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On the Era of Yazdegard III and the Cycles of the Iranian Solar Calendar

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Abstract The well-known Persian solar era (Yazdegardī era) presents some problems. It is believed to have started with the official rise to the throne of the last Sasanian sovereign Yazdegard III in 632 CE and it is characterized by the one-day backward motion of all dates of the relative calendar every four Julian years. I here analyze some Arabic and Persian sources of the Islamic age in order to establish the kind of cycle or cycles that the Iranian solar calendar was based upon. In this regard, I observe that, following the statement of an outstanding figure of astronomer of the 10th century CE, the first year of the Yazdegardī era should have fallen on the third year of a four-yearly cycle of one-day backward motion of that calendar, and not in the first one, as is taken for granted in the available conversion tables.

In this study I deal with a calendarical system I prefer to call Iranian calendar rather than Zoroastrian calendar, as is customary in the scholarly tradition. Indeed, the latter definition tends to obscure the great socio-cultural relevance of this phenomenon. 'Iranian calendar' is a better match for the definitions found in the only ancient sources that speak extensively about it, that is, the astronomical works of the Islamic age. In these texts the expression adopted is usually «the calendar of the Persians» (rather than «of the Magians», even though the Magians did use that same calendar and this fact was well known).[1] In other words, the object of my research consists of problems related to the Persian solar calendar and its era starting with the official rise to the throne of the last Sasanian sovereign Yazdegard (or Yazde-

1 On the Mandean calendar, the great Iranian scholar Hasan Taqizadeh (1937-1938, p. 358; Italian ed.: p. 150) wrote about: «The calendar among this people is just the Iranian calendar of the Sasanian age. Only the names of the months differ, being in Mandean. [...] The Iranian calendar has not been preserved in its integrity in any part of the world and the calendar of the greater part of the Indian Parsees (the current Shāhinshāhī) shows a difference by one month from the calendar of the Sasanian age, due to an intercalation of one month which occured in the Islamic age. Even the calendar of the Iranian Zoroastrians and of the Indian Parsees of the Qadīmī current differs from the calendar of the Sasanian age, since the five epagomenal days are placed at the end of the year rather than at the end of the eighth month. Today the Mandean calendar is exactly the same as the calendar of the Sasanian age». On the whole matter, see now Panaino 2014; in disagreement with Taqizadeh, the Italian scholar states that the Mandean calendar «could have been identical to the Persian one or similar to it in its essential scheme [(30 × 12) + 5], but with some differences or local peculiarities» (Panaino 2014, p. 97).

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gerd) III in 632 CE. This starting point is not to be doubted. Nonetheless, the structure of the Iranian solar calendar during the first centuries of the Islamic age is somehow problematic (see Panaino 2012, with bibliography).

The Yazdegardī calendar is based on vague solar years, that is, on years measuring three hundred and sixty five days each, *without* intercalation. In his *La Chronologie*, Venance Grumel (1958, p. 211) gives us a brief and clear description of it:

> que le nom de ce prince malhereux [i.e. Yazdegard III], le dernier de sa dynastie, soit attaché à une ère ne s'explique ni par un acte de son autorité, ni par sa personnalité, mais par le fait que les actes officiels étant toujours datés des années du souverain régnant, et Iezdegerd n'ayant pas eu de successeur, c'est son nom que l'on continua à employer après sa chute, sans doute par fidélité à la dynastie et comme expression du sentiment national. Le point de départ n'est pas pris du jour même de l'avènement de Iezdegerd, mais selon la coutume traditionelle de compter les années de règne à partir du début de l'année, Ier Ferverdin. L'ère de Iezdegerd commence ainsi au Ier Ferverdin correspondant [in that year] au 16 juin 632 ap. J.-C.

The Iranian year is made up of twelwe months of thirty days each plus an extra brief period, lasting five days, mostly called *andargāh* or *panja* in Persian. Around the beginning of the 11th century CE, the *andargāh* of the Iranian calendar was shifted from the end of the eighth month – i.e. from the position it occupied in the late Sasanian age and which it kept during the first Islamic age – to the end of the year, after the twelfth month.

