

# Al-Sūfī's Book of the Images of the Fixed Stars and its Influence on Islamic and European Celestial Cartography

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## Biographical Sketch of al-Sūfī

Abū al-Husayn ‘Abd al-Rahmān ibn ‘Umar al-Sūfī was born in Rayy (near Tehrān) on 7 December 903 [14 Muharram 291 AH] and died in Baghdād on 25 May 986 [13 Muharram 376 AH].

Al-Sūfī wrote on astrology, astronomy, alchemy and mathematics.

His best-known work is the *Kitāb Suwar al-Kawākib al-Thābitah* (“Book of the Images of the Fixed Stars”) which he completed in Shīrāz around 964.

Originally written in Arabic, it was later translated into Persian and also into Latin.

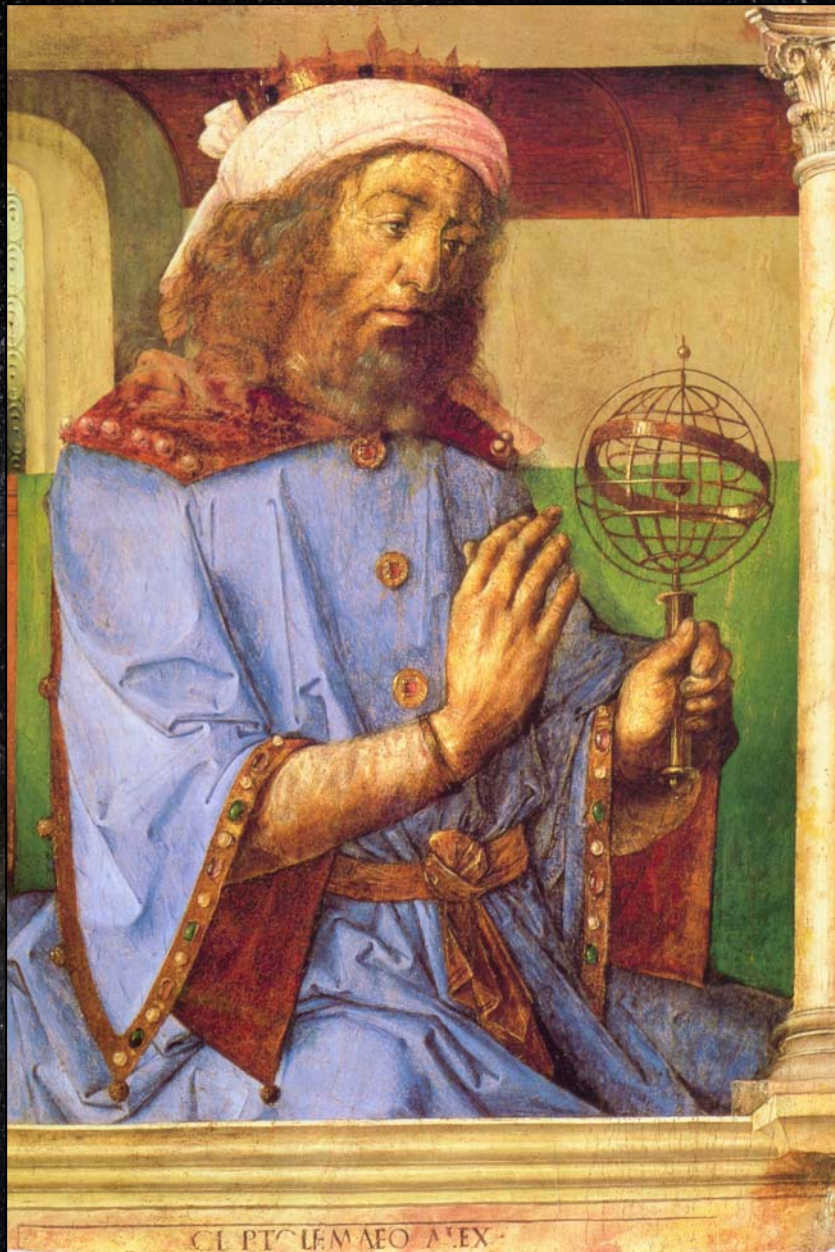
He also wrote a comprehensive treatise on the astrolabe in 1760 chapters which only survives in a shortened version in 170 chapters.

The lunar crater Azophi and the minor planet 12621 Alsufi commemorate his achievements in astronomy.



Detail from Albrecht Durer's woodcut map *Imagines coeli Septentrionales cum duodecim imaginibus zodiaci* (1515)





CL PTOLEMAEO ALEX

Oil on poplar panel attributed to Joos van Wassenhove (c. 1475) for the *studiolo* of Federico II da Montefeltro in the Ducal Palace of Urbino (now in the Louvre, Paris)

# The Star Catalogue of Claudius Ptolemy of Alexandria (c. 150 CE)

## *Almagest*, books VII & VIII

Contains 1028 stars, of which three are duplicate entries, divided into 48 separate constellations. Five stars are listed as 'nebulous' and six stars are listed as 'reddish'. Adopts the magnitude scale of Hipparchus of Nicaea (c. 130 BCE)

### Ecliptic coordinate system

Mean deviation in latitude: 0.3°

Mean deviation in longitude: 0.3°

Systematic deviation in longitude: 1.0°

Epoch: 1 Thoth, 885 Nabonassar [= 20 July 137 CE]

Ptolemy assumed a constant rate of precession amounting to 1.0° per century



# The 48 Constellations of Claudius Ptolemy

## North of the ecliptic

1. Ursa Minor
2. Ursa Major
3. Draco
4. Cepheus
5. Bootes
6. Corona Borealis
7. Hercules
8. Lyra
9. Cygnus
10. Cassiopeia
11. Perseus
12. Auriga
13. Ophiuchus
14. Serpens
15. Sagitta
16. Aquila (+*Antinous*)
17. Delphinus
18. Equuleus
19. Pegasus
20. Andromeda
21. Triangulum

## Zodiacal constellations

22. Aries
23. Taurus
24. Gemini
25. Cancer
26. Leo (+ *Coma Berenices*)
27. Virgo
28. Libra
29. Scorpius
30. Sagittarius
31. Capricornus
32. Aquarius
33. Pisces

## South of the ecliptic

34. Cetus
35. Orion
36. Eridanus
37. Lepus
38. Canis Major
39. Canis Minor
40. Argo Navis
41. Hydra
42. Crater
43. Corvus
44. Centaurus
45. Lupus
46. Ara
47. Corona Australis
48. Piscis Austrinus



# The Star Atlas of al-Sūfī

The work was dedicated to the Buyid ruler Abū Shujā' Fannā Khusraw, entitled 'Adud al-Dawla (936-983), who was a friend and a pupil of al-Sūfī and whose court was seated at Shīrāz (until 977/78) and Baghdād

Epoch star catalogue: 1276 Alexander [1 October 964] = *Almagest* longitudes + 12° 42'

Al-Sūfī adopted a precession constant of 1° in 66 years

For many stars al-Sūfī provided improved magnitude estimates and for a few notable stars he noted its colour

Eight Ptolemaic stars could not be identified by al-Sūfī and were omitted from the catalogue:

- the 14<sup>th</sup> star of Auriga
- the 11<sup>th</sup> star of Lupus
- the six 'unformed' stars of Piscis Austrinus

Each constellation description was augmented by a mirrored pair of star maps, as viewed in the sky and as viewed on a celestial globe

In addition, al-Sūfī added information on pre-Islamic sky lore and many additional stars, not listed in Ptolemy's *Almagest*, including:

- nebulous star above the 14<sup>th</sup> star of Andromeda [= Andromeda Spiral Nebula]
- a small cloud in Aquila = Brocchi's Cluster, Collinder 399 or the Coat Hanger
- nebulous star above the 37<sup>th</sup> star of Argo Navis = Omicron Velorum Cluster [IC 2391]

In some of the manuscripts the additional stars are also plotted in another colour



# Known Manuscripts of al-Sūfī's Star Atlas

## Arabic text

10 Istanbul

8 Paris

6 Tehran

5 London

4 Berlin, Cairo

3 Oxford, Princeton, St. Petersburg

2 Copenhagen, Dublin, Mosul, Tunis

1 Bologna, Doha, Escorial, Geneva, Hyderabad, Leiden, New York, Rampur, Strasbourg, Uppsala, Vatican City, Washington

## Persian translation

3 Paris

2 Cairo, Dublin, New York

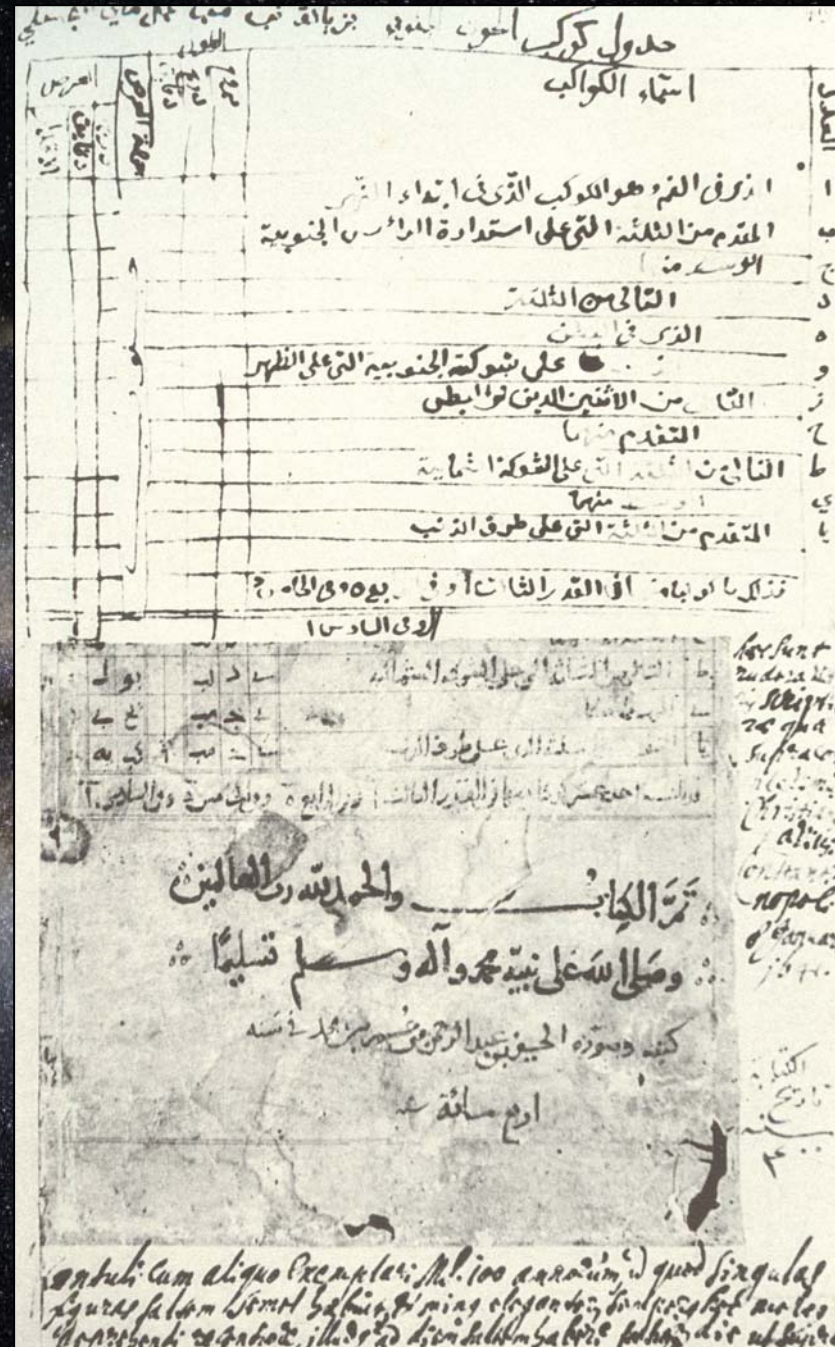
1 Berlin, Istanbul, Kuwait, Mashhad, Tehran



