die and will bring misfortune to the Śākas. If Venus has risen and another planet "occults" [it], [91] it will quickly bring fear to the Yavanas, Kāśmīras, Kṣudramīnas, Śukanāsas, and the Kirātas.

10 *Yugapurāṇa* 47–58. See Mitchiner 2002: 62–66, 104–5; Karttunen 2015: 120–1.

11 Topics include the reading of marks on the limbs (*aṅgaṃ nimittam*), unusual omens such as one based on clothes bitten by mice (*mūsikacchinnam*), appearance of various animals (*migapakkha*), as well as all kinds of astronomical and meteorological phenomena (Mak 2016: 139, n. 8).

12 Close parallels of verses dealing with *tithis* and *nakṣatras* are found also in the Sanskrit *Śārdūlakarṇāvadāna* (Mukhopadhyaya 1954: 202–3), and Amoghavajra's *Xiuyao jing*, a Chinese compilation and translation of Indian astral science dated to 759/764 CE (see T(1299)21.393a; Yano 1986: 109–110). The name "Garga" (伽力伽, *jiālìjiā*, Middle Chinese *kae-lik-kae*) was mentioned also in the Chinese translation of the Mahāyāna text *Mahāsaṃnipāta*, in a chapter titled *Sūryagarbha* translated by Narendrayaśas in 585 CE, as a sage who "taught the positions of *nakṣatras*, methods of long and short months and time measurements" (see T(397)13.282b; Mak 2015: 64).

13 In a Chinese catalogue of astral works found in the Book of Sui 隋書 (c. 629 CE), two titles contain the name "Garga" in different characters (竭伽, *jiéjiā*, MC. *gjet-kae*): "Brahmaṇic astral treatise of the Sage Garga" *Poluomen jiejia xianren tianwenshuo* 婆羅門竭伽仙人天文說 in thirty-one fascicles; "Garga's treatise on dream divination" *Jiejia xianren zhanmengshu* 竭伽仙人占夢書 in one fascicle. In addition, three mathematical/astral titles associated with "Brahman" are found in the same Chinese catalogue: *Poluomen suanfa* 婆羅門算法 in three fascicle, *Poluomen suanjing* 婆羅門算經 in three fascicles, *Poluomen yinyang suanjing* 婆羅門陰陽算曆 in one fascicle. The last title is found also in the Japanese catalogue *Nihonkoku Kenzaisho Mokuroku* 日本国見在書目録 composed by Fujiwara no Sukeyo 藤原佐世 in 875, suggesting some of these Indian texts translated into Chinese were brought as far as to Japan. None of the above works are extant.

tradition in India, the evolution and development of the astral materials is not so apparent in works such as the Epics and the Purāṇas, since these materials of different sources and periods are by and large conflated and cannot not be easily distinguished chronologically. Varāhamihira's *Bṛhatsaṃhitā*, which is considered by far the most comprehensive and authoritative work on practically all subjects discussed in the *Gārgīyajyotiṣa*, was largely modelled upon the *Gārgīyajyotiṣa*. Despite the fact that this once influential text had largely fallen out of fashion by the late first millennium, the astral omens thereof continue to be found in various forms in a variety of Indic traditions, both Brahmanical and non-Brahmanical. As such, the astral materials of the *Gārgīyajyotiṣa* belong arguably to one of the oldest and the most influential astral traditions in the South Asian subcontinent in a truly pan-Indian manner.

2 SOURCES

According to Pingree's survey, there are no fewer than thirty-four distinct works of the *jyotiṣa* genre bearing a title associated with Garga.[14] Among the most extensive works of Garga in terms of both scope and size is the *Gārgīyajyotiṣa*, which Pingree called the "first *Gargasaṃhitā*" (G1),[15] a large and somewhat fluid collection of sixty-four chapters.[16] At present our Garga Workgroup has access to sixteen manuscripts, three of which were used by Pingree in his study of the chapter Śukracāra,[17] four and thirteen respectively by Mankad and Mitchiner in their study of the Yugapurāṇa.[18] The astronomical chapters are found in all manuscripts except F, J, W. In total, thirteen manuscripts are consulted in this study.[19]

3 PREAMBLE AND EXPRESSIONS OF TIME-RECKONING

Scholars of the nineteenth century including Weber, Kern, Burgess, Dīkṣita, and later Negelein and Kane, generally recognized the antiquity and importance of the *Gārgīyajyotiṣa* in the history of *Jyotiṣa* literature.[20] However, with the exception of Pingree's attempt to decipher the content of the planetary chapters (III.2), no attempts have yet been made to analyze its overall astronomical contents. It is therefore

14 Pingree 1970–94: A2, 115–126; A3, 29–30; A4, 78–80; A5, 78–84.

15 We follow here Mitchiner (1986: 101–112). Cf. Pingree 1987*b*: 293. Pingree also called this text "*Vṛddhagargasaṃhitā* or *Vṛddhagārgīyā*"—under type "1" of the *Gargasaṃhitā* (Pingree 1970–94: A2: 116–17)—but he generally referred the text as the first version of the *Gargasaṃhitā* (Pingree 1981: 69). I prefer *Gārgīyajyotiṣa* or G1 over *Gargasaṃhitā* because a popular Purāṇic text with no relation to our text carries also the same name (Zysk 2016: 55–6). For a discussion of other recensions of "Garga," see Geslani et al. 2017: 152–3; Mitchiner 1986; Pingree 1981: 69–74; 1970–94: A2: 116–120.

16 For a review of previous research done by various scholars on different chapters, see Geslani et al. 2017: 154. On the organization of the materials as an amalgamation of indigenous and foreign knowledge, see Mak 2019.

17 Sigla G, P, and M. See Pingree 1987*b*: 293–4.

18 Mitchiner 2002: 24–8. Manuscripts G and W were not used. E and M were not used in the 1986 edition. On Mankad's 1951 edition, see Mitchiner 2002: 19.

19 For the manuscripts of the *Gārgīyajyotiṣa*, see Geslani et al. 2017: 153–4 (15 mss). All manuscripts except C and F were used.

20 For bibliography, see Geslani et al. 2017: 151, n. 1.

imperative to examine the text from its very beginning where the purpose of the text is given.

In the preamble of the text, the author explains the role of the astronomer in a section titled "Sāṃvatsaranirdeśa".[21]