All the dates of this kind of calendar move backwards of one day every four years with respect to the fixed seasonal point, due to the employ of the vague solar year and the lack of intercalation. In spite of the mobility of this kind of calendar and the fluid correspondence between Yazdegardī dates and fixed seasonal points, a relevant part of the Iranian tradition establishes an ideal coincidence between the first day of the first month of the year (i.e. 1 Farwardīn) and the 1° of Aries, the Spring equinox point. This implies the existence of a great intercalary cycle necessitating the insertion in the calendar of a thirteenth extra month every one hundred and twenty years.[2] According to François de Blois, this «idea» may have appeared in the Iranian milieu of the astronomical studies of the first Islamic age.[3] As a matter of fact, it was restored and intended as historical

2 This idea is frequently asserted in Arabic and Persian sources, with some differences in the number of years needed for carrying out the 'intercalation' (120 or 116). It is of interest to observe that al-Kharaqī indicates the year 500 Yazdegardī as the time in which an 'intercalation' was needed, just 124 years after the date of the 'intercalation' noticed by Kūshyār al-Jīlī; see below.

3 De Blois (1996, p. 50) states: «The *idea* of intercalation is, as we have seen, clearly ex-

by the pioneers of Iranian studies, starting with the explanation given by Thomas Hyde in his *Historia religionis veterum Persarum eorumque Magorum* (Oxford, 1700), and later by the well developped theory expressed by *Alfred von Gutschmid in his Über das iranische Jahr* (Leipzig, 1862), who hypothesized the side by side coexistence of two calendars: a civil one (what we know in its Islamic form as the Yazdegardī calendar) and a religious one, whose existence however is not proven. Such a fascinating theory is now outdated.

The Iranian calendar and its history are widely scrutinized by Arabic and Persian sources. Fortunately, these sources furnish us with interesting historical data mixed with various hypotheses regarding its presumed history. These data mostly concern the shape the Iranian calendar assumed during the Islamic age, that is, the Yazdegardī calendar. Her I would like to deal with two relevant issues: the starting point of the era of Yazdegard III, and the historical reckoning of the coincidence between the Spring equinox and 1 Farwardīn (i.e. the first day of the first month of the Iranian year).

The starting point of the Yazdegardī era is well established: 1 Farwardīn of the first year of the Yazdegardī era corresponds to 16 June 632 CE, the official date of the coronation of the last Sasanian emperor Yazdegard III (r. 632-652 CE). What I think to be relevant is the existence of an exception to the generally assumed correspondence between this date and the beginning of a four-yearly cycle of one-day backward motion of the Yazdegardī calendar. This four-yearly cycle is the peridod of time during which the correspondence between a date of the solar vague calendar and another date of a solar fixed calendar (like the Julian one) is assured and univocal. For instance, if on the first year of a four-yearly cycle 1 Farwardīn falls on 15 May, this correspondence will hold true for four years, and on the fifth year 1 Farwardīn will fall on 14 May, thus opening a new four-yearly cycle.

First of all, one must to highlight the importance that the coincidence of 1 Farwardīn and Spring Equinox still has in the Iranian tradition. This coincidence has been of notorious relevance from a ritual point of wiew for Zoroastrians. It was the moment when the Iranian New Year Day (Nawrūz) happened to reach its ideal position in concidence with the first degree of the Aries. According to two great astronomers of the 10-11th century CE, Kūshyār (Gōshyār) al-Jīlī and Abū al-Rayḥān al-Bīrūnī (al-Bērūnī, see below), at this time the five days of *andargāh* shifted to the end of the Iranian year, thus changing the internal schema of the year. Such a coincidence occurs theoretically every 1,440 or 1,461 year (i.e. on the basis of

pressed in a small number of passages in Zoroastrian religious writings compiled during the Islamic period; the *legend* that intercalation had ever actually been carried is not in fact spelt out in any extant Zoroastrian book, but only in the writings of Muslim authors of the tenth century and later». On this matter see also Panaino 1996 pp. 298-301; 2010, p. 161; 2014, p. 87 note 2, and p. 93.

the functioning of the Yazdegardī calendar). Some words need to be spent on this point, since there is a discrepancy of twenty-one years between the two numbers indicating the amount of years of the entire cycle.