# The Bodleian Manuscript (Marsh 144)

Colophon of the Bodleian manuscript Marsh 144 of al-Sūfī's star atlas, acquired in 1641 in Istanbul by Christian Ravius (1613-1677) who had the missing pages (first eleven folios) replaced

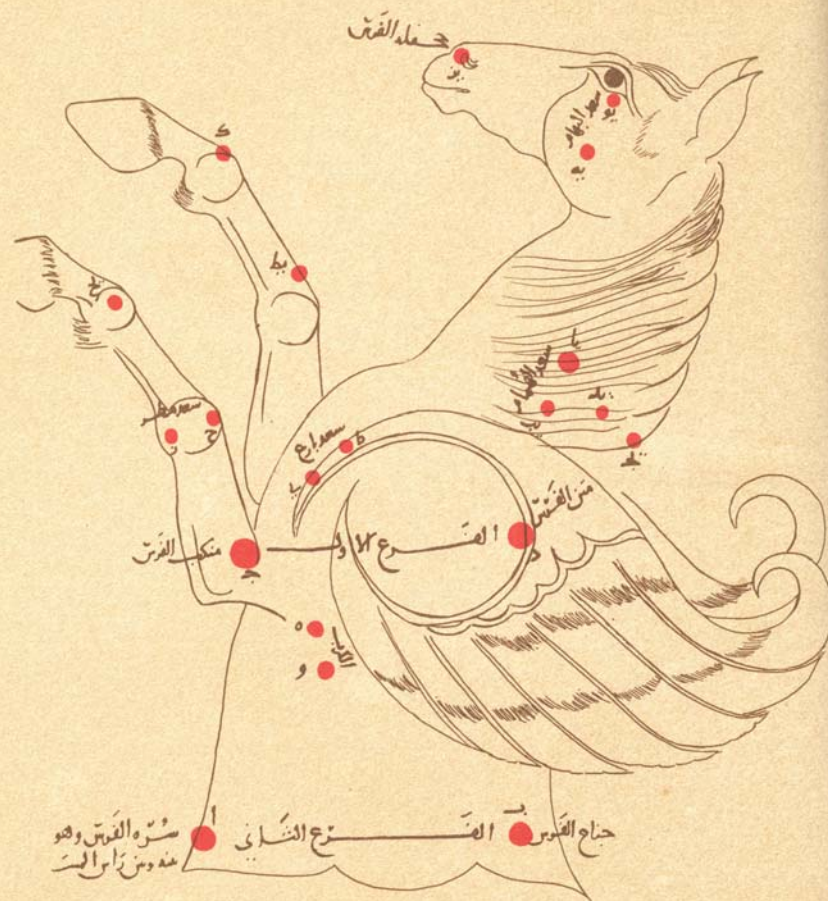
Dated 400 AH [1009/10 CE] and copied by al-Sūfī's son



Later owners of this unique manuscript were Jacob Golius (1596-1667) and Narcissus Marsh (1638-1713)



كُوكُهُ الْقُرْسُ عَلَى مَا رَى فِي السَّمَاءِ



النمش  
 الجذع  
 النقطه بالجذع هي من الصور والواحد النقطه بالسواد العسل الجمره هو خارج الصور والنقطه بالسراد بلا علامه هي التي لا يكرها  
 بفسلوس

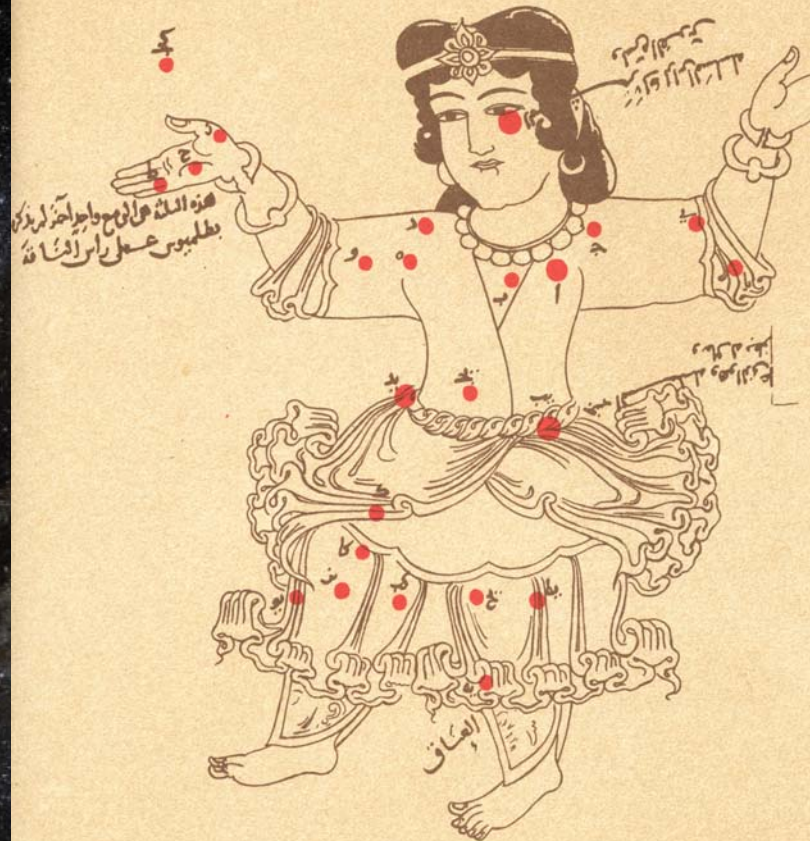
جدول كوكبه الرب الاصغر من زياده **ب** **م** على ما في الجسط

[illegible]

**The constellations Ursa Minor and Pegasus in the Bodleian manuscript  
(from the facsimile published in 1986 by Fuat Sezgin)**



كوكبه السلسلة على ما رى في السما



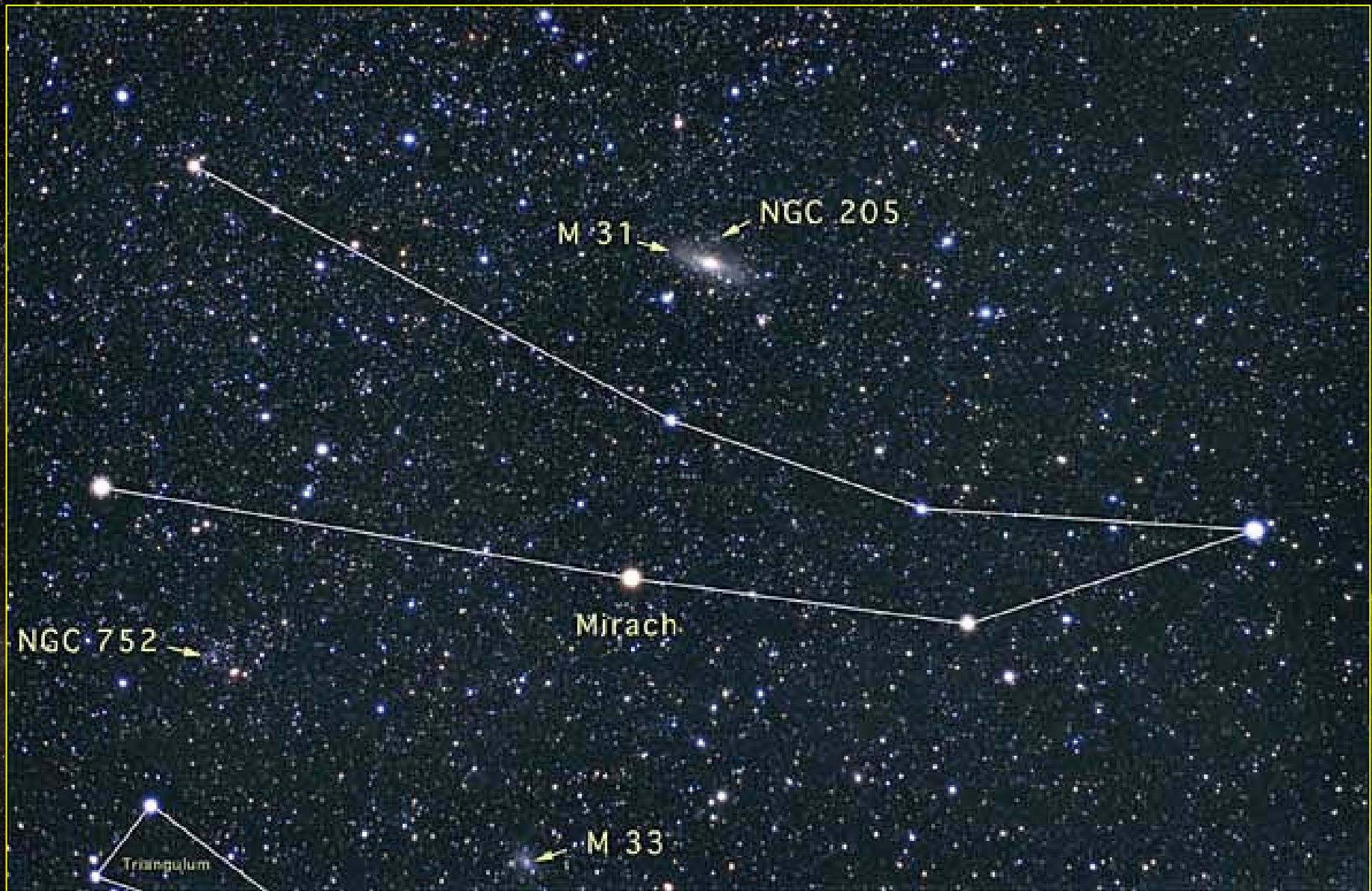
كوكبه السلسلة مع كوكبه السلسلة  
الشمالية التي وضعها بطليموس



النقطة بالحمر هي كوكبه السلسلة والتي بالسواد هي السلسلة الشمالية التي وضعها بطليموس