> अथातः सांवत्सरनिर्देशं व्याख्यास्यामः।
>
> तत्र सांवत्सरो नाम सूर्यचन्द्रमसोर्ग्रहनक्षत्रचाराणां चोदयास्तमयकालानिर्वर्त्तकं निमेषक्षण-काष्टःआदित्रुटिलवमुहूर्ताहोरात्रपक्षमासर्त्वयनविशुवदित्येवमादि … तथा लौकिकवैदिकाध्या-त्मिकानामर्थानां कर्मगुणानां प्रयोगकालसिद्यर्थं तिथिनक्षत्रमुहूर्तकरणानां च प्रयोक्ता। तथा संवत्सर-परिवत्सरेदावत्सरानुवत्सरोद्वत्सराणां पञ्चानां संवत्सराणां लक्षणाभि-गमार्थं संवत्सरज्ञा-नमधिकृत्य संवत्सरपरिवत्सरादीनां प्रज्ञानां च सर्वकार्य-क्रियासिद्धिसंयोजनार्थमादावभिगमनीयो भवति। यथा च मन्त्रोऽग्निमुखोऽपि च सुराणां च तथा संवत्सरमुखाः पार्थिवाः पार्थिवमुखाश्च प्रजास्तस्माद्विजिगीषुणा पार्थिवेनेह चामुत्र च श्रेयो वाप्तुकामेन सांवत्सरोऽधिगन्तव्यः।
>
> Hence we shall explain the [section title] "Description of the astronomer" (*sāṃvatsaranirdeśaṃ*). In this [expression] what is called an astronomer (*sāṃvatsara*) is one [who knows the] the arrival of the time of rising and setting, the motion of Sun, Moon, planets and stars [and the time units within the year (*saṃvatsara*),] such as *nimeṣa*, *kṣaṇa*, *kāṣṭhādi*, *truṭi*, *lava*, *muhūrta*, day, half-month, month, season, half-year and equinox.... Also, he is the undertaker of specific rituals (*karmaguṇa*), whose aims could be mundane, Vedic, or spiritual, [rituals specific to each] *tithi*, *nakṣatra*, *muhūrta* and *karaṇa*, for the purpose of success at the time of undertaking. Also, having become qualified in the knowledge of the year in order to understand the signs of the five years, i.e., *Saṃvatsara, Parivatsara, Idāvatsara, Anuvatsara* and *Udvatsara*, he is the first to be approached [by the king] to bring about success to all requisite actions pertaining to the knowledge [of things] such as *Saṃvatsara*, *Parivatsara* and so on. Just as for the gods the mantra has fire as its head (*agnimukham*), in the same way the kings have the astronomer as their head and people have the kings as their heads. Therefore, the astronomer should be approached by a king who wants to conquer [the earth], or one who wants to obtain a better afterlife.

The reference to the five *vatsaras* (*Saṃvatsara, Parivatsara, Idāvatsara, Anuvatsara, Udvatsara*) in connection to the duties of the Vedic priest is identical to those mentioned in the *Kāṭhakasaṃhitā*,[22] where the "descendants of Garga" (*gargāḥ prāvareyāḥ*) are mentioned also in the same book.[23] The dating of this passage, however, must be considerably later due to the reference to *tithi*, as such a concept, defined later as one thirtieth of a synodic

21 This section (Sāṃvatsaranirdeśa) appears to be the basis of the second *adhyāya* of the *Bṛhatsaṃhitā*, which was titled "Sāṃvatsarasūtra." In fact, some of the *Gārgīyajyotiṣa* materials from this section are found in Dvivedin's edition of the *Bṛhatsaṃhitā* (Dvivedī 1895–7), where such materials must have been Utpala's citations rather than Varāhamihira's.

22 *Kāṭhakasaṃhitā* xiii.15, xxxix.6. The names of the five years are different in the *Vājasaneyisaṃhitā*, *Taittirīyasaṃhitā* and *Taittirīyabrāhmaṇa* (Macdonell and Keith 1912: 1.412).

23 *Kāṭhakasaṃhitā* xiii.12. See Macdonell and Keith (1912: 1.220), referring to Weber 1855: 3: 374.

month, is unknown to the Brāhmaṇas.[24] Particularly noteworthy is also the reference to a sequence of smaller time units: *nimeṣa*, *kṣaṇa*, *kāṣṭhā*(*di*), *truṭi* and *lava*. Among the extant Indian literature, this rare combination of five time units as the smallest time units is found only in the work of Parāśara,[25] and the first book of the *Mahābhārata*.[26] Since the topic of time units is ubiquitous across Indian literature and they come in a bewildering variety, the use of identical time units suggests a close connection among these texts, composed likely in the same period.

Within the *Gārgīyajyotiṣa*, the first *aṅga* "Karmaguṇāḥ" represents likely an older stratum of the Vedic astral science, characterized by the conspicuous absence of planets in both the astronomy and the astral omens described therein.[27] The astrological time units *tithi*, *nakṣatras*, *muhūrta*, and *karaṇa* are considered in the text as the four basic components of an ancient astral lore.[28] It may be noted that the four *karmaguṇāḥ* of the first *aṅga* are not adopted in their original form in the *Bṛhatsaṃhitā*. Instead, one finds related but abbreviated materials toward the end of the latter, as if they had gone out of fashion and remained in the text as a vestige of the past.[29] It may be further noted that the appellation Vṛddhagarga appears sporadically through the text, in both the verses and section headings in particular the first *aṅga*, as well as variants in certain manuscripts. In some occasions, Vṛddhagarga appears to be interchangeable with Garga. In other occasions, particularly those cited by Bhaṭṭotpala in his commentary to the *Bṛhatsaṃhitā*, Vṛddhagarga and Garga refer to authors of distinct texts.[30] suggesting further the possibility of an older stratum of the text before the new planetary science was introduced.

4 PLANETARY SCIENCE

Starting from the second aṅga, the astral omens have a very different character, namely, those associated with the *grahas*, namely, the nine "seizers," Sun, Moon, the five planets and the two pseudoplanets Rāhu and Ketu, known later generally as the pantheon of *navagraha*.[31] The order of the chapters (*aṅga*): *candra* (2), *rāhu* (4), *bṛhaspati* (5), *śukra* (6), *ketu* (7), *śanaiścara* (8), *aṅgāraka* (9), *budha* (10), *āditya* (11), cannot be so

24 Macdonell and Keith (1912: 1.309). Note that MacDonell and Keith's definition of the *tithi* as "a lunar day, the thirtieth part of a lunar month of rather over twenty-seven days" is incorrect. The *tithi* is concerned with the Moon phases, which completes a cycle in a synodic month (c. 29.5 days), not a sidereal month (c. 27.3 days). I follow Kielhorn's advice against the misleading translation of *tithi* as a "lunar day" (Kielhorn 1906: 228). For a discussion on the *tithi* in the *Gārgīyajyotiṣa*, see Mak 2018*b*.

25 Cited in Bhaṭṭotpala's commentary on *Bṛhatsaṃhitā* 2(3). The ratio of the five units according to Parāśara is: 1 : 2 : 4 : 8 : 80. Other units less than a *muhūrta* are *kalā* and *nāḍikā*, defined as a twentieth and a half of a *muhūrta* respectively. See Hayashi 2017: 28.

26 MBh 1.21.13–14. No conversion is given in this passage. Time units given in other books are different (Hayashi 2017: 49–55).

27 References to the planets are extremely obscure in the Vedic literature despite efforts of certain scholars to identify possible allusions (Macdonell and Keith 1912: 1.243). There is no mention of the planets in either of the two recensions of the *Vedāṅgajyotiṣa*, our sole extant sources on Vedic astronomy. At any rate, the concept of *graha* as "planet" is certainly unknown.

28 चतुर्व्यूहं कर्मगुणं गर्गेणोक्तं यथाविधि। तिथिनक्षत्रकरणैर्मुहूर्तानां च संपदः॥ (*aṅga* 1, Paribhāṣā, v. 1)

29 *Adhyāya* 98 and 99, titled "*nakṣatrakarmaguṇa*" and "*tithikarmaguṇa*" respectively.

