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From Modengjia Jing to Xiuyaojing: The Accumulation of Indian Astronomical Knowledge in the Chinese Buddhist Canon

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Abstract: This paper explores the accumulation of Indian astronomical knowledge within Chinese Buddhist scriptures and its dissemination across Chinese society through a comparative study of the Modengjia jing (Ch1 of the ZKA) and the Xiuyao jing (XYJ). The period from the Ch1 of ZKA to the XYJ was a time when Buddhism was in the midst of developing and maturing within China. The Ch1 of the ZKA is regarded as the first Buddhist scripture including a complete account of Indian nakṣatra astrology and translated from Sanskrit parallel text, rather than a native work codified by Buddhists in Ancient China. The XYJ is not a translation but rather an authoritative handbook of Indian astrological knowledge taught by Amoghavajra. A detailed comparison of the contents of the two texts shows that the knowledge contained within Ch1 of the ZKA belongs to the Vedic era and that the XYJ belongs to the post-Vedic era. Beginning with the Ch1 of the ZKA and ending with the XYJ, Buddhist astronomical knowledge steadily grew. Yang Jingfeng’s revision and explanation of the first fascicle of the Sutra reflects Ancient Chinese intellectuals’ acceptance, digestion, and recreation of Buddhist astronomical knowledge. His abandonment of the “Calculation of weekdays” reflects the influence of the Chinese mathematical and astronomical tradition and the calendar tradition upon his perspective; perhaps this is one of the reasons why China has accepted the weekday within daily life up to the modern era. Every civilization, in learning to assimilate other cultures, has a choice between foreignization and domestication, within which a tension is reflected. Learning from foreign cultures is about keeping up with the most advanced civilizations in the world and advancing with the times, while maintaining one’s own cultural identity and cultural characteristics is necessary for one’s own civilization; these two notions are complementary and should not be neglected.

Keywords: Xiuyaojing; Modengjia jing; Indian astronomical knowledge; Chinese Buddhist canon



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1. Introduction

The Chinese Buddhist canon has preserved a great deal of Indian astronomical data. Some examples include the astronomical systems of lunar stations (nakṣatra), luminaries (graha), and the signs of the zodiac (rāśi); calendar knowledge such as seasons and shadow data; and divinatory sayings. These Buddhist astrological and astronomical texts include locally made changes to the original content according to the natural environment and socio-cultural traditions, such as the addition of Chinese place names to certain texts or the use of Chinese seasonal divisions and calendrical data. In this paper, we analyze the typical documents of astronomical texts within Chinese Buddhist scriptures using the Modengjia jing (摩登伽經, abbreviated as the Ch1 of the ZKA), a Chinese translation of *Śārdūlakarnāvadāna*, and the Xiuyao jing (宿曜經, abbreviated as the XYJ) as case studies, and discuss the historical details of the accumulation of Indian astronomical knowledge within the Chinese Buddhist canon.

Zenba Makoto initiated the research on the Ch1 of ZKA and XYJ in Kyoto (Zenba 1952, 1968). Yano Michio published *Mikkyō Senseijutsu* 密教占星術 in 1986 and carried out

a comprehensive study on XYJ. He showed the XYJ and its Sanskrit sources at a conference in 1987. (Yano 1987, [1986] 2013, 2019) His work attracted more scholars to this field. Niu Weixing published *Looking Westward to the Brahma—Astronomical Origins in Chinese Translation of Buddhist Scriptures* 西望梵天——漢譯佛經中的天文學源流 in 2004. More and more Chinese scholars are joining in on the research on astronomical texts of the Chinese Buddhist canon (Niu 2004, 2019; Niu et al. 2022).

The focus of this study is on the Ch1 of the ZKA and other parallel texts, discussing exchanges of astronomy, calendars, and literature between China and India. These texts maintain the main elements of Indian astronomy, such as terminology, divination by nakṣatras, the Hindu calendar, solar shadow data, instrument design, and so on. The original text was changed according to the local natural environment as well as social and cultural traditions (Zhou 2020b). From the perspective of translation style, the astronomical translations mainly focused upon quality, combining literal and free translation. The translation team collaborated and used the strategy of a unified combination of domestication and foreignization during the translation process. The translated works included both mathematical and astronomical content popular with intellectual elites, as well as descriptions of timing instruments and simple divination techniques that could be easily disseminated among the common people (Zhou 2020a).

In the following, we analyze the historical data on the Ch1 of the ZKA and of the XYJ in terms of their historical backgrounds, composers, and contents so as to evaluate the accumulation of Indian astronomical knowledge within the Chinese Buddhist canon.

2. Historical Background and Composition

2.1. Historical Background of Chinese Buddhism

Since the Buddhism came to China, a few monks were claimed to be talented in astrology to predict, magical power to survive, etc. Two texts discussed here are systematic explanation of Buddhist astrology, like a handbook or textbook in certain extent. The Ch1 of the ZKA is regarded as the first Buddhist scripture from India including a complete account of Indian nakṣatra astrology before Tang dynasty. The XYJ is an authoritative handbook of Indian astrological knowledge taught by master Amoghavajra in Tang dynasty. It influenced the Japanese Tantrism and school of astrology, and even modern artistic creations.