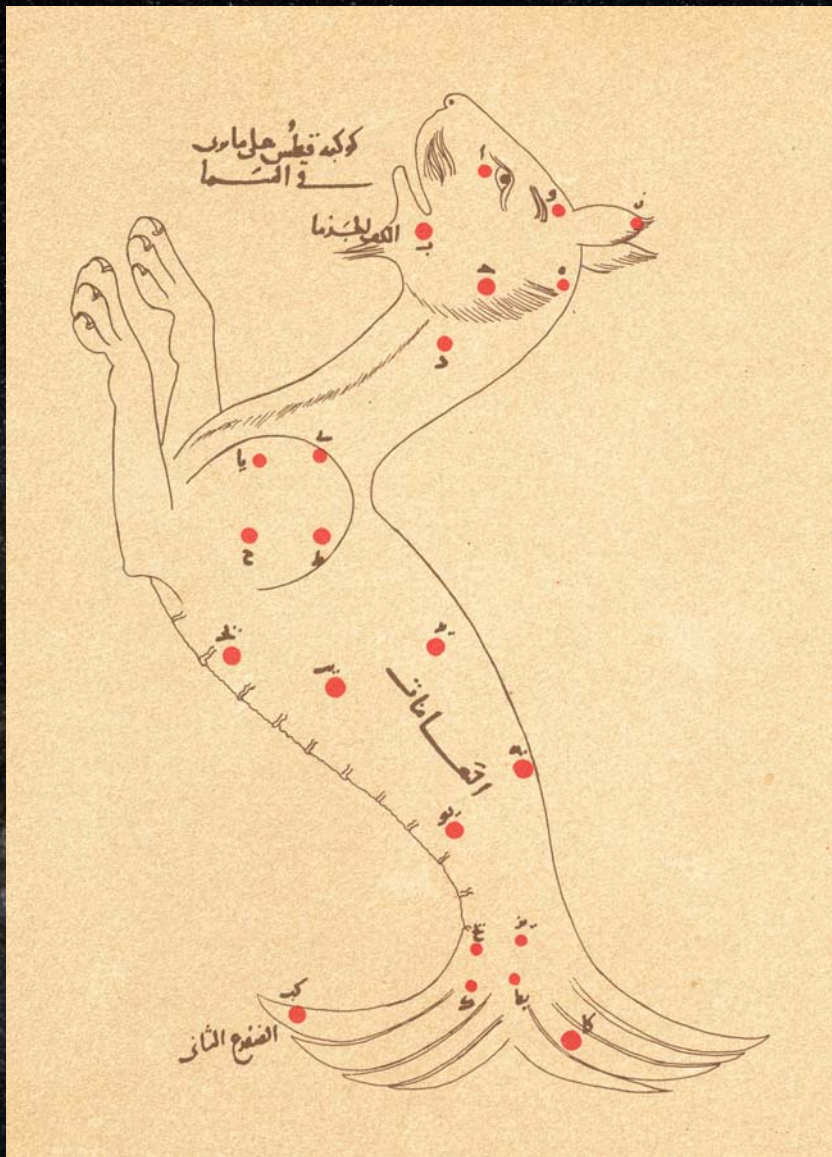
The constellation Andromeda in the Bodleian manuscript





**The constellation Andromeda with the Andromeda Spiral Nebula (Messier 31 = NGC 224)  
Not mentioned in Ptolemy's *Almagest***





The constellations Cetus and Orion in the Bodleian manuscript



# The Paris Manuscript (BNF Arabe 5036)

Copied around 1430-40 in Samarkand, from  
the library of Ulugh Beg

Noteworthy are Far-Eastern influences in  
the depiction of several constellations  
(Draco, Cetus, Hydra)

The complete manuscript is online at the  
GALLICA website

The constellations  
Centaurus and Lupus







جدول كوكبة الذئب الأصغر من الكرة على ما في المحيطي

أسماء الكواكب	الارتفاع	السمت	الزمن	الارتفاع
الذئب على طرف الذئب وهو <b>الجدي</b>	سنة	شهر	يوم	سنة
الذئب على الذئب	سنة	شهر	يوم	سنة
الذئب على مغرب الذئب	سنة	شهر	يوم	سنة
الجنوبي من الضلع المتقدم من أضلاع الموج	سنة	شهر	يوم	سنة
أشمال من هذه الضلع	سنة	شهر	يوم	سنة
الجنوبي من الذئب في الضلع المتأخر من الفرقدين	سنة	شهر	يوم	سنة
أشمال من هذه الضلع من الفرقدين	سنة	شهر	يوم	سنة

فذلك كواكب منها في التدرج الثاني أو الثالث وفي الرابع وفي الخامس

التي تحتها وليس من الصورة

الجنوبي الذي على أيت قامة الفرقدين	سنة	شهر	يوم	سنة
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The constellation Ursa Minor (star map and star table) in the Paris manuscript









## Oriental Manuscripts and Miniatures

SOTHEBY'S

London Wednesday 29 April 1998

## The Doha Manuscript

In 1998 an hitherto unknown early copy of al-Sūfī's star atlas, dated 519 AH [1125 CE], was auctioned in London by Sotheby's

It was acquired by Sheikh Saud al-Thani of Qatar and is currently on display in the Museum of Islamic Art in Doha

A detailed description of the manuscript by David A. King, Barbara Brend and Robert Hillenbrand is included in the Sotheby's auction catalogue







صورة المرأة المسلسلة وهي اندر وميزا على ترى في البركة



صورة المرأة المسلسلة وهي اندر وميزا على ترى في الشتاء

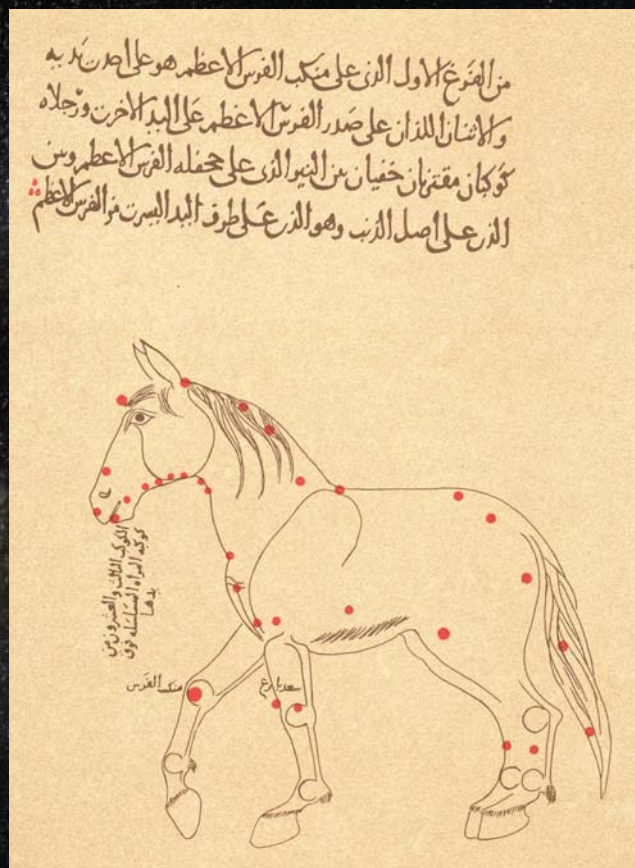


The constellation Andromeda in the Doha manuscript



## Some Pre-Islamic Constellations Depicted in al-Sūfī's star atlas

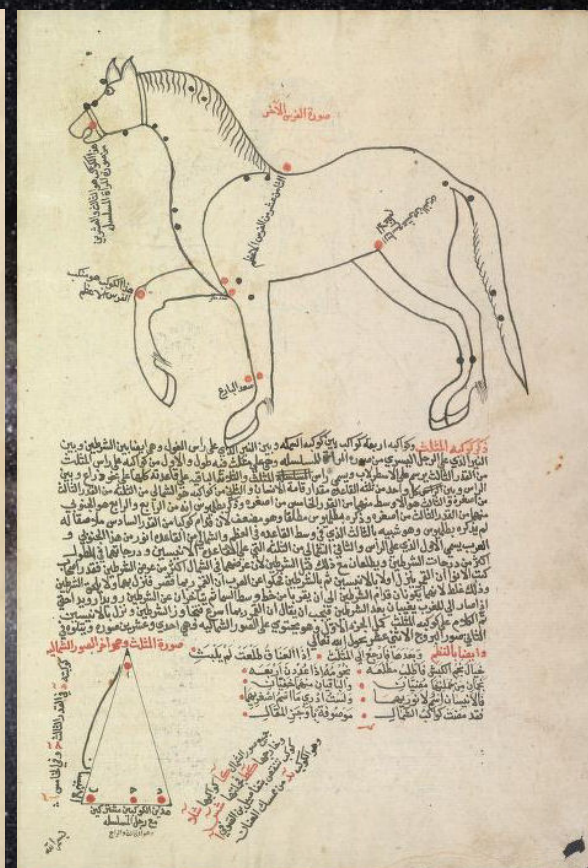
# The Horse



**Oxford, Bodleian Library**  
**Marsh 144 [1009/10 CE]**



**Paris, Bibliothèque Nationale**  
**Arabe 5036 [c. 1430/40 CE]**

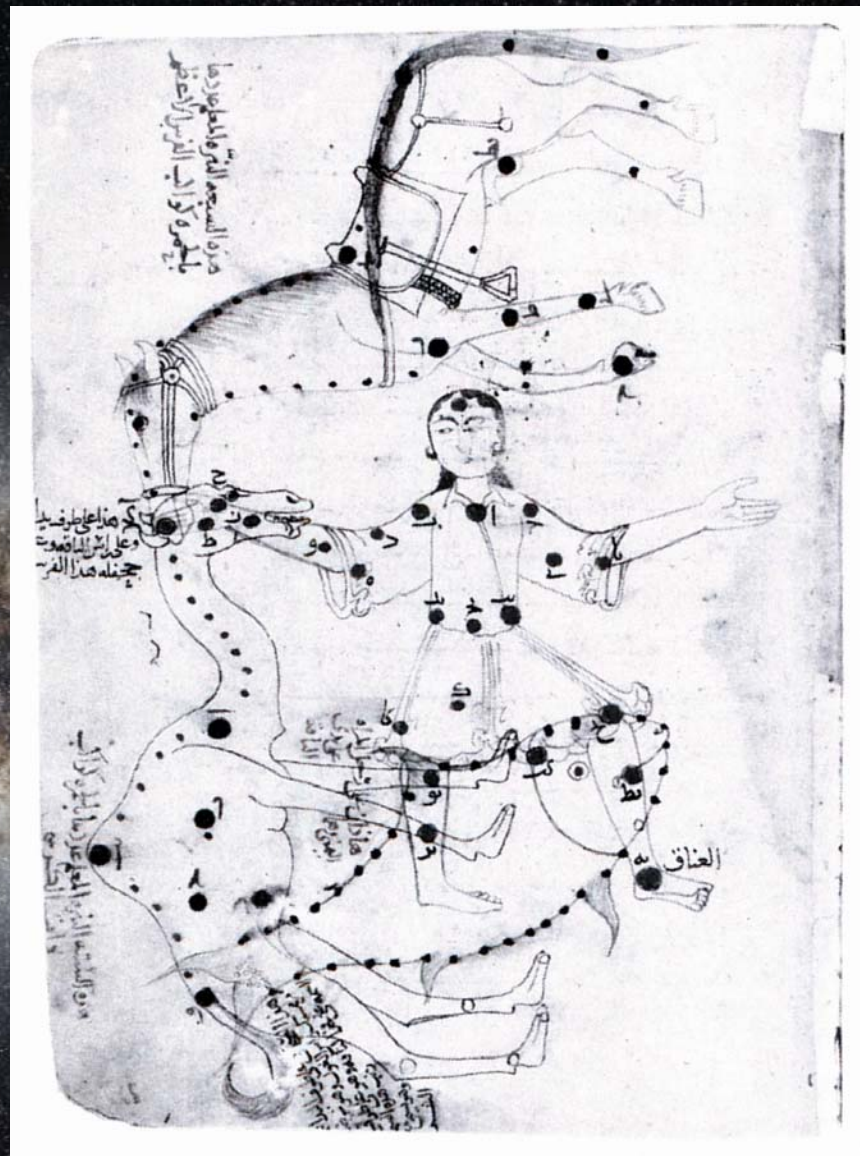


Princeton University Library  
Garrett 2259 Y [1607 CE]