30 See discussion in Kane

31 On the *navagraha* planetary worship in historical perspective, see Mak 2018*a*: 233–241.

easily explained and could be classified as an earlier stage of the evolution of planetary science in India, or what Yano described as "stage 4" where the order of the nine planets was not yet fixed.[32]

The various planetary theories described in the *Gārgīyajyotiṣa* are largely absent in the later *jyotiṣa* traditions. These include: (1) Planetary motion based on *nakṣatra*s divided into various subdivisions such as "paths" (*patha* or *mārga*), "streets" (*vīthi*) and "circles" (*maṇḍala*);[33] (2) Synodic phenomena, with emphasis on the duration of visibility/invisibility.[34] Once again, we should remind ourselves that these astronomical theories are subservient to the larger concern of the text, that is, omens connected with various celestial phenomena.[35] Thus, the author of the *Gārgīyajyotiṣa*, rather than producing an astronomical theory to explain the planetary movement, was mostly interested in telling the readers where the planets might be observed, what unusual features they might have and what they meant as omens. Varāhamihira in his *Bṛhatsaṃhitā* reproduced only some of these descriptions, with the glaring absence of the astronomical details related to planetary synodic phenomena, apparently superseded by the epicycle theories propounded in his own work, the *Pañcasiddhāntikā*. These unusual descriptions with no known precedents from other Indic sources led Pingree to the claim that the planetary theories in the *Gārgīyajyotiṣa* are of ultimately Babylonian origin and that *Gārgīyajyotiṣa* was "probably composed in the first (or possibly second) century A.D.... based on material that goes back to the fourth or fifth century B.C."[36] Considering that at the time of the comparative study neither the Sanskrit nor the Babylonia materials were yet completely edited and analyzed, Pingree's claim might thus have been premature and should be carefully reviewed.[37]

5 TOWARD A CRITICAL EDITION OF THE ASTRONOMICAL CHAPTERS OF THE *GĀRGĪYAJYOTIṢA*

A complete critical edition of the *Gārgīyajyotiṣa* was described by Pingree and Mitchiner as an "urgent necessity."[38] In his edition of the *Yugapurāṇa*, Mitchiner classified the thirteen manuscripts he used into four groups on the basis of variant affinities and quality of the reading. In my edition of the section titled "Tithikarmaguṇa" of the first *aṅga* (Appendix, p. 64 below),[39] I attempted to construct a stemma codicum based on the

32 Yano 2004: 331–2. There appear to be some affinities among certain planets in this sequence, for example, Moon and Rāhu due to the latter being primarily the eclipse demon of the former, the benefics (Jupiter and Venus), the malefics (Saturn and Mars), and the neuter (Mercury). The obscurity of this order must have prompted Varāhamihira to adopt an order similar (though not identical) to the conventional *navagraha* order: Sun, Moon, Rāhu, Mars, Mercury, Jupiter, Venus, Saturn, Ketu (*adhyāya* 3–11).

33 For Venus, see Pingree 1987*b*: 297; for Mars, see (Pingree 1987*a*: 95).

34 For Venus, see Pingree 1987*b*: 296, 305–315; for other planets, see Pingree 1987*a*: *passim*.

35 On the omenology in the *Gārgīyajyotiṣa*, as exemplified by "Signs and portents of calamity" (*Rāṣṭrotpātalakṣaṇa*, ch. 39), see Kumagai 2015.

36 Pingree 1987*b*: 295.

37 Pingree's claims are largely based on his interpretation of the Venus Chapter (Śukracāra) of the *Gārgīyajyotiṣa*, which he translated without an edited Sanskrit text. A review of Pingree's claims based on my paper titled "Garga and the Astronomical Chapters of the *Gārgīyajyotiṣa*," presented at the 228th meeting of the American Oriental Society, is currently under preparation.

38 Pingree 1978: 2.447; Mitchiner 1986: 95.

39 For translation and discussion, see Mak 2018*b*.

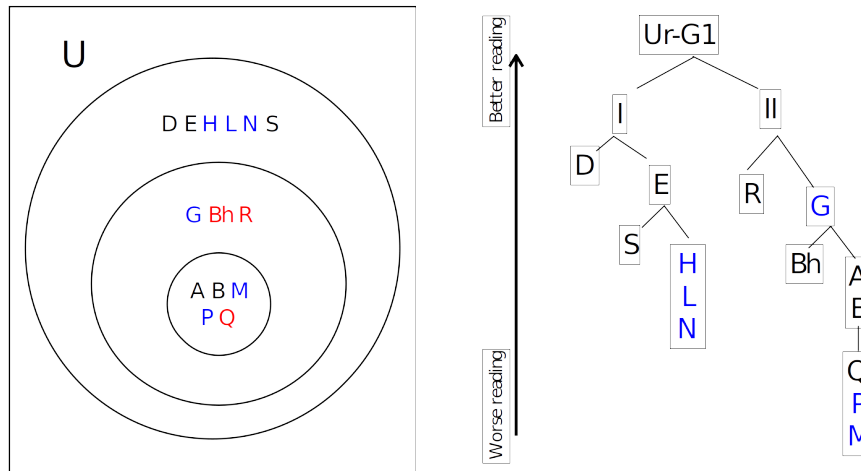

Figure 1: The relation between the subsets of manuscripts.

overlapping lacunae identified. The forty-four verses describing the astrological nature of the fifteen *tithi*s are collated against the thirty verses cited by Bhaṭṭotpala in his commentary to the *Bṛhatsaṃhitā*. In total, six sets of lacunae, three of which are lone cases suggesting further deterioration in transmission. In addition, manuscripts H, L, N, G, P, and M are found to contain a large number of erroneous readings.

17–18	A B M P Q
22cd–23	A B Bh G M P Q R
29cd–33ab	A B Bh D E G H P Q L M N R S
4b–5b	Bh
13b–14c	Q
33c–44	R

Based on the above observation on the thirty common verses, the relation between the subsets of manuscripts may be illustrated as in Figure 1. Provisionally, I propose two main groups of manuscripts, I and II. Group I (D, E, H, L, N, S) contains the greatest number of lacuna-free verses, i.e., 40 out of 44 verses. The missing four verses can only be supplied by Bhaṭṭotpala's citation (U) and are not attested in any other extant sources. Group II comprises the remaining manuscripts (G, Bh, R, A, B, M, Q), which are in various stages of degradation based on our analysis of the lacunae. As the four missing verses in Group I manuscripts are found missing also in the Group II manuscripts, the latter may be treated as a subset of the former and Group II in general may be considered a more distant transmission from the Ur-*Gārgīyajyotiṣa* text.[40] Within the two

40 Note similar observation made by Zysk, who placed Mitchiner's four groups under two major divisions (1+4, 2+3) based on his analysis of gaps and missing texts in the chapter on *lakṣaṇam* (Zysk 2016: 476).

main groups, subgroups are indicated either by lone lacunae or inferior readings. In addition, manuscripts A, Bh, D, G, and L are found to contain significant unique variants. As emendation, cross-contamination and other non-linear processes are always possible and a phylogenetic account of the transmission of Indian manuscripts is far from sufficient, revision to the proposed stemma is always needed especially when more such overlapping sets of lacunae are identified. The revised model, however, must sufficiently account for the pattern of lacunae described above. While the stemma may not represent the most accurate picture of the transmission of the text and the relation between the manuscripts we have access to, it is a helpful reference in terms of prioritizing our use of the manuscript and to identify the best variant readings when no other criteria avail.

