History and Provenance of the “Chinese” Calendar in the Zīj-i Ḥāmīnī

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Abstract
This article sheds light upon a “Chinese” calendar described in the Zīj-i Ḥāmīnī. In previous studies, some characteristics of the calendar were ascribed to the “Uighur” However, I will show that it was not originally associated with the Uighur. This “Chinese” calendar was brought to Iran by the Chinese Taoist Fu Mengchi who accompanied his ruler Hūlegū. Fu Mengchi informed Naṣīr al-Dīn Tūsī of the Chinese calendrical system, which Tūsī described in his Zīj-i Ḥāmīnī. Soon afterward, the calendar was included in the zij of Muḥyī al-Dīn Maghrībī, because it was only used among the Mongol ruling class and their Buddhist servants, who were called Uighur. Muḥyī al-Dīn labeled the “Chinese” calendar the “Chinese-Uighur” calendar, and this title was repeated in subsequent zijes. Therefore, modern scholars have regarded the calendar as a product of the Uighurs. However, the title “Uighur” attached to the calendar in later zijes does not reflect the characteristics of the calendar, but rather the circumstances in which it was utilized.

Key words: Zīj-i Ḥāmīnī, Naṣīr al-Dīn Tūsī, Uighur, “Chinese” calendar, Fu Mengchi

1. Introduction
This article sheds light upon the “Chinese” calendrical system described in the Zīj-i Ḥāmīnī by Naṣīr al-Dīn Tūsī (1201–1274). The Mongols created a vast transcontinental empire in the 13th century. Under their auspices, various commodities, ideologies, and technologies were disseminated across
Eurasia (Allsen). Therefore, aspects of cross-cultural contact in this period have attracted scholars of various disciplines. Among the elements of this cross-cultural exchange, knowledge of astronomy was one of the first to be held in high esteem by great historians of science such as George Sarton and Joseph Needham. These scholars noted that a Chinese astronomer, who has been called Fu Mengchi, had an academic acquaintance with Tusi, a polymath representative of the Muslim world in the thirteenth century (Sarton, 1005; Needham with Wang, 218). Although Fu Mengchi has been widely acknowledged, his personage has been cloaked in a dense fog.

His scarce but clear vestige is the “Chinese” calendar in the Zij-i Ikhani (compiled ca. 1271), which was subsequently recorded in later zijes (astronomical handbooks) with a few modifications. Analysis of the “Chinese” calendar in various zijes began in the first half of the nineteenth century (Ideler) and has been conducted for a number of astronomical handbooks. For example, it was scrutinized by Itaru Imai in the Zij-i Sultaní compiled ca. 1445, by Edward S. Kennedy in the Zij-i Khāqānī compiled ca. 1420, and by Benno van Dalen et al., in the Zij-i Ikhānī. These studies have already clarified the calendar’s mathematical structure to a great extent.

Despite these great achievements, there remain a few points on which some further elucidations are in order, particularly concerning the characteristics of the calendar and its designation as “Uighur.” According to previous studies, the calendar had some different characteristics from not only the official contemporary Chinese calendar but also from any other calendar adopted by the successive Chinese dynasties. Its peculiarities have been attributed to the influence of the Uighurs (Kennedy, 435; van Dalen 2002, 336; van Dalen et al., 111), who had famously played an important role in the nascent period of the Mongol empire and surely contributed to the Mongol acceptance of the Chinese calendar (Bazin, 402-403). Present recognition of the calendar is well reflected in a statement by Benno van Dalen, who produced a series of fruitful works on the astronomical contacts between Iran and China in this period (slightly adjusted):

“The Chinese-Uighur calendar, which is of lunisolar type, was a mixture of the official Chinese calendar of the Jin dynasty, which was defeated by the Mongols in 1215, and certain elements from “unofficial” Chinese calendars. One of the latter may have been the calendar used by the Uighurs, who started to serve the Mongol administration around 1210” (van Dalen 2004, 17, n. 2).

In the Zij-i Ikhānī, however, there is no reference to the Uighurs, even though in later sources the term appears not only in descriptions of the calendrical system, but also in the title Tarikh-i Khitâ wa Uighūr (Chinese-Uighur Calendar). A part of these indications, as I will show, evidence of Uighur influence cannot be found in the contents of the “Chinese” calendar of the Zij-i Ikhānī. As previous studies suggest (Imai, passim), the calendar is an amalgam of various elements found in several Chinese calendars, not only the official one. The two cores of this amalgam are closely associated with the Jin dynasty (1115–1234), which dominated northern China immediately before the Mongols. Specifically, they are the Zhong xiu Da ming li (Revised Great Enlightenment Calendar) and the Fu tian li (Heavenly Agreement Calendar) (van Dalen et al., 129).