**Cassiopeia and the Camel**  
**Oxford, Bodleian Hunt 212 [1171 CE]**



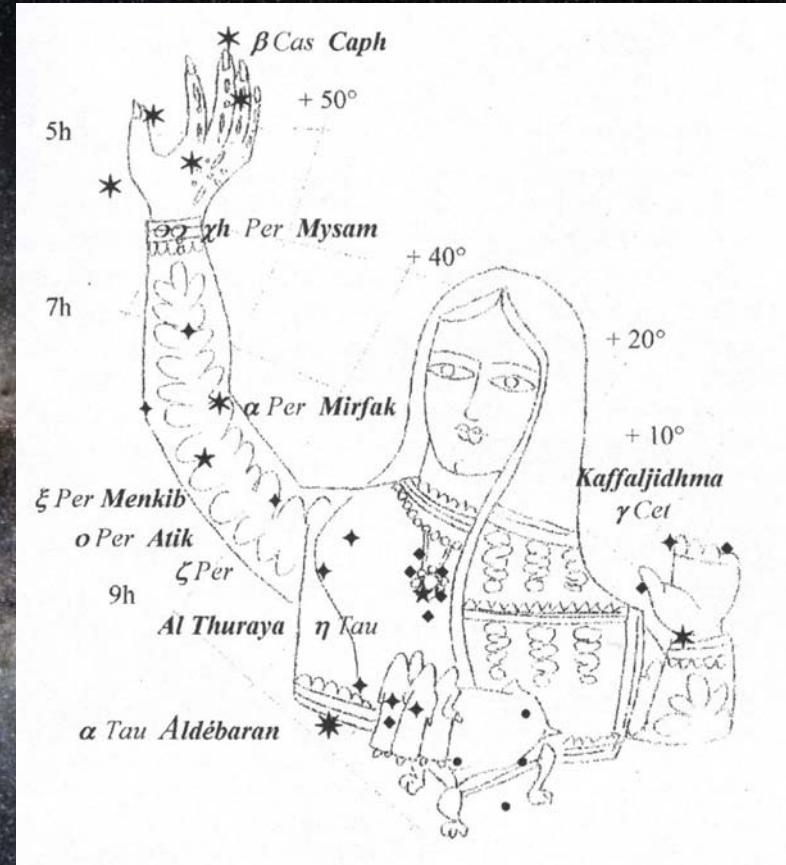
**Andromeda, the Horse and the Camel**  
**Doha, Museum of Islamic Art [1125 CE]**



# The Pre-Islamic Constellation al-Thurayya



New York Public Library, ms. Spencer Pers. 6 [1630/33 CE]



Roland Laffitte, *Des noms arabes pour les étoiles* (2001)



# Transmission to Islamic Scientific Works

Al-Sūfī's star atlas is named in the works of the following Islamic scholars:

**Abū Rayhān al-Bīrūnī (973-1048 CE)**

- *Kitāb al-Āthār al-Bāqiyya* ["Chronology of Ancient Nations"]
- *Kitāb al-Tafhīm li-Awā'il sinā'at al-Tanjīm* ["Instruction in the Elements of the Art of Astrology"]

**Abū Yahyā Zakariyyā ibn Muhammad ibn Mahmūd al-Qazwīnī (c. 1203 – 1283 CE)**

- *Kitāb 'Ajāib al-Makhlūqat wa Gharāib wa al-Mawjūdāt* ["Marvels of Creatures and Rarities of the World"]

**Shihāb al-Dīn Ahmad ibn Mājid ibn Muhammad al-Sa'dī (15/16<sup>th</sup> cent. CE)**

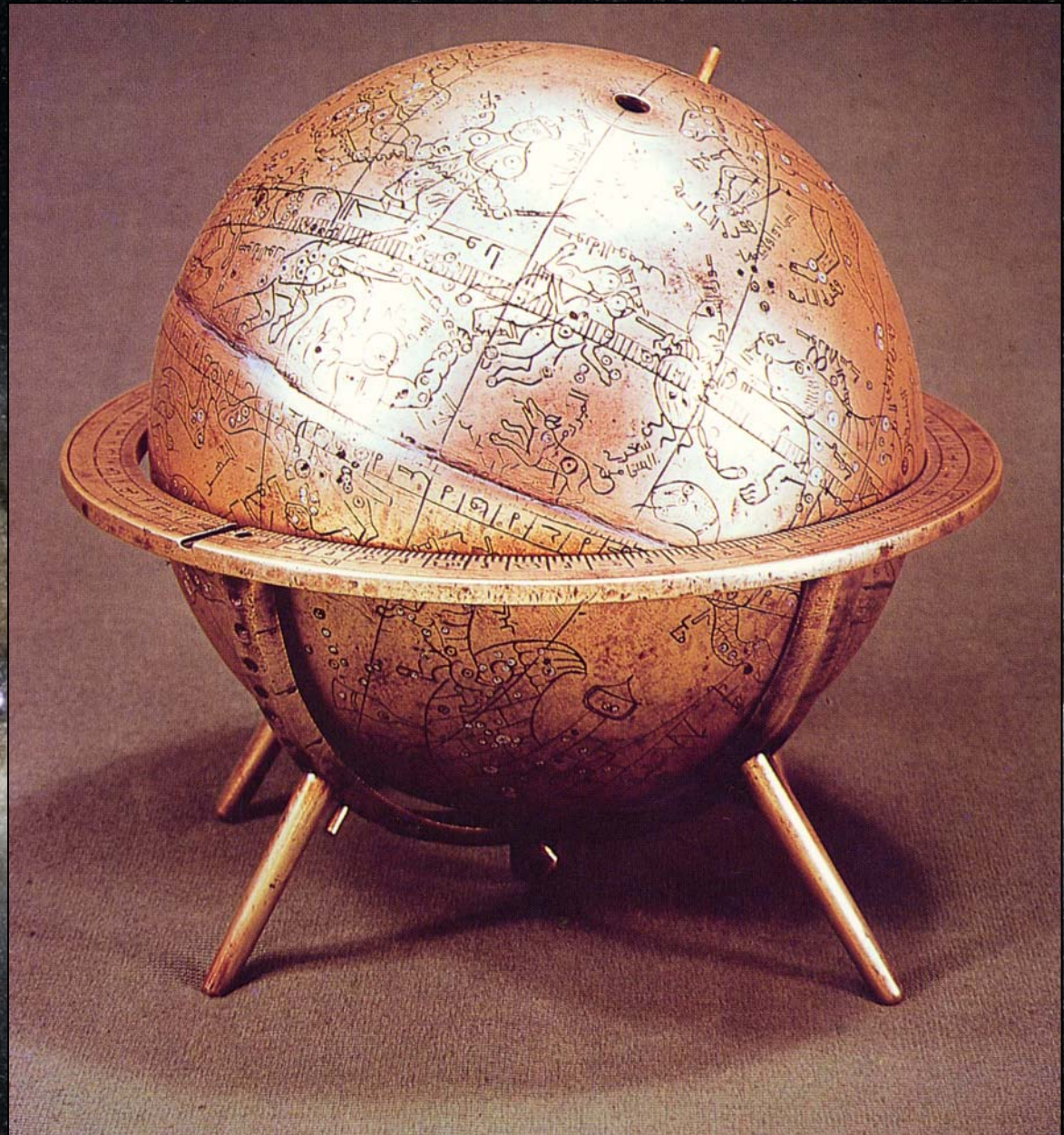
- *Kitāb al-Fawā'id fī Ma'rifad 'ilm al-Bahr wa'l -Qawā'id* ["Uses and Knowledge of Sea Science and Rules"]



# Islamic Celestial Globes

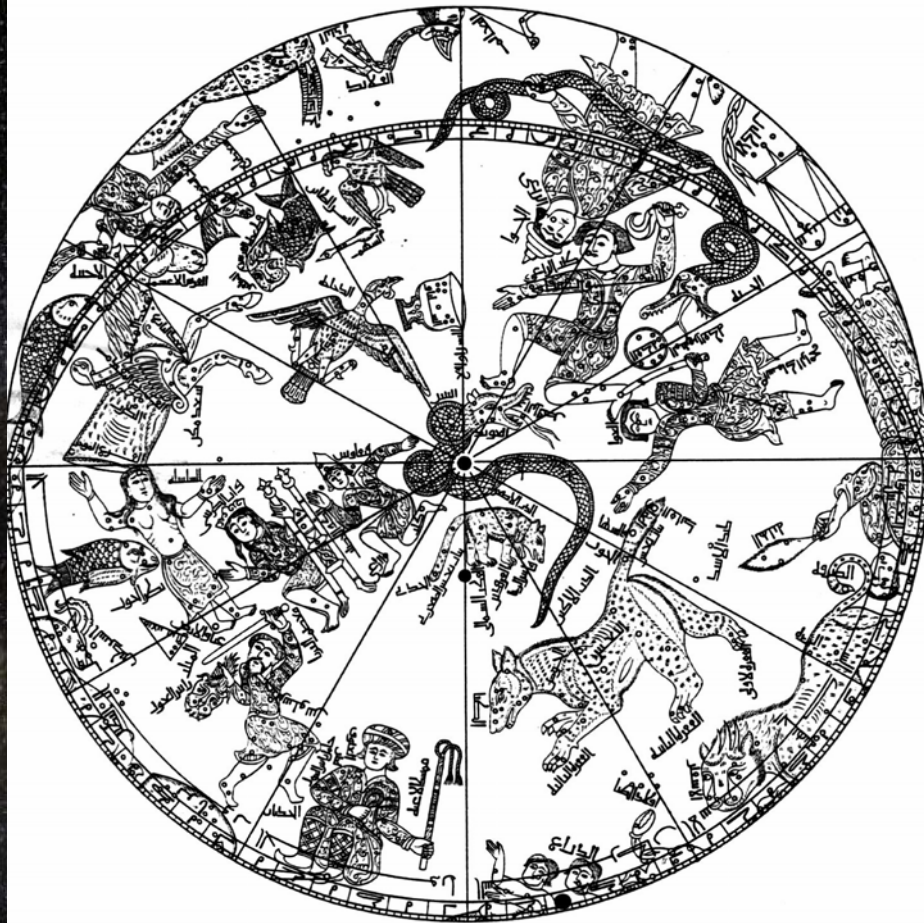
The information from al-Sūfī's star atlas was commonly employed by Islamic instrument makers for the construction of celestial globes, thus continuing a tradition that appears to have originated in Harrān

Al-Sūfī also made celestial globes and a particularly fine celestial globe made of silver was seen in 435 AH [1043/44 CE] in the public library of Cairo by the Egyptian astrolabe maker Ibn al-Sinbadī



Islamic celestial globe, dated 764 AH [1362/63 CE]  
(Oxford, Museum of the History of Science)





AN ANCIENT ARABIC SPHERE.