6 CONCLUSION

To sum up, based on our cursory survey of the passages on time-reckoning and planetary science, we can see that the *Gārgīyajyotiṣa* consists of a body of astral lore that gradually evolved from the late Vedic period up to the early centuries of the Common Era. The lore of *tithi*, *nakṣatra*, *muhūrta*, and *karaṇa* representing the oldest layer of Vedic astral lore in the first *aṅga* of the *Gārgīyajyotiṣa* was gradually supplemented and replaced by the planetary lore as seen in the subsequent astronomical chapters. The *Gārgīyajyotiṣa* of sixty-four *a*s must have been an early attempt by the learned members belonging to the lineage of Garga to integrate the knowledge of a new cosmological and religious outlook with the older Vedic lore, as part of the transition from Brahmanism to Hinduism. As shown by the various passages from the *Mahābhārata* and also parallel materials in early Buddhist texts, from the *Sāmaññaphalasutta* to the Mahāyāna narrative *Śārdūlakarṇāvadāna*, such composite materials from the *Gārgīyajyotiṣa* must have been greatly popular as Garga became synonymous with astral learning during this period in India.

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APPENDIX

GĀRGĪYAJYOTIṢA: TITHIKARMAGUṆĀḤ

MANUSCRIPTS AND EDITIONS USED

Siglum	*Location, institution, shelf-mark, folios* (*reference*)
A	Calcutta, The Asiatic Society, ID 20. 160 ff.
B	Varanasi, Sampurnanand Sanskrit Vishwavidyalaya, 36370. 122 ff. (Pingree 1970–94: A2, 117)
Bh	Pune, BORI 542 of 1895/1902. 275 ff. (P)/ 225 ff.(Z)/317 ff. (Pingree 1970–94: A2, 117)
D	Kolkata, National Library of India, Th319. 295 ff. (Pingree 1970–94: A5, 78)
E	Pune, BORI 345 of 1879/80. 232/239 ff. (Pingree 1970–94: A2, 117)
G	Cambridge, Trinity College, R.15.96. 109 ff. David E. Pingree's transcription #1 (Pingree 1970–94: A2, 117; Aufrecht 1869: 32–6)
H	Varanasi. BHU, 2B/1288. No. 34. 227 ff. (Pingree 1970–94: A5, 78)
L	Kolkata, National Library of India, Th171. 147 ff. (Pingree 1970–94: A5, 78)
M	Mumbai, University of Mumbai, 1433. Itcchārām Sūryarām Desāi Collection. 192/398 ff. (Pingree 1970–94: A2, 117)
N	Kolkata, National Library of India, Th216. 228 ff. (Pingree 1970–94: A5, 78)
Q	Alwar, RORI, 2603. 186 ff. (Pingree 1970–94: A5, 78)
R	Alwar, RORI, 2602. 245 ff. (Pingree 1970–94: A5, 78)
S	Varanasi. BHU, 35311. 220 ff. (P)/201 ff. (Z). (Pingree 1970–94: A2, 117)
Ś	*Śārdūlakarṇāvadāna* (edition: Mukhopadhyaya 1954) Paris MS (p) and Bengal MS (b)
U	Bhaṭṭotpala's commentary to Varāhamihira's *Bṛhatsaṃhitā* (edition: Dvivedī 1895–7).

Notes on the apparatus

Testimonia and major lacunae are noted in the first tier. E.g., Bh: 4b–d – om. means "verse 4b–d in manuscript Bh is omitted." Variant readings are given in full by verse in the second tier. E.g., **1a** vane] Σ, śrīḥ mrane Bh, vene M means "In verse 1a, the preferred reading *vane* is found in all manuscripts except Bh and M, where the variants *śrīḥ mrane* and *vene* are found respectively."

Manuscript/edition, starting folio and line: A 6a24, B 7r6, Bh 10r7, D 7v15, E 8r10, G 8r8 (DEP 21), H 8v5, L 5v6, M 13.8, N 8v3, Q 8v3, R 8v9, S 8r2

वने चैत्ररथे रम्ये महर्षीणां समागमे।
कृताह्निकमृषिं सिद्धं गर्गं क्रोष्टुकिरब्रवीत्॥ १॥
भगवन् का तिथिर्नाम कुतश् चैषां प्रवर्त्तनम्।
किं कर्म फलयोगाद्वा भगवन् प्रब्रवीहि मे॥ २॥
एतस्य तिथिवर्गस्य प्रवृत्तस्येह सर्वदा।
सर्वस्य विस्तरेणेह ब्रूहि कर्म शुभाशुभम्॥ ३॥
पृथक् च देवतास्तिथ्यो नामानि च पृथक् पृथक्।
क्रोष्टुकेर्वचनं श्रुत्वा गर्गो वचनमब्रवीत्॥ ४॥
शृण्वन्तु ऋषयः सर्वे देवाश्च सपुरोहिताः।
यदा स भगवान् दक्षः सोमे यक्ष्माणमुत्सृजेत्॥ ५॥
ततः प्रक्षीयमाणस्य तिथिरेवं च संज्ञिता।
द्विलवोनमहोरात्रमेतस्य परमा गतिः॥ ६॥
वक्ष्यामि च पृथक्त्वेन देवतां नाम कर्म च।
नन्दा भद्रा बला रिक्ता पूर्णा मासा प्रकीर्त्तिता॥ ७॥

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4 Bh: 4b-d - om. **5** Bh: 5ab - om. **7** In pāda d, all mss. except Bh intend to give the emendation *āsām* (f. gen. pl.) to refer to the tithis, but the sixth tithi would be missing as a result. The correct reading appears to be *māsā*, as given in Utpala's citation of v. 21, glossed as *somatithi* in all mss. (except Bh).

1a vane] Σ, śrīḥ mrane Bh, vene M; °rathe] Σ, °rethe BM, °rethai R **1b** maharṣīṇāṃ] Σ, °āṇāṃ AM, mahaṣāṇāṃ B, brahmarṣīṇāṃ D samāgame] Σ, °gamo D **1c** ṛṣiṃ] Σ, ṛṣi R; kṛtāhnikam] Σ, katā° ABM; siddhaṃ] Σ, siddhiṃ BhD **1d** gargaṃ] Σ, garga Bh; kroṣṭukir] Σ, koṣṭakir AQ, koṣṭaṃkir BM, kroṣṭukim D **2a** bhagavan] BhGDR, bhagavān ABMQ, bhagan EHLNS; tithir] Σ, tithi AQN, mithi BM; nāma] Σ, nami N **2b** kutaś] Σ, kutataś M; caiṣāṃ] Σ, caiṣā Bh pravarttanaṃ] Σ, pravarttanāṃ M, pravarttate Bh **2c** phalayogād] Σ, phalayogā R, phaliyogīd Bh **2d** prabravīhi] Σ, °mi EHLNS **3a** tithi°] Σ, ti° R **3c** vistareṇeha] Σ, °ṇaiha BM **3d** °śubhaṃ] Σ, °śubha AQ **4a** pṛthakcadevatās] D, pṛthakdevatatas AGR, pṛthakdaivatatas Q, pṛthaktvadevatas EHLNS, pṛthakdaivatatas BM, pṛthaktvātitāṃ++ Bh **4b** nāmāni ca] Σ, nāmānīha G, nāmānī ABQM, - Bh **4c** kroṣṭuker] Σ, krauṣṭuker A, kroṣṭuke Q **5b** °ścasa°] Σ, °saśca Q, - D **5c** dakṣaḥ] Bh, pakṣaḥ Σ, yakṣaḥ L **5d** some] Bh, somo Σ; utsṛjet] Σ, utsṛjan Bh, atsrjet D **6a** prakṣīyamāṇasya] Σ, °māṇedos Bh **6b** evaṃ] Σ, eva ABMQ **6d** paramā] BhE, paramāṃ DG, paramaṃ Σ; gatiḥ] Σ, gatiṃ D **7a** vakṣyāmi ca] Σ, vakṣyāmīha Bh, rakṣyāmi ca BM **7b** devatāṃ] Bh, °tā Σ **7c** nandā] Σ, naṃdaṃ Q, nardaṃ AM, naṃrda B; bhadrā] Σ, °dro ABM **7d** pūrṇā] Σ, pūrṇa Bh, praṇār AM, prarṇā B; māsā] emend., cāsāṃ Σ, [cā]sāṃ H, cāsaṃ EL, vāsāṃ N, vṛddhi Bh

