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



British Library manuscript Or.5323 is a late thirteenth-century copy of the well-known illustrated treatise on the constellations, composed by the Persian astronomer ^cAbd al-Raḥmān b. ^cUmar b. Muḥammad al-Ṣūfī in 964AD. It is a significant manuscript, both in terms of Islamic art history and constellation iconography. This study follows three different approaches to establish the date and provenance of the manuscript.

The study begins with a precise description of the manuscript, and a reconstruction of its original pagination. Additional notes and owners' seals are examined, and provide new details of the manuscript's provenance and history. These establish that the manuscript was produced before 1279-80AD. Then follows a review of al-Ṣūfī's biography, and the history of his treatise. Al-Ṣūfī's influences and innovations are discussed, as is the extent of the work's popularity and dissemination throughout the Islamic world and Europe.

The illustrations are assessed in relation to a review of Islamic constellation iconography previous to 1400AD, in other copies of the treatise and on celestial globes. There is a particular connection with three celestial globes, attributed to an II-Khānid observatory in Marāghā (NW Iran) in the late thirteenth century. The metamorphoses of the classical constellation-images in the Islamic world are also discussed, constellation by constellation, and the considerable influence of late classical pseudo-scientific astronomy literature is demonstrated.

Finally, the al-Ṣūfī manuscript is considered in the stylistic context of thirteenth-century Islamic art. There are different stylistic links in evidence, one archaic and one contemporary. The contemporary link is with "Seljuk-style" painting, in both manuscript-illustrations and overglaze-painted ceramics, and is the most dominant. Certain decorative motifs are also found in architectural reliefs and metalwork, from thirteenth-century Iraq. It is concluded that the illustrations represent a continuation of an early thirteenth-century style into the second half of the century. The illustrations belong to an important period for the arts of the book in Islam: the moments before the artistic impact of the Mongol invasions of Iran became manifest.

To my parents

3

Acknowledgements

In particular I would like to thank my supervisor Dr Anna Contadini, for advice and useful discussion, Mr Alexander Morton (formerly of SOAS) for invaluable advice and translation of Persian marginalia to the British Library al-Ṣūfī manuscript, Dr. Raymond Mercier (Southampton University) for discussion, advice and careful proof-reading of the section on star-tables, Prof. David King (Institüt für Geschichte der Naturwissenschaften, Frankfurt) for providing advice on qibla-finding diagrams and useful cross-references, Prof. Paul Kunitzsch (Munich) for advising me on the textual sources of a marginal note in the British Library al-Ṣūfī manuscript, and the staff of the Irish Embassy in Tehran, especially Mr Tim Doyle and Ms Fereshteh Sirus, for greatly-appreciated help with arranging visits to manuscript-collections, and providing an interpreter.

My sincere thanks are also due to the following people:

Dr Silke Ackermann (Dept of Medieval & Later Antiquities, British Museum) for advice and permission to view objects; Dr Colin Baker, Mr Muhammad clsa Waley and the desk staff at the Oriental and India Office Collection (British Library) for permission to view manuscripts: Dr Jim Bennett and Stephen Johnston (Museum of the History of Science, Oxford) for permission to view a celestial globe; Mr Turgai Bey and Ms Gülendam Hamm (Topkapı Palace Library, Istanbul) for permission to view manuscripts; Dr Sheila Canby (Dept of Oriental Antiquities, British Museum) for permission to view objects; Dr Monique Cohen, Dr Michel Garel, Dr Marie-Geneviève Guesdon, and Dr Francis Richard (Division oriental du Dept des manuscrits, Bibliothèque Nationale de France, Paris) for permission to view manuscripts; Dr Fadai and Messrs Ha'ri, Kusha and Amiri (Majlis Library, Tehran) for permission to view manuscripts; Mr Marcus Fraser (Sotheby's, London) for giving me photographs of the al-Şūfī manuscript sold as Lot34 in April 1998); Håkan Hallberg, Dr Hans Nodesjö and Dr ^cAlī Mirmohades (Uppsala University Library) for providing information about an al-Şūfī manuscript in their collection; Dr Nevzat Kayu (Süleymaniye Library, Istanbul) for permission to view manuscripts; Dr Sophie Makariou (Dept. des Antiquités Orientales, Musée du Louvre, Paris) for permission to view celestial globes, for useful advice and for giving me a copy of a lecture she delivered at the Louvre; Edoardo Manzano Moreno (Consejo Superior de Investigaciones Cientificas, Madrid) for advice; Mme Muzerelle (Bibliothèque de l'Arsenal, Paris) for permission to view a Latin translation of al-Sūfī; Ms Doris Nicholson (Bodleian Library, Oxford) for permission to view manuscripts, and

generous help with many photographic orders; Ms Monique Pelletier (Dept des Cartes et Plans, Bibliothèque Nationale de France, Paris) for permission to view a celestial globe; Prof. Michael Rogers (SOAS) for careful proof-reading, advice and discussion, and for arranging photographs of a celestial globe in the Khalili Collection; Dr Rouhfar and Dr Mohammad Reza Karegar (Iran Bastan Museum, Tehran) for permission to view and photograph an al-Şūfī manuscript, Dr Michael Ryan and Dr Elaine Wright (Chester Beatty Library, Dublin) for permission to view manuscripts: Dr Emilie Savage-Smith (Oriental Institute, Oxford) for useful advice and for kindly lending me a photograph of a nineteenth-century engraved copper plaque, Mr Tim Stanley, Ms Nahla Nassar and Ms Manijeh Bayani (Nasser D. Khalili Collection of Islamic Art, London) for permission to view manuscripts and a celestial globe, for discussion, and for giving me excellent photographs of the Khalili celestial globe; Dr Zeren Tanindi for providing impromptu (and much-appreciated) interpreting at the Topkapı Palace Library, Dr Sergei Tourkin and Prof. Kychanov (Oriental Institute, St Petersburg), for organising the delivery of an important microfilm. Fr José Luis del Valle O.S.A. (Escorial Library, Madrid) for permission to view manuscripts, Dr Rachel Ward (formerly of the Dept of Oriental Antiquities, British Museum) for permission to view a celestial globe, and also the staff of the Vatican Library, and the Real Academia della Historia in Madrid.

I would like to acknowledge the University of London Central Research Fund, for generously sponsoring two of my research-trips.

For technical support, I would like to thank Mr Junaid Menar (SOAS) and Mr Michael Dowling.

For much-appreciated help and support (practical/emotional/etc.): Umut Azak, Malika Kraamer, Tristan Sellen, and above all my parents.

Table of Contents:

Part 1 – Text	
Abstract2	
Acknowledgements4	
Table of contents6	
List of plates9	
Chapter One	
A late thirteenth-century astronomy manuscript, produced in Iran	
1. Introduction19	
2. Hűlāgū's seal20	
3. The Qibla-finder for Qazwīn in 1279-80AD22	
4. Reference to a Buyid waqf library in Baghdad26	
5. An engraved copy of the Or.5323 Pegasus, from more recent times33	
6. Accession to the British Library collection34	
7. Previous attributions36	
8. Format41	
9. Reconstructing pagination44	
10. Summary55	
Chapter Two	
Al-Şūfī and <i>Kitāb Şuwar al-Kawākib al-Thābita</i>	
1. The author58	
2. The treatise on the fixed stars	
3. Dissemination86	
Chapter Three	
Islamic Constellation Iconography	
1. Images primarily as maps91	

Pseudo-scientific images	92
Iconographical change in scientific images Introducing foreign material: translation vs transliteration	97 97
3. Linking classical and Islamic constellation iconography	103
4. Later constellation iconography	115
5. Pre-1400AD constellation iconography	119
6. The iconography of the constellations	125 140 149
7. Summary The Maghrebi Group The Marāghā Group	159
Chapter Four Stylistic orientation of the British Library al-Şūfī illustrations – the conservative a	ıl-Süfi
tradition versus contemporary Seljuk style	
1. IntroductionRestrictions imposed by functionRecent reassessment of Marsh144	170
2. 'The conservative al-Şūfī style': conservatism within the al-Şūfī f tradition	183 187 192
Monumentality and the Moon-Face: the British Library al-Şūfī fig	210
Robes, turbans and boots: costume in the British Librar Sūfī Communicative Pairs: monumental paired figures in constellimages and ceramic decoration Rearing horses in manuscripts and ceramics: companion Pegasus Half-palmettes and simurgh-heads in curling scroll motifs Late thirteenth-century styles of painting The continuation of Seljuk style in early Il-Khānid times	ry al- 216 llation 222 is foi 227 233
Conclusion	.247

Appendix One
Extant copies of al-Ṣūfī's Kitāb Ṣuwar al-Kawākib al-Thābita251
Annual div Tura
Appendix Two
Early Islamic Celestial Globes258
Appendix Three
A concordance of stars and constellations in Greek and Arabian nomenclature260
Bibliography286
Part 2 - Illustrations

- **1A.** London, British Library Or.5323 fol.86r: 19th-century seals and notes Taken from microfilm photocopy.]
- **1B.** London, British Library Or.5323 fol.86r: Qibla-diagram [Taken from microfilm photocopy.]
- **1C.** London, British Library Or.5323 fol.85r: Dār al-cllm reference note [Taken from microfilm photocopy.]
- Private Collection: copper plaque dated 1601AD [Photo loaned by Dr Emilie Savage-Smith.]
- 3. London, British Library Or.5323 fol.30v: Pegasus
- 4. London, British Library Or.5323 fol.28v: Aquila and Delphinus
- 5. Paris, Bibliothèque Nationale Ar.5036 (c.1430-40AD al-Şūfī): Hercules
- 6. Washington D.C., Freer Gallery 54 (late 14th-century ^cAjā'ib al-Makhlūqāt): Sagittarius and Capricorn
 [Taken from Atil 1975 p.119.]
- 7. Paris. Bibliothèque de l'Arsenale 1036: Serpens and Serpentarius
- 8. Dürer's 1515AD star-chart of the northern hemisphere [Taken from Whitfield 1995 p.71.]
- 9A. London, British Museum OA 1967.7-24.1: cast brass casket, inlaid with copper (12th-century Khurāsān)

 [Taken from Ward 1993 p.18.]
- 9B. London, Nasser D. Khalili Collection MTW 1266: cast brass casket (12th-century Khurāsān)

 Taken from Piotrovsky & Vrieze 1999 p.161.]
- 10A. Istanbul, Topkapı Library A.3493 (1131AD al-Şūfī): Andromeda and two Arabian fish
- 10B. Tehran, Iran Bastan Museum 3777 (c.1306AD al-Şūfī): Arabian Horse
- 11A. Oxford, Bodleian Library Hunt212 (1171AD al-Şūfī): Cassiopeia and She-Camel
 - [Taken from Wellesz 1964 p.90.]
- 11B. Sotheby's Lot 34 (1125AD Qatar al-Ṣūfī): Andromeda, Arabian Horse,
 Arabian She-Camel and Arabian Fish
 [Photograph courtesy of Sotheby's.]
- 12. Nuhad es-Said Collection Cat.5: brass ewer with silver and copper inlay (late twelfth-/early thirteenth-century), detail depicting *Sagittarius*

- [Taken from Allan 1982 p.47.]
- 13A. London, British Library 685.h.2: printed edition of Manilius' Astronomicon (1739) illustrating the Farnese globe, detail depicting Orion [Detail from Whitfield 1995 p.23.]
- **13B.** Paris, Bibliothèque Nationale Ge.A.325 celestial globe (c.1085AD): Orion
- 13C. Oxford, Bodleian Library Marsh144 (1009-10AD al-Sūfī): Orion
- **14A.** Caprarola, Villa Farnese: fresco of the constellations (1575AD), *Perseus* [Detail from Whitfield 1995 p.78.]
- 14B. Istanbul, Topkapı Library A.3493 (1131AD al-Şūfī): Perseus
- 15A. Paris, Bibliothèque Nationale Ge.A.325 (c.1085AD globe): Perseus
- 15B. Rome, Vatican Library Ross.1033 (1224AD al-Sūfī): Perseus
- 16. Ceiling fresco at Quşayr Amra (c.711-715AD Umayyad palace).
- 17A. Naples, Museo Nazionale Archeologico: Atlas Farnese
 [Taken from Whitfield 1995 p.23]
- 17B. London, British Library 685.h.2: printed edition of Manilius' *Astronomicon* (1739) illustrating the complete Farnese globe
 [Taken from Whitfield 1995 p.23.]
- 18. Leiden University Library Voss.Lat. Q79 fol.42v: The Pleiades
 [Taken from Gaehde & Mütherich 1976 plate 19.]
- 19A. London, British Library 685.h.2: printed edition of Manilius' Astronomicon (1739) illustrating the Farnese globe, detail depicting Hercules [Detail from Whitfield 1995 p.23.]
- 19B. London, Nasser D. Khalili Collection SCI 21 celestial globe (1285-86AD): Hercules
 [Photograph courtesy of the Nasser D. Khalili Collection of Islamic Art.]
- 19C. Istanbul, Topkapı Library A.3493 (1131AD al-Şūfī): Cepheus
- **20A.** Leiden University Library Voss.Lat. Q79 fol.28v: Cassiopeia [Taken from Savage-Smith & Katzenstein 1988 p.25.]
- London, British Library 685.h.2: printed edition of Manilius' Astronomicon
 (1739) illustrating the Farnese globe, detail depicting Cassiopeia
 [Detail from Whitfield 1995 p.23.]
- 21. Oxford, Bodleian Library Or.133: Kitāb al-Bulhān
- 22A. Florence, Istituto e Museo di Storia della Scienza inv.2712 celestial globe (1085AD): Virgo [Detail from Meucci 1878]
- 22B. Paris, Bibliothèque Nationale Ar.5036 (c.1430-40AD al-Şūfī): Virgo
- 22C. Dublin, Chester Beatty Library Ar.4220 (1577AD Tagrīr): Virgo

- [Taken from Carey 1997 plate 17.]
- 23A. Paris, Bibliothèque Nationale Ge.A.325 celestial globe (c.1085AD): *Lyra*
- 23B. Tehran, Iran Bastan Museum 3777 (c.1306AD al-Şūfī): Lyra
- 24. New York Public Library Spencer Pers.Ms.6 fols.141v-142r (1630-33AD *Tarjumah-i Şuwar al-Kawākib*): al-Thurayya
 [Taken from Schmitz 1992 fig.127.]
- 25. Sotheby's Lot 34 (1125AD Qatar al-Ṣūfī): Ursa Minor [Photograph courtesy of Sotheby's.]
- 26. London, Nasser D. Khalili Collection SCI 21 celestial globe (1285-86AD):
 Draco
 [Photograph courtesy of the Nasser D. Khalili Collection of Islamic Art.]
- 27A. London, British Library Or.5323 fol.12r Cepheus
- 27B. Oxford, Bodleian Library Marsh144 (1009-10AD al-Şūfī): Cepheus
- 27C. Paris, Bibliothèque Nationale Ar.2489/1 (1266AD al-Şūfī): Cepheus
- 28A. London, British Library Or.5323 fol.13v: Bootes
- 28B. Paris, Bibliothèque Nationale Ar.2489/1 (1266AD al-Şūfī): Bootes
- 28C. Sotheby's Lot 34 (1125AD Qatar al-Ṣūfī): Bootes [Photograph courtesy of Sotheby's.]
- 29A. Vienna, Nationalbibliothek: planispheric map of the northern constellations (c.1440AD), detail depicting *Hercules*[Detail from Whitfield 1995 p.68.]
- 29B. Dürer's 1515AD star-chart, detail depicting *Hercules* [Detail from Whitfield 1995 p.71.]
- 30A. London, British Library 685.h.2: printed edition of Manilius' Astronomicon (1739) illustrating the Farnese globe, detail depicting Lyra [Detail from Whitfield 1995 p.23.]
- **30B.** Dürer's 1515AD star-chart, detail depicting *Lyra* [Detail from Whitfield 1995 p.71.]
- 30C. Vienna, Nationalbibliothek: planispheric map of the northern constellations (c.1440AD), detail depicting Lyra [Detail from Whitfield 1995 p.68.]
- 31A. London, British Library Or.5323 fol.22r Auriga
- 31B. Paris, Bibliothèque Nationale Ge.A.325 celestial globe (c.1085AD): Auriga
- 31C. London, Nasser D. Khalili Collection SCI 21 celestial globe (1285-86AD):
 Auriga
 [Photograph courtesy of the Nasser D. Khalili Collection of Islamic Art.]

- 31D. Dresden, Staatlicher mathematisch-physikalischer Salon (c.1278-1310AD globe) Auriga
 [Detail from Drechsler 1873.]
- 32. Washington D.C., Freer Gallery 41.11: lustre-painted bowl (1210AD)
- 33A. Oxford, Bodleian Library Ms Laud 644: Bede, *De Signis Coeli*: Auriga [Detail from Whitfield 1995 p.44.]
- 33B. London, British Museum OA 1950.7-25.1: inlaid-silver bronze bowl known as the "Vaso Vescovali" (c.1200AD Khurāsān)

 [Detail from Ward 1985 p.20.]
- 34A. Dresden, Staatlicher mathematisch-physikalischer Salon celestial globe (c.1278-1310AD): Serpentarius [Detail from Drechsler 1873.]
- 34B. London, British Museum OA 71.3.1 celestial globe (1275-76AD):

 Serpentarius

 [Detail from lithograph produced in Dorn 1830.]
- 35A. Oxford, Bodleian Library Marsh144 (1009-10AD al-Şūfī): Delphinus
- 35B. Lake Van, Achtamar Island, Church of the Holy Cross (915-21AD): Jonah relief.

 Taken from Nersessian 1965 plate 17.]
- 36A. Paris, Bibliothèque Nationale Ar.2489/1 (1266AD al-Şūfī): Delphinus
- 36B. London, British Museum OA 71.3.1 celestial globe (1275-76AD): *Delphinus* [Detail from lithograph produced in Dorn 1830.]
- 37A. Oxford, Bodleian Library Marsh144 (1009-10AD al-Şūfī): Pegasus
- 37B. Oxford, Bodleian Library Hunt212 (1171AD al-Şūfī): Pegasus
- 38A. London, British Museum OA 71.3.1 celestial globe (1275-76AD): *Pegasus* [Detail from lithograph produced in Dorn 1830.]
- 38B. London, Nasser D. Khalili Collection SCI 21 celestial globe (1285-86AD):

 Pegasus

 [Photograph courtesy of the Nasser D. Khalili Collection of Islamic Art.]
- 39. London, British Library Or.5323 fol.32v: Andromeda
- 40. London, British Library Or.5323 fols.41v-42r: Gemini
- 41A. Oxford, Bodleian Library Hunt212 fols.91v-92r (1171AD al-Şūfī): Gemini
- 41B. Rome, Vatican Library Ross.1033 (1224AD al-Şūfī): Gemini
- 42. London, British Library Or.5323 fol.45v: Led
- 43A. Oxford, Bodleian Library Marsh144 (1009-10AD al-Şūfī): Leo
- 43B. Paris, Bibliothèque Nationale Ar.2488 (mid-thirteenth-century al-Ṣūfī):

 Leo

- 44A. London, Nasser D. Khalili Collection SCI 21 celestial globe (1285-86AD):
 Virgo
 [Photograph courtesy of the Nasser D. Khalili Collection of Islamic Art.]
- 44B. London, British Museum OA 71.3.1 celestial globe (1275-76AD): Virgo [Detail from lithograph produced in Dorn 1830.]
- **45A.** Sotheby's Lot34 (1125AD Qatar al-Ṣūfī): *Virgo* [Photograph courtesy of Sotheby's.]
- 45B. Oxford, Bodleian Library Marsh144 (1009-10AD al-Şūfī): Virgo
- **46A.** London, Nasser D. Khalili Collection SCI 21 celestial globe (1285-86AD): *Libra*
 - [Photograph courtesy of the Nasser D. Khalili Collection of Islamic Art.]
- 46B. Florence, Istituto e Museo di Storia della Scienza inv.2712 celestial globe (1085AD): Libra [Detail from Meucci 1878]
- **47A.** Vatican Library Vat.Gr.1087 fol.310v (15th-century Byzantine commentary on the *Phaenomena*): *Libra*
- **47B.** London, British Library 685.h.2: printed edition of Manilius' *Astronomicon* (1739) illustrating the Farnese globe, detail depicting *Libra* [Detail from Whitfield 1995 p.23.]
- **47C.** Vatican Library Vat.Gr.1087 fols.309v-310r (15th-century Byzantine commentary on the *Phaenomena*): *Libra and Virgo*
- **48A.** London, British Library Or.5323 fol.53r: Sagittarius
- 48B. Oxford, Bodleian Library Marsh144 (1009-10AD al-Şūfī): Sagittarius
- **48C.** Oxford, History of Science Museum 44790 celestial globe (1362-63AD): Sagittarius
- 49A. Oxford, Bodleian Library Hunt212 (1171AD al-Sūfī): Sagittarius
- 49B. London, British Museum OA 71.3.1 celestial globe (1275-76AD):

 Sagittarius

 [Detail from lithograph produced in Dorn 1830.]
- **50A.** Paris, Bibliothèque Nationale Ge.A.325 celestial globe (c.1085AD): Sagittarius
- **50B.** Vatican Library Vat.Gr.1087 fols.309v (15th-century Byzantine commentary on the *Phaenomena*): *Sagittarius*
- 51A. Tehran, Iran Bastan Museum 3777 (c.1306AD al-Şūfī): Capricorn
- 51B. Florence, Istituto e Museo di Storia della Scienza inv.2712 celestial globe (1085AD): Capricorn[Detail from Meucci 1878]

- 52A. Istanbul, Topkapı Library A.3493 (1131AD al-Sūfī): Aquarius
- 52B. Bibliothèque Nationale Ar.2964 fol.27r (1199AD Kitāb al-Diryāq)
- 53A. London, British Library 685.h.2: printed edition of Manilius' Astronomicon(1739) illustrating the Farnese globe, detail depicting Cetus[Detail from Whitfield 1995 p.23.]
- **53B.** Vatican Library Vat.Gr.1087 fol.310v (15th-century Byzantine commentary on the *Phaenomena*): Cetus
- 54A. London, British Museum OA 71.3.1 celestial globe (1275-76AD): Cetus [Detail from lithograph produced in Dorn 1830.]
- 54B. London, Nasser D. Khalili Collection SCI 21 celestial globe (1285-86AD):
 Cetus
 [Photograph courtesy of the Nasser D. Khalili Collection of Islamic Art.]
- 55A. Oxford, Bodleian Library Marsh144 (1009-10AD al-Şūfī): Cetus
- 55B. Rome, Vatican Library Ross.1033 (1224AD al-Şūfī): Cetus
- 56. London, British Library Or.5323 fol.61r: Cetus
- 57. London, British Library Or.5323 fol.63v: Orion
- 58. London, British Museum OA 71.3.1 celestial globe (1275-76AD): Canis Major [Detail from lithograph produced in Dorn 1830.]
- 59A. Oxford, Bodleian Library Marsh144 (1009-10AD al-Şūfī): Argo Navis
- **59B.** Rome, Vatican Library Ross.1033 (1224AD al-Sūfī): Argo Navis
- 60A. Dresden, Staatlicher mathematisch-physikalischer Salon celestial globe (c.1278-1310AD): Argo Navis
 [Detail from Drechsler 1873.]
- 60B. London, Nasser D. Khalili Collection SCI 21 celestial globe (1285-86AD):

 Argo Navis

 [Photograph courtesy of the Nasser D. Khalili Collection of Islamic Art.]
- 61A. Oxford, Bodleian Library Marsh144 (1009-10AD al-Ṣūfī): Centaurus and Lupus
- 61B. Paris, Musée du Louvre MAO824 celestial globe (1145-45AD): Centaurus and Lupus
- 62. London, British Library Or.5323 fol.80r: Centaurus and Lupus
- 63A. Sotheby's Lot 34 fols.155v-156r (1125AD Qatar al-Ṣūfī): Centaurus and Lupus
 [Photograph courtesy of Sotheby's.]
- 63B. Rome, Vatican Library Ross.1033 (1224AD al-Ṣūfī): Centaurus and Lupus

- **64A.** Paris, Bibliothèque Nationale Ge.A.325 celestial globe (c.1085AD): *Ara*
- 64B. London, Nasser D. Khalili Collection MTW 1417: incense-burner (12th-century Khurasan)

 [Taken from Piotrovsky & Vrieze 1999 p.147.]
- 65. London, British Museum OA 71.3.1, celestial globe (1275-76AD). [Photograph taken from Walker 1996 plate X.]
- 66A. Dresden, Staatlicher mathematisch-physikalischer Salon, celestial globe (c.1278-1310AD): Leo[Detail from Drechsler 1873.]
- 66B. London, Nasser D. Khalili Collection SCI 21, celestial globe (1285-86AD):

 Leo

 [Photograph courtesy of the Nasser D. Khalili Collection of Islamic Art.]
- **66C.** London, British Museum OA 71.3.1, celestial globe (1275-76AD): *Leo* [Detail from lithograph produced in Dorn 1830.]
- 67A. Dresden, Staatlicher mathematisch-physikalischer Salon, celestial globe (c.1278-1310AD): Delphinus [Detail from Drechsler 1873.]
- 67B. London, Nasser D. Khalili Collection SCI 21, celestial globe (1285-86AD):

 Delphinus

 [Photograph courtesy of the Nasser D. Khalili Collection of Islamic Art.]
- **67C.** London, British Museum OA 71.3.1, celestial globe (1275-76AD): *Delphinus* [Detail from lithograph produced in Dorn 1830.]
- 68. Marāghā observatory
- **69.** Tehran, Iran Bastan Museum 1275: silver-gilt plate (Sasanian period) [Taken from Harper & Meyers 1981 p.211.]
- 70A. Oxford, Bodleian Library Marsh144 (1009-10AD al-Sūfī): Bootes
- 70B. Istanbul, Topkapı Library A.3493 (1131AD al-Sūfī): Virgo
- 71. London, British Library Or.5323 fol.58r: Aquarius
- 72A. Paris, Bibliothèque Nationale Ar.2489/1 (1266AD al-Şūfī): Andromeda
- 72B. Paris, Bibliothèque Nationale Ar.2489/1 (1266AD al-Şūfī): Virgo
- 73A. Damascus, National Museum of Syria inv.32486A: fresco fragment from Qaşr al-Ḥayr al-Gharbī (c.724-727AD)
 [Taken from Piotrovsky & Vrieze 1999 p.147.]
- **73B.** Samarra, Jawsaq al-Khaqani palace (833-41AD): fresco [Taken from D.T.Rice 1975 p.32.]
- 74. Paris, Bibliothèque Nationale Ar.2489/1 (1266AD al-Ṣūfī): Perseus

- **75.** Oxford, Bodleian Library Marsh144 (1009-10AD al-Ṣūfī): Sagittarius (detail)
- 76. London, British Library Or.5323 fol.21v: Perseus
- 77A. Sotheby's Lot 34 (1125AD Qatar al-Ṣūfī): Andromeda [Photograph courtesy of Sotheby's.]
- 77B. New York, Metropolitan Museum of Art Acc.13.160.10 (c.1400AD al-Ṣūfī):

 Andromeda

 [Taken from Upton 1933 p.187.]
- 78A. Damascus, National Museum of Syria inv.13971/71: silver coin naming governor ^cAbdallah ibn Ziyad (679-80AD Basra)
 [Taken from Institut du Monde Arabe 1990 p.54.]
- 78B. Sasanian-style gold medallion of Buyid ruler ^cAdud al-Dawla (d.983AD) [Taken from Kühnel 1956 fig.11.]
- **79A.** London, British Museum OA 1974.5-16.1: silver bowl (658AD Khwarazm) [Taken from Ward 1993 p.49.]
- 79B. London, Nasser D. Khalili Collection POT 99: slip-painted ceramic bowl (c.1000AD Nishapur/Samarkand)
 [Taken from Piotrovsky & Vrieze 1999 p.182.]
- 80. Paris, Bibliothèque Nationale Ar.2489/1 (1266AD al-Ṣūfī): Aquarius
- 81. London, British Museum PRB P1993.4-1.1: silver tray known as "the Corbridge Lanx" (4th or 5th century, Mediterranean area)

 [Taken from Buckton 1994 p.38.]
- 82A. British Museum PRB 1946.10-7.2, 1946.10-7.3: two silver plates from the "Mildenhall Treasure" (4th century, Eastern Roman Empire)

 [Taken from Buckton 1994 p.39.]
- **82B.** Cleveland Museum of Art 62.294: gilt silver ewer (Sasanian period) [Taken from Grabar 1967 p.109.]
- 83. Sasanian stone relief, "The Triumph of Shapur I" (late 3rd century Naqsh-e Rustam)

 [Taken from Dutz & Matheson 1997 pp.44-45.]
- 84A. Oxford, Bodleian Library Marsh144 (1009-10AD al-Sūfī): Bootes
- 84B. St Petersburg, State Hermitage Museum inv. S-499: silver bowl (early 11th century Iran or Afghanistan)
 [Taken from Piotrovsky & Vrieze 1999 p.157.]
- 85A. Panjikent, eastern wall of the northern chapel of Temple II: seated goddess
 [Taken from Azarpay 1981 p.71.]]
- 85B. Berlin, Staatliche Museum: Manichean miniature (8th/9th century)
 [Taken from Widengren 1965 plate 3.]

