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Chinese Lunar Stations and Indian *Nakṣatra*s in the Sui and Tang Periods

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Abstract: The twenty-eight "lunar stations" (*ershiba xiu* 二十八宿) are unique in Chinese intellectual history in that they served as functional equivalents for Indian *nakṣatra*s, which are also a type of lunar station (or mansion), but in practice these were quite different from the comparable Chinese system. The native Chinese lore of lunar stations as it was understood in the Sui period was outlined in the *Wuxing dayi* 五行大義 by Xiao Ji 蕭吉 (c. 530–610), which is a manual of Chinese metaphysics free of any Buddhist influences. We might compare the content in this text to writings by contemporary Buddhists, such as Jizang 吉藏 (549–623) and Zhiyi 智顗 (539–598), to illustrate the extent to which native, rather than foreign, astral lore took precedence in the writings of Buddhists in the Sui and Tang periods. This study will demonstrate that Buddhists in China struggled with understanding the *nakṣatra*s and even when faced with the opportunity to adopt an orthodox Indian model, they shifted toward a kind of hybridized system.

Keywords: astronomy; Buddhism; Xiao Ji; Zhiyi; Jizang; Zhanran; Sanlun; Tiantai; Amoghavajra; Moon

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1. Introduction

The *nakṣatra*s of India, which are often translated as "lunar mansions" following the Latin tradition of astrology, were originally twenty-eight (or in some instances twenty-seven) divisions of the orbital path of the Moon along which asterisms were identified. This system was apparently connected to pregnancy. Falk (2018, p. 532) explains that

> the circle of 27 or 28 *nakṣatra*s was used by an early group of savants to define the day of delivery. On the day of the marriage, precisely three days before the planned conception, the Moon's position needed to be made out and remembered. When the Moon came close to that *nakṣatra* for the tenth time, delivery was close at hand.

This was evidently only an approximate and not exact technique, but it evolved over time into something more precise. The dimensions of the *nakṣatra*s were originally measured using *muhūrta*s (the day and night are divided into thirty *muhūrta*s altogether). The length of a given *nakṣatra* was determined by the amount of time required for the Moon to transit through it. The *nakṣatra*s in this coordinate system are of varying dimensions, some being longer than others. This system is attested and explained in the Buddhist *Śārdūlakarṇāvadāna* (Zenba 1952). There were two recensions of the *Śārdūlakarṇāvadāna* that explain *nakṣatra*s (one is titled *Mātaṅga-sūtra*), from the fourth to fifth centuries, translated into Chinese.[1]

Each *nakṣatra* in Indian astronomy is assigned a determinative star (*yogatārā*) together with counts of stars that comprise each *nakṣatra*, although in the wider body of Indian astronomical literature these values are not uniform.[2] In any case, it is not apparent from the two Chinese translations of the *Śārdūlakarṇāvadāna* (they differ considerably in details) that there was much awareness of either the ecliptic or celestial equator within the Buddhist understanding of stars. Neither of the models of *nakṣatra*s known through the two recensions of the *Śārdūlakarṇāvadāna* in China speak of the speed of the Moon, the perigee, or the apogee; hence, actually determining the position of the Moon in such a framework would rely largely on observation, rather than on calculation. What we can observe from the texts is more basic astral folklore, rather than any technical or scientific model. We ought not to expect a technical model in any case, since the Vinaya (monastic codes) does not expect that a monk should master mathematical astronomy. Apart from a few scattered instances in Mahāyāna literature in which a bodhisattva might study worldly arts and sciences to benefit sentient beings, such as astronomy and calendrical science, Buddhism did not have any pressing need for astral sciences until the advent of more complex rituals that required astrological timing within Mantrayāna (Vajrayāna, "Esoteric Buddhism") starting in the late seventh century. In the past, I observed that "the scriptures and orthopraxy of Mantrayāna required an understanding of astrology and, in some cases, expertise in observational astronomy (Kotyk 2022a)".