मित्रा महाबला चैव उग्रसेना सुधर्मिनी।
आनन्दा च यशा चैव जया प्रोक्ता त्रयोदशी॥८॥
उग्रा चतुर्दशी ज्ञेया सौम्या पञ्चदशी तथा।
द्विरेताः परिवर्त्तन्ते चान्द्रे मासे पृथक् पृथक्॥९॥
शुक्लः कृष्णश्च पक्षौ द्वौ प्रवर्त्तयति यः प्रभुः।
नाम दैवतकर्माणि तासां वक्ष्यामि कृत्स्नशः॥१०॥
नन्दा प्रतिपदा प्रोक्ता प्रशस्ता ध्रुवकर्मसु।
ज्ञानस्य च समारम्भे प्रवासे चाधिगर्हिता॥११॥
दानं दद्यात्तपः कुर्यात् पुष्टिसौभाग्यमेव च।
जन्म चात्रोत्तमं विद्यात् स्वयंभूश्चात्र देवताम्॥१२॥
भद्रेत्युक्ता द्वितीया च शिल्पव्यायामिनां हिता।
आरम्भे भेषजानां च प्रवासे च प्रवासिनाम्॥१३॥
आवाहव्यवहारार्थं वास्तुक्षेत्रगृहादिषु।
पुष्टिकर्मसु च श्रेष्ठा देवता च बृहस्पतिः॥१४॥
बलेत्युक्ता तृतीया च बलं स्यात्तत्र कारयेत्।
गोश्वकुञ्जरभृत्यानां दम्यानां दमनानि च॥१५॥

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11 Citation from Utpala cmty to BS (1037) begins here. **13** Q: om. from 13b **13** Ś: dvitīyā kathitā bhadrā śastā bhūṣaṇakarmasu **14** Q: om. up to bṛhaspatiḥ **15** $Ś^{p}$: calā tṛtīya vyākhyātā praśastā calakarmasu

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8a mitrā] Σ, mitra ABGM; mahābalā] Σ, balā Bh caiva] Σ, caivaṃ Q sudharminī] emend., sudhārminī Σ **9b** saumyā pañcadaśī] Σ, saumyāryācadeṇas Bh **9c** parivarttante] Σ, °tate Bh **9d** māse] Σ, māne DEHLNS **10a** śuklaḥ] Σ, śukla D, °klaṃ G, °kraṃ ABMQ; kṛṣṇaś ca pakṣau] Σ, kṛṣṇapakṣai R **10d** tāsāṃ vakṣyāmi] Σ, nāsīṃvakṣyāmi AQ, nāsaṃsīnakṣyāmi M, nāsīṃnakṣyāmi B **11a** nandā] Σ raṃdā A, caṃdrā Q; pratipadā proktā] Σ, °pad ity uktā U, °padām āhuḥ $Ś^{p}$, °māhuḥ pratipadāṃ $Ś^{b}$ **11b** praśastā] Σ, °tāṃ Ś **11c** jñānasya ca] Σ, jñagnasya ca B, vijñā° Ś; samārambhe] Σ, māraṃbhe BhS, samārabhau BM **11d** cādhigarhitā] DEHLNS, cāpigarhitā ABGMQR, cātigahitā Bh, ca vigarhitā UŚ **12a** dānaṃ] Σ, dārna Bh, nādyād U; dadyāt] Σ, dadyā ABM, daṃdyārt G, dadyān Bh; tapaḥ] Σ, tapa Bh, tavaḥ ABGMQ; kuryāt] Σ, kuryā D **12b** ca] Σ, vā Bh **12c** janmacātrottamaṃ] Σ, janmavāttottamaṃ QR, janmavājottamaṃ A, janmavātrotamaṃ B, janmavāntotamaṃ M; vidyāt] Σ, vindyāt DU, pidhyan ABMQ **12d** svayaṃbhūś cātra devatāṃ] Bh, °devataṃ ELHNS, °daivatāṃ D, °daivataṃ G, svayaṃbhūś cā devataṃ R, aśvayabhūśvā daivataṃ B, aśvayabhūśyā daivataṃ AMQ, svayaṃbhūr devayā yataḥ U **13a** bhadrety] Σ, bhadraity S ca] Σ, tu U **13b** śilpa]Σ, °pā ABGM, śilpe D; vyāyāmināṃ]Σ, nyāyā° D **13c** bheṣajānāṃ] Σ, bha° BM **13d** pravāsināṃ] Σ, °no AB, °nī M **14a** āvāha°] Σ, vivāha° Bh, vīvāha° G; °vyavahārārthe] Σ, vyavahārathi A, vyavavyavahārathi BM **14c** °karmasuca] Σ, °kamaṃsucā A, °kapaṃsuca B, kapaṃsucā M **14d** devatā ca bṛhaspatiḥ] Σ, °ti G, vidhātā cātra daivatā Bh, decatā ca dṛhaspati ABM **15a** bale°] Σ, ṣale° ABM; ca] Σ, tu U **15b** balaṃsyāttatra] Σ, bale° Bh, balasyāṃtratra R, balasyāṃtrata M, balasampac ca U **15c** °kuñjara°] Σ, °jarā° Bh, °kujara° ABMQ, °ujara° R; °bhṛtyānāṃ] Σ, °bhṛtyānīṃ G, °bhṛtyānaṃ ABMQ **15d** damyānāṃ] Σ, damyānā R; damanāni] Σ, damanena ABGMQR, mānasāni U

कुर्याच्च सर्वकर्माणि बीजान्यपि च वापयेत्।
बलकर्मारभेद्वापि विष्णुं विद्याच्च दैवतं॥ १६॥
रिक्ता चोक्ता चतुर्थी तु क्षुद्रकर्म प्रयोजयेत्।
गोग्रहं दारुणं कर्म कूटसाक्ष्यं समारभेत्॥ १७॥
कुर्यात् सांवत्सराण्यत्र अभिघाताश्रयाणि च।
ग्रामसेनावधं कुर्यात् यमं विद्याच्च दैवतम्॥ १८॥
पूर्णा तु पञ्चमीमाहुः प्रशस्तां ध्रुवकर्मसु।
नवान्नाग्रयणानां च शयनासनवेश्मनाम्॥ १९॥
जन्मक्षेत्रविभूषार्था व्यवहारौषधिक्रियाः।
प्रशस्तं पौष्टिकं कर्म सोमं विद्याच्च दैवतम्॥ २०॥
षष्ठी सोमतिथिर्नाम प्रशस्ता ध्रुवकर्मसु।
क्षेत्रारम्भं गृहं कुर्याद् देवतायतनानि च॥ २१॥