*J. Nodding del. Lith. for the Royal Asiatic Society.*



Height of the Sphere in the Frame 20 1/2 in. Diameter of the Sphere 6 1/2 inches

*J. Nodding del. Lith. for the Royal Asiatic Society.*

Islamic celestial globe, dated 674 AH [1275/76 CE] (London, British Museum)

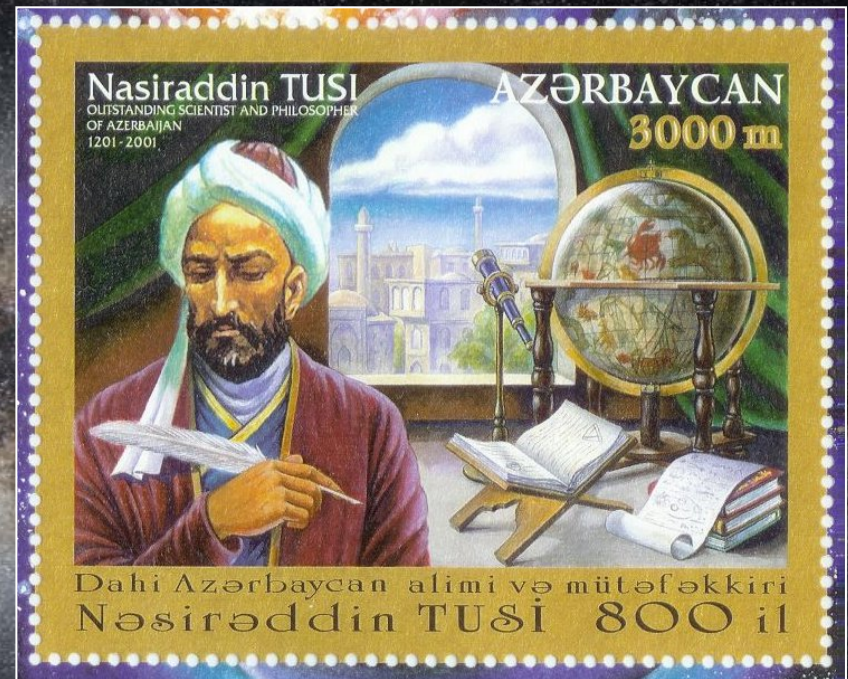




The constellation Perseus in a Persian translation of al-Sūfī's star atlas, dated 1043 AH [1633/34 CE], in the National Library of Egypt

## Persian Translations of al-Sūfī's Star Atlas

The earliest-known Persian translation of al-Sūfī's star atlas was made in 647 AH [1250 CE] by Nasīr al-Dīn al-Tūsī (1201-1274).



Later Persian translations were made by Lutfallah Muhandis ibn Ahmad al-Nadir al-Mi'mar al-Lahūrī (late 16<sup>th</sup> cent.) and by Hasan ibn Sa'd al-Qā'inī (early 17<sup>th</sup> cent.), the latter for Abū'l-Fath Manūchihr Khān, governor-general of Mashhad.

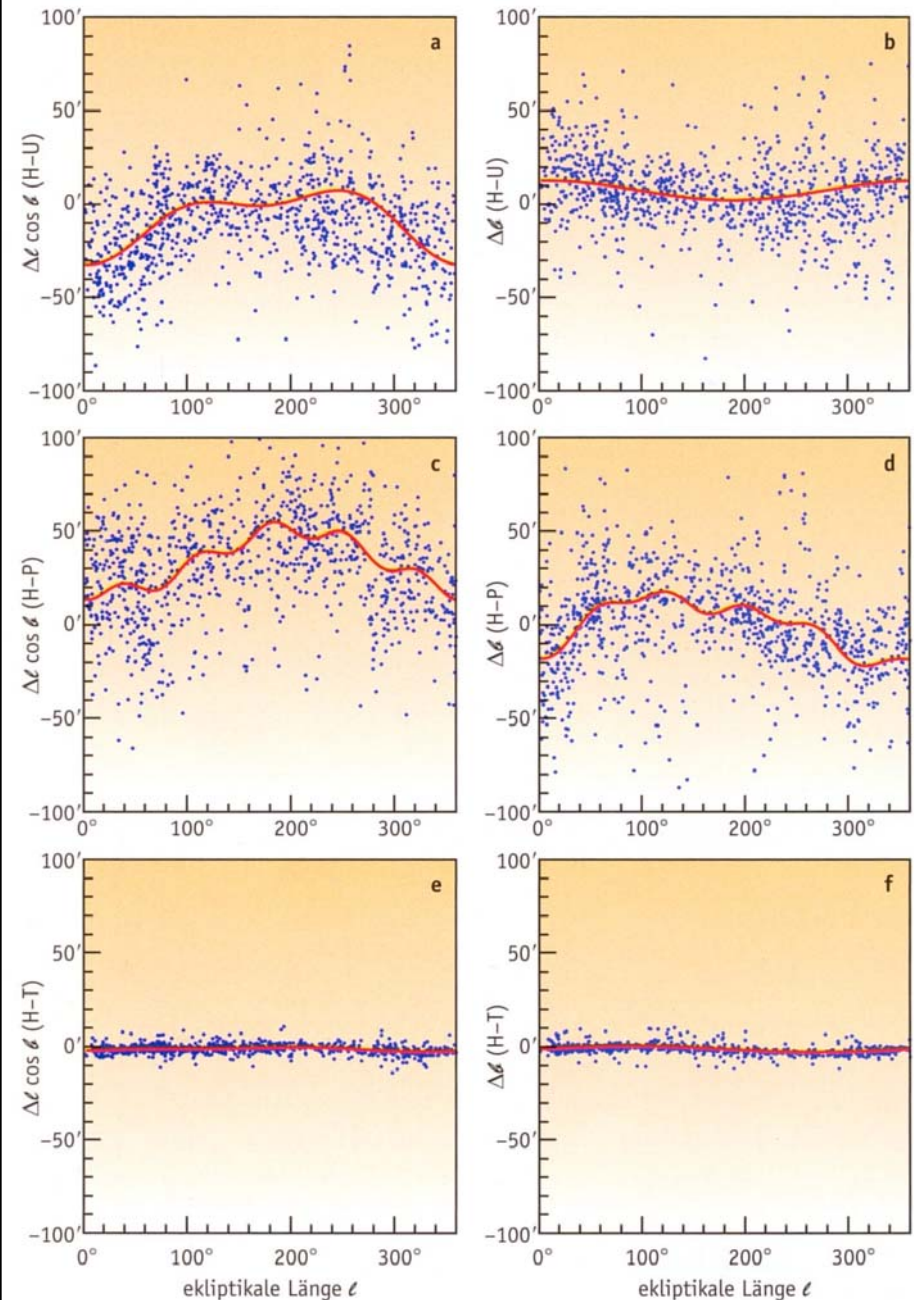


# The Star Catalogue of Ulugh Beg

The star catalogue in al-Sūfī's work was revised by astronomers employed by the Uzbek ruler and astronomer Ulugh Beg (1393-1449), the grandson of Tamerlane.

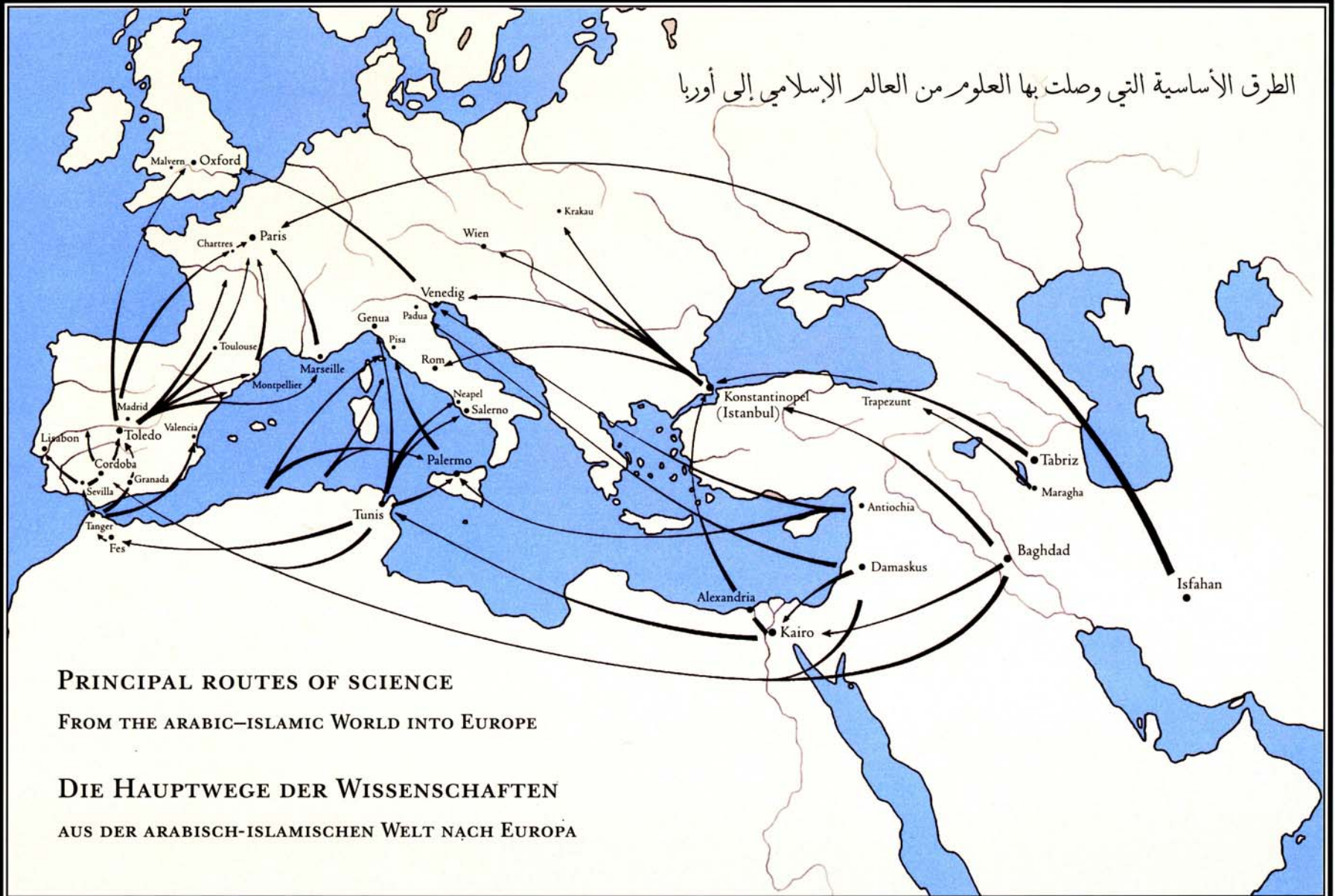
The stellar coordinates in the *Zīj-i Jadīd-i Sultānī* were adjusted to the epoch 1 Muharram 841 AH [4 July 1437 CE].

27 stars, too far south to be observed from Ulugh Beg's observatory in Samarkand, were copied from al-Sūfī's star atlas.