- 86. Vienna, Nationalbibliothek A.F.10 fol.1r: *Kitāb al-Diryāq* (mid-thirteenth-century AD)
 - [Detail from Ettinghausen 1962 p.91.]
- 87. Paris, Bibliothèque Nationale Ar.2964 "old page 27": Kitāb al-Diryāq (1199AD)[Detail from Ettinghausen 1962 p.85.]
- 88. Paris, Bibliothèque Nationale Ar.3929 fol.131v: Magāmāt (1240AD)
- 89. Istanbul, Topkapı Palace Library Haz.841 fol.9r: Warqa wa Gulshāh (c.1225AD)
- 90. Istanbul, Millet Library F.E.1566 fol.1r: *Kitāb al-Aghānī* volume 17 (c.1218-19AD)
 [Detail from Ettinghausen 1962 p.65.]
- 91. Paris, Bibliothèque Nationale Ar.6094 fol.25r; Magāmāt (1222AD)
- 92. London, British Library Or.5323 fol.24v: Serpens & Serpentarius
- 93. Istanbul, Topkapı Palace Library Haz.841: Warqa wa Gulshāh (c.1225AD)
- 94. Istanbul, Topkapı Palace Library Haz.841 fol.49r: Warqa wa Gulshāh (c.1225AD)

 ITaken from Melikian-Chirvani 1970 fig.49.]
- 95. Tehran, Iran Bastan Museum 8224: lustre-painted bowl (1211-12AD)
 [Taken from Fehérvári 1985 p.143.]
- 96A. Istanbul, Millet Library F.E. 1566: *Kitāb al-Aghānī* vol.17 (c.1218-19AD) [Detail from Ettinghausen 1962 p.65.]
- 96B. Vienna, Nationalbibliothek A.F.10: Kitāb al-Diryāq (mid-thirteenth-century AD)[Detail from Ettinghausen 1962 p.91.]
- 97A. London, Victoria & Albert Museum C.51-1952: lustre-painted plate (1207AD Kāshān)
- 97B. Boston, Museum of Fine Arts: lustre-painted star-tile (1211AD Kāshān)
- 98. New York, Metropolitan Museum 16.87: lustre-painted bowl (late twelfth-century Kāshān)
- 99A. Baghdad, Talisman Gate[Taken from Gierlichs 1996 plate 66.]
- 99B. Imām Bahir mausoleum
 [Taken from Al-Janabi 1982 plate 171b]
- 100. London, Nasser D. Khalili Collection MTW 1407, 1428: metal alloy door-handles (early 13th century)
 [Taken from Piotrovsky & Vrieze 1999 p.68.]
- **101.** London, British Library Or.14140 fol.13r: ^cAjā'ib al-Makhlūqāt (c.1300AD)

- The archangel clzrāll
- **102.** London, British Library Or.14140 fol.12r: ^cAjā'ib al-Makhlūqāt (c.1300AD) The archangels Jibrā'il and Mikhā'il
- **103.** Paris, Bibliothèque Nationale Ar.2964 frontispiece: *Kitāb al-Diryāq* (1199AD) [Taken from Farès 1953 plate 3.]
- **104.** Munich, Bayerischer Staatsbibliothek C.arab.464 fol.33v: ^cAjā'ib al-Makhlūgāt (1280AD)
- **105A.** London, British Library Or.2784: *Kitāb Na^ct al-Ḥayawān* (c.1220AD)

 Ibn Bakhtishū^c and a pupil
- 105B. 1224AD Dioscorides: Man bitten by a rabid dog.
- 106. Istanbul, Süleymaniye Library E.E.3638: Rasā'il Ikhwān al-Safā (1287AD Baghdad)
 - [Taken from Ettinghausen 1962 p.98.]
- 107. Paris, Bibliothèque Nationale Sup.Pers.205: Juvayni's *Tārikh-i Jahāngushā* frontispiece (1290AD Baghdad)
 [Taken from Richard 1997 p.41.]
- 108. New York, Pierpont Morgan Library M.500 fol.4v: *Kitāb Manāff al-Ḥayawān* (c.1297-1300AD), Man and Woman
- 109. Paris, Bibliothèque Nationale Ar.5847 fol.100v: Magāmāt (1237AD)
- 110. London, British Library Or.2784: Kitāb Na^ct al-Ḥayawān (c.1220AD)
- 111. New York, Pierpont Morgan Library M.500 fol.11r: *Kitāb Manāff al-Ḥayawān* (c.1297-1300AD), Lions
 [Taken from Gray 1961 p.20.]
- 112. Paris, Bibliothèque Nationale Ar.3929 fol.151r: Magāmāt (1240AD)
- 113. Istanbul, Topkapı Palace Library A.3472: Automata (1206AD)

Chapter One:

A late thirteenth-century astronomy manuscript, produced in Iran

1. Introduction

British Library manuscript Or.5323 is a late thirteenth-century copy of *Kitāb Ṣuwar al-Kawākib al-Thābita*, an illustrated treatise on the constellations, which was composed in 964AD by the astronomer ^cAbd al-Raḥmān b. ^cUmar al-Ṣūfī (d.986AD).

The manuscript is undated. Although the colophon survives, the text concludes without naming a patron, scribe, date or place of production. The first folio, which may have included important identification, is lost. Therefore, most previous attributions of date and place have been made from the style of the illustrations, and range between the thirteenth and fourteenth centuries AD. The internal evidence of the manuscript consists of marginal notes, owners seals, end-notes and a labelled diagram. For the first time, these have been exploited for hints about the manuscript's history. For example, it can now be stated that the manuscript was in Qazwīn in 1279-80AD, ruling out previous attributions to the fourteenth century.

19

¹ A summary of previous published attributions to Or.5323 is given below.

2. Hūlāgū's seal

One previously-published attribution of provenance was based on internal evidence, but is completely unsound: in a 1954 critical edition of *Kitāb Ṣuwar al-Kawākib al-Thābita*, a seal on the final folio (folio 86r) of Or.5323 was taken for "the seal of Hulagū [...] seen by him after the sack of Baghdad in 1258AD". This refers to the Il-Khānid invader of the Islamic world in the mid-thirteenth century AD, and is much mistaken, as the seal in question is that of a Qajar prince, Hūlāgū Mirza (d.1854AD), a grandson of Fatḥ cAlī Shāh. This fanciful statement derives from the confusion of the nineteenth-century Qajar seal for a thirteenth-century Mongol one, but has gone uncorrected in subsequent publications on the manuscript. It is even repeated, by Raby in 1994. The seal [PLATE 1A] is octagonal, measures 9mm across, and reads simply "Allāgū. Just above it, there is a short note in Persian:

هو الله در حضرت ولایت پیشکش شد مسکین هلاکو فی بغداد

["He is God. In the presence of sainthood this was presented. Humble Hulāgū in Baghdad"] It was perhaps this reference to Baghdad which encouraged the 1954 attribution to the Il-Khānid ruler, although the pious formula hardly corresponds with the actions of the thirteenth-century Hūlāgū, who was not Muslim, and assassinated the last chbāsid Caliph in Baghdad in 1258AD. The Qajar Hulāgū Mirza was the governor of Kirmān between 1831 and 1834AD. After the death of Fatḥ cAlī Shāh in 1834AD,

_

² al-Şūfī (3) plate 11.

³ I am very grateful to Mr Morton for identifying the correct Hulagu, and translating all of the Persian notes and seals on this folio, during a meeting at SOAS on 02.12.98, and at the British Library on 24.05.00

⁴ Raby dates the manuscript to the first half of the thirteenth century, and observes that "[previous scholars] overlooked Hülegü's seal (f.86a) and a note claiming that it was presented to him in Baghdad, presumably in 1258AD" (Raby 1994 pp.107, 111 - end-note 11).

Hulāgū fled with his family to Iraq, where he was a refugee in the cities of Baghdad, Kerbala and Najaf, until his own death in 1854AD. This note suggests that Hulāgū may have deposited the manuscript at a religious sanctuary in Baghdad before he died. At the bottom right of the folio, there is a second note in Persian, written slightly earlier in the nineteenth century, in large elegant $ta^c liq$ script:

یا مولانا ادرکنی بتاریخ روز چهار شنبه پنجم شهر شوال سنة ۱۲۵۰ در دار العبادة یزد تحصیل شر چند روزي بعاریت بر ماست

["O Lord take me in your grasp. On the date Wednesday the fifth of Shawwal 1250[H] in the abode of piety Yazd, it was acquired. For some days it was on loan to me."]

The date corresponds to the fifth of February 1835AD, around the time when Hulāgū was fleeing the province of Kirmān, to go to Iraq. Just below this note is a large oval seal, stamped parallel to the script above it, as though in signature. Although the lower left corner is indistinct, the following words are legible:

الراجيالي لله [عبده؟] هلاكو

["The one who hopes in God, [his slave?] Hulāgū."]

This tells us that the manuscript was in Yazd until 1835, when Hulāgū acquired it, and brought it to Iraq.⁵ Before his death in 1854, he deposited the manuscript at a religious sanctuary in Baghdad.

From Baghdad, the manuscript soon made its way to Europe, where it was offered for sale at Gulbenkian and Co., and sold to the British Museum on the 28th of March, 1898.

_

⁵ Morton suggested that the words "for some days, it was on loan to me" might be a philosophical musing on life's brevity, rather than a statement recording a book-loan made by Hulāgū (24.05.00).

Although the colophon of Or.5323 is uninformative, and Hulāgū's seals and notes date from the nineteenth century, this same final folio (86r) includes internal evidence from earlier times. Beside the inscriptions and seals relating to Hulāgū Mirza, there is an annotated diagram which includes a date of 678H (1279-80AD), and mentions Qazwīn. It cannot be proven that this was the date and place of the manuscript's production, but it can be deduced that the manuscript was in Qazwīn at this date, thus establishing a terminus ante quem for the manuscript's production.

3. The Qibla-finder for Qazwin in 1279-80AD

The diagram [PLATE 1B] roughly calculates the direction of prayer from the city of Qazwīn, in north-west Iran. It is labelled with notes written in a crude angular hand, similar to the script named "astronomical Kufic", often found on metal astronomical instruments dating before 1500AD.⁶ The colour of the ink resembles the stylusdrawn constellation-images, although the thin scratchy line is not consistent with the smooth line of a stylus or reed pen. To the left of the diagram is a partly legible note written in the same distinctive script:

استخراج الكري [?] قبلة [...] سنة ٦٧٨

["To obtain [...] of the qibla, the year 678 [1279-80AD]"⁷]

age-Smith & Maddison 1988 p.193. It is very unusual to find this script

Savage-Smith & Maddison 1988 p.193. It is very unusual to find this script in a manuscript, and the scribe may have been an astronomer and instrument-maker.
 I am grateful to Mr Morton for reading this date. The reference to globes may translate as

[&]quot;I am grateful to Mr Morton for reading this date. The reference to globes may translate as "spherical", relating to the use of spherical geometry to deduce the *qibla* azimuth. However, the word for azimuthal point, ..., does not appear here. Professor Paul Kunitzsch suggested to me that "..." (in a letter of 16.12.99).

The diagram is a circle, marked into quadrants by a horizontal and a vertical diameter. Three of the cardinal points are written around the circle: South at the top, North at the bottom, and West on the right. In the top right quadrant, a radius makes an angle of 30° from the vertical diameter – therefore pointing to the south-west. A pointer is drawn at the end of the radius, and labelled with the size of the angle: "ثلثون" (thirty). The measure of the remaining quadrant is written, "ثلثون" (sixty), along the circumference. The outer rim of this quadrant is marked into eighteen sections, each representing five degrees.

Along the North-South diameter, there reads "نصف نهار قزوين" (the meridian line of Qazwīn). Between the North-South diameter and a parallel line, there reads ثمان ("eight degrees") referring perhaps to a range of longitude values. Similarly, the East-West diameter forms a band with a parallel line, and is inscribed with الربع ("fourteen [degrees]") and also عشرة ("which is between the two latitudes"). A simple method of deriving the qibla direction has been used, in which the geographical co-ordinates of Mecca are subtracted from the geographical co-ordinates of one's own location. The resulting angle is the direction of prayer. This "standard approximate method" is associated with al-Battānī (d.929AD), and was condemned by later qibla authors.

_

⁸ The orientation of South at the top of the map is normal in medieval Islamic mapping.

⁹ King 1999 pp.337-339.

"قزوين المحروسة طول فه عرض لو" In the bottom left quadrant, there reads (Oazwin the well-protected, longitude: 85°0', latitude: 36°0'). 10 Kennedy and Kennedy record seven sources which use these precise geographical co-ordinates for Qazwīn, and Gibbs and Saliba a further thirteen. 11 Fifteen of these sources are gazetteers (tables of geographical co-ordinates and qibla azimuths) inscribed on Persian astrolabes, dating from the seventeenth, eighteenth and nineteenth centuries. Gazetteers rely on zīj tables for their information, and the other five listed sources to use 85°, 36° for Qazwīn are indeed zīj manuscripts. All have Persian origins, 12 of which the earliest (and therefore most relevant) is the c.1270AD zīj-i īl-khāni, compiled at the Maragha observatory under Nasīr al-Dīn al-Tūsī (d.1274AD).¹³ Kennedy and Kennedy categorise these sources as a single discernible group, exhibiting "an Iranian strain stretching over several centuries". They conclude that the group derives from an important early index of geographical localities, Kitāb al-Atwāl wa'l-CUrūd li'l-Furs (date unknown), which survives only in quotation, in a geographical treatise by Abū al-Fidā' (d.1332AD). 14 However, Kitāb al-Atwāl locates Qazwin at 75°, 36°, measuring geographical longitude ten degrees East of the zero meridian used by the other sources in the "Iranian strain" group. The latter follow Ptolemy's convention, measuring longitude from the Canary Islands, known as الحزائر الخالدات, or "The Fortunate Isles". If the Iranian group was following the

-

11 Kennedy & Kennedy 1987 pp.269-270; Gibbs & Saliba 1984.

¹⁰ The use of abjad numerals is typical in Islamic astronomy (discussed in Appendix Three).

¹² These are: the c.1270AD zīj-i īlkhānī of Naṣīr al-Dīn al-Ṭūsī (d.1274AD), the c.1440AD zīj-i sultānī of Ulugh Beg (d.1449AD), the c.1580AD Ā īn-i Akbārī composed from a Persian text for the Mughal emperor Akbar (d.1605AD), and a c.1668AD Safavid treatise (Kennedy & Kennedy 1987 pp.269-270).

¹³ Cf. Table-entry in British Library Or.7464: fol.100v (1277-78AD copy of al-Tūsī's zīj-i īlkhānī, produced in Marāghā). PLATE 68 shows two photographs of the site of the observatory.

co-ordinates listed in $Kit\bar{a}b$ al- $Atw\bar{a}l$, it had adjusted the longitudes to Ptolemy's system. Shape the system is no known intermediary source in this group between $Kit\bar{a}b$ al- $Atw\bar{a}l$ and the $z\bar{i}j$ -i $\bar{i}l$ - $kh\bar{a}ni$, it can not be proven that the longitude value was first adjusted at Marāghā. However, that institution was a forum for important innovative research, and it may well have been the location where the revision took place.

In conclusion: the diagram does not relate to the text of al-Ṣūfī's treatise. As it could only function from Qazwīn, it must have been drawn in that city. The inscription and date belong to the diagram, and demonstrate that the manuscript was in Qazwīn in 1279-80AD, permitting the establishment of a latest possible date for the production of Or.5323. There is no likely reason why the diagram would be a later fabrication. However, this does not necessarily mean that the manuscript was produced in Qazwīn at this date.

An advanced scientist would probably not use so inaccurate a method of *qibla*-determination, although the geographical co-ordinates attached to the diagram do demonstrate that the Qazwīn owner of the manuscript was familiar with astronomical literature in Iran. The co-ordinates belong to an older geographical tradition, but represent an updated version - possibly first adjusted at the Marāghā observatory, in c.1270AD. This leaves only a nine year gap between the completion of the Marāghā revisions, and the date beside the Or.5323 diagram.

¹⁴ Kennedy and Kennedy observe that the index of *Kitāb al-Aṭwāl* includes uninhabited areas, and suggest that it was "the basic material for a world map." King suggests the index was compiled in the late twelfth or early thirteenth century (King 1999 p.42).

4. Reference to a Buyid waqf library in Baghdad

At the bottom of folio 85r [PLATE 1C], there is a short note below the image of *Piscis Austrinis* (the southern fish), shown as the constellation is seen on a celestial globe. Its precise wording is unique to this copy of *Kitāb Ṣuwar al-Kawākib al-Thābita*, and reads:

لم احد تحت صورة *الحوت الجنوبي* على ما يرى في الكرة اثرا الكواكب السبعة التي لم يذكرها بطلميوس و اوردت تحت صورة *الحوت ع*لى ما يرى في السماء كما شوهدت في الاصل في د*ار العلم ب*ين السورين

["Under the image of Piscis Austrinis as seen on the globe, I found no trace of the seven stars which go un-mentioned by Ptolemy [in the Almagest]. Under the image of Piscis Austrinis as seen in the sky, [those seven external stars] were presented as they were found originally in the Dār al-'Ilm between the two walls."]

This refers to a group of "external" stars in *Piscis Austrinis*. ¹⁶ The first sentence suggests that these seven stars were not recorded in the star-catalogue of Ptolemy's *Almagest*, and were added to *Kitāb Ṣuwar al-Kawākib al-Thābita* by al-Ṣūfī. A similar label appears in four other al-Ṣūfī manuscripts, ¹⁷ and a further four depict the external stars in the image of *Piscis Austrinis*, without any label of explanation. ¹⁸ Strangely, al-Ṣūfī's star-table records only the eleven internal stars of *Piscis Austrinis*. This is consistent with the format of *Ṣuwar al-Kawākib*, which repeats the star-tables in Ptolemy's *Almagest*, updating the star co-ordinates for 964AD and correcting the values of magnitude, but never adding or removing stars. Generally, if al-Ṣūfī noticed that a star was not recorded in the *Almagest* star-table, he would not amend the table when reproducing it in his treatise. Instead, the star would be added

¹⁵ Kennedy & Kennedy 1987 xi, xvii, xix-xx, xliii.

¹⁶ External stars belong to a particular constellation, but do not feature within the conceived outline of the constellation figure.

 ^{17 1125}AD Süleymaniye, 1130-31AD Topkapı, 1233AD Berlin, and 1266AD Paris copies of al-Şūfī.
 18 1009-10AD Oxford, 1125AD Qatar, 1224AD Vatican, and 1250AD Süleymaniye copies of al-Şūfī.

to the relevant constellation image, and a label would note that Ptolemy had omitted the star from his catalogue, usually:

الذي لم يذكره بطلميوس

["That which is not mentioned by Ptolemy"]

However, in this case there has been an error, perhaps made at a very early stage in the transmission of al-Sūfi's treatise. The star-catalogue in the Almagest does in fact list six (not seven) external stars belonging to Piscis Austrinis. For some reason, this part of Ptolemy's star-table is omitted from all known copies of Suwar al-Kawākib, where only the internal stars of Piscis Austrinis are tabled. Kunitzsch suggests that al-Sūfī himself omitted Ptolemy's table of external stars deliberately, because he could not find the stars in the locations given by Ptolemy's co-ordinates. 19 However, this would be inconsistent with al-Sūfi's usual approach to Ptolemy's tables, as he normally declares all discrepancies between his findings and the recordings of Ptolemy. In the earliest al-Sūfī manuscript of 1009-10AD (which was certainly taken from an autograph copy), the external stars are drawn into the globe-view illustration of Piscis Austrinis, but not on the sky view. 20 There is no label stating that Ptolemy had omitted them. It must be concluded that the external stars of this constellation, and the recurring label explaining (mistakenly) that the stars do not feature in the Almagest, were all added to Suwar al-Kawākib after al-Sūfī's time. It is not clear why al-Sūfī did not include them in his treatise. He had access to more than one copy of the Almagest, as he states in his preface. The external stars are marked on Islamic celestial globes. At some later point, an editor/copyist noticed that the external stars were not listed in the star-table, as they should be. He assumed that al-Sūfi's star-

¹⁹ This suggestion was made to me by Professor Paul Kunitzsch, in a letter of 16.12.99.

²⁰ Cf. pp.173-182 for discussion of recent suggestions made about this manuscript's date.

table was taken directly from Ptolemy's (as is generally the case), but that al-Ṣūfī had inserted those un-tabled stars into his constellation-map for *Piscis Austrinis*. Hence the mistaken label, stating that Ptolemy had not recorded the external stars of *Piscis Austrinis*. This new information was copied repeatedly through generations of successive manuscripts.

As mentioned, the simple statement that Ptolemy did not mention the external stars of Piscis Austrinis (لم يذكرها بطلميوس) is found in four other copies of al-Ṣūfī's treatise. The second sentence in the Or.5323 note is however unique to that manuscript. It reads:

"...under the image of *Piscis Austrinis* as seen in the sky, [those seven external stars] were presented as they were found originally in the *Dār al-cIlm* between the two walls."

This statement could have been made by an earlier scribe, copying out the treatise from a prototype manuscript. While copying out Or.5323, the late thirteenth-century scribe retained all marginal notes and captions from the manuscript he was using as a reference.

In an early copy of the treatise, these seven external stars were depicted under the "sky-view" image of *Piscis Austrinis*, but were not included beneath the "globeview" image. Instead of amending the globe-view image in his new manuscript, the copyist decided to follow the prototype even in this apparent discrepancy. As though to justify this, the copyist explained in a note that the same omission was made "originally" (في الأصل) in his prototype manuscript, which he saw in an institution called the *Dār al-cIlm*, or "House of Science". He decided to "present" this same version of *Piscis Austrinis* in the sky-view, using the verb اورد house of Piscis Austrinis in the sky-view, using the verb اورد المعادلة المع

The Dar al-cIlm bayn al-surayn ("the house of science between the two walls") was an eleventh-century Baghdad library of some repute.²¹ The two walls in question refer to two old city towers in the predominantly Shīcī Karkh quarter of west Baghdad, which gave their name to this important library in the locality. The founder was Abū Nasr Shāpūr b. Ardashīr (d.1025AD), a Zaydī Shīcī Iranian wazīr to the Buyid ruler Bahā' al-Dawla (r.989-90 - 1012-13AD).²² In 993AD, Shāpūr bought the building, and transformed it into an important waaf library for scholars, known as the Dār al-cIlm.²³ Shāpūr filled the library with some 10,400 volumes, including one hundred Qur'an manuscripts copied by members of the renowned Banu Muqla family of calligraphers.²⁴ The library also received donations of scientific works from authors themselves: Jibrā'īl b. cUbayd Allah b. Bakhtīshūc (d.1005AD) donated a copy of his five-volume medical treatise al-Kunnāsh.25 The standard of the library's contents was upheld by a system of examining new donations before accepting them into the collection, and the Dar al-cIlm soon acquired a high reputation as a repository for the major scientific works of the day. Shāpūr compiled a catalogue of his collection, which listed works on astronomy, philosophy,

Kabir 1959 p.33.

²¹ This is not a reference to the ^cAbbāsid library and translation-house of tenth-century Baghdad, known as Bayt al-Hikma, "the House of Wisdom", and earlier as Khizānat Kutub al-Hikma, "the Library/ Treasury of the Books of Wisdom". The Or.5323 note refers to a known Dār al-'Ilm institution, which operated between 993 and 1059AD (Kabir 1959, 1964, Makdisi 1961, Eche 1967). ²² Makdisi shows that the centre was not restricted to Shī^cI scholars, as the staff included Sunni Muslims, such as Abū Bakr Muḥammad b. Mūsa al-Khawārizmī, a Hanafī shaykh (Makdisi 1961 p.8).

²³ The institution provided allowances to destitute scholars, including the poet al-Ma^carrī, and grammar classes were held there. Eche describes in detail the organisation of the library (Eche 1967 pp.102-117).

²⁵ Jibrā'īl b. 'Ubayd Allah b. Bakhtīshū' belonged to a renowned medical family, whose members had served as personal physicians to 'Abbāsid Caliphs. Jibrā'īl joined 'Adud al-Dawla's court at Shīrāz in 967AD, and followed the court's move to Baghdad c.977AD, where he was responsible for restoring the hospital known as bīmāristān cAdudī. He died c.1005AD at the court of Amīr Mumahhid al-Dawla, in Mayyāfāriqīn (Contadini 1994 p.358).

medicine, geometry, poetry, grammar, figh and theology, 26 This institution was also a meeting-place for intellectuals: when the Syrian poet-philosopher Abū'l-cAlā al-Ma^carrī paid a visit in 1009-10AD, he participated in scholarly discussions, but also enjoyed musical entertainment.²⁷ In 1059AD, the Dār al-cIlm was burned down during faction-fighting in the Karkh quarter, between Shī^cī and Sunnī civilians, after the invasion of the (Sunnī) Seliuk Toghril Beg.²⁸ Some of the books were saved by the minister ^cAmīd al-Mulk al-Kundurī, Toghril Beg's wazīr, who incorporated them into his own library in Khurāsān.²⁹

Dār al-cIlm is a term which was used to describe several libraries or institutions of learning in the Islamic world, during the tenth and eleventh centuries AD.³⁰ The Buyid dynasty founded many famous institutions of this name, including one at Shīrāz founded by 'Adud al-Dawla (al-Sūfī's patron, d.983AD), who joined the assembled intellectuals in debates.³¹ Another celebrated Buyid Dār al-cIlm library, in

²⁷ al-Ma^carrī described the performance in verse: "There appeared to us in the House of Sābūr a songstress/ Made of silver, gay in the evening, and excited" (Kabir 1964 p.181).

28 Eche 1967 pp.116-117. Pinto writes that the fires and looting were the work of the Seljuk soldiers

²⁶ Eche 1967 p.105.

themselves (Pinto 1929 p.224), while both Eche and Bosworth implicate the Sunni civilians who had long been hostile to their Shī Tneighbours (Eche 1967 p.116; Bosworth 1991 p.139). Makdisi quotes the historian Ibn al-Jauzī (Muntazam, 7, p.172), who wrote that Sunni violence against buildings in the Shī'ī quarter followed the departure of a Turkish general, al-Basāsīrī, "who had championed the Shīcites" (Makdisi 1961 p.8, note2). Basāsīrī was the city's governor, and fled his office to return with an army (supported by the Fatimids) against Caliph al-Qa'im, in 1059AD. With the Caliph deposed, Basasīrī controlled the city for forty weeks, proclaiming the Fatimid Caliph al-Mustansir in the Friday khutbah. He was ousted and executed by the Seljuks.

29 Eche 1967 p.117. The wazīr is said to have visited the ruins of the library after the fire, and chosen

the best of the surviving volumes.

³⁰ In 1004-05AD, the Fatimid Caliph al-Ḥākim (d.1021AD) founded a Dār al-cIlm in Cairo, supplied with a library, teachers, support staff and facilities for members of the public to make copies of books. The institution stayed open until the collapse of the dynasty (Walker 1997 p.189-193).

There was also a library and reading room (Kabir 1959 p.32).

Rayy, was burnt down by Mahmūd of Ghaznī.³² Shāpūr evidently intended a great institution like those of his royal masters.

There should be no doubt that al-Sūfī's important treatise, so recently composed for another member of the Buyid dynasty, would have been in Shāpūr's Dār al-cIlm collection. Judging by the note in Or.5323, new copies of manuscripts could be made at the library. There is another reference to this institution in a second manuscript of Suwar al-Kawākib, copied in 1233AD at Mosul. 33 In the colophon on folio 93r, it is written that this 1233AD manuscript was copied in Mosul from a 1014AD copy of an earlier manuscript, which belonged to "the waaf [library] of the Dar al-clim between the two walls in the City of Peace [Baghdad]".

للوقف لدار العلم ببين سورين بمدينة السلم

The earlier manuscript had been written out by Faraj b. Abd Allah al-Habashī ("the Abbysinian"), an assistant (مولى) of al-Ṣūfī. The tables and the images had been drawn by al-Sūfī himself. Al-Sūfī died in 986AD, but his pupil's career would of course continue for many years. As was the custom, Faraj al-Habashī may have donated his precious copy of al-Ṣūfī's treatise to Shāpūr's prestigious library - where it remained and was available for copying by others - such as the 1014AD scribe.

Another al-Sūfī manuscript (dated 1125AD) was also copied in Baghdad, from a 1036AD copy, taken from an earlier manuscript by the same Faraj b. Abd Allah al-

Sourdel 1965. Many great libraries of the ^cAbbāsid period are described in Pinto 1929.
 Berlin Staatsbibliothek Ms5658.

