

Citations from Garga in Somākara's commentary on the *Yājñajyotiṣa*

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1. Introduction

The *Vedāṅgajyotiṣa* (abbr., VJ), or “the astronomical knowledge as an auxiliary to the *Veda*”, is the earliest treatise of mathematical astronomy (*jyotiṣa*) in India. It has two recensions with minor differences. One is traditionally considered as pertaining to the *R̥gveda*. Therefore it is called *Āraṇjakjyotiṣa* (RJ, 36 stanzas). The other belongs to the *Yajurveda*. It is called *Yājñajyotiṣa* (YJ, 43 stanzas). There is only an old commentary on YJ composed by Somākara.¹⁾ The text of RJ and YJ, together with Somākara's commentary, is published by Sudhākara Dvivedin (1908). In Somākara's commentary, we can find some citations from the older texts (e.g., the *Manusmṛti*, the *Matsyapurāṇa*, and the *Śatapathabrāhmaṇa*), an untraceable *Pariśiṣṭa* and an unnamed work ascribed to Garga.

Garga is generally mentioned as an astrologer who lived in the Post-Vedic period. A large number of texts, especially those on *jyotiṣa* (“astral knowledge” in the widest sense) are attributed to Garga.²⁾ Many verses of Garga are also cited in Varāhamihira's astrological works and Utpala's commentaries on them.³⁾ The most important work ascribed to Garga is known as the *Gārgīyajyotiṣa* (around A.D. 250), a part of which has been published as the *Yugapurāṇa* (Mitchiner (1986)). It is the main source of Varāhamihira and Utpalas' citations.

2. Citations from Garga in Somākara's commentary

In his commentary on YJ, Somākara cites a total of 92 lines (11 are repetitions) ascribed to Garga in 10 places.⁴⁾ These citations from Garga are reliable since some citations from the Vedic texts in Somākara's commentary can be definitely traced. Although most of the lines were translated in German by Weber (1862), they are still worth examining carefully in order to understand VJ and Garga. The citations are mostly in the Śloka verse and always introduced with the words “*tathā ca gargaḥ*” (lit., in this manner, Garga (says)), “*iti*

gargaḥ" (thus (said) Garga), or "*gargavākya*" (Garga's saying). Taking into account the meaning, all these lines, or the semi-verses can be divided into 3 groups as below.

Group 1: Garga's words convey the same meaning as the *mūla* text of YJ.

1–(1) One and a half verses cited in YJ 5 describe the position of the sun and the moon in the first day of the five-year cycle:

kālajñānaṃ mahat puṇyaṃ kālaś cāditya ucyaṭe | sa ca māghasya śuklasya somavāsavayoḥ saha ||
sahodayaṃ śraviṣṭhābhiḥ prastham ahaṇām udayamukhe | (Dvivedin (1908, 6))

The knowledge of time is very meritorious. The time is said to be the sun. And he [the sun], makes a rising with the moon and [the lunar mansion whose divinity is] *Vasu* (i.e., *Śraviṣṭhā*) in the bright-half of the month *Māgha*. [That is] the start of the days in [the sun's] northern [course].

1–(2) Four lines in YJ 8 tell the variation of 6 *muhūrtas* of the length of daytime between two solstices. However, the first two lines and the latter two are almost the same.

Group 2: citations to supplement YJ with some astronomical details.

2–(1) The citation, consisting of 33 lines, is supplied to YJ 9–10. It details the information of the five years of a Yuga.

āyanāny ṛtavo māsāḥ pakṣās tṛkṣaṇi tithir dinam | tattvato nādhigamyante yadābdo nādhigamyate || 1 ||
yadā tu tattvato 'bdasya kriyate 'dhigamo budhaiḥ | tadaivaīṣām amohaḥ syāt kriyāṇāṃ cāpi sarvaśaḥ
|| 2 || tasmāt samvatsaraṇāṃ tu pañcānāṃ lakṣaṇāni ca | karmāṇi ca pṛthaktvena daivatāni ca
vakṣyati || 3 || (Dvivedin (1908, 14), Weber (1862, 33))⁵⁾

The sun's course, the seasons, the months, the half months, the asterisms, the lunar days and the days cannot be truly understood when the years are not understood (1). On the other hand, when the understanding of year is made by learned men, there will be no error about them and also in all aspects of rites (2). Therefore, the characteristics, the rites, and the divinities of the five years will be told separately (3).

For each of the five years two and a half verses are allotted, exactly in the same way. We summarized these teachings in Table 1. The items in the first two columns are neither mentioned in VJ nor found in other astronomical texts. At the end of this long quotation, Garga emphasizes the importance of the observation in determining the years. It is rarely seen in the astronomical texts. Before Brahmagupta (7th century CE), Garga is probably the earliest astronomer who emphasizes that point.

