

Forgotten History Al-Sufi's Book Of Fixed Stars

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Who Is This Guy?



- Khalid (“... ed” not “... eeeeed”)
- Pharmacist by education
- Open Source Software Development and Consulting by experience (32 years)
- One of the developers of Drupal, a Web Content Management System
 - NASA
 - RASC





Condensed History



- Egyptians (3100 B.C.E - 323 B.C.E)
 - Rise of stars every 10 days (Decans)
- Babylonians, Assyrians (1st millennium B.C.E)
- Alexander the Great 323 B.C.E
- Library of Alexandria, by Ptolemy (his general)
 - Library, University, and Research Institute
- Roman Occupation of Egypt 30 B.C.E





Hipparchus



- Hipparchus of Nicaea ~ 130 B.C.E.
 - Precession (1 degree per century)
 - Magnitude Scale
 - Star Catalog, lost but incorporated in Almagest





Claudius Ptolmey



- Lived in Alexandria ~ 150 C.E.
- Authored Almagest, Tetrabiblos (Astrology), translated to Arabic (800s), then from Arabic to Latin in (1100s)
- 48 Constellation visible from mid northern latitudes (Alexandria ~ 31 N)
 - Grouped by ‘North of ecliptic’, zodiacal, and ‘South of Ecliptic’
- 1025 stars, 5 nebulous, 6 reddish
- Star catalog and magnitude scale of Hipparchus





Where In The World?

2bits





Arab Folk Astronomy



- Pre-Islamic (before 622 C.E.)
- Wide area
 - Southern Iraq, Syria, all of Arabia
- Preserved in poetry, and handed down in stories and proverbs
- Not the regular signs of the zodiac
- 28 stations of the moon, one per day
- Various asterisms





Anwaa Tradition



- Rising and setting of certain stars (e.g. Sirius, Canopus, Pleiades, ...etc)
- Timing of important annual events: wind, rain, goats and camels giving birth, availability of pasture
- First documented and collected by Abu Hanifa Al-Dinawari, in his book: Al-Anwaa
- His work is lost, but almost all of it is incorporated in other works (including Ibn Qutaybah, and Al-Sufi, who critiqued his lack of scientific method)





Arab Astronomy



- Started by translation from Sanskrit sources (India)
- Then from Greek (Ptolmey's Almagest)
- House of Wisdom
 - Established by Caliph, in Iraq
 - Translation of scientific works: geometry, medicine, philosophy
 - Also a research institute
- Successive observations and corrections (e.g. to the value of precession, circumference of earth)





Zij



- Persian word, meaning: astronomical treatise, with formulas and parameters for calculations
- *Mumtahan*, commissioned by Caliph Al-Mamun, Iraq, early 800s
- *Sabi*, by Al-Battani, in Iraq, late 800s
- *Hakemi*, for Al-Hakim, ruler of Egypt, late 900s
- *Ilkhani*, commissioned by Hulegu, at the request of Tusi (Maragheh observatory, late 1200s)
- *Sultani* commissioned by Ulugh Beg, 1400s
- Others





Celestial Sphere



- ‘Not mentioned by Ptolemy’





Celestial Sphere

2bits

- Ostriches
- River
- Second Toad





Celestial Sphere

2bits





Al-Sufi Biography



- Abu Al-Husain Abdul Rahman Ibn Omar Al-Sufi
- Born: 7 December 903 C.E. (Rayy, Iran) = 291 A.H.
- Died: 25 May 986 C.E. (Baghdad, Iraq) = 376 A.H.
- Observed in Shiraz, Iran, in service of its ruler
- Book on Astrolabe (1760 chapters, survives in short version with 170 chapters)
- Other works in astrology, mathematics, and alchemy
- Made celestial globes, one made of silver was seen by an astrolabe maker in Cairo in 1043 C.E.





Al-Sufi Biography



- In the West known as: Azophi, Ebennesophi
- Lunar crater Azophi, and minor planet 12621 named after him





Al-Hussain His Son



- Also an astronomer
- Also in the service of rulers
- Also copied and illustrated his father's work
- Composed Urjuzat Al Kawakib (extant today)
 - Didactic poem
 - Aratus: Phaenomena poem, on Eudoxus' work
 - Manilius: Astronomica





Book Of Fixed Stars



- Called: Book of Fixed Stars
- Also, Book Of the 48 Constellations
- Dedicated to the Buyid ruler, Abu Shujaa Fana Khusrow (Adud Al Dawla, 936 - 983 C.E.)
- Was a friend and pupil of Al-Sufi, ruled Shiraz
 - Al-Sufi mentions him in his book
 - Al-Hussain mentions him in his poem





Book Of Fixed Stars



- Epoch 1276 Alexander = 1 October 964 C.E.
- Almagest longitudes + 12 degrees and 42'
- Precession of 1 degree every 66 years, based on Zij of Al-Battani, compiled earlier
- First pictorial star/constellation atlas





Manuscripts

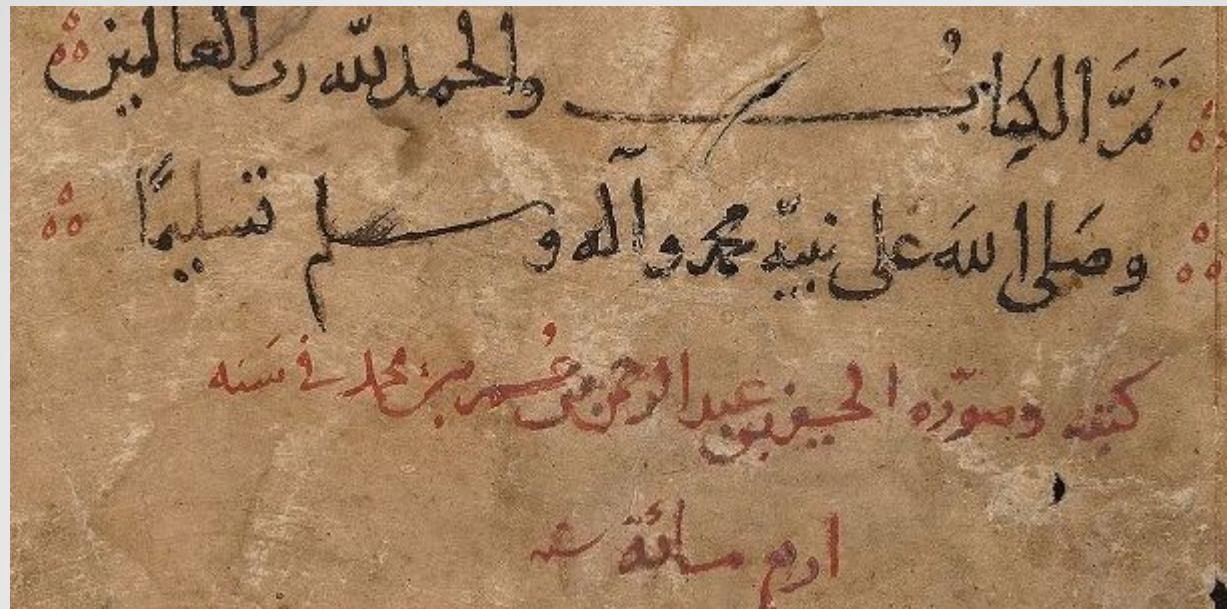


- At least 66 Arabic manuscripts exist (Turkey, Europe, Iran, India, USA)
- Bodleian, Oxford, two old manuscripts
 - Written 1009/1010 C.E., supposedly by Al-Hussain, the author's son. Missing first 11 pages. Printed in Germany 1986 facsimile
 - Written 1170 C.E, for a ruler of Mosul
- BNF Paris, several, one ~ 1430 C.E. for Ulugh Beg, Lavishly illustrated, (by an artist?), and a copy of it
- Doha, Qatar: Written in 1125 C.E. (unavailable)





Manuscripts – Sufi's Son **2bits**



- “Book completed ... written and illustrated by *Al-Husain ibn Abdul Rahman ibn Muhammad* in the year 400 [A.H. = 1009/1010 C.E.]”
- Later research says it is a later addition



Book Structure



- Introduction
 - Two traditions (Arab and Greek), and those who know one, are not familiar with the other
 - Critique of inaccuracies and shortcomings of astronomical works up to his time:
 - Al-Battani, Abu Hanifa, others
 - What is in the sky contradicts what is in these previous books
 - Describes what he is about to document, and his own observations



Book Structure



- Constellation North of Ecliptic
- Zodiacal Constellations
- Constellation South of Ecliptic





Methodology



- Names of the constellation (Greek, and Arab)
- Where its stars are relative to each other, noting position, magnitude, also cloudy, colour, or multiple
- Relative position to Milky Way, other nearby stars
- Names of known stars (e.g. used on Astrolabes)
- Corrections to Ptolemy from Sufi's own observations
- Notes magnitude for each star, even double stars
- List of stars, with lat/long coordinates
- No Greek mythology (perhaps none in Almagest?)
- Plenty of Arab Lore about said stars and asterisms





Methodology



- Followed by two images of the constellation
 - One as seen on a celestial sphere
 - The other, “*if you hold the book up over your head, you see the image as it is in the sky*”
- Followed by a detailed list of stars, in table form
 - Serial number (A, B, G, D, ...)
 - Description
 - Latitude, Longitude, Zodiac and Hemisphere
 - Magnitude (correcting Ptolmey)
 - Summary of star numbers for each magnitude





Magnitudes



Tableau synoptique de l'intensité lumineuse des étoiles principales selon Ptolémée (ou Hipparch), Sūfi et Argelander.

La petite Ourse.				Ptolémée.	Sūfi.	Argelander.	Ptolémée.	Sūfi.	Argelander.
		Ptolémée.	Sūfi.	Argelander.					
1	α	Ursae minor.	3	3	2	3	π	—	—
2	δ	—	—	4	4	4.5	4	ρ .	—
3	ϵ	—	—	4	4	4.5	5	σ	—
4	ζ	—	—	4	4	4.5	6	d	—
5	η	—	—	4	5.4	5	7	τ	—
6	β	—	—	2	2	2	8	h	—
7	γ	—	—	2	3	3	9	v	—
1	Flamst.	5	4	4	5.4	10	ϕ	—	—
La grande Ourse.				11	θ	—	12	ι	—
1	ϵ	Ursae major.	4	4	3.4	13	x	—	—
				14	c	—			4
									5.4
									5





Discoveries



- Corrected positions and magnitudes for many stars
- Removed 8 stars in Almagest which could not be identified (14th in Aur, 11th in Lup, 6 in Piscis Austr.)
- Discovered nebulous objects
 - Andromeda Galaxy M31
 - Brocchi's cluster (Coat Hanger)
 - Omicron Velorum Cluster (IC 2391)
 - Mentioned LMC and SMC





Peculiarities



- Makes a distinction between:
 - Stars within the image of a constellation
 - And those outside the image
 - Uses different colour ink for each
- Many stars suffixed with ‘not listed by Ptolmey’
- Digressions on visits to other cities and asking about past observers





Misc. Observations



- “Lots of stars intermingled, hard to count” between Leo and Ursa Major (group of stars near Coma 12)
- Detailed measuring of coordinates, in degrees and arc minutes for many constellations, e.g. Libra, and Canopus in Argo Navis, correcting what he saw as errors by predecessors





Mirror Images

2bits

- One as seen in the sky
 - Another as seen on a celestial sphere
 - Distinction between ‘inside the image’, and ‘outside the image’