The personal background of Fu Mengchi is not related to the Uighurs either, but, instead, to northern China. The title given to Fu Mengchi, sīngsing, means “Taoist master,” as is well known among scholars who research Chinese sources of this period. In the early period of the Mongol empire, a Taoist sect known as the Quan-zhen jiao (Integral Realization Sect?) established a strong base over northern China, in support of the Mongol court. Also, the Hülêgû family had their own fief in Chinese

1. It is worthwhile remarking on the Chinese word “li,” usually translated as “calendar.” Li not only stood for a general system by which the beginning, length, and subdivision of a year were fixed, it also indicated an almanac dealing with solstices; the length of days, months, and years; the motion of the sun and moon; planetary revolution periods, and the like (Needham, 9).
territories, in which a decree was issued concerning Taoists (Takahashi, 33-34).

Whereas there is no evidence for Uighur influence, we thus see that strong connections to northern China can be found in Fu Mengchi’s personal background and in his “Chinese” calendar. The available clues lead to the assumption that he was more affiliated with northern China than with the regions further west, the land of Uighurs.

In scrutinizing Fu Mengchi and his calendar, it will be necessary to make a slight adjustment in our understanding of the cross-cultural contacts of the Mongol period. Before going into details, it is useful to remark on calendars and astronomical activities in the Mongol period in general.

2. Historical Background

By 1206, Temüjin completed the task of forcefully unifying the tribes of Mongolia. In that year, following a decision of the qurultai (the council of tribal chiefs), he was acknowledged as khan of the consolidated Turkic-Mongol tribes and took the new title Chinggis Khan (Morgan, 1986, 63). Within a short period after that, he and his successors would create a huge empire across Eurasia.

Since ancient times, the Turkic-Mongols had appreciated solar motion not directly, by astronomical observations or calculations, but indirectly, through its effects on vegetation, in a way suitable to their pastoral economy (Bazin, 119). In the official Chinese history of the sixth-century dynasty it is stated that

“[Turks] do not know the succession of years, and only count it based on the grass turning green” (Ling & De, 910; Bazin, 118).

The Mongols seem to have adopted the Chinese calendric system through contacts with the Jin dynasty around 1201 (Bazin, 402). Despite the

disharmony between the astronomically-determined beginning of the Chinese year and the Turko-Mongolian nomadic tradition, according to which the year starts at the beginning of spring, the Mongols accepted the Chinese calendar (Melville, 84).

Therefore, at first, the Mongols continued to use the Revised Great Enlightenment Calendar of the Jin dynasty. Xu Ting, who was the Sung ambassador to the Mongolian court in 1237, reported that he encountered the Chinese calendar being used in the Mongol court. Upon inquiry, the calendar was identified as that made by Yelü Chucai (1190-1244), who accompanied Chinggis Khan on several campaigns and was famous as the chief “Chinese” advisor of the early Mongol rulers (Allsen, 165-166). In Chinggis’s military expedition to the west, Yelü Chucai compiled a calendar which took into account the difference in geographical longitude between Samarqand and mainland China. This was the Xi zheng geng-wu yuan li (Western Expedition Calendar with Epoch Year Geng-Wu [i.e., 1210]). With the exception of the small correction due to the difference in geographical longitude, it is identical to the Revised Great Enlightenment Calendar. He also wrote the Ma da ba li’, which was based on the “methods of western regions”. After the eastern Muslim lands had been annexed to the Mongol empire and Chinese territories had been put under direct Mongol rule, Muslim astronomers came to these territories. In 1267, the most famous of these astronomers, Jamāl al-Dīn (fl. 1267-91), compiled and submitted the Wan nian li (Myriad Years Calendar) to Qubilai, the de facto first emperor of the Yuan dynasty (1271-1368), which constituted the eastern part of the Mongol empire. Qubilai promulgated it to a limited

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1. The meaning of this term is yet to be determined (Allsen, 165).
2. Without doubt, Jamāl al-Dīn initiated the most significant phase in the history of Western Asian astronomy in Yuan China. His activities in China are crucial to any consideration of astronomical exchange in this period (Allsen, 165; van Dalen, 2002, 336, 340-341).

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1. The term “Turko-Mongols” is used because, concerning the tribes of Mongolia in the twelfth century, it is by no means clear in all cases which were Turkic and which Mongol (Morgan, 1986, 56).
extent. Unfortunately, the contents of both the *Ma da ba li* and the Myriad Years Calendar are currently unknown (Yabuuchi, 1997, 11-12).

Although, in this way, the project for calendrical reform had been ongoing since the time of Chinggis Khan, it made rapid progress after Linan, the capital of the Southern Song dynasty, was occupied in 1276. That is because afterward, it was possible to make use of not only northern Chinese astronomical achievements—from the Jin to the Yuan dynasties—but also southern ones, and to carry forward the reform on this integrated astronomical accumulation. In 1280, a year after Qubilai finally defeated the Southern Song dynasty and reunified China under one rule, the new *Shou shi li* (Season-Granting Calendar) was compiled, and almanacs based on it were widely distributed beginning the following year (Yamada, 179; Yabuuchi, 1997, 13). It was by far the most accurate calendar in the tradition of Chinese mathematical astronomy and continued to be used for almost 400 years; although calendar reform was also conducted in the following Ming dynasty (1368-1644), that dynasty’s calendar, the *Da tong li* (Great Concordance Calendar), was very similar to the Season-Granting Calendar (van Dalen, 2002, 340).