Habashī.³⁴ According to the 1125AD colophon, Faraj had read his copy aloud to his teacher (al-Sūfī), who then signed it to certify its accuracy. This of course means that the copy was completed before 986AD, when al-Sūfī died. This points to the presence of two copies of al-Şūfī's treatise in early eleventh-century Baghdad, both produced by Faraj with some participation from al-Sūfī. There is some question over the precise date of both manuscripts, but the later colophon reports suggest that both were produced before 986AD. One (the "ancestor" of the 1233AD manuscript) was at Shāpūr's Dār al-cIlm library, where it was copied in 1014AD. The other (the "ancestor" of the 1125AD manuscript) was copied in 1036AD, also in Baghdad, though not necessarily at the Dār al-cIlm. The British Library manuscript (Or.5323) is also a "descendant" of an al-Sūfī manuscript housed at Shāpūr's library, as its endnote testifies. There is a general correlation of the iconography of constellationimages between Or.5323 and the 1233AD manuscript, but there are no outstanding matches of exceptional versions, such as Delphinus, which is an unusual fish-bird composite animal in Or.5323, and Andromeda, whose feet are chained in the 1233AD manuscript.

³⁴ Lot34, sold at Sotheby's on 29th April 1998 to Shaykh Sa^cūd of Qatar, for £880,000. A full translation of the colophon is provided in the sales catalogue (Brend, Hillenbrand & King 1998 p.34).

5. An engraved copy of the Or.5323 Pegasus, from more recent times

In the last year, there has come to my attention an unusual copper plate, engraved with the image of two truncated horses with ornate wings, within a framed border [PLATE 2].³⁵ Without a doubt, these horses are copied directly from the British Library al-Ṣūfī illustration of the two views of the constellation *Pegasus*, on folio 30v [PLATE 3]. Almost every detail of the drawings has been copied faithfully, including the labels of the star-names, and the caption identifying the sky- and globeview images. The plate is 0.3cm thick, and measures 25.6 x 35.4cm. As the al-Ṣūfī manuscript folios measure 23.7 x 33.7cm, the engraved images are probably to scale with the original.

At the bottom right of the plate, is an inscription reading طهرات ۱۰۱۲ هجري, "Tehrān 1012H" (1603-04AD). I doubt that the plate was actually produced so early as 1603AD, and would suggest instead the late eighteenth or nineteenth century. The insertion of a false date shows that the object pandered to a demand for much older artefacts. The intention was to create a decorative object, although the metalworker also chose to reproduce the star-labels and captions — indicating that the plaque was intended for an audience which at least aspired to the scientific content of the image.

This eccentric plaque provides an unexpected episode in this manuscript's history, probably in the early nineteenth century. It could have been made for the European market, during the period when the al-Şūfī manuscript was in the hands of European

_

³⁵ Private Collection, London. While visiting Dr Emilie Savage-Smith at her office (17.03.00), I noticed a photograph of this plate. I immediately recognised the source of the engraved images. Needless to say, we both were equally surprised!

art-dealers, before its sale to the British Museum in 1898. It is fascinating to speculate that it may be one of a series, and one would look forward to similar objects coming onto the Islamic art market and being made known.

6. Accession to the British Library collection

The British Museum bought our al-Ṣūfī manuscript from the booksellers C. & G. Gulbenkian & Co of 120 Bishopsgate Street, London, in March 1898. The invoice from Gulbenkian's to the Museum is dated 21st December 1897, but the purchase was not completed until 28th March 1898, when the invoice was marked with the British Museum stamp, and signed by Robert K. Douglas, the Head of the Department of Oriental Printed Books and Manuscripts.

On the 26th of March 1898, the proceedings of the purchase were noted in the Reports of Purchases November 1893 to December 1900. W. Douglas recommended the purchase of a group of eight manuscripts, available for sale together from Gulbenkian's. These manuscripts were in Arabic or Persian, and included a 1295AD Persian treatise on medicine, a 1429AD Arabic poetry-manuscript, a history of the Sultans of Delhi, and the al-Şūfī astronomy-treatise ("Suwar al-Kawakib: a description of the fixed stars, with illumination. Arabic XIV century folio"). The eight manuscripts were offered at £70 altogether. This sum represented just under 10% of the annual purchases grant for the Department of Oriental Printed Books and

Manuscripts, which had been set at £750 for the term 1897-98.³⁶ The expense is justified in the following note:

"W. Douglas has the honour to recommend to the Trustees to purchase from Messrs C. & G. Gulbenkian & Co. the following eight Arabic and Persian Manuscript. W. Douglas has had an opportunity of consulting D. Rieu as to the value to the Museum of the above manuscripts, and D. Rieu quite agrees with him in thinking that the price named is moderate. [Signed Robert K. Douglas]"

The sale was recorded two days later, both on the invoice and on the last flyleaf of the al-Ṣūfī manuscript. The eight manuscripts were catalogued under the pressmarks Oriental 5316 through to 5323. Five days later, the purchase was formally presented to a committee of the Trustees of the British Museum, recorded in *Minutes of the Trustees* 1896-1900.

In 1907, Or.5323 was examined by the astronomer Edward Ball Knobel,³⁷ who inserted two handwritten A5 pages of observations at the beginning of the manuscript. He noted copyist's errors in the star-tables, and observed a different hand in the star-table entries, after folio 48. Knobel also made general suggestions as to the original pagination, (which agree for the most part with my reconstruction of the sequence).

-

³⁶ This had been reduced from £900, the previous year's allocation. The next year was to remain at £750.

³⁷ The notes are dated 5th November 1907, and signed: "E. B. K[nobel]". Knobel was the president (and later the treasurer) of the Royal Astronomical Society, London. His signature appears on three other al-Şūfī manuscripts: Marsh144 (that signature dated October 1887), Hunt212 (both at the Bodleian Library, Oxford), and on a nineteenth-century copy of the *Urjūza'* on the constellations, attributed to al-Şūfī, in the Nasser D. Khalili Collection of Islamic Art. Later he published an edition of Ulugh Beg's star-catalogue, for which he referred to copies of al-Şūfī (Knobel 1917).

7. Previous attributions

The first recorded attribution of a date to Or.5323 was made by W. Douglas in his report for the 26th of March 1898, where he described it as a fourteenth century AD manuscript. 38 In 1912, the manuscript was described briefly in A Descriptive List of the Arabic Manuscripts acquired by the Trustees of the British Museum since 189439, where it was again attributed to the fourteenth century. In the same year, ten of the illustrations were published by F.R. Martin, in The Miniature Painting and Painters of Persia, India and Turkey from the eighth to the eighteenth century. Martin wrote that the illustrations were of "the Mongolian school", and proposed the date c.1300AD.40 In 1916, Hauber mentioned the manuscript briefly, agreeing with Martin's date and attribution for the most part: "Die meisten Gestalten zeigen mongolische Typus, doch andere scheinen wieder mehr arabisch zu sein". 41 In 1925, Laurence Binyon briefly described the manuscript's "fine outline drawings" (Asiatic Art in the British Museum, Sculpture and Painting). 42 Binyon followed Martin's attribution of c.1300AD, and further observed that the manuscript was "remarkable for the elegance of the calligraphic drawings, influenced by Chinese drawings".43 This echoes Martin's connection with Mongol art in Iran.

In 1931, Or.5323 was put on exhibition at the British Museum, and attributed to fourteenth-century Samarkand in J.V.S. Wilkinson's Guide to an Exhibition of

³⁸ There is no mention of date in the invoice from Gulbenkian & Co.

³⁹ Ellis & Edwards 1912 p.39.

⁴⁰ Martin 1912 vol.2 plates 35-39.

⁴¹ Hauber 1916 p.146-147.

⁴² Binyon 1925 p.24.

⁴³ Binyon 1925 pp.55-56.

Persian Art in the Prints and Drawings Gallery.⁴⁴ In Upton's 1933 article about a c.1400AD al-Ṣūfī manuscript in the collection of the Metropolitan Museum of New York,⁴⁵ the author quoted briefly a letter from Wilkinson about Or.5323. In the letter, Wilkinson had commented on the manuscript's "Chinese influence" as well as "Chinese influence" as well as "Abbasid features".⁴⁶ In 1937, Sarre published an article discussing the imitation of al-Ṣūfī constellation-images on ceramic decoration, using an image from Or.5323 as a comparative illustration.⁴⁷ He describes the manuscript as Mongolian, from c.1300AD, following Martin's 1912 attribution.

Also in 1937, Holter was the first to suggest that the manuscript dated from "pre1300", in his hand-list of illustrated Islamic manuscripts produced before 1350AD. 48

Shortly afterwards in 1940, Buchthal followed this opinion and proposed that
Or.5323 was "roughly contemporary" with a Maqāmāt manuscript of 1222AD.

Buchthal briefly compares the Or.5323 Gemini images ("from Persia proper") with a figure in the 1222AD Maqāmāt manuscript, in order to demonstrate that the Maqāmāt images did not depend solely on Byzantine manuscript-painting. Agreeing with Martin's stylistic attribution, Buchthal states that the Or.5323 figures are "of Mongolian type". 49

⁴⁴ British Museum 1931 pp.11-14.

⁴⁵ Metropolitan Museum of Art Acc.13.160.10.

⁴⁶ Upton 1933 p.180. At this point, Wilkinson may have discarded his Samarkand attribution of two years previously. Strangely, the c.1300AD Samarkand provenance was again attributed to the British Library manuscript in a recent M.A. thesis (Caiozzo 1992), without explanation.

⁴⁷ Sarre 1937 p.192.

⁴⁸ "Martin hält die Handschrift für mongolisch und datiert sie um 1300. Sie könnte auch gut früher entstanden sein" (Holter 1937A p.3).

⁴⁹ Buchthal 1940 p.127. The Maqāmāt manuscript is Bibliothèque Nationale Ar.6094.

In 1954, a critical edition of *Kitāb Ṣuwar al-Kawākib al-Thābita* was published by the Dāiratu'l-Maārif-il-Osmania, in Hyderabad. The edition included a reproduction of folios 64v and 65r of Or.5323. The caption reads: "Undated, but bears the seal of Hulagū and seen by him after the sack of Baghdad in 1258AD, hence it is a 7th century A.H. MS." As mentioned above, this is an error which has previously gone uncorrected. It has also been repeated, by Raby in 1994.⁵¹

In 1959, Wellesz published the first serious discussion of the iconography of al-Ṣūfī's constellation-images. She referred only briefly to Or.5323 as its illustrations did not conform to her proposed model of two distinct iconographical groups, and like Buchthal, she assigned the manuscript to the thirteenth century. Echoing Binyon, Upton and Wilkinson, she observed that the illustrations displayed "some Chinese influence", and also remarked upon a similarity with a 1250AD Persian translation of *Ṣuwar al-Kawākib*. 52

In 1978, Sezgin included Or.5323 in a list of manuscript copies of *Kitāb Ṣuwar al-Kawākib al-Thābita*, in *Geschichte des Arabischen Schrifttums*, and assigned it to the fourteenth century.⁵³ In 1992, Carboni discussed the Or.5323 image of Pegasus, in relation to his main study of a c.1300AD Īl-Khānid copy of Qazwīnī's cosmology,

⁵³ Sezgin 1978 p.214.

⁵⁰ al-Şūfī (3) plate 11.

⁵¹ Raby 1994 pp.107, 111 (end-note 11).

⁵² Wellesz 1959 pp.23-24. Wellesz does not go on to discuss the implication of this alleged connection, or to consider the many differences between these two manuscripts and their illustrations. Or.5323 is in Arabic, while the 1250AD manuscript is in Persian. Al-Ṣūfī's text was translated into Persian by Naṣīr al-Dīn al-Ṭūsī (d.1274AD), but this is not his autograph copy and the provenance is unknown. Shared iconography between these two manuscripts is discussed in Chapter Three, and stylistic similarities in Chapter Four.

and concluded that the manuscript was produced in late thirteenth-century Anatolia.⁵⁴ In 1994, Raby referred to Or.5323, in a brief aside from his main discussion of a 1399AD astronomy manuscript.⁵⁵ In 2000, Hoffmann referred to the Or.5323 illustrations of *Gemini* in a discussion of the nude in early Islamic painting, and suggested "probably dating to the thirteenth century".⁵⁶ Illustrations from the manuscript have also been published in general texts, such as *The World of Islam*, *Faith*, *People*, *Culture* (1976), *Astrology as illustrated in the collections of the British Library and the British Museum* (1980), *The Mapping of the Heavens* (1995), and *Astronomy Before The Telescope* (1996).⁵⁷

All of the published references to Or.5323 have been brief, and many occur simply as a brief cross-reference, or as a short entry in a hand-list. This is so even though the illustrations represent an important period for the arts of the book in Islam, the moments when the artistic impact of the Mongol invasions of Iran was becoming manifest. Previous art historians seem to have avoided this unusual manuscript, perhaps because of its resistance to proposed stylistic models. For example, Wellesz refers to Or.5323 only to admit that it defies classification under either of her proposed groups of Islamic constellation iconography. Also, commentary on the progression of Islamic art during the thirteenth and fourteenth centuries has tended to

-

⁵⁴ See Chapter Four for a discussion of Carboni's conclusions, and further comparison between the two manuscripts.

⁵⁵ Raby 1994 pp.107, 111 (end-note 11). See note above for Raby's attribution of provenance.

⁵⁶ Hoffmann 2000 p.44.

⁵⁷ Sabra states that the manuscript was "illustrated in Mosul, early fourteenth century" although this attribution is given no justification (Sabra 1976 p.353). Pattie describes Or.5323 as fourteenth century, "perhaps made near Samarkand" (Pattie 1980 p.27). Both Whitfield and Walker date the manuscript to the thirteenth century (Whitfield 1995 p.41; Walker 1996 plate 9).

concentrate on dated manuscripts⁵⁸ – although there was an apparently concrete provenance for Or.5323, proposed in the 1954 edition of Ṣuwar al-Kawākib. This has largely gone ignored.⁵⁹ Or.5323 is not included in Simpson's discussion of "post-conquest" Persian art, nor in her list of "the five earliest extant Il-Khānid volumes".⁶⁰ Ettinghausen does not mention the manuscript in the chapter "The Impact of the Mongol Invasion" in Arab Painting, even though the 1297-1300AD Kitāb Manāfic al-Ḥayawān from Il-Khānid Marāghā is discussed.⁶¹ Gray omits Or.5323 from the chapter "The Mongol Style under the Il-Khans" in Persian Painting, perhaps because he did not consider it to be Il-Khānid.⁶² Equally, the manuscript goes unmentioned in general publications on Islamic art history such as Rice, Islamic Art (1975), Brend, Islamic Art (1991), or Blair and Bloom, The Art and Architecture of Islam 1250-1800 (1994).

Previous publications of Or.5323 images

Martin 1912 vol.2, plates 35-39:

Perseus (fol.21v); Auriga (fol.22r); Bootes (fol.13v); Andromeda and Pisces (fol.33r); Cetus (fol.61v); Sagittarius (fol.53r); Taurus (fol.38v); Leo (fol.45v); Canis Minor (fol.72r); Aquarius (fol.58r).

Binyon 1925 plate 44:

Sagittarius (fol.53r)

-

⁵⁸ In a welcome departure from this restricted field of discussion, two recent Ph.D. dissertations have approached important undated manuscripts from the thirteenth century. Contadini 1992 discusses Kitāb Na^ct al-Ḥayawān (British Library Or.2784), a c.1220AD bestiary. Carboni 1992 discusses a c.1300AD copy of Zakarīya al-Qazwīnī's cosmology (British Library Or.14140).
⁵⁹ It is however fortunate that the 1954 attribution went unnoticed, as it was much in error (see above).

No correction has been published, so I assume that the apparently sound proposed provenance was ignored by accident, rather than deliberately.

⁶⁰ Simpson 1982 p.115. The five manuscripts selected are the 1280AD ^cAjā'ib al-Makhluqāt, 1287AD Rasā'il Ikhwān al-Safā, 1290AD Ta'rīkh-i Jahān-gushā, 1297-1300AD Manāfī al-Ḥayawān, and 1299AD Marzubānnāma. These are discussed in relation to the style of the British Library al-Ṣūfī, in Chapter Four.

⁶¹ Ettinghausen 1962 pp.134-142. This manuscript's date has been newly assessed in Schmitz 1997. ⁶² Gray 1961 pp.19-55.

Sarre 1937 p.192, fig.3:

Leo (fol.45v)

Buchthal 1940 fig.21:

Gemini (fol.41v)

Dāiratu'l-Macārif-il-Osmania 1954 plate 11:63

Orion (fol.64v)

Wellesz 1959 plate 75:

Andromeda (32v)

Sabra 1976 fig.10:

Andromeda (32v)

Pattie 1980 p.26:

Perseus (21v)

Carboni 1992 plate 48:

Pegasus (fol.30v)

Whitfield 1995 p.41:

Leo (fol.45v)

Walker 1996 plate 9:

Leo (fol.45v)

Hoffman 2000 fig.12:

Gemini (fol.41v)

8. Format

There are eighty-six folios in the manuscript. The folios are a buff-coloured polished paper, and have all been trimmed and remounted in newer paper frames. The folios measure 23.7 x 33.7cm including these paper mounts, and approximately 21 x 27cm without. The trimming and remounting avoid the text and circumvent many marginal notes, although on occasion, half of the first or last line on a folio has been covered, or cut away. The paper of the frames is beginning to disintegrate at the edges, and the repair work probably took place soon after the manuscript entered the British

⁶³ Listed in the bibliography of primary sources, as al-Sūfī (3).

Museum's collection in 1898, if not earlier. Page-numbers (in European numerals) were added in pencil to the folio-rectos, often upon the new frames. The manuscript was also rebound in a modern red leather binding (measuring 26.3 x 35.5cm). This occurred after 1907, as there are two hand-written pages of comments written by Knobel in November 1907, inserted in the new binding.

The text ranges from twenty-three to twenty-nine lines per page. This irregularity is not on account of the trimming suffered by the margins, which suggests that the layout of the text was slightly careless. It seems that the chapter-titles were laid out before the text was introduced, and that the copyist occasionally had to squeeze the text to fit the space remaining and leave enough room for the constellation-images. There are no ruled lines imprinted into the paper to guide the scribe, and the lines become ever more dense and closely-set in response to the volume of text which must fit into pre-determined spaces. The short chapter for *Crater*, the cup, on folio 78r is particularly condensed.

Chapter titles are written in large script, usually in red ink with brown diacritical and vocalisation marks, and occasionally vice versa. The script of the main text is *naskh*, written in black ink. The constellation-images are drawn with a thin dark grey stylus, which allows for great refinement of line. Each constellation is depicted twice, and usually on the same folio or page-opening.⁶⁴ The stars are marked as gold circles ringed in red. Brown ink is used for notation on the images: to mark the external

-

⁶⁴ This contrasts with other copies of *Kitāb Şuwar al-Kawākib al-Thābita*, such as Bodleian Library Marsh144 (1009-10AD), where the pairs of constellation-images are placed on the recto and verso of (Foot-note continued on the next page.)

stars, to label the constellation-images as they may be seen on a celestial globe or in the sky, to number individual stars on constellation-images, and to label individual stars with their Arabian names. Each pair of constellation-images is entitled [عورة[التنين] ("the image of [Draco]"). The "globe-view" and "sky-view" images are differentiated from one another with the labels:

["The image of [Draco] as it is seen in the sky/globe"].65

The star-tables are drawn out in brown ink, their titles written in red, and their main contents in brown. Additional notes or corrections to the main text or illustrations are written in brown.

The text of the treatise concludes on folio 86r, with a table of the stars in *Piscis Austrinis*, the Southern Fish.⁶⁶ After the table, there follow two final lines of text in the original script, announcing the conclusion of the manuscript with a series of pious formulae to God, the Prophet Muḥammad, his family, and the Imāms:

تم الكتاب و الحمد للّه رب العالمين و صلواته على سيدنا محمد النبي و اله الائمه الابرار الطاهرين و هو حسبا و نعم الوكيل

century.

single folios, and one image is simply traced through the folio from the other. This convention makes the distribution of the stars more consistent between the two images of the same constellation.

⁶⁵ Both the labels and titles on many constellation-images can feature the word "كوكبة" (constellation) instead of "صورة" (image).

⁶⁶ Folio 86v is inscribed with a brief calligraphic line in Persian, and a scrawled list of names, both seemingly irrelevant to the original manuscript. Mr Sandy Morton observed that the names are written in a format similar to lists of property, although they were not likely to refer to slaves, as their names implied some status. This may be an inventory of some sort, as numbers follow some of the names. Mr Morton also suggested that the Persian line at the head of folio 86v dates from the fifteenth

9. Reconstructing pagination

A series of notes, corrections and catchwords have been added throughout the text in dark black ink, written in Persian, in a minute hand. These are evidently the work of a conscientious owner, perhaps the person in Yazd who sold or gave the manuscript to the Qajar prince Hulagu Mirza in 1835AD, or perhaps indeed Hulagu himself. The consistent sequence of catchwords at the foot of folio-versos suggests that the manuscript was rebound during this ownership. It may have been acquired in an unbound and incomplete state, as many of the Persian notes suggest. Evidently, the manuscript was compared with another copy of the treatise, in order to reconstruct the pagination and establish which folios were missing, as the notes frequently state what text or illustration ought to follow. For example, folio 39 is missing, and it can be deduced by comparison with other manuscripts that the missing material amounts to the last two lines of the chapter on Andromeda, the star-table for that constellation, and either an image of Andromeda with two fish from Arabian astronomy, or an image of the large Arabian constellation of the horse. In small Persian handwriting, the final two lines from the missing folio have been added at the foot of folio 38v, and there is a note announcing "the image of the larger horse". On folio 8v, the title for Ursa Major has been omitted from the thirteenth-century text, but is added in the same distinct small Persian script.

The manuscript is almost complete, and is missing only nine folios. Originally there were ninety-five folios, of which eighty-six now remain. At least once, the manuscript became detached from its binding. When it was rebound, some folios were shuffled together, especially towards the end of the manuscript, and some were lost. A reconstruction can be made, primarily by examining the sequence of the text.

I have compared the manuscript with complete copies of the treatise.⁶⁷ The catchwords (at the foot of most folios) and two previous systems of pagination (at the head of most folios) are also useful indicators of sequence, though not infallible. Unfortunately, the folios have been closely trimmed and remounted, resulting in the loss of many of these additional notes. As mentioned above, the text is rarely affected by the trimming.

At the head of many folio-versos, there are page-numbers given in abjad numerals. These predate the rebinding (and the shuffling) of the folios, and therefore correspond to a previous pagination. However, the later trimming and remounting of the folios have removed some of these numbers, and they cease completely after folio 60v. While these page-numbers are generally consistent with the sequence of the text, an examination of the manuscript's contents shows that the abjad page-numbers skip folios 23, 24 and 39. Folios 23 and 24 are present in the current manuscript, and may have been missed by accident. Folio 39 is still missing, and may already have been lost when these page-numbers were written in. As a result, folio 40v is labelled \(\mathbf{U}\) (37), and all subsequent abjad numbers are behind sequence by three.

At the head of certain folio-rectos, there are page-numbers given in Arabic numerals which correspond to a still earlier pagination. Written in brown ink, these numbers run consistently through the manuscript, and predate the disappearance of folios 1,

-

⁶⁷ I referred to Süleymaniye Library A.S.3493 (1131AD), which is in excellent condition, and the 1954AD publication of *Kitāb Şuwar al-Kawākib al-Thābita*, which is based primarily on Bibliothèque Nationale Ar.5036 (c.1430-40AD).

16-19, 39, 54 and 65. The page-numbers observe a pagination system which effectively divides the manuscript into quires of ten pages each, and may also be the work of the conscientious nineteenth-century owner. The first quire consists of folios 1-10, the second of folios 11-20, the third of folios 21-30, and so on. For example, on the first page of the third quire (i.e. 21r), is written the word ثالثة (third), and on the first page of the fourth quire (i.e. 31r) is written close (fourth), etc. Typically, the second, third, fourth and fifth pages of each quire (e.g. folios 22-25) are marked with the folio-number written in Arabic numerals (e.g. 77, 77, 77, 70). The sixth to tenth folios (e.g. folios 26-30) are not marked. By accident, however, the page-number on 22r reads TT (32) instead of TT (22). This may have occurred when the Arabic two (7) was mistaken for a three (7). As a result of this error, these Arabic folio-numbers are out of sequence by ten, e.g. folio 32r is labelled YY (42). Later, this paginationsystem skips folio 77, and subsequent page-numbers are further out of sequence by one. The tenth quire, therefore, begins on folio 92r (instead of 91r), where the top of the page reads عاشرة (tenth). The page-number on folio 94r reads ۱۰۲ (103) instead of 94. Due to the later trimming and remounting of folios, many of these notes and page-numbers have been lost, but those remaining are of great use in the reconstruction of the pagination (see table below).

Each chapter consists of the title, a passage of text, two images of the constellations, and a table of star-positions. The position of the images or table in relation to the text is generally flexible, and can sometimes precede rather than follow. Towards the end of the manuscript, the position of the images and tables becomes increasingly out of synch with the relevant chapter. The end of a folio may be left blank at the end of a passage of text, presumably the proper position for the star-table and constellation-

images, which are to be found displaced elsewhere. For example, there is space left before and after the short chapter on the constellation *Lepus*, the hare, on folios 78v and 79r. The two images and the star-table for *Lepus* are instead located on folio 76v, between the text and the table of the previous chapter on *Eridanus*, the river. (The constellation-images of the river feature just before the *Eridanus* chapter, on 74v and 75r.) It seems that the artist inserted the images for *Lepus* one page too soon, because he assumed that the first blank space after the image of *Eridanus* was the correct place for the following constellation. The image of *Canis Major* (after *Lepus* in the sequence) is placed in the next available space on folio 78r, again too soon. The chapter on *Canis Major* comes shortly afterwards, on 79v-80v.

A reconstruction of the manuscript's pagination follows.

Key to the notation used in the table

[T-Ursa Minor]

= the chapter-title for the constellation, written in larger script, usually in red ink, sometimes in brown, thus:

كوكبة الدب الاصغر

[constellation of the smaller bear]

[Table-Ursa Minor]

= table of all stars in and just external to the constellation. Each star is listed by number, described by its place along the constellation figure, assigned a grade of magnitude, and defined in co-ordinates of longitude and latitude. The co-ordinates are those used in the *Almagest*, with 12° 42' added to the longitude values to compensate for precession. Typically, a table heading reads:

جدول كوكبة [الدب الاصغر] بزيادة يب مب على ما في المجسطي [Table of the constellation of [e.g. Ursa Minor], increasing the longitude in the Almagest by 12° 42'.]

[2 x Ursa Minor]

or

[1 x Gemini]

[1 x Gemini]

= two images of the constellation, as seen in the sky and on a globe. Labels on each illustration identify which is which. In this manuscript, the two versions of each constellation are usually shown facing one another, either on the same page or on the same page-opening.

Entries in italics state the likely contents of missing folios.