The *Nawrūznāma* is a Persian *risāla* on the Iranian New Year Day composed between the 11th and 12th century CE, and attributed to the well-known Persian astronomer and mathematician ʿUmar al-Khayyām(ī). There are two extant manuscripts of this text and, while one of them is lacunous on the matter, the other speaks *apertis verbis* of a 'Great Cycle' (*dawr-i buzurg*) of the Iranian calendar, linking it directly with the institution of the Nawrūz, the festival of the New Year Day:

> The Nawrūz was instituted because the Sun has two cycles, the first determined by his return to the first degree of Aries every three hundred and sixty five days and one fourth of a day […] and the other determined by his return every 1,461 years to the same degree at the very same moment and day when it started to move.[4]

Thus, according to this text, the Great Cycle of backward motion of the Iranian year lasts 1,461 years (indeed 365.25 × 4 = 1,461). However, we must pay due attention to the fact that the author of this work wrote in a period posterior to the reform of the Iranian calendar operated by Malikshāh al-Saljūqī between 1076 CE and 1079 CE, which introduced a new era – the Jalalian one – and a new calendar with periodical intercalations of the solar year. After this reform, the new and more common version of the Jalalian calendar had twelwe months of thirty days each plus the five (or sometimes six) days of *andargāh* at the end of the year.

At the time when the *Nawrūznāma* was composed, the five days of *andargāh* occurred regularly after the twelfth month, and for the author of this *risāla* this was a well known fact. Moreover, the measure of the solar year considered in the text is 365.25 days, and this may well explain why the author refers to a cycle of 1,461 years. Indeed, it is mathematically true that the backward motion (of one day every four years) of Nawrūz throughout a year assumed as 365.25 days long, entails a period of exactly 1,461 years (365.25 × 4 = 1,461).

However, we should keep in mind that the Yazdegardī year – i.e. the Ira-

4 I translate from the ms. of the *Nawrūznāma*, Add. 23568, f. 86b of British Museum Library, since the two passages are seriously lacunous in Ms. Cod. Or. 8° n. 2450, ff. 78b and 79b of the Staatsbibliothek in Berlin, on which is based the Mīnawī's edition of this text [Ḥakīmʿ Umar Khayyām (1933/1312 solar H.), *Nawrūznāma*. Ed. by Mīnawī, Mujtabā. Tehran: Kitābkhāna-yi Kāwa]. The transcription is as follows: «ammā sabab-i nihādan-i nawrūz ān būda ast ki čūn āftāb rā du dawr buwad yak-ī ān ki har sīṣad u shaṣt u panj rūz wa rubʿ az shabānarūz-ī ba-awwal daqīqa-yi ḥamal bāz āyad ān waqt rā nawrūz wa nawsāl khwānand wa dīgar ān ki har hazār u čahārṣad u šaṣt u yak sāl ba-hamān daqīqa bāz āyad ba-hamān waqt u rūz ki rafta būd».

nian calendrical year as it was before the Jalalian reform and as it is now in the Yazdegardī calendar – was based on solar vague year of 365 days each, without any fraction. Moreover, as already noticed by Hasan Taqizadeh (Taqizadeh 1937-1938, p. 117 note 249; Italian ed.: p. 256), the shift of five days from a month to another or from a certain point of the year to its end – during the elapse of the whole cycle – implies that the total number of days the Nawrūz moved throughout every four years in order to return to the starting seasonal point are 360 instead of 365. This implies a cycle lasting (360 × 4 =) 1,440 years.[5]

As a side note, I think that a complex mathematical elaboration focusing upon the Iranian calendar and its cycle of 1,440 years is traceable in the Qābūs' tower in Gurgan (Gonbad-e Kāvūs, Iran). On this monument nothing satisfying has ever been written regarding the significance of its star shape and the functions it had. The novelty of the Arabic inscriptions on the Qābūs' tower resides in featuring both an Islamic lunar date and the correspondent Iranian solar date, both indicating the year 1006 CE. I discussed the matter in a study in which I related the dates indicated in the inscriptions to the geometrical refinement of that extraordinary building, and its evident astronomical connection to the solar year (as a matter of fact, the tower features several solar references; see Cristoforetti forth.). This was due to the deliberate will of an Iranian prince, the Ziyarid ruler Qābūs ibn Wushmgīr known as *Shams al-maʿālī* (first r. 1 CE; Buwayhid occupation 981-997 CE; second r. 997-1012 CE), who was deeply tied to tradition and was also a skilled astronomer. It should be underlined that the solar date inscribed on the tower is the first epigraphical evidence of the adoption of the Iranian calendar in Islamic times. The hypotesis I propose is that the Ziyarid sovereign aimed at celebrating the end and renewal of the 'Great Year' of the Iranian calendar, and builded a tower fuctioning also as a solar watch marking the natural seasons.