17 ABMQ: - om until v. 19. **17** Ś: caturthī kathitā riktā grāmasainyavadhe hitā/ cauryābhicārakūṭāgnidāhagorasasādhanam **18** ABMQ: -om. **19** Ś: pūrṇā tu pañcamī jñeyā cikitsā-gamanādhvasu/ dānādhyayanaśilpeṣu vyāyāme ca praśasyate// **21** Ś: aśitisaṃjñitā ṣaṣṭhī garhitā'dhvasu śasyate/ gṛhe kṣetre vivāhe vā'vāhakarmasu mitraiti//

16a kuryācca] Σ, kuryānna A ; °c ca sarva°] Σ, °d āsavakarmāṇi U **16c** bala°] BhU, bāla° Σ, bālaṃ D, vāstu° G ; °rabhed] emend., °rambhed Σ, °rembhed BM ; vāpi] Σ, [d]yāpi D, taiva U **16d** viṣṇuṃ] Σ, vavi AQ, vivi B, cavi M ; vidyācca] Σ, vidhācca BM, vidyādya A, viṃdyātsva D ; °taṃ] Σ, daivatām BhG **17a** riktā] Σ, °to Bh ; coktā] Σ, pro° U ; tu] Σ, tru N, va Bh, ca U, na D **17b** prayojayet] Σ, suyo° Bh **17c** gograhaṃ] Σ, grogra° Bh, gotra° G **17d** kūṭasākṣyaṃ samā°] emend., kūṭasākṣeyamā° EGLNHRS, krūṭa° Bh, °sākṣi samā D, °śāstraṃ samā° U **18a** sāṃvatsarāṇy] DELHNRS, sāṃvasa° Bh, saṃ° G, sammāraṇaṃ U **18b** atra] Σ, kuryād U ; abhighātā°] DU, asighātā° BhEHLNRS, asiddhātā° G **18c** grāma] Σ, dhruva° U **18d** yamaṃ] BhDU, sāmaṃ ELHNS, somaṃ GR ; vidyāc] BhGR, vindyāc DEHLNSU **19a** pūrṇāṃ tu pañcamīm āhuḥ] BhELNRS, pūrṇā tu° DG, pūrṇo tu° ABMQ, pūrṇo nu° H, pūrṇā ca pañcamī proktā U **19b** praśastāṃ] ABh, °tā Σ ; °masu] Σ, °maṇi U **19c** navānnāgrayaṇānāṃ ca] U, nāvanānāśrayāṇāṃ ca R, nāvanānāśrayāṇā ca ELHN, nāvanānāśrayoṇāṃ ca D, nāṃnāvanānāśrayāṇā ca S, narānnānāśrayāṇotra G, navānnāśrayāṇo ca AQ, nanānnānāśrayāṇo ca BM, dhanadhānmātrapānānāṃ Bh **19d** °veśmanām] Σ, °veśmanā R, °veśmani D, °yeśmana BMQ **20a** °ṣārthā] BhU, °ṣārthaṃ DEGHLNRS, °ṣārthe ABMQ **20b** °rauṣadhikriyāḥ] Bh, °roṣadhikriyāḥ LHRSN, °rauṣadhīkriyā D, roṣadhikriyā G, °roṣadhikriyaḥ ABM, °roṣadhikriya Q **20c** praśastaṃ] Σ, praśastaḥ R, praśasta G, prāśasta BMQ, praśāntaṃ U, śaśasta A **20d** somaṃ] Σ, saumaṃ D ; vidyāc] Σ, vindyāc ABDGMQRU ; daivataṃ] Σ, daivatāṃ BhR **21a** ṣaṣṭhī] SU, ṣaṣṭī BhDEHLNR, ṣaṣṭhi M, ṣaṣṭi ABGQ ; soma] Σ, vṛddhi Bh, māsā U **21b** dhruva°] Σ, dhruriva BM, dvāva A **21d** kuryād] Σ, kuryā ABGMQ

कारयेत् संश्रयद्वारगोपुराट्टालकानि च।
अध्वानं तु न गन्तव्यं कुमारश्चात्र दैवतम्॥ २२॥
सप्तमी मित्र नामा च मैत्रीं कुर्यान्नृपेषु च।
कुर्याद्राज्ञां ध्वजं छत्रमासनं शयनानि च॥ २३॥
रत्नानि मणियुक्तानि वस्त्रान्याभरणानि च।
धारयेद्भूषणार्थाय देवाः सप्तर्षयः स्मृताः॥ २४॥
महाबलाष्टमी चैव कुर्याद् बलनिदंशनम्।
अधिकारान् प्रयुञ्जीत यन्त्रकाण्डं धनूंषि च॥ २५॥
कुर्याच्च नगरे गुप्तिं सुरुङ्गान् परिखान् तथा।
हस्त्यश्वांश्च प्रयुञ्जीत वसवश्चात्र देवताः॥ २६॥
उग्रसेना तु नवमी रोधने वधबन्धने।
अमित्रदमनार्थे च हिता शत्रुवधार्थिनाम्॥ २७॥

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22 ABBhGMQR: om. from 22cd-23 **23** ABBhGMQR: om. **23** Ś:mitraiti saptamī khyātā śreṣṭhā sā saukṛte'dhvani/ nṛpāṇāṃ śāsane chatre śayyānāṃ karaṇeṣu ca// **24d** D continues with *devatāyatanāni ca*, followed by a repetition of vv. 22ab, 24. **25** Ś: mahābalāṣṭamī sā ca prayojyā parirakṣaṇe/ bhayamandarabaddheṣu yogeṣu haraṇeṣu ca//

22a saṃśrayadvāra] emend., saṃśrayādvāra D, saṃśrayedvā Σ, saṃśrayedvāpi Bh, saṃkramadvāra U **22b** gopurā] Σ, topurā A; °ṭṭālakānica] EHLNS, °ṭṭalakānica D, °ṭṭalakādica R, °ṭṭalakādivā G, dālakānica Bh, °vṛtakādi A, °vṛttakādi Q, °kṛtakādi BM, °dyālayāni ca] U; ca] Σ, va A, vā GMQ **22c** adhvānaṃtu] DELHN, adhvānāṃttu S, ādhānaṃca U; gantavyaṃ] DELHNS, kartavyaṃ U **22d** daivatam] U, °tā DELHNS **23a** nāmā ca] DEHLNS, °tu U **23b** maitrīṃ kuryānnṛpeṣuca] D, maitrīkūryāt++suca EHLNS, mitrakāryādhruvāṇi ca U **23c** dhvajaṃ] DU, °ja EHLNS **23d** śayanāni] DU, śayanādi EHLNS **24a** ratnāni] Σ, raktāni ABGMQR; maṇiyuktāni] Σ, maṇimuktāni U, yuktāni GR, yuktarani ABMQ **24c** dhārayed] Σ, kārayet DU; bhūṣaṇārthāya] Σ, °ṇādyāṃś ca U **24d** devāḥ] Σ, devaṃ Bh; saptarṣayaḥ smṛtāḥ] Σ, °yas tathā U, ṣaṇmāturaḥ smṛtāḥ Bh **25a** mahābalāṣṭamī] Σ, mahābalā cāṣṭamī EHLNS; caiva] DU, ca Σ, proktā] BhG **25b** balanidaṃśanaṃ] Σ, dalanidaṃśataṃ AB, ?lanidaṃśataṃ M, dalanidaṃsataṃ Q, bāla° U **25c** prayuñjīta] Σ, mayuñjīta R; adhikārān] Σ, adhikāran Bh **25d** yantrakāṇḍaṃ BhGR, yatrakāṃḍa DELHNS, yatrakāṃḍaṃ Q, dyantrakāṃḍaṃ ABM, °trākāra U **26a** nagare] Σ, re[śva]re D, nare EHLNS **26b** suruṃgāṃ] ELH, °gā S, surūṃgāṃ G, sturāṃgāṃ R, sturuṃgā ABQ, sturūṃgā M, gurugāṃ D, muragān Bh, surańgān U; parikhān] emend., °ās U, pacakhāṃ D, paṃcakhāṃ ELHNS, paṃnakhān Bh, paṃcakhāṃs R, vankhāraṃs G, paṃcakhāṃras ABQ, paṃcakhāraṃs M; tathā] Σ [n]api Bh **26c** hastyaśvāṃś ca prayuñjīta] DELNHS, hastyaśvāṃśca++++ R, hāstyaśvāṃ+++++ G, hastyaśvāṃ+++++ BMQ, hastyaśvā+++++ A, rathāśvagohastyādīn Bh **26d** vasavaś cātra] Σ, vasavaśrātra G, svasa° Bh; devatāḥ] DELHNS, devatā Σ **27a** tunavamī] DLS, trunavamī EHN, tunarvami G, nunarvasi ABMQ **27b** rodhane] Σ, bandhane U; vadhabandhane] Σ, vadhanaṃdhane A, caghanaṃdhane BQ, caghalaṃdhane M, bandhabandhane Bh **27c** amitradamanā°] Σ, amibhadamanā° B, abhitradamanā° Q, abhimadamanā° M **27d** hitā] BhDU, hito ELGHRS, hitau ABMQ; śatru°] Σ, śastra° ABMQ; °vadhārthinām] BhG, °vadhothinā R, °vadhorthinaṃ DELNS, °vadhorthina H, °vadhoryinā A, °vadhorpinā M, °vadhopinā BQ, °vadhāya ca U