At some point in the early centuries of the Common Era, Indian mathematical astronomy adopted a new model of twenty-seven *nakṣatra*s, in which each one is equal in dimension. These in turn were aligned with the twelve zodiac signs (the zodiac signs are ultimately Mesopotamian in origin, but they were adopted by Greek astronomers). This model divides the ecliptic (the apparent path of the Sun over the course of the solar year), rather than the orbit of the Moon. A system, normally understood as the *navāṃśa*s ("ninths"), was devised, in which 108 *pāda*s divided the twelve zodiac signs (each zodiac is assigned 9 *pāda*s, while each of the 27 *nakṣatra*s was assigned 4 *pāda*s. Alternatively, the ecliptic could be divided into 360 degrees, following the Greek model. The earliest attested examples of these models in China, however, are relatively late. The Chinese monk Yixing 一行 (673–727) and the Indian monk Śubhakarasiṃha (Shanwuwei 善無畏; 637–735) describe the *navāṃśa*s between 724 and 727 in their commentary on the *Vairocanābhisaṃbodhi* (*Dari jing* 大日經).[3] The value of 360 degrees is first attested in China in a text titled *Jiuzhi li* 九執曆 (**Navagraha-karaṇa*), a treatise on Indian mathematical astronomy that was translated and adapted from Sanskrit in 718 by Gautama Siddhārtha/Siddha (Qutan Xida 瞿曇悉達; d.u.).[4] Neither the *navāṃśa*s nor the Western value of 360 degrees were ever adopted and implemented by Chinese astronomers or Buddhists during the Tang period.

The Chinese independently created their own model of dividing the celestial equator into twenty-eight "lodges" or "stations" (*ershiba xiu* 二十八宿). The Chinese system is attested from antiquity. Cullen (2017, p. 186) notes that "the system of the lodges antedates the foundation of the empire by at least a few centuries: the names of all 28 lodges appear in an approximate circle on the lid of a lacquer box found in a tomb dated to 433 BCE. The earliest list of these with measurements dates to 139 BCE".[5] These were also of uneven dimensions (and their definitions change over time), but they are entirely different from any model of *nakṣatra*s. Chinese astronomers divided the celestial equator and ecliptic into 365¼ degrees (*du* 度). This value is derived from the length of the tropical year. Chinese astronomers from at least the year 718 were aware of the "Western" value of 360 degrees and also the zodiac signs (the zodiac signs are mentioned but not properly defined somewhat earlier in Buddhist texts), but the value of 360 degrees was not adopted until the early modern period. Yixing famously created two sets of stations: one for measuring the celestial equator, and one for measuring the ecliptic, the inspiration for which likely stemmed in part from Indian astronomy in Chinese translation, in light of the emphasis on the ecliptic in Indian and Hellenistic astronomies, but the ecliptic was still well understood in antiquity in China.[6] Although Yixing is a famous example of a Chinese monk who became a state astronomer, he was the exception rather than the rule. The reality is that technical knowledge of astronomy was restricted by state law, so access to relevant resources was generally limited especially during the seventh and eighth centuries (the early to mid-Tang periods), although printing technology allowed for the circumvention of such restrictions over time.[7]

Chinese Buddhists encountered astral lore in Buddhist scriptures even without having much expertise in astronomy. There was also an early iconographical component to this cultural development. Hiyama (2022) points out the illustrations on the wall murals of Mogao Cave 285 from the Northern Wei period, which combine Indian and Chinese elements. She identifies Sūrya alongside the *nakṣatra* Kṛttikā. Although this does not indicate technical expertise in astronomy, it does show that there was already an awareness of the significance of the stars in a Buddhist context.[8] This leads to an interesting question of how Buddhists interpreted the *nakṣatra*s. In this paper, I want to examine how some prominent Buddhist authors of the Sui and Tang interpreted the lunar stations. My conclusion after reviewing the primary sources is that the cosmography of Chinese Buddhists was basically rooted in the native Chinese model at first, although a more certain awareness of the differences between Indian and Chinese systems emerged over time during the Tang period. The situation changed in the mid-Tang when a sort of hybrid system emerged that was neither fully Indian nor Chinese in character.