Recon- structed order of folios	Current folio- numbers European numerals	Folio- rectos: notes or Arabic numerals	Folio- versos: Abjad numer als	Contents	Location in text
1r	missing	(first)		Frontispiece: title, and dedication	Title-page
1v	"			Beginning of text (c.28 lines of text)	al-Ṣūfī's preface
2r	1r		(2) ب	26 lines of text	
2v	1v	1	1	24 lines of text	
3r	2r	1		23 lines of text	
3v	2v	Ì		25 lines of text	
4r	3r	1		23 lines of text	
4v	3v	1		25 lines of text	
5r	4r	0 (5)	Ì	26 lines of text	
5v	4v	1-3-7	<u>ه</u> (5)	25 lines of text	
6r	5r		 · · / -	27 lines of text	
6v	5v		<u> </u>	26 lines of text	
7r	6r	1		18 lines of text + [T-Ursa Minor] + 7	Part 1:
••		1		lines of text	Northern
7v	6v		 	19 lines of text + space	Hemisphere
8r	7r			[2 x Ursa Minor] + [Table-Ursa Minor]	Chapter 1: Ursa Minor
8v	7v			23 lines of text	Chapter 2:
9r	8r			26 lines of text	Ursa
9v	8v			7 lines of text + [2 x Ursa Major]	Major
10r	9v	ثانیة (second)	II	[Table-Ursa Major]	
10v	9r	1 • (10)		[Table-Draco]	Chapter 3: Draco
11r	10r	11 (11)		[T-Draco] + 26 lines of text	
11v	10v		(11) يا	25 lines of text	
12r	11r			11 lines of text + space	
12v	11v		يب (12)	[2 x Draco]	
13r	12r	۱۳ (13)		[2 x Cepheus] + [T-Cepheus] + 7 lines of text	Chapter 4: Cepheus
13v	12v			24 lines of text	_
14r	13r			6 lines of text + [Table-Cepheus]	
14v	13v		يد (14)	[2 x Bootes] + [T-Bootes] + 5 lines of text	Chapter 5: Bootes
15r	14r	10 (15)		26 lines of text	
15v	14v		يه (15)	24 lines of text	
16r	missing			Bootes: table	
16v	missing			Bootes: table	
17r	missing			Corona Borealis: 2 images, title.	Chapter 6: Corona Borealis
				g. Landv.	49

17v	missing			Corona Borealis: text, table.	
18r	missing			Hercules: title, text.	Chapter 7. Hercules
18v	missing			Hercules: text	
19r	missing			Hercules: text	
19v	missing			Hercules: 2 images	
20r	15r			[Table: Hercules]	
20v	15v		يخ (18)	[2 x Lyra] + [Table-Lyra]	Chapter 8: Lyra
21r	16r	ثالثة (third)		[T-Lyra] + 17 lines of text + [T-Cygnus] + 5 lines of text	Chapter 9: Cygnus
21v	16v			25 lines of text	
22r	17v	۲۲ (32)		23 lines of text	
22v	17r		년 (20)	[2 x Cygnus]	
23r	18r	۲۳ (33)		[Table-Cygnus] + [T-Cassiopeia] + 6 lines of text	Chapter 10:
23v	18v		كا (21)	24 lines of text	Cassiopeia
24r	19r	TY (34)	T	12 lines of text + [2 x Cassiopeia]	
24v	19v		كب (22)	[Table-Cassiopeia] + [T-Perseus] + 12 lines of text	Chapter 11:
25r	20r	†		25 lines of text	Perseus
25v	20v		کج (23)	25 lines of text	1 4 2 2 3 4 2 3
26r	21r	1	1	1 line of text + [Table-Perseus]	
26v	21v		کد (24)	[2 x Perseus]	
27r	22r			[2 x Auriga] + [T-Auriga] + 5 lines of text	Chapter 12:
27v	22v			25 lines of text	Auriga
28r	23r			13 lines of text + [Table-Auriga]	
28v	23v		کو (26)	[1 x Serpens& Serpentarius]	Chapter 13:
29r	24v		1	[1 x Serpens&Serpentarius]	Serpentarius
29v	24r		کز (27)	[Table-Serpens&Serpentarius]	
30r	25r		1	[T-Serpentarius] + 23 lines of text	
30v	25v		کح (28)	24 lines of text	
31r	26r	رابعة (fourth)		[T-Serpens] + 23 lines of text	Chapter 14:
31v	26v		كط (29)	27 lines of text	Serpens
32r	27r	۴۲ (42)		[Table-Serpens] + [T-Sagitta] + 4 lines of text	Chapter 15: Sagitta
32v	27v		J (30)	[2 x Sagitta] + [Table-Sagitta] + [T-Aquila] + 12 lines of text	Chapter 16: Aquila 50

33r	28r	47 (43)		26 lines of text	
33v	28v		ע (31)	[2 x Aquila] + [Table-Aquila] + [2 x Delphinus]	Chapter 17: Delphinus
34r	29r	** (44)		[Table-Delphinus] + [T-Delphinus] + 811 + [T-Equus] + 5 lines of text	Chapter 18: Equus
34v	29v		لب (32)	[2 x Equus] + [Tab-Equus] + [T-Pegasus] + 11 lines of text	Chapter 19:
35r	30r	۴۵ (45)		25 lines of text	Pegasus
35v	30v		لح (33)	[2 x Pegasus]	
36r	31r			[Table-Pegasus] + [T-Andromeda] + 8 lines of text	Chapter 20:
36v	31v		لد (34)	26 lines of text	Andromeda
37r	32r			23 lines of text	
37v	32v		له (35)	[2 x Andromeda]	
38r	33v			[1 x Andromeda & Pisces] + 9 lines of text	
38v	33r		(36) لو	2 lines of text + [1 x Andromeda & Pisces] + 9 lines of text	
39r	missing			c.2 lines text + table for Andromeda	
39v	missing			Image: Andromeda & Arabian fish, or Arabian Horse?	
40r	34r			[T-Triangulum] + 13 lines of text + [2 x Triangulum] + [Table-Triangulum]	Chapter 21: Triangulum
40v	34v		(37) لز	7 lines of text + [T-Aries]	Part 2:
41r	35r	خامسة (fifth)		26 lines of text	Zodiac Chapter 1:
41v	35v		لح (38)	7 lines of text + [2 x Aries]	Aries
42r	36r	٥٢ (52)		[Table-Aries] + [T-Taurus] + 7 lines of text	Chapter 2: Taurus
42v	36v		لط (39)	26 lines of text	
43r	37r	٥٣ (53)	1	26 lines of text	
43v	37v		(40) م	28 lines of text	
44r	38r	٥٢ (54)		23 lines of text	
44v	38v		ما (41)	[1 x Taurus]	
45r	39r	00 (55)		[1 x Taurus]]
45v	39v	, , , , , ,	مب (42)	[Table-Taurus]	
46r	40r			[Table-Taurus] + [T-Gemini] +21 lines of text	Chapter 3: Gemini

46v	40v		مج (43)	27 lines of text	
47r	41r			27 lines of text	
47v	41v		مد (44)	2 lines of text + [1 x Gemini]	
48r	42r	1		4 lines of text + [1 x Gemini]	
48v	42v		مه (45)	[Table-Gemini] + [T-Cancer] + 2 lines of text	Chapter 4: Cancer
49r	43r			27 lines of text	
49v	43v		مو (46)	[2 x Cancer] + [Table-Cancer] + [T- Leo] + 3 lines of text	Chapter 5: Leo
50r	44r			28 lines of text	
50v	44v		مز (47)	25 lines of text	
51r	45r	سادسة (sixth)		18 lines of text + space	
51v	45v		مح (48)	[2 x Leo]	
52r	46r			[Table-Leo]	
52v	46v		مط (49)	[T-Virgo] + 24 lines of text	Chapter 6: Virgo
53r	47r	٦٣ (63)		29 lines of text	
53v	47v		(50) ن	28 lines of text	
54r	missing	(64)		Virgo: image	
54v	missing		(51)	66	
55r	48r	70 (65)		[Table-Virgo]	
55v	48v		نب (52)	[T-Libra] + 28 lines of text	Chapter 7: Libra
56r	49r			28 lines of text	
56v	49v		نج (53)	9 lines of text + [Table-Libra]	
57r	50r		· 	[2 x Libra] + [T-Scorpio] + 15 lines of text	Chapter 8: Scorpio
57v	50v		ند (54)	27 lines of text	
58r	51r	<u> </u>		[Table-Scorpio]	_
58v	51v		نه (55)	[2 x Scorpio] + [T-Sagittarius] + 10 lines of text	Chapter 9: Sagittarius
59r	52r	<u> </u>	ļ. <u>.</u>	26 lines of text	
59v	52v	 	(56) نو	27 lines of text	
60r	53r	 		9 lines of text + [1 x Sagittarius]	
60v	53v	 		[Table-Sagittarius]	<u> </u>
61r	54r	سابعة (seventh)		[1 x Sagittarius] + [T-Capricorn] + 8 lines of text	Chapter 10:
61v	54v		نح (58)	27 lines of text	Capricorn
62r	55r			5 lines of text + [Table-Capricorn]	
					52

62v	55v		نط (59)	[2 x Capricorn]	
63r	56r	V Y (74?)		[T-Aquarius] + 28 lines of text	Chapter
63v	56v		س (60)	29 lines of text	11: Aquarius
64r	58r	۷۳ (73)	1	[1 x Aquarius]	1
64v	58v			[1 x Aquarius]	1
65r	missing			Aquarius: tables	1
65v	missing			"	1
66r	59r	Ī		[T-Pisces] + 27 lines of text	Chapter
66v	59v			27 lines of text] 12:
67r	57r			9 lines of text + space	Pisces
67v	57v			[Table-Pisces]	}
68r	missing			Pisces: image	
68v	missing			"	
69r	60r			4 lines of text + [T-Cetus] + 23 lines of text	Part 3: Southern
69v	60v			25 lines of text	Hemisphere
70r	61r			[1 x Cetus]	Chapter 1:
70v_	61v			[1 x Cetus]	Cetus
71r	63r	ثامنة (eighth)		[Table-Cetus]	
71v	63v			[1 x Orion]	Chapter 2:
72r	64v	7(٨)		[1 x Orion]	Orion
72v	64r			[Table-Orion]]
73r	62r	۸۳ (83)		Space + [T-Orion] + 18 lines of text	
73v	62v			28 lines of text]
74r	65r	۸۴ (84)		20 lines of text + space	l
74v	65v_			[1 x Eridanus]	Chapter 3:
75r	67r	Λο (85)		[1 x Eridanus]	Eridanus
75v	67v			[T-Eridanus] + 26 lines of text]
76r	70r		-	26 lines of text	(Image
76v	70v			9 lines of text + [2 x Lepus] + [Table- Lepus]	and table of Lepus
77r	66r	1		[Table-Eridanus]	is inserted
77v	66v			Blank	too soon)
78r	68r			[2 x Canis Major]	(Image inserted too soon)
78v	68v			space + [T-Lepus] + 13 lines of text	Chapter 4:
79r	69r			5 lines of text + space	Lepus
79v	69v			[Table-Canis Major]	Chapter 5:
80r	7lr_			[T-Canis Major] + 27 lines of text	Canis
80v	71v			28 lines of text	Major
81r	72r			[T-Canis Minor] + 7 lines of text + [Table-Canis Minor]	Chapter 6: Canis Minor
81v	72v	 	1	[T-Argo] + 28 lines of text	Chapter 7:

82r	73r	تاسعة (ninth)	28 lines of text	ı
82v	73v		28 lines of text	
83r	74r	97 (92)	6 lines of text + space	
83v	74v		[Table-Argo]	
84r	75r	97 (93)	[1 x Argo]	
84v	75v		[1 x Argo]	
85r	76r	94 (94)	[T-Hydra] + 27 lines of text	Chapter 8:
85v	76v		28 lines of text	Hydra
86r	77r	90 (95)	[2 x Hydra]	
86v	77v		15 lines of text + space	
87r	78r		[Table-Hydra] + [T-Crater] + 11 lines of text	Chapter 9: Crater
87v	78v		[2 x Crater] + [Table-Crater]	_
88r	79r		[T-Corvus] + 12 lines of text + [Table-Corvus]	Chapter 10: Corvus
88v	79v		[2 x Corvus] + [Table-Lupus]	Chapter
89r	80r		[2 x Centaurus&Lupus]	11:
89v	80v		[T-Centaurus] + 28 lines of text	Centaurus
90r	81r		28 lines of text	
90v	81v		11 lines of text + [T-Lupus] + 17 lines of text	Chapter 12:
91r	82r		27 lines of text	Lupus
91v	82v		[Table-Centaurus]	
92r	83r	عاشرة (tenth)	[2 x Ara] + [T-Ara] + 10 lines of text	Chapter 13:
92v	83v		10 lines of text + [2 x Corona Australis] + [Table-Ara]	Ara
93r	84г		[Table-Corona Australis] + [T-Corona Australis] + 7 lines of text	Chapter 14:
93v	84v		20 lines of text + space	Corona Australis
94r	85r	1•٣ (103)	[2 x Piscis Austrinis]	Chapter 15:
94v	85v		[T-Piscis Austrinis] + 24 lines of text	Piscis
95r	86r		[Table-Piscis Austrinis] + 2 lines of text, stating the end of the treatise.	Austrinis
95v	86v		List of names, irrelevant to text.	

10. Summary

It can be deduced that the location of the manuscript's text, tables and illustrations was decided before work commenced on any of these sections, perhaps by inscribing the chapter-headings first of all. The main text was then copied into the manuscript, leaving space at the end of each chapter for the star-table and two illustrations, which were added next. The occasional displacement of tables and illustrations occurred because the amount of space required for all three items was ill-judged. The irregular spacing and density of the text shows that the layout of the manuscript was not planned line by line. The copyist had to adjust the script in order to leave enough space at the end of chapters, and in some cases, the remaining space was not enough. This may explain why the illustrations of Cassiopeia and Sagittarius are half the size of the other constellation-images of human figures, such as Auriga and Perseus, which occupy almost full folios.

This contrasts with the organisation and presentation of three late thirteenth-century Il-Khānid manuscripts, the 1277-78AD $Z\bar{\imath}j$ -i Il-Khāni 68 (Marāghā), 1297-1300AD $Man\bar{a}fi^c$ al-Ḥayawā n^{69} (Marāghā), and c.1300AD $^cAj\bar{a}$ 'ib al-Makhlū $q\bar{a}t$ (Mosul?), in which evenly-copied ruled text is presented within red double-lined frames. There does survive another Marāghā manuscript however, which does not conform to this text layout: a medical commentary, collated by c Umar b. Mu'ayyad al- c Ur $q\bar{\imath}$ –

_

⁶⁸ British Library Or.7464.

⁶⁹ Pierpont Morgan Library Ms.500.

⁷⁰ British Library Or.14140. Carboni attributed the manuscript to Mosul (Carboni 1992).

⁷¹ Red double-lined frames also occur in earlier manuscripts from the Mosul area, such as the 1199AD and mid-thirteenth-century *Kitāb al-Diryāq* copies (Bibliothèque Nationale Ar.2964; Vienna Nationalbibliothek A.F.10).

the son of a well-known astronomer at the Marāghā observatory.⁷² The text is not ruled, nor the script as spaced and regular as the other Marāghā manuscripts cited.⁷³ This is to demonstrate that not all Marāghā manuscripts were produced according to the same format, and that a Marāghā provenance should not be ruled out for the British Library al-Ṣūfī manuscript on account of its format.

In conclusion, the British Library al-Ṣūfī manuscript, Or.5323, was produced according to the usual format of *Kitāb Ṣuwar al-Kawākib al-Thābita*, although its layout becomes interrupted slightly towards the end of the manuscript. A marginal note on folio 85r shows that the manuscript was copied from an earlier codex, which in turn was copied from another al-Ṣūfī manuscript stored in a renowned Baghdad library, burned down in 1059AD. The manuscript was in Qazwīn in 1279-80AD, as is shown by a diagram drawn on folio 86r by someone with a rudimentary grasp of astronomy. The latest possible date for the manuscript is therefore 1279-80AD. The person who drew the diagram used geographical co-ordinates derived during the thirteenth century in Iran – perhaps at the Marāghā observatory founded in 1259AD. My proposed connection between the precise Qazwīn co-ordinates of (85° 0', 36° 0') and c.1270AD work at Marāghā, shows that the manuscript's date could be attributed to the period 1270-80AD. The notes, diagram and seals do not prove that the manuscript was produced at Marāghā, however.

_

⁷² British Library Or.6690 is a commentary on Ḥunayn b. Isḥāq's Kitāb al-Masā'il fī al-Ṭibb. I am grateful to Dr Emilie Savage-Smith for bringing this manuscript to my attention, and showing me the collator's signature on fol.213v (06.04.00). Another of al-ʿUrḍī's sons, Muḥammad, made a celestial globe, also attributed to Marāghā (listed in Appendix Two).

At some point in its history, possibly in nineteenth-century Europe, a copy of the *Pegasus* illustration on folio 30v was made on an unusual engraved copper plate. During the nineteenth century, the manuscript was restored while still in Iran. In 1835AD, the manuscript was in Yazd, where it was borrowed by a Qajar prince, Hulāgū Mirza. Before his death in 1854AD, Hulāgū deposited the manuscript at a religious sanctuary in Baghdad. In 1898AD, the manuscript was sold to the British Museum, and was rebound shortly afterwards.

⁷³ The Or.6690 script is also quite similar to Or.5323, although written in brown rather than black, and with a thicker nib. The medical manuscript is also smaller (14.8 x 22.8cm), and has 17 lines per page.

1. The author

Abū'l-Ḥusayn 'Abd al-Raḥmān b. 'Umar b. Muḥammad b. Sahl al-Sūfī al-Rāzī was a celebrated Persian astronomer, born in Rayy, Iran, on the 14th of Muharram 291H (7th December 903AD). He served the Buyid ruler Abū Shujā' Fannā Khusraw, entitled 'Aḍud al-Dawla (936-983AD), at his first capital Shīrāz, and then in Baghdad after 977-78AD. Al-Ṣūfī outlived his patron, and died on the 13th Muḥarram 376H (25th May 986AD) in Baghdad.

Al-Ṣūfī taught 'Aḍud al-Dawla about the positions and movements of the constellations, while a second tutor (another famous astronomer) Abū'l-Qasim 'Alī b. al-Ḥusayn b. 'Alī al-Sharīf al-Ḥusaynī, called Ibn al-Ā'lam (d.985AD) instructed the prince on the use of zīj tables. Ibn al-Qifṭī records that 'Aḍud al-Dawla boasted about his accomplished instructors, saying "My teacher in grammar is Abū 'Alī al-Farisī al-Nasawī, for the solution of the zīj [I have as my teacher] al-Sharīf b. al-Ā'lam, and for the positions and movements of the fixed stars, [I have] al-Ṣūfī." Al-Ṣūfī's best-known work, Kitāb Ṣuwar al-Kawākib al-Thābita "Book of Images of the

-

Important early sources on his life are the biographer Ibn al-Nadīm (d.995AD) of Baghdad, the astronomer Ibn Yūnis (d.1009AD) of Faṭimid Cairo, and the biographer Ibn al-Qifṭī (d.1248AD) of Aleppo.

Aleppo.

The most notable of the Buyid rulers, ^cAdud al-Dawla expanded his realm of Fars to absorb ^cUmān (967AD), Kirmān (968AD), Makrān (971AD) and eventually Baghdad (977-78AD) – where he ousted his cousin ^cIzz al-Dawla Bakhtiyar (d.978AD) - and the northern Iraqi provinces of Diyār Rabī and Diyār Bakr. He died of epilepsy in Baghdad in 983AD. (Bowen 1960; Kabir 1964 pp.42-68; Kraemer 1992 pp.272-285; Cahen 1960.)

³ This division of labour is significant when it comes to comparing the tables of star-positions which both astronomers produced (discussed below). Entitled al-zīj al-cAdudī after his patron, Ibn al-Āclam's zīj was translated into Greek, and is discussed in an eleventh-century Byzantine text (Walker 1996 p105). See also Mercier 1989; Sezgin 1974 p.309; Sezgin 1978 p.215; Suter 1900 p.62; Casiri 1770 p.411.

Fixed Stars", was composed as a teaching aid for his royal pupil. It has been described as "an important intermediary development between the presentation of the celestial atlas as depicted by Ptolemy and that of our times". The treatise describes the constellations one by one, providing two illustrations of each figure, and a table listing the stars within each constellation. The recorded star-positions in the treatise are set for 964AD, probably the year al-Ṣūfī presented the work to "Aḍud al-Dawla.6" He also composed the following works on astronomy, astrology and mathematics:

- Kitāb al-camal bi-l-asturlāb (on the construction and use of the astrolabe); dedicated to Sharaf al-Dawla (d.989AD);⁷
- Fī sharh al-camal bi-l-kura ("On the Explanation of Operations with the Sphere"), dedicated to Samsām al-Dawla (d.990-1AD);8
- Kitāb al-mudkhal ilā ^cilm al-nujūm wa aḥkāmihā (compendium of treatises on astrological applications of astronomy);⁹
- Kitāb al-tadhkira wa maṭārih al-shu^cā^cāt (on the projection of rays);¹⁰
- Risālat fī taṣḥīḥ ṭāli^c Aḍud al-Dawla (a study of Aḍud al-Dawla's horoscope);¹¹
- Risālat fī camal ashkāl mutasāwiyat al-adlac (on equilateral polyhedrons);
- Risālat fī ma^crifat mā maḍā li-layl min sā^ca bi-qiyās al-kawākib al-thābita wa-lṭāli^c (on time-keeping by night).¹³

⁴ Ibn al-Qiftī p.226.

⁵ Sezgin 1986 p.5.

⁶ This means that the treatise was composed in Shīrāz, rather than Baghdad - where ^cAdud al-Dawla moved in 977-78AD.

⁷ The treatise was composed before 970AD, as the preface was written by Ibn al-cAmīd, an important Buyid wazīr who died in 970AD (cf. Sezgin 1978 p.215). There are seven extant manuscript copies, all incomplete, including al-Ṣūfī's autograph: Bibliothèque Nationale Ar.5098. The full Arabic text has been published in Kennedy, E.S., Destombes, Marcel, al-Ṣūfī's Kitab al-camal bil Asturlab, Osmania Oriental Publications, Deccan, 1966 (listed in Primary Bibliography as "al-Ṣūfī (6)").

⁸ The treatise was therefore completed between 983 and 986AD, when al-Sūfī died. Sezgin gives the title Kitāb al-camal bi-l-kura al-falakīya (Sezgin 1978 p.215). Kennedy published a survey of this lengthy work (describing the contents of three sections of fifty, fifty-two and fifty-five chapters each respectively), referring to AhmetIII 3491/1 and 3505/1, both in the Topkapı Library.

⁹ Sezgin 1979 pp.168-169.

¹⁰ Sezgin 1979 p.169. Listed by Ibn al-Qifti (p.226), and described in al-Birūnī (2) p.1388.

¹¹ Sezgin 1979 p.169. An excerpt from this treatise is given in *Dastūr al-Munajjimīn*, "a compilation of astronomical and chronological text and tables made by some anonymous member of the Isma'iliya sect", fols.169r-169v, Ar.5968, Bibliothèque Nationale (Kennedy & Destombes 1966 p.10).

¹² Sezgin 1974 p.310.

¹³ Not listed by Sezgin, the title-page of a copy of this treatise is in a manuscript in the National Library of Cairo (DM647) (King 1986 p.41).

Al-Ṣūfī is thought to have compiled a $z\bar{\imath}j$ of astronomical tables, as Ibn Yūnis cites al-Ṣūfī's solar parameters in his own $z\bar{\imath}j$, and the Spanish Jewish astronomer Abraham b. ^cEzra (mid twelfth-century) also makes references. ¹⁴ However, neither Ibn al-Nadīm nor Ibn al-Qiftī mention a $z\bar{\imath}j$ by al-Ṣūfī, nor does al-Ṣūfī himself mention it when discussing the $z\bar{\imath}j$ tables of other authors. ¹⁵

The biographer Ibn al-Qiftī (d.1248AD) mentions an illustrated *Urjūza* on the constellations among al-Ṣūftī's works. ¹⁶ Most subsequent researchers agree that this is an error, but differ on the identity of the real author. An Egyptian poet and mathematician, Abū cAlī b. Abī al-Ḥusayn al-Ṣūftī (fl.c.1136AD), and his patron Fakhr al-Dīn Qarā Arslān (the Artuqid ruler of Hisn Kaifa, d.1174AD) have been named together in two copies of this *qasīda*, and seem to be the most reasonable attribution – although there is an early tradition of attributing the poem to the son of the astronomer al-Ṣūftī. There are at least ten extant copies, including one nineteenth-century copy of an 1177-78AD manuscript. ¹⁷ The *Urjūza* is appended to two copies of al-Ṣūftī's treatise: the 1125AD Qatar and 1224AD Vatican al-Ṣūftī manuscripts. In the 1125AD manuscript, the poem is explicitly presented as the work of the astronomer's son, "saving in verse what his father had said in prose":

هذة قصيدة قالها ولد ابي الحسين الصوفي نظم فيها ما نثره ابوه

¹⁴ Mercier 1991 is a study of references to al-Ṣūfī's "lost zīj" in twelfth-century tables for use in London and Pisa (drawn from twenty Latin manuscripts, listed in Mercier 1991 pp.65-67). Kunitzsch notes that Ibn Ezra records wrong information about al-Ṣūfī's precession constant (Kunitzsch 1986A)

p.78). ¹⁵ Mercier 1991 pp.43, 57-58.

¹⁶ Ibn al-Qiftī p.226.

¹⁷ Brockelmann 1937 p.863: Paris 2561/4, Munich 870, Lee 56 ix, Bol.422, Laleli 2698, Gotha 1398, Cairo V 226. King 1986 p.44: DM 417/2, DM 163, DM 831/1. The nineteenth-century copy is in the Khalili Collection. For references to the author, cf. Brockelmann 1937 p.863; King 1986 p.44; Steinschneider 1870 p.305; Suter 1900 pp.62-63, 212; Wellesz 1959 p.1, note 2; Brend, Hillenbrand & King 1998 p.47.

Al-Ṣūfī also constructed a silver celestial globe for ^cAdud al-Dawla, which was later exhibited in a Cairo library in 1043-44AD/435H. The globe was seen there by one Ibn al-Sanbadī, who reported that it weighed 3,000 dirhams, and had cost 3,000 dinars. ¹⁸ Ibn al-Sanbadī also saw a copper globe at the library, apparently made by Ptolemy (!), which had belonged to Amir Khalid b. Yazid b. Ma^cwiya. ¹⁹

Although little is known about al-Ṣūfī's career before he joined the court of ^cAḍud al-Dawla, he may have been active in his hometown of Rayy at the court of Rukn al-Dawla (d.976AD), ^cAḍud al-Dawla's father. Rukn al-Dawla's trusted wazīr Abū'l-Fadl Muḥammad b. al-Ḥusayn b. Muḥammad, known by the laqab Ibn al-^cAmīd (d.970AD), was a patron of astronomical activity. ²⁰ He ordered the construction of a large mural quadrant in Rayy, which was used to measure the obliquity of the ecliptic in 950AD. ²¹ Among the astronomers who carried out the measurements were Abū'l-Faḍl al-Ḥirawī and Abū Ja^cfar al-Khāzin, although others were also involved. ²² Ibn al-^cAmīd was certainly acquainted with al-Ṣūfī at this time. In the preface to Suwar

_

¹⁸ This account is quoted in Ibn al-Qiftī's Ta'rīkh al-Ḥukamā' ("Chronology of Learned Men"), Ibn al-Qiftī p.440. Ibn al-Sanbadī (? וְיִיׁ וֹשְׁיִּבְּבֶּב) lived in Cairo, and was well-versed in astronomy. He reported that in 435H (1043-44AD), the minister Abū al-Qāsim ʿAlī b. Aḥmad al-Jurjanī ordered work to begin on the books of the library of Cairo: a catalogue was to be made, and decrepit bindings were to be replaced. Ibn al-Sanbadī visited the library to find out what books there were in his field, and found 6,500 volumes on astronomy, engineering and philosophy alone. He saw a silver globe at the library, made by Abū'l-Ḥusayn al-Ṣūfī for ʿAḍud al-Dawla.

¹⁹ At this point, the text reads "we reflected what [time] had elapsed since the [globe's] time [of manufacture], that it was 1,250 years [old]". This voice must belong to Ibn al-Qift, as he persistently uses the first person plural, and gives Ibn al-Sanbadī the first person singular. If the globe was indeed made by Ptolemy himself, it could not be more than 913 years old, but it can be assumed that this is merely an uninformed guess on the part of Ibn al-Qift, which does not affect the validity of Ibn al-Sanbadī's account. However, Kunitzsch is sceptical about the whole report, suggesting that it is "highly improbable and [...] possibly distorted in the course of transmission", although he does not explain his suspicions further (Kunitzsch 1987 p.117).

²⁰ Ibn al-Amīd was a renowned man of letters, called "the second Jāhiz" by Ibn Khallikan (Kabir

Ibn al-'Amīd was a renowned man of letters, called "the second Jāhiz" by Ibn Khallikan (Kabir 1961 p.10). He had impressive administrative and diplomatic skills, and led Rukn al-Dawla's troops on military campaigns. He became wazīr at Rayy in 939-40AD (Cahen 1971; Kabir 1961 p.8). See Kraemer 1992 pp.241-255. He also owned a large library, containing books "on every science and every branch of philosophy and literature, more than a hundred camel-loads". His librarian was the Buyid historian Ibn Miskawaih, who gives this description. (Pinto 1929 p.218).

²¹ Sayili 1960 pp.103-104. Sayili discusses the scale of this project, and whether it could be said to constitute an observatory.

al-Kawākib, al-Sūfī mentions two journeys made with the wazīr: in 946-47AD he visited Dīnawar (in Jibal province, north-east of Kirmānshāh) "in the company of alustādh al-ra'īs Abū'l-Fadl Muhammad b. al-Husayn", and in 948-49AD they were in Isfāhān together.²³ Another instance of collaboration between the two occurred sometime before 970AD, when al-Sūfī composed a treatise on the astrolabe. dedicated to Sharaf al-Dawla (d.989AD, son of cAdud al-Dawla), of which Ibn al-^cAmīd wrote the preface.²⁴

Ibn al-cAmīd was sent to Fars to educate the young cAdud al-Dawla (who called him al-ustādh al-ra īs), returning later to Rayy. 25 In 944AD, cAdud al-Dawla had succeeded his (childless) uncle cImad al-Dawla as the ruler of Fars, at the age of thirteen.²⁶ In 956-57AD, Ibn al-cAmīd was sent to restore the young prince, who had been deposed in a revolt led by an army officer Ibn Bullakā. 27 Presumably, this was the primary reason for the wazīr's mission to Shīrāz, although Rukn al-Dawla must also have seen the importance of sending his son a good counsellor to educate him in statecraft.²⁸ Al-Ṣūfī could have been a member of this 956-57AD teaching mission from Rayy - as he did become astronomy-tutor to the prince at Shīrāz. By 960-61AD, al-Şūfī was established at the court of cAdud al-Dawla, as he describes the

²³ al-Şūfī (2) pp.244-245, 251.