We can observe something else on this matter. I believe that a possible trace of the Iranian 1,440-yearly cycle can be found in the commentary to the *Zīj* by Ulugh Bīg titled *Dastūr al-ʿamal wa taṣḥīḥ al-jadwal*, written in 1498-1499 CE by the Ottoman astronomer and mathematician Mīrīm Çelebī (d. 1525 CE), grandson of the teacher of Uluġ Bīg, Ṣalāḥ al-Dīn Mūsā ibn Muḥammad ibn Maḥmūd Qāḍīzāda al-Rūmī. This author wrote

5 Cf. also Taqizadeh 1937-1938, p. 39, p. 117, p. 150 note 51 and note 249 (Italian ed.: p. 24, p. 66, p. 79 note 51 and note 249). Mentions of the great cycle of the Iranian calendar lasting 1440 years are in *Muntahā al-idrāk fī taqāsim al-aflāk* (Florence, Biblioteca Medicea Laurenziana, Ms. Or. 110 f. 93a) by ʿAbd al-Jabbār b. Muḥammad al-Ṭābitī al-Kharaqī (d. ca. 1106-7 CE) and *al-Tuḥfat al-shāhiyya fī-'l-hay'a* (London, British Museum Library, Ms. Add. 23393, ff. 151b-152a; Paris, Bibliothèque National, Fond Arabe 2516, f. 98b) by Quṭb al-Dīn Maḥmūd al-Shīrāzī (d. between 1310 and 1316 CE).

four centuries after the Jalalian reform of the Iranian calendar. As it was customary for any astronomer of that time, Mīrīm Çelebī also elaborated an intercalary cycle for the Jalalian calendar, but unlike several other famous astronomers, who elaborated intercalary cycles of 220, 268, and 300 years, Çelebī elaborated a much longer cycle lasting 1,440 years, with 349 leap years. This fact was astonishing for Taqizadeh, who observes: «It is unknown why Çelebī assumed as a basis for his measure of the fraction of the solar year the astronomical observations from the *Zīj-i īlkhānī,* disregarding the observations from Samarqand, even though he himself did comment the *Zīj-i īlkhānī* by Ulugh Bīg, and his grandfather collaborated with that soverain» (Taqizadeh 1937-1938, p. 173 note 335; Italian ed.: p. 301). In my opinion, all this is possibly due to the strength that the idea of a 1,440-yearly cycle generically connected to the Iranian calendar may have had on the Ottoman scholar.

Coming back to the coincidence between 1 Farwardīn and the Spring equinox, the oldest mention on this matter is a rather short text from the *Jāmiʿ zīj* by the Iranian astronomer Kūshyār ibn Labbān al-Jīlī (the book was written in Arabic at the beginning of the 11th century CE, a short time after 1 Farwardīn and 1° of Aries coincided):[6]

> When hundred and twenty years [after the time of Anūshīrvān] has passed, it was the end of the reign of the Persians, the disruption of their government, and [the beginning of] the domination of the Arabs over them. […] The five days [of *andargāh*] remained at the end of the month of Ābān [the 8th month] until the year three hundred and seventy five of the Yazdajird era, when the Sun entered Aries on the first day of the month of Farwardīn [the 1st month]. We have been informed that in Fārs and the those areas [near it], the five days were moved to the end of the month of Isfandārmudh [the 12th month] according to the ancient tradition.

Another record on the matter is available in another source, less known indeed, which appears to be useful in this regard. In the section on Persian chronology in the *Muntahā al-idrāk fī taqāsīm al-aflāk* by Abū Bakr Muḥammad ibn Aḥmad al-Thābitī al-Kharaqī,[7] there is a very clear passage

6 No complete edition of this work has ever been published. The Arabic passage and its German translation are available also in Ideler 1825-1826, p. 547 and p. 625. For the edition of the chapters on calendars, with an English translation and a summary of the whole work, see Bagheri 2008 (for the above quoted passage, see p. 79). For some important observations about it, see de Blois 1996, p. 52 notes 37, 38.