2. Jizang

The monk Jizang 吉藏 (549–623), connected with the scholastic tradition of Sanlun 三論, "Three Treatises" (the Chinese tradition is generally equated to Indian Madhyamaka), was a prolific author and penned a number of commentaries. One example of interest in his writings is his comment on the reference to "an error in degrees [in the orbit of the Sun and Moon in the] twenty-eight *nakṣatra*s" 二十八宿失度 in the *Humane Kings Perfection of Wisdom Sūtra* (*Renwang bore boluomi jing* 仁王般若波羅蜜經).[9] Jizang states the following:

> Twenty-eight refers to each of the four quarters each having seven. Four times seven is twenty-eight. An "error in degrees" refers to their movements not following their normal paths, hence it speaks of an error in degrees. The Metal Star is the Great Brightness [Venus]. The Tripiṭaka Master states, "In foreign countries it is called the Astrologer's Star. The country will prosper if it moves properly, whereas there shall be scarcity if it errs in degrees." 二十八者, 四方各有七, 四七二十八也. 失度者, 行不依常道, 故云失度. 金星者, 太白星也. 三藏師云: 「外國名天師星, 如理行即國豐, 失度則儉. 」[10]

Jizang could cite foreign explanations, as we see here, but he generally followed the Chinese lore. This is clear from another set of remarks that he makes in the same commentary. For instance, he states, "As to the twenty-eight stations, in the eastern quarter, they are Jiao, Kang, Di, Fang, Xin, Wei, And Qi". 二十八宿者, 角亢弖房心尾箕, 是東方宿也.[11]

This is a Chinese reckoning. We know this because Jizang's understanding of astral lore generally parallels that of non-Buddhist Chinese writers. A contemporary of Jizang, Xiao Ji 蕭吉 (c. 530–610), compiled a work titled *Wuxing dayi* 五行大義 (*Great Meaning of the Five Elements*) that offers extensive details on Chinese metaphysics and cosmology connected to the theory of five phases/elements (*wu xing* 五行) and yin-yang 陰陽. Therein we read, "There are seven lunar stations of the Eastern Quarter Green Dragon: Jiao, Kang, Di, Fang, Xin, Wei and Qi, being Wood [in nature]. They are altogether thirty-two stars and seventy-five degrees." 東方蒼龍七宿: 角亢氐房心尾箕, 木也. 合三十二星, 七十五度.[12] This sequence, starting from Jiao 角 (generally equated to the Indian *nakṣatra* Citrā), is Chinese and not Indian in origin. In Buddhist contexts, the sequence of *nakṣatra*s would typically commence from Mao 昴, equated to Kṛttikā, which from Vedic times was connected to the Pleiades. Kṛttikā in that period rose with the vernal equinox.[13] The *Mātaṅga-sūtra*, for instance, follows this sequence: "Although the asterisms are numerous, there are essentially only twenty-eight: the first is called Mao [Kṛttikā], the second is called Bi [Rohiṇī], the third is called Zi [Mrgaśīrṣa] …" 星紀雖多, 要者其唯二十有八. 一名昴宿, 二名為畢, 三名為觜.[14]

Another important difference between the Chinese and Indian systems is the counts of stars for each lunar station or *nakṣatra*. Xiao Ji gives thirty-two stars for the seven running from Jiao to Qi. The comparable *nakṣatra*s in the *Mātaṅga-sūtra*, from Citrā to Pūrvāṣāḍhā, total twenty-two stars according to the *Mātaṅga-sūtra*.[15]