Table 1 Characteristics of the Five-year Yuga

| Name of years | Deity | Sun's course | Date | Moon in asterism and its deity | |
|----------------------|-------|----------------|--------------------|--------------------------------|--------------|
| <i>Samvatsara</i> | Agni | <i>Uttara</i> | <i>Māgha Ś1</i> | <i>Śraviṣṭhā</i> | Vasu |
| | | <i>Dakṣiṇa</i> | <i>Śrāvaṇa Ś7</i> | <i>Citrā</i> | Tvastr |
| <i>Parivatsara</i> | Arka | <i>Uttara</i> | <i>Māgha Ś13</i> | <i>Ādrā</i> | Rudra |
| | | <i>Dakṣiṇa</i> | <i>Śrāvaṇa K4</i> | <i>Pūrvabhadrapadā</i> | Aja |
| <i>Idāsamvatsara</i> | Vāyu | <i>Uttara</i> | <i>Māgha K10</i> | <i>Anurādha</i> | Mitra |
| | | <i>Dakṣiṇa</i> | <i>Śrāvaṇa Ś1</i> | <i>Aśleṣā</i> | Sarpa |
| <i>Anuvatsara</i> | Indu | <i>Uttara</i> | <i>Māgha Ś7</i> | <i>Aśvinī</i> | <i>Aśvin</i> |
| | | <i>Dakṣiṇa</i> | <i>Śrāvaṇa Ś13</i> | <i>Pūrvāṣāḍha</i> | Jala |
| <i>Idvatsara</i> | Mrtyu | <i>Uttara</i> | <i>Māgha K4</i> | <i>Uttaraphālgunī</i> | Dhātṛ |
| | | <i>Dakṣiṇa</i> | <i>Śrāvaṇa K10</i> | <i>Rohiṇī</i> | Ka |

evam etad vijānīyat pañcavarṣasya lakṣaṇam || 16cd || dṛṣṭvā svarūpaṃ yuktasya tad varṣam iti nirdīśet | 17ab | (Dvivedin (1908, 15), Weber (1862, 36))

One should know the characteristics of the five-year [Yuga] in this way (16cd). By observing the nature of the conjoint [of the sun, moon, and asterisms], one should announce what the year is [now] (17ab).

2–(2) Somākara cites 27 lines in YJ 11 to show the four kinds of time unit that are not clearly mentioned in VJ. They are *sāvana* (civil), *saurya* (solar), *cāndra* (lunar), and *nākṣatra* (sidereal). A unit called *lava* mentioned here is also seen in the chapter titled “Tithikarmaguṇāḥ” of the *Gārgīyajyotiṣa* where the context and the conversion of *lava* are not clear.⁶⁾ The first four verses of the citations are:

sāvanaṃ cāpi sauryaṃ ca cāndraṃ nākṣatraṃ eva ca | catvāry etāni mātāni yair yugaṃ pravibhajyate || 1 || ahorātrātmakaṃ lokyaṃ mānaṃ ca sāvanaṃ smṛtam | ataś caitāni mātāni prakṛtāniha sāvanāt || 2 || tataḥ siddhāny ahorātrāṇy udayās cāpy atharkajāḥ | triṃśac cāṣṭādaśaśatī dinānāṃ ca yuge smṛtā || 3 || māśas triṃśad ahorātrāḥ pakṣo 'rdhaṃ sāvanaṃ smṛtam | ahorātralavānāṃ tu caturviṃśaṃ śātātmakam || 4 || (Dvivedin (1908, 17), Weber (1862, 40–41))

Civil, solar, lunar and sidereal measure—these are four measures by which a Yuga is divided (1). The civil [measure] consisting of a day and night is known as *sāvana*. Therefore these measures are produced here by the civil measure (2). From this [civil measure] are established the days and nights and the rising produced by the sun. It is said that there are 1830 [civil] days in one Yuga (3), and that one month has 30 days and nights and a *pakṣa* is its half in the civil measure. [Number of]

lavas of one day and night is 124 (4).

The constants within a Yuga in terms of the four measures are summarized in Table 2. It is not clear why here the length of a civil day is considered as 124 *lavas* and that of a lunar day is 122.⁷⁾ Later in the *Yavanajātaka* 79.5 the lunar day is equivalent to a civil day less its $1/64$,⁸⁾ which is more precise.

2–(3) Garga's two verses quoted in YJ 12 give the definition and the length of a lunar day. It is to be noted that the first verse as shown below is also attested in Chapter Tithikarmaguṇāḥ of the *Gārgīyajyotiṣa* with minor differences.⁹⁾ The meaning of the second verse is not clear, perhaps due to the corruption of the text. Almost the same two verses are quoted in YJ 37 while the second verse is again quoted in YJ 41.

tataḥ prakṣīyamāṇasya tithir ity eva saṃjñitā | dvilavonam ahorātraṃ somasya gatir uttamā ||
(Dvivedin (1908, 19), Weber (1862, 47))

Therefore the utmost motion of the waning moon is a day and night minus two *lavas* and it is termed a *tithi*.

2–(4) Three lines are quoted in the commentary on YJ 29. The first line is the repetition of the second line of 2–(3). The following two lines probably tell something about the motion of the sun, but its meaning is not clear.

2–(5) One phrase is quoted in support YJ 38 to teach the relation: 1 *muhūrta* = 2 *nāḍikās*.

Group 3: citations to supplement VJ with some astrological or ritual details.