7 He was a Persian astronomer, geographer, and mathematician of the first half of the 12th century CE, writing in Arabic. His name probably refers to the village named Kharaq near Marw. For this reason, he is also called al- Marwazī. He composed the text in ca. 527 (1132-1133 CE). He died in Marw in 533 (1138-1139 CE).

concerning the year 500 Yazdegardī (beginning 12 Feb. 1131 CE, ending 11 Feb. 1132 CE):

> on the year three hundred and seventy five of the era of Yazdajird, when the Sun went to touch the spring equinox point at the the first day of Farwardīn-māh, we added the five days [of *andargāh*] to the last days of Isfandārmudh-māh [the 12th month]. The intercalation took place in the regions of Fars, while in the regions of ʿIraq and Khurasan [the five days] remained to the end of Ābān-māh [the 8th month] […]. On Saturday, the 12th of the month of Rabīʿ al-thānī in the year [52]5, year 500 in the era of Yazdajird, [when the Sun[went to touch the spring equinox point] in the month of Urdībihisht it was time to apply the *kabīsa* again, and therefore we applied it by adding five days to the last days of the month of Farwardīn; and therefore its days numbered thirty-five.[8]

I have already discussed this passage and other material on the matter of the shift of the five epagomenal days in the Iranian calendar (Cristoforetti 2007, pp. 47-54). The dates mentioned in this text are 12 Rabīʿ al-thānī 525 Hijrī and 1 Urdībihisht 500 Yazdegardī, both corresponding to 14 March 1131 CE, date of the Spring equinox which regularly occurred at this date during the period 1112-1147 CE.

Leaving aside the historicity of the theory proposed by Muḥammad al-Kharaqī concerning the shift (in his words *kabīsa*)[9] of the 5 days of *andargāh* from the end of the year to the end of the first month and the general functioning of the Iranian calendar, in the *Muntahā al-idrāk* we have an account of the coincidence between the first day of an Iranian month (the second in this case, i.e. Urdībihisht) and the Spring equinox.

This statement agrees with Kūshyār's passage. Such a momentous coincidence of Farwardīn with Aries is the only one in the Yazdegardī calendar. This is of extreme importance, since both texts say that in that age the five days of *andargāh* had been shifted to the end of the Iranian year,[10] deter-

8 Ms. Or. 110 of the Biblioteca Medicea Laurenziana in Florence, f. 93b: «ilā sana khamsa wa sabaʿīn wa thalathamiʾa min taʾrīkh Yazdajird fa-unhit al-shams ilā māss nuqṭat al-iʿtidāl al-rabīʿī awwal yawm min farwardīn-māh fa-alḥaqnā al-ayyām al-khamsa bi-akhir ayyām isfandārmudh-māh wa huwa al-makbūs bi-nawāḥī Fārs fa-mā bi-nawāḥī ʿIrāq wa Khurāsān baqiyat fī akhir ābān-māh […] wa qadd ʿādat nawbat al-kabīsa <ilā farwardīn-māh> ilā urdībihisht māh yawm al-sabt al-thānī ʿashar min shahr rabīʿ al-akhir sana khamsa [wa ʿishrīn wa khamsamiʾa] sana khamsamiʾa min taʾrīkh Yazdajird fa-kabsanā farwardīn-māh wa alḥaqnā al-khamsa al-ayyām bi-akhir ayyāmihi fa-ṣārat ayyāmuhu khamsan wa thalathīn yawman».

9 On the meaning of the word *kabīsa* – too often translated as 'intercalation' with excessive ease – see Cristoforetti 2009.

10 The same information is available in Abū al-Rayḥān Muḥammad ibn Aḥmad al-Bīrūnī (2002/1422 H.), *al-Qānūn al-masʿūdī*. Ed. by al-Jundī, ʿAbd al-Karīm Sāmī. Vol I. Beirut: Dār

mining a change in the internal structure of the calendrical year.[11] At last, the Yazdegardī year corresponded to the ideal Iranian year (though for four years only). According to the above mentioned texts, such a propitious coincidence – the first one in the history of the Yazdegardī calendar – occurred in the year 375 Yazdegardī. Both texts speak of the passing of the Sun from Pisces into Aries in the first day of the first month of the Iranian year (1 Farwardīn).