Ursa Major

2bits





Cetus - Ulugh Beg

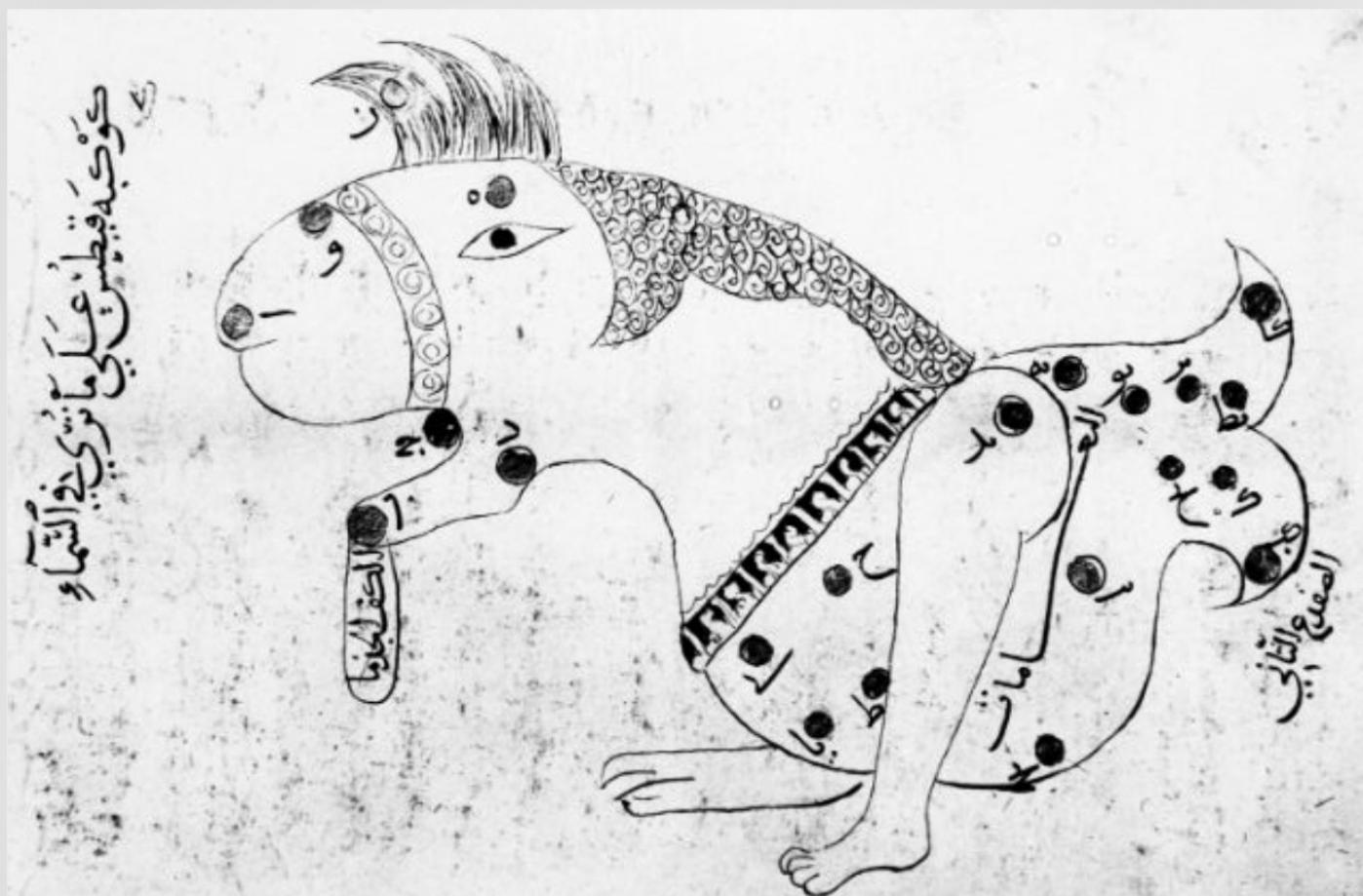
2bits



- From the royal manuscript, with gold leaf for stars
- 2nd Toad, Deneb Kaitos Shamali and Ganoubi, No Ostriches



Cetus – 1125 CE



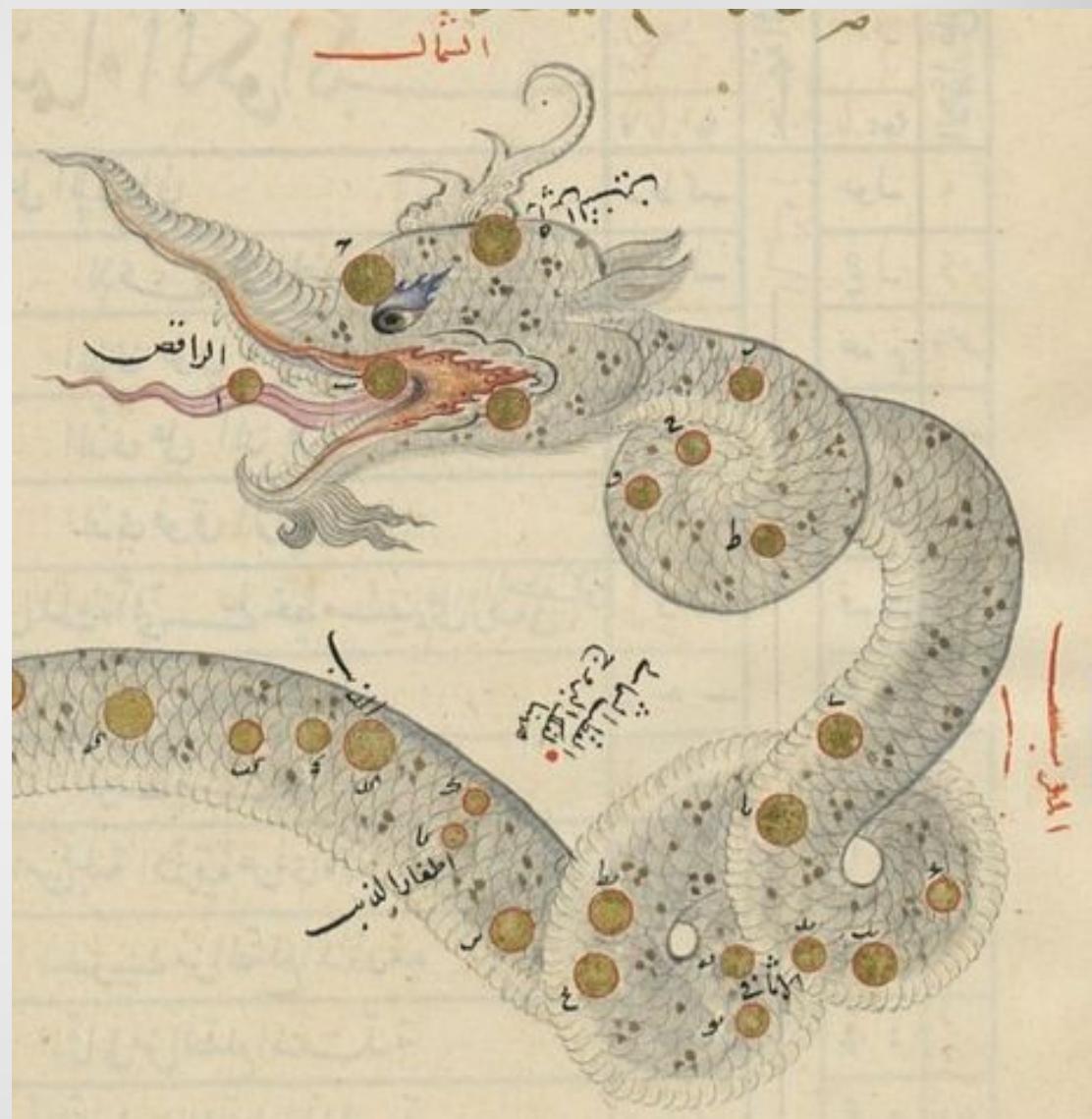
- Written in Mardin, Syria, 1125 C.E.
- 2nd Toad, Ostriches, No Deneb Kaitos Shamali/Ganoubi



Draco - Ulugh Beg



- From the royal manuscript, with gold leaf for stars
- Chinese artistic influence. Not odd, given Samarkand proximity
- North pole of ecliptic





Ursa Minor



- From a late 1400s manuscript
- Comments on colour coding (inside image, outside image, not listed by Ptolmey)
- Scribe added location of NCP





Ursa Minor



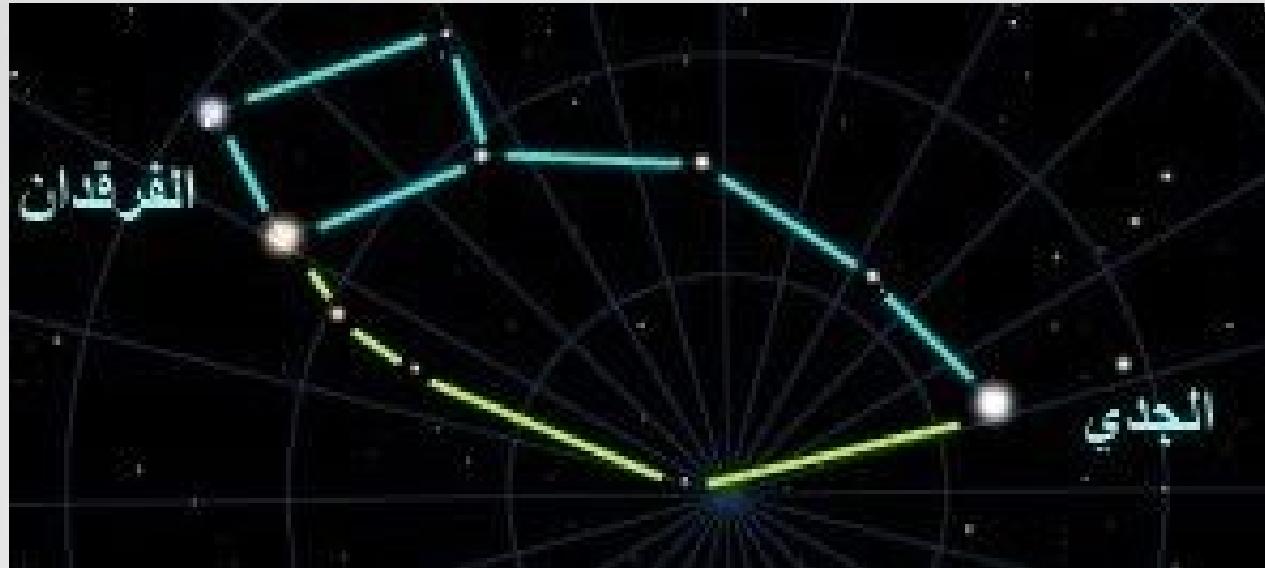
- Vatican,
Morocco 1224
C.E.
 - “millstone rig”
 - Two marking for
‘pole’
 - قطب معدل
النهار
 - موضع القطب
للفأس





NCP ~ 960 C.E.

2bits



- Reconstruction of north celestial pole in 960 C.E.
- Sufi's text says it is at the bend connecting the two Pharkads [Pharkad and Kochab] and Algedi [Polaris]
- Scribe misinterpreted Sufi's analogy of millstone rig, shaped like the body of a fish



Star List - Draco



- (Partial list)
 - ‘More than Almagest’
 - Number,
 - Description
 - Latitude, longitude (deg, mins),
 - Hemisphere
 - Magnitude



Star List - Cancer

2bits

- First star listed as ‘cloudy’
 - Two sections, inside the image, and outside
 - Summary by magnitude after each section



Manuscript 1170CE Damage 





Ursa Minor - French



Figure 1⁶⁾.

Catalogue des étoiles de la constellation le petit Ours, les longitudes de l'al-madjisti augmentées de 12° 42'.

11^a

N°	Noms des étoiles.	Longitude.	Latitude	Gran-deur.
1.	L'étoile qui est à l'extrémité de la queue, nommée <i>al-djudaï</i>	2° 12' 52" B	66° 0'	3
2.	Celle qui est après sur la queue	2 15 12	70 0	4
3.	Celle qui est après avant la racine de la queue قبل مخرز الذنب	2 28 42	74 0	4
4.	La méridionale du côté antérieur du quadrilatère الأضلع المتقدم من اضلاع المربع	3 12 22	75 40	4
5.	La boréale du même côté.....	3 16 22	77 40	5.4
6.	La méridionale de celles qui sont dans le côté postérieur; c'est la plus brillante des deux Veaux انور الفردين, <i>anvar al-farkadaïn</i>	3 29 52	72 50	2
7.	La boréale du même côté; c'est la plus obscure des deux Veaux اخفى الفردين, <i>achfa al-farkadaïn</i>	4 8 52	74 50	3

En tout sept étoiles, dont une de la deuxième grandeur,
deux de la troisième, trois de la quatrième et une de la
cinquième.

Étoile située au-dessus et qui n'appartient pas à la figure.

