An Ottoman Calendar for 1740/41[1]

Calendars were in pre-modern time anything but a simple enumeration of dates. In those times even the general public were more aware of the connection of date- and timekeeping with the skies than today. A calendar or better an almanac had therefore always to include astronomical data, which were particularly important because of the general belief in astrology, which further led to predict meteorological phenomena and auspicious or inauspicious days. Of course religious feasts and their roots in history - also more important than today - had their place in almanacs as well. Almanacs were quite common in the Ottoman Empire, and even more elaborate than in the West due to the region's multi-ethnic and multi-religious traditions and the duty of Muslims to perform daily prayers at certain times. As compendia of popular tradition, science and beliefs they deserve a closer study by historians and anthropologists. As they are not quite easy to read and understand today they need some explanation.

I shall present and analyze here an Ottoman almanac or takvim for 1740/41.[2] In 2007 a detailed study about a later Ottoman almanac (1824/25),, including a complete translation, has been published by Marlene Kurz [3]. My article is meant to complement her research by a check of astronomical data in an earlier takvim[4], a detailed evaluation of the methods to define Islamic calendar dates, a closer look at the sometimes bewildering holiday section and a check of the system of astrological advice - or the absence of it - included in both almanacs.

The result of the present study can be resumed here as follows:

- The author of the calendar, a müneccim (astronomer), defined the astronomical data for its year, *i.e.* 1740/41 AD, not by studying the stars himself but according to a database, a so-called *zīj*, authored by earlier proper astronomers, in this case most probably by the Timurid sultan-astronomer Ulugh Beg (reigned 1447-49 AD). Also the clear influence of Biruni's (973-1048) writings on the takvim, mainly in the holiday section, confirms the continuing tradition of medieval Islam in this relatively modern takvim.
- All calendar dates directly defined by the sky, *i.e.*.the Islamic lunar dates and Nawruz, are found by astronomical methods and not by the schematic (or arithmetic) method used in modern data conversion tables.
- The date/time of astronomical events listed in the calendar are mostly confirmed by modern astronomy, although not every time. This is hardly surprising, because a medieval *zīj* can of course not always come to the same results as 20th-century science.

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[1] **All AD-dates mentioned in this article are of the Julian (Old Era) calendar, which is used in this takvim and in all others quoted for comparison.They are named by their year, like takvim1740, takvim1831 etc. - Ottoman-Turkish is transliterated into modern Turkish, sometimes (for purely Arabic terms) according to Arabic transliteration rules.**

[2] I am grateful to Sam Fogg (of Sam Fogg Gallery, London) for having provided high-resolution images of this takvim in his possession and for his permission to publish the manuscript This takvim and four others owned by me that I use for comparison will be referred to (with their main year added) as takvim1740, takvim1831, takvim1895, takvim1938 and salname1996 (Iranian), respectively.

[3] M. Kurz, *Ein osmanischer Almanach für das Jahr 1239/1240 (1824/1825),* Berlin 2007.

[4] which makes it particularly interesting, because no other Ottoman almanacs are known from before 1800 according to Hofelich. “Taḳwīm”

- The list of religious holidays with a considerable number of Christian feasts recorded along Muslim feasts witnesses the relative open-mindedness of the contemporary Ottoman society[5]. In takvim1740 the number of Christian holidays even exceeds the number of Muslim holidays.
- Holidays with enigmatic names like Beiza-i Sürh and Nevruz Khorezmshah have been explained in detail and certain anomalies in the list of religious holidays pointed out.
- Astrological advice abundant in the calendar does not rely on a canon or consistent system, but is completely arbitrary in spite of opposite statements by some scholars.

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Basically the Ottomans knew two kinds of calendars. One of them is a takvim (from Arabic: taqwīm),[6] that covers **one year** only, the other one a ruzname, a perpetual calendar covering multiple years.

The **ruzname**

Before analyzing the annual calendar for 1740/41 in detail, a few remarks are appropriate for comparison sake about the second kind of a calendar, which is a **perpetual** one. These so-called ruznames[7] are often beautifully designed as codices or scrolls on parchment or paper. They have always been of interest to chronologists as well as to collectors of Islamic art.[8] They exist in two versions, the first attributed to Shaykh Vefa, a holy man who died in 1491[9], and the second (the more common one, at least during the later centuries of the Ottoman Empire) to Darendeli Mehmet Efendi, whose version had been in use since the end of the 18th century. Only about once in every century a scholar took the pains to explain them in detail.[10]

The ruzname, a perpetual calendar valid for many years, has to rely on a cyclical recurrence of dates found by an arithmetic formula. The entries in its tables are limited to one cycle. Otherwise the number of years covered (normally about 100) would make it unwieldy and, therefore, useless as a tool, mainly for non-scholars.

This method is however correct only regarding one of the two calendar systems forming the basis of the ruznames, *i.e.* the Julian (Old Era) calendar. This calendar has the well known true cycle of twelve

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[5] For other interpretations of the meaning of Christian holidays in Ottoman takvims *vid*. Kurz*, Almanach*, p,36.

[6] Hofelich "Taḳwīm" & its bibliography. A detailed description of a takvim or what he called 'journal of the year [daftar al-sana]' is given by al-Bīrūnī, *Kitāb al-tafhīm*, no. 321. It is essentially like the Ottoman takvims, although with a slightly different choice of data categories. For the design of a standard Ottoman takvim see also Akgür, „Müneccimbaşı Takvimlerinde Tarihleme Yöntemleri", vol. 80, pp. 99-120.

[7] Persian *ruz* = day and *name* = letter/document.

[8] *e.g.* three ruznames in: The Nasser D. Khalili Collection of Islamic Art, vol. XII/1 (ed. Julian Raby), Oxford 1997, cat. 170-172.

[9] D..A.King, In Synchrony with the Heavens, p.440.

[10] the descriptions of ruznames I could trace are by chronological order: 1.) Georgii Hieronymi Velschi (=Welsch), *Commentarius in* Ruzname *Naurus sive Tabulae aequinoctiales novi Persarum & Turcarum anni*, Augusta Vindelicorum (=Augsburg/Germany) 1676; 2.) M. d'Ohsson, *Tableau Général de l'Empire Othoman,* vol. I, Paris 1787; 3.). J.B. Navoni, "Rouz-namé ou Calendrier perpétuel des Turcs", in: Hammer-Purgstall, *Fundgruben des Orients*, vol. IV, Vienna 1814, pp. 38-67/127-153/253-277 (& attached tables); 4.) F.K.Ginzel, *Handbuch der mathematischen und technischen Chronologie – das Zeitrechnungswesen der Völker*,vol.1, Leipzig 1906, pp. 266-71; 5.) N. A. Bär & G. Rettelbach, „Aufbau und Inhalt der Osmanischen Kalenderrolle im Hamburgischen Museum für Völkerkunde", in: *Mitteilungen aus dem Museum für Völkerkunde Hamburg.* n.F., Bd. 20; 1990. pp. 145-160. Nos.2 to 5 are versions of the Darendeli ruzname, while no.1 is a Sheykh Vefa ruzname.

months of alternating fixed length within a sequence of three normal years followed by one intercalary year, starting at one of seven weekdays, which results in recurring cycles of 28 years that can be easily handled even by a short ruzname.

The task to define in advance the 1st of the lunar months - the lunation - of the Islamic lunar calendar, the other calendar used in the ruzname*s,* is much more complicated, however.

It is obvious that lunations determined by visual observation of the New Moon - the orthodox rule - cannot be predicted in advance. That alone would make it impossible to determine future dates, which is the very purpose of a calendar.


Part of Ruzname (years 1245-1331 Mali calendar)

One alternative - using astronomical methods for finding the lunations of each month in the next hundred years - would extend the ruzname to a codex of hundreds, if not thousands of pages, and it would no more fit into a few pages or a one or two meters long paper scroll, which is the only practical size for a ruzname.

The ruzname must therefore rely for the Islamic lunar calendar.as well on a cyclical method with short tables of arithmetically calculated dates .

Such a schematic Muslim calendar was already known to mediaeval Muslim scholars and is applied in modern Western conversion tables such as Mahler-Wüstenfeld and modern computer conversion programmes.[11] It does not compute the dates of a new crescent, *i.e.* a new month, by one of the several and rather complicated astronomical calculations, but for convenience sake applies a cyclical arithmetic formula that approximates very closely the astronomical calculation, without always reaching the same result however. This well known formula uses a recurring cycle of 30 years, in which normal lunar years (354 days) are followed at certain intervals by intercalary years (355 days), while the months alternate between months of 30 and 29 days (Muharram, the first month, with 30 days and Dhu ‘l-Hijja, the last month, with normally 29 days and 30 days in intercalary years). It can conveniently be called arithmetic, because it is the result of arithmetic, not of astronomical calculations, or of visual observation, which is the truly orthodox way of defining the months.

Yet as mentioned before, the arithmetically obtained cycles of the Islamic year can only approximate the visually observed or astronomically found lunations.

The Darendeli ruznames, moreover, apply a cycle of only eight years, which further sacrifices precision for still easier use. Eight correctly (astronomically) calculated lunar years have 2834 days + 22h28.6m, while the eight-year arithmetic cycle is composed of a full number of 2835 days.[12] This

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[11] Qalqashandī*, Ṣubḥ al-aʿshā fī ṣināʿa al-inshā,* vol.VI, pp. 255-6. In his 30-years cycle the 15th year is an intercalary year, whereas other cyclical calendars mark the 16th year instead. As the difference to the astronomically correct calendar amounts to precisely half a day in the 15th year , the additional full day could be added to either the 15th or the 16th year of the 30-years cycle.

[12] whereas the 30-year cycle, which is not used in the Darendeli ruzames, results in the more correct figure of 2834 days + 22 hours for eight lunar years.

number can be divided without a rest into 405 weeks, which is ideal for a perpetual calendar, although the difference results in an error of one day once every 126 years.
Apart from this relatively small discrepancy affecting the length of the years, a more important source of error, which is shared by both the ruznames and the modern conversion tables or computer programmes, lies in their rigid alternating sequence of lunar months with 29 and 30 days. Every Islamic historian has been frustrated more than once when he had to realize that the Hijra dates quoted in historical sources or in modern Arab newspapers are based quite often on lunations that differ from the conversion tables, *e.g.* a month with 30 days could often be followed by a month with also 30 days.[13] Therefore, the ruznames, while correctly listing the truly cyclical dates of the Julian calendar, offer only - albeit very close - approximate results for the Islamic lunar calendar and the conversion of its dates into the Western calendar.[14]

The **takvim**

The calendar presented and analysed here in detail is a **takvim**, an annual calendar manuscript **valid for one year** only (1740/41 AD) that differs in purpose, form and content from the perpetual ruzname, with the principle difference being in the method applied for computing the dates. The takvim under study here was dedicated to Sultan Mahmud I. (1740-1754)[15] and was later included among his own waqfs and those endowed by the Validé-Sultan Saliha Sultan, his mother, to be kept by the Naẓārat-i Ḥaramayn al-Sharīfayn (the government department in charge of the Holy Sites of Mecca and Medina) in a location described as "inside the Bab 'Azab in the annexes (? mulḥaqāt) of the waqfs near the Holy and Great mosque of Aya Sofia in Istanbul" [16].
This illustrious provenance might explain the luxurious – for this kind of manuscript at least – design as a codex in leather binding with gold embossed medallions.
The interest of this manuscript as of other takvims lies in the wealth of astronomical, astrological, chronological, religious and meteorological data that represent in a concise form the knowledge and interest Ottoman society had in these subjects. As other and much cheaper takvims with similar data exist, this interest could not have been confined to the social elite only.

The last folios with a drawing of a lion attacking an animal, a Persian poem together with a chronogram for 1706 AD and two ghurretnames[17] for the much earlier years of 1110 AH and 1118 AH, have obviously been added at some time to the takvim, which was designed for 1153 AH/1740-1 AD, and to which they bear no relation. I have therefore omitted them in this study.

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[13] thus in takvim1740 we have Jumada I with 30 days followed by Jumada II with also 30 days!

[14] Navoni, who at the start of the 19th Century had still the chance of knowing how ruznames were used in practice, states this quite clearly (Navoni, *Rouz-namé*, vol.6, p.42): "car les astronomes turcs ne se règlent pour cela ni d'après le cycle de trente ans, ni d'après celui, bien moins exact, de 8 ans, dont ils font usage dans leur Calendrier perpétuel, pour trouver le jour de la semaine, par lequel commencent, ou plutôt sont censées devoir commencer leurs années et les lunaisons suivantes." He repeats this assessment, where he contradicts l'abbé Toderini, one of his sources, who erroneously had described the ruzname as a very precise instrument for getting correct lunar dates and even times (Navoni, *Rouz-namé,* vol.6, pp.40-1)

[15] remarkable among his many honorific titles that are mentioned are "Alexander" [Iskandar] and "caliph" [halife-i resul rabb al-ʿālamīn]

[16] 1st folio page recto.

[17] a *ghurretnāme* is a table to compute the weekday of the first day of each month for several years (from Arabic: *ghurra* [first day of a month] and Persian *nāme* [letter/document]),

*W*ith its short time-frame a takvim can afford the luxury of computing all days of the lunar year by applying the finely tuned and much more precise methods of the astronomers. It has furthermore the possibility to register astronomical phenomena that occur on a particular day/time of its year, but which cannot or can only with much difficulty be fitted into the rigid cyclical calendar of the ruznames.
But did the calendar makers really master the precise methods of the astronomers and did they study the stars themselves?[18] In fact they did probably not, nor had to. They relied on detailed databases or handbooks, which were created by earlier professional astronomers, some hundreds of years earlier. In the Islamic world such a database was provided by a *zīj*. Approximately 200 of them are known, with the most famous one being arguably the *zīj* of Ulugh Beg, a Timurid sultan, who is more famous as an astronomer than as the unlucky ruler he was during his short reign (1447-49) that ended abruptly with his assassination by his own son.[19]
The müneccim (astronomer/astrologer), who created the takvim1740, did not mention any *zīj* - in fact he tells us nothing about the method he used for defining dates like Nawruz or the lunations of Islamic months. That he did consult a *zīj* is almost certain, however. The salname1996, a modern Iranian almanac, that resembles very much our takvim, lists several *zīj*es among which even the modern Iranian calendar maker could chose to define the Nawruz date for different locations.[20]
Which *zīj* in particular the author of takvim1740 might have used will be discussed in the later chapter dealing with Nawruz.
Officially the solar calendar of Iran is now regulated by the Institute of Geophysics of Tehran University; and only their announcement of date and time of Nawruz sets the norm now for the whole of Iran in spite of the country's large East-West extension.

The focus of the takvims on astronomy is accentuated by their choice of their basic year, *i.e.* the solar year starting on Nawruz - the vernal (spring) equinox -, which is different from any other calendar ever in practical use in the Ottoman Empire.[21] The epochs (New Year) of the Julian, Mali-Financial, Seleucid, Coptic eras - all solar calendars - that were all in actual use mainly for administrative purposes are not defined like Nawruz astronomically. The emphasis on astronomy makes the traditional takvim, an almost correct calendar[22], much more valuable than the cyclical ruzname for astrologers and their disciples, however, as the planetary positions and movements are essential components of horoscopes and their influence on the conduct of daily life.
More modern takvims, while substituting the astronomically defined year starting on Nawruz with the Ottoman Mali-Financial year that begins on the 1st of March, still keep their focus on astronomy by listing planetary aspects like conjunctions. .

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[18] Akgür, *op.cit*. is no help in spite of mentioning 'methods' [yöntemleri] in the title.
[19] a detailed article on *zīj* with an extensive bibliography is in D.A.King/J.Samsó, "Zīdj", *EI*[2]
[20] Miṣbāhzādeh, A., *sālnāme-i fārisī sičghān-īl 1375 AHS* [=1416 AH 1996 CE], p.5.
[21] the Seljuk Malikshāh calendar with its era on the vernal equinox *(vid.* A.2. below) was known, but seldom used in practical life in the Ottoman Empire.
[22] except of course in the case of Ramadan, when the actual sighting of the new crescent at its start or its end can override the dates of astronomically computed visibility. This rule was and is however not followed in other months, although it is valid in principle for them as well.