Taking into consideration the relevance of the event from a calendrical point of view in relation with the Yazdegardī calendar, the occurrence of that Spring equinox in coincidence with the first day of the first Iranian month must have also determined the banner of a one-day backward motion of the Yazdegardī year with respect to the solar seasons (as already said, the proof of it consists in the shift of the five days of *andargāh* which occurred at that time). The implicit information that Kūshyār al-Jīlī and Muḥammad al-Kharaqī give us is that 1 Farwardīn moved from the 2° to the 1° of Aries (while during the preceding four years 1 Farwardīn coincided with the 2° of Aries), and that the Spring equinox coincided with the end of the Yazdegardī year. Indeed, the lack of any intercalary mechanism in this calendar based on the vague solar year implies the existence of four-yearly cycles of one-day backward motion of the calendrical year. In other words, the beginning of the year of the Yazdegardī calendar (1 Farwardīn, i.e. Nawrūz) came a day in advance every four years.

In consequence of this fact, the coincidence between 1 Farwardīn and 15 March (i.e. the date of the Spring equinox during the period 1000-1015 CE) noticed by both the astronomers should have interested the period from 1006 CE to 1009 CE.

Now, if we check the available conversion tables for the Yazdegardī calendar,[12] it can be seen that 1 Farwardīn coincided with 15 March just during the period 1004-1007 CE (in 1008 CE and 1009 CE it coincided with 14 March). Thus the coincidence between 1 Farwardīn and the Spring equinox occured in the third year of one of the four-yearly periods adopted in the conversion tables. This implies the existence of a discrepancy of two

al-kutub al-ʿilmiyya, p. 129. But see de Blois (1996, p. 53 note 40) on the possible non effectiveness of the shift.

11 Several scholars have tried to identify the mind of this operation among the lot of prominent political men of that time. Taqizadeh 1937-1939, pp. 917-918, indicates Bahā' al-Dawla – likely in virtue of his military and political preminence. Bihrūz 1952-1953, p. 56 indicates the Saffarid ruler Khalaf ibn Aḥmad, but gives no explanation for this name. Bulsara 1953, p. 191, identifies in Qābūs ibn Wushmgīr the eluding policy-maker, but his position is flawed by too generical arguments, focussing on alleged Qābūs' Sasanian ancestry.

12 Conversion tables are available in Patell (1866, pp. 123-182) until 2000 CE, Neugebauer (1937, pp. 395-404) and Wüstenfeld ([1854] 1961, p. 38). Nöldeke (1879, p. 436) elaborates a table of conversion valid for the Sasanian age, on the basis of the same four-yearly cycles adopted in the above mentioned tables.

years between the data detectable from Kūshyār's and al-Kharaqī's work and the conversion tables. As a matter of fact, all the available conversion tables start from 16 June 632 CE and consider the period 632-635 CE as the first four-yearly period of the Yazdegardī calendar. Consequently, if we think that the information traceable from the above-mentioned sources are correct, half of the correspondences fournished in the conversion tables is wrong. Therefore, the first day of the Yazdegardī era should have been 17 June 632 CE instead of 16! Needless to say, such a problem is relevant in order to establish the Iranian chronology, though a single statement (supposing a direct dependence of al-Kharaqī from Kūshyār) is not enough, especially if we consider that Kūshyār does not doubt the correspondence of the first day of the Yazdegardī era with 16 June 632 CE («the 16th of Ḥazīrān of the 943 of the era of Alexander» in his statement; see Ideler 1825-1826, p. 520). And yet, he could have been wrong in the reckon of the date of that momentous coincidence.

However, the modern chronologists pay attention to the account given by Kūshyār but from another point of view. For example, Neugebauer elaborated a table also for the reckoning of the Yazdegardī days (Neugebauer 1937, pp. 401-402). In this table, he indicates a double possibility of reckoning for days pertaining to the last four months of the year. The double possibility is due to the fact that, as already noticed, in a particular moment of the long history of the Yazdegardī calendar the five days of *andargāh* had been displaced from the end of the eighth month to the end of the year, and evidently this influenced the reckoning of the correspondences of days pertaining to the last four months of the year. In Neugebauer's table the date *post quem* which is necessary to take into account as the alternative reckoning, is the year 1006 CE for this is the year when the shift of the five days of the *andargāh* was decided.