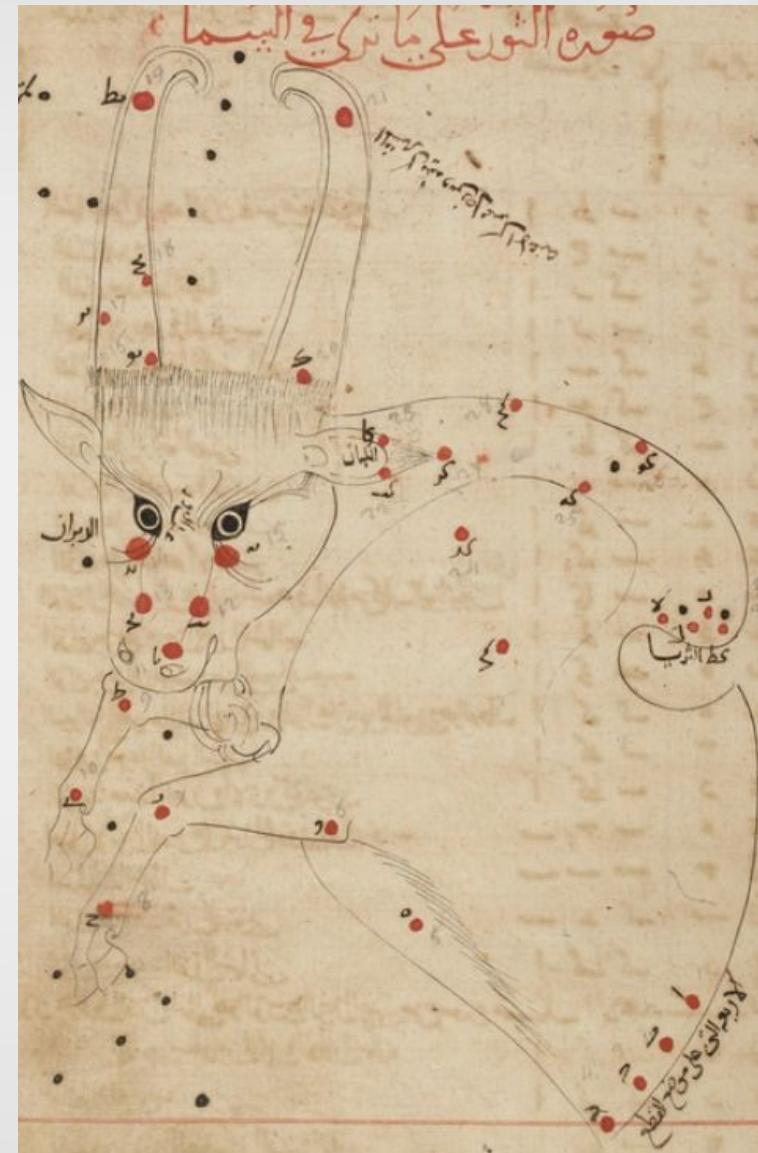
1. La plus méridionale en ligne droite avec les deux Veaux. 3 25 42 71 10 4



Taurus, Pleiades

2bits

- Taurus
- Pleiades
- Aldebaran (Arab name)





Nebulousity



Nebulous Stars

Nebulous Patches





Perseus Double Cluster

- Perseus (= Bershaos),
‘Carrier of the Goul’s
Head’
- Double Cluster





Perseus Double Cluster

2bits

- Closeup, showing the cloudy star in Perseus' wrist





Perseus Ulugh Beg

2bits

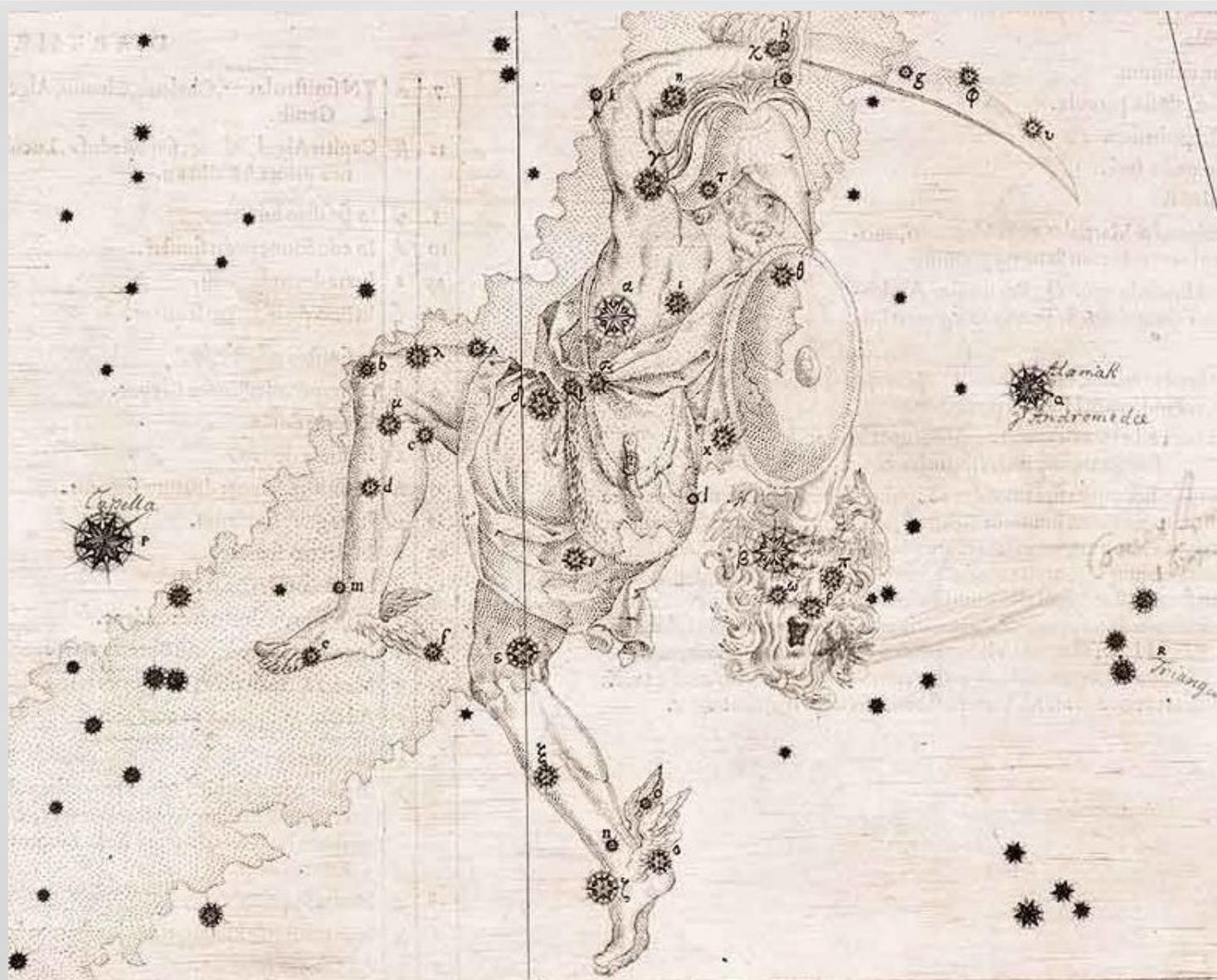
- In the expensive gold leafed manuscript
- Double Cluster drawn
- Not in other sloppy manuscripts of Al-Sufi's book





Uranometria 1603 C.E.

2bits



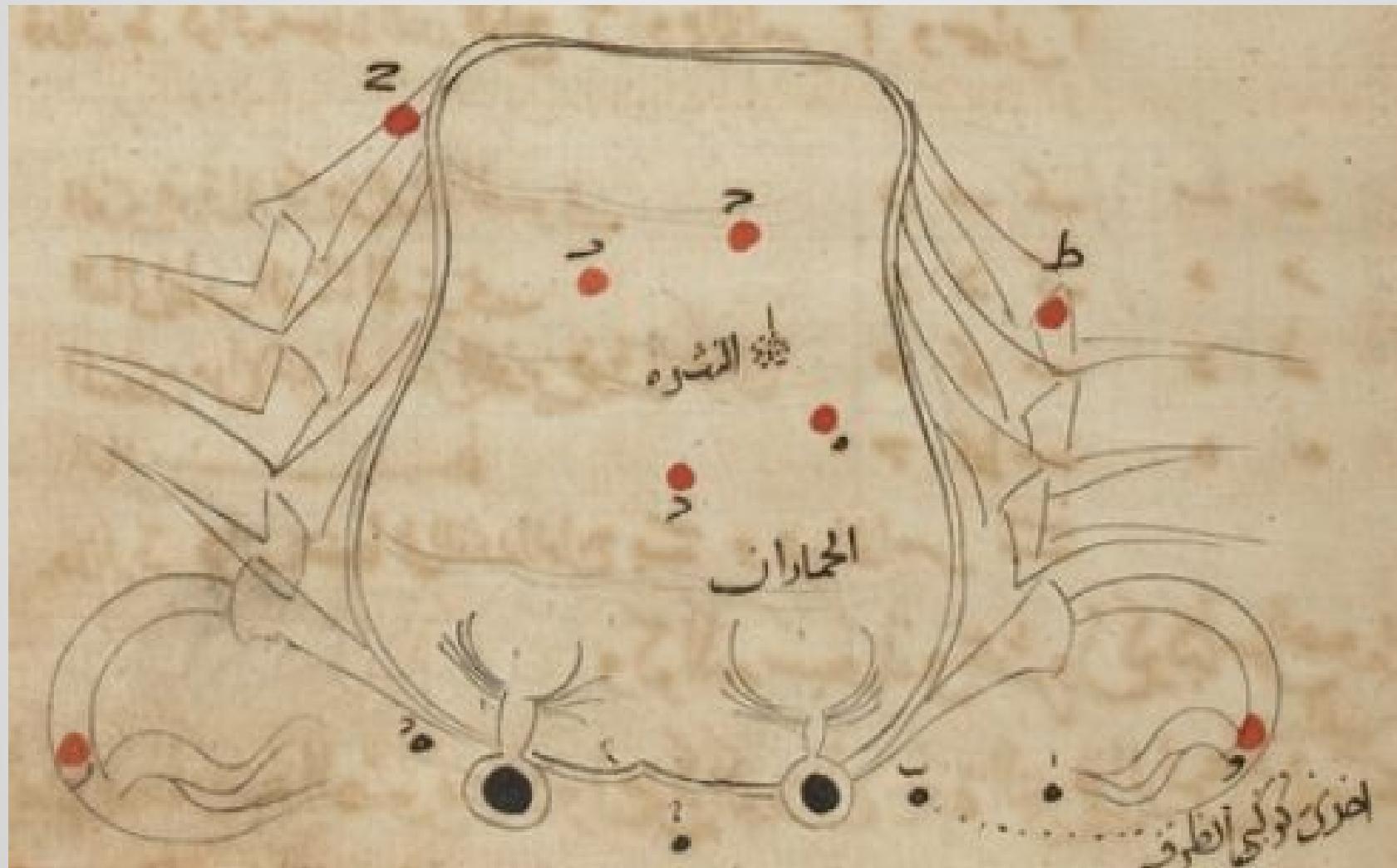


Perseus Double Cluster

- Magnitude: Cloudy!



Cancer, M44, 2 donkeys





Brocchi's Cluster / Coathanger

في الموضع الرفيع من القطب المغير من الحمراء صور باطية يندك كوالبها من
عند الناس الذي على على الرب قيم نحو الشمال والغرب ثم يعطى نحو المشرق
فاسفلها طيبة ثم يعطى نحو الجنوب والمشرق حتى يصل لخطه سماحة
على شمال الاشيا الذين على فوق السهم من الخطه وبين القوارب مدار ذرع
وقد صارت الخطه على حافتها المرقبة والنبي الذي على زين العقب على حافتها

- Mentioned in passing, when describing Aquila
- As near Sagitta
- Even Messier, described his objects as nuisances





Sagittarius with Cluster

2bits

- Label: Cloudy
- M22 or M25?
- Two sets of 'Ostriches', those who are done drinking, and those who are still drinking.