²² Sayili 1960 p.104. Their names are not recorded however.

²⁴ Sharaf al-Dawla reigned as amir in Shīrāz, and later Baghdad, from c.958 to 989AD. A condensed version of al-Şūfi's astrolabe treatise is Süleymaniye Library AyaSofya2642/2 (1466-67AD). Its introduction includes information about the original (Kennedy & Destombes 1966 p.4). Destombes states that the treatise was written in 970AD (Destombes 1962 p.13).

25 Bowen 1960. Kraemer says that Abū'l-Faḍl taught Aḍud al-Dawla in Rayy (Kraemer 1992 p.275).

²⁶ Bowen 1960. By other accounts, ^cAdud al-Dawla did not succeed his childless uncle until 949AD (Schjellerup 1874; Kraemer 1992 p.273).

27 Kabir 1964 p.42. Apparently, a well-worded letter from Ibn al-cAmīd convinced the rebel to submit.

²⁸ Abū'l-Fadl was succeeded by his less impressive son, Abū'l-Fath cAlī b. Muḥammad (948/9-976/7AD). He also led troops on behalf of Rukn al-Dawla, and was used by Adud to persuade or placate his father in times of disagreement over succession issues. He was executed in 976-77AD, for conniving against a counsellor of Mu'ayyid, son and successor to Rukn al-Dawla in Rayy.

arrival of an Isfahāni astronomer, Ibn Rawāja, into the ruler's presence.²⁹ The episode is mentioned in the preface of *Ṣuwar al-Kawākib*, which was composed for ^cAdud al-Dawla in 964AD.

At Shīrāz, al-Ṣūfī led a series of solar observations at the winter solstice of 969AD, summer solstice of 970AD, and autumn equinoxes of 971 and 972AD,³⁰ to measure the obliquity of the ecliptic (the same aim as the Rayy project of twenty years previously). The main instrument used was a large graduated ring, entitled the "cAdudi" ring (al-ḥalqat al-cAḍudīya) - named after the patron. As al-Ṣūfī names this instrument in Ṣuwar al-Kawākib (964AD), the observational activity may have begun before the major projects of 969-972AD.³¹ Other astronomers participated, including Abū Sahl Wayjan b. Rustam al-Qūhī,³² Aḥmad b. Muḥammad cAbd al-Jalīl al-Sijzī, Nadhīf b. Yumn al-Yūnāni (i.e. the Greek), and Abū'l-Qāsim Ghulām Zuhal ("the Slave of Saturn", d.986AD).³³

A younger figure in al-Ṣūfī's circle was one Faraj b. cAbd Allah al-Ḥabashī. He is not mentioned by Sezgin or Suter, but his name is recorded in two copies of Ṣuwar al-Kawākib dated 1125AD and 1233AD. Faraj was an assistant (aeta) of al-Ṣūfī's, and wrote out copies of the treatise for his master. In one instance, he copied out the text and read it back to al-Ṣūfī to check it properly. In another instance, he

_

²⁹ al-Ṣūfī (2) p.269. Stern suggests that 'Adud al-Dawla's court was in Isfahān (Stern 1960 p.87). However since 944AD 'Adud al-Dawla had been the ruler of Fars province - of which the capital was Shīrāz. The constellation treatise of 964AD was composed in Shīrāz, as al-Ṣūfī mentions observations made there in the text (al-Ṣūfī (1) pp.213, 229).

³⁰ Kennedy & Destombes 1966 p.3.

³¹ al-Şūfī (1) p.229.

³² Brockelmann 1937 p.399; Ibn al-Nadīm (1) p.669 (for a list of works on mathematics).

³³ Suter 1900 p.63; Sayili 1960 p.105; Sezgin 1979 p.168; Ibn al-Nadīm (1) p.669.

³⁴ 1125AD Qatar manuscript, produced in Baghdad, and 1233AD Berlin manuscript, produced in Mosul

³⁵ Described in the colophon of the 1125AD Qatar al-Sūfī.

copied the text, and al-Ṣūfī carried out the star-tables and the images.³⁶ Both of these manuscripts were deposited at a renowned Baghdad library named *Dār al-cIlm bayn* al-surayn, founded in 993AD by a Buyid wazīr.³⁷

Al-Ṣūfī's career probably began then in Rayy, where he was born. He was a travelling-companion to the chief wazīr on two occasions in 946-47 and 948-49AD, and may have participated in astronomical observations in Rayy, sponsored by the wazīr, in 950AD. In 956-57AD, he may have travelled in the company of the wazīr to Shīrāz, to educate the Buyid prince 'Aḍud al-Dawla. By 960-61AD he was in service to the prince, and in 964AD, he completed his chief work, dedicated to his pupil. In Shīrāz between 969 and 972AD, he carried out observations sponsored by 'Aḍud al-Dawla. In 977-78AD (or shortly afterwards), he must have travelled to the new court of 'Aḍud al-Dawla in Baghdad. His name is not listed among the astronomers working at the Baghdad observatory of 'Aḍud's son Sharaf al-Dawla, in the 980s. He died in 986AD, in Baghdad.

The preface of al-Ṣūfī's constellation-treatise describes his initial impressions of cAdud al-Dawla as one already well-versed in the sciences, keen to make new progress, and most welcoming of scholars to his court. Although in this context, al-Ṣūfī would only write the most complimentary things about his patron, his description tallies with Adud al-Dawla's life. He was a keen patron of science, and

_

39 al-Şūfī (2) p.252.

³⁶ Described in the colophon of the 1233AD Berlin al-Şūfī.

³⁷ Cf. Chapter One for a discussion of this remarkable library and its contents.

³⁸ Ibn al-Ā'slam, the other astronomy-tutor to 'Adud al-Dawla, also moved to Baghdad, where he seems to have established a small private observatory (Sayili 1960 pp.108-109).

made his court "a rendezvous for theologians, grammarians and poets". ⁴⁰ He had a large palace library, accessible only to scholars. ⁴¹ He founded a hospital in Shīrāz, and later another in Baghdad. ⁴² He also founded an observatory in Shīrāz, where a team of court astronomers including al-Ṣūfī carried out observations. After the move to Baghdad in 977-78AD, ^cAdud al-Dawla founded an academy of science, ⁴³ and carried out large-scale restoration of the dilapidated city, rebuilding public mosques, streets, embankments, bridges and water-channels.

His son Abū'l-Fawaris Shīrdil, Sharaf al-Dawla (r.983-989AD), showed similar interests in science, and built an observatory in the palace gardens in Baghdad.⁴⁴ A team of astronomers followed a program of planetary observations there, completed in June 988AD. At the inaugural observations, official documents testified that the instruments and observations were accurate.⁴⁵ Among the astronomers involved were Abū'l-Wafā' al-Būzjānī (d.998AD) and Abū Sahl Wayjan b. Rustam al-Qūhī, who had participated in 'Adud al-Dawla's observation program at Shīrāz some twenty years earlier.⁴⁶

__

⁴⁰ Kraemer 1992 p.275. A recorded charitable vow reflects the prince's studious ambitions: "When I have completed my study of Euclid, I shall give 20,000 dirhams in charity, and when I finish the book of Abu ^cAlī [a book of grammar], I shall give 50,000 dirhams" (Kabir 1964 p.61). In a dispute with his cousin ^cIzz al-Dawla Bakhtiyar (d.977-78AD), the weak ruler of Baghdad, ^cAdud listed among his grievances that his cousin had refused him requests for "some rare documents" (Kabir 1964 p.29).

⁴¹ The geographer al-Maqdisī described the library's layout and staff system, writing "there is no book

The geographer al-Maqdisī described the library's layout and staff system, writing "there is no book written up to this time in whatever branch of science but the prince has acquired a copy of it" (Ahsan al-taqasim p.449, fully quoted in Pinto 1929 pp.228-229). Gradually the library fell into neglect, and the calligrapher Ibn al-Bawwāb complained to the later Buyid ruler Bahā al-Dawla that a precious Qur'ān copied by Ibn Muqla had been allowed to fall apart (Yaqut Irshād V pp.446-7; quoted in Pinto 1929 p.235).

⁴² The Baghdad hospital, bīmāristān ʿAḍudī, was staffed by twenty-four physicians, who also delivered lectures. The renowned physician Jibrā'īl b. ʿUbayd Allah b. Bakhtīshūʿ (d.c.1005AD) travelled with the Buyid court to Baghdad, and was made responsible for the project (Contadini 1994 p.358). The hospital was still active two centuries later, when Ibn Jubayr visited Baghdad (Kraemer 1992 p.278).

⁴³ Wiet 1971 p.91.

⁴⁴ Sayili 1960 pp.112-117. Sharaf al-Dawla inherited Fars province on his father's death, and gained 'lraq in 986-7AD.

⁴⁵ Sayili 1960 p.113.

⁴⁶ Brockelmann 1937 p.399; Sayili 1960 pp.112-117.

2. The Treatise on the Fixed Stars

Al-Ṣūfī's best-known work is Kitāb Ṣuwar al-Kawākib al-Thābita, the Book of the Images of the Fixed Stars. "Fixed Stars" is a term describing the stars, which were thought to be fixed to the surface of a large celestial sphere, turning around the Earth. (The "Wandering Stars" are the planets, which were seen to move independently and at different paces, across the celestial sphere.)

In 1831, the preface was published in Arabic with accompanying French translation, by Michel Caussin, who referred to Ar2488 (13th century AD), Ar2489 (dated 1266AD), and Ar2490 (dated 1516AD), of which all three are in the Bibliothèque Nationale de France.⁴⁷ In 1874, H.C.F. Schjellerup published a full translation of al-Sūfī's text, also into French, using Ms83 (dated 1601AD) in the Royal Library of Copenhagen, and Ms191 (dated 1606AD) in the Institute of Oriental Studies, St Petersburg.⁴⁸ A critical edition of the Arabic text was published in Hyderabad, in 1954 by the Dāiratu'l-Maārif-il-Osmania, based mainly on Ar5036 (c.1437AD), in the Bibliothèque Nationale de France, but also collated with Bodleian Marsh144 (dated 1009-10AD), Topkapi A.3493 (dated 1131AD), Vatican Ross.1033 (dated 1224AD), Berlin Staatsbibliothek A.5658 (dated 1233AD) and Asafiya, Hyderabad (no date mentioned).⁴⁹ The edition includes the text of the *Urjūza* on the constellations (allegedly written by al-Ṣūfī's son), translated extracts from the

⁴⁷ Caussin, Michel, "Les constellations d'Aboulhossain Abderrahman Es-Soufi", Notices et extraits des manuscrits de la bibliothèque du roi et autres bibliothèques, vol.12, Paris, 1831, pp.241-276 (listed in Primary Bibliography as "al-Şūfī (2)"). This translation omits a short paragraph at the end of the preface, found in British Library Or.5323, Bodleian Library Marsh144, and Topkapı Library A.3493, explaining the meaning of the terms al-mutaqaddim and al-tāli. The paragraph is included in

Schjellerup's edition (see following note).

48 Schjellerup, Hans C. F. C., Description des Etoiles fixes composée au milieu du 10e siècle de notre ère, par l'astronome persan Abd-al-Rahman al-Sūfī, Commissionaire de l'Académie Impériale des Sciences, St Petersburg, 1874 (listed in Primary Bibliography as "al-Ṣūfī (1)").

preface to Schjellerup's translation of 1874, and plates from eight al-Ṣūfī manuscripts, including British Library Or.5323, the focus of this study. Kunitzsch notes (correctly) that this 1954 publication is "deplorably rich in misprints and other errors". In 1969, the 1250AD Persian translation of al-Ṣūfī's treatise was published in facsimile, as Tarjama-i ṣuwar-i kawakib, be qalam-i Khwaja Naṣir al-Din-i Ṭusi. In 1986, the earliest known copy of Kitāb Ṣuwar al-Kawākib al-Thābita, (dated 1009-10AD, Marsh144, Bodleian Library Oxford) was also published in facsimile by the Institute for the History of Arabic-Islamic Science in Frankfurt.

The author's main source for the treatise is the star-catalogue compiled by the Alexandrian astronomer Ptolemy (d. after 161AD), called "Baṭlamiyūs" in Arabic. 53 He recorded observations made between 124 and 141AD. Ptolemy's theories on astronomy remained hugely influential for centuries, and were thoroughly studied and often challenged by scientists of the Islamic world. Ptolemy's star-catalogue is included in his major work *Mathematika Syntaxis*, known as al-*Mijisṭī* in Arabic, and so later as the *Almagest* in the West. 54 At least four translations of the *Almagest* into

⁴⁹ Nizamu'd-Din, M. (gen. ed.), Suwaru'l-Kawākib or Uranometry, Dāiratu'l-Maārif-il-Osmania, Hyderabad, 1954, with a note by H.J.J. Winter (listed in Primary Bibliography as "al-Ṣūfī (3)"). The book also includes rather crude re-drawings of all of the illustrations in the Ar5036 manuscript.

⁵⁰ Kunitzsch 1986A p.59. The 1954 text also borrows heavily from other publications, such as the statement on p.1 that Kitāb Şuwar al-Kawākib al-Thābita "is one of the three great masterpieces of observational Astronomy of the Medieval ages", the other two being the catalogues of Ibn Yunus (d.1008-09AD) and of Ulugh Beg (1437AD). This comes almost verbatim from Sarton 1927 p.666. ⁵¹ Tarjama-i ṣuwar-i kawakib, be qalam-i Khwaja Naṣir al-Din-i Ṭusi, Tehran, 1348Sh, (=1969AD)

⁵¹ Tarjama-i şuwar-i kawakib, be qalam-i Khwaja Naşir al-Din-i Ţusi, Tehran, 1348Sh, (=1969AD) (listed in Primary Bibliography as "al-Ṣūfī (4)"). The same manuscript was the basis of a publication of the Persian text, edited by Sayyid Mu^cizz al-Din Mahdawi, Tehran, 1351Sh (=1972AD). ⁵² Sezgin, Fuat (ed.), The Book of Constellations, Kitāb Ṣuwar al-Kawākib, by Abd al-Raḥman al-

⁵² Sezgin, Fuat (ed.), The Book of Constellations, Kitāb Şuwar al-Kawākib, by Abd al-Raḥman al-Şūfī, Abu'l-Ḥusayn Abd al-Raḥman ibn Umar ibn Muḥammad (d.986AD), Publications of the Institute for the History of Arabic-Islamic Science, series C, vol.29, Frankfurt am Main, 1986 (listed in Primary Bibliography as "al-Ṣūfī (5)").

⁵³ Plessner 1960. Ptolemy also wrote on astrology, geography, optics and harmonics.

⁵⁴ Μαθηματική σνταξι means mathematical systematic treatise. "al-Majisti" and "Almagest" derive from μεγίστη σνταξι, "greatest treatise". Kunitzsch proposes that the Arabic title derives from a Pahlavi form (Kunitzsch 1974 pp.119-125). The Arabic-transliterated title betrays the route by which the *Syntaxis* reached Europe. Although a Latin translation of the *Almagest* was made from a Greek manuscript in Sicily, c.1160AD, this version was not disseminated. Rather, Arabic translations were the means by which Ptolemy was reintroduced to Europe, until Greek manuscripts became available (Foot-note continued on the next page.)

Arabic were made during the ninth century, including those of Sahl al-Tabarī, al-Hajjāj b. Yusūf b. Matar, and Isḥāq b. Ḥunayn (d.877AD),⁵⁵ whose 827-28AD version was later corrected by Thābit b. Qurra (d.901AD).⁵⁶ In the preface to Ṣuwar al-Kawākib, al-Ṣūfī mentions that he referred to as many translations of the Almagest as he could find, having noticed discrepancies between them,⁵⁷ although Kunitzsch observes that al-Ṣūfī's treatise follows the wording of Isḥāq b. Ḥunayn's translation for the most part, but takes star-positions from a range of versions.⁵⁸ Revising Ptolemy's star-catalogue is an important focus of al-Ṣūfī's treatise, but not the only one: he also clarifies previous scholarship on native Arab astronomy, and identifies common errors in scientific literature of his day.

Preface

The treatise begins with a long preface, in which al-Ṣūfī describes his methods, and his motivation for composing the book. He dedicates the treatise to ^cAdud al-Dawla, praising him as a patron.

The preface starts with a sharp criticism of the level of contemporary authors on astronomy, and instrument-makers. He attacks two groups, those who study classical astronomy, طريقة المنجمين ("the way of the astronomers"), and those who study

in Renaissance times. In Toledo, 1175AD, Gerard of Cremona translated the text into Latin from

Arabic, and this version was the most popular in medieval Europe (Kunitzsch 1986B pp.116-117).

Translator and physician, Abū Zaīd Ḥunayn b. Isḥāq al-ʿIbādī was active at Jundīshāpūr and then Baghdad, where he was employed as a Greek-Arabic translator by the Banū Mūsa b. Shākir family. He later became chief physician to the ʿAbbāsid Caliph al-Mutawakkil, and supervised the translation-school created by the same ruler (Sarton 1927 p.611; Goodman 1990 pp.487-91).

⁵⁶ Physician, mathematician and astronomer, Abū'l-Ḥasan Thābit b. Qurra b. Marwān al-Ḥarrānī was a founding member of the 'Abbāsid translation school in Baghdad (Sarton 1927 p.599; Goodman 1990 pp.485-486).

 ³⁷ al-Şūfī (2) p.241.
 ⁵⁸ Kunitzsch 1986A p.57; 1975 p.110-111. Al-Şūfī was criticised for his inconsistent use of different versions, by Ibn al-Salāh (d.1154AD). See below under Star-tables for further criticism.

Arabian folk astronomy, طريقة العرب ("the way of the Arabs"), remarking that authors usually knew about one system and were ignorant of the other – even though one might not assume so.⁵⁹ This criticism serves to explain a range of common misconceptions for the reader's benefit, as well as to justify the need for an informed book on the constellations. It also elevates the author's status as a scientist among amateurs, and encourages the student reader with the suggestion that success lies in learning the basics properly. While al-Ṣūfī may well have identified with these sentiments, this introductory defence is also a rhetorical device, previously used by both al-Battānī (d.929AD) and Ptolemy himself. The preface of al-Battānī's lunar and solar zīj of 880-81AD also states that the dismal level of current astronomical literature prompted the author to compose a new text.⁶⁰ Ptolemy wrote the Almagest to improve and clarify the theories of Hipparchus of Nicaea (fl.161-126BC). Similarly, al-Ṣūfī presents himself as a champion of independent research and thorough knowledge, condemning the ignorance and/or shoddy methods of fellow authors and scientists.

The preface begins:

"I have seen many people who seek knowledge of the stars, their positions in the celestial sphere, and their constellations [...]. One sort follows the methods of the astronomers, and relies on celestial globes produced by craftsmen who do not know the sky themselves, and who have used celestial co-ordinates found in books to plot out the stars on their instruments, not knowing truth from error. Anyone who knows the stars can look at these globes and see that many stars are in the wrong place. The globe-craftsmen sometimes refer to books written by astronomers who falsely claim to have observed all the stars and determined their exact positions. In fact, these authors have only taken certain important stars, known to everyone, like the eye of Taurus, the heart of Leo, the ear of corn of Virgo, and the three stars on Scorpio's forehead – the stars which Ptolemy observed in the Almagest because they lie beside the Ecliptic. These authors also observed these few stars, and recorded their positions

⁵⁹ He mentions al-Battānī's ignorance of Arabian astronomy in particular (al-Ṣūfī (2) p.251).

⁶⁰ The astronomer Abū ^cAbdallah Muḥammad b. al-Jābir b. Sinān al-Battānī (d.929AD) was active in Raqqa. He wrote a commentary on Ptolemy's *Tetrabiblos*, and also compiled a lunar and solar zīj for the year 880-81AD, and a star-catalogue for 911AD (Hartner 1970).

for their own era. As for all the other stars, the authors simply adjust the longitudes from Ptolemy's catalogue. They also add or subtract a few minutes of longitude and latitude from many star-positions, to make their own catalogue seem more plausibly the results of observations, as though they really found these differences. Often these authors do not know about the stars at all. Of this number are al-Battānī, ^cUṭārid and others."

Al-Ṣūfī describes how false data circulates through astronomy literature and instruments through negligence, ignorance and deception. Many astronomers falsely claim to conduct their own observations of star-positions, he accuses, which can be proven by comparing their results with earlier literature. Naivety or laziness then brings other astronomers to quote from the concocted catalogues, and broadcast errors further. Al-Ṣūfī criticises how deplorable errors quickly become accepted as correct, simply because authors and craftsmen will only refer to other literature and instruments to establish information – rather than use their own eyes to observe the truth from the stars themselves. He suggests that this unwillingness exposes how few astronomers are actually capable of making proper observations. There follows a detailed criticism of the star-positions and magnitudes recorded by early astronomers.

Al-Battānī is accused of compiling a catalogue only of such star-positions which agree among all known versions of the *Almagest*, although claiming to have observed and measured all the positions himself.⁶² Certain star-positions were changed slightly, to disguise their source. For certain stars, al-Battānī notes magnitudes which are wrong, but commonly found in astronomy literature – proving, according to al-Sūfī, that al-Battānī had not observed them himself – nor had those authors he

_

⁶¹ al-Sūfī (2) pp.241, 257.

⁶² al-Sūfī (2) p.241.

consulted.⁶³ The object of al-Ṣūfī's criticism must be al-Battānī's catalogue of 489 stars for the epoch 911AD, (reportedly) made from observations at Raqqa.⁶⁴

Al-Ṣūfī then picks out errors in a treatise on the constellations by ^cUṭārid, which seems to have been illustrated. ⁶⁵ This shows that al-Ṣūfī's illustrated treatise was not the first in the Islamic world. Although claiming a perfect knowledge of the constellations, ^cUtārid had depicted *Sagittarius* facing the wrong direction.

Next, al-Ṣūfī describes a beautiful celestial globe, made by ^cAlī b. ^cIsā al-Ḥarrānī, in which certain stars in *Virgo* were in the wrong place. ⁶⁶ This reference is interesting, because al-Ṣūfī mentions stars which should be in the constellation-figure's wings. In the 1009-10AD Oxford copy of al-Ṣūfī's treatise, apparently produced by his son, *Virgo* is depicted without wings.

Having discussed his predecessors in classical astronomy, al-Şūfī turns to authors on native Arabian astronomy, which included a calendar system called the *Anwā*.⁶⁷ During the ninth and tenth centuries, information about this system, and the

63 al-Sūfī (2) p.242.

⁶⁴ See Hartner 1970.

⁶⁵ al-Şūfī (2) p.242. Uṭārid b. Muḥammad al-Ḥāsib (or al-Kātib) was an astronomer, astrologer and mathematician, active in the ninth-century. He wrote the following treatises: Kitāb manāfī al-ahjār (on precious stones), Kitāb al-jafr al-hindi (commentary on Indian divination), Kitāb al-amal bi 'l-asṭurlāb (on the use of the astrolabe), Kitāb al-amal bi dhatt al-halq (on the use of the armillary sphere), Kitāb tarkīb al-aflak (on the structure of the heavens), Kitāb al-mar'ia al-mahraqa (on burning mirrors) (Ibn al-Nadīm (2) p.278; Sarton 1927 p.572; Sezgin 1978 p.161; Suter 1900 p.67.). There is no known copy of this treatise on the constellations.

⁶⁶ Active in Baghdad, ^cAlī b. ^cIsā al-Asţurlābī al-Ḥarrānī was apprenticed to the instrument-maker Ibn Khalid al-Marwarrūdhi, who served the ^cAbbāsid Caliph al-Ma'mūn (r.813-833AD) (Ibn al-Nadīm p.671). With al-Marwarrūdhi and others, ^cAlī b. ^cIsā participated in al-Ma'mūn's observation-projects in Dayr Murran on Mount Qāsīyūn near Damascus (in 831-32AD), Baghdad (in 829-30AD) and Sinjar (for an account of al-Ma'mūn's patronage of observatories, see Sayili 1960 pp.50-87). ^cAlī b. ^cIsā also wrote one of the first Arabic treatise on the astrolabe, which has been published (see primary bibliography) (Sarton 1927 p.566). There survives an astrolabe made by one of his pupils (inv.57-84/155; History of Science Museum Oxford; reproduced in Savage-Smith, 1992B, p.19).

individual names of stars and constellations, was first set down, not by astronomers, but by lexicographers aiming to record pure Arabic language in the proverbs and vocabulary of the Bedouins.⁶⁸ Many of these authors lacked a full understanding of astronomy, and often made simple blunders as to the location of stars. Al-Ṣūfī discusses these, identifying correct versions in most cases.

In particular al-Ṣūfī mentions that the lexicographer Abū Ḥanīfa, a famous compiler of Arabian astronomy material, did not properly understand the term "fixed stars", nor could he differentiate the Arabian constellation of the lion from *Leo*. ⁶⁹ Abū Ḥanīfa also quoted information from another lexicographer Ibn Kunāsa, which al-Ṣūfī shows to be inaccurate. ⁷⁰ Before reading his work, al-Ṣūfī says, he had always thought of Abū Ḥanīfa as a proficient astronomer. He had visited his birthplace in Dīnawar in 945-46AD, and seen the room where he worked. Many people told him how Abū Ḥanīfa had made observations from the roof, over many years. However on reading his book, al-Sūfī realised that Abū Ḥanīfa was really only familiar with the

___ 67 __

⁶⁷ This system was measured in twenty-eight "anwā" (singular: naw'), or periods of time, according to the simultaneous rising and setting of pairs of prominent stars, also used to predict the weather (Pellat 1960).

⁶⁸ Astronomers (including al-Ṣūfī and al-Bīrūnī) began to collect Arabian astronomy information from the later ninth century onwards (Pellat 1960 p.523). From the early eighth century, astronomers were also collecting the works of Greek, Indian and Persian scientists and philosophers, for translation into Arabic, study and evaluation. In Baghdad, the 'Abbāsid dynasty were keen sponsors of this activity, as were wealthy private citizens (such as the Banū Mūsa family). Hārūn al-Rashīd (d.809AD) founded a library, Khizānat al-Ḥikma ("the storehouse of wisdom"), where scientific works were translated. Expanding the library after the model of Jundīshāpūr academy, Hārūn's son al-Ma'mūn (d.833AD) founded the famous translation-institute Bayt al-Ḥikma ("the house of wisdom") in 830AD, where systematic translation-projects took place. (Goodman 1990; Pingree 1971 pp.1136-37; De Lacy O'Leary 1949 pp.155-175).

⁶⁹ al-Sūfī (2) pp.244, 247. Abū Ḥanīfa Aḥmad b. Dāwūd al-Dīnawarī (d. 895AD) wrote a compilation of Anwā' lore, entitled Kitāb al-Anwā', which survives in fragments. This title was used by many authors on this subject (Pellat 1960 p.523). Abū Ḥanīfa wrote a book on plants, Kitāb al-nabāṭ, also collected from oral tradition (Sarton 1927 p.615).

⁷⁰ al-Şūfī (2) p.249. This is another instance of errors becoming current because of reliance on inaccurate texts. Ibn Kunāsa (d.822AD) compiled a *Kitāb al-Anwā* which is no longer extant (Pellat 1960 p.523).

most well-known stars, and what information was available in other books on Arabian astronomy.⁷¹

Al-Battānī is then criticised more, for discussing Arabian astronomy and the system of lunar mansions, and committing many gross mistakes.⁷² For example, he attributes the lunar mansion *al-baldat* to stars in *Sagittarius*, even though this mansion is placed in an empty starless area of the sky. Al-Ṣūfī found this mistake repeated elsewhere, on many celestial globes,⁷³ and concludes that al-Battānī might have saved himself some embarrassment if he had kept to the study of classical astronomy, to the movements of the planets, and eclipses of the sun and moon.⁷⁴

Next al-Ṣūfī describes a meeting in Isfahān in 948-49AD with an astronomer called Ibn Rawāja, who claimed to be a proficient astronomer, but soon showed that he knew the stars only by name. While showing al-Ṣūfī an astrolabe marked with many stars, he identified one star by the wrong name, as القرد ("the ape") instead of ("the solitary"). He was then unable to tell al-Ṣūfī this star's location. In 960-61AD, Ibn Rawāja presented himself at the court of Aḍud al-Dawla, and again failed to identify a star correctly.

Having encountered gross errors among even the most well-respected astronomers and in their writing, al-Ṣūfī resolved to write a reliable book on the constellations. He

⁷² al-Şūfī (2) pp.249-251.

⁷¹ al-Şūfī (2) p.245.

⁷³ al-Ṣūfī (2) p.250.

⁷⁴ al-Ṣūfī (2) p.251.

⁷⁵ al-Sūfī (2) p.251.

⁷⁶ In the constellation *Hydra*. Ibn Rawāja's mistake could come from his use of a carelessly-copied text, in which the diacritical marks were misplaced.