The translators of the Ch1 of the ZKA were Zhi Qian 支謙 and Zhu Lüyan 竺律炎. Zhi Qian was a translator from Wu during the Three Kingdoms period and came from the Yuezhi 月支 family. From the first year of the Huangwu 黃武 reign to the middle of the Jianxing 建興 reign (222–53), Zhi Qian devoted himself to the translation of Buddhist texts into Chinese for thirty-two years and translated such important texts as the *Vimālakīrti Sutra* 《維摩詰經》, the *Prince's Ruiying Benyiqi Sutra* 《太子瑞應本起經》, and the *Daimingdu Sutra* 《大明度經》. The translated scriptures were considered to be elegant and polished and were widely praised. Zhu Lüyan was an Indian monk who translated sutras during the Three Kingdoms period. In the third year of the Huangwu era (223), he came to Wuchang with Wei Zhinan 維祇難 and translated the *Dhammapada Sutta* 《法句經》, which he had brought with him. In the second year of the Huanglong 黃龍 reign (234), he and Zhiqian jointly translated the Ch1 of the ZKA. It is important to note that the Buddhist canon's catalogs were compiled across many ages, and some of the translators have been inaccurately recorded. More precisely, the Ch1 of the ZKA was recorded during the Sui Dynasty in 594, when the *Fajijing* (法經's "Catalog of Sutras (《眾經目錄》)") was compiled. Therefore, the Ch1 of the ZKA should have been translated before the *Fajijing* (法經's "Catalog of Sutras", i.e., before year 594.

The full title of the Sutra is "Sutra on Mañjuśrī Bodhisattva and the Sages' Teaching on Auspicious and Inauspicious Times, Good and Evil Constellations and Planets (文殊師利菩薩及諸仙所說吉凶時日善惡宿曜經)", and it was translated by Amoghavajra (不空, 705–74), one of the three great masters of the Tang Dynasty. It was published in the second year of the Qianyuan (乾元二年759), and the complete text was completed in the second year of the Guangde (廣德二年764). Amoghavajra was a Buddhist ācārya and translator in the

Tang dynasty and a native of Sri Lanka in South India who studied the secret method of the Vajradhātu under Vajrabodhi (金剛智). He was active during the three dynasties of Emperor Xuanzong (玄宗), Suzong (肅宗), and Daizong (代宗) of the Tang Dynasty and was closely associated with the latter two emperors. When he passed away at the age of seventy, he was posthumously honored with the titles of Sikong (司空) and “Great Advocate (大辯正)”. He was the sixth inheritor of Tantric Buddhism, and his disciples included Hanguang (含光), Huichao (慧超), Huiguo (惠果), and Huilang (慧朗). Kūkai (空海), a Japanese monk and disciple of Huiguo, then founded the Shingon Sect in Japan and continued the lineage. Amoghavajra’s translations consist of about 110 works and 143 fascicles, which are divided into five categories, namely, Mahāyāna, Miscellaneous Tantra, Vajradhātu, Mahāsukha (大乐), and Miscellaneous Writings. The XYJ was a work he completed with Yang Jingfeng (楊景風), an astronomer and Buddhist of that time. In the fourth year of the Jianzhong (建中) reign of Emperor Dezong (德宗) of the Tang Dynasty (783), the astronomer Xu Chengsi (徐承嗣) and the summer official (夏官) Yang Jingfeng (楊景風) worked together to formulate a new calendar, the Jianzhong Zhengyuan Calendar (建中正元曆), which was used until the first year of the Zhonghe (中和) reign of Emperor Xianzong (憲宗) of the Tang Dynasty (806). Yang Jingfeng lived in the same era as the Indo-Tang Gautama family 瞿曇氏, who provided astronomical calendar services at the Tang court and had some knowledge of Indian astronomy.

Zen Buddhism as a sign of the localization of Buddhism in China dates from the Longshuo 龍朔 to Chuigong 垂拱 periods, corresponding to the reigns of Emperor Gaozong 唐高宗 and Wu Zetian 武則天 of the Tang Dynasty. In this way, the Ch1 of the ZKA was translated before the Sui Dynasty, prior to the advent of the localization of Buddhism in China, and the XYJ was translated and compiled during the reign of Kaiyuan 開元, following the localization of Buddhism in Chinese history. “After the Jin 晉 Dynasty, the styles of Buddhism in the north and the south were indeed different, but they were then synthesized at the time of the Chen-Sui-Dynasty (陳隋), so that the power of Buddhism in our country reached its height afterwards. Sui 隋 and Tang 唐 Dynasty Buddhism can be called the period of great prosperity as well Sui and Tang Dynasty Buddhism, bearing the results of the development of hundreds of years since the Han and Wei Dynasties, underwent a wide range of evolution into sects. And the understanding of the gradual refinement can be blended with the doctrines of India, and self-establishment, such as with the Tiantai 天臺 Sect and Zen 禪 Sect, can be said to be pure Chinese Buddhism as well.” (Tang [1982] 2010, preface) After six or seven hundred years of development, the Buddhist community in the Sui and Tang dynasties was full of talented people, bearing a wide range of sects and highly refined doctrines and incorporating a variety of Indian intellectual traditions. The most influential Buddhist astrological work, Xiuyaojing, was developed under the auspices of the Sixth Patriarch of Tantric Buddhism, Amoghavajra, constituting an inevitability of the times.