Sagittarius with Cluster

العنوان		الطول		العرض		علامة المحسنة		جدول حركة الرأسي ببراده	
الرقم	المعنى	الرقم	المعنى	الرقم	المعنى	الرقم	المعنى	الرقم	المعنى
١	الذى على يفصل المسمى	٢	م - ٩	٣	ج - ٤	٤	د - ٣	٥	و - ٦
٢	الذى على يفتح اليد السرى	٦	ك - ٧	٧	ط - ٨	٨	ل - ٩	٩	م - ١٠
٣	الذى في الجانب الجنوبي من النوس	١٠	كما - ١	١١	ز - ٢	١٢	رم - ٣	١٣	ذ - ٤
٤	ابل الاشراف الذرى في الجانب الشمالي من القور إلى الجنوب	١٤	ط - ٦	١٥	ز - ٧	١٦	هـ - ٨	١٧	ف - ٩
٥	ابل هذين في الشمالي وهو على طرف القوس	١٨	خ - ٩	١٩	ح - ١٠	٢٠	ذ - ١١	٢١	م - ١٢
٦	الذى على الكتاب لا يسر	٢٢	كما - ١	٢٣	ز - ٢	٢٤	رم - ٣	٢٥	ذ - ٤
٧	المقدم لهذا وهو على العشم	٢٦	كما - ١	٢٧	ز - ٢	٢٨	رم - ٣	٢٩	ذ - ٤
٨	الكاف المطرد الذي على العز	٣٠	كما - ١	٣١	ز - ٢	٣٢	رم - ٣	٣٣	ذ - ٤





Andromeda Galaxy M31 **2bits**

ذكر بقلم يوم من الثالث واما العرب فانها وجدت سطرين من لواكب
فلا حاطا بصور سهكلة عظيمة تحت خواصها بعضها من هذه الصور و
بعضها من كوكب السهكلة الشماليه من السهكلتين اللتين وضعيهما بقلم يوم
في النسخ الثاني عشر من صورة البروج وابتدأ السطر من عنده طه سحابيه فالصف
للكوكب الرابع عشر الزنك في الجنب لا يرى من السهكلة التي فوق الميزان فلا يرى الا زهر
يسمى العازل في وسط صورة السهكلة الغضبيه ثم ينضم ما من الوسط الى ايمقعاً عند





Greek and Arab Names



حَوْكَةُ الْمَرْأَةِ الْمُسْلِمَةِ وَنَسْمَى الْمَرْأَةِ الْمُلْمَعِيَّةِ بِالْبُوْنَابِيَّةِ اَنْدُرُومِيْدَا

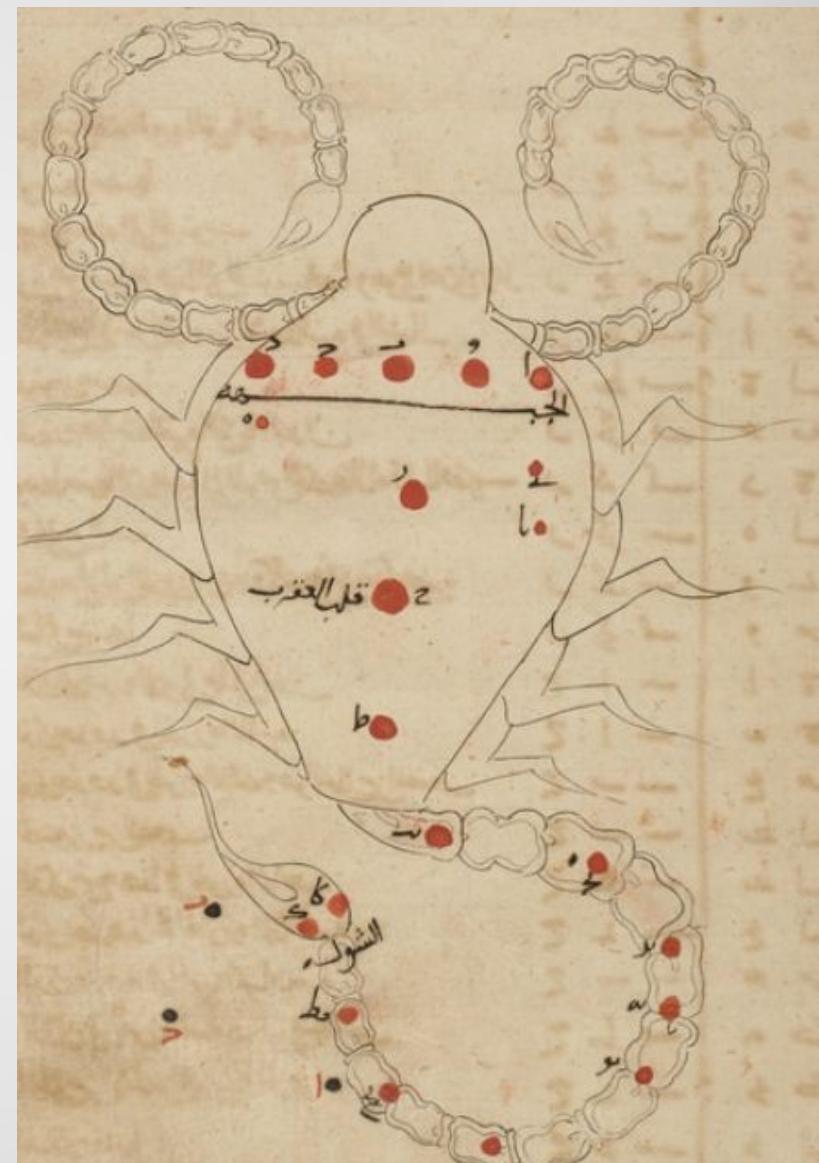
- “Constellation of the ‘Chained Woman’, also called ‘The Woman Who Saw No Husband’ [never married?], and in Greek: Andromeda”
- In Greek mythology, she marries Perseus, and has 7 sons and 2 daughters
- Wrong translation by Al-Sufi’s predecessors?



Scorpio



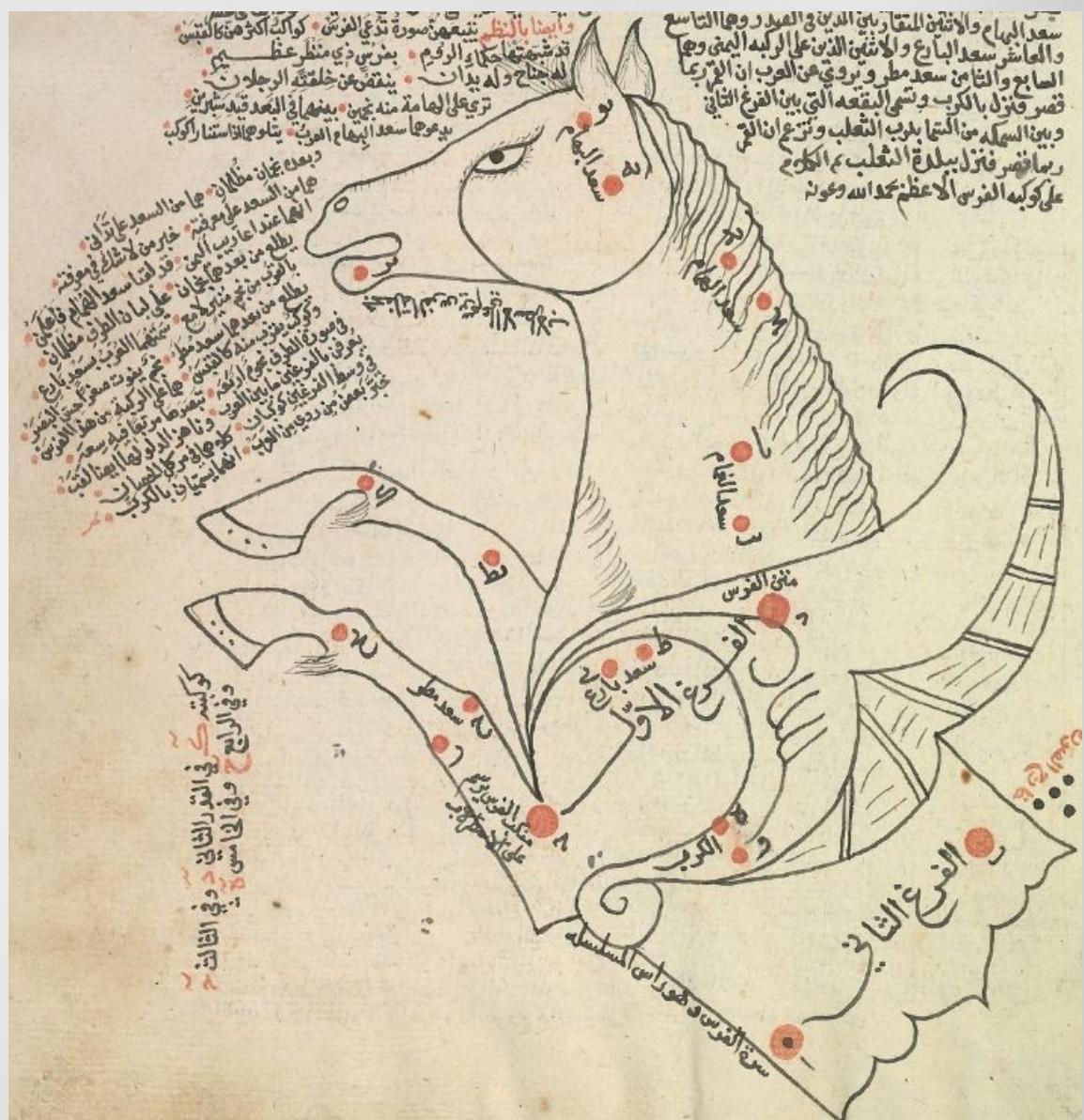
- Front 5 stars called collectively: The Forehead (Jabha)
- Now called Acrab (Scorpion), and Dschubba (forehead)
- Antares called 'Heart of the Scorpion'
- Shaula





Pegasus, Winged Horse

- The Great Horse
 - Depicted with wings
 - Partial “has no hindquarters, or rear legs”

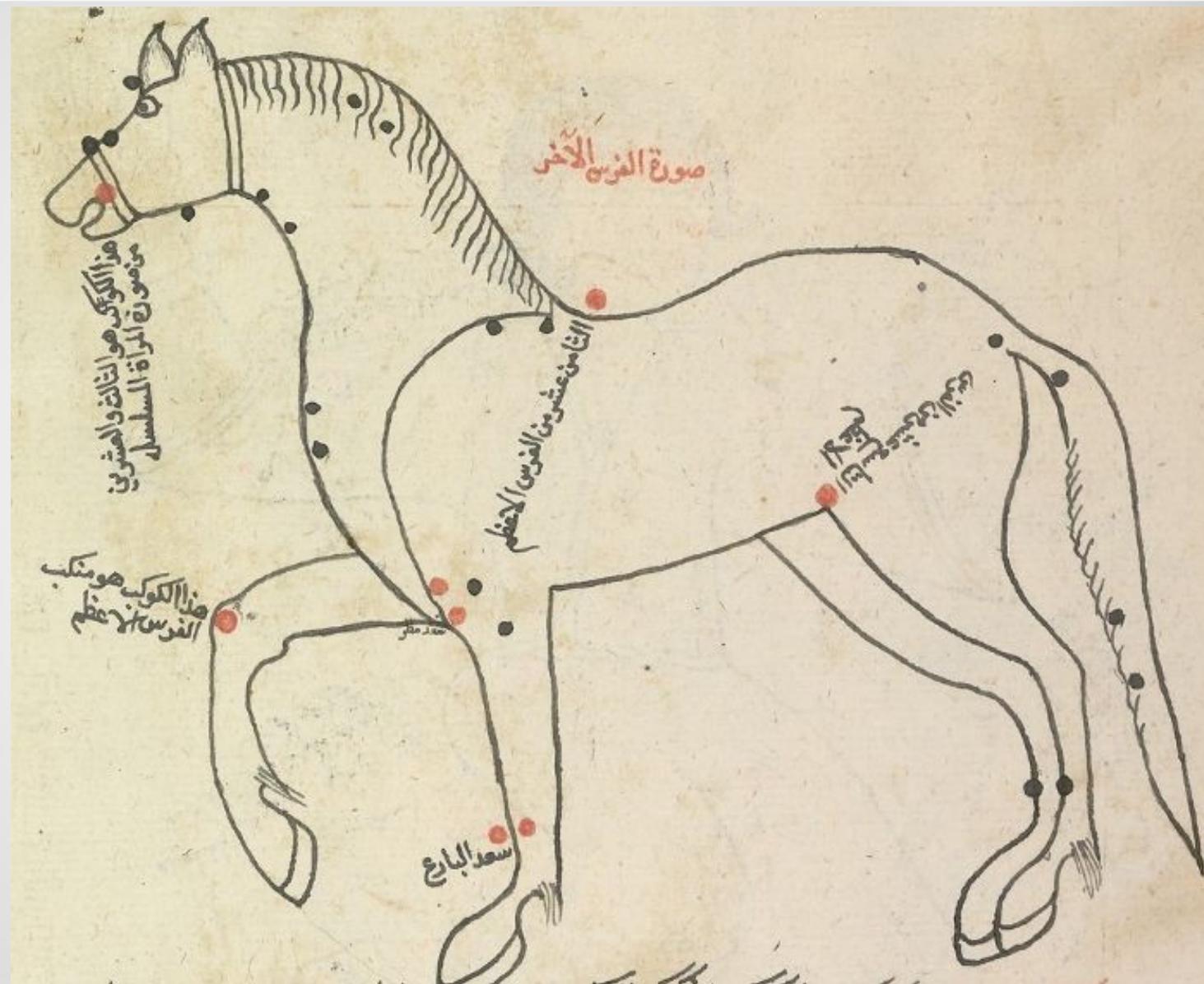




The Other/Full Horse



- From Arab Star Lore
- Called ‘The Other Horse’
- Also, “The ‘full’ Horse”