الطرق الأساسية التي وصلت بها العلوم من العالم الإسلامي إلى أوروبا



## PRINCIPAL ROUTES OF SCIENCE

FROM THE ARABIC-ISLAMIC WORLD INTO EUROPE

## DIE HAUPTWEGE DER WISSENSCHAFTEN

AUS DER ARABISCH-ISLAMISCHEN WELT NACH EUROPA



# The Latin Translation of al-Sūfī's Star Atlas

First translated into Latin in the 13<sup>th</sup> century, probably in Sicily

Nine manuscripts are now known, later copies often featuring a star table adjusted to the epoch 1428

For each constellation, only one image is given

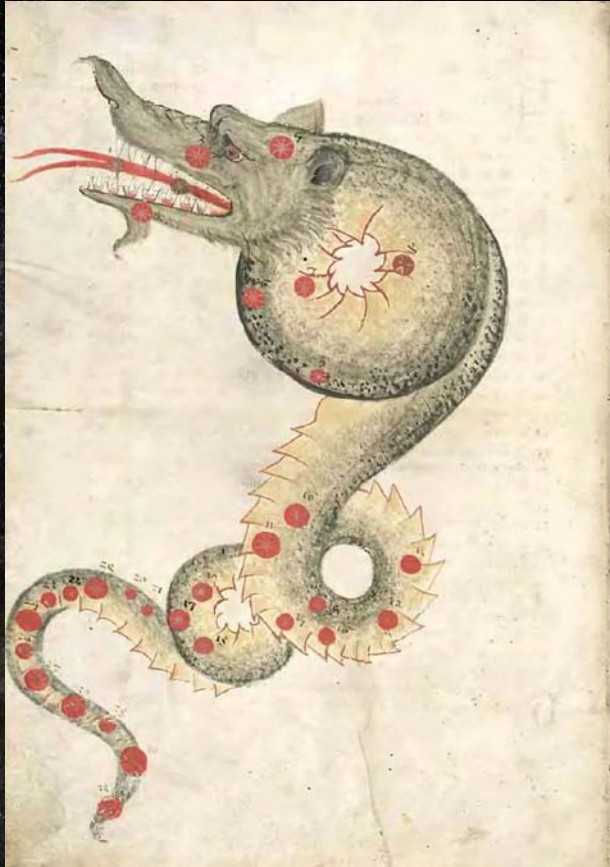
Major source for Arabic star names in later European star lists

The constellation Perseus (Gotha, Forschungs-bibliothek M II 141)





# The Constellation Draco in the Sūfī-Latinus Tradition



Prague, Památník Národního Pisemnictví  
Strahoviensis D.A. II. 13



Gotha, Forschungsbibliothek  
M II 141



Munich, Bayerische Staatsbibliothek  
Clm 826





The constellation Andromeda in the Latin version of al-Sūfī's star atlas (Gotha, Forschungsbibliothek) and in Ismael Boulliau's *Ad astronomos monita duo* (1667), copied from an anonymous manuscript dated 1428



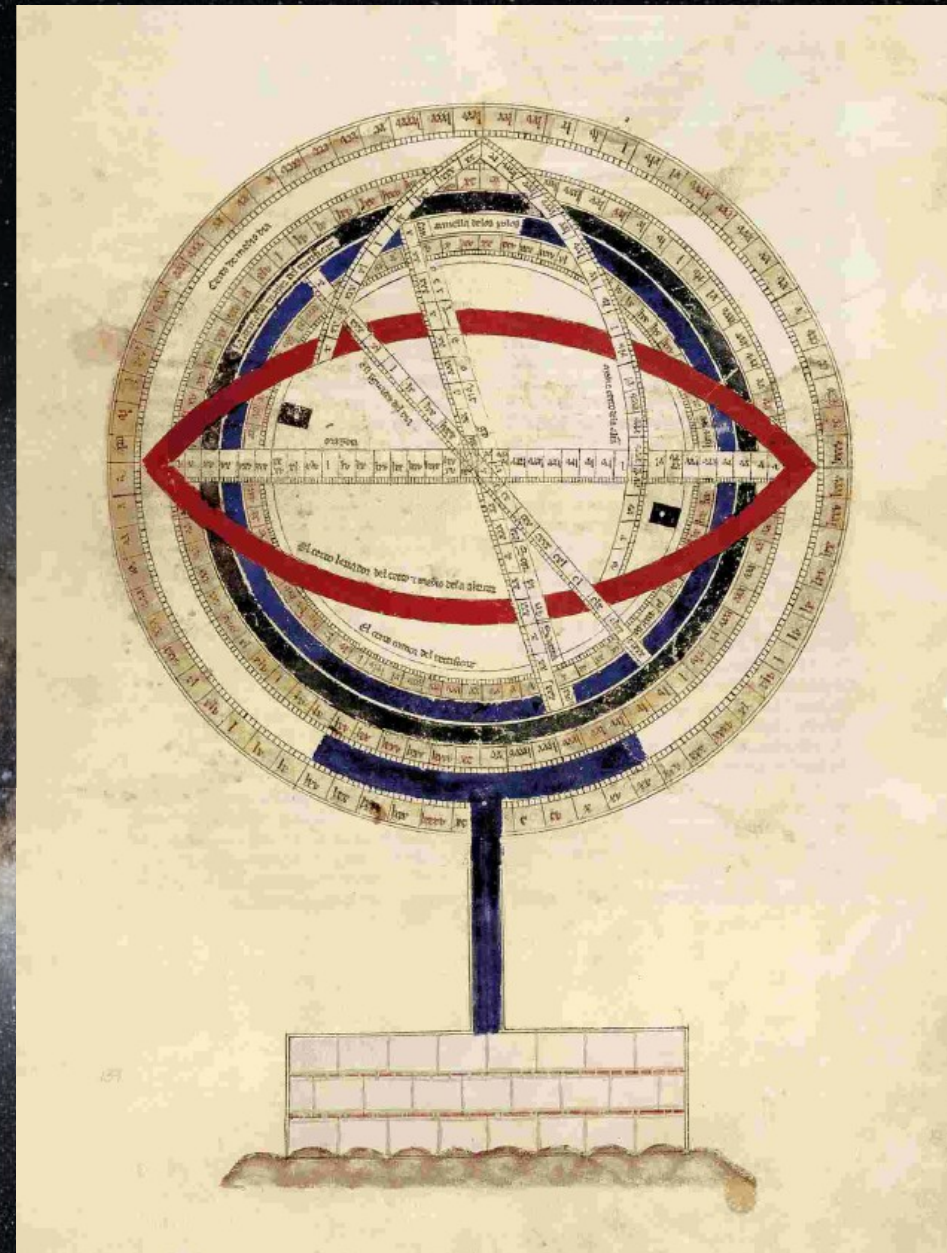
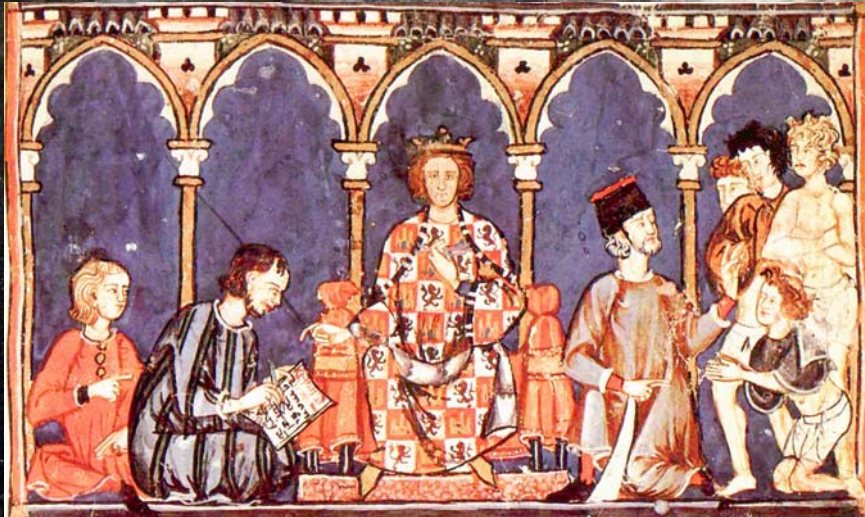
# The *Libros del saber de astrología*

A Castilian translation of al-Sūfī's star atlas was prepared in 1256 by Judah ben Moses ha-Cohen with the assistance of Guillén Arremón Daspa

It was revised in 1276 by Alfonso X el Sabio, king of Castile and León, and several scholars and was included as the *Libro de las estrellas de la ochava espera* in the *Libros del saber de astrología*

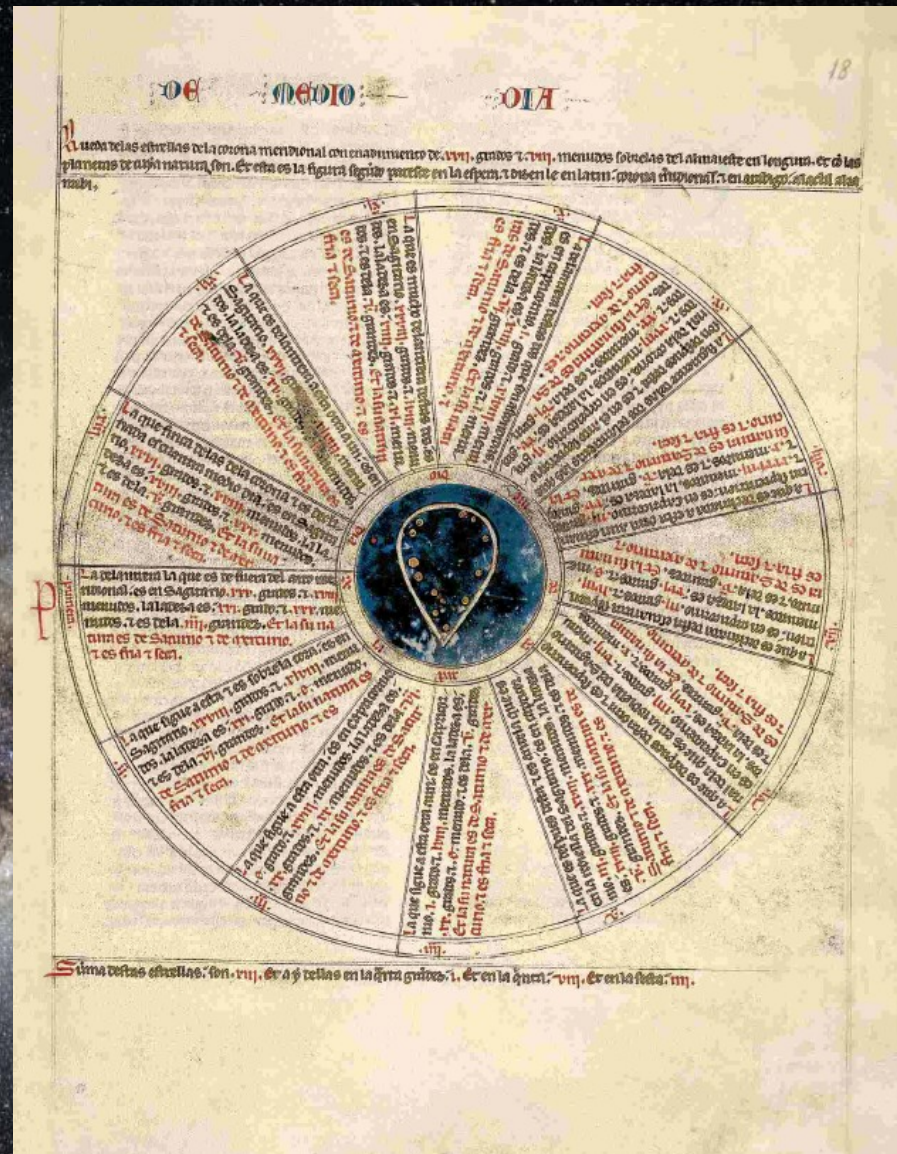
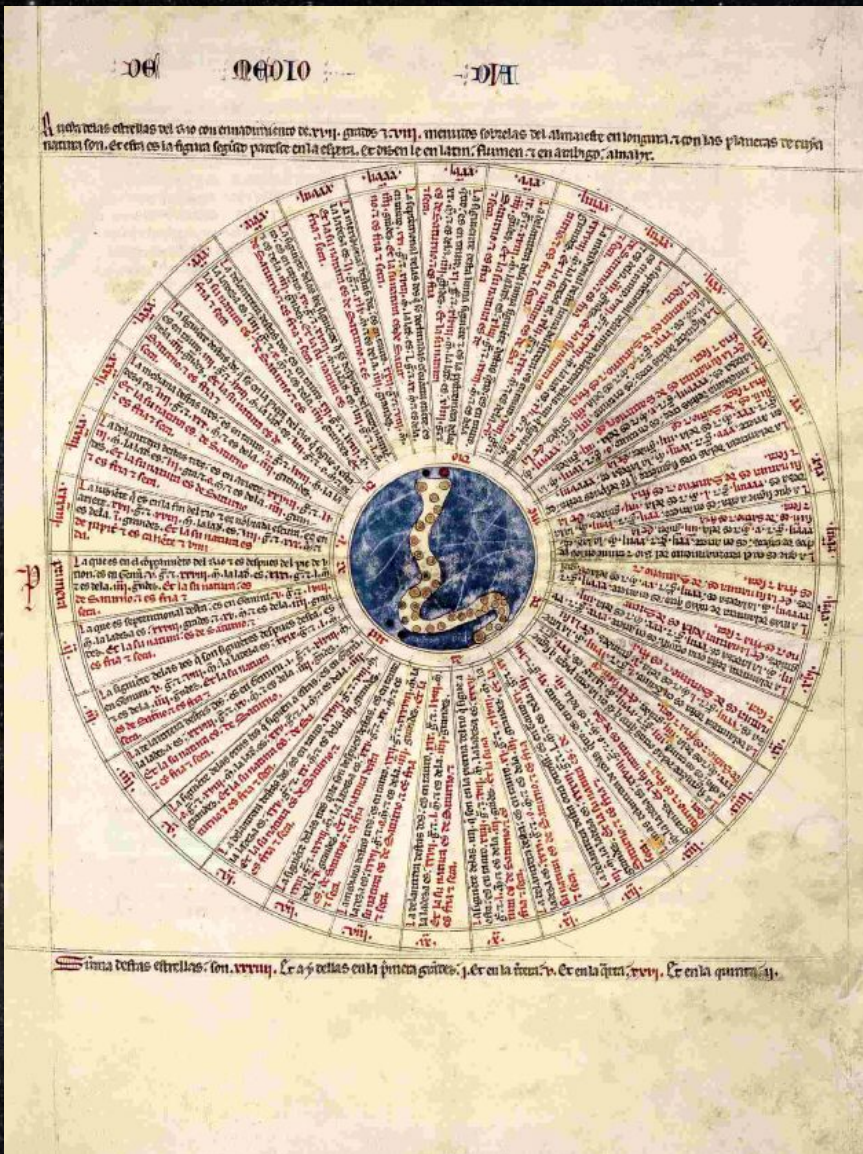
Epoch set to 1 January 1252 by adding  $17^{\circ} 08'$  to Ptolemy's longitudes [= al-Sūfī's epoch +  $4^{\circ} 26'$ ]