Meanwhile, in the 1250s, a brother of Qubilai, Hülegü, led extensive military campaigns in the Middle East. By taking Baghdad in 1258, he ended the Abbasid caliphate. He reigned over Iran and Iraq from 1256 to 1265 and founded the Ilkhanid dynasty (1256-1336; van Dalen, 2002, 329). The first aim of Hülegü’s campaign was to exterminate the Isma‘ili, a goal he achieved along with “releasing” Tūsī, who resided in their fortress. Under the Ilkhanid patronage, the Maragha observatory was established, and Tūsī became its director. He compiled an astronomical handbook titled *Zij-i Ilkhānī* at the observatory, shortly before his death in 1274. Because various human and material resources were concentrated at Maragha, a range of highly significant research was done there, and the achievements of scholars who were active at the Maragha observatory had a lasting effect on the astronomical output of future generations, up until the European Renaissance (Saliba, 2006, 367-368).

3. **Historical Sources concerning Fu Mengchi**

We have only a faint idea of who Fu Mengchi was. There are four known primary sources concerning him:

2. Tārīkh-i Banākātī, by Dāwūd b. Muhammad Banākātī
3. *Tansūq-nāma*

Among these sources, Rashīd al-Dīn’s “Tārīkh-i Chīn” and the history by Banākātī refer directly to Fu Mengchi by name. The latter is an abridged version of the former; thus, its statements do not provide any new information concerning Fu Mengchi (Banākātī, 338). Furthermore, the description concerning him in the *Tansūq-nāma*, which is a translation of a Chinese medical text, is also based on Rashīd al-Dīn’s “History of China” (Rashīd al-Dīn, *Tansūq-nāma*, 16) Rashīd al-Dīn’s statement in “Tārīkh-i Chīn,” in *Jāmi‘ al-Tawārīkh*, is, therefore, the most direct and original source concerning the Chinese sage, Fu Mengchi; the following passage represents Rashīd al-Dīn’s reference to him in the “History of China”.

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1. For the structure of the Season-Granting Calendar and the astronomical reforms that underlie its compilation, we can refer to Nathan Sivin’s work (Sivin).
2. Koichi Haneda elucidates the provenance of the work (Haneda).
According to Rashid al-Dīn, the Chinese man who explained the Chinese calendrical and astrological knowledge to Tūsī was named Fu Mengchi (QWMHY) and held the title sīngsīng, which Rashid al-Dīn explained as "sage" (‘ārif; Boyle, 253, n. 4). Even though scholars have not identified this Chinese sage with a historical personage up to now, it has been well-known that the title sīngsīng is the transliteration of the Chinese xiānshēng. While Western scholars grasped this word as having a more generalized meaning, as in, for example, "teacher" or "master" (Jahn, 21-22; Alissen 162), it should be more concretely interpreted as "Taoist master," in consideration of the contemporary Chinese context. For example, from parts of a Chinese decree issued to a Taoist temple dated to 1238, it is clear that the term was used to represent a Taoist master.

"...a decree to instruct any provost and urban daruṣhachi (resident commissioner), governor, and daruṣhachi administering artisans in the lands..."

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1. Although the Chinese sage is provisionally called Fu Mengchi in this article, there is a long history of attempting to identify him that began at the end of the seventeenth century. In 1869, Müller reconstructed this name as FUMNHY from the Tārikh-i Bandūkī and vocalized it as Fau Munji (Boyle, 253, n. 4). Later, d’Ohsson represented it as Fau-moon-dii, relying on Müller (d’Ohsson, 265). Needham introduced the theory by a modern Chinese scholar that it could be represented as Fu Meng-chhi (Needham with Wang, 375). More recently two Chinese scholars have reconstructed it as Fu Mien-chi, with a question mark (Zhou & Gu, 830; cf. Alissen, 162).
knowledge, which came to be a part of Tusi’s Ziy-i Ikhani. In fact, a section of the Ziy-i Ikhani’s first chapter, which concerns various calendars and eras in the zij, focuses on the Chinese calendrical system called “Tarih-i Khitā”. We will now discuss this section in detail.

4. The “Chinese” Calendar in the Ziy-i Ikhani

4.1. Chinese Calendars

In Chapter 3, the personage of Fu Mengchi has been clarified as much as possible. Now, after some general remarks on the “Chinese” calendar, the contents of his calendar are scrutinized. Although the “Chinese” calendar was also described in the various Persian and Arabic zijes of the following periods, almost all the descriptions were based on that in the Ziy-i Ikhani. For the following information on the general description of the “Chinese” calendar, I have mainly relied on an article by van Dalen (van Dalen, 2002, 334-335).\footnote{1. Although the accepted view is that Fu Mengchi worked at the Maragha observatory (e.g., Sayili, 1960, 205-207), this does not have a solid foundation: to my best knowledge, there are no sources that prove the fact. Referring to research by Mamedbeili, John Boyle states that the Chinese astronomer’s name is mentioned in a Tehran manuscript of Mu’ayyad al-Din ‘Ushū’s treatise on the instruments of the Maragha observatory, Risāla fi Khsyfa al-Arsād (Boyle, 253, n. 4); however, Muhammad Tahriyut, on whom Mamedbeili relies in this regard (Mamedbeili, 194), does not bring evidence to show the existence of Fu Mengchi at the Maragha observatory, despite referring to the manuscript (Tahriyut, 377-378). It is possible that Fu Mengchi’s acquaintance with Tusi was a personal one. I would like to thank Benno van Dalen for providing me with the relevant pages of Mamedbeili’s monograph.}