Not Equuleus



- Equuleus is listed separately
- As 'Piece of the Horse'





Andromeda + Fish

2bits

- Quoting Ptolemy
- Andromeda with Northern Fish





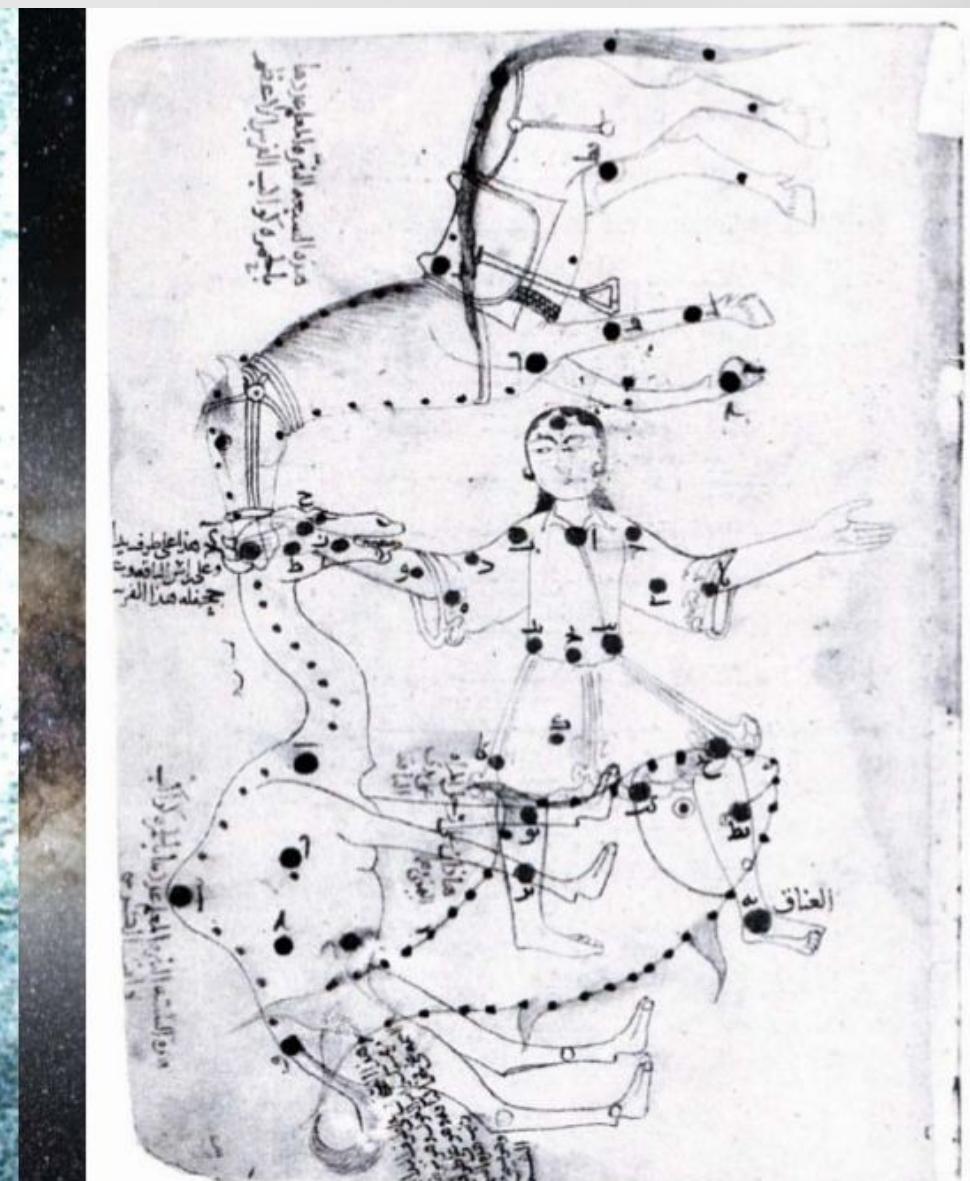
Andromeda + Other Fish

- Andromeda, with yet another Fish (Arab Star Lore)
- Note the Double Cluster on the fish's tail





Horse, Fish, She Camel 2bits





Horse, Fish, She Camel 2bits

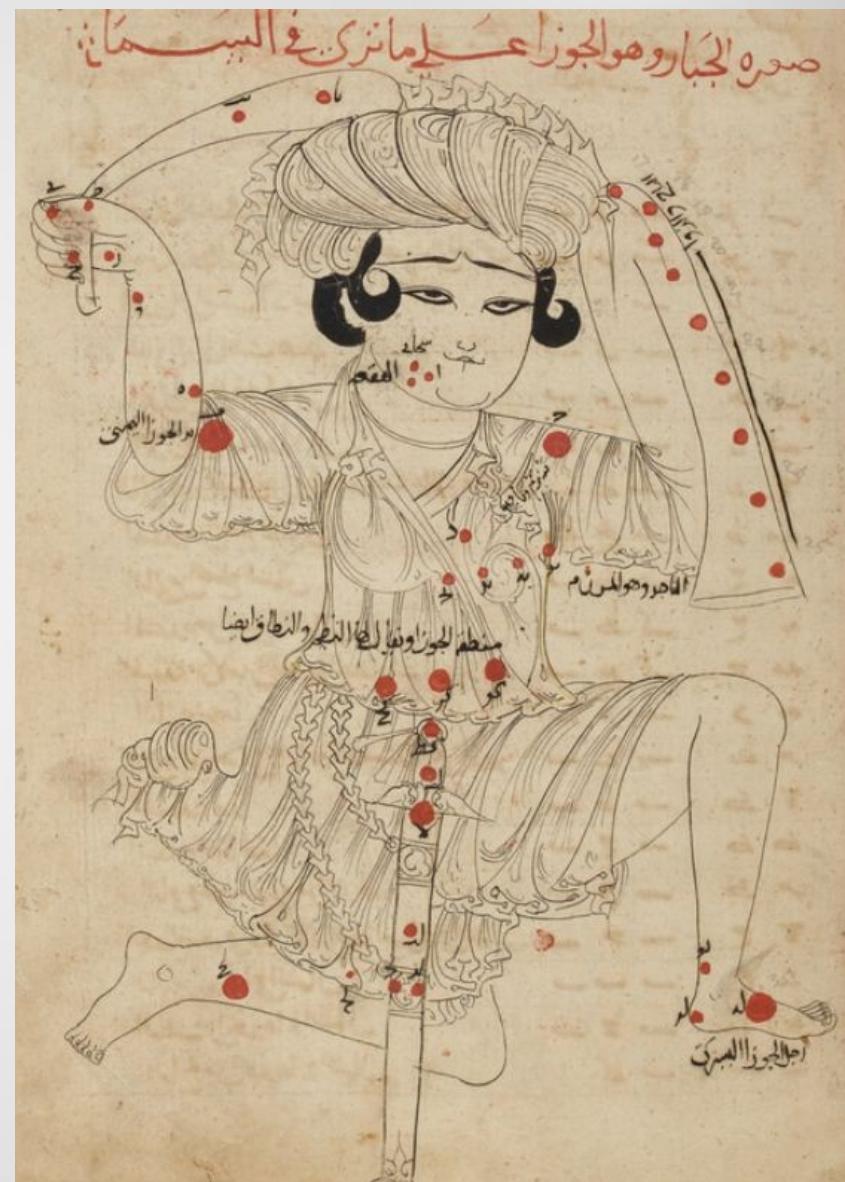




Orion



- Labels the face as ‘Cloudy’, and says it is actually 3 stars
- Yad Al Jawzaa = Betelgeuse (misreading or mispelling by translators يد to بـد)
- Rigel Al Jawzaa Al Yusra = ‘Orion’s Left Foot’
- Mintaq = Nazm = Nitak
- No M42 nebula!





Altair



- Al Nisr Al Taayer = The Flying Eagle = Altair



Leo, corrected

2bits

- Title says ‘as seen in celestial sphere’, then corrected to ‘as seen in the sky’
- Regulus labelled “The Lion’s Heart, and also ‘The Regal One”





Suhail/Suhayl



- Several having the prefix Suhail in Arabic
 - Suhail
 - Suhail al Wazn
 - Suhail Hadar
 - Suhail Raqash
 - Muhlfain
 - Muhnithain