2.2. Composition of Two Texts

Looking at a series of Sanskrit and Tibetan–Chinese texts, it is clear from the study of parallel texts that the Ch1 of the ZKA is a Buddhist scripture transmitted from India rather than a native creation of the Han Chinese (Miyazaki et al. 2015; Zhou 2020b). Generally speaking, Buddhist sutras are considered to have been spoken by the Buddha. While avadāna like the Ch1 of the ZKA, actually tell the story of the cycle of karma in two lives, these may have been the versions used by *dārṣṭāntikas* in India of *Sarvāstivādin* sect (Zhou 2023).

The XYJ was orally taught by Amoghavajra and written by his disciple Yang Jingfeng (楊景風) and others. There is no Sanskrit original of the XYJ; rather, it was supposedly originally composed by Buddhist monks in China. According to Prof. Michio Yano’s research, this Sutra is divided into two fascicles, the second of which was dictated by Amoghavajra (不空) and recorded by Shi Yao (史瑤) in 759 AD. The first fascicle was revised, annotated, and organized by the astronomer Yang Jingfeng (楊景風) based on the second fasci-

cle. Zemba Makoto and Yano Michio claimed within their monographs (Zenba 1968; Yano [1986] 2013) that the XYJ is not a translation but rather was written by Chinese monks during the Tang Dynasty, while Li Hui argued that the XYJ is a Chinese translation (Li 2007) of a Sanskrit text. Frankly speaking, Li's conclusion displays a lack of knowledge of Buddhist literature. The Buddhist tripitaka include Dharma, Vinaya, and Abhidharma, many of which were composed by ancient elites along the road of the transmission of Buddhism. After careful reading and comparison, it is reasonable to surmise that the XYJ is not a translation but rather was written by the monks of Tang China.

The Ch1 of the ZKA is clearly a Chinese translation of Buddhist Sanskrit *avadāna*, given that it bears so many parallel texts. The XYJ, on the other hand, is evidently not a translation but rather an original Buddhist Astrology manual written by monks in Tang China.

2.3. History of the Development of Astronomical Literature in the Chinese Tripitaka

From the Eastern Han 东汉 Dynasty to the Northern Song 北宋 Dynasty, Buddhists in ancient China traveled westward in search of the *Dharma* or otherwise brought scriptures eastward, thus producing a large number of Buddhist texts that contained a great deal of astronomical information. Table 1.2 in (Niu et al. 2022), the "List of Extraterritorial Astronomical Literature from China", lists 54 Buddhist texts containing astronomical elements, ranging from An Shigao (安世高)'s *Three Thousand Vigilant Measures of the Great Bhikkhu* (大比丘三千威儀) composed during the Han Dynasty to Shihu (施護)'s *Twelve Margins of Good Fortune Sutra* (十二緣生祥瑞經) composed during the Song Dynasty. Among them, 33 sutras, or 61% of the total number of sutras, were written in the period between the composition of the Ch1 of the ZKA and the XYJ. They include important vinaya texts such as the *Four Points of the Vinaya* (四分律), the *Ten Recitation Vinaya* (十誦律), and the *Mahasamgha Vinaya* (摩訶僧祇律); important sutra texts such as *Digha nikāya* (長阿含經), the *Mahānirvāṇa Sūtra* (大般涅槃經), and the *Mahāsamñipātasūtra* (大方等大集經); and important abhidharma such as the *Mahāprajñā-pāramitā-śāstra* (大智度論), the *Abhidhammakosa* (阿毗達摩俱舍論), the *Yogacaryābhūmi* (瑜伽師地論), and so on.

The above canonical books were translated by *Kumārajīva*, *Xuanzang*, *Paramārtha*, and other monks and occupy an important position within the transmission of Buddhist literature. It is conceivable that Indian astronomical knowledge underwent continuous transmission between learned Buddhist monks. At the same time, the above canonical texts had a certain influence among the intellectuals of Ancient China. For example, He Chengtian (何承天 435–43), an astronomer in Nanjing (南京), paid attention to the Indian astronomical equinoxes, eclipses, the step of light and shadow, the lodging degree of chronology, and the location of the legal day according to the lunar eclipse and questioned the traditional "seven intercalary leaps in nineteen years" of the intercalary week of the Han Dynasty, advocating instead that "the change be made at any time to get its coincidence" and that each of the five stars should be given its own time. Emperor Wu of Liang in the period from 502 to 49 questioned the traditional 7 leaps in 19 years in the Han Dynasty and advocated to "move and change at any time in order to take the conjunction of the five stars" and designate a post-element for each. On the other hand, Emperor Wu of Liang, who possessed some understanding of the ancient cosmology of India, "made a different celestial body, set up a new idea, and rejecting the theory of Sphere-Heavens (別擬天體, 立新意, 排渾天)." In turn, Zhang Zixin (張子信), in the 534–64 period, discovered that the motion of the sun and the planets was not uniform (Niu et al. 2022, p. 25).