An example of Jizang relying on local astronomical conventions is observed in his statement that "the error of degrees in the [orbits of the] Sun and Moon refers to the sky being comprised of 365¼ degrees. The Sun moves one degree daily. It completes a revolution in one year". 日月失度者, 天有三百六十五度四分度之一, 日一日行一度, 一歲一周天.[16] The value of 365¼ degrees for dividing "the sky" (a reference to the celestial sphere) is also typically Chinese, but not Indian. Similar remarks are given by Xiao Ji: "The sky is comprised of 365¼ degrees, measured out over the four quarters. The Sun daily progresses one [degree], without any variation in speed. [The Sun] brings the four quarters together as one, hence the character is 'four' combined with 'one'". 天有三百六十五度四分度之一, 布在四方. 日日一歷, 無差遲. 使四方合如一, 故其字四合一也.[17]

If Indian lore were cited by Jizang, we would expect either the 108 *pāda*s or 360 degrees (or perhaps even the *muhūrta*s as defined in the translations of the *Śārdūlakarṇāvadāna*), but instead we see the typical Chinese value that is seen also in the work of Xiao Ji. Jizang perhaps did not know that the Indians divided the skyscape using different parameters. He seems to presume a universality to the Chinese value.

3. Zhiyi and Zhanran

Monks of this period, the Sui to early Tang, apparently considered astral material to be worldly in nature. Astral sciences were associated with Vedic Dharma. The major patriarch of the Tiantai 天臺 lineage, Zhiyi 智顗 (539–598), is on record as stating, "Regarding the Vedic Dharma, it is complete comprehension of worldly letters, stars, medicine, warfare, and commerce. This is the heterodox path of the Vedas". 韋陀法者, 世間文字星醫兵貨悉能解知. 是為韋陀外道.[18] Later on, Zhanran 湛然 (711–782), one of the patriarchs of the Tiantai school, extrapolated on these remarks by Zhiyi in 765.[19] Interestingly, Zhanran expresses an awareness of the differences between the Chinese and Indian systems. We read the following:

> "Stars, medicine, etc.,": The *Shuowen* [*jiezi*, a dictionary from the Han period] states, "Being the essence of things, and above they constitute the arrays of fixed stars." [These subjects] are mostly in two of the Vedas, the Protective Wards [*Atharva Veda] and the Sacrificial Rites [*Yajur Veda]. This land [of China] also has [these subjects]. It is as explained in the *Mātaṅga-sūtra*. Again, there is the Brahmin, Puṣkarasārin, who asks Triśaṅku, "Do you understand the stars?" He replies, "I still yet know of things finer, so all the more so this minor art." He goes on to explain the twenty-eight lunar stations and seven planets, but the seven asterisms, arrayed into four quarters, somewhat differ from here [in China]. Here there are seven in the western quarter: Kui, Lou, Wei, Mao, Bi, Zi, Shen [equated to Revatī, Aśvinī, Bharaṇī, Kṛttikā, Rohiṇī, Mrgaśīrṣa, and Ārdrā]. … As to how they are arrayed in scripture, they start from Mao [Kṛttikā] and end at Liu [Āśleṣā] in the western quarter. Each quarter is assigned seven respectively in turn. There is a shift of three asterisms probably because of the lands being different. In the scriptures, each one of the asterisms has their names and [star] counts provided, as well as the constellational forms, the surnames attached to the asterisms, what is required for sacrifices, and the number of degrees necessary for the Sun to transit them. There are also six stations which require altogether one day and one night for the Moon to transit them. They are Bi, Jing, Di, Yi, Niu, and Bi [Rohiṇī, Punarvasū, Viśākhā, Uttaraphālgunī, Abhijit, and Uttarabhādrapadā]. 星醫等者, 說文云: 「萬物之精以為列宿.」多在攘災祭祀二韋陀中. 此土亦有. 彼如摩蹬伽中. 又有蓮華實婆羅門, 問帝勝伽言: 「汝知星不?」答言: 「密要尚知, 況此小術」廣說二十八宿及七曜等, 然經列四方七星與此方稍異. 此方者西方七: 奎婁胃昴畢觜參. … 經所列者, 西方從昴星起, 終至柳星. 如是遞遷一方各七. 應是地異故星移三座. 經中一一各出其星名數, 星之形狀及以星姓, 祭法所須, 日行度數. 又有六宿一日一夜共月俱行, 謂畢井氐翼牛壁.[20]