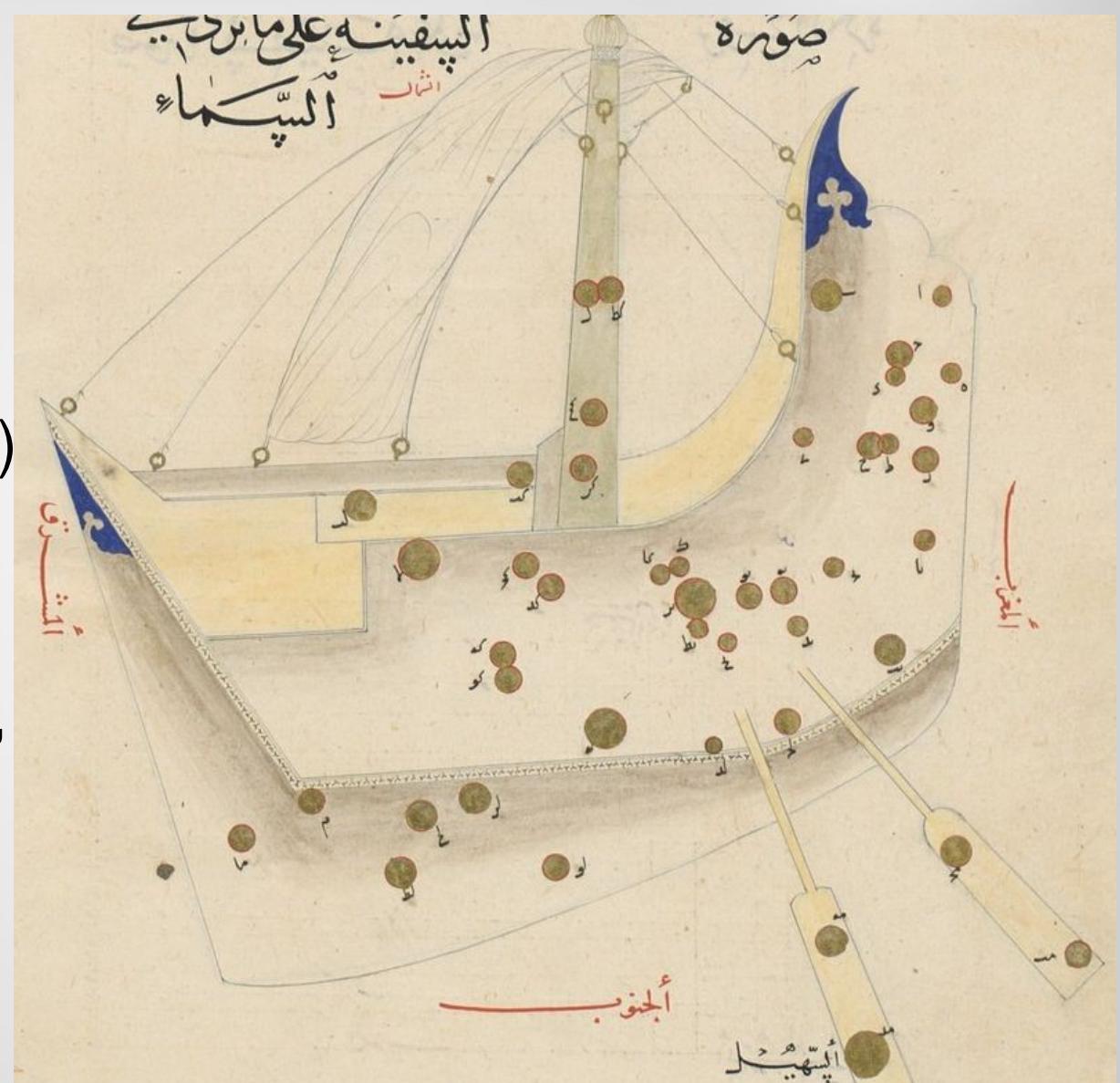




Argo Navis – The Ship

2bits

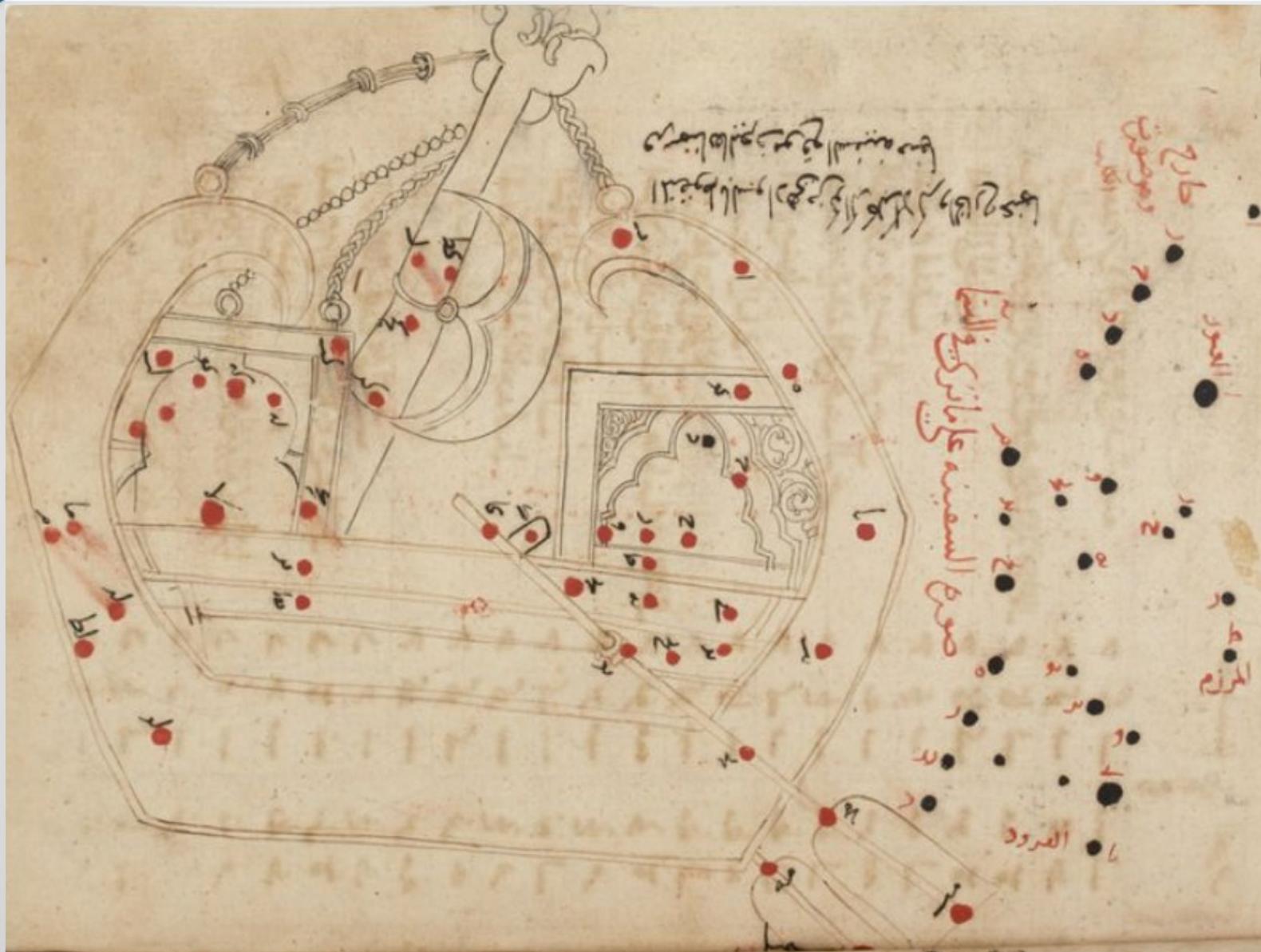
- From the royal manuscript
- Now broken into Vela (Sail), Pupis (Poop deck), and Carina (Keel)
- Discussion of detailed measurement of Canopus (Alpha Carina, Suhail)'s location visibility from Shiraz' latitude





Argo Navis – The Ship

2bits





Magellanic Clouds



- “People claimed that under the feet of Suhail (Canopus) are bright white stars not seen in Iraq or Najd. People of Tihama call them ‘the cows’. Ptolemy did not mention them, and we don’t know if this is true or false.”

واحدة وزعم قوماً تحت قدمي سهيل كواكب زهر
يضر لا يرى بالعراق ولا يخداون اهل تقا هة سيمير سا
البقر ولم يزكى بطليوس شيئاً من ذلك وگلاندر
هو هوم باطل فقدر وى قومان ايتدا، كواكب السفينة





Lyra, Tortoise



- “Saw its image on some spheres as a tortoise’
- This is where Sulaphat comes from
- Sheliyak as well (not Arabic)
- Vega, Falling Eagle

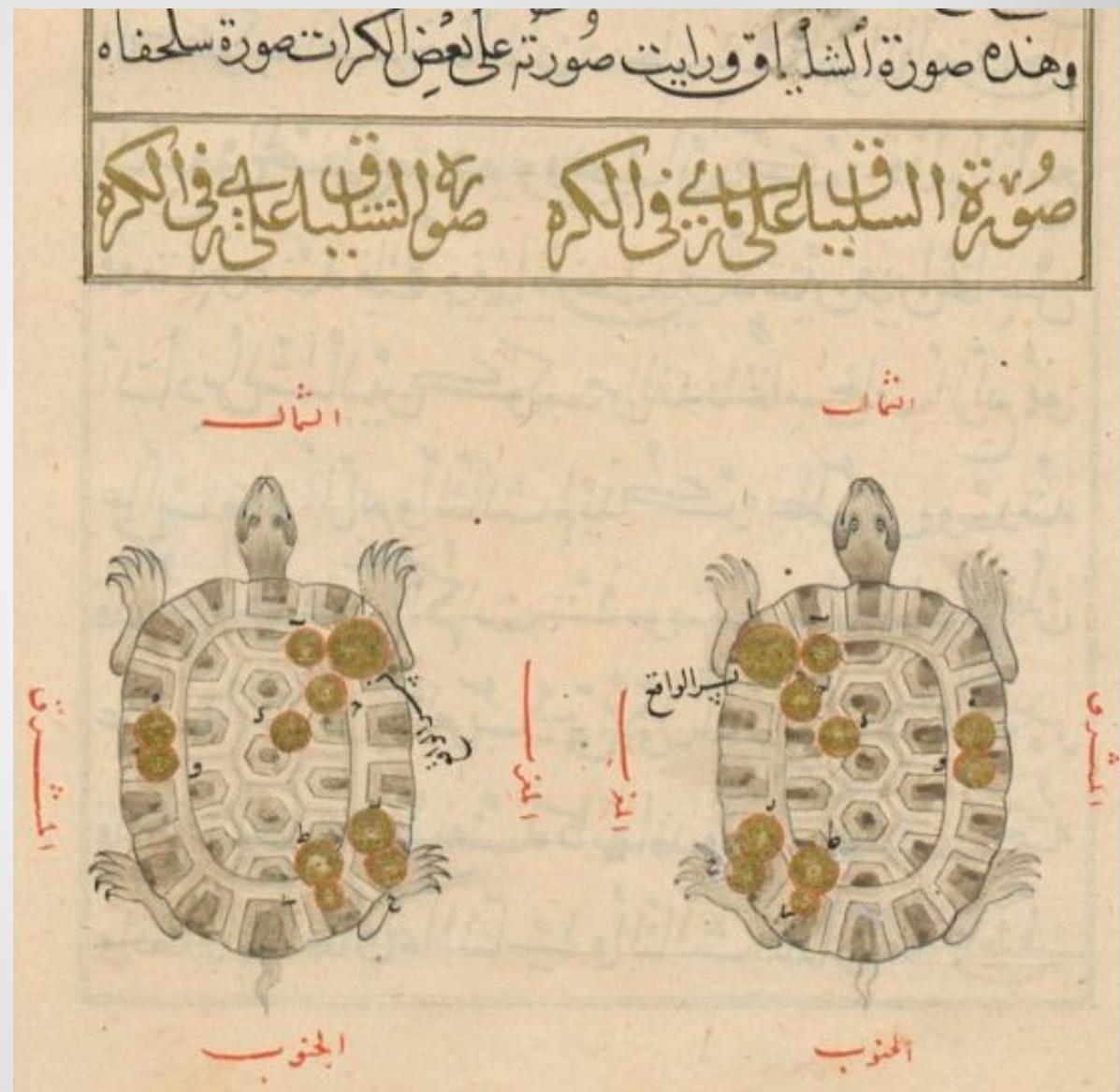




Lyra, Tortoise

2bits

- Indeed, in the royal manuscript, it is a tortoise
- Mistake in labelling the images: both say 'as in celestial sphere'

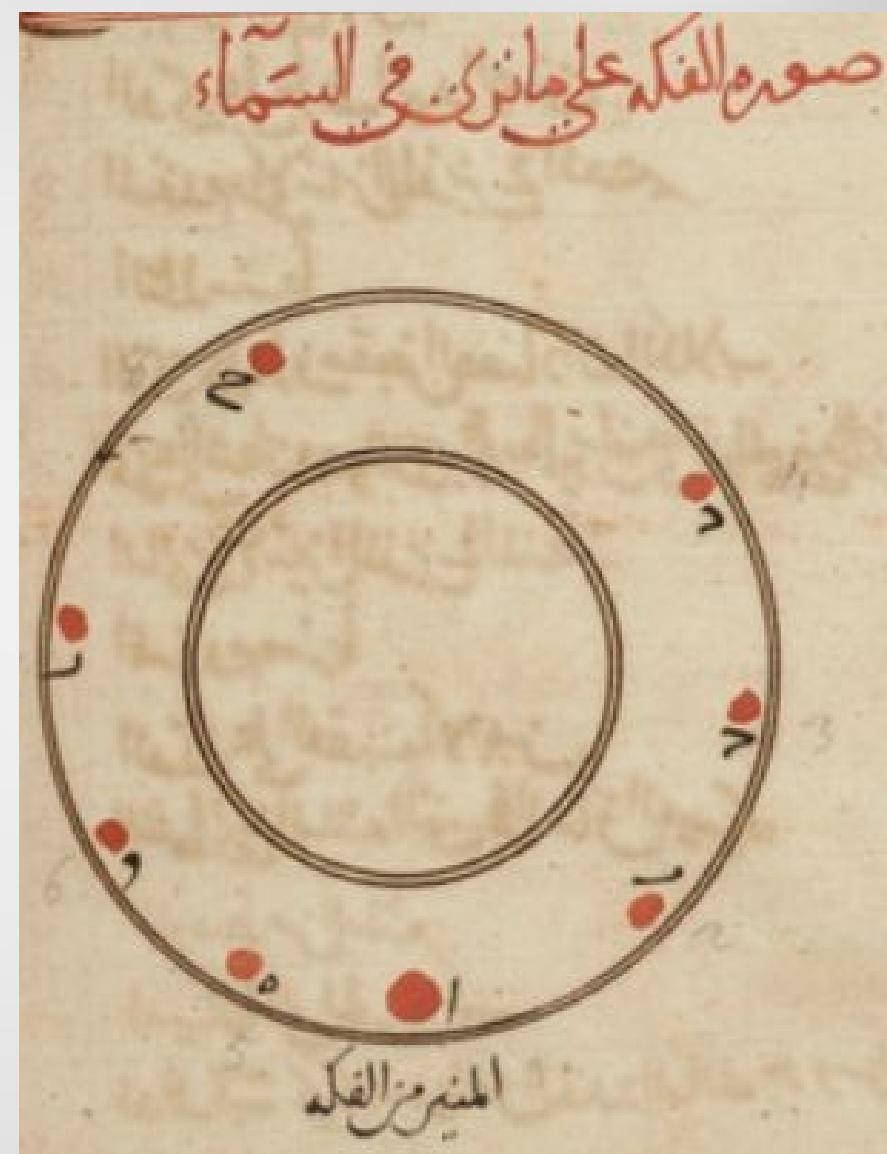




Corona Borealis

2bits

- Folk name: 'plate of the poor', because it is broken, and missing a side
- Alphekka is the name of the constellation
- Taken as the name of the brightest star