From the above, we can assume that Indian astronomical knowledge within the Chinese Tripitaka developed parallel to the growth of Chinese Buddhism and had a profound influence upon intellectuals, imperial court, and Chinese society as a whole.

3. Comparison of Chapters and Contents

Upon comparing chapters and contents, we find that the predominant astronomical elements are *graha* (曜, luminaries) and *nakṣatra* (宿, lunar mansions). The ways of making predictions are rather different in the XYJ and Ch1 of ZKA. The upper fascicle of the

XYJ is divided into six chapters (品). Chapter one, titled “Determining the nakṣatra dating (定宿直品)”, outlines a basic geocentric Mt. Sumeru (須彌)-oriented cosmology and a layout of the ecliptic defined by twenty-eight nakṣatras and twelve zodiac houses (十二宮) plus their spatial relations to one another. It is written in the following manner:

“In the first zodiacal sign, nakṣatra Maghā is four *pādas* wide, Pūrvaphalgunī is four *pādas* wide, Uttaraphalgunī is one *pāda* wide, and the *graha* sun is located there. The god is like a lion, so it is called Shizi Gong (師子宮). Its dominant on official issues and wealth. If a person is born to this palace, he will have the right spirit, be rich and filial, and oversee military duties. In the second zodiacal sign, Uttaraphalgunī is three *pādas* wide, Hasta is four *pādas* wide, Citrā is two *pādas* wide, and the *graha* there is Budha (Mercury). (第一(宮), 星四足, 張四足, 翼一足, 大陽位焉。其神如師子, 故名師子宮。主加官得財事。若人生屬此宮者, 法合足精神、富貴孝順, 合掌握軍旅之任也。第二(宮), 翼三足, 軫四足, 角二足, 辰星位焉。”

Chapter two is titled “Born on Nakṣatra Days (宿直所生品)”, and details the twenty-eight nakṣatras (二十八宿). It lists their respective shapes and associated deities, *gotras*, and foods. Chapter three, “Category of the three sets of Nine (三九祕宿品)” describes a method of electional astrology calibrated to the individual in which the twenty-seven *nakṣatras* are divided into three sets of nine, such as the nakṣatra of destiny (命宿), the nakṣatra of prosperity (榮宿), the nakṣatra of decline (衰宿), etc. Chapter four, “Seven-graha day (七曜值日品)”, details the seven planets and the seven days of a week in the modern order: Sunday (日曜日), Monday (月曜日), Tuesday (火曜日), Wednesday (水曜日), Thursday (木曜日), Friday (金曜日), and Saturday (土曜日). Chapter five, “Secret Divinations (祕密雜占品)”, details various secret methods, e.g., the ‘six harms’ 六害, representing six assignments relative to one’s birth nakṣatra: ‘life’ (命宿), ‘affairs’ (事宿), ‘intention’ (意宿), ‘gathering’ (聚宿), ‘common’ (同宿), and ‘overcoming’ (克宿).

Chapter six, “*Kṛṣṇa-pakṣa* and *śukla-pakṣa* (黑白月分品)”, defines the thirty-day Indian month, composed of a *śukla-pakṣa* 白月 (waxing period) and a *kṛṣṇa-pakṣa* 黑月 (waning period) converted into lunar days, together with a hemerological method 撰日法 for selecting auspicious days. Chapter 7 in the Taisho Tripitaka version, “Auspicious days”, provides details on choosing auspicious days, divinations on *kṛṣṇa-pakṣa* and *śukla-pakṣa* days, a divination on 27 nakṣatra days, divinations on journey and tailoring, three sets of nine, etc. This chapter covers the last part of the upper fascicle and the beginning part of the lower fascicle. While a special section was inserted in the Japanese manuscript, namely, the seventh section, “calculating weekdays (算曜直章)”, it is expressly not taught by Mañjuśrī, and is thus called a section 章 and not a chapter 品. It is not included in the Taishō version. It is a complex formula for calculating weekdays 算曜直, citing a translation by the Indo-Tang Gautama family 瞿曇氏. The lower fascicle in the Taisho Tripitaka has Chapter 8 “Divination over seven planet days”, and the corresponding topics cover divinations over Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, etc. The lower fascicle is arranged by subject; most of its content parallels that of the upper fascicle. The lower fascicle contains comments on misunderstandings of the Chinese, whereas the upper fascicle was clearly more adapted for the Chinese readership (Yano [1986] 2013; Kotyk 2015a, 2015b).