The star table in the Parisian Alfonsine Tables (with nearly identical epoch) was based on Gerard of Cremona's translation of the *Almagest* (c. 1175)



Armillary sphere from the *Libros del saber de astrología* (Madrid, Universidad Complutense ms 156, c. 1276)





The constellations Eridanus and Corona Australis in the *Libro de las estrellas de la ochava espera* (Madrid, Universidad Complutense ms 156, c. 1276)

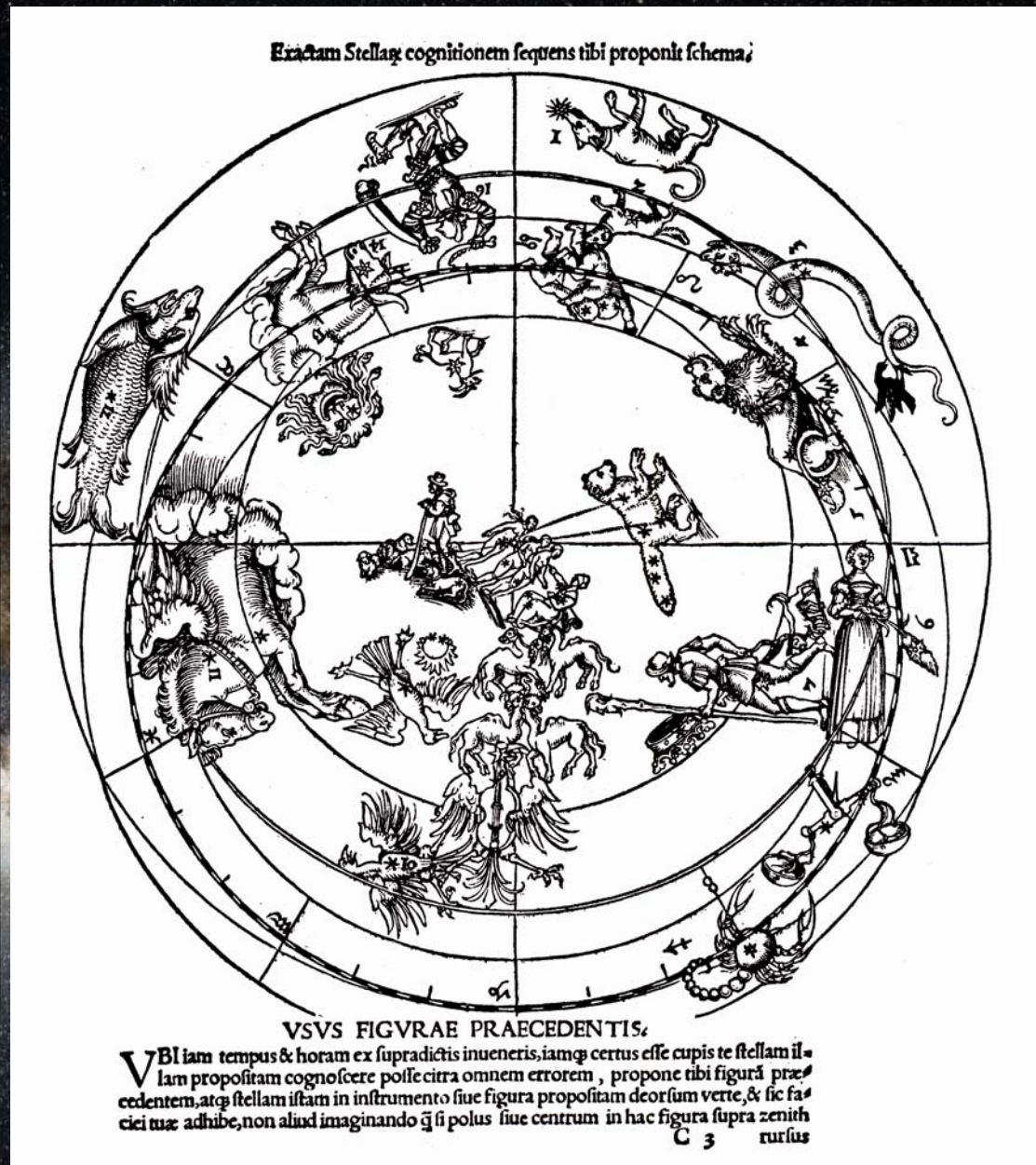


# Al-Sūfī and Petrus Apianus

In 1533 Petrus Apianus (1495-1552) from Ingolstadt published a star map in his *Horoscopion generale* (and also in his *Instrument Buch* of 1533) which contained several 'Arabic' asterisms apparently based on an Arabic copy of al-Sūfī's star atlas in his possession

In 1532 Petrus Apianus received an imperial printing privilege to publish several books, including a *Liber Azophi Astrologi vetustissimi*, but for reasons unknown no such book was ever published

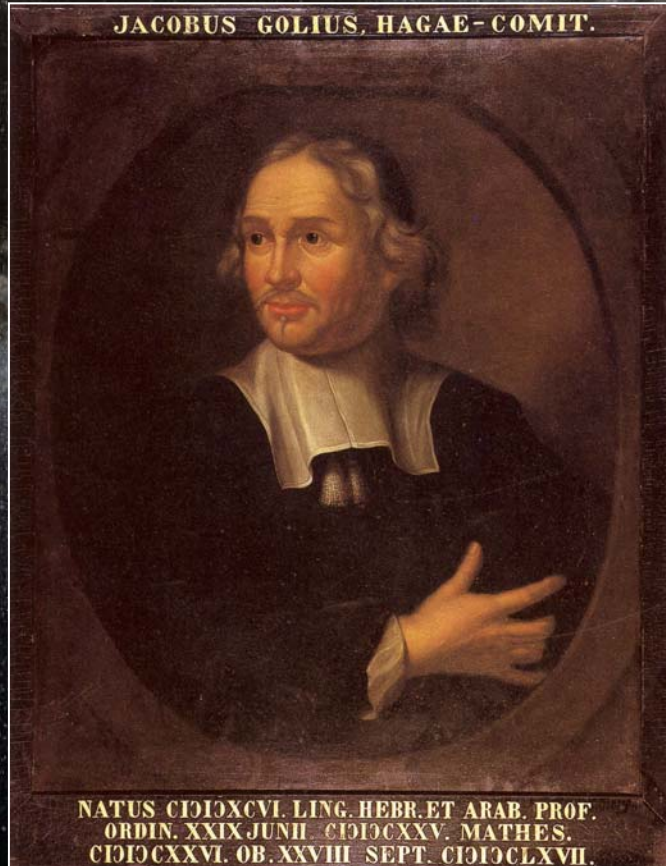
In the chapter on constellations and star names in his *Astronomicum Caesareum* (1540) Petrus Apianus on several occasions referred to a work by 'Azophi Arab[u]s' for traditional Arabic star names