The takvim became the object of an important ritual at the Ottoman court. The müneccimbaşı, the chief astronomer, whose task was to prepare the takvim for the next year, presented it on Nawruz, the day of the vernal (spring) equinox, during a ceremony called nevruziyye to the sultan, the grand-vizier and other dignitaries.[23]
This ceremony is one more proof of the importance of time-keeping and chronology in the Islamic society and in the Ottoman Empire in particular. The Christian world had of course their own obsession with chronology, when it came to defining the correct date for Easter, a matter of theological dispute for centuries, even millennia. Yet in the Islamic world the interest for chronology went far beyond the sphere of religion. Apart from the general belief in astrology - with the exception of only a few orthodox Muslim scholars like Avicenna -, this interest was caused not only by the need to define the lunar months and the prayer times, but to a large extent by the presence of important non-Muslim minorities with different calendar styles, the proximity to centres with their own elaborate tradition of timekeeping, like Iran and India,[24] and the need to manage tax matters on a seasonal basis, which the lunar Islamic does not provide.

It would be interesting to know if this takvim of the 18th century and later Ottoman almanacs with their focus on planetary phenomena are still committed to the Ptolemaic idea of the planets (including the Sun and the Moon) moving around the Earth or if they had already adopted the heliocentric world model of Copernicus
To understand this and also further references to planetary constellations, a basic knowledge of the Ptolemaic world model is needed.
In short, according to Ptolemy's Almagest seven planets orbit around the Earth, *viz.* Moon, Mercury, Venus, Sun, Mars, Jupiter and Saturn (by order of their spheres from the Earth), the eighth celestial sphere being the abode of the fixed stars. The circular movement of the five real planets around the Earth is further modified by smaller circles (so-called epicycles) of each planet around a centre that is continuously advancing on the main orbit, which makes the planets stop and even retrograde at certain times for an observer on Earth,[25] a phenomenon that is otherwise not explicable in the geocentric world model. The takvim mentions these changes of direction at certain dates.
The Copernican ideas were transmitted to the Ottoman Empire in the second half of the 17th century by the works of European astronomers: Noel Durret (translated by Ibrahim Efendi in 1660-4) and Janszoon Blaeu (translated by Ebû Bekr ibn Behrâm ibn Abdullâh el-Hanefî el-Dimaşkî, d.1692). It took much longer for them, however, to gain general acceptance. As late as in the early 19th century Seyyid Ali Paşa, director of the technical college Mühendishâne-i Berrî-i Hümayûn (later: Istanbul Technical University), opted for the geocentric world of Ptolemy in the preface to his edition of a work of a 15th century geographer, although he did mention Copernicus's geocentric and Tycho Bra-

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[23] Aydüz, "Müneccimbaşı", and Gündüz, "Nevruz"

[24] the best known Islamic author with an encyclopaedic interest in chronology is arguably Biruni, who - after writing his important work on the chronology of Middle Eastern nations - in his later life studied in detail astronomy and timekeeping as practiced in India, resulting in his equally important book India: *an Account of the Religion, Philosophy, Literature, Geography, Chronology, Astronomy, Customs, Laws and Astrology of India* (edited by E. Sachau), London 1910.

[25] a good visual demonstration with a comparison between the geocentric and the heliocentric model is given in http://jove.geol.niu.edu/faculty/stoddard/JAVA/ptolemy.html.

he's combination of geocentric and heliocentric ideas[26]. As the astronomic phenomena and their terms mentioned in the takvim can be explained in both world models (although with some difficulty in the geocentric one as mentioned in the previous paragraph), the author of takvim1740 could still have adhered to the Ptolemaic as well as to the new Copernican school.[27]

According to its title the takvim1740 is a 'list of year change (*i.e*. at the spring equinox) and important events [during the year]' [marifet-i cedvel-i tahvil-i sal-i ve tevarih-i meşhure]
It is divided into three main sections that will be treated in detail in the following pages:

A) General section: the start of the calendar together with astronomical data, year, date, horoscope of the Turkic calendar and the ascendant of the year, Nawruz.

B) Detailed calendar: all dates of the year together with astronomical and other data weekday, days according to the Julian and Hijra calendar, zodiac of the day, auspicious or inauspicious days.

C) C. Partial lunar eclipse[28]

[26] The latest known *zij* treatise, the *Zij-i Bahadurkhani*, written in 1838 and printed in 1855, which was dedicated to Bahadur Khan, incorporated the heliocentric system into the z*ij* tradition**.**

[27] Ali Kuşçu (1403-1474), an early Ottoman astronomer, had already stated - based on empirical studies of the comets - that there was a possibility of the Earth moving around the Sun (Wikipedia*, Science and technology in the Ottoman Empire).* Other Muslim authors, like Biruni and Qazwini, had similar ideas much earlier, without committing themselves, however, to the heliocentric system.

[28] This section is at the end of the takvim, following Biruni's advice that an eclipse, with its implication of unpleasant things [*ghayr maḥmūda*] , should not be mentioned before other data: Albîrûnî,, *Kitāb al-tafhīm*, no. 321. Takvim1895 no more observes this rule by listing several lunar and solar eclipses at the very beginning.

-A) **General Section** (folios 1 and 2)

جدول معرفت تحويل سال و تواريخ مشهوره

بالسعادة والاقبال تجدد سال همايون فال بامر ذى القدرة والجلال

مثلثه ناريه دن برج قوسده واقع قران اصغر علوينك اون طقوزنجى سنه‌سى

وقران نحسين سرطانينك ايكنجى سنه‌سى وتاريخ فارسى قديمك بيك يوز اونجى

سنه‌سى شهريور ماهنك يكرمى طقوزنجى كونى وتاريخ قبطينك بيك درتيوز

اللى التنجى سنه‌سى شهر برمهاتينك اون اوچنجى كونى وتاريخ روميينك

ايكى بيك اللى برنجى سنه‌سى ماه آذرينك طقوزنجى كونى وتاريخ ملكشاهينك

التى يوز التمش ايكنجى سنه سنك ابتداسى وتاريخ هجرت فخر كائنات

عليه افضل الصلوات واكمل التحيات حضرتلرينك بيك يوز اللى ايكنجى سنه‌سنده

واقع ذو الحجة الحرامك بحسب الرؤيه يكرمى برنجى احد كونى

مسرت آثار وجميع بلدان وعروضده استواء ليل ونهار محقق اولور

جعله الله تعالى مباركا وميمونا على كافة المؤمنين وعامة المسلمين

زايچه سال تركان

زايچه طالع سال بافق دار السلطنة السنية

المشترى

الزهره

الراس

الطالع

عطارد

سهم السعاده

سهم الغيب

شمس

المريخ

ذنب

قمر

كوسفند

اسد

خوك

پارس

كاو

كمسكو

These pages merit a detailed study of astronomical phenomena and chronological data used to define the start of the takvim.
The takvim defines:

1. The past occurrence of **two planetary conjunctions** and their relation to the current year (folio 2 recto).
2. The start date of the current year, *i.e.* Nawruz, the date of the (spring = vernal) equinox, by giving equivalent dates of **five different calendars** (folio 2 recto).
3. A horoscope for the current year according to the **Turkic animal calendar** (folio 2 recto).
4. A horoscope for the **ascendant** of the current year (folio 2 recto).
5. The exact time for **Nawruz** (folio 1 verso).

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ad 1. The past occurrence of **two planetary conjunctions**
Two astronomical phenomena are given as a reference for the year of the takvim:

conjunction (a)
The 19th year after the conjunction of the smallest two upper planets in Sagittarius of the fire triplicitate [müsellese-i nariyeden burc kavsda vaki kıran-ı asgar-i ulviyaneyn on dokuzuncu senesi].

conjunction (b)
The 2nd year of [after] the conjunction of the two malefic planets in Cancer [kıran-ı nahseyn sartaninin ikinci senesi].

The common denominator of both events is the conjunction [kıran] of two planets. The relative positions of the planets to each other and their movements are very important in astrology. We find them mentioned very frequently in the takvim with their Arabic terms used by Islamic astronomers/astrologers. A conjunction (Arabic: qīrān, *alias* marriage) occurs when two real planets, *i.e.* except the Sun and the Moon, are at close distance to each other.[29] Islamic astronomers generally defined a conjunction quite loosely, *i.e*. both planets have only to be within the same zodiac sign. Such a "conjunction" could last several days, while the takvims mark them for one day only. The reason why the takvims prefer a closer conjunction is probably the idea that "if there is a space equivalent to half the body of each one or less, then it is more accurate in the indication of whatever they both initiate."[30],

The planets in conjunction (a):
Apart from the well known division of the zodiac in twelve signs, every three of the signs are lumped together in the triplicitates [muthallatha] of fire, earth, air and water, which were also associated with astrological meanings. Sagittarius belongs to the fire triplicate.

[29] The other relative positions (aspects) of the planets are mentioned below in section B. Calendar.
[30] Abū Maʿšar*, Abreviation,* pp. 40-1**.**

The five real planets (the only ones known before the discovery of Uranus in 1781[31]) circle on their spheres relative to the Sun[32] . The Arabic dual used in takvims is sufficient to identify the "two lower planets" [Arabic: sufliyayn], as there are only two "below [the Sun]", *i.e.* Mercury and Venus.
With three planets on spheres 'beyond' the Sun – Mars, Jupiter, Saturn – the corresponding term "two upper planets" [Arabic: ʿulwiyayn] would not be precise enough however, save for the addition here of "smaller/smallest" [Arabic: aṣghar]. This term is explained by Māšāʾallāh, who uses the expressions "great, middle, small conjunction" to refer to the conjunctions of Jupiter and Saturn (the two farthest planets), of Saturn and Mars (the farthest and the nearest planet) and of Jupiter and Mars (the two nearest planets), respectively .[33]
The planets in the small conjunction, the one mentioned here, are therefore Mars and Jupiter.[34]
(The term aṣghar is also sometimes used in a completely different connection to denote Mars, which is "the smallest" [naḥs-i aṣghar] of the two inauspicious planets [naḥsayn], Saturn being "the biggest" [naḥs-i ekber])

The planets in conjunction (b):
Here we are dealing with the two inauspicious planets [naḥsayn], Mars and Saturn The calendar pages of the takvim include also entries for the dates of conjunction of the two auspicious planets [saʿdayn], Venus and Jupiter.

I thought it worthwhile to check the astronomical data given in the takvim. Fortunately in this age of the internet there is no need for complicated mathematical formulas, which I, probably just like many others interested in Ottoman timekeeping, would not grasp easily anyway. I used commonly available astronomical software from various sources to calculate the historical data for the positions of the Sun, the Moon and the planets with an exactitude that is quite sufficient for our purpose.[35]
The planetary positions along their orbital path of 360° are traditionally measured in hours/minutes/seconds, similar to the division of the 360°-circle of a clock into 24 hours. The measurement, the so-called Right Ascension or RA, starts with 0h0m0s in Aries at the point of the vernal equinox.

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[31] its discovery was ignored by even later takvims, like that of 1831.

[32] for the explanation of the planets in Islamic astronomy and astrology see: Kunitzsch, „al-Nudjūm II" and Hartner[Kunitzsch], „Minṭaḳat al-Burūdj"

[33] cited in Abū Maʿšar, *Historical Astrology,*vol.1, p.585 n.36. in another context he offers a different definition for small, middle and great conjunctions between the same outer planets Jupiter and Saturn exclusively, *viz.* whether they take place in the same or in different triplicicates. (Abū Maʿšar, *Historical Astrology*, vol.1, pp.584-5.) Kurz, *Almanach*, p.55, obviously follows this second definition.

[34] Māšāʾallāh check by astronomical software (see below) proves, however, that the addition of "smallest" to 'conjunction (a)' of this takvim has to be interpreted according to Māšāʾallāh's first definition, *i.e*. the conjunction of Mars and Jupiter, not that of Jupiter and Saturn.

[35] 1.)Ahmed M., http://www.mooncalc.moonsighting.org.uk/ 2.) Burnett K. *lunar position spreadsheet* (MS-Excel). 3.) Polster, S. Mathematik ‚alpha 2016': http://mathematikalpha.de/ 4.) http:/www.xylem.demon.co.uk/kepler/. 5.) http://ephemeris.com/index.html. 6.) Nasa http://eclipse.gsfc.nasa.gov/LEcat5/LE1701-1800.html. 7.)Tarot-Live.com, http://www.tarot-live.com/moons-nodes-res.php; 8.) Newcomb.exe (for MS-DOS, accessible in Windows by installing a DosBox) - a planetary program published by Willmann-Bell, Inc., Richmond/Virginia, USA 1986, for the planets and the Sun.

check of conjunction (a).

On 29.12.1722 Mars and Jupiter were positioned at RA 17h34m54s and 17h35m07s and at declinations of -23°46'13'' and -23°00'19'' respectively. Their angle of separation was 0°46. These nearly identical positions put both of them into the zodiac sign of Sagittarius[36]. The year of the takvim, which begins on 9.3.1740, is in fact the 19th year after the date of conjunction according to the traditional calculating method that included both first and last date.[37]

check of conjunction (b).

On 6.4.1739 Mars and Saturn were at RA 6h18m39s and 6h18m01s and at declinations of 25°22'39''and 22°56'10'', respectively, which meant that they were so close together as to form a conjunction.[38] This happened in Cancer, as this zodiac sign is placed on the 24h zodiac circle between 6h and 7h59m59s. Thus 1740 was in fact the 2nd year after this conjunction according to the traditional counting method.

Although both reference dates are correct, there had been another conjunction of Mars and Jupiter in Sagittarius in 30.1.1734, a date much closer to 1740 than the conjunction mentioned in the takvim.

Why then chose the author the much earlier reference date of 30.12.1722 ? It was certainly not copied from an earlier takvim, because his only two years earlier record of conjunction (b) proves that he could use recent calculations.

There can only be one explanation: the münaccim had simply overlooked the fact that Mars and Jupiter had a conjunction in Sagittarius much closer to his takvim. This and a few other flaws of the takvim that I point out in this analysis show that our münaccim (and also his *zīj*) was not infallible and that his entries do not always pass the test of closer scrutiny.

One more question remains, though: many other planetary conjunctions of different planets happened before and during 1740. Why did the author choose these particular conjunctions, *i.e*. Mars & Jupiter and Mars & Saturn, for this year?

In Islamic astrology a conjunction within the fire triplicicate indicates power for the people of the mashriq, with Sagittarius as the strongest and Aries as the weakest sign, while Leo takes the middle rank.[39] According to these criteria, conjunction (a) has the most positive influence.

The conjunction (b) of the two malefic planets in Cancer is on the other hand the worst possible aspect according to astrological belief.[40]

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[36] the zodiac belt of 360° = 24 hours is divided between the 12 signs, with 30°/2 hours each, as follows: Aries 0-2 hours (vernal equinox *per definitionem* at 0°=0h, when the Sun enters Aries), Taurus 2-4 hours, Gemini 4-6 hours, Cancer 6-8 hours, Leo 8-10 hours, Virgo 10-12 hours, Libra 12-14 hours, Scorpio 14-16 hours, Sagittarius 16-18 hours, Capricorn 18-20 hours, Aquarius 20-22 hours, Pisces 22-24 hours.

[37] *e.g.* Pentecost = literally the 50th day (after Easter Sunday), whereas today the same date is reckoned to be the 49th day after Eastern.

[38] in Istanbul (latitude 41°1'6'' N and longitude 28°57'52'' E.), which is the location used in the takvim.

[39] Abū Maʿ šar*, Historical Astrology*, vol.1, p. 31.

[40] According to Kurz, *Almanach*, pp..55-56, both conjunctions - the 'great' conjunction of Jupiter&Satun and the conjunction of Mars&Saturn - are important for serious subjects, like dynsaties, religions etc.