1. British Library Ms. Or. 7464; This manuscript was produced/copied at Maragha in 676 AH/1277–78, only three years after Tusi’s death, and includes the “kunger” introduction,
The “Chinese” calendar shares basic characteristics with calendars officially adopted in successive Chinese dynasties, which were lunisolar; therefore, lunar months and solar years are compounded to keep pace with lunations and solar motion. In addition, the calendar employed an abstract duodecimal cycle of “twelve branches,” in conjunction with a decennial series of “ten trunks,” to derive a sexagenary cycle for denoting years and days (Melville, 83).

Each month starts with the day of a new moon and consists of 29 or 30 days. To determine the day of the new moon, at first, the time of the mean new moon is calculated from the average length of a lunation; in the Chinese calendrical system in the Zij-i Ilkhānī, this length is taken to be 29.5306 days. To obtain the time of the true new moon, the time of the mean new moon is corrected by means of the solar and lunar equations, whose maximum values are 0.1840 days and 0.3844 days, respectively. The period of the solar equation corresponds to the solar year, but that of the lunar equation, called the anomalous month, which is, specifically, 27.5556 days long, is somewhat smaller than a lunar month.

The solar year in this calendar starts around the time when the sun passes through the halfway point of the zodiacal sign Aquarius; it has a length of 365.2436 days and is divided into twenty-four equal parts, called qi. The beginning of the first month is calculated on the basis of the starting point of the second division of the solar year, the Yu-shu; practically, the first month immediately precedes the entrance of the sun into the zodiacal sign Pisces. An ordinary year consists of twelve lunar months (354 or 355 days), but, to conform to the solar year, the calendar requires insertion of a leap month every second or third year. The leap month is that which includes only one starting point of a solar division (all other months include two starting points).

Although Fu Mengchi’s calendar basically relied on the official Chinese calendrical system, it differed in several respects from the Chinese model.

4.2. Fu tian li (Heavenly Agreement Calendar)

As mentioned above, Fu Mengchi’s calendrical system has a number of characteristics that are rather atypical for an official Chinese calendar. They are summarized by the following four points:

1. Use of a point different than the winter solstice to prescribe the solar year.
2. Use of a parabolic interpolation scheme for the solar equation.
3. Use of a peculiar value of the anomalous month (27.5556 days).
4. Use of decimal notation to represent the fraction of a day instead of specific denominators (cf. van Dalen, 2002, 335).

In regard to the first point, the Zij-i Ilkhānī reads as follows:

“Fifth Section, on knowing the beginnings of the divisions of the solar year which occur in each year
Whenever we want to know the beginning of each of the twenty-four divisions in a given year, we must know which day and double-hour châgh will fall, on the beginning of the Lichun (Li-chun; the first division) in the proceeding and following year in a sexagenary cycle. We call it “the starting point of the division of a year,” which is called “kîw” (qi-shou) in the Chinese language” (Tusi, London Ms. 5v; idem, Paris Ms. 7r; idem, Cairo Ms. 6r).

which does not appear in other manuscripts (Boyle). On the assumption that this manuscript well preserves the form of the original, it is taken as the basic text.
2. Bibliothèque nationale de France, Ms. Ancien fonds persan 163: This is also quite an early manuscript and, according to notes on the manuscript (Tusi, Paris Ms. 2r, 3r), the copyist was a son of the author, Asil al-Din b. Nâzîr al-Din (d. 715 AH/1315; Richard, 179).
3. Dîr al-Kutub al-Miṣqat, Ms. Dîr al-Kutub Miṣqat Fârisî 1; This manuscript was copied at Maragha in 692 AH/1293 (King, 203).
This passage shows that the Li-chun was regarded as the starting point for computation of the divisions of the solar year, qi-shou, in the Zij-i Ilkhâni. Under the Chinese tradition, the Dong-zi (winter solstice) was taken as the starting point. This rule was first changed in the Fu tian li (Heavenly Agreement Calendar) compiled by Cao Shi-wei during the Jian-zhong era (780–783) of the Tang dynasty (618–907). In regard to the Fu tian li, the New Standard History of the Five Dynasties offers the following passage:

“During the Jian-zhong era, the mystic Cao Shi-wei first changed the old methods. This calendar, which set the fifth year of the Xian-qing era (600 AD) as the start of the epoch and the Yu-shui as the starting point of the year, was named the Heavenly Agreement Calendar. [However,] it was used only among the people under the name of civil calendar (xiao-li)” (On Yang, 670; Yabuuchi, 1982, 2).

As Yabuuchi noted, in the above passage “the starting point of the year” should be corrected to “the starting point of the division of the solar year” (Yabuuchi, 1982, 4). Therefore, the use of a different point from the winter solstice to set the start of the solar year commenced with the Heavenly Agreement Calendar, and the “Chinese” calendar in the Zij-i Ilkhâni followed this precedent.