Zhanran had studied the *Mātaṅga-sūtra* (again, a recension of the *Śārdūlakarṇāvadāna*), and he was furthermore aware of the basic structure of the Chinese lunar stations, but this does not indicate knowledge of advanced astronomy. He actually errs in stating that Niu 牛 (equated to the *nakṣatra* Abhijit) requires one day and one night for the Sun to pass through it. The *Mātaṅga-sūtra*, in reality, measures the length of the *nakṣatra*s in relation to the movement of the Moon, not the Sun. Abhijit is said to be "three stars, shaped like the head of a cow; it is conjunct with the Moon for one unit of time [*muhūrta*]". 牛宿三星, 形如牛首, 一時與月而共同行. One *muhūrta* would not exceed one modern hour.[21] Zhanran had misread or misunderstood the technical details involved.

Zhanran also evidently possessed some cursory knowledge of the Vedas, perhaps as basic outlines, and he equates their contents to what is practiced in China. A few generations prior to Zhanran, there were several texts related to Indian scriptures and astronomy that had been translated into Chinese, although these are not extant today. Fei Changfang 費長房 in 597 in his catalog of Buddhist works records the details of this project. Six or seven staff members in 585 translated texts classified as "Brahmanical classics" (*Fan gushu* 梵古書) and what appears to have been astronomy (*qianwen* 乾文) under the "capital superintendent" (*neishi neisheng* 內史內省).[22] This undertaking was under the direct supervision of the state, rather than the Buddhist sangha. The bibliography (a catalog of books in the court library) in the dynastic history of the Sui dynasty (*Sui shu* 隋書), published in 636, lists several works related to "Brahmanical" astronomy and mathematics, including one title *Astronomical Teachings of Brahmin Sage *Garga* (*Poluomen Jiejia xianren tianwen shuo* 婆羅門竭伽仙人天文說) in a voluminous thirty fascicles. Judging from the title and length, this might have been the *Gārgīya-jyotiṣa* (**Garga-saṃhitā*), a major early work of Indian astrology. Monks perhaps consulted these works, but they are not directly cited. The monk Amoghavajra (Bukong 不空; 705–774) might have extracted material directly from these into his manual of astrology in the mid-eighth century, but he also generally did not cite his sources in this instance.[23]

4. Later Developments

Amoghavajra's manual of astrology offers the first known Chinese Buddhist discussion of the major differences between Chinese and Indian skyscapes. The title is generally known by its abbreviated form: *Xiuyao jing* 宿曜經 (*Sūtra of Nakṣatras and Planets*), which is attributed to Mañjuśrī Bodhisattva (Wenshu Pusa 文殊菩薩). The first version was completed by Amoghavajra in 759, but a revision was undertaken in 764 to add more clarity.[24] We see explicit explanations of the differences between the two systems, which perhaps was largely due to the fact that Amoghavajra was working with a team of court astronomers, rather than strictly with Buddhist monks. Concerning the *nakṣatra* Kṛttikā (Mao 昴), we read, "In the astronomy of the Great Tang, Mao is seven stars. Now, based on this explanation in the *sūtra*, the stars are not identical to that of the Great Tang. Hence, we rely on the astronomy of the Great Tang. Each are illustrated following the corresponding lunar station." 唐国天文, 昴七星. 今案此經説, 星不與大唐同. 故依大唐天文, 各圖於當宿之下. The Indian number, in contrast, is six stars.[25]