Takvim1831 by comparison has the following attributes for its year: a) the 11th year of the conjunction of the two upper planets in Aries and b) the 5th year of the conjunction of the two malefic planets in Cancer.[41]
Both takvims, therefore, apparently intend to record both the best and the worst planetary conjunctions for a given year, a choice that could probably make some sense to astrologers.

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ad 2) The start date "when in all countries and latitudes day and night are equal" [cemi-i buldan ve urudda istiva-i leyl ve nehar mütehakkik olur], *i.e.* Nawruz**,** the date of the (spring= vernal) equinox according to **five Middle Eastern calendars**: _

- 29 Shahrivar 1110 '**Old' Persian** calendar, *i.e*. the solar Yezdegerd calendar, beginning with the accession year 612 AD of Yezdegerd III of the Sasanid dynasty (as opposed to the 'new' Malikshah calendar -see below). Its first day (or Hormuzruz) of Ferverdin, the first month, corresponds to 16 June 612 AD.[42] As Yezdegerd III was the last Sasanid king to accede the throne, the epoch of this calendar did not change after that.
- 13 Barmahat 1456 **Coptic** calendar, starting with the accession of the Roman emperor Diocletian on 29. August 284. The Coptic era, although labeled religiously correct "Era of the Martyrs", is in fact a fossilized pagan Roman calendar that counted the years from the accession of the emperor, quite similar to the equally unchanging Yezdegerd epoch.
- 9 Azer 2051 **Rumi** calendar. This is obviously not one of the two other calendars normally called "rumi" (= Byzantine or Greek), *i.e.* the Julian (Old Era) calendar counting the years AD and the Ottoman Mali (Financial) calendar counting the years AH. It denotes the Seleucid calendar that starts with the accession year of Seleucos I Nikator, a general of Alexander the Great, in 312 BC, yet follows the same rules of the other "rumi" calendars for calculating the length of a year[43]. The takvim applies the Syrian version of the Seleucid calendar, *i.e.* with the twelve months carrying Syrian names and the year beginning on 1 Tishrinievvel = 1.October Julian Era. This solar calendar was quite popular in the Middle East for many centuries as a seasonal adjusted alternative to the lunar Islamic calendar. It is also called 'Era of Alexander' by mistakenly associating it with Alexander the Great. To Jews it was known as 'Era of Contracts', who used it in the Middle Ages before the proper Jewish calendar was generally adopted in the 15th century[44].
- 1 Ferverdin (New Year) 662 **Malikshah** calendar, the 'new' Persian calendar (often called **Jalali** after Sultan Malikshah's honorific title Jalāl al-Dīn). According to the calendar reform made by this Seljuk sultan (1072-92) the era of his solar calendar began during the Islamic year of 471 AH with 1 Ferverdin 1 at the vernal equinox, which was equivalent then to 15 March 1079. Because the Julian year exceeds the true solar year by approx. three days in 400 years – a discrepancy remedied by the Gregorian calendar reform in 1582 - , 1 Ferverdin 662 (*i.e.* again vernal equinox) occurred six days earlier in the Julian calendar on 9 March.

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[41] also checked as correct. This takvim did not overlook a later conjunction, as our takvim1740 did.
[42] for a very good and detailed explanation of Iranian calendars see Bär, *Iranische Zeitrechnungen*.
[43] according to Bickerman, *Notes on Seleucid and Parthian Chronology, t*he Seleucid era cannot always be precisely converted into other calendar systems. Takvim1740 applies the rules adopted after the Roman occupation of Syria that aligned it with the Julian calendar (Bär, http://www.nabkal.de/kalrech1.html).
[44] according to Biruni*, Chronology*, p.32, Alexander ordered the Jews in Jerusalem before his campaign against Persia to abolish their own calendar and adopt his era instead.

The Malikshah calendar year 662 is therefore identical with the takvim's basic year, which explicitly starts on "Nawruz sultani", *i.e.* Nawruz of Sultan Malikshah.

- Sunday, 21 Dhu 'l-Hijja 1152 after the **Hijra** (AH). The addition of "according to the sighting (of the Moon)" [bi-ḥasab al-ruʾyā] after the date reflects the traditional dilemma of Islamic chronologists to reconcile their calculated prognostics with the religious dogma that only the actual sighting of the new crescent Moon can define the start of a month.[45]

The Western date corresponding to the dates given by four of these five calendars, the Coptic, Rumi, Malikshah and Hijra, is uniformly **Sunday, 9 March 1740 AD**, thus confirming the takvim.

T*he Yezdegerd date **29 Shahrivar 1110** coincides with **9 March 1741,** however, i.e. one year too late! Yet on the detailed calendar pages we find an entry about the **start of year 1110** Yezdegerd era on **12.9.1740**, i.e. much earlier**.** The author was well aware then that Nawruz of that year correspond-ed to **29 Shahrivar 1109** (the previous year) of the Yezdegerd Era. The error was thus only due to an oversight, when he or a copyist wrote the first page of the takvim.*

9. March 1740 AD is therefore correctly defined as Nawruz of this year and constitutes the starting date of the takvim.

It is remarkable that the two most important calendars of the late Ottoman Empire besides the Islamic calendar are not mentioned. They are the Julian and the Ottoman Financial (Mali) calendars, both following almost identical rules (except for dating the years) and both beginning on the 1st of March. We have to bear in mind, however, that the takvim was primarily meant to be an astrological tool with a focus on astronomy and less a record of civilian dates like the Julian and Mali calendars.

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ad 3. Horoscope of the **Turkic calendar** [zayiçe-i sal-ı Turkan]
On the bottom right of page one is a rhomboid grid with the year names of the Central-Asian animal calendar that counted the years in cyclical periods of 12 years, of which each one was named after an animal. Unlike the other years the year of the Monkey is especially marked as year nine. This calendar follows the rules established in the better known Chinese animal calendar, still popular in China for special feasts. I use the commonly accepted English equivalents of the Chinese year names, although the exact translation of the almost exclusively Persian year names in the takvim might be slightly different.[46] Only one quite unusual name, *viz.* küskü [كسكو] for "Rat", is of Eastern Turkic origin.[47].

[45] *vid.* Kurz, *Almanach,* p.27 for Navoni's report about the sighting of the new moon in Ramadan, which could overrule dates obtained by astronomers.

[46] *e*.g. "Panther" [pāris] instead of "Tiger", "Crocodile" or "Shark" [nahang] instead of "Dragon". Other takvims might use different names, mostly a mixture of Persian, Turkic and Arabic terms. Takvim1831, for instance, has the Arabic fars for "Horse", the Arabic ghanīm for "Sheep" or "Ram", the Persian mūsh for "Rat" and the Turkic daqūq (modern tavuk] for "Rooster".

[47] According to O.Turan, *Oniki hayvanlı Türk takvimi,* p. 113, "küskü" is the Uighur calendar name for the Rat, a term also adopted by Nasir al-Din Tusi, Ulugh Bey and Biruni. Bazin, *Les calendries Turcsx,* p.529, writes that prudish calendar makers like our author avoided to use sıçgan or modern sıçan, the term for rat common

Years in this cycle were counted starting from the year of the Rat (year One) until the year of the Boar (year Twelve) - in a grid roughly arranged counter-clockwise.
As each year in a 12-year cycle belonged alternating to five different "elements" (wood, fire, earth, metal, water), one complete greater cycle was composed of 12x5 years = 60 years.
A delegation of pagan Turks visiting the court of Mahmud of Ghazna (998-1030) explained how to convert Rumi (Seleucid) calendar years into the animal calendar.[48] Their method shall be used for a check of the takvim's animal calendar:

> **'Af**ter adding nine years to the Rumi (Seleucid) year, the result is divided by 12, By adding the remainder to 1, *i.e.* for the first year (of the Rat), the year is defined within the 12-year cycle.'

In our case we have (2051+9)/12 = 171, with 8 remaining, to which we add 1 to get 9. This is the year of the Monkey, i.e. same year (with both name and number marked in gold) given by the takvim.[49]
The standard inclusion in even late Ottoman takvims of the rather antiquated Turkish animal calendar, which was not generally used in the Ottoman Empire (unlike in Iranian lands), can be explained by its astrological importance, as demonstrated by the term 'horoscope' [zayiçe] that introduces it. It is in fact mainly a horoscope for children born during that year[50], not a dating system due to its general lack of month or day entries.

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ad 4. Horoscope for **the ascendant of the year in Istanbul** [zayiçe-i tali-i sal bi-ufuk-ı Dar as-Saltana al-seniyye].
The Arabic term ṭāliʿ marks the ascendant, a key term for many horoscopes. It is defined as the zodiac sign rising first above the Eastern horizon, which is supposed to exert a profound influence on a person born at that time.
At New Year of 9 March 1740 Istanbul witnessed Gemini as the ascendant (correctly marked in the grid) between 8.49 am and 10.42 am local time[51]. The horoscope is based on the time, when Gemini became the ascendant for Istanbul that lasted approx. two hours including the time of equinox. The Sun is still in Pisces, the zodiac sign that precedes Aries, which marks the beginning of the New Year.[52] To check the horoscope we have to examine if all planets and other "bodies", whose meaning is still to be explained, were domiciled in the zodiac sign assigned to them in the grid during the approximately two hours that Istanbul had Gemini as ascendant..
We obtain following results[53], which prove that the Ottoman astrologer got the correct astronomic data for his horoscope:
Sun in ***Pisces,*** Moon in ***Scorpio***, Mercury in **Aries,** Venus in ***Taurus,*** Mars in ***Pisces***, Jupiter in ***Taurus***, Saturn in ***Cancer.***

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in calendars since the 13th century (including the salname1996 of footnote 21), because it resembles sıçırgan, a vulgar insult (something like "shitter"), and preferred to use instead the antiquated "küskü".

[48] O.Turan, *Oniki hayvanlı Türk takvimi*, pp.47-8. This information was given to Biruni, who tapped this unique source to complete his knowledge of Turkish chronology, while staying with Mahmud of Ghazna at the time.

[49] For a very detailed explanation of the structure of this calendar *vid*. O.Turan, *Oniki hayvanlı Türk takvim.*

[50] O.Turan, *op.cit..,* p. 32..

[51] http://www.horoskop.at/home/tipps-und-tests/aszendent-berechnen/

[52] also in takvim1831.

[53] all (except the Moon) checked by Newcomb.com. For the Moon: Burnett, *lunar position spreadsheet*

Apart from the planets four other “bodies” are placed together with their zodiac signs. They are “Head” [ra’s] (in Cancer), “Tail” [dhanab] in Capricorn, “Part of Fortune” [sahm al-saʿāda] in Pisces and “Part of the Occult” [sahm al-ghayb] in Virgo.

“Head” and “Tail” stand for the dragon’s head and tail [Arabic: ra’s al-tinnīn and dhanab al-tinnīn], respectively, which are the nodes or points, where the Moon’s slightly inclined (five degrees) orbital plane intersects with the ecliptic, the plane described by the Sun’s yearly orbit around the Earth in the geocentric world. Both nodes - the “Head”-node (in Western astrology also known as the male node), where the ascending Moon passes from the southern (lower) to the northern (upper) side of the ecliptic, and the “Tail”-node for the descending Moon – lie opposite each other on a circle 180 degrees apart. They do not remain at their position, however. The Moon does not travel around the Earth in a plane that always cuts the ecliptic at the same points, but its orbital plane changes its place slowly backwards, like a wobbling spinning top, making one complete tour through the zodiac in approx.18.6 years (comparable to the similar movement of the Earth axis due to the 'precession of the equinoxes') The invisible nodes are, therefore, behaving somehow like planets, which also move through the zodiac, thereby feeding astrologers’ lore for millennia.[54] In their untiring search for signs from the heavens they conceived these nodes as fictitious planets, which have their own share of planetary influence.[55] This explains why the takvims mention the nodes in the horoscope of the New Year, but also during the year when a planet during his orbit around the earth “meets” such a node, when both are at the same celestial coordinates (see below for a check of these node-days in the calendar).
Suffice here to say that both Moon nodes are correctly placed in the grid (ascending node [ra’s al-tinnīn] with Cancer for New Year 1740 - descending node [dhanab al-tinnīn] with Capricorn at the opposite side of the Moon’s orbit.
While the Moon’s nodes still have a sound astronomical base as the point of intersection between the orbit of the Moon and the ecliptic, the other two “bodies”, the Lot or Part of Fortune [sahm al-saʿāda] and the Part of the Occult [sahm al-ghayb], are only the result of astrological kabala (quite obvious with names like these! [56]). Their position at any time during the day[57], is defined (in degrees) as the distance between Moon and Sun added to the degree of the ascendant, where the zodiac ascends over the Eastern horizon.[58]. More details of this cryptic “science” is found in astrological literature.[59]

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[54] for a good visual demonstration of the movements of the nodes see http://www.astrologyclub.org/articles/nodes/nodes.htm

[55] The nodes as additional planets have even found their way into objects of Islamic art, as in Hartner, “The Vaso Vescovali”. Another example in Indian art is a zodiac design with seven planets and two dragon nodes on a Hindu temple: F.K.Ginzel, *Chronologie,* vol.1, p.87 n.1.

[56] sahm = arrow in the sense of “lot” or “share” could well have its origin in the pre-Islamic game of maysir that used real arrows to draw the lot for the distribution of the parts of a slaughtered animal.

[57] Islamic astrology has different calculations for their position during the day and during the night.

[58] a detailed description including the method for calculating the position of these parts is in al-Bīrūnī, *Kitāb al-tafhīm,* 475 ss.

[59] *e.g.* Abū Maʿ šar ,*Historical Astrology*, vol.1, pp.593-6 and the sources cited in the notes. For a check I used Kemal Milar’s astrological program http://www.astrozoom.com/

ad 5. The exact time of **Nawruz**

بسم الله الرحمن الرحيم

الحمد لله الذي خلق الخلق على غير مثال بعزته وابتدع الأشياء بقدرته
وجعل الليل والنهار والشمس والقمر والنجوم مسخرات بامره وفطر السموات والأرض
والجبال والبحار بعظمته وانما امره اذا اراد شيا ان يقول له كن فيكون الذي
عجزت الملائكة عن علم شي من امره الا ما علم اياهم فتبارك الله احسن الخالقين
والصلوات والسلام على سيد المرسلين محمد خاتم النبيين وعلى آله وصحبه الطيبين
الطاهرين اما بعد عنايت بى غايت ربانى والطاف اعطاف جناب سبحانى برله
تاريخ هجرت خورشيد تابان آسمان رسالتك بيك يوز الى ايكى سنه سى ذو الحجه سينك
بحسب الرؤيه بكرمى بريجى احدكونى طلوع آفتابدن درت ساعت يكرمى ايكى دقيقه
مرور نده نيّر اكبر يعنى شمس ضيا كستر برج حملك اول ثانيه سنه تحويل وانتقال ايدوب
تساوى ليل ونهار ونوروز سلطانى مسرت آثار اولور ان شاء الله تعالى
بو سال سعادت نشان اخيار جهان وعامة ابرار واهل ايمان اوزرينه مبارك
وميمون وخجسته وهمايون اوله خصوصا سلطان سلاطين زمين وزمان
وخاقان اسكندر نشان صاحب التمكين خليفة رسول رب العالمين الواصل
علو قدره الى العليين كهف الملوك والسلاطين ملاذ الفقراء والمساكين
رافع اعلام الشرع المبين سالك مسالك الخلفاء الراشدين غياث الاسلام
والمسلمين قاتل الكفرة والمشركين المؤيد بتأييد رب العالمين المنصور بنصرة
خير الناصرين السلطان ابن السلطان ابن السلطان السلطان الغازى
ابن السلطان مصطفى خان ابن السلطان محمد خان لا زال اشجار دولته مخضرة
وازهار سلطنته محمرة الى آخر الزمان وغاية الاوان امين يا رب العالمين

The exact time of Nawruz, *i.e*. the moment when during 9 March 1740 the Sun arrived exactly at the point of vernal equinox defined as longitude 0° of Aries, is described in these rather florid terms on page two:
"in the 52nd year of the message given by the shining Sun in Heaven (*i.e*. the Prophet[60]) by his Hijra, on Sunday, the 21th day of Dhu 'l-Hijja according to the sighting [of the Moon], four hours and twenty-two minutes after sunrise, when the luminous Sun is in full light, is the first second of [the Sun's] changing and passing into Aries, when there is equality of day and night and Nawruz Sultani as a joy to mankind" [tarih-i hicret-i hurşid taban-i asman risaletin bin yüz elli iki senesi Zilhicce'sinin bi-hasab al-ruya yirmi birinci ahad günü tulu-ı aftab'dan dört saat yirmi iki dakika mururında nayyir ekber yani shams-i ziyagüster burc-ı Hamlın evvel thaniyasi tahvil ve intikal edüp tesavi-i leyl ve nehar Nawruz Sultani meserret asar olur].
If we define the time of sunrise as usual, *i.e*. when the upper rim of the Sun reaches the horizon (6h.10m. local Istanbul time[61]), the equinox as determined by the müneccim occurred at **10h32m** (= sunrise+4h22m).
A computer check gives us **9h23m19s** local Istanbul time (MLT.) instead for the vernal equinox in 1740.[62]
The difference is approx. **1h08m**, which is quite large.