The Ch1 of the ZKA is divided into two fascicles. The upper fascicle mainly focuses on stories of the current and previous lives of Prakṛti and Ānanda, which are divided into Chapter one, “Converting the Girl Prakṛti (度性女品)”; Chapter two, “Explaining the Past (明往緣品)”; Chapter three, “Revealing the Truth (示真實品)”; Chapter four, “Inquiries (眾相問品)”; and chapter five, “Explaining Uranography (說星圖品)”. The lower fascicle is primarily made up of astrological content, consisting of Chapter six, “Foreseeing Calamity and Fortune (觀災祥品)”, and Chapter seven “Explaining Time Divisions (明時分別品)”. The contents of astrological prophecies and astronomical calendars include the characteristics of *nakṣatras*; the fractions of day and night, the lengths of time and seasons, and the fractions of *kṣāṇa*; the units of length and those for the measurement of gold and grains; the fate of those born on nakṣatra days; predictions for cities built on nakṣatra days; predic-

tions for the first rainfalls during monsoons on nakṣatra days; predictions of lunar eclipses occurring on nakṣatra days; the desirability of and the undesirability of things that happen on nakṣatra days; the fractions of day and night on the day of the solstice, the length of the day’s shadows, and the change of time and seasons; predictions of earthquakes; the divinatory statements of earthquakes; the divinatory statements of imprisonment; the divinatory statements of moles on a woman’s body; the good and bad characteristics of a person born on nakṣatra days; and so on.

Table 1 comparing the contents of the Ch1 of ZKA and the XYJ from the Taisho Tripitaka version.

Table 1. Contents of Ch1 of ZKA and the XYJ (Taisho Tripitaka Version).

XYJ			Ch1 of ZKA		
Fascicle	Title of Chapter	Contents	Fascicle	Title of Chapter	Contents
Fascicle 1 Revised by Yang Jingfeng	Chapter 1 Determining the nakṣatra dating scheme	Mt.Sumeru, layout of twenty-eight nakṣatras and twelve zodiac houses	Fascicle 1	Chapter 1 Converting the Girl Prakṛti	The story of Prakṛti and Ānanda
	Chapter 2 Born on Nakṣatra Days	Details of nakṣatras		Chapter 2 Explaining the Past	<i>Buddha</i> tells the story of <i>Trīṣaṅku</i> and <i>Puṣparasārin</i>
	Chapter 3 Category of the three sets of Nine	Nakṣatras divided into three sets of Nine		Chapter 3 Revealing the Truth	<i>Trīṣaṅku</i> talks about the caste system
	Chapter 4 Seven-graha day	Seven planets and week		Chapter 4 Inquiries	<i>Puṣkarasārin</i> was convinced by the knowledge of <i>Trīṣaṅku</i>
	Chapter 5 Secret divinations	Various secret divinations		Chapter 5 Explaining Uranography	Description of twenty-eight <i>nakṣatras</i>
	Chapter 6 <i>Kṛṣṇa-pakṣa</i> and <i>śukla-pakṣa</i>	Hemerology on selecting auspicious days		Chapter 6 Foreseeing Calamity and Fortune	Natal predictions for individuals born under each nakṣatra; predictions for cities, rainfall, disasters during eclipses, earthquakes, etc.
Fascicle 2 Orally taught by <i>Amoghavajra</i> , written by Shi Yao	Chapter 7 Auspicious days	Details on choosing auspicious days	Fascicle 2	Chapter 7 Explaining Time Divisions	The lengths of day and night in given months and seasons, time units, water clocks, predictions of recovery from sickness and release from jail, mole readings, gnomonic measurements, details of who and what the nakṣatras preside over, etc.
	Chapter 7 Auspicious days	Selecting auspicious days, divinations on <i>Kṛṣṇa-pakṣa</i> and <i>śukla-pakṣa</i> days, divination on 27 <i>nakṣatra</i> days, divination on journey and tailoring, three sets of nine,			
	Chapter 8 Divination over seven planet days	divinations over Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, etc.			

By taking the Comparison of Chapters and Contents into consideration, it can be found that the predominant astronomical elements within the XYJ are graha (曜, luminaries) and nakṣatra (宿, lunar mansions), which are considerably more comprehensive than the Ch1 of the ZKA, which only includes nakṣatra with which to make predictions. This is a key contrast in the history of Indian astronomy. In many talks, Bill Mak shares the idea of dividing the history of Indian astronomy into two phases based on terminology

and technological development: the Vedic period, which was dominated by nakṣatra, with terms such as tithi, nakṣatra, muhūrta, and karana, and the post-Vedic period, which was dominated by grahas, with terms such as navagraha (the nine planets), yoga (planetary conjunction), planetary worship, and so on. Based on their content, the Ch1 of the ZKA belongs to the Vedic period, whereas the XYJ belongs to the post-Vedic period. The XYJ exemplifies the archetype of Indian astrology from the Tang period to the present day.