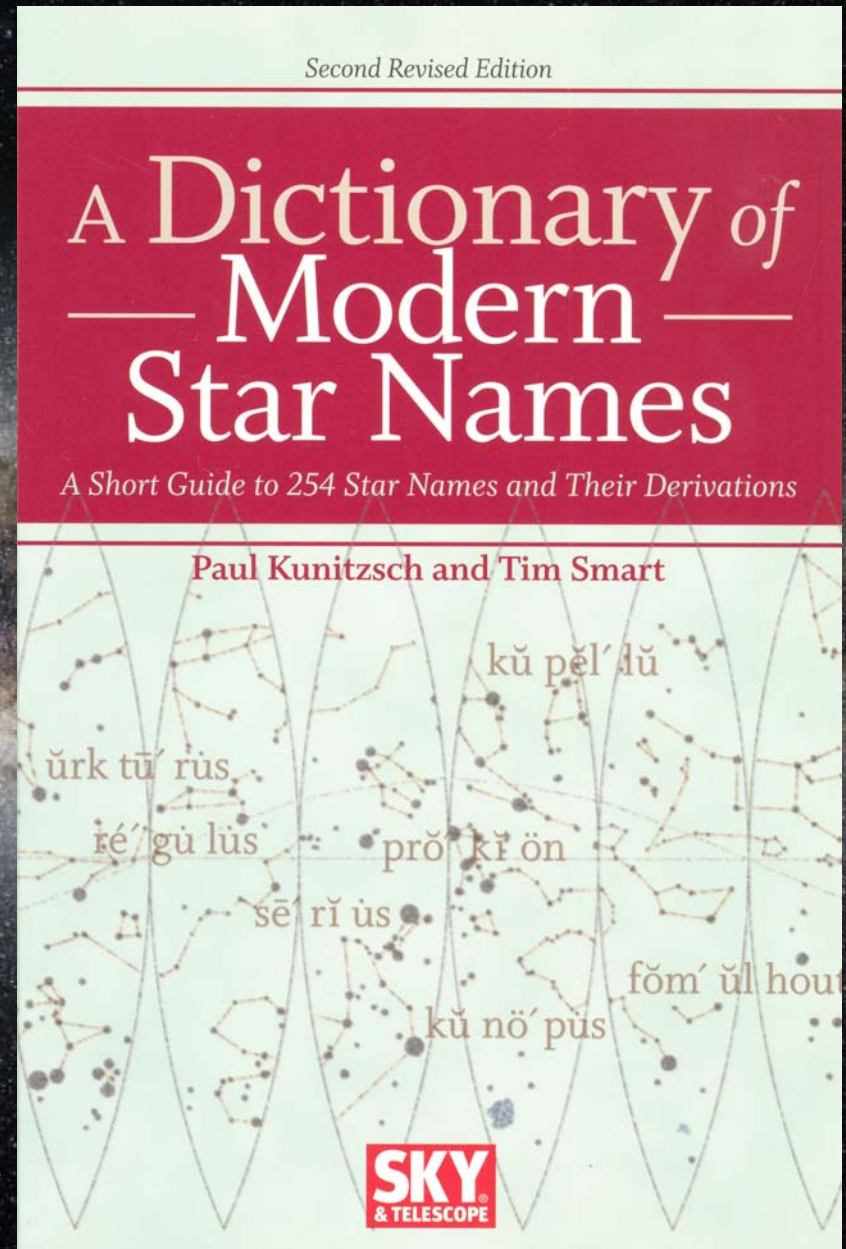
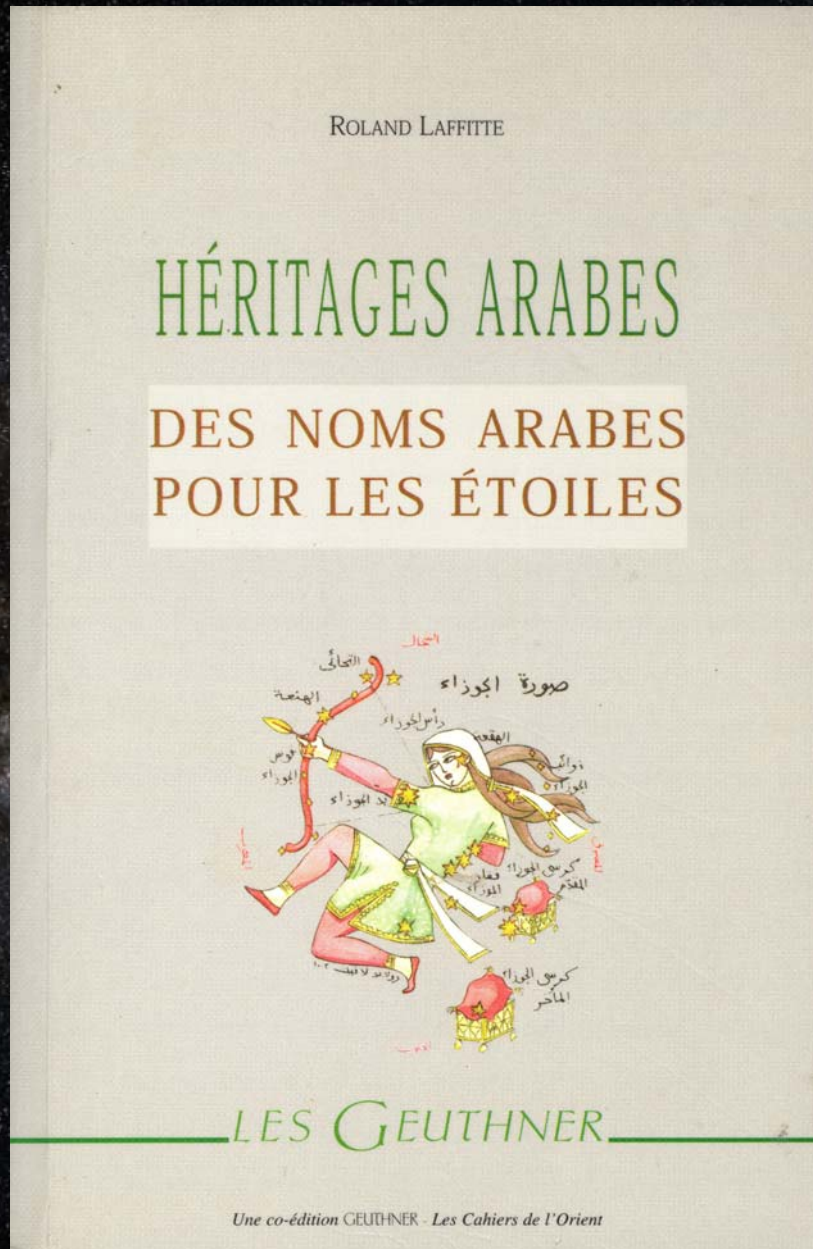
# Celestial Globe by Jacob Aertsz Colom & Jacob Golius

Al-Sūfī's stellar nomenclature was also adopted on the 34-cm celestial globe published in the 1640s in Amsterdam by Jacob Aertsz Colom (1599-1673) in collaboration with the Leiden oriental scholar and astronomer Jacob Golius (1596-1667)





# Recent Publications on Islamic Star Names





# Recent Art-Historical Studies of al-Sūfī's Star Atlas

## Painting The Stars In A Century Of Change

A thirteenth-century copy of al-Ṣūfī's *Treatise on the Fixed Stars*

British Library Or.5323

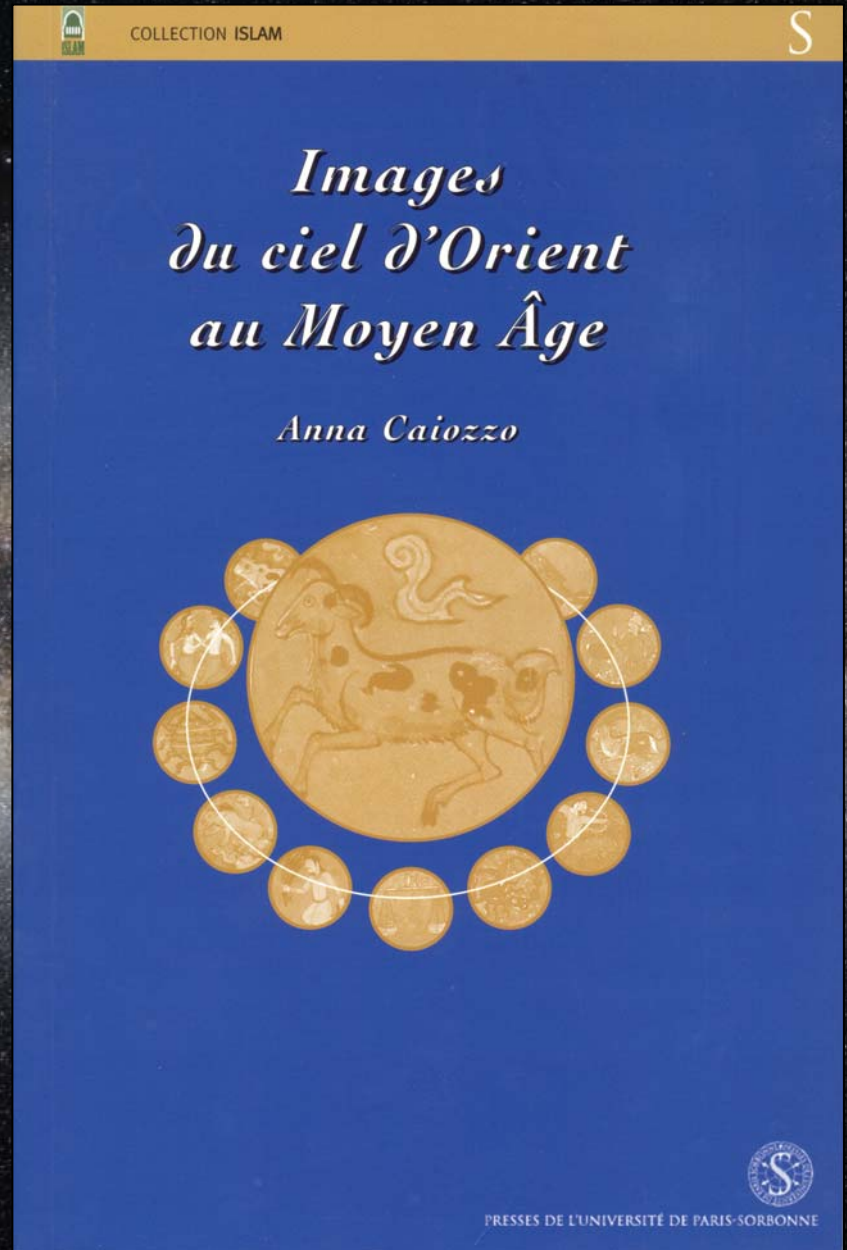
Part 1

**Moya Catherine Carey**

School of Oriental and African Studies

Ph.D. thesis

2001





# DESCRIPTION DES ÉTOILES FIXES

COMPOSÉE

AU MILIEU DU DIXIÈME SIÈCLE DE NOTRE ÈRE

PAR L'ASTRONOME PERSAN

**ABD-AL-RAHMAN AL-SÛFI.**

TRADUCTION LITTÉRALE

DE DEUX MANUSCRITS ARABES DE LA BIBLIOTHÈQUE ROYALE DE COPENHAGUE ET DE LA BIBLIOTHÈQUE IMPÉRIALE DE ST. PÉTERSBOURG

AVEC DES NOTES

PAR

**H. C. F. C. Schjellerup.**

Avec 7 planches.

*Lu le 16 Juin 1870.*

**St.-PÉTERSBOURG, 1874.**

Commissionnaires de l'Académie Impériale des sciences:

À St.-Pétersbourg:

MM. Eggers et C<sup>ie</sup>, H. Schmitzdorff,  
J. Issakof et Tcherkessof;

À Riga:

M. N. Kymmel;

À Odessa:

M. A. E. Kechribardshi;

À Leipzig:

M. Léopold Voss.

Prix: 2 Rbls. 75 Kops. = 3 Thlr. 2 Ngr.

## Schjellerup Edition (1874)

Edition of the complete text with a French translation by Hans Karl Frederik Kristian Schjellerup (1827-1887), based on a manuscript in Copenhagen, dated 1010 AH [1602 CE], and a manuscript in St. Petersburg, dated 1015 AH [1606 CE]



**May 2010: English translation of al-Sūfī's star atlas announced by Ihsan Hafez, a Lebanese astronomer and international student at the James Cook University (Australia)**

**ABDUL-RAHMAN AI-SUFI  
AND HIS  
“BOOK OF THE FIXED STARS”  
A Journey of Re-discovery**



**Thesis to be Submitted by:  
IHSAN HAFEZ**

**Centre for Astronomy  
School of Engineering and Physical Sciences  
James Cook University, Townsville  
Queensland, Australia.**

**Ihsan.Hafez@jcu.edu.au**

**Supervisor: Professor Richard Stephenson  
Co-Supervisor: Associate Professor Wayne Orchiston**