A closer look at the salname1996 could possibly offer an explanation, why the takvim differs so much from the astronomical result. The relatively recent Iranian salname lists several equinox times for Isfahan from which to choose according to the preferred source: *e.g.*13h07m in Ulugh Beg's *zīj vs*. 11h33m18s recorded by the Geophysics Institute.[63]
Apparently the medieval *zīj*es continued to be used by even modern calendar makers, at least in Iran. If we go further and determine equinox in Istanbul in 1740 by delaying it by the same time from the true astronomical data like Ulugh Beg did for Isfahan - assuming that the delay would be approximately the same at this period in both cities - the difference of the true Nawruz to the takvims's date is reduced to only **26m.**
This makes it very probable that our müneccim based his calculation on Ulugh Beg's *zīj*, This assumption is confirmed by the fact that until the end-18thcentury Ulugh Beg had been the main *zīj* authority in Ottoman Turkey.[64]

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[60] that the Prophet is compared in these exalted terms to the shining sun in heaven, is quite surprising as the pure human nature of the Prophet is always stressed in Islam. It is, however, consistent with similarly phrased metaphors used for dating Nawruz (in B.5 above) and a lunar eclipse (see below) where the traditional addition of "Prayer upon him" undoubtedly denotes the Prophet.
[61] U.S.Naval Observatory http://aa.usno.navy.mil/cgi-bib/aa_rstablew2.l
[62] Eagle/Bretagnon/Simon, *Planetary programs*
[63] the wording used by the author of that almanac, a Shiite mullah, clearly shows his regret to have to follow the official time schedule instead of Ulugh Beg's time!
[64] Unat, "Zic", *Islam Ansiklopedisi.* Kurz, *Almanach*, pp.13-15.

B) Detailed Calendar (folio 2 verso to folio 8 verso; here page 1 of folio 2 verso)

محرم الحرام سنه ۱۰۵۳					الاختیارات
شنبه کجه سی جنوبی مرتفع و منجلی کورینه					
نوروز سلطانی	یکشنبه	۲۱	۹	قوس	اصلاح تیر و کمان شرای حیوان
اول موسم بهار	دوشنبه	۲۲	۱۰		عمارت اراضی تعلیم موسیقی
مهر ماه قدیم	سه شنبه	۲۳	۱۱	دلو	محذور
تحویل مریخ بحوت	چهارشنبه	۲۴	۱۲		وضع بنیان حاجت از قضاة و بیران
حرکت اخلاط دمویه	پنجشنبه	۲۵	۱۳		حاجت از علما صحت فقها
حرکت حشرات	جمعه	۲۶	۱۴		سفر و حرکت شرکت و تجارت
اول شرب مسهل	شنبه	۲۷	۱۵	حوت	شرب دوا خرق مجرای ما
تربیع عطارد بزحل	یکشنبه	۲۸	۱۶		ممتزج
محرم الحرام سنه ۱۰۵۳	دوشنبه	۲۹	۱۷		
	سه شنبه	۱	۱۸		ترتیب لشکر اصلاح الات سفر
بهار ۱۲۰ سه ۱۱۰	چهارشنبه	۲	۱۹	حمل	تزویج ابکار غرس اشجار
	پنجشنبه	۳	۲۰		تجارت و شرکت ابتداء کار
طلوع مقدم	جمعه	٤	۲۱	ثور	معالجه و شکار حاجت از کبار
تحویل عطارد بثور	شنبه	٥	۲۲		تحریر نامه تجدید جامه
فریاد عندلیب	یکشنبه	٦	۲۳	جوزا	شکار دریا ریاضت چارپا
تسدیس زهره بزحل	دوشنبه	۷	۲٤		ممتزج
	سه شنبه	۸	۲٥	سرطان	شرای جواهر حاجت از اکابر
	چهارشنبه	۹	۲٦		عقد لوا اساس و بنا
برمودهٔ قبط	پنجشنبه	۱۰	۲۷	اسد	صنعت زرگر شرای جوهر
نوروز خوارزم شاه	جمعه	۱۱	۲۸		تجدید ثیاب مشارکت احباب
تربیع شمس بزحل	شنبه	۱۲	۲۹	سنبله	شرای دواب تعمیر خراب
بهار ۱۳ سه ۱۱	یکشنبه	۱۳	۳۰		ترتیب ادویه لبس جامه
	دوشنبه	۱٤	۳۱	میزان	محرم
	سه شنبه	۱٥	۱		
تحویل زهره بجوزا	چهارشنبه	۱٦	۲	عقرب	
طلوع مؤخر	پنجشنبه	۱۷	۳		شرب دوا علاج مرضی
زیاده شدن آبها	جمعه	۱۸	٤	قوس	شرکت و تجارت حجامت و زینت
بیضهٔ سرخ	شنبه	۱۹	٥		دیدار پادشاه طلب عز و جاه
قران سعدین	یکشنبه	۲۰	٦	جدی	اجرای انهار صید و شکار
تثلیث نحسین	دوشنبه	۲۱	۷		فراغ و عزلت طلب مغفرت

This page as all the others of the main part of the takvim contains astronomical, chronological and meteorological data as well as advice for every day.
No prayer times are listed unlike those in later takvims. The reason must be the still general absence of clocks or watches in 18th century Turkey; only the muezzin could call to prayer.

Choices (Ikhtiyārāt)	zodiac	Rumi	Arabic	Weekday	Muḥarram al-Haram 1153 *Moon sighting: Tuesday night, South, elevated; clear visibility*
repair arrows and bows/ buying animals	Sagittarius	9	21	Sunday	Naurūz Sulṭanī; first day of Spring
cultivation of land/music lessons	Capricorn	10	22	Monday	
forbidden (maḥdhūr)		11	23	Tuesday	'Old' Mihrimāh (Yezdegerd calendar))
building/petition judges and holy men	Aquarius	12	24	Wednesday	**Transition of Mars into Aquarius**; Move of Blood
petition ulamā' /meet jurists		13	25	Thursday	
journey and movement/business and trade	Pi-sces	14	26	Friday	Move of Insects
drink medicine/dig canals		15	27	Saturday	First Drink of Laxatives
intermediate (mumtazij)	Aries	16	28	Sunday	**Square of Mercury with Saturn**
		17	29	Monday	
prepare army/ إصلاح الات سفر = repair voyage tools (weapons?)	Taurus	18	1	Tuesday	Muḥarram al-Haram 1153
give girls in marriage/plant trees		19	2	Wednesday	
business and trade/start work		20	3	Thursday	*Day: 12.5 hours, Night: 11.5 hours*
treatment and hunting/petition important people	Gem	21	4	Friday	**Rise of Muqaddam**
write letter/renew clothes		22	5	Saturday	**Transition of Mercury into Taurus**
شكار دريا = hunting at sea (fishing?)/ رياضت جاريا = punishing slave girl (?)	Cancer	23	6	Sunday	Call of the Nightingale
intermediate (mumtazij)		24	7	Monday	**Sextile of Venus with Saturn**
buy jewellery/petition important people	Leotttt	25	8	Tuesday	
عقد لواء = presentation of banner (?) /foundation and building		26	9	Wednesday	
goldsmith trade/buy jewel		27	10	Thursday	Day of ʿ ʿĀshūrā; **Sharaf of Sun;** Coptic Barmūda; Naurūz Horezmshah
renew clothes/meet friends	Virgo	28	11	Friday	
buy riding animal/repair ruins		29	12	Saturday	
prepare medicine/wear (good) clothes	Libra	30	13	Sunday	**Square of Sun with Saturn**
malefic (nahs)		31	14	Monday	*Day: 13 hours, Night: 11 hours*
		1	15	Tuesday	April (Nisān); **Transition of Venus into Gemini**
	Scorpio	2	16	Wednesday	
drink medicine/treat the sick		3	17	Thursday	**Rise of Muʾakhkhar**
business and trade/cupping and cosmetics	Sagitta-rius	4	18	Friday	
audience with Pādishāh/seek fame and respect		5	19	Saturday	
dig rivers/hunting	Capricorn	6	20	Sunday	"Red Egg" (Beiza-i Sürh); Rise of Waters
relax and retreat/ask forgiveness		7	21	Monday	**Conjunction of Benefic Planets; Trine of Malefic Planets** -

1st column (from right)

1) Astronomical data

a) Relative positions of planets.
Apart from the conjunction [qīrān] already explained in 'A.General section' there are other relations between planets listed in the takvim:
Opposition [muqābala] = planets at 180 degrees apart
Burning [iḥtirāq] = a conjunction of a real planet with the Sun, when it is "burned"
by the Sun. A NASA-video documenting the transit of Mercury across the Sun on 9.5.2016 is a good illustration of such a 'burning'[65]
Trine [tathlīth] = planets 120 degrees apart;
Square [tarbīʿ] = planets 90 degrees apart;
Sextile [tasdīs] = planets 60 degrees apart.

Apart from these planetary positions takvim1740 lists eight conjunctions of a star with a Moon male node [raʾs] or tail node [dhanab] that have been explained in '4. Horoscope for the ascendant of the year in Istanbul' above.
Taking into account that these nodes were considered virtual planets, these occurrences could also be called conjunctions [qīrān] or oppositions [muqābala], respectively, of a real planet with a virtual one, which are shown in table 1 of the annex. According to this table takvim1740 differs from the astronomically correct data in five of eight entries listed

b)Movements/Absolute positions of stars.
b.a.) Planets
Transition [taḥwīl] = The transition of a planet into the next zodiac sign
Apogee [awj] = nearest distance to Earth
Perigee [ḥaḍīḍ] = farthest distance from Earth
Forward movement [istiqāmat] = The moment, when a planet after a period of apparent retrograde movement advances once more on its orbit as seen from the Earth.
Retrograde mouvement [rajʿat] = the moment, when a planet after a period of advancing on its orbit begins an apparent retrograde movement as seen from the Earth.[66]
Exaltation [sharaf] and Dejection/Fall [hubūṭ]
In Islamic astrology these terms denote the place of exaltation for a planet, like its throne, and its opposite place of dejection, respectively. These places are not defined by their highest or lowest position in one of the known astronomical coordinates, as the terms might suggest, but by a certain degree a planet has reached in one of the zodiac signs. Biruni, who does not give any explanation why these degrees ("defined by the Persians and Greeks") had been chosen in particular[67], and Abū Maʿshar[68] list the places of exaltation [sharaf] of the planets (incl. the Moon nodes as virtual planets) as follows:

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[65] http://www.engadget.com/2016/05/10/nasa-mercury-sun-transit-video/
[66] According to a check by http://ephemeris.com/index.html only 6 of the 12 entries in takvim1740 for forward and retrograde movements were astronomically correct, the other half were incorrect.
[67] Albîrûnî,, *Kitab al-tafhim*, no.443.
[68] Abū Maʿšar, *op.cit.*, p.580

Saturn 21° Libra Mercury 15° Virgo Jupiter 15° Cancer Moon 3° Taurus
Mars 28° Capricorn Dragon's Head 3° Gemini Sun 19° Aries Dragon's Tail 3° Sagittarius
Venus 27° Pisces

Takvim1740 lists only two entries for sharaf (corresponding data of an astronomical programme added as a check):

Planet	Takvim1740	Astronomical Programme
Sun	Thursday 27.3.	Friday 28.3 19° Aries 14:04:36
Mercury	Thursday 30.7,/10.8.	Thursday 30.7. 15° Virgo 15:00:00

Apart from the Sun and Mercury only the Moon, another 'planet', had reached its degree of sharaf (3° Taurus) during 1740 - even twice on 18.3.1740 and 3.11.1740. These dates have been omitted in the takvim for unknown reasons.

b.b.Fixed stars
Rise of lunar mansions and associated fixed stars [ţulūʿ]
The lunar mansions and their rising is a phenomenon in need of some explanation.[69] The key concept are the anwāʾ (sing. nawʾ), an Arabic word that would be translated today roughly as storm or (bad) weather, but originally meant the rising of lunar mansions.[70]

The Arabs divided the celestial globe into 28 lunar mansions,[71] several of which belonged to a certain nawʾ associated with a particular weather. Each lunar mansion occupies approx. 12 $^{5/6}$ of the 360° ecliptic, while each of the 12 solar zodiac signs covered 2 $^{1/3}$ mansions. There is a striking parallel of these Moon-related mansions with the traditional concept of the zodiac as the background for the annual movement of the Sun. Yet the Arabs "being illiterate people" according to a sarcastic, yet rather cryptic statement by Biruni, an Iranian full of contempt for the Arabs (although writing in Arabic himself), 'could not recognize (or better*:* compute) the lunar mansions, except by certain marks, visible to the eye' .[72]

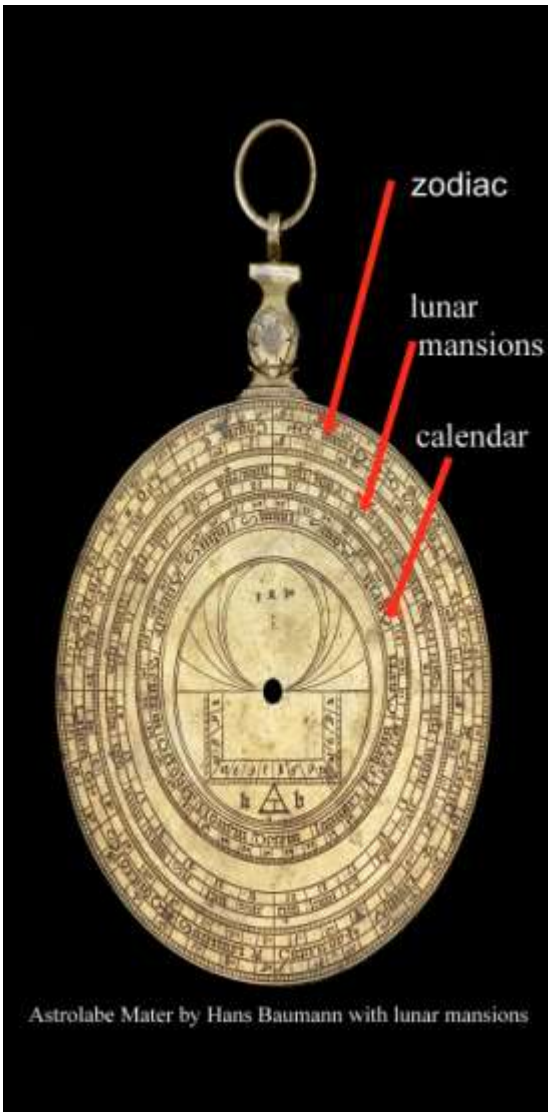
[69] for Moon mansions *vid.* P. Kunitzsch, *Sternnamen*, pp.54-7. and Schmidl, *Volkstümliche Astronomie*, pp. 602-614.