Corona Borealis

2bits

- Drawn ‘broken’ in another manuscript





Incomplete Page

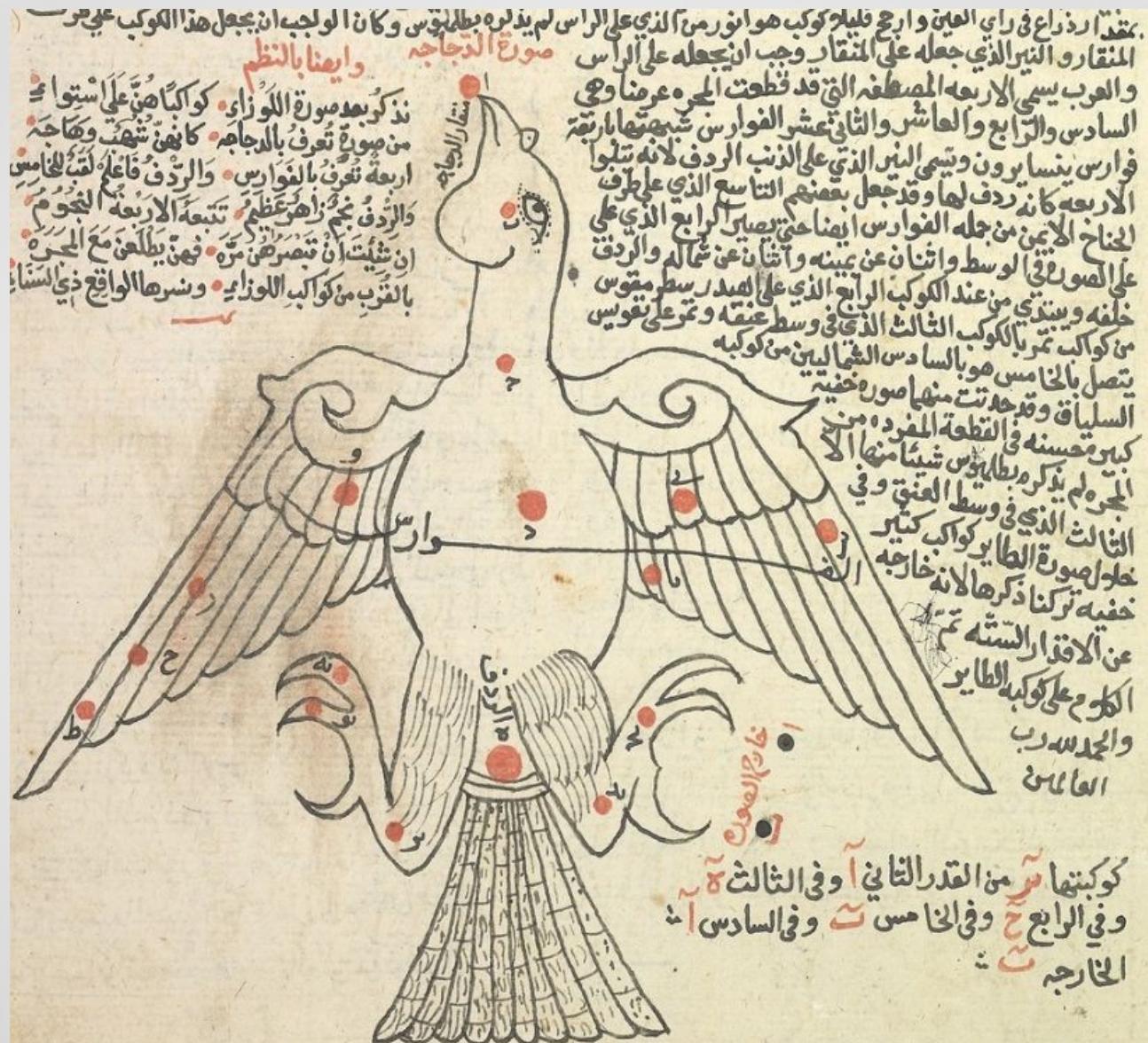


- Guess which constellation?





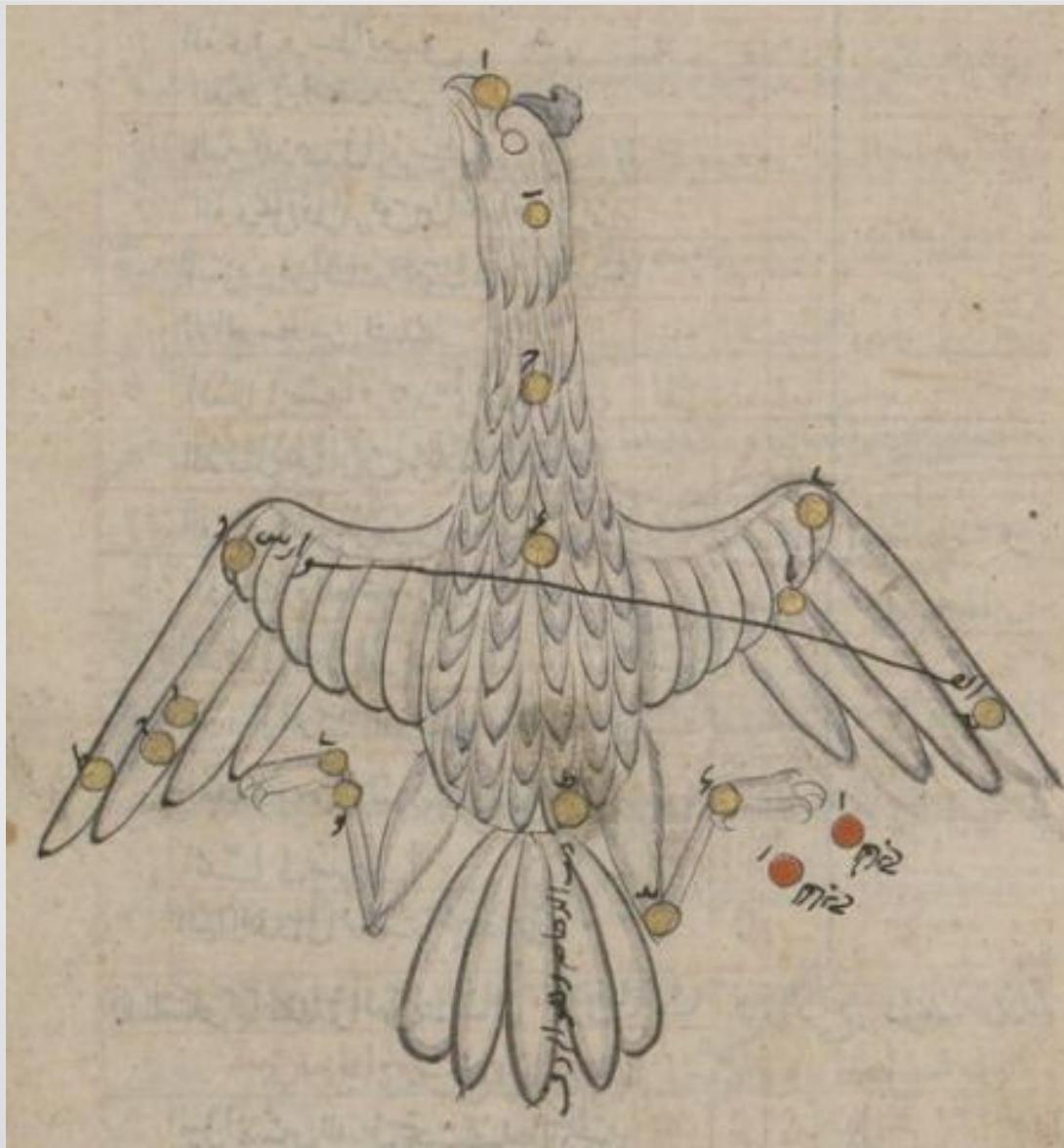
Guess the Constellation? **2bits**





Cygnus – Ulugh Beg

2bits





Combined Manuscript



- Text and drawings from the father original book
- List of stars from his son Al-Hussain's poem (Urjuzat Al Kawakib)
- No celestial globe image
- Written ~ 1606 C.E.
- Perhaps someone thought tables are too boring? Or was it Al-Hussain who made that version for didactic reasons?
- Princeton University





Combined Manuscript

2bits

لوكبه الدلت الكنجامة وحسن عونه **وأيضا بالنظم** كوايات تعنها أثنيوه أحواها زاهرة منوار. قوله لكتتها الرؤوم دناء الغافلية. وشيخته بالذى تقدما في حالة الدلت بخوم اربعه شكلت بصوره مرتعمه تدور حول القطب كالدورة. ينعرف بالتعشى لدى الاعاب يتبعها تأثره على نسق تأوح للعنان ذا الليل المغضى. ولقتها العوب بالبنات والقتها الرؤوم الرؤوات ان الذي يهدوا من المربعة من صنف الشلوة المخطفه يعرف بالجرون لدى الاعاب. كذلك يزوي عن ذوق الاداب ثم الذي يتعين هنا الجنا. فتح بغير ذوى يعشقونه عند الاعاب عيادة فاعل. وفيه بضم صغير مظلمه لقتها بعنهن الاعاب رسها وجاء في بعض الروايات السناء. وقد قسمها نعيساً عبده لها على الفحوم نيسه وعصبة تقوها السيد وباعونه دى جبرة مقدمة ان تختنى الابصار. وفه ايضًا مثل ستار قول الذى قال ارى حرا السها وهو ربى الدلت بعلوة وعا وبعد هذا الجمجم والمطر اذهروه ونور سبي القايدية. حتى تغوم النفق والبنات. وكائن تعرف بالقرارات هي على طلاق هذه الدلت من البنات والنساء بالقرب. وقولى في قبورهن الفرايا. راوونن الاعاب غير مانين وقوته سبيه بالليواقي. وهن افأدار الليل المغفار. والقرارات اسم لكم التكمل استهباب. وعند جهوده عن الروايات تعرف ايها بالقليلات. تقدمها كوكوك لكنه صغيره كثيرة ليست لعن صوره خفتة في غاية الغفاء. تعرفها الاعاب بالظباء. تقدمها بقية صغيرة. غالبة المنعش مسترفة. فالليل المغفار ينبع من الماء العذب والليل المغفار ينبع من الماء العذب.

سورة الدّاتُ الْأَكْبَرُ





Influence



- On Islamic Scholars
 - Al-Biruni (973 - 1048 C.E.)
 - Al-Qazwini (1203 - 1283 C.E.)
 - Al-Tusi (1201 – 1274 C.E.)
 - Ibn Majid (15th-16th century C.E.)
 - Ulugh Beg (1393 - 1449 C.E.)