4. The Accumulation of Indian Astronomical Knowledge between *Modengjia Jing* and *Xiuyaojing*

4.1. *Nakṣatras, Grahas, and the Zodiacal Signs*

In Ancient Indian astronomy, the nakṣatras and the twelve zodiacal signs were the most important coordinate systems along the ecliptic. The coordinate system of the nakṣatras appeared as early as the Vedas, while the system of the twelve zodiacal signs was introduced to India by the Greeks after first year of Gregorian calendar, merging their system with that of the former. The Ch1 of the ZKA contains only the coordinate system of nakṣatras and does not make any reference to the system of the twelve zodiacal signs. The XYJ, in contrast, describes not only the coordinate system of the nakṣatras but also the coordinate system of the twelve zodiacal signs. At the beginning of the upper fascicle in the XYJ, the correspondence between nakṣatras and the twelve zodiacal signs is clearly explained. The Ch1 of the ZKA contains both the twenty-eight- and twenty-seven-nakṣatra systems. The XYJ was originally supposed to be a twenty-seven-nakṣatra system but was changed to a twenty-eight-nakṣatra system in order to correspond with the Han Chinese tradition of twenty-eight constellations.

For the translation of the Indian names of the nakṣatras, the Ch1 of the ZKA employs the traditional Chinese counterpart of the twenty-eight constellations, namely, “角, 亢, 氐, 房, 心, 尾, 箕 ... 井, 鬼, 柳, 星, 张, 翼, 轸,” while other Buddhist scriptures of the same period use either a phonetic or literal translation. In terms of the breadth of later circulation, the Ch1 of the ZKA's choice is more correct. The XYJ clearly chose the Chinese translation of the twenty-eight constellations, which suggests that this translation was already fixed by that time.

On account of the grahas, the seven luminaries of the Sun, the Moon, Venus, Jupiter, Mercury, Mars, and Saturn are found in the Ch1 of the ZKA but not in the weekly order. Regarding the entirety of the XYJ, the ordering of the days of the week from Sunday to Saturday had already been introduced into ancient Tang China, but it did not replace the upper ten days (上旬)–middle ten days (中旬)–lower ten days (下旬) calendar system of the Chinese imperial court.

4.2. *Revision of XYJ by Chinese Astronomers*

Compared to the Taisho edition, some Japanese manuscripts of the XYJ add a chapter at the end of the fascicle one titled “The Seventh Chapter on the Calculation of weekdays (算曜直章第七)”. Astronomer Yang Jingfeng, in a two-line note, claims that this is not part of Manjushri's teaching and therefore is not treated as a “chapter (品)” but rather as just a “section (章)”. This chapter deals with numerology, calculating the total number of days (cumulative days) from the starting point of the calendar to the current day, dividing it by seven, and using the remainder to find the “day of the week”. The majority of the content of the “Section of Calculation of luminaries' dating” is quoted from the Indian systematic astronomical work “Navagraha Calendar (九執曆)”. Yang Jingfeng was a calendar expert and felt that the content of how to calculate weekdays was important, and so he quoted the content of the Navagraha Calendar to supplement the XYJ. However, the starting point of this calendar was not appropriate, and the constants used were not precise, so the calculation method provided could not determine the correct weekday. In China, where there exists a reliable tradition of calculation, this chapter was discarded for being useless after the discovery of this error. However, Kūkai (空海) received the XYJ from Huiguo (惠果), which contained this chapter, and he himself realized the importance of the weekday so

he kept it. Since later Japanese scholars did not know much about the mathematical aspects of astronomy and could not simply discard the contents of the important classics introduced by the Kūkai, the “Calculation of weekdays (算曜直章)” was preserved in the existing Japan manuscript of the XYJ (Yano [1986] 2013).

The revision of the XYJ by Yang Jingfeng and other Chinese astronomers showed their choices between foreignization and domestication, in which a tension is reflected. Adding “The Seventh Chapter on the Calculation of weekdays (算曜直章第七)” might have been carried out to learn the “Navagraha Calendar (九執曆)” from the Indo-Tang Gautama family 瞿曇氏 to keep up with the most advanced civilizations in Asia and the rest of the world. When Chinese astronomers used their reliable tradition of calculation and discovered the errors of weekday calculations, they discarded this chapter to keep it right in astronomy and mathematics. Learning and adapting are complementary, and neither of them should be neglected.

4.3. Charts of XYJ Composed in China

There are no charts within the upper and lower fascicles of the Ch1 of the ZKA. The lower fascicle of the Taisho version of the XYJ has two charts that show how the host on which one’s birthday falls can be found, and the Japanese manuscript of the XYJ has one chart. The corresponding text is as follows:

“If one takes the host in which the moon is located on the fifteenth day of the month of one’s birth on the chart, and counts backwards and forwards from there to the host to the end of one’s birth day, and then one has found the host to which one belongs 夫欲求人所屬宿者，即於圖上，取彼生月十五日下宿，從此望宿逆順數之，至彼生日止，則求得彼人所屬宿也。(T21, no. 1299, p. 395b1-3)”.