[70] using imaginative etymology, very much *en vogue* with traditional Muslim authors, Biruni traces the word to the Arabic verb nāʿa, meaning "sighing under a heavy burden [like a camel does]", here the burden of raising the lunar mansion. Even a monograph published by the University of Kuwait as late as 2007 (!) repeats the same etymology: al-Zaid, *Raşd al-azmina* , p. 22

[71] other divisions were known as well, like the 27 mansions of the Indians and **the 30 mansions of the** Ancient Egyptians.

[72] Albîrûnî,, Chronology, p..336. About his anti-Arab bias see Sachau's preface p. xiii. More information about Biruni's remarkable combination of praise of Arabic vs. Persian as a scholarly language and contempt of Arabs in general in: Kaveh F.N.*, A Comparative Study,* pp. 173ss.

The lunar mansions rise, when the associated fixed stars first become visible during their so-called heliacal rising above the eastern horizon at dawn, after a period when they were still hidden below the horizon and before the rising Sun prevents their view again. The heliacal rising of fixed stars is changing over longer periods, because the Earth axis moves in a complete circle every 25800 years like the wobbling motion of a spinning top, when some force is exerted from the side (*i.e*. the gravitational force of the Sun, the Moon and to a much lesser degree the planets). The ancient Egyptians based their calendar on the heliacal rising of Sirius and devised a method of telling the time at night by the rising of 36 'decan' stars (one for each 10° segment of the 360° circle of the zodiac/calendar). The Sumerians, the Babylonians, and the ancient Greeks also used the heliacal risings of various stars for the timing of agricultural activities. The elaborate rules of lunar mansions are also known in Western astrology, which even uses the Arabic terms for them. Their "rising" as well as the associated weather phenomena (anwā'), are also recorded by Biruni. Of course his Iranian sense of intellectual superiority does not allow him to give credit to the Arabs, whose terms he used nevertheless, but to the Greek and Indians, who enjoyed his respect.



Astrolabe Mater by Hans Baumann (1490)[73]

Table 2 in the annex records the days in the Julian calendar, when the fixed stars associated with their lunar mansions made their first heliacal rise in that year, *i.e*. became visible on the Eastern horizon. They advance from 989 AD, the year recorded by Biruni, to the takvims of 1740 and 1831 by **7 [or 6] days and 9 days**, respectively. To check this we have to apply two opposite rules:

1. Due to the precession of the Earth axis and calculated in the astronomically correct Gregorian calendar the fixed stars rose - counted from 989 - approx. 11 days later in 1740 and approx. 12 days later in 1831[74].
2. As the Julian year is too long astronomically, all dates obtained in the Gregorian calendar have to be moved back again by approx. one day every 400 years in order to conform to the Julian calendar.

By applying both rules we get the correct advance of Julian dates for table 2, which would be **5 days from 989 to both 1740 and 1831**.

[73] inv.46979©Museum of the History of Science, University of Oxford.

[74] The precession postpones the heliacal rising of fixed stars by approximately 1 day every 71.6 years. Also Kurz interprets the postponement of lunar mansion dates as a result of the precession (idem, *Almanach*, p. 46).

The dates in the late takvim1831 are most probably the correct ones, because they were certainly based on the new tables of Lalande that replaced Ulugh Beg's *zīj*.[75] We have therefore to use them as the base and change the dates in takvim1730 and in Biruni's list accordingly, *i.e.* 2 days later in takvim1740 and even 4 days later in Biruni's list.[76] It thus appears that the mediaeval sources had computed the dates too early.

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2) Holidays

The choice of religious and other memorable dates differs widely in Ottoman calendars. Some include Christian holidays in addition to Islamic feasts, some completely ignore other religions, while some also record Jewish holidays that are left out in other calendars. The republican takvim1938, still authored by a self-styled müneccimbaşı (the office had by then been officially abolished), adds quite a few entries to commemorate Turkish republican national days and victories against the Greeks during the 'war of liberation' in 1921-2. Takvim1895 includes even birthdays of foreign rulers

It was obviously left to the author's own choice, which memorable days to include. It is still remarkable that the takvim1740 published here, which was made for Sultan Mahmud I. and then made into a waqf for the Holy Sites in the Hejaz, devotes so much space to Christian feasts, whose number even exceeds that of Islamic holidays (no Jewish dates are included).

Christian (Julian AD)

Sunday 6.4.1740 [Beiza-i Sürh]

"*The Red Egg.*"

As in takvim1740, takvim1831 and takvim1938 that date coincides with Easter Sunday of the Orthodox Church, it is obviously a synonym for Easter. The takvims do not explain the meaning and the formula for Beiza-i Sürh, however. The strange term is equivalent to modern Turkish yumurta bayramı (egg festival), when the Easter egg is hard-boiled and dyed red to symbolize the blood of Christ.[77]

The Hamburg ruzname, described by Nikolaus Bär,[78] fortunately includes the following definition: "Sunday after the Wednesday following the 15th of the Arabic month that starts in March, is Beiza-i Sürh" [Mart içinde yeni olan arabi ayının on beşinden sonra gelen çarşamba akıbında gelen yekşenbi Beiza-i Sürhdür].

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[75] They had been translated and published by the chief astronomer of the reformer Sultan Mahmud II (1808-1839) in 1814.(*vid.*Ihsanoglu, 'Introduction of Western Science', cited in Kurz, *Almanach*, p.15.). The result for takvim1831 is confirmed by the identical data of takvim1824 (analysed in Kurz, *Almanach*, pp.89-124), because the long term effect of the precession was the same for 1824 and 1831.

[76] As explained by Günzel, *op.cit*., pp.25-28, the visibility of fixed stars during dawn before sunrise at a certain latitude cannot really be timed exactly anyway.

[77] I disagree with Bär&Rettelbach, *op.cit.*, pp.151-2, who propose that Beiza could be a wrong Arabic spelling of Paskalya (Eastern). It is the Ottoman/Persian version of the Arabic word Bayḍā' (= egg) and Hebrew Beitza, the term for a hard-boiled egg used during the Jewish Passah celebration.
in a verbal communication Bora Keskiner told me that the Mevlevis have the tradition that an egg was introduced into the vagina of Mary to check her virginity and that the egg, embarrassed by this outrageous examination, blushed, thereby becoming a beiza-i sürh.

[78] see above footnote 10.

This definition apparently tries to redraft in Ottoman terms[79] the Christian Easter formula confirmed by the Council of Nicaea in 325 AD, *viz.*
"The first Sunday after the first full Moon following the vernal equinox."
As a full Moon is on the 15th of an Islamic lunar month, it seems logical to use the Islamic calendar for defining Easter.

In the randomly chosen 101 years, 1700-1800, that were checked, the Beiza-i Sürh days are with some notable exceptions identical with Easter Sunday of the Greek Orthodox Church,[80] if following criteria are observed:

1. The Islamic day starts at sunset of the day that **precedes** the Christian date that is obtained by conversion programmes. This is because they are based on the later and larger part of the Islamic day (midnight until the following sunset) and not on its start at the previous sunset..
2. Easter is after Wednesday on or following the 15th of the Arabic month, the standard rule in pre-modern societies that included both start and end date in computing time.

These rules are important in years like 1722, 1726, 1729, 1743, 1746, 1749, 1753, when the 15th of the lunar month starting in March is marked as a Thursday in the data conversion programmes. This is however true only for the later part and not for the start at sunset on Wednesday. Therefore in these cases the following Sunday is correctly marked as Beiza-i Sürh, and not Sunday one week later.[81]

The reason for the remaining mistakes appears at a closer examination. The ecclesiastical rule that the full Moon preceding Easter has **to follow the vernal equinox** on 21.3. is absent from the Beiza-i Sürh formula !
The fifteenth of an Islamic month, which starts in the range from 2nd[82] to 5th March, will however necessarily be a date **before the vernal equinox on 21.3.**
It can therefore not be considered as the Easter full Moon, although according to the formula it would be. Example years are 1717, 1736, 1755, and 1774. The true countdown to Easter starts in these cases with the next full Moon one month later.
With a different wording ('...that starts after 5 March...') instead of ('...that starts in March---') the formula would have been correct in these cases as well..
Yet there are even more complications. Ecclesiastic rules going back to the 6th Century AD define Easter as the Sunday following a special Easter full Moon date, the Luna XIV paschalis, which is close to, but not necessarily identical with the astronomical full Moon. For 1756, 1780 and 1800 the Beiza-i Sürh formula wants Easter to be on 7.4. 12.4 and 1.4., respectively (Sunday after full Moon

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[79] The reference to a month in the Julian calendar, which was well known in the Ottoman Empire but much less in other Muslim countries of the mashriq, points to an Ottoman origin of this formula. Also the word "Mart" for March is Turkish.

[80] according P. Yotov's list of Easter dates in http://5ko.free.fr/en/easter.php?y=18.

[81] There is no need, therefore, to change "Wednesday" into "Thursday" in the Beiza-i Sürh formula, as Bär&Rettelbach propose (*op.cit.*, pp.151-2). I disagree also with their opinion that Beiza could be a wrong Arabic spelling of Paskalya (Eastern), as it is certainly a variant of Beitza, the Hebrew term for a hard-boiled egg used during the Jewish Passah celebration.

[82] An Islamic month with max. 30 days starting earlier in March, i.e. on 1 March, would be followed on 31 March by a new Islamic month, which would then start the formula's Easter calculation.

on Wednesday), while it happens that the later Luna XIV paschalis is on these days. Therefore Easter was celebrated on the following Sundays 14.4. 19.4. and 8.4.

That there are seven mistakes in the checked data range from 1700 to 1801 makes the Beiza-i Sürh formula useless. Even one mistake would be one too many for a useful short rule to calculate Easter. I suspect that the author of the Hamburg ruzname created and possibly checked it for a few dates and that it was never applied in reality. Its results would always have needed to be confirmed by the Greek Orthodox church and their Easter tables. .

Friday 1.8.1740 [Evvel Savm-ı Meryem]
"Start of Mariam Fast"
A two week fast, the Dormition Fast, before the Great Feast of the Dormition of the Theotokos (see: Friday 15.8.1740)

Wednesday 6.8.1740 [Îd-i Tecelli Nasâra]
"Feast of Radiance of the Christians" (Transfiguratio Domini)
The feast commemorates the day, when Jesus was transfigured upon Mount Tabor, became 'radiant', was called "Son" by Godfather and spoke with Moses and Elijah, thus being elevated above both prominent prophets of Judaism.[83]
One of the twelve Great Feasts of the Eastern Orthodox liturgical calendar.

Friday 15.8.1740 [Vefat-i Meryem]
"Death of St.Mary"
This day is known in the Roman Catholic Church as "Assumption" and
in the Eastern Orthodox Church as the "Dormition of the Theotokos" (falling asleep of the Mother of God), which is the orthodox Christian version of the "Death of Mariam"..
One of the twelve Great Feasts of the Eastern Orthodox liturgical calendar.

Friday 26.8.1740 [Velâdet-i Meryem]
"Birth of St. Mary"
This date is also listed in takvim1831.
The date universally accepted, also in the Greek Orthodox Church, for the nativity of the Theotokos, the Mother of God, is **8.9.** however, which is also given in takvim1895 and by an anonymous author of one of the five Egyptian calendars published by Charles Pellat[84] as mīlād Maryam wālida ʿĪsā ʿalayhi al-salām.
Another one, the calendar of Ibn Mammātī lists a different date (**2.9)** as mīlād al-sayyida Maryam ʿalayhā al-salām. The other Egyptian calendars do not mention that feast.
The Coptic Orthodox Church celebrates now the birth of St Mary on 1 Bashans (Coptic Era) and the annunciation of her birth on 7 Misra (Coptic Era) that correspond to 26.4 and 31.7. Julian (Old Era) respectively, which is not conform with any of the afore mentioned dates.

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[83] Albîrûnî, *Chronology*, p. 297.
[84] *vid*. C. Pellat, Cinq Calendries Egyptiens, Cairo 1986.

Besides the even greater confusion about the day of Annunciation to St Mary (see below) this is one more example of how even the Christian churches and Christian authors like Ibn Mammātī could not agree on their religious holidays.
One of the twelve Great Feasts of the Eastern Orthodox liturgical calendar.

Saturday 13.9.1740 [Arabic: ʿĪd al-Ṣalīb]
"Feast of the Cross"
Holy Cross Feast (exaltatio sancti crucis). The date marks the dedication of the church of the Holy Sepulchre in 335, which is nine years after St.Helena, the mother of the Roman Emperor Constantine I., rediscovered the true cross during a pilgrimage to Jerusalem. The actual finding was on 13.9, the date mentioned in our takvim and which corresponds to the feast day in the Nestorian church, while the other Christians celebrate one day later on 14.9., when the cross is brought out of the church.[85]
The Egyptian historian Jabarti writes that this feast coincides with the date, when the Sun enters into Libra on 22.9.[86]
One of the twelve Great Feasts of the Eastern Orthodox liturgical calendar.

Monday 1.12.1740 [Îd-i Beṣaret-i Meryem]
"Annunciation to Mary"
This date is also given in the Egyptian calendars published by Charles Pellat (probably others as well)[87],
The generally accepted date in the Western and the Greek Orthodox Churches is **25.3.** , however**,** that tallies biologically with the universally accepted date for Christmas on 25.12.
Ibn Mammātī's calendar furthermore mentions that "the pregnancy of Mary became apparent" [ẓahara ḥaml Maryam], on 5 (Coptic) Ṭūbeh = **31.12**, which would have been the case, when she did not have her period one month after the conception on 1.12. This date makes it perfectly clear that 1.12. was in fact understood in several takvims, including the one under study here, as the day of the Annunciation.
Takvim1831, trying to please both traditions, not only includes Îd-i Beṣaret-i Meryem on **1.12.** but adds another feast with the similar, but more explicit wording of "annunciation of the pregnancy of St. Mary" [Îd-i haml beṣaret-i Meryem] for **5.3.1831**.
Also Maqrīzī manages to include both dates for the same annunciation in his *Khiṭaṭ*.[88]
Takvim1895[89] records even three dates: beṣaret-i haml-ı Meryem "Annunciation of the Pregnancy of Mary" on **25.3.1895** - the generally accepted date -, and haml-i Meryem "Pregnancy of Mary" on **26.11.1895** for the Western church [efrenci] and on **8.12.1895** for the Greek Orthodox church [rumi].

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[85] Albîrûnî, *Chronology*, p. 307.
[86] Jabarti, vol.3, p. 137
[87] *vid*. C. Pellat, *op.cit.* for calendars of following authors: Ibn Mammātī: "bishāra Maryam bi-ʿīsā" on 5 (Coptic) Kiyahk = 1.12. (pp. 28-9); Maqrīzī: "bishāra Maryam bi-ḥaml ʿīsā ʿalayhimā al-salām" on 6 (Coptic) Kiyahk = 2.12. . (pp.108-09) and "ʿīd al-bishāra" on 22 (Coptic) Kiyahk = 18.12..
[88] *Kitāb al-mawāʿiẓ wa ʾl-iʿtibār bi-dhikr al-khiṭaṭ wa ʾl-āthār, vo*l. 1 (Būlāq 1270/1853), p.264: "ʿīd al-bishāra" explained as the annunciation to Mary by the angel Gabriel of her conception with Jesus, on 29 (Coptic) Baramhat = **25.3.** *vs.* p.270: "bishāra Maryam bi-ḥaml ʿĪsā ʿalayhimā al-salām" (Annunciation to Mary of her conception with Jesus) on 6 (Coptic) Kiyahk = **2.12**.!
[89] Mehmet Selaheddin, Hediye-i sal sene kamriyye 1312/13, sene semsiyye 1273/4, Constantinople.