⁷⁷ Asked to identify al-nasr al-wāqi^c (in Lyra), Ibn Rawāja named al-cayyuq (in Auriga).

entered the service of cAdud al-Dawla, who wished to know the stars and constellations by name. 78 According to al-Sūfī, no one else at the Buyid court was qualified to teach about the constellations used by the astronomers or the Arabs, nor had anyone previously written a treatise which gave an accurate account of either constellation system.⁷⁹ He lays out the contents of the treatise: a description of the forty-eight constellations, identifying the positions and magnitudes of one thousand and twenty-two stars. The star-magnitudes were established by al-Sūfī's own observations. For the star-positions, the longitude values were updated to 964AD from the catalogue made by Ptolemy in the Almagest. 80 According to al-Sūfī, Ptolemy had in turn referred to earlier observations made by Menelaus, and deduced that longitude had shifted at a rate of one degree per century since the time of Menelaus. Al-Şūfī applied a different rate to update Ptolemy's longitude values, but left the latitude values unchanged.⁸¹ He concludes the preface with a prayer, and dedication to ^cAdud al-Dawla,

."الامير الجليل"

Main text

After the preface follow forty-eight chapters, one for each constellation. Each chapter follows the same format, with text, two illustrations of the constellation, and a table listing all the stars in the constellation. The text of the chapter begins by listing the various names by which the constellation is known, then describing the stars in the group. The constellation-figure is described, and then the relative layout of the stars

Cf. previous note.

⁷⁸ al-Şūfī (2) p.252. ⁷⁹ al-Şūfī (2) p.252.

⁸⁰ Cf. the section on star-tables below, for the need to update star-positions and the epoch used by al-

is explained simply, in terms of lines, squares and arcs, and the distance between stars is given in units of خراع and ذراع and ذراع and كراع . The magnitude of each star is also stated. Al-Ṣūfī's fresh attribution of star-magnitudes, based on personal observations, is an important contribution of his treatise – and he discusses those (frequent) findings which contradict Ptolemy's account. Obscure stars, dimmer than the sixth magnitude, are omitted by Ptolemy, and included by al-Ṣūfī. Ptolemy's catalogue also sometimes errs in given co-ordinates for star-positions: here, al-Ṣūfī evidently had access to a celestial globe mapped out according to Ptolemy's star-catalogue, because he notes that certain stars appeared on this globe in different locations to those in the sky. 83

The constellation's position in relation to nearby star-groups or the Milky Way is also mentioned. If a large star is usually marked on astrolabe *retes*, this information is also given. Often al-Ṣūfī refers to the constellations as they appear on the celestial globe, and he mentions several different globes which he himself examined – including one made by the Sabaeans of Ḥarrān. 84 Twice he mentions different iconographical versions of figures, but also discusses these globes' accuracy as instruments. 85 Many, he writes, have been constructed without regard to the stars' real positions in the sky, or to Ptolemy's star-catalogue in the *Almagest*, because the makers have referred only to unreliable records of star-positions. 86

_

⁸² al_Sūft (1) n 80

⁸³ al-Ṣūfī (1) p.149, referring to a star in Cancer. Cf also p.150, about a star in Leo.

⁸⁴ al-Sūfī (1) pp.77, 127 (reference to "many globes made by the Harranians"), 149, 162, 190.

⁸⁵ He had seen several versions of the constellation *Lyra* as a tortoise, and of *Virgo* as a figure holding an ear of corn (al-Şūfī (1) pp.77, 162).

⁸⁶ al-Ṣūfī (1) pp.166-167. In this case, astronomers could not find a globe which agreed with Ptolemy's catalogue about the position of a particular star in *Libra*, which caused general confusion.

Arab folk astronomy

Al-Ṣūfī then cites the names of individual stars and constellations in native Arab astronomy tradition, which lie within (or across) each given classical constellation. This tradition mapped the sky into constellations, some of which are considerably larger than the Greek ones, and are earlier versions of Babylonian zodiac constellations. Specific identities were also allocated to individual stars, arranged in collective groups. See

Al-Ṣūfī offers explanations for unusual names, pointing out common errors. Occasionally he repeats folk proverbs or beliefs around the star-names – although he also explains that accounts from folk astronomy are often contradictory as to the exact identity of certain stars. ⁸⁹ Further, he notes that recorded information on folk astronomy has been set down by people unfamiliar with both Arab folk astronomy and "scientific" classical astronomy. ⁹⁰ Al-Bīrūnī takes a more philosophical stance in his chapter on the lunar mansions in Āthār al-Bāqiya (written 1000AD, some forty years after al-Ṣūfī's treatise), accepting that much difference of opinion prevailed on the names and exact location of stars: "The Arabs have a proverb applicable to this subject, saying: 'The two contending parties were content, but the judge declined to give a judgment."

_

⁸⁷ There are Arabian versions of the zodiac constellations of *Aries*, *Gemini*, *Leo*, *Virgo*, *Scorpio*, *Sagittarius*, *Aquarius* and *Pisces*. Some are in the same location as the classical figures, while others are displaced nearby (Hartner & Kunitzsch 1993 p.83).

are displaced nearby (Hartner & Kunitzsch 1993 p.83).

88 For example, three small neighbouring star-groups in *Ursa Major* are entitled the first, second and third leaps of the gazelles, describing the trail of hoof-prints. A concordance of Arabian and classical stars and constellations is given in appendix three.

⁸⁹ For example, al-Sūfī (1) pp.123, 253.

⁹⁰ al-Şūfī (1) p.144.

⁹¹ al-Bīrūnī (1) p.348.

Kunitzsch proposed a new assessment of al-Sūfī's account of Arab star-names,92 pointing out that al-Sūfī depended on the weak premise that the Arabian astronomy literature he consulted was indeed a correct account of the names used by the Bedouins. After all, the only literature available to him consisted of such imprecise sources (in terms of astronomical information) as poetry and lexicography, in which al-Sūfī treated all material as genuine references to actual stars and star-groups. Although some of the lore did indeed derive from authentic tradition, this may only be said for one sixth of the recorded material.⁹³ The rest consisted mainly of invention or distortion by poets, who sometimes recorded variants of star-names with poetic license.⁹⁴ A star-name might appear in a poem as a simile, and be distorted to fit the meter. 95 Unfortunately, al-Sūfī took all references to star-names as read, and introduced them uncritically to scientific literature, "in many cases arbitrarily fixing a rather fluid tradition". 96 His account was thereafter accepted as authoritative, and became a standard reference for the subject. 97 Bayer's Uranometria of 1603AD referred to both al-Sufi and Ptolemy, and established modern usage.

Double-format illustrations

The text of each chapter is followed by the illustrations of the constellation-figure. The stars are marked as small circles on the figure, each labelled with a number which corresponds to the star-table. Many are also labelled with their names from Arabian tradition. Divergence from the information in Ptolemy's star-catalogue is

⁹² Kunitzsch 1975 pp.7-34.

⁹³ Kunitzsch 1975 p.30.

⁹⁴ Cf. for examples Kunitzsch 1975 pp.19-20. "... keine echten, im Volk gewachsenen und verbreiteten Namen, sondern reine Kunstprodukte, Erzeugnisse der šu^carā" (p.30). ⁹⁵ Kunitzsch 1975 p.33.

[%] Neugebauer 1975 (part 1) p.9.

indicated on the image, by labelling certain stars "Those which Ptolemy did not mention". There are two images for each constellation, illustrating the constellation as it appears in the sky, and as depicted on celestial globes - in mirror-image [PLATE 3]. This double format is an innovation of al-Ṣūfī's, designed to assist the student of astronomy. He explains that this will avoid confusion. The student examining a celestial globe sees the constellations arranged in reverse of their appearance in the sky. As a teacher, al-Ṣūfī may have noticed that his students found it difficult to learn the layout of a constellation by studying its mirror-image on a globe. A student needed to see both versions, because an astronomer had to be conversant with either view. Thus, illustrations of both views were inserted for each constellation, as a useful visual reference. Al-Ṣūfī also points out that a "globeview" constellation image can be understood better by lifting the page up to the light, and looking at the figure from the other side – to see the constellation as it appears "in its true state" in the sky. 101

Al-Ṣūfī's illustrations function as simple references to the layout of stars within a constellation. The stars are placed carefully, and in many manuscript-copies, there are pinpricks in the star-markers, showing that the stars were transferred carefully from one copy to the next. As star-maps, they have certain disadvantages, and can not compare with a celestial globe. Drawn individually, the figures are not shown relative to other constellations, and do not demonstrate relative scale. Some

⁹⁷ "Er trug dadurch entscheidend zur Bildung einer übertriebenen und verzerrten Meinung von der Sternkenntnis der alten Araber bei, die sachlich unzutreffend ist und darum nicht länger aufrechterhalten werden kann" (Kunitzsch 1975 p.31).

⁹⁸ The stars are conceived as fixed to the surface of a celestial sphere around the Earth. A celestial globe is a model of this sphere, and the constellation-figures marked on its outer surface appear in reverse to the figures visible in the sky – the "inner surface" of the spherical model.

99 al-Sūfī (1) pp.45-46.

Overlapping constellations such as the Serpent and Serpent-Bearer, and Centaurus and Lupus, are always depicted together, although each is discussed in separate chapters.

constellation figures appear upside-down (or sideways) in the sky, such as *Hercules* and *Cepheus*, but are depicted on their feet in individual images. Nor are they mapped according to a system of co-ordinates, as are the stars on a practical celestial globe, although the layout does represent the constellation's correct shape. The two-dimensional page is a difficult place to project the co-ordinate points mapped on the curved surface of the celestial sphere. Such an accurate projection is anyhow unnecessary in al-Ṣūfī's treatise, as a table of co-ordinates is placed beside each constellation-image. These "disadvantages" are unimportant, as the treatise is not intended as a replacement for the globe, but as its supplement.

Placing the Arabian names as labels on constellation-images may have served as a convenient cross-reference for an Arab student of astronomy. Possibly, al-Ṣūfī's audience was more familiar with popular local nomenclature than with classical constellation layout, and the Arabian names could help to orient the student getting to grips with an introduced constellation system. Towards the end of his preface, al-Ṣūfī suggests that explaining the details of both systems may make it easier to recognise either one. ¹⁰³ Arabian constellation names tend also to be used as labels on celestial globes. He suggests that the folk names of the stars were common knowledge in the Middle East: "In all our cities, even the women sewing at home

..

101 al-Sūfī (1) p.46.

103 al-Ṣūfī (2) p.276: ليستدل باحدهما على الاخر "so that one [system] could show information about the other".

Ptolemy discusses this issue in the *Almagest*, saying that the exact placement of stars around constellation images could vary slightly according to different people's perception of the constellation-outline. This was not a cause for great concern, because the exact positions of the stars were identified separately in celestial co-ordinates: "...the descriptions which we have applied to the individual stars as parts of the constellations are not in every case the same as those of our predecessors: [...] in many cases our descriptions are different because they seemed to be more natural and to give a better proportioned outline to the figures described. [...] However, one has a ready means of identifying those stars which are described differently [by others]; this can be done immediately simply by comparing the recorded positions" (*Almagest* VII.4: Toomer 1984 p.340).

know the star which the Arabs call al-nasr al-waqi^c, the diving vulture [in Lyra], and call it al-athāfī, the tripod."104

Star-tables

The star-tables usually occur at the end of each chapter. All the stars of the constellation are listed, first the "internal" stars which lie within the constellationoutline, second the "external" stars lying outside the outline. There are seven entries for each star: its number in the constellation, a brief description in terms of location on the constellation-figure, which zodiac sign it occupies, which hemisphere it occupies, its magnitude, and its co-ordinates of celestial longitude and latitude, given in degrees and minutes [PLATE 4].

The title for each table reads "the table for the constellation [X], adding 12° 42' to the longitude which is in the Almagest'. This refers to al-Sūfi's key source, Ptolemy's star-catalogue in books seven and eight of the Almagest. This catalogue, recorded for the epoch 138AD, lists 1,025 known stars, according to magnitude, and co-ordinates of celestial longitude and latitude. Al-Şūfī produced a revised edition of this catalogue, re-assessing the star magnitudes, and updating the longitude values. 105 The latter was necessary because of a phenomenon which causes celestial longitude to change gradually. Over time, recorded longitude values of star-positions become obsolete, due the phenomenon of the precession of the equinoxes, which causes the starting-point for measuring celestial longitude to recede at a minute rate. 106 A catalogue of star positions could expect a shelf-life of fifty to seventy-five years

 ¹⁰⁴ al-Şūfī (2) p.251.
 105 Strangely, al-Şūfī does not add any stars to Ptolemy's original catalogue table – even though he points out several such stars in the main text and in constellation-images.

before going out of date. 107 Astronomers attempted to discover the rate of precession. in order to update obsolete star-positions with greater speed and ease: Ptolemy proposed a rate of precession of one degree every one hundred years. This was narrowed to one degree of precession every sixty-six years, by the Baghdad astronomers who compiled the Zīj al-Mumtahān ("Tested Tables") for the cAbbāsid Caliph al-Ma'mūn (d.833AD) in 829-30AD. Al-Sūfī refers to these astronomers as Ashāb al-Mumtahān ("the companions of the tested tables").

Al-Sūfī used this same rate, updating the Almagest longitudes by 12° 42' for the epoch 1st October 964AD. 108 According to al-Sūfī (following al-Battānī), Ptolemy had referred to a star-catalogue by Menelaus, made in 98AD, and "updated" it to his own era (138AD). 109 By subtracting from Ptolemy's values, al-Sūfī restored the hypothetical positions of Menelaus and then calculated the appropriate change in longitude co-ordinates between 98 and 964AD – preferring to use the rate derived by the Ashāb al-Mumtahān. 110 Both al-Battānī and al-Sūfī held that Ptolemy had used a 98AD star-catalogue of Menelaus, but it is more commonly held that Ptolemy

¹⁰⁶ For a detailed study of precession, cf. Mercier 1976 and 1977.

110 al-Sūfī (2) pp.255-256.

¹⁰⁷ The same is true of a celestial globe and of an astrolabe, as both are set to map the star-positions of a particular epoch. Ptolemy designed a "precession-proof" celestial globe with a moveable meridian line (the equinoctial colure) and celestial equator, but his design was generally ignored by Islamic and European instrument-makers. The unique model was also adjustable to different geographical latitudes. Whitfield 1995 p.27; Savage-Smith 1992B pp.24, 43.

¹⁰⁸ This corresponds to the beginning of the Syrian year, 1st Tishrin I 1276, using the calendar of Alexander [من سنى ذي القرنين], which counts from 311BC. Al-Sūfī refers to another calendar for the epochs of Ptolemy and Menelaus: 886 and 845 Nabonassar [من سنى بختنصر] respectively. This refers to the earliest Babylonian records of observations, made in the reign of Nabonassar. (1st Thoth) 1 Nabonassar = (26th February) 746BC (a synopsis table of different calendars is given in Neugebauer 1975 part 3, p.1066).

¹⁰⁹ Ptolemy used the epoch 138AD as it was the first year in the reign of Roman emperor Antoninus (d.161AD), to whom the treatise was dedicated. Menelaus of Alexandria was a Greek astronomer and mathematician, who made observations in Rome in 98AD. He wrote six books on chords, which are now lost, and another on spherics - which was translated by Ishāq b. Hunayn (d.910-11AD) at Bayt al-Hikma, Baghdad (Sarton 1927 pp.253-54).

referred to positions recorded by Hipparchus of Nicaea, c.128BC. 111 Had al-Sūfī instead subtracted from Ptolemy to restore the positions recorded by Hipparchus, and then calculated the change in precession by 964AD, the resulting positions would have been more accurate. 112

Although it is often stated that al-Sūfī made independent observations, 113 al-Sūfī's star-positions were calculated from the Almagest, and are not the results of observations. His insistence, in his preface, on first principles must refer to starmagnitudes and the correct identification of Arabian and classical constellations, rather than to observational establishment of star co-ordinates. He must have considered Ptolemy and the authors of Zīj al-Mumtahān to be suitable reliable sources.

Al-Sūfī was later criticised by Ibn al-Salāh (d.1154AD), who also held that conducting one's own observations (rather than depending on literature) was paramount. 114 Ibn al-Şalāh condemned many previous scholars' examinations of Ptolemy's star-positions as not nearly critical enough. Analysing potential causes of accidental textual distortion by copyists, he showed how the figures in Ptolemy's tables so easily become obscured as the star catalogue is copied successively: certain letters are misread for one another, and ambiguities arise between co-ordinates for

^{111 (}Neugebauer 1975 p.288.) Hipparchus of Nicaea (fl.161-126BC) is credited with discovering the precession of the equinoxes. Ptolemy draws from him, but was not as dependent as some authors have suggested. Hipparchus recorded a star-catalogue for 128BC which has not survived, although various references in another text, Commentary on the Phaenomena of Aratus and Eudoxus, do remain. Neugebauer suggests that Hipparchus' catalogue was not as developed as that of Ptolemy (Neugebauer 1975 pp.275-77). I am very grateful to Dr Raymond Mercier for discussing al-Şūfī's calculation methods with me (March and April 2000).

112 By this method, al-Şūfī would have added 13° 30' rather than 12° 42' (e-mail from Raymond

Mercier, 28th March 2000).

¹¹³ Kennedy 1956 p.169.

¹¹⁴ Ibn al-Şalāh pp. 109-111.

degrees and minutes. Al-Ṣūfī had chosen to ignore many of Ptolemy's errors, and had also been inconsistent by depending on different available versions of the *Almagest*. 115

Al-Ṣūfī clearly states that he updated the longitude values using the precession rate proposed by the Baghdad compilers of the 829-30AD $Z\bar{i}j$ al-Mumtahān (1° in 66 years), and left Ptolemy's latitude values unchanged. Had he made his own observations, his star-positions might have been quite different, because his calculated figures are at odds with those observed by his contemporary Ibn al-Ā'clam (d.985AD), the other astronomy teacher to 'Adud al-Dawla. As mentioned, al-Ṣūfī instructed the Buyid ruler on the positions and movements of the constellations, while Ibn al-Ā'clam taught the use of $z\bar{i}j$ tables. Ibn al-Ā'clam also made observations and compiled a new $z\bar{i}j$, 117 in which all of the longitude values are between three and four degrees greater than al-Ṣūfī's values - even though both astronomers were working at the same time. The latitude values are up to one degree greater in Ibn al-Ā'clam's tables. The following table compares the positions given by both astronomers, for six principle stars:

_

¹¹⁵ Ibn al-Şalāh p.111.

¹¹⁶ al-Sūfī (2), pp.255-256.

Excerpts are provided in Kennedy 1956 p.170. The $z\bar{i}j$ has survived in quotation by other authors on astronomy (Mercier 1997 p.402). Cf. also Mercier 1989.

Star	al-Şūfī		Ibn al-Ā ^c lam	
	Longitude	Latitude	Longitude	Latitude
السماك الرامح (a Bootes)	9° 42'	31° 30' N	12° 55'	31° 12' N
عين الثور (α Taurus)	25° 22'	5° 10' S	28° 40'	5° 15' S
قلب الاسد (a <i>Leo</i>)	15° 12'	0° 10' N	18° 45'	0° 15' N
السماك الاعزل (a Virgo)	9° 22'	2° 0' S	12° 33'	2° 6' S
قلب العقرب (a Scorpio)	25° 22'	4° 0' S	28° 47'	4° 24' S
اخر النهر (α Eridanus)	12° 52'	52° 30' S	16° 42'	53° 30' S

An exact difference between the longitude values would have occurred if both astronomers were applying two different precession rates to Ptolemy's catalogue of positions (and if *neither* was carrying out observations). However, the variety of difference between the positions of al-Ṣūfī and Ibn al-Āclam shows that the latter was not applying a straight rate to Ptolemy, and was therefore probably conducting his own observations. On this basis, it is possible that Ibn al-Āclam's zīj shows the real values of the star-positions in the late tenth century. Perhaps strengthening this, Ibn al-Āclam had a particular reputation for being careful and accurate in his observations. The disparity may demonstrate that al-Ṣūfī's star-tables were not perfectly accurate, perhaps because he applied a precession rate now known to be inaccurate. Ibn al-Āclam had derived a more accurate precession-rate, one degree in seventy years. Other astronomers — including Ibn al-Āclam - continued to narrow the elusive rate of precession. For example, Yūnus b. Ḥusayn al-Astūrlābī, the maker

¹¹⁸ Sayili 1960 pp.107-109. Ibn Yūnis (d.1008-9AD) praised Ibn al-Ā^clam for his precise observations and knowledge of geometry (Mercier 1997 p.402), and Naṣūr al-Dīn al-Ṭūsī (d.1274AD), the chief astronomer at the Marāghā observatory, found Ibn al-Ā^clam's observations to be among the most reliable available (Sayili 1960 p.139).

¹¹⁹ Mercier 1997 p.402.

of a celestial globe dated 1144AD, applied a rate which was more accurate than that of the *Mumtahān* astronomers. ¹²⁰ The correct rate is 1° in 72 years. ¹²¹

However, the treatise may not often have been used as a practical reference-book for star-positions: far later copies always record al-Ṣūfī's given positions of the stars in 964AD. Manuscript copies of *Kitāb Ṣuwar al-Kawākib al-Thābita* do not update the star tables to correspond to the correct positions of the copyist's era, and the same star-positions, apparently inaccurate even for 964AD, were always retained as an integral part of al-Ṣūfī's classic text. The continued popularity of the text must also be due to the convenience of the double layout for each constellation, and to al-Ṣūfī's authoritative discussion and concordance of Arabian and scientific constellations.

constellations Lyra and Cancer. Marginal notes show that the text was collated against al-Şūfī's text.

¹²⁰ Musée du Louvre, département des Antiquités orientales: MAO 824. Cf. Makariou 1998 p.3.

¹²¹ Cf. Hartner 1970 p.511.
122 I have examined the tables in the four copies of Kitāb Suwar al-Kawākib al-Thābita, and all give

identical star-positions, at 12° 42' greater in longitude than the positions in Ptolemy, just as al-Şūfī had set them in 964AD. The star-tables of undated al-Şūfī manuscripts can not be used to deduce an approximate date of production, therefore, unlike celestial globes which are mapped out for a particular period of time. Destombes estimated two possible dates for a celestial globe in Dresden, presuming the maker to have updated the star-positions using one of two possible rates of precession of 1° after 66 years (the rate used by al-Ṣūfī), or after 70 years (the rate used by Nasīr al-Dīn al-Tūsī). The resulting dates are 1304AD and 1310AD (Savage-Smith 1985 p.220).

An interesting fragment in the Bodleian Library (Hunt 273) is an illustrated twelfth-century treatise on the constellations, evidently modelled on al-Ṣūfī - in which the star-positions are updated by 15° 27' from the Almagest – approximately equivalent to 1143AD (according to Destombes 1956 p.10). The layout of tables and illustrations is the same as al-Ṣūfī, although only two images survive – of the

3. Dissemination

Al-Sūfi's treatise was used throughout the Islamic world, and also translated into Latin and disseminated in Christian Europe. The polymath al-Bīrūnī (d.1048AD) referred to "the book of Abū'l-Husayn on the fixed stars" as though it were part of the canon of constellation literature, in Athar al-Baqiya ("The Chronology of Ancient Nations"), composed in 1000AD, fourteen years after al-Sūfi's death. 123 The renowned astronomer Nasīr al-Dīn al-Tūsī (d.1274AD) translated the text into Persian. 124 A luxurious copy was made for Ulugh Beg (d.1449AD) the astronomerprince of the Timurid dynasty. 125 Ulugh Beg referred to al-Sūfī (using al-Tūsī's Persian translation) while compiling a new star-catalogue, in his zīj-i jadīd-i sultanī of 1437AD. 126 In the $z\bar{i}i$, Ulugh Beg writes that he had a celestial globe made, plotted according to the co-ordinates of al-Sūfī's catalogue, and saw that the star-positions did not correspond correctly to their real situation in the sky. 127 Thus, he decided to conduct fresh observations of the stars, excepting twenty-seven which were too far south to be visible from Samarkand. 128 Their positions were calculated by applying a precession rate to al-Sūfī's figures. 129 Ulugh Beg retained al-Sūfī's magnitudevalues.

12

¹²³ Bibliothèque Nationale Ar5036 (c.1430-40AD), was probably executed at Samarkand, where Ulugh Beg's observatory was built (Kunitzsch 1975 pp.15-16; 1986A p.60). ¹²⁶ Kunitzsch 1986A pp.61-64. The observatory, north-east of Samarkand, was built in 1424AD.

¹²⁸ Knobel compared Ulugh Beg's values with modern calculations of star-positions in 1437AD. The co-ordinates rarely differ by more than one degree (Knobel 1917 pp.52-74).

¹²⁹ Ulugh Beg used the same rate as Ibn al-Ā'lam and al-Ṭūsī (1° every 70 years), adding 6°59'.

¹²³ In his chapter on the lunar mansions, al-Bīrūnī mentions al-Ṣūfī's treatise at the end of a list of "the literature of this kind", i.e. the works of various authors on the constellations (al-Bīrūnī (1) p.335).

¹²⁴ An early copy of al-Tūsī's Persian translation is dated 1250AD, in the Süleymaniye Library

⁽AyaSofya 2595). The suggestion (made in Storey 1958 p.41) that this manuscript was the autograph copy is disputed, in spite of its very early date. Cf Kunitzsch 1986A p.62, note 22.

125 Bibliothèque Nationale Ar5036 (c.1430-40AD), was probably executed at Samarkand, where

¹²⁷ Sédillot 1847 pp.198-199. This remark seems strange, as Ulugh Beg was certainly aware of the phenomenon of the precession of the equinoxes.

¹²⁸ Knobel compared Ulugh Beg's values with modern calculations of star-positions in 1437AD. The

Livy Ulugh Beg used the same rate as Ibn al-Ā'clam and al-Ṭūsī (1° every 70 years), adding 6°59'. Knobel noted a discrepancy about this addition, and showed that Ulugh Beg's staff had mistakenly applied the precession rate to Hijra years instead of solar (or "Persian") years (Knobel 1917 pp.12-13).

The Egyptian astronomer Taqī al-Dīn b. Muḥammad al-Rashīd b. Macrūf al-Miṣrī (d.1585AD), who directed a short-lived observatory in Istanbul built in 1579AD, also owned a copy of al-Ṣūfī's treatise – now in the Oriental Institute of Saint Petersburg. Two other Persian translations were made, by Luṭfallah "Muḥandis" b. Aḥmad al-Nadir al-Micmar al-Lahūrī (late sixteenth century), and Ḥasan b. Sacd al-Qā'īnī (c.1630AD).

The text of al-Ṣūfī's treatise was copied directly into Zakarīya al-Qazwīnī's 1270AD cosmology 'Ajā'ib al-Makhlūqāt wa Gharā'ib al-Mawjudāt "The Book of the Wonders of Creation and the Oddities of Existence", written in Wasit. The work was divided into three sections on the earth, sea and sky. The section on the heavens included entries on different angels as well as planets and constellations. The text of al-Ṣūfī's treatise was used (almost verbatim) for the section on the constellations, with the difference that only one image was provided for each constellation [PLATE 5].

Occasionally, the makers of celestial globes used the treatise as a reference guidebook for star-positions, and sufficiently esteemed it to cite al-Ṣūfī in the globes' inscriptions. The earliest known example is a brass celestial globe in the Nasser D. Khalili Collection, dated 1285-86AD/684H. Its inscription reads: "These stars were drawn from the Book of Constellations by Abū'l-Ḥusayn al-Ṣūfī, after increasing their longitudes 5 degrees to correspond to our time [...]"

130 St Petersburg Institute of Oriental Studies: C.724 (16th century). There is a well-known miniature depicting astronomers at work in the observatory, (Istanbul University Library: FY.1404; reproduced in Savage-Smith 1992B p.27). In the background, the shelves are packed with books.

¹³¹ Nasser D. Khalili Collection: SCI21.

A convenient handbook reference to the constellations, Suwar al-Kawākib was also widely transmitted and translated through Christian Europe, which contributed to the adoption of Arabic star-names (as transliterated approximations) in western astronomy tradition, which has survived to the present. ¹³³ The author was known by many approximations such as Azophi, Abolfazen, Albuhassin, Ebennesophy, Acophius, Alzophi, Ilbermosophim and Jeber Mosphim. 134 In Northern Spain, al-Sūfī's treatise was consulted by the astronomers at the court of Alfonso X of Castile (r.1252-1284AD), and used in their compilation, the Libros del saber, an encyclopaedic collection of monographs on astronomy, which was edited in 1276-77AD.¹³⁵ The Jewish scholar Rabbi Juda translated a Latin version of the treatise (entitled De stellarum fixarum motu atque locis) into Spanish, and presented it to Alfonso X in 1256AD. 136 Kunitzsch lists eight manuscripts of al-Sūfī's treatise in Latin translation, entitled the "Sufī Latinus corpus", which includes Ms1036 in the Bibliothèque de l'Arsenale: Liber de locis stellarum fixarum, cum ymaginibus suis verificatis, ab Ebennesophy philosopho, annis Arabum 272 [PLATE 7]. This manuscript contains many references to Sicily, although Gousset has proposed that it was produced in Bologna, c.1270AD. 138 In the mid-sixteenth century, a mathematics

132 Savage-Smith & Maddison 1988 vol.1, p.212.

134 Listed in Kunitzsch 1986A pp.67, 78-79, and Hauber 1918 pp.50-51.

¹³³ Cf the "modern" star-names Vega (al-nasr al-waqi in Lyra), Aldabran (al-dabaran in Taurus) and Rigel (rijl al-jawza' in Orion), among many.