अध्वानं च न गच्छेत प्रोष्यं न प्रविशेद् गृहम्।
सहरोधविषादीनि रुद्राणी चात्र देवता॥ २८॥
सुधर्मां दशमीं प्राहुर्ध्रुवं कुर्याद्यशस्करं।
कूपान् खनेन्नदीश्चैव कूपं पुष्करणीयुतम्॥ २९॥
आरामान्नगरीश्चैव क्षेत्राणि च गृहाणि च।
पुण्यशालां सभां कुर्याद्धर्मं विद्याच्च दैवतम्॥ ३०॥
सुनन्दैकादशीमाह ध्रुवं विद्यान् महानसम्।
निवेशनगरग्रामयज्ञविप्रसभास्तथा॥ ३१॥
स्त्रीषु चाग्रं प्रवर्तेत दासकर्मकरेषु च।
गूढार्थं न प्रयुञ्जीत कामशत्रुश्च देवता॥ ३२॥
द्वादशीं तु यमामाह ध्रुवं विद्याद्यशस्करम्।
मङ्गलान्यत्र कुर्वीत मन्त्रोपनयनानि च॥ ३३॥
कोष्ठागाराणि कुर्वीत निधानं च निधापयेत्।
ऋणं चात्र न गृह्णीयादादित्यश्चात्र दैवतं॥ ३४॥
जयां त्रयोदशीमाहुः कर्तव्यं कर्म शोभनम्।
वस्त्रमाल्यमलङ्कारं चित्रान्याभरणानि च॥ ३५॥

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29 ABBhDEGHLMQRS : om. 29cd - 33ab **33** ABhDEGHLMQRS : resume from 33c **34** 30 U : ārāmān nagarīś caiva kṣetrāṇi ca gṛhāṇi ca/ puṇyaśālāṃ sabhāṃ kuryād dharmaṃ vindyāc ca daivatam// **34** R : om. until end of section and resumes in the next section from *phalāni ca karmāṇi*. **34** Mss. DELNH left blank space (D c. three lines, EH c. two lines) possibly due to the missing verses 29cd-33ab or damage from a common exemplar. The blank is however misplaced.

28a adhvānaṃ] Σ, adhvāne R, adhāne ABGMQ ; ca] Σ, va EHS, tra A ; na] Σ, - Q ; gaccheta] Σ, gacchet U **28b** proṣyaṃ na] ABDMQRU, prośyaṃ na ELHNS, pro G^{ac}, pro[?i]to G^{pc}, proṣito Bh ; praviśed] Σ, naviśe Bh, °śe ABMQ **28c** saharodhaviṣādīni] Σ, saharoviṣādīni R, gṛhorodha° Bh, saṃhareta vi° U **28d** rudrāṇī] Σ, tudrāṇī R, tudrāṇāṃ G ; devatā] Σ, daivatam U **29a** sudharmāṃ] DEHS, °mā GR, °mī Bh, °maṃ ABMQ, sudhanvā U ; °mīṃ prāhur] Σ, °mī prāhu AR, °mi prāhu Q, °mīm āhur M, °mīm āhu B **29b** °karaṃ] Σ, °kara BM **30d** vidyāc] emend., vindyāc U **31b** vidyān] emend., vindyān U **33b** vidyād] emend., vindyād U **33c** kurvīta] Σ, kuryīta M, kuryītar AB, kuryātar Q **33d** mantropanayanāni] Σ, mantropana° R, mantropata° Bh, mantropara° G, maccopana° BMQ, maghropana° A, cūḍopana° U **34a** koṣṭhāgārāṇi] Σ, koṣṭāgārāni D, kroṣṭāgārāri ABMQ ; kurvīta] DU, yuñjīta Σ, suṃjīta M, ṣujīta Q **34c** gṛhṇīyād] Σ, gṛhnīyād ABQ, gṛhīyād M, gṛhvīyād U **34d** ādityaś cātra] Σ, dharmaś caivātra Bh ; daivataṃ] Bh, daivatā Σ **35a** jayāṃ] Σ, jārya Bh, jayā BMU ; °māhuḥ] Σ, °nāmma Bh, °māha U **35b** karma śobhanam] U, cānukārakaṃ DG, vānukārakaṃ ELHNS, vānuvārakaṃ ABM, vātuvārakaṃ Q, vāstuveśanaṃ Bh **35c** alaṅkāraṃ] Σ, alaṃraṃ M, °ra U **35d** citrāny] Σ, viprāṇy U

सौभाग्यकरणं स्त्रीणां कन्यावरणम् एव च।
मण्डलं युग्मवसनं कामं विद्याच्च दैवतम्॥ ३६॥
उग्रां चतुर्दशीं विद्याद्दारुणान्यत्र कारयेत्।
बन्धनं स्वरिपूणां च प्रवासं चात्र वर्जयेत्॥ ३७॥
पूर्वाभिघातनं चैव दारुवध्याभिघातिनम्।
ग्रामसेनावधं कुर्याद् विद्याद् रुद्रोऽत्र देवता॥ ३८॥
अमावास्या तु सिद्धार्था पितृयज्ञोऽत्र शस्यते।
दैवकार्याग्निकार्याणि गोकुलानि निवेशयेत्॥ ३९॥
पुरोहितं च वरयेत् कुर्याद्यज्ञक्रियास्तथा।
बलींश्चारोपहारांश्च पितरश्चात्र देवताः॥ ४०॥
कल्याणी पौर्णमासी च देवकर्माधिकारकम्।
विप्रकार्याग्निकार्ये च गवां घोषान्निवेशयेत्॥ ४१॥
राज्ञां पुरोहितान् कुर्याद्यज्ञानि विविधानि च।
शुभं कर्म च कर्तव्यं सोमं विद्याच्च देवताम्॥ ४२॥