A remotely possible interpretation would be that haml-i Meryem does not mean the day of the Annunciation but a date when she was already visibly pregnant with eight months.
That the Annunciation at the beginning of December would mean that Christ would have been born at the beginning of September, does not seem to have troubled our takvims nor the Egyptian calendars nor for that matter Charles Pellat, who simply records the undeniable fact that the annunciation now "est célébrée le 29 baramhāt = 25 mars."[90]
One explanation for these contradictory dates could be a different tradition in the Eastern (not Greek) churches for the Annunciation to Mary as opposed to the now generally accepted one. In the Nestorian church, where the ecclesiastical year, starting on the first of December, is divided into nine sections (shawūʾa), the first one, which begins on **1st December**, is called the section of the Annunciation[91]. Nestorians formed a sizeable minority in Mesopotamia, therefore their tradition could perhaps explain that date in the almanac. I would like to agree with Kurz, however, who sees the basis for that date in the *zīj* of Ulugh Beg, who also lists 1 December for the day of the annunciation[92]. Nestorian Christians were largely represented in Ulug Beg's Central Asia, and it would confirm once more the importance of that astronomer for even late Ottoman almanacs. There is still no explanation, however, for the Coptic tradition in the work of the Egyptian historian Maqrizi , who died in 1420, *i.e.* four years before Ulugh Beg built his observatory in Samarqand.
Already Biruni reports that while the annunciation date of 25.3. was that of the Melkites (followers of the Byzantine Church), [93] the Nestorians celebrated either on the last Sunday in November or the first Sunday in December.[94] Arguing rationally as usual, Biruni agrees with the Melkites, citing the human nature of Christ who was subject to the laws of childbearing, whereas he reports without further comment the dissident view that the Messiah, differing from mankind, stayed only 25 days in his mother's womb (it could have been 390 days as well, if he had been born on Christmas day of the next year!) or – a completely different argument – that the annunciation may have occurred while Christ had already been conceived.
Even the Jacobite Syrian Church according to one tradition, which is apparently forgotten now, dated the Annunciation on a Sunday in December.[95]
Although Muslim historians and chronologists like Biruni[96] and Maqrīzī[97] must have been quite well informed about Christian feasts, it is not surprising, therefore, that they as well as the Ottoman calendars had some difficulty finding their way in the intricate maze of contradictory Christian traditions, which are not easy to trace even today.

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[90] C.Pellat, *op.cit*., p.28 n.4.
[91] A.S. Atiya, *A History of Eastern Christianity*, University of Notre Dame 1968 (reprint 1980), p. 296.
[92] Kurz, *Almanach*, p.37.
[93] Albîrûnî,, *Chronology*, p. 290.
[94] details in Albîrûnî, *Chronology*, pp..307. According to a table on p. 313 the Sunday of Annunciation could be between 27.11.and 3.12.
[95] 1st Sunday in December: C. Sélis, *Les Syriens orthodoxies et catholiques*, Brussels 1974 (reprint 1988), p. 188; 2nd Sunday before Christmas: A. Baumstark, *Festjahr und Kirchenjahr der Syrischen Jakobiter,* Paderborn 1901, p.169. Albîrûnî, *Chronology*, p. 307, "was told" that the Jacobites celebrate the Annunciation on 10 Nisan of the Jewish calendar (in 1740 AD coinciding with 27.3.), but he adds (p. 312) that not having met a Jacobite Christian he was not acquainted with their system.
[96] Albîrûnî,, *Chronology*, pp. 282-302
[97] Maqrīzī, *op.cit.*, pp. 264-9.

Thursday 25.12.1740 [Şeb Milad-i Isa]
"Night of the Birth of Jesus, Peace be upon Him".
Christmas.
One of the twelve Great Feasts of the Eastern Orthodox liturgical calendar.

Tuesday 6.1.1741 [Arabic: al-Ṣalīb fī ´l-Māʾ]
"The Cross in the Water":
It commemorates the baptism of Jesus (epiphany). In the Orthodox church a priest during an open air ceremony used to toss a cross into the water as a sign for that baptism.

Monday 9.2.1741 [Savm Kebir Nasâra]
"Great Fast of Christians"
"Clean Monday" or "Ash Monday" is the day starting the 40-days Great Lent fasting period (Sundays included) that lasts until Good Friday. Paskha, the Orthodox Eastern, in 1741 fell on Sunday 22.3., a date that confirms the takvim's date for "Ash Monday" as correct.

Muslim (AH)
Thursday 10 Muharram 1153 [Yevm Aşura]
"Day of Ashura"
A holy day for both the Sunna and the Shīʿa, although with different connotations. For the Sunnis it is a day of commended fasting. Traditionally the door of the Kaʿba was opened on that day for visitors.[98]
The 10 Muharram is, however, much more important for the Shīʿa, as on this day in 61AH/680AD their third imam, Ḥusayn b. ʿAlī, had been martyred in the battle of Karbalāʾ, an event celebrated annually in Iran with processions and religious plays. It is remarkable that takvims in mainly Sunni Ottoman Turkey commemorate this event as well.

Tuesday 12 Rabi I. 1153 [Leyle-i Mevlud al-Nabī]
"Birthnight of the Prophet"
This is the date for the Sunnis, while the Shīʿa celebrate on 17 Rabi I.

Friday 1 Rajab 1153 [Leyle-i Regaib]
"Night of Wishes"
A feast particularly popular in Sufi circles in Turkey, where the holy night starting at sunset on Thursday before the first Friday in Rajab, a holy month in general, is celebrated by the Regaibiyye ceremonial, characterized by prayers and the lighting of candles.[99] Leyle-i Regaib is regarded in one popular tradition as the date of marriage of the Prophet's parents. As the Prophet's birthday (see above) is celebrated by Sunnis on 12 Rabi I. the Prophet must consequently have been born eight solar

[98] A.J.Wensinck, "ʿĀshūrāʾ" ,*EI*[2]
[99] M. Uzun, "Regâibiyye", *Islam Ansiklopedisi*, Istanbul 2007.

months after the wedding night - a surprising parallel to the even more mysterious 25 days of pregnancy of Mary according to one of the annunciation dates (see above).[100]
Orthodox Muslims therefore refute the popular tradition of the marriage of the Prophet's parents on that day, in order not to blame Amina, his mother, for pre-marital sex. [bu gece, Peygamber efendimizin babasının evlendiği gece değildir. Böyle söylemek yanlıştır[101]]

Wednesday 27 Rajab 1153 [Leyle-i Mirac al-Nabi]
"Night of Heavenly Journey of the Prophet"
The night, when Prophet Muhammad made a miraculous journey to the Masjid al-Aqşā, which according to an older tradition is a place in Heaven, whereas it is now generally understood to be the mosque carrying this name on the Temple Mount in Jerusalem.[102].

Saturday 15 Shaban 1153 [Leyle-i Berat][103]
"Night of Salvation"
A day when the believers hope for forgiveness and absolution from their sins (Arabic: barāʾa = innocence). According to one tradition it also commemorates the day, when the qibla, the prayer direction, was changed from Jerusalem to Mecca. [104]

Saturday 27 Ramadan 1153 [Leyle-i Kadr]
"Night of Destiny"
The night, when the Koran was revealed (Koran 87:5).[105]

Saturday 9 Dhu l'-Hijja 1153 [Yevm Arafa]
"Day of Arafa"
The day, when the pilgrims stay at Mount Arafat as prescribed in the Hajj ritual.[106]

Sunday 10 Dhu l'-Hijja [Îd-i Adha]
"Feast of Adha"
Also known as the Great Feast (Îd-i Kebir) and in Turkey as Kurban Bayram, the feast that marks the end of the Ḥājj pilgrimage, celebrated by the sacrifice of sheep. The Îd-i Fıtr or Lesser Feast (Îd-i Sagir) that marks the end of the Ramadan fasting is not included in the takvims, however, in spite of being equally popular as a general festival occasion, if not more so than the Kurban Bayram. The reason for this omission could be that the precise date for fast breaking is still primarily defined not by

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[100] *vid.* H.Tekeli, "Regaib Gecesi", *Islam Ansiklopedisi*, Istanbul 2007, with a full account of the traditions concerning this day, including without further comment (just like M.Uzun, *supra*) the story about the conception of the Prophet. Turkish religious websites often relate the marriage of the Prophet's parents in Rajab without further comment. In one instance, however, the author explained the slightly embarrassing birth date by a mistake in dating the marriage that according to him (no source given) was contracted one month earlier, *i.e.* in Jumada I: http://www.bibilgi.com/REGAIB-GECESI. (unfortunately this site, which I have consulted, is no more accessible now, because its domain was sold)
[101] http://www.dinimizislam.com/detay.asp?Aid=2011
[102] B.Schrieke-(J.Horovitz), "Miʿrādj", *EI*[2]
[103] H. Ünal, "Berat Gecesi", *Islam Ansiklopedisi*, vol. 5, Istanbul 1992.
[104] Albîrûnî, *Chronology*, p. 329.
[105] Albîrûnî, *Chronology*, p. 330-1
[106] for more memorable events on this day, vid. Albîrûnî, Chronology, p. 333.

the cyclical calendar or even by astronomical calculations, but by the actual vision of the new crescent Moon (unlike in other months, where this rule is no more observed in practice). It is true that the same rule applies to the beginning as well as to the end of Ramadan that are both defined in the takvims. But whereas a calendar is by definition a collection of dates, the associated feast was perhaps omitted for the sake of orthodoxy.

Other (AH and Julian AD)
Thursday 10 Muharram 1153 27.3.1740 [Nevruz-i Horezmṣah]
While originally all Iranians celebrated Nawruz on the same day, the Iranians of Iran advanced their Nawruz (that had been transferred from the summer solstice to the vernal equinox at a later stage) by five days due to an astronomical correction, whereas Khorezm (Transoxania) kept the old system.[107] According to that tradition the Khorezmian New Year (called Nawsarji in the Khorezmian language) of the takvim should be on the fifth day that followed the Persian Nawruz on 29 Shahrivar 1110 (9.3.1740). After adding these five days, we reach 14.3.1740, but still not the date mentioned in the takvim.
This particular feast is named, however, after a 'Khorezmshah', *i.e.* a particular ruler of Khorezm.[108] Biruni, himself a Khorezmian, mentions in fact a calendar reform made by a Khorezmshah called Abū ʿAbdallāh Muḥammad b. Aḥmad b. ʿIrāq, who reigned from ca. 958 to ca. 975.[109] According to this reform, the "first of Nausarji" should fall on the second[110] (or the third[111]) of the "Syrian Nisan" , a month in the Seleucid calendar. In 1740 this day corresponds to 2.(or 3).4.1740 AD - again not the date given in the takvim.
A closer look at Biruni's works could offer an explanation, however. After Nawruz the Persians celebrated a feast called 'Great Nawruz' **six days later**[112], which the Ottoman takvims could have interpreted (mistakenly?) as the result of the calendar reform. To get to the real Nevruz-i Horezmṣah of the same year six days would have to be deducted, which then brings us to **27.3.1740** - in fact the date given in takvim1740.[113] This interpretation conflicts however with Biruni's explicit statement that the 2.(or 3).4.1740 AD corresponded to the **first** of Nausarji. It is therefore not more than a speculation, however tempting it might be.

It is surprising that late Ottoman takvims[114] remember such an obscure feast that dates back many centuries to an equally obscure Central Asian monarch and that is not mentioned anywhere else. As Biruni's *Chronology of Nations* and his *tafhīm* are as far as I know the only sources mentioning a reform of Nawruz-date by a Khorezmshah, we have to conclude that the 10th century author Biruni was still a reference to the müneccims many centuries later.

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[107] Albîrûnî,, *Chronology* , p 220
[108] similar to the common "Naurūz sulṭanî", a term associated with the Seljuk Sultan Malikshah,who also initiated a calendar reform..
[109] Albîrûnî,, *Chronology* , pp. 229/30
[110] Albîrûnî,, *tafhīm*, no. 320
[111] Albîrûnî,, *Chronology* , pp. 229/30. Biruni is giving a different date here.
[112] Albîrûnî,, *tafhīm*, no. 302; Albîrûnî,, *Chronology*, p. 201.
[113] using the date of the *tafhīm* (footnote 111): 2.4./13.4. 1740 minus six days = *27.3.*29.3./9.4.1740
[114] same entry in takvim1831 and in takvim1895.

Wednesday 23 Muharram 1153 **9.4.1740 [Evvel Sene-i Sevr]** "New Year of Taurus" and Monday 28 Muharram 1153 **14.4.1740 [Aher Sitte-i Sevr]** "Last six of Taurus." These dates mark the first six days after the Sun enters Taurus, the second zodiac sign of the year beginning with the vernal equinox. It is a time of bad weather according to meteorological folklore.

Wednesday, 7 Safar 1153 **23.4.1740 [Ruz Hızr]** "Hızr day" and Sunday, 16 Shaban 1153 **26.10.1740 [Ruz Kasım]** "Kasım day"
The two key seasonal dates in Ottoman calendars are: Ruz Kasım corresponding to St. Demetrius' day and Ruz Hızr corresponding to St.George's day. Ruz Kasım lent its name to the neo-Turkish term 'Kasım' for November, which replaced the old Teşrinievvel. Even in modern Turkish calendars the year is divided into two half-years, Hızr (counting the days from the last Ruz Hızr), and Kasım (counting the days from the last Ruz Kasım).

26 Jumada II 1153 – 7.9.1740 [Hamsa-i Müsteraka Kadim]
"Five (days) 'stolen' from the old (Persian calendar)"
The start of the final period of five leap days (normally known as Endergāh) that is added to the last of the twelve 30-day months of the "old" Persian (Yezdegerd) calendar in order to align it with the solar year. 7.9.1740 is in fact equivalent to 1. Endergah 1109 of the Yezdegerd Era.

Saturday, 27 Ramadan 1153 **6.12.1740 [Evvel Şeb Yelda]** "first night yelda" and
Sunday 6 Shawwal 1153 – **14.12.1740 [Aher Şeb Yelda] "**last night yelda"
Şeb Yelda is originally an Iranian feast day on the eve of the winter solstice, the longest night of the year, to celebrate the return of longer days or their rebirth, as implied by the original Syriac word "yelda" that is derived from the Semitic root "w-l-d" denoting birth.
The takvim, however, mentions a whole festive week between a first and a last day of yelda, with the winter solstice 10.12.1750 being in the middle. The same entries in takvim1831 place the "yelda" period between 6.12. and 15.12, *i.e.* with a start on the same day but lasting one day longer.

Monday 12 Dhu 'l-Qada 1153 **19.1.1741[Evvel Hamsin]**
"start of khamsīn (=50)"
Start of a second (late) winter period, lasting 50 days until the arrival of spring on the vernal equinox on 9.3.1742. The zodiac signs of Capricorn, Aquarius and Pisces (10.12.-8.3) together represent the 90-days winter season.
*
3) Meteorological data
The reason to include meteorological data such as winds, temperature, floods *etc.* in an almanac based on astronomical phenomena that are used for horoscopes and similar predictions is not immediately clear, at least not for a modern reader for whom astronomy does nothing to explain why, for instance, a northern wind starts to blow on a special calendar date. This connection is, however, so well established since early antiquity, that it must be simply taken for granted also in the

takvims[115]. The anwā´, now understood as storms, are anyway related to the lunar mansions as mentioned before.
Biruni, however, characteristically uses the alleged astronomical/meteorological connection for one of his sarcastic anti-Arab comments: "since the Arabs attribute all meteorological changes to the influence of the rising and setting of the stars, in consequence of their ignorance of physical sciences, thinking that all changes of the kind depend on the bodies of the stars and their rising, not upon certain parts of the celestial globe and the Sun's marching therein."[116]
At any rate this clearly affirms once more a common meteorological tradition reaching back from the relatively modern Ottoman almanacs to antiquity.
Just to quote a few examples from takvim1740:

Thursday 21 Rabi II. 1153/**5.6.1740 [Sukut-i Nokta be-Nīl]** "Drop in Nile" and Monday 2 Rabi II. 1153/**16.6.1740 [Ibtida-i Fezune-i Nil]** "Start of Nile Flood"
The first date, known in Egypt as the "Night of the Drop" [layla al-nuqţa], is a fixed day in the Coptic calendar, 11. Ba'una, equivalent in 1740 to 5. June, and marks the day, when a miraculous drop falls into the Nile, causing it to rise. On the second date, three to nine days after the summer solstice, the Nile high waters have reached the southern border of Egypt, thereby starting the flood.[117] This is consistent with the summer solstice date on 10.6.1740 (see below).[118] In the 19th century the rise of the flood was daily proclaimed in the streets of Cairo on and following 27 Ba'una (21.6.).[119]
Takvim1831 also mentions "First flood of Euphrates" on 22.4. in addition to both Nile dates,[120] The high water in both rivers has of course different causes, which Biruni tries to explain, although not very clearly.[121]

Tuesday 26 Rabi I. 1153/**10.6.1740 [Evvel Fasl-i Sayf]**
"Start of Summer" (summer solstice)

Saturday, 30 Rabi I 1153 **14.6.1740** [Arabic: ʾ**Awān Waṣal Waraq]**
"Time of Pruning Leaf" and Sunday 17 l'-Hijja 1153/**22.2.1741** [Arabic: **Ayyām Waṣal Qalam**] "Days of the Pruning Pen"

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[115] Biruni seems to have had some doubts, however: "When the influence of some station has been found out and is known, and nothing happens at its time, people say: the star was empty, or: the Station was empty, i.e. the time of its Nauw' has gone by without there being any rain, or heat, or cold, or wind." (Albiruni, Chronology, p. 339).