The fact that this coincidence occurred in a third year of the four-yearly period 1129-1232 CE adopted in the conversion tables is extremely relevant for the issue I am discussing here. This allows us to observe that the four-yearly cycles of the historical Yazdegardī calendar detectable from Kūshyār's account – possibly confirmed by this last passage – do not coincide with those upon which the conversion tables are elaborated. Then, another question arises: why did these astronomers disregard such a problem?

As done by Kūshyār al-Jīlī (and Abū al-Rayḥān al-Bīrūnī too), the astronomers registered accurately all the information on the calendrical systems available at the time. However, no uncertainty is expressed about the correspondence of the first day of the Yazdegardī era, unfailingly considered to be 16 June 632 CE. Why then Kūshyār al-Jīlī and al-Kharaqī refer the occurence of the momentous coincidence of 1 Farwardīn with the Spring equinox to the third year of the four-yearly period of the Yazdegardī calendar (namely 373-376 = 1004-1007 CE)?

If it is difficult to find a satisfactory answer to such a question on a calen-

drical level, an investigation in wider areas, i.e. the political and cultural domain, can help us in this regard.

As I said, it is my opinion that the tower of Qābūs can be interpreted as an architectural testimony of the ideal Iranian calendar at the time of the momentous return of the Nawrūz at the Spring equinox, with the renewal of the Great Year of the Persians, with relevant symbolical and propagandistic meanings. The renewed occurence of the Nawrūz (1 Farwardīn) of the solar vague calendar in its ideal position at the 1° of Aries, occurred after more than one thousand years. That moment, from an Iranian perspective, signified the return to a condition of ideal, primigenial order. Obviously, this is not devoid of cultural and political implications.

The 10-11th century CE is the historical age witnessing the formation and the establishment in the ʿAbbasid caliphate of a new political order, centered upon the institutional figure of the supreme army commander, the well-known figure of *al-amīr al-umarā'*. At that time, the idea of a possible renewal of the Persians' power was widely circulating, having a propagandistic usage. Certainly, it affects the modern scholarly reconstructions of this historical period, in which we are often dealing with the expression as 'Iranian renaissance',[13] not devoid of important implications on the cultural level. Sadly, however, in historical reconstructions the analysis focusses upon the *dynastic* membership and the *origin* of the representatives of the ruling élites. This attitude leads us to focus on whatever peculiar cultural features the homelands (the Iranian sub-Caspian regions, in this case) of the political protagonists of this age may have had, but the survey in order to define in what precisely consisted the Iranism of those regions is largely omitted. Then, given such formulations, the obvious conclusion is that the protagonists of the history of this period were the champions of an Iranism (very generic indeed) which was materializing in political terms just at this time. In other words, a mere confirmation of the most common historiographical stereotypes. What I want to stress here is that we are dealing with an issue concerning Islam as a whole. The involvement of etnhically Iranian elements in the so-called 'Iranian Renaissance' was not a reaction to Islam – as it is too easily asserted in modern times, and primarily in contemporary, learned Iran –, but rather the expression of a political protagonism displayed well inside the boundaries of Islam itself.

What is relevant is that this aspect – which is an exquisitely cultural aspect, even if it might have been subject to exploitations for the purposes of political discourse – *was not a new* one at this time. It *was already present* in the Islamic culture of this age in a structural way, under the form of general (shared) thought patterns regarding world history, actually conceived

13 The great success of this expression in handbooks on Islamic history is partially justified by the extraordinary vitality characterizing the artistic fields in the 10-11th century CE.

as a series of subsequent dynastic successions. This way of thinking was directly linked to an important aspect of astrology. According to D. Pingree: «The possibility of applying some of the methods of continuous horoscopy to predicting or reconstructing historical events was apparently first realized in Sasanian Iran» (1987, p. 870). Therefore, this kind of astrology was an ancient acquisition in Iran. Obviously enough, all innovations in this field were extremely productive politically, and the elucubrations of the astrologers became a widespread matter of debate. Indeed, as Pingree (1987, p. 870) states:

> annual events in society were predicted from the local theme cast for the moment of the vernal equinox. An ingenious approximate correlation was observed between the Zoroastrian concept of the twelve millennia [...] and the revolutions of the conjunctions of Saturn and Jupiter. The conjunctions of these two planets were separated by approximately twenty years; the theme of the time of any conjunction was used to determine the course of public affairs during the following two decades. Twelve or thirteen successive conjunctions remain in the same triplicity for a period of some 240 or 260 years; the theme of the time of the first conjunction in a triplicity is regarded as deciding the fate of a dynasty. [...] These techniques were utilized by Islamic astrologers to reconstruct the past as well as to foretell the future.