There was clearly a conscious decision to dismiss the Indian model altogether in favor of the Chinese one, even when orthodoxy might have favored the former. The reasoning for this decision is not explained anywhere, but we can imagine that it was deemed impractical to adopt the uranography of *nakṣatra*s alongside the system of *navāṃśa*s; hence, a compromise was made and Amoghavajra and his team simply fell back on the Chinese system, but even this was limited. They devised a system of assigning each of the twenty-seven *nakṣatra*s (denominated using the Chinese terms) to each day of the lunar calendar (twelve months of thirty days each). In this way, the *nakṣatra* on the fifteenth day (the Full Moon) corresponds to what it normally would in the Indian calendar. The Sanskrit names of the months in the primary Indian system are derived from the *nakṣatra* in which the Full Moon transits.[26] A similar explanation was already given by the famous monk Xuanzang 玄奘 (602–664) in his travelogue to India, which was released in 646.[27] It is therefore possible that Amoghavajra adapted an existing framework of converting the Indian calendar into something workable in China. The result, in any case, was basically that Indian concepts were projected onto the Chinese lunar calendar, resulting in a hemerology (a system of determining auspicious days on the calendar) rather than anything technically astrological in character, which otherwise would require strict reference to the observed position of the Moon. This meant that the actual position of the Moon relative to the *nakṣatra*s (or even the Chinese lunar stations) was irrelevant. In effect, the *nakṣatra*s and the deities ruling over them became rulers of individual days, rather than being primarily stellar in character. This is similar to how the planets are rulers of the days of the week (Saturn rules Saturday, etc.), all without any relation to their positions in the sky. The fixed stars and planets become detached from the reckoning of time.

Although the *nakṣatra*s were not overly important in earlier centuries, Mantrayāna ("Esoteric Buddhism") came to include them in *maṇḍala*s as deities (albeit minor ones). In China, this treatment of the *nakṣatra*s based on their presentation in *maṇḍala*s only became standard from around 724, when the *Vairocanābhisaṃbodhi* was translated, and the associated iconography was simultaneously introduced into China. The *nakṣatra*s, initially illustrated as anthropomorphic deities seated atop lotuses, were treated as cosmic deities alongside the deified planets (*navagraha*) and zodiac signs.[28] The passage of time was treated with increasing attention because of greater interest in astrology. Some times are more opportune or auspicious for rituals than others based on a number of elements that were otherwise not part of earlier Buddhist traditions (for example, the seven-day week as it aligns with the *nakṣatra*s). In what we might assume is the voice of Śubhakarasiṃha, we can see the importance of observing astrology in the commentary on the *Vairocanābhisaṃbodhi*:

> The accomplished individual has studied the Vedic scriptures, and is skilled and discerning in the arts. If they see that the *maṇḍala* was created at an erroneous time, they will worry that it will result in something inauspicious, and subsequently this produces apprehension. They will say, "I have heard that there is nothing that those wise in *dhāraṇī* do not accomplish, but now I see this. They cannot even select an auspicious time with good stars. This is to say nothing of other profound matters!" As a result of this, they doubt the teacher and his teaching. 以所度之人, 曾習韋陀祠典, 伎藝明處. 若見造漫荼羅時分舛謬, 慮恐致不吉祥便生疑怪, 言:「我聞總持智慧者無所不達, 而今觀之, 尚不能擇得好星善時, 況餘深事乎.」由此疑師疑法.[29]

It is within this context that the *nakṣatra*s indeed took on additional significance that was otherwise not apparent in the works of earlier generations of writers. As Xuanzang observed, one of the "Five Sciences" (*pañca-vidyā*) studied by Indian youths was "*yin and yang* [lunar phases] and calendrical calculations" (*yinyang lishu* 陰陽曆數).[30] Nevertheless, although some Indian monks studied astronomy (and astrology by extension), this phenomenon is not strongly paralleled in China. With the rare exception of Yixing, who became a court astronomer, technical knowledge of astronomy was evidently not taken up in any significant way amongst members of the sangha in China. Amoghavajra himself did not feel compelled to adopt an orthodox and properly Indian model of *nakṣatra*s, even when he had the opportunity to do so. This might have simply been resignation to the practical realities of his time. Monks in China were not expected to understand the complexities of astronomy. The result was a sort of hybridized system of "*nakṣatra*s" that was neither Indian nor fully Chinese in the technical sense, but something new.