[116] Albîrûnî , *Chronology*, in his chapter on lunar mansions, p. 337. In spite of this seemingly rational critique (triggered by his anti-Arab bias) he managed to contradict himself elsewhere by stressing 'the general usefulness [of the science of lunar mansions] for the purpose of prognosticating all meteorological xxxwhich revolve together with the Lunar Mansions'! (ibid, p.335).

[117] Albîrûnî , *Chronology*, p. 258: "People say that …on this date, *i.e.* 16.6., the Nile begins to rise."

[118] F.K.Ginzel, Handbuch der mathematischen und technischen Chronologie – das Zeitrechnungswesen der Völker, vol.1, Leipzig 1906, pp. 154-6.

[119] for the Nile feasts in Egypt see E.W.Lane, *Manners and Customs of the Modern Egyptians*, London 1836 (reprinted 1978), pp. 483-4.

[120] Albîrûnî, *Chronology*, p. 251: Euphrates begins to rise on 24.4.

[121] Albîrûnî, *Chronology*, p. 252.

These days are related to two pruning seasons. Takvim1938 translates the rather cryptic Arabic entries of our takvim into modern Turkish as bağ budama kalem âshısı for 23.2./8.3.1938 and yaprak âshısı zamanı for 13,/26.6.1938 that help to understand their meaning.
A kalem [Arabic: qalam] âshısı is a cutting instrument for grafting [âshı] plants. With the first date, therefore, the pruning of vineyards [bağ] begins. The second date marks the pruning of other leaves [Arabic: waraq; Turkish: yaprak].
The author of takvim1831, obviously having no inkling anymore about the meaning of these agricultural terms, changed waraq into the somehow similar sounding barak and made 14.6. of the Julian calendar the start day for a season of blessings [barak] !

Saturday 6 Jumada I. 1153/19**.7.1740 [Evvel Ayyam-i Bahur]**
"Start of Dog Days" and Saturday 13 Jumada I. 1153/**26.7.1740 [Aher Ayyam-i Bahur]** "End of Dog Days"[122]
Other calendars and almanacs have different dates, but all fall in July and August. The term 'Dog Days' is a translation of the "caniculares dies" of the Romans, a hot weather period from 23.7. to 23.8. that started originally with the heliacal rising of Sirius, the "Dog Star" (the brightest star in canis maior "The Big Dog"),
The takvim mentions a much shorter period, one week only. Biruni, who dates this period in the week 18.7.- 24.7., explicitly refutes the belief held in antiquity that the heat during this period was caused by the great mass of Sirius added to that of the Sun and that the dates should, therefore, have changed according to the change in the heliacal rising of the star. He also makes an attempt to explain the etymology of Bahur without committing himself too much, because he traces the term to either Greek or Syriac or Arabic origin.

Friday, 15. Rajab 1153/**26.9.1740** [Arabic: **Badʿ Suqūṭ al-Awrāq]**
Start of falling of leaves (trees shedding their leaves?)

Monday 12 Dhu l'-Qada 1153/**7.2.1741 [Cemre-i ulâ be-Hava]** "First coal to air", and Saturday 9 Dhu l'-Hijja 1153/**14.2.1741 [Cemre-i saniye be-Âb]** "Second coal to water", and Saturday 16 Dhu l'-Hijja 1153/**21.2.1741 [Cemre-i salise be-Hâk]** "Third coal to earth"
These three days of the coal occur in February with one week apart and are characterised by heat that was believed to affect air, water and earth consecutively.[123] Although according to Biruni rooted in Arab, *viz*. lunar tradition, these weather-related days had to be fixed according to the seasonally correct solar calendar. Biruni once more manages to castigate his usual target, the Arabs, for their "confusion" to remember the exact days for the reoccurrence of the coal dates.[124] Still the three coal days remained an essential item in the relatively modern Ottoman ruznames and takvims.

Thursday 21 Dhu l'-Hijja 1153/**26.2.1741 [Evvel Berd al-Acuz]** "Start of cold of the old woman", and Wednesday 27 Dhu l'-Hijja 1153/**4.3.1741 [Aher Berd al-Acuz]** "End of cold of the old woman"

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[122]Albîrûnî, *Chronology*, p. 259-62
[123] Albîrûnî,, *Chronology,* pp.242-4.
[124] Albîrûnî,, *Chronology.,* pp.243.

Each of these seven days of the “old woman”, a cold and stormy period at the turn of February to March, carries its own Arab name.[125] In this case it was according to Biruni a mathematician in Bukhara, not an Arab of course, who dated the Arab days correctly by fixing them into his own seasonally correct solar calendar.[126] These days also commemorate the seven consecutive nights and eight days, when God destroyed the unbelieving people of ʿĀd and Thamūd..[127] Biruni gives several versions to explain the strange name of the “old woman”.[128]

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[125] Albîrûnî,, *Chronology.,* pp.244.
[126] Albîrûnî,, *Chronology.,* pp.245
[127] Koran, sura LXIX, 4-8.
[128] Albîrûnî,, *Chronology.,* pp.245-6. and ibid, *tafhīm*, no.221: 1.) Only one old woman was spared the fate of her people, the ʿĀd and Thamūd; 2.) :An old woman, thinking it was warm, threw off her garment and perished in the cold; 3.) ʿacuz is only the name for the last part of winter [Arabic ʿajuz = backside” *vs.* Arabic: ʿajūz = old man or woman].. The last seems to be the most probable interpretation.

2nd, 3rd, 4th column (from right)

Arab (AH) and Rumi (AD) calendar
The days of the Rumi calendar (here the Julian calendar) corresponding to the first of the Arab (Hijra) months of 1153 AH in are recorded in these columns.
The Hijra year 1153 is correctly listed as anl intercalary Islamic year of 355 days (as opposed to the normal year of 354 days) in both the takvim and the arithmetic (cyclical) calendar, but the length of individual months in the takvim (also in other takvims) does not follow the strict alternating sequence of 30 and 29 days of the arithmetic calendar and conversion tables.
The takvims apply a set of rules that are obtained by astronomical calculation. This is also reflected in the first row of the calendar pages that include a detailed description of the appearance of the new Moon at each start of a lunar month. According to the sample page above the new Moon will appear on Tuesday, 1st Muharram 1153 in the evening "clearly visible at a southern and elevated position" [serşenbih gecesi cenubi mürtefi ve münceli görüne], a prediction that can only result from astronomically computing the phases of the Moon.[129]

The correct method of calculating in advance the Islamic lunar year is a problem not solved even today in spite of abundant literature devoted to this subject.[130] The discrepancy remains between the orthodox rule of actual sighting of the new Moon, which more often than not happens on different days in the Islamic world, and the astronomic calculations, which are themselves based on different criteria for the visibility of the new crescent.[131]
Table 3 of the annex shows the Rumi = Julian (Old Style) dates corresponding to the first day of the Islamic months in 1740/41 AD according to the takvim itself, the astronomical calculation of the lunation adapted for the location of Istanbul.[132] and the arithmetic (or cyclical) calendar.
The differences of the astronomical to the arithmetic calendar (marked in the table in bold-italic-underlined) show clearly once more that arithmetic calculations are no more and no less than a useful and easily accessible tool for historians with approximate dates that have an error margin of one, sometimes even two days, which can only be corrected, when the weekday is known as well.
It is much more remarkable that there is no difference between our takvim and the astronomical programmes. This is quite noteworthy in view of the divergent opinions regarding the visibility of the new crescent. The takvim mentions for instance in its first row at the start of two months, Shawwal 1153 and Dhu 'l-Hijja 1153, that for the new crescent "[also] hidden visibility possible" [hafî görünmek muhtemildir]. Other astronomical calculations could well have postponed the new month by one day in these cases.

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129 *vid*. similar Moon visibility predictions in fig.2 of D.A.King, "Science in the service of religion: the case of Islam", in: D.A.King,, *Astronomy in the Service of Islam*, Aldershot/UK 1993, p. 249..

130 A summary of these problems can be found at: http://www.moonsighting.com/globalcalendar.html.

131 *vid*. M. Ilyas, *A Modern Guide to Astronomical Calculations of Islamic Calendar Times & Qibla,* Kuala Lumpur 1984, pp. 82ss. for a detailed explanation of the Islamic lunar month and the problems to define the visibility of a new crescent. .

132 Polsen, *Mathematik alpha 2016.* (look under *>Physik>Sonne und Mond>Mondphasenkalender*.) I have also used Monzur Ahmed's moonc60.exe, a free MS-DOS program, that could be downloaded from http://ummah.net/ildl/mooncalc.html, but the site is unfortunately no more available.. Both reach the same results that prove the takvim's dates to be astronomically correct.

5th column (from right)

Zodiac [burūj]

The fifth column from right is entitled zodiac [al-burūj]. It might seem strange at first that Sagittarius is mentioned as the zodiac sign for Nawruz, while that date is defined as the moment when the Sun enters Aries. As only two (sometimes three) days correspond to each of the twelve zodiac signs, the planet in this case must move much faster than the Sun, which travels from one zodiac sign to the next one only once every month. This fast moving "planet" is the Moon that revolves around the earth in less than 30 days while the Sun's orbit (in geocentric terms) takes more than 12 times longer. The Moon therefore appears in (or better: in front of) the zodiac signs in a much quicker sequence.

The first days of the Moon in **Taurus** during 1153 AH as defined in the zodiac column of the almanac shall serve for a clearer and more detailed explanation[133]:

1) 1 Muharram 1153	**7)** 17 Jumada II 1153
2) 29 Muharram 1153	**8)** 15 Rajab 1153
3) 26 Safar 1153	**9)** 13 Shaban 1153
4) 24 Rabi I 1153	**10)**10 Ramadan 1153
5) 22 Rabi II 1153	**11)** 9 Shawwal 1153
6) 20 Jumada I 1153	**12)** 6 Dhu'l-Qa'da 1153
13) 4 Dhu'l-Hijja 1153	

From the first appearance of the Moon in (in front of) Taurus on 1 Muharram 1153 until its 13th time on 4 Dhu l-Hijja 1153 it had travelled twelve times through the zodiac belt, with its position changing at similar intervals among the other eleven signs during the rest of the year. This cyclical period amounts to 327 days, which is 27 days less than the 354 days of the normal Islamic lunar year.

The difference is easily explained. A lunar month according to the Islamic calendar is the time between one new crescent to the next one, in other words the time between identical phases of the Moon as seen from the Earth. During this period the Moon has not only to complete one full orbit of 360° around the earth as measured in relation to the fixed stars or the zodiac. In the meantime the Earth moves as well, and for the same Moon phase to be visible from the Earth the Moon has to travel further to make up for the difference[134]. Twelve such periods, known as synodic months, complete the common Islamic year of 354 days[135], whereas twelve of the zodiac-related shorter Moon orbits – the so-called sidereal months – take only 327 days to complete.[136] This effect is mirrored in the zodiac column where the same zodiac reappears always two or three days earlier in the Islamic (synodic) months.

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[133] The dates in the takvim have been checked as correct by using the ephemeris programme of E.Myles Standish: http://www.ephemeris.com/ephemeris.php

[134] The same phenomenon could be explained in geocentric terms as follows: the new crescent appears later because the Sun has advanced on its orbit around the Earth.

[135] exactly: 354 days, 4 hours, 24 minutes

[136] exactly: 327days, 10hours, 19minutes.

6th column (from right)

Advice [Ikhtiyārāt]

This column shows days suitable for a certain activity, written in rhyme form.

The advice as such is astrological humbug and can, therefore, safely be ignored.[137]

Another completely different matter with some importance for cultural history is whether they follow an established set of rules that are consistent with entries in other calendars or data tables. Religious commands like Ramadan fasting for the Muslims and pre-Easter fasting for Christians can only be dated precisely, because they emanate from an orthodox and generally acknowledged authority, such as the Koran and the Sunna for Muslims and the Bible and the rules established by councils like the Council of Nicaea for Christians. The question is, therefore: does a similar orthodox and generally accepted canon exist in Islamic astrology, which must then be reflected in the choices [Ikhtiyārāt] of the takvim?

According to Hofelich[138] the ikhtiyārāt depend on the position of the Moon in the zodiacal sign, whereas Nallino mentions both zodiac and lunar mansion as criteria[139].

This is definitely not the case in the takvims mentioned here, however.

In the sample page 1 of verso 2 the following disparate advice is offered for the rise of Muqaddam in takvim1740: "medical treatment & hunting - petition to important people" [mu`ālaja ve shikār - ḥāja az kibār] and in takvim1831 we have: "ghalqa ve al-nasīt (?) - digging of well and river" [ḥafr bi´r ve nihār].

For the rise of Mu'akhkar we find in takvim1740 "drinking medicin - treatment of the sick"[shurb dawā ve `ilāj marḍā], whereas takvim1831 advises "petition to (important) people"[ḥaja az rijāl].

For dates, when the Moon is in Capricorn, takvim1740 gives following advice: "cultivation of land – teaching of music" (10..3.1740); "forbidden" (11.3.1740); "digging of rivers – fishing and hunting" (6.4.1740); "resting and retreat – asking forgiveness" (7.4.1740).

Navoni has listed 24 days of the Islamic calendar (two for each month) in his description of a ruzname as days of "mauvais augure" [eyyam-i nahisat] in his ruzname.[140] Yet table 4 of the annex shows clearly that both takvim1740 and takvim1831 completely ignore the ruznames' warnings. Takvim1895 no more even includes the 'choices'. although its frequent records of planetary positions still must have an astrological meaning.

Other records of lucky, unlucky or mixed days, like the Persian list in Biruni[141] are not reflected either in the 'choices' of the ruznames or takvims.

The discrepancies are very obvious also in takvim1831 with no unlucky, but a considerable number of lucky and mixed days. The choices in our takvim1740 pay no attention to the unlucky days of the ruznames either.

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[137] When the influence of some station has been found out and is known, and nothing happens at its time, people say: the star was empty, or: the Station was empty, i.e. the time of its Nauw' has gone by without there being any rain, or heat, or cold, or wind. (Albiruni, Chronology, p. 339).

[138] M.Hofelich, "Taḳwīm"

[139] Nallino, "Astrology",

[140] Table G of Navoni, *op.cit.*

[141] Albîrûnî,, *Chronology*, p. 218.

Being all in verse form and often quite difficult to translate, they seem to be chosen more for rhyming sake than for their practical use. It is hard to believe that even an author, whose astrological credo implies the existence of beneficial and unlucky days, could have taken the choice for *e.g.* 15.3.1740 “to drink medicine and dig channels” very seriously. I only included the column ‘choices’ in the sample page for completion sake.

There is no evidence therefore for a consistent and generally accepted system of the ikhtiyārāt[142]. These entries and the synopsis in table 4 of the annex make it quite clear that astrology could not establish commonly accepted rules for defining these dates. It has no generally recognized canon or book of authority, unlike religions, and remains very much the domain of individual astrologers, whose advice and prognostics tend to be widely divergent.