Next, we address the use of a parabolic interpolation scheme for the solar equation. Although the contents of the Heavenly Agreement Calendar were unknown for a long time, a small fragment entitled “Futenreki军团をrissel” (the table of the Heavenly Agreement Calendar concerning the solar equation) was found at the Tenri Library, Japan, in March 1963. From this, it was proved that the data were all given by the following formula:

\[ y = (182 - x) \times 33 \]

Then, the parabolic interpolation scheme utilized in the table had the same base as that of the “Chinese” calendar in the Zij-i Ilkhâni:

1. In this formula, \( y \) is the solar equation and \( x \) is the mean solar anomaly, both expressed in Chinese degrees. The aforementioned formula reflects revisions made by Ikkei Suzuki to the original version introduced by Shigera Nakayama (Suzuki, 72-73; Nakayama, 451).
Agreement Calendar. Except for that denoted by the first point, these elements common to both calendars are devices to simplify computation. This is one reason that the Heavenly Agreement Calendar was not officially adopted and was instead called a “civil calendar” - significant digits are sometimes lost when these devices are used. However, the Heavenly Agreement Calendar was adopted as a text for the examination of the Astronomical Bureau in the Jin and Yuan dynasties, even though it was a “civil calendar” (Yamada, 119-125). This may explain why the “Chinese” calendar in the Zīj-i Ilkhanī also inherited its simplifying elements.

When we consider that a good number of bureaucrats of the Jin dynasty escaped into the Taoist sects, particularly into the Integral Realization, after the fall of the dynasty (Kubo, 167), it is likely that Fu Mengchi, the transmitter of the amalgamated calendar, was one of them. In any case, the “unofficial” elements of his calendar were all derived from the tradition of the Chinese calendars since the Tang period, and there is no evidence of Uighur participation, as suggested by van Dalen, who said, “it is therefore tempting to conjecture that the above-mentioned characteristics of the Chinese-Uighur calendar that stem from unofficial Chinese calendars derive from the original calendar of the Uighurs” (van Dalen, 2002, 336). Although the actual contents of the calendar utilized in the Mongol period by the Uighurs, who usually had their own calendar basically corresponding with the Chinese one, have not become well known, the transliteration into Persian script of a cycle in the Zīj-i Ilkhanī called “the fourth cycle” (dawr-i chahārnum), which consists of twelve elements for divination, was somewhat different from the transliteration into Uighur script of the same cycle in a document from 1202 (Bazin, 286-288). Also, the dates of an Uighurian text written in Brahmi script from 1277 agreed with those of the official Chinese calendar (Bazin, 306-308). Therefore, it is natural to consider that the “Chinese” calendar in the Zīj-i Ilkhanī was brought by a Taoist scholar from Chinese territories and had little connection with the contemporary Uighurs.

Incidentally, it has been suggested that Cao Shi-wei, the compiler of the Heavenly Agreement Calendar, came from the “western regions,” which included the land of the Uighurs. This is because his family name, Cao, was attached to the people who came from a city of Sogdiana in the Tang period, and it was stated in some Chinese sources that the Heavenly Agreement Calendar was based on Indian methods (Yabuuchi 1982, 3-4). Although Yabuuchi took a prudent attitude to this assumption, there is a strong possibility that Cao Shi-wei came from Sogdiana because it is well known that many Sogdians came to China in the Tang period and propagated Manichaeism, and these Manichaeans, in particular, brought new astrological and calendrical elements into China (Lieu, 232).

In this sense, it is possible that the “Chinese” calendar in the Zīj-i Ilkhanī is the epitome of cultural traffic between East and West. Some elements of the calendar were supposedly transmitted from the western regions into China through Sogdian Manichaeans in the eighth century and then, conversely, from China into Iran by the Chinese Taoist (Fu Mengchi) in the thirteenth century.

5. Turkic Elements in the Calendar

Finally, it is necessary to consider why the calendar in the Zīj-i Ilkhanī has been thought to have a relationship with the Uighurs. As mentioned above, the analysis of the “Chinese calendar” described in zījes commenced with that of a zīj authored after the Zīj-i Ilkhanī, specifically, Ulugh Beg’s Zīj-i Sultanī (compiled ca. 1445), in which the Chinese calendrical system derived from Fu Mengchi was given the title of “Chinese-Uighur” calendar (Sédillot, 314). The first zīj in which the term Uighur appeared is the Adwār al-Anwār madā al-Duhār wa-al-Akwār (ca. 1275) by Muhīṭ al-Dīn al-

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1. Sogdiana covered territories around Samarkand, Bukhara, Khujand, and Kesh in modern Uzbekistan. The name “Cao” was specifically attached to the people from the city of Kabudan.
Maghribli (Muhīy al-Dīn, 11v), who also worked in the Maragha observatory and who compiled this zīj over a period of several years after Tūsī’s zīj was completed (Saliba 1983, 391-392). There is no doubt that Muhīy al-Dīn referred to the statements of Tūsī concerning the Chinese calendrical system, since the contents of their zījes scarcely differed despite the difference of language: Muhīy al-Dīn’s zīj was in Arabic and Tūsī’s was in Persian. Adding the term “Uighur” was likely connected to observation of which groups utilized the “Chinese” calendar in Iran. It is probable that, in those days, this calendar was properly used only among the ruling class centered upon Mongol royalty and among Buddhist monks protected in the earlier period of the Ilkhanate. This is reflected in the statements of the Zīj-i Īlkhanī:

“Exordium

On describing calendars used in this period

The calendar which our sovereigns use is the calendar of the Chinese and Turkic peoples. Those used in our regions are Roman, Arabian, and Persian calendars, and a new calendar was established by Sultan Malikshāh. Astral scholars take these calendars into consideration” (Tūsī, London Ms. 17r; idem, Paris Ms. 5r; idem, Cairo Ms. 3v).

From this passage, it is clear that the “Chinese” calendar was utilized among “our [Mongol] sovereigns and Turks (including a few Chinese),” not by other people in Iran. Furthermore, the following statements appear in the section on the festivals of various calendars.

“Seventh Division

Concerning famous days in each calendar

The sovereigns of the Mongols celebrate New Year’s Day as well as the first day of each month and the birthday of the sovereign. Buddhist monks practice bājiq for three days each month. That is their fasting. They differ in

the days, one day earlier or later. On the last days of the months and in the Jaqshābād (the twelfth month of the “Chinese” calendar), several days are also those of bājiq, in which they practice religious observances and eat decided foods” (Tūsī, London Ms. 23r; idem, Paris Ms. 18v; idem, Cairo Ms. 23v).

This passage is devoted to the explanation of the “famous days” of the “Chinese” calendar. By these statements, it is made clear that, in Iran, people who utilized this calendar were Mongol rulers and the Buddhist monks who served them. In fact, according to Charles Melville, the events recorded in the “Chinese” calendar all concern the activities of the Mongol ruling class or persons closely attached to the ruling elite in the contemporary Persian chronicles (Melville, 85). Moreover, it is worthwhile noting that the term bakhshīyān, which denoted Buddhist monks, became synonymous with “Uighur” in the course of Mongol domination in Iran (DeWeese, 82-83, n. 22). Muhīy al-Dīn Maghrībī came from the western Muslim world and had probably never been farther east than Baghdad and Maragha (Ridawī, 232-237). Therefore, for him, Uighur was not a term representing the people who dwelt in the western region of China, but instead described the Buddhist monks serving the Mongol rulers who utilized their peculiar calendar, which he called the “Chinese-Uighur” calendar in his zīj. Originally, the calendar that Fū Mengchi taught to Tūsī had no relationship to the Uighurs, but it eventually became known as the “Chinese-Uighur’s” as a reflection of the political situation in Iran.

There are several Turkic words in the calendar in the Zīj-i Īlkhanī; for instance, the names of years and months are described in both Chinese and Turkic, and a Turkic technical term concerning the solar equation also appears (Mercier, 50). However, this fact does not mean that the Uighur—a
Turkic people—had anything to do with the creation of the calendar. As Louis Bazin properly stated, from the middle of the thirteenth century, the Turkophonic regions were under Mongol domination. The Mongols, who had been influenced by the Turkic culture, in particular the Uighur culture, since the nascent growth of their empire, mingled further with it as they advanced to the western regions. Eventually, the Mongolian language was only imposed on the eastern regions of the empire that depended directly on the Yuan dynasty, that is, present-day Inner and Outer Mongolia and their border lands. In more western regions, where Mongolic people have remained even up to the present day, the Mongol ruling elites linguistically turkicized themselves through several generations, although preserving their own customs and faith to the blood of Chinggis (Bazin, 403). As a result, the “Chinese” calendar was practiced in Turkic form in Iran, so it was natural to insert Turkic words into the description of the “Chinese” calendar in the Zīj-i Ilkhānī.

6. Conclusion
On the basis of a range of evidence, the nature of the “Chinese” calendar has come to light. It was brought to Iran by the Chinese Taoist Fu Mengchi who

1. Most Turkic people also utilized the “Chinese” calendar, but in the skeletal and simplified form. In the Zīj-i Ilkhānī, it is stated that “Turks curtail the (octagonal) cycle to a duodecimal one and count it in their language. Their calendrical measure (qeyd-i zīvīh-i Ilkhan) is not known” (Thul, London Ms. 5v; idem, Paris Ms. 7r; idem, Cairo Ms. 6r). Finally, this “Turkic” calendar was assimilated into Persian calendrical customs and the year has commenced on Persian New Year, Nawrūz, since the Timurid period (Ishaya 2008).

1. It is possible to see Uighur words on this page, with which the description of the “Chinese” calendar begins.
accompanied his ruler Hülegü. He informed Tūsī of the calendar, which Tūsī described in the Zīj-i ʿIlkānī. The Chinese calendrical system was then included in the Zīj of Muḥyī al-Dīn Maghrībī in the period immediately thereafter, and it was practiced only among the Mongol ruling class and their Buddhist servants, who were called “Uighur.” In reflecting on this social situation, Muḥyī al-Dīn labeled the “Chinese” calendar as the “Chinese-Uighur” calendar, and this title succeeded to the later zījes, one of which became the first focus for analysis of the “Chinese” calendar. Thus, the calendar was attributed to the Uighurs, who surely played an important role in the nascent period of the Mongol empire.