5. Conclusions

This study has demonstrated that the *nakṣatra*s were introduced into Chinese Buddhism, initially via translations of Buddhist texts, most notably the *Śārdūlakarṇāvadāna* in two recensions. The technical details and their differences with the indigenous lunar stations were not so clearly studied by Jizang in the period of the Sui to the early Tang. Instead, Jizang simply fell back on the familiar local lore, which can be demonstrated with reference to the book of Xiao Ji, who wrote an extensive guide to metaphysics and related lore during the Sui period. There appears to have been a sense at the time that the Indian and Chinese systems were identical, and that the Chinese value of 365¼ for dividing the celestial sphere was universal. Zhanran, in a later generation, was aware that there were, in fact, some differences between the Chinese and Indian systems, but he did not go into great detail. Again, we can see that in large part the lunar stations were held as equivalent to the *nakṣatra*s. Amoghavajra compiled the first authoritative manual of astrology in Chinese Buddhism in the mid-eighth century. Although he explains some technical features of the *nakṣatra*s, and also notes the differences between the Indian and Chinese models, the system he adopts is a sort of hybridized form based on the Chinese calendar rather than on astronomical parameters. Amoghavajra made a conscious decision to favor the Chinese system as he understood it over the Indian. We can only suspect that the reason for this was the practicalities of the local sangha, in which monks were not expected (or even allowed) to study astronomy.

One important point to take away from this discussion is that strict adherence to an orthodox standard was not the norm, even when it was theoretically possible. Adaptation, compromise, and even omission were the norm in the Chinese sangha when approaching the technical fields of Indian sciences and arts. This same observation has been made regarding the study of Sanskrit in the Tang period, in which orthodox grammar and phonetics according to an Indian standard were not evidently studied in detail apart from a few rare exceptions of monks who went abroad. Instead, we observe extensive word lists, and a highly modified system of Sanskrit studies which was divorced from orthodox Sanskrit grammar (Kotyk 2021b). The Buddhist approach to the *nakṣatra*s and astronomy/astrology in China was similarly a sort of emulation of an Indian science, but the underlying system of timekeeping and the skyscape both remained entirely rooted in the local milieu. Even if the Indian system of astronomy were more accurate for predicting phenomena such as eclipses, this level of technical expertise was unknown to the sangha, except for the notable exception of Yixing. In the end, it was simply more practical to use the familiar Chinese system and overlay some Indian themes atop it.

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Notes

1 See the two translations into Chinese: *Shetoujian Taizi ershiba xiu jing* 舍頭諫太子二十八宿經 (*Sūtra of Prince Śārdūla and the Twenty-Eight Lunar Stations*) and *Modengjia jing* 摩登伽經 (*Mātaṅga-sūtra*). The dating of these translations is complex because the traditionally assigned translators can be disputed. The former is attributed to Dharmarakṣa 竺法護 (c. 239–316), which is plausible based on the style of the text. The latter is attributed to Lü Yan 律炎 and Zhiqian 支謙 in the year 230. Hayashiya (1945, p. 541), however, already disputed this and suggested a more probable date in the late fifth century. Kotyk (2017, pp. 28–29) further explores the matter and agrees with Hayashiya. Zhou (2020, pp. 46–51) expresses some doubts about the purported translators of the *Mātaṅga-sūtra*. She also points out a total of six recensions of the base story in the text. The manual of divination is only part of two recensions. On Indian astronomical material in China, see also the study by Niu (2004).

2 See the exploration of these numbers and the comparative tables in Pingree and Morrissey (1986).

3 On the astrology in the commentary, see Yamashita (1996, pp. 324–25) and Kotyk (2018, pp. 324–15).

4 See translation and remarks in Yabuuchi (1989, p. 6). See also Mak (2023, pp. 353, 359).

5 The Chinese system is often translated as "lunar stations" or "lunar lodges," but as Cullen points out, it is difficult to justify the characterization of them as "lunar" because their original function was not strictly tied to the Moon (the other planets also "lodge" in them). See Cullen (2011) for discussion. The Moon requires 27.3 days for one revolution, which is one factor in considering whether the Chinese model was originally lunar in inspiration, although Cullen's observation still holds much weight. I will continue to translation *xiu* 宿 as lunar station for the ease of reference.