Ulugh Beg



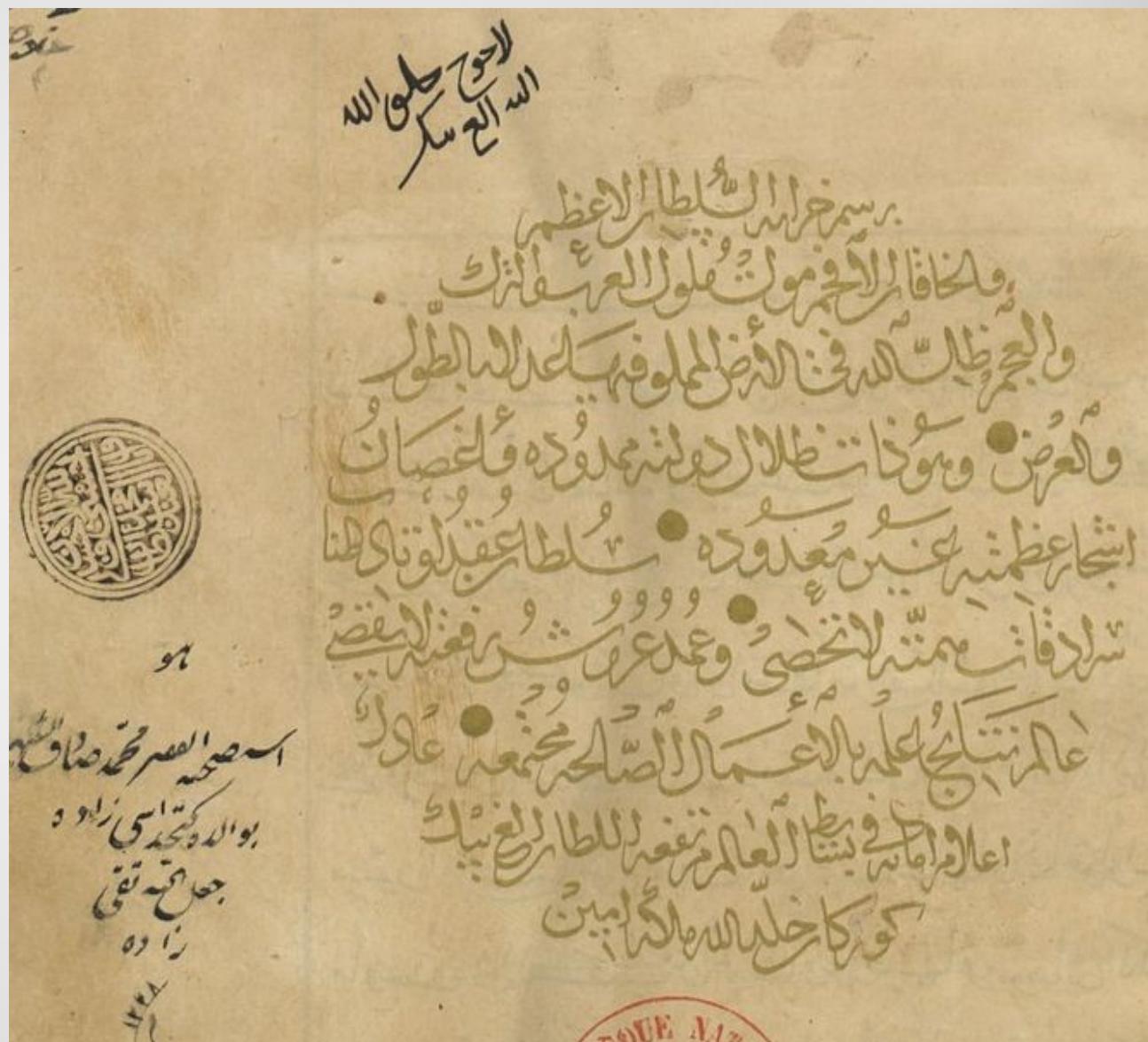
- 1393 - 1449 C.E.
- Grandson of Tamerlane (Tatar conqueror) and Sultan
- Observatory in Samarkand (Uzbekistan)
- Employed famed astronomers
- Madrasa (university, or institute)
- Re-Observed positions of 992 stars
- Correction to the length of sidereal year (25 sec error)
- Zij Sultani, printed in Latin, Oxford 1655 C.E.
- His own son ordered his killing





Manuscripts – Ulugh Beg 2bits

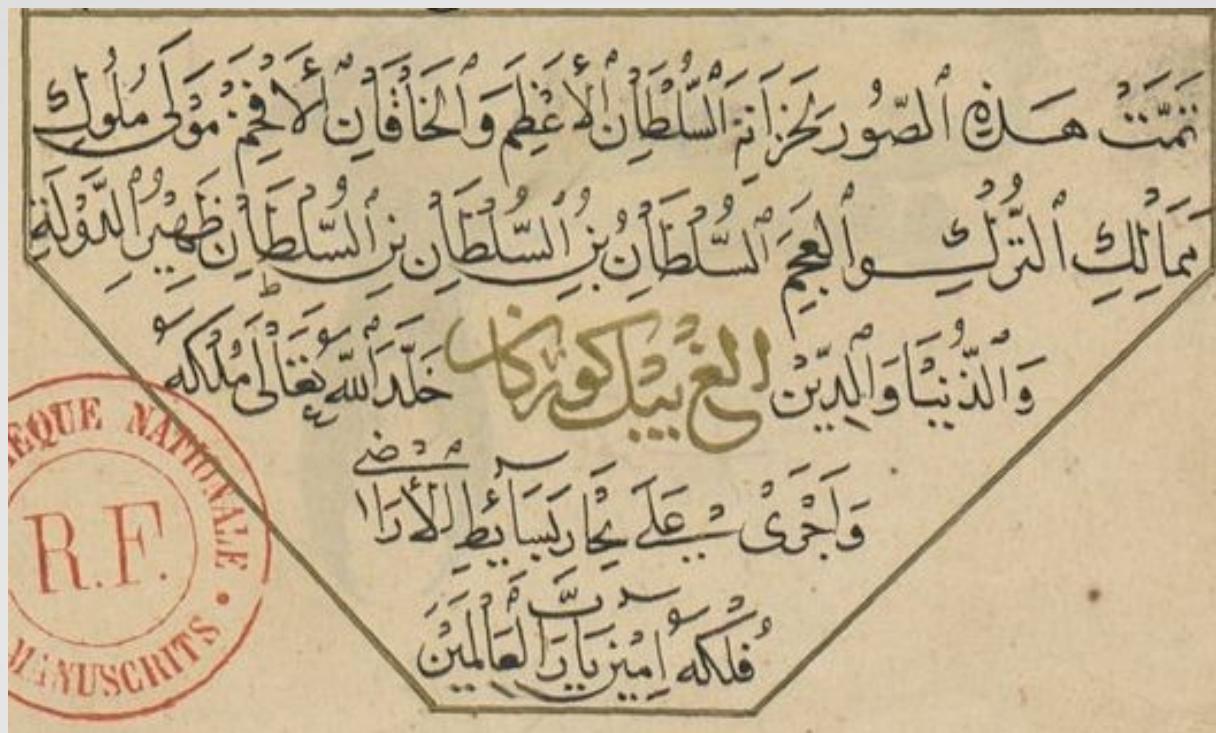
- Ulug Beg's scribble (with humility)
- Gold leaf praise and prayers
- Seal and scribble of subsequent owners



TOUE M12



Manuscripts – Ulugh Beg



“Complete for the library of the Grand Sultan, King of Kings for Turks and Persians, the Sultan son of Sultan, Dahir Al-Dawla Ulugh Beg Korkan may his domain be preserved by Allah ...”



Ulugh Beg Observatory

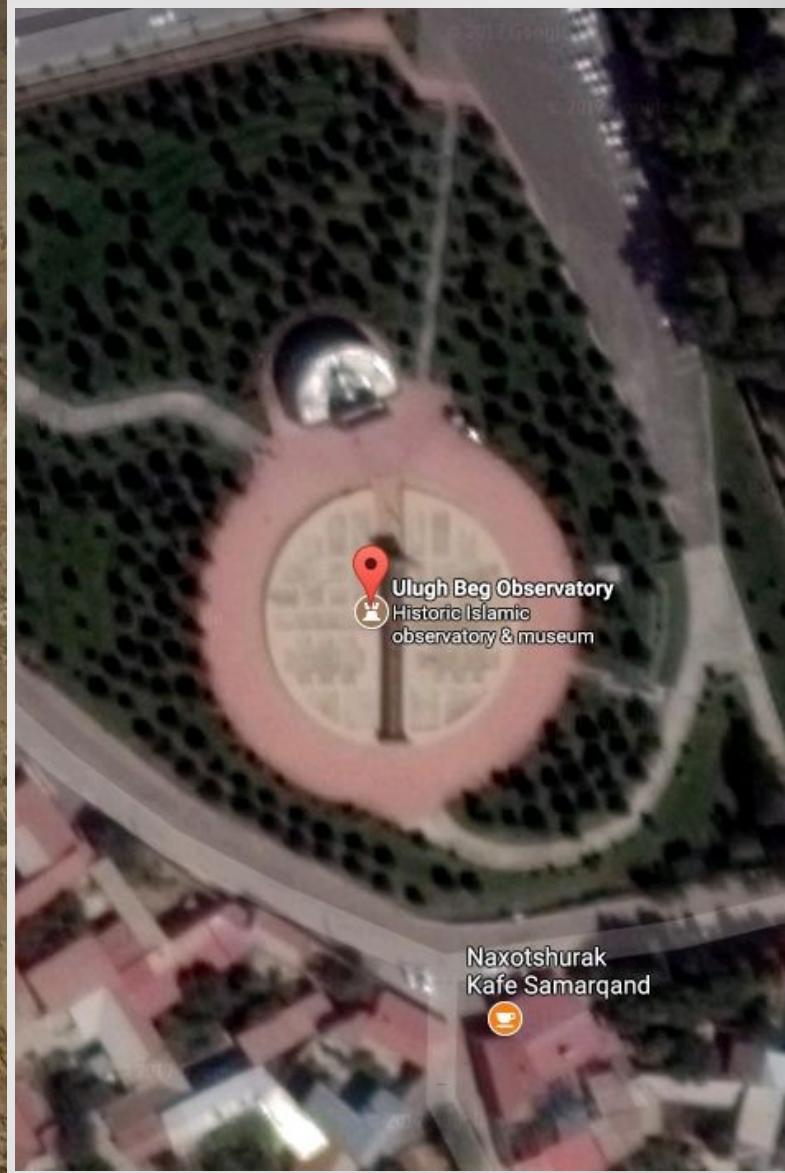
2bits





Ulugh Beg Observatory

2bits





Persian Translations



- First by Nasir Al-Din Al-Tusi (1250 C.E.)
 - Himself and astronomer
 - Had his own copy of Sufi's book, with corrected coordinates and magnitude in his own hand writing
 - Started the Maragheh observatory in 1259 C.E. (north west Iran, near Azerbaijan)
 - Wrote extensively on astronomy, including *Zij Ilkhani*
- Later translations by others to Persian





Latin Translations



- 9 Manuscripts exist
- Not in the initial translations from Arabic (10th to 13th centuries)
- Sicily in 13th C.E. Sicily
- Castille, for Alphonso X El Sabio (reigned 1252–1284)
- Libros del Saber de Astronomia, handbook
- Included a free recension of Al-Sufi's book, with constellation drawings





Later Editions



- Italian translation 1341 C.E.
- Petrus Apianus 1533 C.E., some Arab asterisms derived from Al-Sufi
- Giovanni Riccioli 1651 C.E. used Al-Sufi's latinized name (Azophi) for a moon crater
- Thomas Hyde 1655 C.E. in Oxford an edition of Ulugh Beg's star catalog; and in the commentary quoted from Ṣūfī's book.





Later Editions



- Giuseppe Piazzi in 1814 C.E. picked up around 100 Arabic star names, which he added to the 1814 edition of his Palermo star catalog, thereby introducing them into modern astronomy.
- Hans Carl Frederik Christian Schjellerup
 - French translation, printed 1874 in St. Petersburg, without pictures
- Arabic edition in Hyderabad, India 1954
- Facsimile in 1986, Germany





Aftermath



- Arab astronomy started with translations from India, then Greek works
- The Islamic world did not get continuous updates from Western observations (after the initial translation from Greek in the early 800s)
- Later, observations from the Arab world made its way to Europe, in waves, including Sufi's work





Conclusions



- Al-Sufi was a real observational scientist
- Had meticulous discipline and methodology, and correction to prior scientists (critical thinking)
- We can probe his mind after over 1,000 years!
- He merged two traditions: Arab and Greek
- Which filtered down in merged star names (Arabic names for Greek lore, as well as Arabic names for Arab lore)
- Science and culture are cumulative and cross-civilization





Further Reading



- LoC's wdl.org: 2 manuscripts (online, or download PDF)
- Schjellerup *Description des étoiles fixes* on Google Books
- Other manuscripts are on Bodleian and BNF
- *Al-Sufi's Book Of The Images Of The Fixed Stars and Its Influence On Islamic and European Celestial Cartography*, Robert H. van Gent, Utrecht University
- *Abdul Rahman Al-Sufi And His "Book Of Fixed Stars" A Journey of Re-Discovery*, Ihsan Hafez, 2010, James Cook University, Australia
- *A Dictionary of Modern Star Names: A Short Guide to 254 Star Names and Their Derivations*, Kunitzsch and Smart





Questions?



Questions? Comments?