It is natural that there are similarities between the Heavenly Agreement Calendar, the “Chinese” calendar in the Zīj-i ʿIlkānī, and the Season-Granting Calendar, as several previous studies have noted (e.g., Imai, 37; Nakayama, 452), because, as clarified in this article, these calendars were all used or compiled in accordance with the same intellectual foundation, namely, that of China during the late Jin and early Yuan periods.

Studies on the Mongol empire have made remarkable progress (Jackson; Morgan 2004), and historical studies in science in this period have also advanced, but the results of both have not necessarily reflected upon each other. It would give me great pleasure if this work served, even if only in a small way, to bridge the gap between these fields.

Acknowledgements
In addition to Dr. Benno van Dalen, I sincerely appreciate the help of Dr. Michio Yano and Dr. Ryoko Watabe, who kindly offered me access to precious manuscripts. This work is supported by a Grant-in-Aid for the Japan Society for the Promotion of Science Fellows (09J10434).

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Muḥyī al-Dīn Maghrībī, Adwar al-Anwār madā al-Dāhir wa al-Akwār, Chester Beatty Library, Ms. 3665.

Secondary Sources (alphabetical order, by author)

1. One of the representative researchers is, of course, Benno van Dalen, on whose works this study greatly relied.


**Book Review**


For a long time, no specialized catalogues of medieval Islamic scientific manuscripts were available to historians of science. The first example of such a catalogue was the catalogue of the scientific manuscripts at the Cairo Library, which was published by David King in the 1980s in two volumes in Arabic and one volume in English.

In his catalogue, King not only described many hitherto unknowns manuscripts in the field of history of exact sciences, but he also established a new way to describe scientific manuscripts. King’s work shows that if manuscript cataloguing is carried out by specialized historians of science, the results will be much more useful than the work done by non-specialists.

A similar project, on a smaller scale, was carried out in Iran in the 8th volume of the catalogue of the manuscripts at the Astan-e Quds library in Mashhad. That volume was devoted to mathematical and astronomical manuscripts, but unfortunately, the technical scientific and astronomical terms were not used in a competent way in the description of the manuscripts. In Iran, the first combined catalogue of scientific manuscripts was provided by Ahmad Monzavi in 1348/1969. In his *Fīhrst-e Noskhehaye Khatte-y Farsi*, (vol. 1, pt. 4, pp. 132-203), Monzavi introduced 587 mathematical manuscripts in libraries of Iran and some other countries. Of course he updated his project in 1378 H.S/2000 by publishing *Fīhrstware-y ketabha-y Farsi*, (vol. 4, pp. 2591-2759). Unfortunately both Monzani’s researches are only limited to Persian manuscripts.
تاریخ علم
نشریه علمی-پژوهشی پژوهشکده تاریخ علم
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رائحتي تدوين مقالة

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2. فهرست مقالة فاسري، جد فوركان (54240 كلمه) و فهرست
3. مقالة في موضوع، نتائج، و فهرست
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 hebt تعرية: 

استاذ تأليفه

منیر فاسري

ويث هيام هوشنجنیکی

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حقوق یا قبول و نیز ویراستاری مقاله‌ها برای مجله محض و دفتر مجله از استفاده مقاله‌های دریافتی می‌داند است.

10. مسئولیت محتوی و نسخ مقاله به همراه علیه و حقوقی بررسی و تهیه نوشته است.
11. تاریخ و اقتباس از مقاله‌های دیگر مجله تاریخ علم با ذکر مدت ارد است.
12. پس از نشر و جاب مقاله‌ها، سه نسخه از مجله به نویسندگان (ها) اهدای خواهد شد.
13. نویسندگان می‌توانند به سردری مجله تاریخ علم با ذکر کامل نام و نام خانوادگی خود (و سایر نویسندگان همکار)، رتبه علمی، آدرس، تلفن، دوره‌گزار و نشانی الکترونیکی را اعلام می‌دارند.
14. چندین مقاله که نویسندگانش، دانش‌پژوهان و سازمان‌ها، تمام مکاتبات و مسئولیت مقاله به نویسندگان است.
مقالمه‌ای خارجی:

tکوه‌های عری و ایرانی عرضه شده توسط آنتونیا شیکاگانسی

گریگوری تورنیان

تاریخ و مشاهده توپیجی در زیج‌ایلخانی

یورگینی ایسایی

معارف کتاب

چکیده مقالمه‌ای فارسی

چکیده
نتیجه‌ی زیج‌ایلخانی به همراه ترجمه خود و توضیحی مکتب از دسته‌ی کهن رازی‌ای این است که رازی‌ای‌دانان بسیاری در برابر آنها اضافه‌تر کرده‌اند. محاسبه‌ی ویژه‌ی زیج‌ایلخانی با استفاده از یک مجاورت جدید از جمله روش‌هایی است که برای حل مسائلی تلیث زیج‌ایلخانی راه‌حل این است. گیلان‌الدین چمپید که در روال‌های مرتبط با آن در مورد تولید جدیدی از زیج‌ایلخانی در سال ۹۳۲ ق (در سال ۱۵۲۶ ه) را به نمایش می‌گذارد. این مقاله با توجه به نوآوری‌های این تاریخ زیج‌ایلخانی، این رازی‌ای بیشتر خواهد شد.