Figure 1 can help astrologers find the correct nakṣatra for one’s birthday. It includes the nakṣatras, the twelve zodiacal signs, and the grahas, presented from the outer hoop to the inner hoop. From the words of “Sun 大阳”, “Moon 大阴”, “Saturn 填星”, and “Jupiter 歲星”, we can unearth a clue regarding traditional Chinese astronomy. The scribe changed the word “太” to “大” to avoid a taboo word.

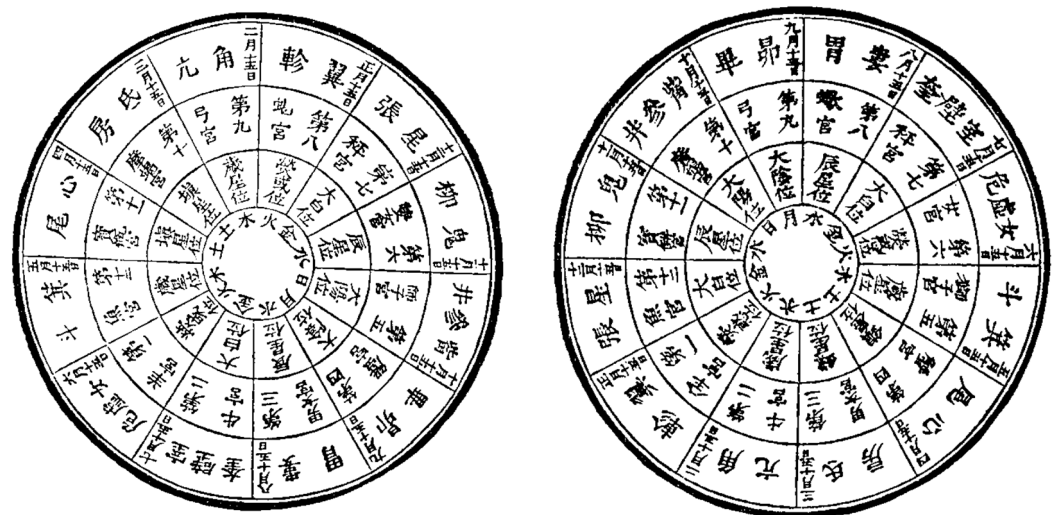


Figure 1. Two charts in the Taisho version of XYJ. (T21, no. 1299, p. 395a5-29).

These two charts with a taboo word might be a special tool that Chinese astronomers and academic monks can use in learning. The above three cases show tension between foreignization and domestication. Elites kept up with the most advanced astronomy in ancient times and preserved their own traditions in science and culture.

5. Conclusions

The Ch1 of the ZKA is considered to be the first Buddhist scripture through which Indian astrology spread to the Han Chinese. The XYJ, on the other hand, is regarded as the most important and influential text of Indian astrological Buddhist literature. From the Ch1 of the ZKA to the XYJ, the literature of Indian astronomy was gradually cemented into an archetype, through which Indian astronomical knowledge was accumulated and transmitted within Buddhist scriptures. Many cases can support this conclusion, like the nakṣatra divination system in the Ch1 of ZKA, but nakṣatras, grahas, and the zodiacal signs emerge in one system in the XYJ.

There are a few standards with which to divide the phases of Ancient Indian astronomy. In his talks, Bill Mak divides the history of Indian astronomy into two phases based on terminology and technological development: Vedic astronomy, which was dominated by nakṣatra, with terms such as tithi, nakṣatra, and muhurta, and post-Vedic astronomy, which was dominated by grahas, with terms such as navagraha (the nine planets), yoga (planetary conjunction), planetary worship, and so on. The Ch1 of the ZKA is part of Vedic astronomy because of nakṣatra 宿, whereas the XYJ is part of post-Vedic astronomy because of nakṣatra 宿 and graha 曜. The XYJ exemplifies the archetype of Indian astrology from the Tang period to the present day.

The arrangement of the twenty-eight nakṣatras, twelve zodiacal signs, and seven grahas by the editors of the XYJ demonstrates that the translators were familiar with the astronomical knowledge of both India and China and had the ability to make selective translations and non-translations, as well as the capacity to make additions or deletions to its content. For example, the Ch1 of the ZKA only lists seven grahas, while the editors of the XYJ added Rāhu and Ketu in order to form nine grahas. The addition and abandonment of the “Calculation of weekdays (算曜直章)” reflect the familiarity of Chinese astronomers like Yang Jingfeng and other astronomers with the computational tradition. These actions also show that the tradition of the upper ten days (上旬)–middle ten days (中旬)–lower ten days (下旬) calendar system of the Chinese imperial court was stably followed in Ancient China.