6 See discussion in Kotyk (2022b).

7 See discussion of printed almanacs by Whitfield (1998).

8 There were a few relevant scriptures that incorporate Indian astral sciences which were translated into Chinese prior to the Tang period. On this subject, see Mak (2015), Niu (2019).

9 *T* 245, 8: 832c5; 830a11-12. The translation of this scripture is nominally attributed to Kumārajīva, but this is doubtful.

10 *T* 1707, 33: 355a8-11.

11 *T* 1707, 33: 345a4-5. Read as *hu* 互 as *Di* 氐.

12 *Wuxing dayi*, 4.15.

13 As is well understood, later Indian sources in the Common Era generally reckon the first *nakṣatra* as Aśvinī (Lou 婁), since it was aligned with the vernal equinox, although typical Buddhist lore follows the more ancient precedent of Kṛttikā as the first *nakṣatra*.

14 *T* 1300, 21: 404b27-29.

15 *T* 1300, 21: 404c29-405a12.

16 *T* 1707, 33: 345a9-10.

17 *Wuxing dayi*, 4.9–10. The last statement is a description of the character for Sun, *ri* 日 being interpreted as four (*si* 四) sides unified by one (the character for "one", *yi* 一).

18 *Mohe zhiguan* 摩訶止觀 (*Great Cessation and Contemplation*). *T* 1911, 46: 132c25-26.

19 This date is based on a line in the preface to the text (時永泰首元興唐八葉之四載). See *T* 1912, 46: 141b6-7.

20 *T* 1912, 46: 438b9-21.

21 *T* 1300, 21: 405a13-14. A *shi* 時 ("time") in China technically denoted a division of the day and night altogether into twelve units of time (often translated as "double hours"). This is completely different from the *muhūrta*s (fifteen for the daytime and fifteen for the night on an equinoctial day, when daylight and nighttime are equal in length, at which time one would be forty-eight minutes).

22 See his *Lidai sanbao ji* 歷代三寶紀 (*Account of the Triple Gem Throughout the Ages*). *T* 2034, 49: 104b12-18.

23 *Sui shu*, 34.1019, 1026. See discussion and reconstruction of the name by Kawai and Kōzen (1995, pp. 603–4). See discussion in Kotyk (2021a, pp. 208–9).

24 See the authoritative study on the text by Yano (2013). Yano also discusses the two major recensions of the text: that of the mainland and that of Japan. The latter better preserves the original text by Amoghavajra, whereas the former reveals significant modifications that would postdate Amoghavajra. The modern typeset Taishō edition (T 1299) is based on the mainland recension. Here I will cite a typeset edition of the Japanese recension, the *Sukuyō-kyō shukusatsu* 宿曜經縮刷, edited by Wakita Bunshō 脇田文紹 (1897).

25 *Sukuyō-kyō shukusatsu*, vol. 1, pp. 10–11. See translation in Kotyk (2022a).

26 *Sukuyō-kyō shukusatsu*, vol. 1, pp. 13–15. See also table 18.1 in Yano (2003, p. 380), in which the month names are displayed alongside the corresponding *nakṣatra*s.

27 See *Da Tang Xiyu ji* 大唐西域記 (*Account of the Western Regions of the Great Tang*). *T* 2087, 51: 876a5-20.

28 The illustrations from the Tang period are best preserved in Japan. See encyclopedia by Somekawa (2013).

29 *T* 1796, 39: 618b4-8. See translation in Kotyk (2018, pp. 21–22).

30 二工巧明, 伎術機關, 陰陽曆數. *T* 2087, 51: 876c16-21. The term *yinyang* 陰陽 obviously in this context cannot refer to the Chinese metaphysical model, but instead here it refers to the lunar phases.

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