A good example of the debate excited by astrological argumentations is a passage in the *Chronology* by al-Bīrūnī, written around 1000 CE. Here, the wide circulation during the 10-11th century CE of ideas explicitly connected to the political astrology based on the Jupiter-Saturn conjunctions is absolutely clear:

> People say that the Sasanian rule existed during *fiery* conjunctions. Now, the rule over Dailam was seized by ʿAlī b. Buwaihi called ʿImād-aldaula during fiery conjunctions. This is what people used to promise each other regarding the restoration of the rule to the Persians, although the doings of the Buwaihi family were not like those of the ancient kings. I do not know why they preferred the Dailamite dynasty, whilst the fact of the transitus into a *fiery Trigonon* is the most evident proof indicative of the Abbasid dynasty, who are a Khurāsānī, an eastern dynasty. Besides, both dynasties (Dailamites as well as Abbasides) are alike far from renewing the rule of the Persians and further still from restoring their ancient religion.[14]

14 al-Bīrūnī (1879), *Chronology of Ancient Nations*. (Transl. by Sachau, C. Edward), London: W.H. Allen & Co., p. 197.

In this passage, al-Bīrūnī relates and comments a *vox populi* that was circulating in his times on the subject. However, Bīrūnī *does not say* that the Buwayhids are Persians; he only says that one of them, ʿAlī, ruled over Daylam. Abū Rayḥān al-Bīrūnī, hating the hyperbolical expressions of the Buwahid propaganda, underlines that the Buwahids do not behave in the way of the ancient kings. Furthermore, he states that the Abbasid dynasty is an 'oriental' (*khurāsānī*) dynasty. This statement is linked to the idea that the passing of the conjunction Jupiter-Saturn into a fiery trigon would have given an indication of the uprising of a new oriental dynasty. It is clear that for al-Bīrūnī that passing indicated the uprising of the Abbasids – as they were 'oriental' – and not of the Buwayhids. The great scholar concludes affirming that, at any rate, both these dynasties do not aim at the renewal of the rule of the Persians and the restoration of their ancient religion. In other words, on the basis of his deep knowledge of the *astrological* matter, al-Bīrūnī tones down the *political* implications implicit in the discourse on Jupiter-Saturn conjunctions and the renewal of the Persians. For us, the most meaningful point lies in al-Bīrūnī's way of dealing with this issue: no doubt, he speaks elliptically. In the whole passage, he assumes that most of the assertions he makes are well-known to the potential readers of his work, implicitly giving us a good indication on the wealth of information of the people of his time.

In this perspective, I find noteworthy that the date of construction (1006 CE) of the aforementioned tower of Qābūs matches the 'middle conjunction' Jupiter-Saturn, indicating the passing from the fiery triplicity to the earthly one (this conjunction started in Leo and ended in Virgin). Such a passage occurs around ¼ of the 960-yearly cycle of Jupiter-Saturn conjunctions, that is, at the end of the first and the beginning of the second of the four periods making the entire cycle. The astrology of conjunctions believes those moments to be of extreme importance for the change of dynasties (the previous middle conjunction, in 749 CE, foreshadowed the upcoming of the Abbasid dynasty; see the above-quoted passage from al-Bīrūnī's *Chronology*).[15] All in all, the influence of such widespread ideas on Kūshyār al-Jīlī (and possibly al-Kharaqī) seems evident: having four possible years at his disposal, he deliberately chose the beginning of the third year (i.e. the medium point) of that quadriennium as the moment of coincidence between Nawrūz and the 1° of Aries.

15 A forecast on terrible political upheavals in connection with the conjunction Jupiter-Saturn in 397 Hijri (27 September 1006 CE-16 September 1007 CE) by the great Andalusian astronomer Maslama al-Majriṭī is also well-known (Samsó 1979, pp. 229-230).

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