¹³⁵ Published by Rico y Sinobas (ed), Libros del saber de astronomia del rey D. Alfonso X de Castilla, Madrid, 1863-67. The first four books are dedicated to the constellations. Kunitzsch points out that the section is not a "complete direct translation", even though al-Şūfi's text was its main source (Kunitzsch 1986A p.65). ¹³⁶ Hauber 1918 p.49.

¹³⁷ Kunitzsch 1986A pp.66-77. The other seven manuscripts are: 1) Gotha Forschungsbibliothek Ms MII 141 (c.1428AD); 2) Prague Strahov Library Ms D.A.II, 13; 3) Berlin Kupferstichkabinett Ms Hamilton 556³⁸; 4) Munich Clm 826; 5) Catania Ms Catin.85; 6) Vienna Ms 5318; 7) Kues Cusanus-Stift Ms 207. (Kunitzsch does not propose dates for these manuscripts.) The full title of the Arsenale manuscript is given in Hauber 1918 p.50. Hauber also cites a reference by Bouillau to a Latin manuscript by "Ebennesophim": Ismaelis Bullialdi, Astronomia Philolaica, Paris, 1645, pp.224-25 (Hauber 1918 p.51, note 3). ¹³⁸ Cf. Gousset 1984.

professor at Ingolstadt University, Peter Apian (d.1552AD), had access to a copy of Suwar al-Kawākib, which he intended to publish. 139

In 1515AD, Albrecht Dürer produced the first printed map of the constellations, in two woodcuts of the northern and southern hemispheres. At the four corners of the woodcut of the northern stars were portraits of four scholars central to the history of the constellations [PLATE 8]. These were Aratus (early third century BC, Macedonia), Manilius (early first century AD Rome), Ptolemy (second century AD Alexandria), and al-Ṣūfī himself - entitled "Azophi Arabus". Each is shown holding a celestial globe. This represents a succession in the history of studying the constellations: the two poets described the constellations in verse, while Ptolemy and al-Ṣūfī recorded the stars using a more scientific approach. A later acknowledgement of al-Ṣūfī's reputation in Europe was made when Johann Baptist Riccioli named a small lunar crater "Azophi", in the first detailed map of the moon, in his Almagestum Novum of 1651AD. The crater lies near those of "Ptolemeus" and "Albategnius" (i.e. al-Ṣūfī's predecessor al-Battānī, d.929AD), between Terra Sanitatis and Terra Fertilitatis.

Al-Ṣūfī's treatise was outstandingly successful, and became a standard reference-book. Three separate aspects were important and useful: the revised star-catalogue,

•

¹³⁹ Kunitzsch notes that in 1531, Peter Apian applied for (and received) a privilege from Emperor Charles V to print editions of a list of books, which included *liber Azophi Astrologi vetustissimi*, "the book of the ancient astronomer Azophi". The book was never published, but Kunitzsch points out that "it is hardly possible to imagine that he ever had applied for, and was granted, the imperial privilege of editing a book that was not within reach of his hands" (Kunitzsch 1987 pp.123-124).

¹⁴⁰ Dürer explains that the scientific basis of the maps was provided by the mathematician and

¹⁴⁰ Dürer explains that the scientific basis of the maps was provided by the mathematician and historian Johannes Stabius, and the positions of the stars by the Nuremberg astronomer Konrad Heinfogel (d.1530AD) (Hauber 1918 p.52).

¹⁴¹ Kunitzsch 1986A pp.79-80.

The crater's name has remained to this day, and is thus labelled in Homan's c.1730AD map of the moon (reproduced in Whitfield 1995 pp.96-97), and in modern sky atlases (Tirion 1991 p.3).

al-Sūfi's apparently authoritative discussion of Arabian astronomy, and the double-format illustrations. The star-catalogue could be used to calculate "up-to-date" tables for an astronomer's own era. The new positions could then be used to plot a celestial globe. The revision of star-magnitudes was an important contribution, as it was based on independent observations, and did not draw from previous textual tradition. The discussion was timely, as there was much confusion among other authors on the subject, and the concordance between Arabian and classical nomenclature makes a stimulating comparison. The format of the illustrations, designed to convey a simple concept, is understandable from a lay learner's point of view, which may have stimulated further interest beyond scientific circles. The presence of illustrations also makes the treatise presentable as a luxury item, appreciable on an aesthetic as well as scientific level.

¹⁴³ The fixed stars were also of interest to astrologers, who considered them in the construction of horoscopes (Kunitzsch 1993; Tourkin 2000).

1. Images primarily as maps

This study surveys the iconography of constellation images in the Islamic scientific mapping tradition. These are the images on engraved celestial globes and in copies of al-Ṣūfī's illustrated handbook on the fixed stars, *Kitāb Ṣuwar al-Kawākib al-Thābita*. Both of these use constellation images primarily as maps. Their function is to contain and clarify chosen groupings of stars, interpreting the group as the body and limbs of a given figure or object. While this function may not be honoured consistently, it remains the defining intention of each image.

Within this seemingly narrow band of definition, there is considerable variety between constellation images in style, quality and iconography. This should not be surprising. New celestial globes and constellation-handbooks were produced from Ceuta to Samarkand, to suit the standards and pockets of different patrons, be they astronomers or amateurs, and as with any piece of workmanship, the circumstances of production dictate both quality and stylistic provenance. That elegance and utility are not mutually exclusive is demonstrated by the exquisite al-Ṣūfī manuscript produced for the Timurid prince and astronomer Ulugh Beg (d.1449) [PLATE 5].

¹ Bibliothèque Nationale Ar.5036 (c.1430-40AD). As Ulugh Beg's name appears on the frontispiece

of the manuscript, it can be stated that the manuscript was produced on his behalf (cf. Caiozzo 1992 p.2). Ulugh Beg was a keen astronomer. He founded a famous observatory at his court in Samarkand, where he worked with a large staff of scientists to compile a new $z\bar{z}j$. One of his chief astronomers, Jamshid Ghiyāth al-Dīn al-Kāshī (d.1429), described his master's proficiency: "...the emperor of Islam [...] is himself a learned man, [...] and the meaning of this is not said and written by way of polite custom. [...] he produces elegant astronomical proofs and operations, and he enunciates general laws as they should be, and explains the $Tadhk\bar{r}a$, and the Tuhfa in such fashion that no additions can conceivably be made (to the explanation)" (Kennedy 1960 pp.193-194).

Pseudo-scientific images

This study avoids those constellation images in Islamic art which are featured for purposes other than to demonstrate stellar positions, such as astrological representations of the zodiacal constellations, often accompanied by figures of planets, in manuscript-painting, metalwork and ceramics.² Constellation images in a pseudo-scientific context belong to a separate branch of iconography, subject to different influences. This branch usually features only the twelve zodiacal constellations. In this context, the constellation-images cease to be maps, and become symbols of the earthly influences they are considered to hold. Ancient astrological convention tends to influence the iconography.³ For example, Taurus tends to appear as a whole bull, not as the truncated animal of constellation maps. A full-bodied Taurus is shown ridden by the lute-playing figure of Venus (its planetary lord), on a thirteenth-century brass pen-box from Mosul.⁴ The absence of the mapping function also removes compositional restrictions. On a map of the stars of Leo, the twelfth lunar mansion is an important star above the constellation, and its location dictates that the lion's tail must go upwards and accommodate it. On the lid of a brass pen-box, made in 1281AD in Western Iran, Leo's tail curls under his body,

-

² In astrology, the position of a planet in a zodiac sign has a particular significance. At any moment in time, each planet lies in a zodiacal constellation, and each combination of planet and sign exerts a different influence, malign or benign. To calculate a horoscope, an astrologer must accurately record these positions at a precise moment, and then judge their combined significance.

³ Early forms of *Taurus*, *Leo* and *Scorpio* are mentioned in Babylonian texts of c.1500-1700BC, and one of the earliest representation of *Sagittarius* is c.1200BC (reproduced in Hartner 1938 p.147). The formalised ecliptic, divided into twelve even sections, was identified by the mid-fifth century BC. (Whitfield 1995 p.17; Walker 1996 p.49.) The earliest representation of all twelve signs is the Dendera Zodiac, a Hellenistic Egyptian sandstone carving from the first century BC, which shows the Babylonian signs among constellation-figures from Egyptian astronomy. (Musée du Louvre; reproduced in Whitfield 1995 p.26.)

⁴ British Museum OA 1884.7-4.85; reproduced in Ward 1993 p.83.

where it echoes the spiral scrolls of the background. The sun appears behind the lion, its rising image filling the space at the top of the medallion.⁵

In very rare instances, a constellation may be depicted according to a different convention. Since ancient times, the constellation Sagittarius has been depicted as a centaur, aiming a bow and arrow. However, on an engraved brass lidded casket from twelfth-century Khurāsān, the figure is represented only as a bow, held by a pair of (disembodied) hands [PLATE 9A]. Ward suggested that the centaur was omitted out of religious sensitivity. Instead, the isolated bow may refer to the constellation as it is named in pre-Islamic Arabian astronomy – القوس the archer, and was introduced from Greek astronomy. This image of a bow refers only to the ancient name, and is neither an image from an ancient iconographical tradition, nor a scientific map. Other zodiac images on this casket seem to support this theory: the older name for Virgo is limited. The corn sheaf (as opposed to the translated limited) - the virgin), and the sign is depicted as two sprouting plants. The older name for Aquarius is depicted as a bucket (as opposed to a well. The hesitation from human representation is not

-

⁵ British Museum OA 1891.6-23.5; reproduced in Ward 1993 pp.90-91. The sun is the planetary lord of Leo, and the lion and the sun have been associated since prehistoric times (Hartner 1938 p.115).

⁶ British Museum OA 1967.7-24.1.

⁷ This meaning is retained in the Latin name for the constellation. See Appendix Three for discussion on the parallel development of the zodiac constellations in Arabian and Greek traditions.

There is a very similar inlaid brass casket, of identical diameter (23.5cm), in the Nasser D. Khalili Collection [PLATE 9B]. The Khalili casket is more complete than the British Museum object, retaining three round feet, hinge, hasp, and a dome-shaped finial topped with a small long-tailed bird. This long-tailed bird (a peacock?) is a recurring decorative motif in the engraved roundels of both caskets. The Khalili Sagittarius is depicted as a man (lower torso concealed) shooting a sprouting dragon's head.

supported by the sign of *Gemini*, shown as two human-headed birds, wearing crowns and haloes.

It seems that there was no tradition of depicting the Arabian constellations as maps, until Kitāb Ṣuwar al-Kawākib al-Thābita. For the purposes of comparison and concordance, al-Ṣūfī superimposed Arabian constellation-figures over certain classical constellations. Al-Ṣūfī's treatise includes images of the Great Fish (overlapping Andromeda) [PLATE 10A], and of the Horse (standing alone) [PLATE 10B]. The She-Camel is occasionally depicted overlapping Cassiopeia [PLATE 11A] — such as the 1171AD Oxford al-Ṣūfī, 10 and one remarkable illustrations combines Andromeda, the Horse, the She-Camel and the Fish [PLATE 11B]. Even in this context, however, the star-distribution in the Arabian constellation-images suggests that they are not true maps: in the image of the She-Camel superimposed onto Cassiopeia in the 1171AD Oxford al-Ṣūfī, the stars marked in the camel's neck run together in an unlikely close line. The Horse (beside Andromeda) is depicted without any stars in the 1131AD Topkapı al-Ṣūfī, 11 and other versions show a line of stars neatly skirting the horse's outline, again probably an unrepresentative arrangement of the stars. 12

.

⁹ This relates to an iconographical merger between *Gemini* and its planetary lord Mercury, which is beyond the scope of this thesis.

¹⁰ Hunt 212: fol.40r.

¹¹ A.3493: fol.54v.

¹² Marsh144: fol.88v; Hunt 212: fol.75v.

The astrological tradition of representing each zodiacal constellation with an associated planet¹³ also affected constellation iconography. The pseudo-planet "Jawzahr" was depicted as a dragon, which caused eclipses by swallowing the sun or moon.¹⁴ Like the other planets, Jawzahr was assigned a position of exaltation and of dejection. These were in *Gemini* and *Sagittarius* respectively, and the dragon is usually included in decorative images of these constellations. For example, on a late twelfth-century silver-inlaid brass ewer from Herat, decorated with zodiac signs and associated planets, *Sagittarius* is depicted turning backwards to aim his bow at a dragon's head which sprouts from his tail [PLATE 12].¹⁵ The inclusion of the pseudoplanet has rearranged the constellation's iconography: usually *Sagittarius* aims the bow forwards, and two stray scarf-ends trail behind. The sprouting dragonhead also occasionally intrudes in images of *Leo* and *Cancer*, the domiciles of the sun and moon, because of the pseudoplanet's association with lunar and solar

¹³ In astrology, each zodiac sign is the domicile of a "planetary lord", but can also be the location of a planet's exaltation (point of strongest influence) or dejection (point of weakest influence). The positions of the planets along the zodiacal belt (or ecliptic) are paramount in the calculations of horoscopes (cf. Hartner 1938 pp.116-119).

¹⁴ The ancient Mesopotamian association of a dragon with lunar and solar eclipses occurs in Late Assyrian mythology, noted in a Sumero-Akkadian text from the seventh century BC (Azarpay 1978 p.371). In Islamic astronomy, the head and tail of a knotted dragon are linked with eclipses, and are given planetary status in astrology. Twelfth and thirteenth century AD representations of the eclipse dragon appear in a talismanic context, such as the stone reliefs on city gateways, and on a bridge over the Tigris at Jazīrat ibn 'Umar (reproduced in Hartner 1938 figs.2, 24-29), or the frontispiece of a treatise on poisons and antidotes, dated 1199AD (Kitāb al Diryāq, Bibliothèque Nationale Ar2964; reproduced in Azarpay 1978 p.364). There is a related myth in Hindu astrology, in which a monstrous celestial figure also threatens the sun and moon. The demon Rahu steals a sip of amrita, the forbidden liquid of immortality, and his crime is reported to Vishnu by the sun and moon. Vishnu beheads the demon, but the stolen drink has already made the thief immortal. Rahu's head and decapitated body, Ketu, occupy the sky as two separate celestial bodies, who vengefully follow their informers, the sun and moon, trying to swallow them. When they succeed, an eclipse occurs. Rahu and Ketu were considered as two planets, and appear alongside the other seven in Indian frieze sculpture (for example, a thirteenth-century series of the nine planets, produced in Orissa, includes individual statues of Rahu and Ketu: British Museum OA 1951.7-10.2, and OA 1951.7-10.2). Even when the physical cause of eclipses was known, both Islamic and Hindu astronomy retained the terms of reference to the mythological monsters to label the ascending and descending nodes of the moon's orbit (Hartner 1938

p.131).

15 Hartner proposes that the composite image of Sagittarius-Jawzahr has an ancient Babylonian prototype, an archer fused with a scorpion-monster (Hartner 1938 pp.147-149).

eclipses.¹⁶ In these contexts, the images are not confined by star distribution, but by astrological traditions and aesthetic priority.

Zick-Nissen has suggested that certain figures depicted on ceramics from the ninth to the thirteenth centuries represent constellation images, complete with principal stars, but I will not refer to these either as they represent stylised quotation from map-images (if even that), rather than functional constellation figures.¹⁷

Also discarded are the illustrations of the constellations in Kitāb ^cAjā'ib al-Makhluqāt wa Gharā'ib al-Mawjudāt, ¹⁸ the popular cosmology written by Zakarīya al-Qazwīnī (d.1283AD), in which Savage-Smith notes that the layout of the stars within the figures is largely disregarded. ¹⁹ Although Qazwīnī's chapter on the constellations is directly lifted from Kitāb Ṣuwar al-Kawākib al-Thābita, each constellation is shown only once, abandoning al-Ṣūfī's dual format [PLATE 6]. As Qazwīnī's constellation-images do not present a precise arrangement of the stars, there would be anyhow less benefit to be derived from a "globe-" and "sky-view" of such images. The benefit of the format is to be derived when both images depict the arrangement of the stars accurately.

_

¹⁶ A dragon's head sprouts from *Leo*'s tail in a medallion on a bronze vessel from twelfth-century Iran (reproduced in Hartner 1938 p.112). *Cancer* and Jawzahr appear together in a medallion, on a brass ewer made in Herat 1180-1200AD (British Museum OA 1848.8-5.2; reproduced in Ward 1993 p.70).

¹⁷ Sarre put forward a similar suggestion, concerning Rayy lustreware decorated with dotted figures of

¹⁷ Sarre put forward a similar suggestion, concerning Rayy lustreware decorated with dotted figures of animals. The dots were held as the connection between the lustre figures and the illustrations to al-Sufi's treatise, which show the stars as small circles, mapped across the constellation images. Zick-Nissen considers far more examples, citing ceramics from Samarra, Takht-i Sulayman, Nīshāpūr, Transoxiana and Spain (cf. Sarre 1937, Zick-Nissen 1975).

 $^{^{18}}$ The text of al-Sūfī's treatise was used for the section on the constellations.

¹⁹ "The emphasis of the artists illustrating al-Qazwīnī's book appears to have been on the interpretation of the mythological figure represented by the constellation rather than on the accurate placement of the stars within the asterism" (Savage-Smith 1992A p.16).

2. Iconographical change in scientific images

The constellation mapping tradition is not one that invites variation or promotes originality. The cycle of subjects to illustrate is quite static, as all forty-eight constellations are always represented, and any iconographic changes tend to occur within confined parameters only. The "skeleton" of a constellation image is of course its constellation, an immutable arrangement of stars, to which the image must remain faithful in order to be functional. Developments in the iconography of these images are therefore restricted to changes which do not distort or dismember the "skeleton". However, as long as the layout of the constellation is accommodated, considerable variations of iconography are possible, if prompted. In al-Ṣūfī's case, consistency with the basic conventions of Ptolemy's astronomical system was imperative to a rational assessment and criticism of his star-catalogue, and there was no motive to alter the Greek constellation imagery. Most of the forty-eight Ptolemaic constellations were transposed into the science literature of the Islamic world with little change to their iconography. Nonetheless, motives for variation did appear within these narrow confines, and are set out below.

Introducing foreign material: translation versus transliteration

In the context of transposing functional images from one culture to another, there is a stimulus for change or "correction" when the foreign visual language is not clear. The unchanged function of these images as star maps ensured that their constellation "skeletons" remained constant, but unfamiliar elements were often re-drafted. Most of the constellation images are not culture-specific and can be transposed without

change, such as many of the animals,²⁰ and very simple objects such as *Sagitta*, the arrow, and *Triangulum*, the triangle. Other constellation images represent or include items particular to a cultural region, such as the wreaths of *Corona Borealis* and *Corona Australis*, the burning altar *Ara*, and the thyrsus held by *Centaurus*. There are two means by which these culture-specific items are redrafted abroad, which can be categorised as "translation" and "transliteration".

"Translation" occurs when the foreign becomes the familiar, and domestic equivalents replace alien accoutrements. For example, the trailing cloak of Sagittarius is "translated" into an unravelling turban in many Islamic images. "Transliteration", on the other hand, is the result of the translator's incomprehension, and consequent inability to provide a translation. In "transliteration", a foreign object goes unrecognised, and is nonetheless copied at least in outline, without understanding. It loses its original signification. As a constellation image, the element still honours its function to accommodate stars in the constellation, but it no longer has a rational coherence as an image. For example, the unknown classical wreath of Corona Borealis is reduced to representation as a vague round shape, but it continues to surround a loose ring of eight stars. An analogy can be made with the transfer of Greek constellation names into the Islamic scientific tradition: many proper names were simply transliterated, and a new label was sometimes also assigned which gave a brief description. Thus Andromeda is both "Andrūmīdā" and "the chained woman" (Ilaclia Ilaculus), while Cepheus is "Qīqāwus" or

²⁰ Although, Wellesz has suggested that in the 1009-10AD Oxford al-Ṣūfī, the dog of Canis Minor has been 'orientalised': "the hound of classical origin has been replaced by a Saluki, a typically Eastern dog" (Wellesz 1959 p.17).

"Qīfāwus", 21 and sometimes also "the flaming" (الملتهب). The interrelation of the Greek constellations, such as the family group of Andromeda, Cassiopeia and Cepheus, 22 or indeed that of Ursa Major and Ursa Minor, would of course be lost. 23

In the case of the constellation *Orion*, an element of the image was unclear to the Arab copyists, even though it was not an alien cultural artefact. Here, the source of confusion may have been the quality of the original representation. Ptolemy's catalogue mentions that there is a pelt on *Orion*'s arm.²⁴ On the Farnese globe, a long thin cloak hangs from *Orion*'s hand [PLATE 13A]. This cloak undergoes a gradual metamorphosis in Islamic imagery: it is drawn increasingly vaguely, until it eventually joins with *Orion*'s extended arm to become an extremely long sleeve falling to the ground. As the cloak accommodates a long line of stars, the shape of the original garment had to be retained. In early examples of Islamic constellationimages, *Orion*'s arm remains distinct from this hanging garment. Although the frescoed dome of the constellations in the c.711-715AD desert palace of Qusayr

²¹ The discrepancy between these names is due to the errors of scribes: the Arabic letters qāf (o) and fā (o) are differentiated only by the number of superscript dots. Al-Ṣūfī recalls a similar mistake made by one Ibn Rawāja, an amateur astronomer (cf. p.73).

²² As described in Ovid's *Metamorphoses*, Cepheus is the king of Ethiopia, whose vain wife Cassiopeia boasts of her own beauty and angers the gods. Her punishment is meted out to her daughter Andromeda, who is condemned to be chained to the rocks and devoured by a sea-monster (identified as the constellation *Cetus*). (Ovid p.112.) All three constellations are close together in the sky: *Cepheus*, as a foreign king, wears a strange hat, *Cassiopeia* sits on a throne, and *Andromeda* stands with her arms held out as though in chains. (Occasionally, her chains are also included in al-Sūfī illustrations.)

²³ Jealous of her husband's wandering affections, Juno changes Callisto, Jupiter's latest romantic conquest, into a bear. Arcas, Callisto's son by Jupiter, grows up knowing nothing of his parentage, and is about to kill his transformed mother on a hunting-trip, when "almighty Jupiter stayed his hand, and prevented a crime being committed, by removing both mother and son. A whirlwind carried them up, together, through the void of heaven, and then he set them in the sky as neighbouring constellations" (Ovid, pp.62-64). Aratus tells a different story: the two bears are former foster parents of the young Jupiter. Later, their charge rewarded them with immortality as constellations (Aratus p.44).

p.44).

24 "As a huntsman, Orion carries an animal pelt as a garment or an arm-guard" (Ptolemy p.383, footnote 71).

^cAmra, Jordan, is quite dilapidated, a short cloak can be made out hanging from Orion's upper arm. On two late eleventh-century globes, the cloak appears as a long vague object dangling from Orion's fist [PLATE 13B]. Eventually the metamorphosis takes place, and the skin is drawn as a very long sleeve end. This version is used in copies of Kitāb Suwar al-Kawākib al-Thābita, from the earliest surviving manuscript (1009-10AD) onwards [PLATE 13C].25 The early eighthcentury fresco and the two eleventh-century globes demonstrate that the transition from hand-held lion-skin to oversize sleeve-end was indirect, and goes some way to explain why this transformation should take place. Why should a lion-skin cloak be so unlikely in the Islamic world that an Arab artist would draw a vague shape rather than reproduce the cloak? The ill-defined Islamic version could originate from an indistinct damaged classical prototype. This is a plausible motive for change, as the Greek images available to Arab artists would not necessarily be in good condition, perhaps on an old wooden globe, or in a crumbling manuscript. Savage-Smith suggests that "most celestial globes produced in antiquity were made of wood and thus have not survived the deterioration of centuries [to the present day]."²⁶ Even by the time of scientific transmission to the Islamic world, a wooden classical globe (or a well-thumbed manuscript) might be in very bad condition. Thus the "transliteration" of an image can occur when its original meaning is made obscure by poor communication.

The constellation *Perseus* features a Greek warrior which quite happily "translated" into a figural type from Islamic culture. Western images of *Perseus* show the hero

-

²⁵ This statement holds for all copies of al-Sūfi's treatise known to me (see Appendix One).

holding a sword in one hand and the decapitated head of the Medusa in the other [PLATE 14A]. While Greeks would know who Perseus was and whose head he was likely to brandish, neither the name nor the image should hold any resonance to non-Greeks. In the Almagest, Ptolemy refers to the "Gorgon-head" of Perseus, and the first Arabic translations of the Almagest (eighth century AD) replace this term with ra's al-ghūl, "the head of the demon".27 True to this translation, Medusa's head appears as a bearded demon with ghoulish features in all al-Sūfī manuscripts, and never as a woman with snakes for hair [PLATE 14B]. It has been suggested that the ghoul's trailing beard is an Islamic artist's interpretation of the blood dripping from Medusa's (beardless) head.28 Whether the bearded male version of the head derived from attention to the translated text, or from ill-conceived reproduction of a classical image, the result is the same, and it is hard to prove which was the case. In purely functional terms, the astronomer observing the Greek constellation need not care whether the severed head was male or female (nor even how many heads the warrior was holding), only that there was a cluster of stars at the end of the figure's arm, because these stars were accommodated in a head. Coincidentally, when Islamic artists converted Medusa's unfamiliar head into a male head, they bestowed onto the constellation-figure the standard Islamic iconography of the warrior planet Mars.²⁹ The "Islamic" image is slightly elaborated on two eleventh-century celestial globes from Valencia, which show Perseus grasping not one but three cleanshaven heads

²⁶ Savage-Smith 1985 p.11.

²⁸ Panofsky & Saxl 1933 pp.240-241.

²⁷ Kunitzsch 1974 pp.180-181, referring to the translation made by Ishāq b. Hunayn (fl.c.879-90AD).

²⁹ The standard image of Mars, with a severed head in one hand and a sword in the other, features in Islamic planetary iconography at an early stage, such as an early thirteenth-century brass inkwell, (Metropolitan Museum of Art 59.69.2a, b; reproduced in Baer 1972 p.202). In astrology, Mars is the planetary lord of Scorpio. When the warrior is depicted holding one or two scorpions by the tail, the shape of the scorpion's oval body held by its long thin tail also resembles the pig-tailed heads which Mars traditionally brandishes.

[PLATE 15A]. This remains consistent with Mars' bloody reputation, and deviates from the single bearded head, which Wellesz had suggested was simply re-drafted from the classical Medusa head. A copy of al-Ṣūfī's treatise from Ceuta (1224AD Vatican al-Ṣūfī) depicts "Medusa" as a single head with three faces [PLATE 15B]. It is perhaps these "triple-headed" versions from the Western Islamic world which demonstrate that the figure of Mars was indeed intended for *Perseus*, and that the demon's beard was not a copyist's error for streaming gore.

In conclusion, some elements of classical constellation-imagery underwent transformation when adopted into the astronomy tradition in the Islamic world. When this took place, a classical prototype (or a constituent element) was rejected, and replaced with a new or amended image, taken from the repertoire of Islamic art. This occurs, for example, with the new image of *Perseus* as the typical Islamic version of the planet Mars (discussed above), and of *Auriga* as the stock image from Islamic art of the seated groom (discussed below). Other elements may have been incoherent on their introduction to the Islamic world, because the constellation-images available to artists were of poor quality, making details of composition difficult to identify, let alone re-draft – as, for example, with the lion-skin cloak hanging from *Orion*'s arm. Some elements, however well-depicted, were obscure beyond the classical world, such as the thyrsus held by *Centaurus*, and were redrafted only in vague outline.

3. Linking classical and Islamic constellation iconography

The earliest al-Sūfī manuscript surviving is dated 1009-10AD, only twenty years after the author's death. It was copied and illustrated by al-Sūfī's son, and can be assumed to be very close to the father's autograph copy. 30 The iconography of the figures has already undergone some change from that of the classical constellations, and it is clear that the metamorphosis of classical figures did not begin with al-Sūfi's decision to illustrate Kitāb Şuwar al-Kawākib al-Thābita. As Books Seven and Eight of Ptolemy's Almagest were not originally illustrated with the constellations, the new figures in Kitāb Suwar al-Kawākib al-Thābita were open to influence from any other available source of constellation imagery. The origins of al-Sūfi's illustrations are therefore to be found in the wide variety of constellation images which were in circulation since classical times in both scientific and pseudo-scientific contexts. There was a wealth of these sources available, as it seems that the constellations were a popular decorative theme, as well as the basis of broadly-practised science. For example, Saxl reports that ceiling paintings of the starry heavens were known since ancient times. The earliest surviving representative of this long tradition is the frescoed dome of the classical constellations in the bath-house of Qusayr ^cAmra, the c.711-71540 desert palace of an Umayyad prince, in modern-day Jordan

[PLATE 16].³¹ The poet Firdausi, writing c.1000AD, described a palace built by Khusrau Parviz (a hero in the *Shāhnāma* epic), with a dome decorated with zodiac signs, the planets and the lunar mansions.³² There were also pseudo-scientific celestial globes in circulation, and illustrated poetic works. Unfortunately, very few

³⁰ Bodleian Library Marsh144. See Chapter Four for recent discussion about the manuscript's authenticity.