37d U : ghātanaṃ ca viśeṣataḥ// **42** U quotes end here in v. 42

36b °varaṇam] Σ, °caraṇam BhL **36c** maṇḍalaṃ] Σ, muṇḍanaṃ U ; yugmavasanaṃ Σ, yugmavasaṃ AQ, thugmavasaṃ BM, copavasanaṃ ? emend. **36d** vidyāc] Σ, vindyāc U ; daivatam] ABDGM, devatāṃ EHLNS, daivatāṃ BhU **37a** ugrāṃ] UBh, ugrā Σ ; caturdaśīṃ] Σ, caturdaśī ABDGQ ; vidyād] Σ, vidyād ABMQ, vindyād U, nāma D **37c** bandhanaṃ svaripūnāṃ ca] Bh, bandhanaṃ svanāṃ Σ, bandhanaṃ svati punāṃ G^{ac}, bandhanaṃ sva(ri)ti punāṃ(kṣa) G^{pc}, bandhanaṃ rodhanaṃ caiva U, paśatābadhanaṃ pabhūnāṃ D **38a** pūrvābhighātanaṃ] DEHLNS, °dhātanaṃ Bh, pūrvomidhāthānaṃ G, °ghānaṃ ABMQ, °hananaṃ U **38b** dāruvadhyābhighātinaṃ] D, dārūvadhaghātanam U, dāruvadhyaghātinaṃ EHLNS, dāruvadyātinaṃ ABMQ, dārūṇaṃ viṣaghātinaṃ Bh, dāruṇaṃ viṣaghāṇaṃtinaṃ G **38c** grāmasenāvadhaṃ] Σ, °vadya A, °śenāvadyu BM, grāmaṃ śenāvadyaṃ Q **38d** vidyād] Σ, vindyād U, vidyā ABMQ ; rudro] Σ, tudro ABMQ ; tra] Σ, gra ABM, vatra Q **39a** amāvāsyā] U, amāvāsyāṃ Σ, amāvāsyāyāṃ G, amīṃvāsyā Bh, amānāsyāyāṃ A, amānāsyāyā BM **39b** pitṛyajñotra] Σ, pitṛ yanujñautraṃ G, pitṛyajñaunaṃ A, pitṛyajñaubhaṃ BM, pitṛyaśaulaṃ Q ; śasyate] Σ, śiṣyate D **39c** daivakāryāgnikāryāṇi] Σ, deva° BhDEHLNS, devakāryāṇi kurvīta U **39d** gokulāni] Σ, gāku° BM, gokulaṃ tu U ; gokulāni niveśayet] Σ, gokulāniveśayet D **40a** purohitaṃ ca] Σ, purohitāya U ; varayet] D, varaṇaṃ U, vaśyet EHLNS, vavasye M, vasyeta G, vasye ABQ, vaśyetu Bh **40b** °kriyās] Σ, °kriyām U **40c** balīṃś cāro°] DEHLNS, °liṃś° AG, °liṃsāro Q, °liś° BM,°cādo° Bh, baliṃ caivo° U **40d** pitaraś] Σ, pitaś ABMQ ; devatāḥ] DEHLNS, °tā Σ **41a** kalyāṇī] ABhGMU, °ṇīṃ DEHLNS, kanyāṇī Q ; paurṇamāsī] GMU, paurṇamāṃsī AB, pauṇamāsi Q, paurṇimāsīṃ D, paurṇimāsī Bh, paurṇamāsīṃ EHLNS **41b** °kārakaṃ] EHLNS, °kārakāṃ BhGQ, °kāraka D, °kārakā ABM, °kāriṇī U **41c** °kāryāgnikārye] Σ, °kāryā Bh, °kārye'gni° U **41d** ghoṣān] Σ, dyoṣān BM, °ṣe U **42a** rājñāṃ] Σ, °jñaṃ Bh, °ṇaṃ ABM, °ṇāṃ Q, °jñaḥ U ; purohitān] BhDG, °tā ABMQ, °taṃ U, purohitaśca L, purohicāra H, purohi ENS **42b** yajñāni] Σ, yajñāṃś ca Bh ; vividhāni ca] Σ, °dhāni G, °dhān api Bh **42c** ca] Σ, pra D **42d** vidyācca] BBhMQ, vindyāca G, , vindyācca U, vidyāttu HLS, vidyātru EN, vidyātu D, vidyā[tra ?] A ; devatām] ABhGR, °tā Σ, daivataṃ D

एतास्तु तिथयः सर्वाः परिवर्त्तन्ते चक्रवत्।
शुक्लपक्षे च कृष्णे च शुक्लचन्द्रमसोर्वृताः ॥ ४३ ॥
अप्रमत्तः सदा युक्तो ब्राह्मणः सुसमाहितः।
तिथयो निर्दिशेत् सम्यग् गर्गस्य वचनं यथा ॥ ४४ ॥
वृद्धगार्गीये ज्योतिषशास्त्रे तिथिकर्मगुणाः ॥

43 The reading *śuklacandramasor vṛtāḥ* of ms. D suggesting a month to consist two Full Moons would yield a *pūrṇimānta* system, i.e., beginning and ending with a Full Moon. The order of *pakṣa* given here in *pāda* c, i.e., bright and dark, however, is not so satisfactory. On the other hand, an *amānta* system, i.e., beginning and ending with a New Moon, described as containing one Full Moon (*śuklacandramasāvṛtāḥ*) appears to me rather trite.

43a etās] Bh, etat EHLMNS, eta ABDGQ **43b** °varttante] emend., °varttate ADEGLQS, °vattāte HN, °varttateḥ BM, °varteta Bh **43c** śuklapakṣe] AGLQ, °pakṣeś H, °pakṣaś S, °pa † E, °pakṣa BMN, śuklaḥ pakṣe D, śukle pakṣe Bh ; ca kṛṣṇe ca] Σ, † ṣṇe ca E, kṛṣṇapakṣe Bh **43d** śukla°] emend., śuklā° BELHMNS, °klāṃ ABhGQ ; °candramasorvṛtāḥ] D, °candramasāvṛtāḥ Σ, °masyāvṛtāḥ G **44a** sadā] Σ, sava ABMQ, satāṃ BhG ; yukto] Σ, mukto Bh **44b** brāhmaṇaḥ su°] Σ,, brāhmaṇa su° E, brāhmaṇāsu° ABMQ, brāhmaṇāṃ G^{ac}, brāhmanāṇām G^{pc} **44c** tithayo] Σ, tithayoḥ AQ, tithiṃś ca Bh ; nirdiśet] Σ, °śe EHS, nirdaśet ABMQ ; samyag] D, samya Σ, śamya S, yasyar G, yamya ABMQ **44d** gargasya] D, gārgasya Σ, gārgyasya Bh ; vacanaṃ] Σ, vavarta Bh **45a** °gārgīye] Σ, °gārgīya N ; jyotiṣaśāstre] D, jyotiṣeśāstre Σ, jyotiḥśāstre Bh, jyotiṣośośā G ; tithikarmaguṇāḥ] Σ, tithikaraṇaguṇāḥ D, tithikaṃguṇāḥ G

Please write to ⟨wujastyk@ualberta.ca⟩ to file bugs/problem reports, feature requests and to get involved.

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