3–(1) A passage in the commentary on YJ 5 reveals a little about the rites connected with lunar mansions and some elements (e.g., *lagna*, *karaṇa*) related to astrology. Moreover, its prose style as below is unique in Garga's corpus:

Table 2 Constants of the five-year Yuga in the Four Measures

| Four Measures | Number of days in a Yuga | Number of days in a month | Number of months in a Yuga | Number of <i>lavas</i> in a day |
|---------------|--------------------------|---------------------------|----------------------------|---------------------------------|
| Civil | 1830 | 30 | 61 | 124 |
| Solar | 1800 | 30 | 60 | 126 1/15 |
| Lunar | 1860 | 30 | 62 | 122 |
| Sidereal | 2010 | 30 | 67 | 112 60/67 |

teṣāṃ ca sarveṣāṃ nakṣatrāṇāṃ karmasu kṛttikāḥ prathamam ācakṣate | ... *karaṇāṇāṃ kiṃstughnaḥ* | *grahāṇāṃ dhruvaḥ* || (Dvivedin (1908, 6), Weber (1862, 27–28))

3–(2) Three verses quoted in YJ 17, partly shown below, reveal some information about the rule of choosing the day for a certain rite. Though the exact meaning is not clear yet, it can be seen that the ritual activities and the astronomical observation are closely related. The first and last verses are also quoted in YJ 43.

caturdaśyāṃ yadā kṛṣṇe kṣayam abhyeti candramāḥ | *dr̥ṣyo bhavati vāpy uccaiḥ sinīvālī tatas tadā* || ... *kecid icchanti dr̥ṣṭe 'pi kecit tena gatādhvani* || (Dvivedin (1908, 27), Weber (1862, 59))

When the moon disappears on the 14th lunar day of the dark-half of the month, the new moon, therefore, becomes highly visible. ... Some other people [wish to perform the rite] because of that [reason], when the moon is visible immediately before the new moon (*gatādhvan*).

3. Concluding Remarks

After a close examination of the citations ascribed to Garga, the following facts or features emerge. First, our knowledge of Garga according to the recent studies on the *Gārgīyajyotiṣa*, the *Atharvavedapariśiṣṭa*, and the works of Varāhamihira and Utpalas' was limited to the field of astrology and ritual. The citations in Somākara's commentary, however, show a different aspect. Garga here is considered to be familiar with the astronomy of VJ. He not merely repeats the rules of VJ, but also adds much information, especially, on the observations, the details of the five-year Yuga system, and the sub-unit of a day called *lava*. Therefore, we suppose that the VJ astronomy not only survived in the texts, but also made a certain development before the time of the *Siddhāntas* (i.e., the Indo-Greek astronomy). At the same time, Garga was probably one of those who inherited the VJ tradition both in astronomy and ritual. On the other hand, we find that one verse in the citations is very close to that in the *Gārgīyajyotiṣa*. It adds the possibility that these lines are actually from Garga and some of them may also go back to the *Gārgīyajyotiṣa*. This fact would reveal the diversity of the subject or content of the *Gārgīyajyotiṣa*. Finally, it should be noted that in the citations here no distinctive feature of the *Siddhāntas* (e.g., the *bhūtasamkhyā* (i.e., word numerals), motion of planets, the constants, and the Āryā meter) is found. Taking account of all the facts pointed above, we suppose that the date of the citations would be around early centuries CE, which is near to the *Gārgīyajyotiṣa*.

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Notes

1) Somākara's name is not mentioned in any other astronomical text. Considering the time of the texts he cited in the commentary, we suppose that Somākara lives in early centuries CE. Dvivedin (1908, Intro. 4) says that Somākara has a family name Śeṣa and belongs to South India. However, this view has no strong evidence. 2) Most of them await critical edition and examination while recently there have been some new studies on the *Gārgīyajyotiṣa* and the *Gargasaṃhitā*. See Geslani et al. (2017) and Mak (2018). 3) Geslani et al. (2017, 151). 4) The lines are in the places of the commentary on YJ 5 (4 lines), 8 (4 lines), 9–10 (33 lines), 11 (27 lines), 12 (4 lines), 17 (6 lines), 29 (3 lines), 37 (4 lines), 38 (1 line), 41 (2 lines) and 43 (4 lines). Also see Mitchiner (1986, 6), and Weber (1862, 27–28; 33–36; 40–42; 47; 59; 91). 5) The verse number is based on Dvivedin's edition. There are some variations of the verses in Dvivedin's edition and Weber's study but they are not shown here. We have chosen the better readings in this paper. 6) Mak (2018, 991, note 12). 7) However, the number 124 is a quite common number in the original VJ astronomy. The number of *parvans* (i.e., half month) is 124, and the length of a *nakṣatra* (i.e., lunar mansion) is divided into 124 parts. Such a part is called "*bhāṃśa*". 8) Mak (2013, 89). 9) In that place it reads: *tataḥ prakṣīyamāṇasya tithir evaṃ ca saṃjñatā | dvilavonam ahorātram etasya paramā gatih || v 6 ||*. See Mak (2018, 991).

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