[142] in spite of this astrologers seem to agree that their 'advice' is based on lunar mansions. *e.g* V.Robson, lhttp://www.constellationsofwords.com/stars/MooornMansions.htm, an opinion that both Hofelich and Nallino apparently adopted without further checks.

C. Partial lunar eclipse

يكشنبه كجه سى جنونى روشن وبلند كورينه					
اخر بزد العجوز تثليث سعدين	چهارشنبه	٢٧	٤	دلو	طلب حاجت بنا وعمارت
	پنجشنبه	٢٨	٥		اصلاح الات شراى دواب
	جمعه	٢٩	٦		ممتزج
	شنبه	٣٠	٧		
تربيع عطارد بمريخ	يكشنبه	١	٨		ابتداء اعمال رجاى مرام
تحويل شمس بحمل	دوشنبه	٢	٩	ثور	تزويج زنان استماع الحان

الاختيارات

صورة الخسوف الجزئى

حكم خالق كون ومكان وامر صانع زمين وآسمان برله تاريخ هجرت سلطان جهان عليه من الصلوات اتمها ومن التسليمات اكملها حسب تقرينك بيك يوز الى اوج سنه سى شوالينك اون دردنجى دوشنبه كجه سى غروبدن يدى ساعت واون اوج دقيقه مرورنده ماه منيرتقدير اصبع برج سرطانده انخساف آغاز وسكز ساعت قرق اوج دقيقه ده اون ايكى اصبع تقديرا ولنان جرم قمردن يدى اصبع مقدارى منخسف اولوب وسط خسوف اوله ودر عقب انجلايه باشليوب اون ساعت واون اوج دقيقه مرورنده بالكليه منجلى اوله ذلك تقدير العزيز العليم

The takvim predicts on its last page[143] in its typical exalted language a partial lunar eclipse:

> "In the 1153rd year of the Hijra of His Presence, the Lord of the World - the most complete prayers and most perfect benedictions for Him -, on Monday, 14 Shawwal, in the evening, seven hours and 13 minutes after sunset, is the beginning of an eclipse of the shining Moon at his ascending node in Cancer. At eight hours and 43 minutes is the middle of the eclipse reaching seven digits (fingers) of the Moon's diameter of twelve digits (*i.e. 7/12th partial eclipse*). After that its [the Moon's] shine starts to increase [again], attaining full light when 10 hours and 13 minutes have passed. As ordained by the Most Exalted, the Omniscient." [birle tarih hicret Sultan-ı Cihan ʿalayhi min al-ṣalawāt atammuhā ve min al-taslimāt akmaluhā hazretlerinin yüz elli üç senesi şevvalinin on dördüncü düşembeh gecesi gurub'dan yedi saat ve on üç dakika mururında mah munir ukde-i ras'ta burc seratan'da inhisaf âghaz ve sekiz saat kırk üç dakika'da on iki asbu takdiran olunan carm-ı kamar'dan yedi asbu mıkdarı münhasif olup vasat-ı husuf ola ve der akab incilaye başlayıp on saat ve on üç dakika mururıinda biʿl-kulliye münceli olur. Dhālika taqdīr al-ʿAzīz al-ʿAlīm]

A check of these data gives us the following results:

According to a NASA table of lunar eclipses a partial lunar eclipse that was visible in most of Africa and Asia, including Turkey, happened on Sunday, 21.December 1740 OE/1.January 1741NE with its greatest extent at 23h47m06s GMT lasting 164.6 minutes[144]. Adding one hour and 56 minutes for the difference in local time between Greenwich and Istanbul[145], the eclipse was seen in Istanbul according to NASA on **Monday, 22.December 1740 OE at approx. 1.43 a.m**. at its greatest extent.

The takvims's Hijra date has to be converted into the Julian (Old Era) calendar in order to check its conformity with the NASA data. 14 Shawwal 1153 began at sunset of Sunday, 21.12.1741. On that date the Sun set in Istanbul at 16.42 pm local time. If we add the 8 hours and 43 minutes elapsed after sunset according to the takvim, the eclipse would have attained its greatest extent on **Monday, 22.December 1740 OE at 1.25 a.m.**

The difference to the NASA calculation is, therefore, only 18 minutes, which seems to be acceptable, considering the fact that the criteria for timing the sunset and the eclipse in an Ottoman almanac of 1740/41AD (or in Ulug Beg's *zīj*) could well have been slightly different from the NASA parameters.

The extent of the partial eclipse is nearly the same for both NASA ***(0.5621***) and the takvim (7/12 = ***0.5833***), especially if the takvim measured the eclipse by drawing a straight line across the Moon at 7/12th of its diameter, not taking into account the concavity of the eclipse's base line which leaves a curved section uncovered by the eclipse.

A lunar eclipse happens when the Earth obstructs the light of the Sun by casting a shadow on the Moon, which at this time is on an axis Sun-Earth-Moon, *i.e.* at 180° or in terms of Right Ascension at 12h from the Sun. At the time of the eclipse the Sun was at RA 18h51m7s, placing it into Capricorn. Therefore, the Moon was in fact in Cancer.

The duration of the eclipse according to NASA was approx. **165 minutes** and according to the takvim ***180 minutes***.

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[143] This position at the end of the takvim is consistent with a statement in Albîrûnî,, *Kitāb al-tafhīm*, no. 321 that an eclipse, with its implication of unpleasant things [ghayr maḥmūda] , should only be mentioned at the end..

[144] http://eclipse.gsfc.nasa.gov/LEcat5/LE1701-1800.html

[145] longitude of Istanbul: 28°58'46.3080'' E

The takvim's prediction of the lunar eclipse is correct therefore, diverging only to a slight degree from the modern NASA tables.

*

Conclusion

The astronomical data of takvim1740 are to a considerable degree confirmed by modern astronomy programmes, although some mistakes remain. They are witness to the advanced scholarship of Islamic mediaeval astronomers like Ulugh Beg, which the müneccims probably relied upon. That they made use of that medieval science and not of Western astronomy shows the resilience of the Ottoman calendar makers still at a time, when scientific progress in other fields had already become a Western monopoly. The mediaeval connection is furthermore proven by the clear influence of Biruni on some of the takvim's data.

The lunar Islamic calendar together with the Prophet's interdiction of nasī', the intercalation to adapt it to the seasons, was certainly a handicap for chronologists, which they managed however to overcome to some extent, as proven by the takvim. -

Quite remarkable is the importance given to Christian holidays, the number of which exceeds even that of Muslim holidays. The fact that the takvims even found a purely Muslim (if somehow deficient) rule for defining Easter in the Beiza-i Sürh formula is proof once more of the openness of the Ottoman society. The confusion about dating Christian feasts on the other hand is certainly due to divergent views within the Christian churches themselves that are quite considerable, and not to ignorance of the Muslim müneccims, who finally had to choose one of several dates offered by the Christian communities.

Of course, the astrological nonsense related to natural phenomena and to human fate seems absurd to the modern observer. Following Ptolemy astrology was however considered a science in the Ottoman world, although no common canon is apparent. Even a rational thinker like Biruni seems to have believed that human fate was influenced by the stars, and his doubts about the a stellar influence on the weather are invariably combined with sarcastic remarks about the Arabs. He had no problem in accepting the same ideas when an Arab origin was not apparent. The following quote from him may serve as a fitting example, how astrologers (and probably Biruni himself) reconcile absence of proof with strong belief in theory:

> "When the influence of some [lunar] Station has been found out and is known, and nothing happens at its time, people say: the star was empty, or: the Station was empty, i.e. the time of its Nau' has gone without there being any rain, or heat, or cold, or wind."[146]

The takvim shows that the quite advanced astronomical science in the Muslim world was mainly used for astrology and to draw horoscopes. We should always be aware, however, that astrology is not only common in pre-modern Ottoman almanacs, but even in our own 'enlightened' society as well, with horoscopes published in modern newspapers and the quite common and even increasing fascination with everything esoteric.

[146] Biruni, *Chronology*, p.339.

Annex

table 1 (planets with a node)

Planet with Node	Date AH (Takvim)	Date AD (Takvim)	Date AD (Astronomical)[147]	RA Planet	RA Node
Venus with Head	Mo 26 Safar 1153	***Mo 12. 5.1740***	***Sa 10.5.1740*** 17:30 LMT	7h04m39s	7h04m39s
Mercury with Head	Sa 7 Rabi II 1153	***Sa 21.6..1740***	***Fr 22.6.1740*** 03:45 LMT	7h00m46s	7h00m46s
Sun with Head	We 11 Rabi II 1153	We 25.6.1740	We 25.6.1740 23:20 LMT	7h04m45s	7h04m45s
Jupiter with Head	We 6 Rajab 1153	***We 17.9.1740***	***Fr 19.9.1740*** 22:07:15 LMT	6h42m00s	6h42m00s
Sun with Tail	Mo 7 Shawwal 1153	Mo 15.12.1740	Mo 5.12.1740 04:45 LMT	18h20m45	6h20m45
Jupiter with Head	So 20 Shawwal 1153	***So 28.12.1740***	***Th 25.12.1740*** 05:27 LMT	6h20m38s	6h20m38s
Mercury with Tail	We 30 Shawwal 1153	We 7.1.1741	We 7.1.1741 02:45 LMT	18h20m24s	6h20m24s
Venus with Tail	Fr 9 Dhu'l-Qa'da 1153	***Fr 16.1.1741***	***Sa 17.1.1741*** 03:40 LMT	18h19m34s	06h19m34s

The entries in the two columns 'Date AD' marked in bold/italic/underline show where takvim1740 differs from the astronomical correct data.

[147] http://ephemeris.com/goto.php.

table 2 heliacal rising of stars (lunar mansions)

Stars	Biruni 989 AD[148]	takvim 1740/41 AD	takvim 1831/32 AD	Associated zodiac [149]
(Saʿd al-) Akhbiya	1.3.989	not included	10.3.1831	Aquarius
Muqaddam	14.3.989	21.3.1740	23.3.1831	Pegasus
Muʾakhkhar	27.3.989	3.4.1740	5.4.1831	Pegasus+Andromeda
Baţn al-Ḥūt/Rishā[150]	9.4.989	16.4.1740	18.4.1831	Andromeda
Sharaţayn	22.4.989	29.4.1740	1.5.1831	Aries
Buţayn	5.5.989	12.5.1740	14.5.1831	Aries
Thurayyā	18.5.989	25.5.1740	27.5.1831	Taurus
Dabarān	31.5.989	7.6.1740	9.6.1831	Taurus
Haqʿa	13.6.989	20.6.1740	22.6.1831	Orion
Hanʿa	26.6.989	3.7.1740	5.7.1831	Gemini
Dhirāʿ	9.7.989	16.7.1740	18.7.1831	Gemini
Nathra	22.7.989	29.7.1740	31.7.1831	Cancer
Ţarafa	4.8.989	11.8.1740	13.8.1831	Cancer + Leo
Jabha	17.8.989	24.8.1740	26.8.1831	Leo
Zubra	31.8.989	6.9.1740	8.9.1831	Leo
Şarfa	13.9.989	19.9.1740	21.9.1831	Leo
ʿAwwā	26.9.989	2.10.1740	4.10.1831	Virgo
Simāk	9.10.989	15.10.1740	17.10.1831	Virgo
Ghafr	22.10.9**89**	29.10.1740	31.10.1831	Virgo
Zubāna	4.11.989	11.11.1740	13.11.1831	Libra
Iklīl	17.11.989	24.11.1740	26.11.1831	Scorpio
Qalb	30.11.989	7.12.1740	9.12.1831	Scorpio
Shaula	13.12.989	20.12.1740	22.12.1831	Scorpio
Naʿāyim	26.12.989	2.1.1741	4.1.1832	Sagittarius
Balda	8.1.990	15.1.1741	17.1.1832	Sagittarius
(Saʿd al-) Dhābiḥ	21.1.990	28.1.1741	30.1.1832	Capricorn
(Saʿd al-) Bulaʿ	3.2.990	10.2..1741	12.2.1832	Aquarius
(Saʿd al-) Suʿūd	16.2.990	23.2.1741	25.2.1832	Aquarius + Capricorn

[148] His table is made for the year 1300 of the Era Alexander, *i.e.* of the Seleucid calendar, that corresponds to 989 AD, Albîrûnî,, *Chronology*., p. 352.

[149] According to Kunitzsch, *Sternnamen*, pp.55-6 and F.K.Ginzel, *Handbuch*, vol.1,

[150] Both names (Rishā in the takvims; Baṭn al-Ḥūt in Biruni) mean the same lunar mansion: Kunitzsch, *Sternnamen*, p.135. For a detailed description of the Muslim lunar mansions see also ibid., *Untersuchungen zur Sternennomenklatur der Araber,* Wiesbaden 1961.

table 3 (Islamic dates > Julian dates)

takvim (Hijra)	takvim (Julian)	astronomical	arithmetic
1 Muharram 1153	Tuesday, 18..3.1740	Tuesday, 18..3.1740	Tuesday, 18..3.1740
1 Safar 1153	Thursday, 17..4.1740	Thursday, 17.4.1740	Thursday, 17..4.1740
1 Rabi’ I. 1153	Friday, 16..5.1740	Friday, 16..5.1740	Friday, 16..5.1740
1 Rabi’ II.1153	Sunday, 15..6.1740	Sunday, 15.6.1740	Sunday, 15.6.1740
1 Jumada I. 1153	Monday, 14.7.1740	Monday, 14.7.1740	Monday, 14.7.1740
1 Jumada II. 1153	Wednesday,13.8.1740	Wednesday,13.8.1740	Wednesday,13.8.1740
1 Rajab 1153	Friday,12.9.1740	Friday,12.9.1740	Thursday 11.9.1740
1 Sha’ban 1153	Saturday, 11.10.1740	Saturday, 11.10.1740	Saturday, 11.10.1740
1 Ramadan 1153	Monday, 10.11.1740	Monday, 10.11.1740	Sunday, 9.11.1740
1 Shawwal 1153	Tuesday, 9.12.1740	Tuesday, 9.12.1740	Tuesday, 9.12.1740
1 Dhu l’-Qa’da 1153	Thursday, 8.1.1741	Thursday, 8.1.1741	Wednesday, 7..1.1741
1 Dhu l‘-Hijja 1153	Friday, 6..2.1741	Friday, 6.2.1741	Friday, 6.2.1741
1 Muharram 1154	Sunday, 8.3.1741	Sunday, 8.3.1741	Sunday, 8.3.1741

table 4 (choices)

unlucky days in Navoni's Ruzname	choices in Takvim1740	choices in Takvim1831
3 **&** 7 Muharram	trade, commerce, profit **& mixed**	**lucky/**pursuit of profit and wishes
2**/**20 Safar	marriage making, company**/**meeting saints, building castles and countries	mixed**/**mixed
4**/**15 Rabi' I.	Uqd imarat,ibtida' wa mubasharat**/**buying dawab, meeting friends	appeal to judges**/**recite Koran
1**/**2 Rabi' II.	organising kingdom, policy making**/forbidden**	**lucky/**arrange order in house
1**/**5 Jumada I.	serving the sultan, asking favours/buying slaves, repair musical instruments	build fountain**/**sell jewels
1**/**14 Jumada II.	repose and retreat, asking absolution and forgiveness/prayer, help, good favours	**mixed/**listen to advice
9**/**11 Rajab	**mixed**/travel, trade, sea journey, company	study poetry**/**start organise things
2**/**15 Shaban	buy animals, appeal to saints/new clothes, reading book, ask favours from judges and saints	hunt birds**/**appeal to eremites
1**/**15 Ramadan	reciting Koran, buying birds/riding, travel, profit making	lucky/mixed
4**/**20 Shawwal	buying jewellery, company, travel/making weapons, appeal to scholars	build solid building**/**audience of kings
3**/**6 Dhu 'l-Qada	trade, travel, buying jewellery, arrange instruments, buy riding animals/make cap and belt, beware of travel	**mixed/**body cosmetics
2**/**25 Dhu 'l-Hijja	travel, marriage, appeal to nobles/appeal to scholars; company of jurists	**lucky/**pleasure and joy

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