Beginning with the Ch1 of the ZKA and ending with the XYJ, Buddhist astronomical knowledge grew and developed over time. Yang Jingfeng’s revision and explanation of the first fascicle of the Sutra reflect Ancient Chinese intellectuals’ acceptance, assimilation, and recreation of Buddhist astronomical knowledge. The abandonment of the “Calculation of weekday (算曜直章)” reflects the influence of the Chinese mathematical and astronomical tradition and the calendar tradition, and perhaps this is one reason why China has not accepted the weekday within daily life. The lower fascicle of the Taisho version of the XYJ has two charts that show one how to find the host on which their birthday falls. These two charts containing a taboo word might be a special tool Chinese astronomers and academic monks can use in learning. In learning to assimilate other cultures, every civilization has a choice between foreignization and domestication, in which tension is reflected. Learning from foreign cultures is about keeping up with the most advanced civilizations in the world and advancing with the times, and maintaining one’s own cultural identity and cultural characteristics is necessary for one’s own civilization. The two are complementary, and neither should be neglected.

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Abbreviations

Ch1 of ZKA	Modengjia jing 摩登伽经
XYJ	Xiuyaojing 宿曜經

References

- Kotyk, Jeffrey. 2015a. *Amoghavajra's Xiuyao Jing 宿曜經 (Buddhist Astrology Manual)*. Digital Dictionary of Buddhism Entry.
- Kotyk, Jeffrey. 2015b. *Mātā-ga-Sūtra (Śārdūlakarṇāvadāna) 摩登伽經*. Digital Dictionary of Buddhism Entry.
- Li, Hui. 2007. An Examination of the Traces of Sinicization in the Chinese Translation of the Xiuyaojing <宿曜經>漢譯版本之漢化痕跡考證". *Journal of Shanghai Jiaotong University (Philosophy and Social Science Edition)* 15: 45–52.
- Miyazaki, Tensho, Nagashima Jundo, and Liqun Zhou. 2015. The Śārdūlakarṇāvadāna from Central Asia. In *Buddhist Manuscripts from Central Asia: The St. Petersburg Sanskrit Fragments*. Edited by Seishi Karashima and Margarita I. Vorobyova-Desyatovskaya. Tokyo: The Institute of Oriental Manuscripts of The Russian Academy of Sciences, and The International Research Institute for Advanced Buddhism, Soka University, vol. 1.
- Niu, Weixing. 2004. *Looking Westward to the Brahma Sky—Astronomical Origins in Chinese Translation of Buddhist Scriptures 西望梵天—漢譯佛經中的天文學源流*. Shanghai: Shanghai Jiao Tong University Press.
- Niu, Weixing. 2019. *Extraterritorial Astronomy of the Tang Dynasty 唐代域外天文學*. Shanghai: Shanghai Jiao Tong University Press.
- Niu, Weixing, Zhijia Jin, and Shenmi Song. 2022. *Collation and Research on the Astronomical and Calendrical Data of the Buddhist and Taoist Canons 佛道二藏天文曆法資料整理與研究*. Shanghai: Shanghai Sanlian Bookstore.
- Tang, Yongtong. 2010. *A Historical Sketch of Sui and Tang Buddhism 隋唐佛教史稿*. Beijing: Peking University Press. First published 1982.
- Yano, Michio. 1987. The Hsiu-Yao Ching and Its Sanskrit Sources, History of Oriental Astronomy. In *Proceedings of the International Astronomical Union Colloquium, New Delhi, India, 13–16 November 1985*. Edited by G. Swarup, A. K. Bag and K. S. Shukla. Cambridge and New York: Cambridge University Press, pp. 125–34.
- Yano, Michio. 2013. *Mikkyō Senseijutsu 密教占星術*. Tokyo: Toyoshoin. First published 1986.
- Yano, Michio. 2019. *Esoteric Buddhist Astrology: Japanese Sukuyōdō and Indian Astrology*. Translated by Bill M. Mak. New Delhi: Aditya Prakashan.
- Zenba, Makoto 善波周. 1952. "Matōga gyō no tenmonrekisū ni tsuite" 摩登伽經の天文曆數について. In *Tōyōgaku ronsō: Konishi, Takahata, Maeda san kyōju shōju kinen 東洋學論叢: 小西高阜前田三教授頌壽記念*. Kyoto: Heirakuji Shoten, pp. 171–214.
- Zenba, Makoto 善波周. 1968. "Sukuyōkyō no kenkyū" 宿曜經の研究. *Bukkyō daigaku daigakuin kenkyū kiyō 仏教大学大学院研究紀要* 1: 29–52.
- Zhou, Liqun. 2020a. Change and invariance: Astronomy in early Buddhist literature 變與不變: 早期佛教文獻中的天文學. *Studies in the History of Natural Sciences* 39: 35–52.
- Zhou, Liqun. 2020b. *Texts and Studies of Śārdūlakarṇāvadāna—Exchanges of Astronomy, Calendars and Literature between China and India 虎耳譬喻經文本與研究—中印間天文、曆法和文學的交流*. Shanghai: Shanghai Jiao Tong University Press.
- Zhou, Liqun. 2023. How Did Bhikṣuṇī Meet Indian Astrology? Viewing the Buddhist Narration and Logic from the Story of the Mātāga Girl. *Religions* 14: 657. [CrossRef]

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