کلید واژه‌ها: تلیث زیج‌ایلخانی، رازی‌ای، متمایلی، ایلخانی، جهانگیر

مقامه

همزمان با آتش‌های ایران در انتقال حکومت از خاتم‌اند زند به خاتم‌اند قاجار، شهر کاشان در پرویز جامعی محکم مهربانی در نی (۱۷۱۲-۱۷۶۰) بکه از پرویزی تاریخ‌های فرهنگی و دریبی ایران به حساب می‌آمد. جنگ‌های طالب مهدیه‌ای در تسیعیان خون‌ریزی کاشان می‌شدو و عزل عرفی و نقدها را در مصادر و می‌می‌خوهد. پس از درگذشت ملا شهاب‌الملک که در سال ۱۷۲۸ در دانشگاه آزاد اسلامی واحدهای علوم و هنرهای ۱۹ این مقاله برجه‌ی از روال‌های کاشانی انتقال تاریخه‌ای است که در سال ۱۹۲۸ در دانشگاه آزاد اسلامی واحدهای علوم و هنرهای می‌باشد.
In the Name of God

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1. All articles must include the following elements: title; one paragraph English abstract (of not more than 150 words) and key words; introduction; main sections; conclusion; references.

2. Articles must be submitted in MS Word 2003, or upper version, format (not more than 20 pages) with all fonts embedded.

3. References must be in alphabetical order by first author surname and each reference should be ordered as follows: author’s surname, author’s first name, work title, translator or editor (if necessary), publication place, the year of publication (for example: Rūzī, Muhammad b. Zakartuyyā, al-Ḥāwī fi al-Tībb, translated by S. Mahmoud Tabataba’ī, Tehran 1369).

4. A footnote must not be used to cite the source of a direct or indirect quote; such a reference must appear in the text within parentheses. In-text references must include author’s surname, volume and page number; like: (Rūzī, III, 154). The work name for in-text cites must be included only if there is more than one work by the same author(s); for example: (Rūzī, al-Ḥāwī, II, 57; Idem, al-Ḥāwī wa al-Dīdūrī, 77).

5. Authors will be expected to submit a cover letter appended to the article, including the article title; author’s name, credentials and affiliations; and the addresses, phone and fax numbers (work and home) and e-mail address.

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تقویم‌های عربی و ایرانی عرضه شده توسط آنلاین‌شیراکاتسی گرگری بروتیان

در این مقاله برای اولین بار، تقویم‌هایی ایرانی و عربی را که انجام شیراکاتسی، دانشمند سطح هفتم میلادی ایرانیان در آثار خود آورده است، بر اساس تقویم‌های استریمیونی (Stratigraphy) 245 روز و 38 روز به‌ایرانی‌های ایرانی به‌نام آنا ای‌گان و ادامه شده است که بر اساس تقویم‌های پولنیسی و عربی، تغییرات را که مسیحیان ساختار در سرزمین‌های ایرانی و عربی در تقویم پولنیسی داده به‌جای بیان کرده است. این تقویم‌ها با آنها مبنای عروق تقویم عربی (الساری) در ایران شناخته می‌شوند. این تحقیق نیز به بازی معمولاً به عنوان تقویم عربی (الساری) با ایرانیان شناخته می‌شود.

تأثیر و مشابه تقویم‌های در زیج ایلامی

پروئش دانشجوی دانشگاه تکایو، ژاپن محقق مهار در یکی از تحقیقات مهم در زمینه تاریخ علم دانشگاه تهران این مقاله به تقویم‌های این مقاله از آن یک سهیل است، خواهد پرداخت. در این تحقیق این محور را بررسی می‌کند به‌ایرانی-عربی نسبت به ساختار و پی‌نویسدن این تحقیق. این تحقیق در زمینه تقویم‌های ایرانی به‌نام آنا ای‌گان و ادامه است که بر اساس تقویم‌های پولنیسی و عربی، تغییرات را که مسیحیان ساختار در سرزمین‌های ایرانی و عربی در تقویم پولنیسی داده به‌جای بیان کرده است. این تحقیق نیز به بازی معمولاً به عروق تقویم عربی (الساری) با ایرانیان شناخته می‌شود.

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اویورها در زمین می‌گذرند مغزی است. می‌گذرند مغزی عشایر (تقدیم چیتی) را به «تقدیم چیتی» اویورها می‌گذرد و این در زمینه‌ای بسیار نیز تکرار شده است این را محفلان امروز آن را تقدیم اویوری می‌نماید. هر چند اطلاع عشایر اویوری برای این تقدیم در آثار بعدی مشخصه‌های اصلی آن را تغییر نداده اما تغییراتی در کاربرد آن به وجود آورد.