³¹ Saxl 1969 p.424.

³² Ouoted in Melikian-Chirvani 1994 p.149.

examples of these early images, popular or scientific, have survived today, and what little remains tends to be seized upon as the "connecting link between the late classical period and Islam".33 With so little information, it is impossible to reconstruct thoroughly the development of early constellation iconography in Islamic art, let alone to identify different strands with conviction. Only general statements can be hazarded about this early period, and even they must be qualified with admissions of inadequate information. There is great iconographical diversity in later images, and it is just as likely that earliest examples were equally diverse, and are only less represented by posterity.³⁴ It can however be stated that among the sources likely to have influenced constellation iconography in al-Sūfi's time are artefacts from both late classical and early Islamic times: celestial globes, planispheric starmaps and popular or scientific illustrated constellation handbooks.

Of these, there survive today no such Islamic artefacts from before al-Sūfī, although he himself cites an earlier illustrated handbook on the constellations, by a ninthcentury astronomer, "Utārid.35 Those to appear after al-Ṣūfī's handbook were probably prompted by its popularity, but were also eclipsed by their model's success: only two early fragments survive, while there are over fifty manuscript-copies of Kitāb Suwar al-Kawākib al-Thābita. (This is not to mention the further (uncredited) circulation of al-Şūfī's treatise, in full quotation, in Zakarīya al-Qazwīni's ^cAjā'ib al-

³³ This was Saxl's pronouncement on the fresco in Quşayr Amra, although his article frequently qualifies any easy generalisations about this little-represented transitional period (Saxl 1969 p.431).

34 By "later images" I refer have to the manual period (Saxl 1969 p.431).

By "later images", I refer here to the main period of this study - the eleventh to fourteenth

centuries.

35 The ninth-century astronomer and mathematician, ^cUţārid b. Muḥammad al-Ḥāsib (cf. Chapter

³⁶ Cf. Table of extant copies of Kitāb Şuwar al-Kawākib al-Thābita (Appendix One). The two fragments of constellation-treatises not by al-Suffi are Bodleian Library Hunt 273 (mentioned earlier: p.85 foot-note 122) and Or.133 (Kitāb al-Bulhān, discussed below: pp.113-114).

Makhlūqāt.) The earliest Islamic celestial globes to survive are both from late eleventh-century Valencia, although there were certainly earlier examples from which al-Ṣūfī (or his artist) may have taken iconographical inspiration. Al-Ṣūfī mentions that he had seen many celestial globes, including ones made by the Harranians.³⁷ He often notes different versions of constellations current among the globes available. The only trace of an Islamic planispheric star-map is perhaps echoed on the c.711-715AD constellation fresco at Quṣayr ^cAmra, and it was probably derived from late classical maps.

Of late classical artefacts, there survive no functional celestial globes. The oldest surviving and only classical example is a marble globe, now supported by a (Renaissance period) statue of the Titan, Atlas [PLATE 17].³⁸ It is a decorative item rather than a scientific instrument, but its model may have been more functional. Late classical globes were still extant in the early centuries of Islam as potential models for constellation imagery, as is testified in a report that a metal globe made by Ptolemy himself was on exhibition to the public in Cairo library in 1043AD.³⁹ Ibn al-Ṣalāḥ (d.1154AD) stated that he had seen a Greek celestial globe from c.738AD.⁴⁰

It may have been classical manuscript-painting which most influenced al-Sūfi's constellation iconography. A popular literary genre in classical and medieval times

.

³⁸ Naples, Museo Nazionale Archeologico. According to Savage-Smith, the globe is a first-century AD Roman copy of a Greek original from the second or third century BC.

³⁹ This globe was exhibited alongside a silver globe made by al-Şūfī (Ibn al-Qiftī p.440). While the

³⁷ He frequently criticises their accuracy. Al-Ṣūfī was qualified to comment on this subject, as he had written "the most voluminous treatise" about the many uses of the celestial globe (Kennedy 1989 p.48).

³⁸ Naples, Museo Nazionale Archeologico. According to Savage-Smith, the globe is a first-century

³⁹ This globe was exhibited alongside a silver globe made by al-Şūfī (Ibn al-Qiftī p.440). While the globe was probably not made by Ptolemy himself, it may well have been of Greek manufacture. Cf. Chapter Two for a discussion of this report, p.61.

was the versified account of the classical constellations, of which the earliest was the Greek Phaenomena (c.250BC) by Aratus of Soli. 41 Many derivative Latin versions (collectively termed Aratea) followed, such as a translation by Germanicus (early first century AD), and another by Rufius Festus Avienus (fourth century AD).⁴² These circulated in illustrated manuscripts, and were a source of pseudo-scientific constellation images, which could enjoy broad distribution among the 'laity'. Aratean images also circulated on semi-scientific celestial globes: these are described by Leontius, a seventh-century Byzantine writer, in a treatise entitled On the Construction of an Arataean Globe.⁴³ The Phaenomena was not a scientific work. Without using technical terms, Aratus described the layout of the constellations in the sky and the myths behind their names, as well as meteorological implications of the rising and setting of certain stars. It was an obvious text for illustration, and the images were not required to be functional maps. 4 Typical Phaenomena copies depict each constellation-figure individually, as well as together in a single sky-map, with little scientific accuracy. 45 The illustrations usually also include the five planets (depicted as truncated busts), the seven Pleiades (also as busts) [PLATE 18], the

⁴⁰ Ibn al-Salāh p.18. He wrote that the globe was set with a longitude 6° greater than the *Almagest*. By applying a precession rate to this increase, Kunitzsch calculated a date of c.738AD for the globe.

The earliest complete surviving example is a Carolingian manuscript dated 818AD (Bayerische Staatsbibliothek Munich Clm.210: fol.113v; reproduced in Whitfield 1995 p.24).

⁴² Aratus' poetical slant was continued by later authors, who assigned further mythological identities to constellations: Catasterisms falsely ascribed to Eratosthenes of Cyrene (c.275-194BC), and Poetica Astronomica by Gaius Julius Hyginus (first century AD) (Savage-Smith & Katzenstein 1988 pp.11-14).
⁴³ Savage-Smith 1985 pp.12-15.

⁴⁴ The same casual approach applied to the "Arataean" globes, which Leontius explained: "[Aratus was] not aiming at precise accuracy [...] but rather at usefulness for the navigators [...] For indeed they navigate not by means of ingenious mechanical devices and exact precision, but by means of unaided eyesight and observing in general terms the arrangement of the stars [...]" (Savage-Smith

⁴⁵ Cicero (106-43BC) wrote that Aratus' poem was essentially a description of a celestial globe constructed by Eudoxus of Cnidos (c.390-340BC): "[he] described it in verse, not displaying any knowledge of astronomy but showing considerable poetical skill" (quoted in Savage-Smith & Katzenstein 1988 p.12).

four seasons, and Jupiter, to whom the *Phaenomena* is dedicated, depicted alone as a reigning deity.

Various similarities between the Phaenomena and Kitāb Suwar al-Kawākib al-Thābita show that the latter is in many ways the Islamic world's answer to the western classic of popular astronomy, presented in a more scientific manner, and fortified with the updated, revised versions of Ptolemy's star-tables. The Phaenomena was translated into Arabic in the early ninth century AD, probably by the Jewish astronomer Sahl b. Bishr, at the court of Abū'l-Tayyib Ṭāhir b. al-Husayn (d.822-23AD), (general of Caliph al-Ma'mūn, and later the governor of Khurāsān).46 Aratus was well-known to Severus Sebokht, the bishop of Kennesrin, who quotes liberally from the Phaenomena in his treatise on the constellations, written in 661AD.47 Certainly, there is a striking coincidence with al-Ṣūfī's format: images of single constellations, which accompany chapters about individual figures. 48 In copies of the Phaenomena, each constellation is depicted once only, although there seems to be no particular pattern as to which view (sky or globe) is depicted. For example, in the Leiden Aratea, a ninth-century Latin version of the Phaenomena, some constellations are depicted as they are seen in the sky, and others as seen on a globe, apparently at random.⁴⁹ In many of the more symmetrical constellations (such as Cancer, the crab), it is impossible to tell whether the globe or sky view is being

_

⁴⁶ Honigmann 1950 pp.30-31. It is not known if an illustrated manuscript was used, although the images are so central to the text that the copy must have been illustrated.

⁴⁷ Nau 1929-30 pp.362-371. Severus Sebokht wrote disapprovingly about the tendency of poets and

⁴⁷ Nau 1929-30 pp.362-371. Severus Sebokht wrote disapprovingly about the tendency of poets and astrologers to attribute personalities and significance to mnemonic figures. His chapter on the constellation is entitled "Upon the fiction (which attributes) a figure to constellations, and the foolish fables (projected by poets) on the subject".

⁴⁸ "The influence that illustrations associated with copies of [the *Phaenomena*] had on the delineation of constellations in the Islamic world has received little consideration by historians" (Savage-Smith 1992B p.17).

presented, as the random distribution of stars is no indication. This (perhaps unintended) variety may have prompted al-Ṣūfī's decision to depict both views, and to label each clearly. Although stars are usually superimposed across *Phaenomena* images, they are applied with little regard to the actual distribution of star-positions – again, a characteristic improved in al-Ṣūfī's treatise. The compatibility of format is illustrated by the actions of a sixteenth-century owner of an al-Ṣūfī manuscript: Western woodcut images of single constellations have been inserted beside the relevant al-Ṣūfī illustrations, providing a direct comparison of style and iconography.⁵⁰

Al-Ṣūfī discusses the forty-eight classical constellations individually, as does Aratus. Where Aratus relates the Greek myths associated with the constellations, al-Ṣūfī describes Arabian star-groups located upon or near the constellation in question, and cites popular Arabic proverbs about the stars. The image of Jupiter, the father-god of the classical pantheon, is discarded for obvious reasons. Aratus discusses meteorological predictions derived from the rising and setting of stars, and al-Ṣūfī does the same, referring to the native Arabian system of the Anwā'. The only conspicuous omission from the Phaenomena format used in Kitāb Ṣuwar al-Kawākib al-Thābita is the planispheric map depicting all of the constellations at once.

40

⁴⁹ Leiden University Library Voss.lat.Q.79; reproduced Savage-Smith & Katzenstein 1988 pp.20-34.

⁵⁰ St Petersburg, Institute of Oriental Studies C.724. The images are from the Latin version of Aratus by Hyginus. Their Latin names have been re-labelled in Arabic transliteration by the owner – who may have been Taqī al-Dīn al-Miṣrī (d.1585AD), the director of Murad III's rather short-lived observatory (founded 1579AD). His name is inscribed on the manuscript, showing that it was once in his possession.

An important distinction between constellation-images in classical and Islamic tradition, is the pose of the figures depicted on a celestial globe. On a classical globe, such as the Atlas Farnese, the figures stand with their backs to the viewer [PLATE 19A, the constellation *Hercules*]. This is in keeping with the classical concept of the celestial globe representing a huge sphere, visible on Earth from the "inside", i.e. the constellation-figures are "looking inwards" towards the earth at the centre of the sphere. Even though Islamic astronomy also used the model of the sphere of the fixed stars around the earth, the inward-looking poses of classical constellations are reversed on an Islamic celestial globe, and the figures face the viewer instead [PLATE 19B].51 This rearrangement usually takes place on a basic level, and the change to the figure's silhouette is generally minimal. Profiled figures do not change. The effect on the layout of the stars within the constellation-image is nil. In al-Şūfī's manuscript, these two different poses are illustrated: the "globe-view" constellation figure stands beside the "sky-view", with both facing the viewer [PLATE 19C]. The globe-view figure is effectively a mirror-image, instead of a view of the same figure from behind. A rod held in the right hand on the globe, therefore changes to the left hand of the same figure as seen in the sky. Makariou and Caiozzo suggested that Islamic artists and craftsmen inverted the constellation-figures out of religious sensitivity, "n'osant pas se substituer à l'œil de Dieu". 52 I would suggest rather that the "face-forward" composition of Islamic constellation-images, globe or sky, shows that the influence of popular pseudo-scientific manuscript-illustrations (as represented by the *Phaenomena*) was greater than that of scientific classical celestial

⁵¹ One unusual exception to this is the image of Andromeda with two fish constellations, in a 1630-33AD Persian translation of al-Şūfī: the woman stands with her back to view, and her head turned in profile (New York Public Library Pers.Ms.6: fol.72v; reproduced in Schmitz 1992 fig.122). ⁵² Makariou & Caiozzo 1998 p.99.

globes. As mentioned earlier, Phaenomena constellation-figures are usually "faceforward". The ninth-century Carolingian Leiden Aratea depicts certain constellations face-forward, although the figure is shown in mirror-image of the proper sky version, in contravention of classical practice for the "globe-view" of a constellation [PLATES 20A, 20B].⁵³ Copies of the *Phaenomena* (and related versions) usually also include a planispheric map, which shows most of the constellations facing the viewer or in profile. Differing between manuscripts, the map may show the constellations as seen in the sky or on a globe.⁵⁴

Such planispheric maps were available in the Islamic world long before the translation (and certain introduction) of the Phaenomena in the ninth century.⁵⁵ This is shown by the c.711-715AD frescoed dome of the constellations in the desert palace of Ousayr ^cAmra, Jordan [PLATE 16]. ⁵⁶ The fresco represents the constellations of both the Northern and Southern hemispheres (although its damaged state allows only a fragmentary glimpse), and was probably copied from a planispheric map showing the constellations as they appear on a globe – the figures are depicted in mirror-image of their proper appearance in the sky. Saxl identified

⁵³ Cassioneia and Aquarius (among others) (Leiden University Library Voss. Lat. O. 79; reproduced in Savage-Smith & Katzenstein 1988). Other figures are also shown facing the viewer, such as Capricorn and Sagittarius, and are arranged as seen in the sky.

54 In general, earlier copies of Aratean manuscripts include a planispheric map of the sky-view, and

later copies a planispheric map of a celestial globe. The 818AD Carolingian Aratus (Bayerische Staatsbibliothek Munich; reproduced in Whitfield 1995 p.24) and tenth-century AD copy (British Library Harley 647) show the constellations as seen in the sky. Two fifteenth-century AD versions (British Library Add.15819; Vatican Library Gr. 1087), show the constellations as they would be seen on a celestial globe. The ninth-century Leiden Aratea does not include a planispheric map.

The remarks of Severus Sebokht in 661AD Qennesrin prove that the text was known far earlier (cf.)

earlier reference). 56 Savage-Smith 1992B p.13; Saxl 1969.

two Greek manuscripts⁵⁷ containing planispheric maps which share "striking astrothetical errors" with Quṣayr ^cAmra, as well as similarities in iconography.⁵⁸ There are also enough iconographical differences between the Western manuscripts and the fresco to show "the orientalisation of the [classical constellation] types at an early stage."⁵⁹ The fresco also demonstrates new activity in the classical mapping tradition, changes made in the Islamic world. Savage-Smith observes that the frescoed map uses a system of lines dividing the ecliptic into twelve segments, which is characteristic of Islamic celestial globes, and not used in the West. This shows that Quṣayr ^cAmra occupies a stage of transition between Greek and Islamic scientific traditions.

Savage-Smith stated that the absence of *Libra* from Quṣayr ^cAmra affiliates the fresco with "a pre-Ptolemaic conception of the skies", as represented by the planispheric maps in Aratean manuscripts. However, the fragmentary state of the Umayyad fresco does not conclusively show that *Libra* has been omitted. ⁶⁰ The exact source of the planispheric map model for Quṣayr ^cAmra is not known, but the fresco points to active development of classical maps and constellation iconography within the Islamic world. While the Quṣayr ^cAmra mapping-lines demonstrate a more scientific approach than would be expected in the *Phaenomena*, the ultimate source of the imagery may have been a "globe-view" planisphere illustration to Aratus' text.

-

⁵⁷ A copy of Ptolemy from the early ninth-century (Vatican Library Codex Vat. Graec. 1291) and a fifteenth-century Greek commentary on Aratus (Vatican Library Codex Vat. Graec. 1087).

⁵⁸ Saxl compared the fresco figures with those on the Farnese globe (second century AD, from earlier models), as well as the ninth-century Ptolemy manuscript, and fifteenth-century Aratus commentary (Saxl 1969 pp.426-428).

⁵⁹ Saxl 1969 p.430.

⁶⁰ Savage-Smith 1992B p.16. See the entry for *Libra* in this section, for a discussion of *Libra*'s 'devolution' from *Scorpio*, as a distinct constellation.

Wellesz approaches the *Phaenomena* illustrations as a useful but imperfect indicator of classical constellation images, as though assuming that the principal influence on al-Sūfī illustrations was classical, rather than the "comparatively late and debased constellation pictures" of the Phaenomena. 61 This is probably an underestimation of Aratus, as I would conclude that the Phaenomena tradition contributed to al-Sūfī the very concept of an illustrated handbook on the constellations. The "face-forward" pose was preferred in most Aratus constellation-images, globe or sky, and was also adopted by al-Sūfī. Even though Aratus illustrations were of a less scientific approach than classical celestial globes, they may have been more influential on the format of the images in Kitāb Suwar al-Kawākib al-Thābita because they were more readily available in the Islamic world.⁶²

The concept of providing two illustrations of each constellation may have been al-Sūfī's innovative contribution to the genre. When al-Sūfī refers to an earlier illustrated handbook on the constellations, in the preface to Kitāb Şuwar al-Kawākib al-Thābita, he writes that ^cUtārid (the author) mistakenly depicted Sagittarius facing east.63 From this remark, it does not appear that cUtarid provided more than one image of the constellation. The constellations are depicted only once each in a 1286AD copy of a 1029AD astrology manuscript by al-Bīrūnī (d.1048AD).44 Although this does not prove that the eleventh-century original was also illustrated, it may at least imply that al-Bīrūnī did not use two versions of each constellation.

⁶¹ Wellesz 1959 p.6.

⁶² See Chapter Two for a discussion of the scientific influences on al-Sūfī's text.
63 al-Şūfī (3) p.3.

Al-Sūfī's characteristic double format does feature in a fragment of thirteen folios, inserted into a 1399AD astrological miscellany, Kitāb al-Bulhān [PLATE 21].65 These illustrations show eleven zodiacal constellations and two constellations from the southern hemisphere, and they are clearly a fragment from a series of all fortyeight classical constellations. In the manner of al-Sūfī's treatise, each constellation is represented twice: once as seen in the sky and once as seen on the globe, with the exception of Pisces and Eridanus, whose "sky-views" are both missing. Carboni suggests that the fragment is mid-fourteenth century, from Egypt,66 while Raby proposes a date of 1180-1220AD, and a Seljuk provenance.⁶⁷ Both authors suggest the fragment to be detached folios from a copy of Kitāb Suwar al-Kawākib al-Thābita. There are however some discrepancies between these folios and other al-Şūfī manuscripts, which prompt me to suggest that they are not an al-Sūfī fragment, although they obviously do belong to an illustrated account of the fixed stars. At the foot of each Bulhān constellation is an inscription stating the total number of stars. These are written in the same script as the titles for each constellation, and are not later additions. Such an inscription would be unnecessary in Kitāb Şuwar al-Kawākib al-Thābita, which provides a table of stars for each constellation. The Bulhān numbers are anyhow at odds with those in al-Sūfī's catalogue, and are based on a

⁶⁴ Kitāb al-tafhīm li-awā'il sinā at al-tanjīm, (Book of instruction on the principles of the art of astrology), British Library Add.7697.

⁶⁵ Bodleian Library Or.133: fols.81v-93v; reproduced in Raby 1994 pp.114-117. Cf. Carboni 1988 p.42. The constellations are slightly disordered, and run Aries (x2), Taurus (x2), Gemini (x2), Orion (x1), Cancer (x2), Leo (x2), Virgo (x2), Libra (x2), Sagittarius (x2), Capricorn (x2), Aquarius (x2), Pisces (x1), Orion (x1), Eridanus (x1). Scorpio is missing from the sequence, as is the southern constellation of Cetus, the sea-monster, which is usually listed between Pisces and Orion.

⁶⁶ Carboni 1988 p.45.

⁶⁷ Raby 1994 p.106.

different reckoning of the constellations.⁶⁸ We know from al-Sūfī's preface that there was at least one other illustrated treatise current in his lifetime, that of ^cUtārid. It is possible that further treatises were produced in imitation of Kitāb Suwar al-Kawākib al-Thābita, using the same double format, and that this fragment is the remains of one such treatise. Alternatively, these pages could have been conceived as an extract from al-Sūfī, retaining the most popular part of the treatise, and discarding the text and the star-tables. In either event, the pages do not belong to a copy of al-Sūfī's treatise. Raby notes that the images are unusual for a pre1250AD copy of al-Sufi, in that they are not "predominantly linear." Indeed they are painted in thick bright colours, but fine drawing remains visible beneath. Raby links the style of the drawing with the images on Kashan minācī. To Carboni remarks that the palette of pink, violet, green and brown is Jalairid,⁷¹ and it may be that the initial pre1250AD drawings were touched up by a late fourteenth century owner, perhaps as preparation for insertion among the other brightly-coloured paintings of the Kitāb al-Bulhān compendium.

⁶⁸ I compared the Bulhān numbers with three copies of Kitāb Şuwar al-Kawākib al-Thābita: 1131AD Topkapı, 1250AD Süleymaniye, and our British Library manuscript. ⁶⁹ Raby 1994 p.108.

⁷⁰ Raby 1994 p.108. ⁷¹ Carboni 1988 p.46.

¹¹⁴

4. Later constellation iconography

Ulugh Beg's copy of Kitāb Ṣuwar al-Kawākib al-Thābita (c.1430-40AD) represents a turning-point in the development of al-Ṣūfī iconography, where the artist's conflict between obeying constellation layout and choosing a graceful and rational composition was briefly resolved. The al-Ṣūfī manuscripts and globes of pre1400AD depict the constellation figures primarily as the star-maps dictate. Various iconographical means are used, but to the same end. Frequently, distortions of figures result, such as the curiously short arm of Bootes, and the curiously long sleeve of Orion. In particular, the figures on the eleventh-century Valencian globe in the Bibliothèque Nationale assume strange and grotesque poses in order to accommodate the underlying stars.

Rather than reproduce a distorted figure in accordance with an earlier prototype, later artists often sought to rationalise these awkward figural poses. The arm of *Virgo*, which contains the important star Spica, is a case in point: early versions consistently show the arm awkwardly held against the body [PLATE 22A]. Ulugh Beg's manuscript resolves this, producing an altogether more graceful figure without interfering with the layout of the constellation [PLATE 22B]. The figure's body is turned, into a slight three-quarter pose, bringing most of the arm out of sight behind the body, while holding out the hand bearing the all-important star. This improved pose is retained in other 'later period' al-Ṣūfī manuscripts, such as a 1577AD version and a 1630-33AD Persian translation [PLATE 22C].⁷²

Eventually though, aesthetics triumphed over function, and the contortions required by the distribution of stars were overruled. Generally speaking, the figures in later copies of *Kitāb Ṣuwar al-Kawākib al-Thābita* assume more graceful poses, and less rigorous attention is paid to their underlying maps. Details of figure's costumes or accountrements are clarified, when before they were only sketchily reproduced. For example, the chair belonging to *Cassiopeia* is drawn increasingly rationally: according to perspective, and including all four chair-legs, as can be seen in a seventeenth-century al-Ṣūfī manuscript.⁷³ The 1009-10AD Oxford al-Ṣūfī shows the typical earlier version of *Cassiopeia*: the woman is seated on a high-backed chair, with the front legs of the chair either omitted or concealed by her dangling feet, and the finialled chair-back is drawn only in faint perspective.⁷⁴

Because they descend from a more constrained iconographical tradition, even 'later period' al-Ṣūfī figures remain in strong contrast to contemporary pseudo-scientific constellation images. Comparison of the images in two late sixteenth-century astronomy manuscripts demonstrates that scientific and pseudo-scientific constellation iconographies remain distinct, even after 'scientific iconography' relaxes its grip on star-distribution. $Taqr\bar{\imath}r^{75}$ is a Safavid version of al-Ṣūfī's treatise, written in 1577AD by a court astronomer of Shah Isma^cīl II. Its illustrations are

_

⁷² 1577AD Taqrīr (Dublin, Chester Beatty Library Ar4220: fol.68v; reproduced in Carey 1997 plate 17), 1630-33AD Tarjumah-i Ṣuwar al-Kawākib (New York Public Library Spencer Pers.Ms.6: fols.106v-107r; reproduced in Schmitz 1992 fig.123).

⁷³ Tehran, Majles Library ms196; reproduced in Nasr 1976 fig.39.

⁷⁴ Marsh144: fols.53r (globe view), 53v (sky view).

⁷⁵ Chester Beatty Library Ar4220; fully reproduced in Carey 1997.

much more restrained than the images of the constellations in the astrological compendium *Nujūm al-cUlūm*, made in Bijapur in 1570-71AD.⁷⁶

Characteristically for this 'later period', the details of constellation iconography stabilise, and any further variation tends to occur along grounds of fashion and aesthetics. Constellation figures reflect contemporary facial types and costumes, rather than the "conservative al-Ṣūfī style" of the earlier period, which followed (with varying degrees of success) Sasanian art. This can help to indicate the period in which an undated manuscript or globe was produced, as for example, when Belloli followed this method to deduce a date and provenance for a seventeenth-century Indian globe in the Smithsonian Institution.

The occasional appearance of iconographical innovations even in late copies of al-Ṣūfī shows that constellation imagery always remained susceptible to influence outside of the rigid tradition of al-Ṣūfī copyists, from archaic constellation iconography, or simply from the enterprise of an individual editor. For example, on two late eleventh-century globes made in Valencia, a 1362-63AD Kirmānī globe and in Ulugh Beg's c.1430-40AD al-Ṣūfī manuscript, *Lyra* is represented as a tortoise [PLATE 23A].⁷⁹ This respects a classically derived tradition which had been discarded in all other known al-Ṣūfī manuscripts and celestial globes (where *Lyra* is depicted as an ornate urn, e.g. PLATE 23B), although al-Ṣūfī mentions that he had

-

⁷⁶ Chester Beatty Library In02; reproduced in Leach 1995 p.822.

⁷⁷ Cf. Chapter Four for a full discussion of this style within the tradition of al-Şūfī illustration.

⁷⁸ Belloli 1985.

⁷⁹ c.1085AD Paris globe, 1085AD Florence globe, 1362-63AD Oxford globe, and c.1430-40AD Paris al-Şūfī (Bibliothèque Nationale Ar.5036: fol.53v).

seen *Lyra* represented as a tortoise on some globes.⁸⁰ The reappearance of this early version in the fifteenth-century manuscript demonstrates that new forms could still be introduced into the "canon" of Islamic constellation iconography because other visual references were available, and that the canon remained subject to change.⁸¹

For an example of individual "iconographical enterprise", I refer to a 1630-33AD Persian translation of *Kitāb Ṣuwar al-Kawākib al-Thābita*, which includes a unique depiction of the huge Arabian constellation of *al-Thurayyā*, as the upper half of a man [PLATE 24].⁸² The decision to illustrate this constellation may have been the independent decision of the editor and translator Ḥasan b. Sa^cd al-Qā'īnī (fl.1630AD), as I am unaware of any precedent. Thus, scientific constellation iconography was not isolated from revision or innovation, at any point.

•

80 al_Süfi (3) n 68

⁸¹ In fact, the iconography did not change very often, especially after 1400AD, but this example shows that change was not inconceivable. For a longer discussion on *Lyra*, see the main entry in this section.
⁸² The constellation covers stars in *Perseus*, *Taurus*, and *Cassiopeia*. Schmitz mistakes the figure for "the giant Cetus" (Schmitz 1992 p.123).

5. Pre1400AD constellation iconography

The iconography of the forty-eight constellations is discussed individually below, referring to Islamic scientific constellation-images (as defined above), dating from the earliest known illustrated manuscript in Islamic art, up to 1400AD. (Particular reference will be made to the British Library al-Ṣūfī, the focus of this study.) This consists of fourteen copies of al-Ṣūfī's *Kitāb Ṣuwar al-Kawākib al-Thābita* and ten celestial globes, which range from the courtly to the provincial, and from Spain to Iran.⁸³ References to globes or manuscripts will be made with their Christian dates and current locations, e.g. "1009-10AD Oxford al-Ṣūfī", "1285-86AD Khalili globe", etc. The objects are as follows (in chronological order):

•	al-Ṣūfī	1009-10AD/400H	Marsh 144	Bodleian Library, Oxford.
•	Globe	1085AD/478H	2712	Ist. e Mus. di storia d. scienza, Florence.
•	Globe	c.1085AD	GeA325	Bibliothèque Nationale, Paris.
•	al-Ṣūfī	1125AD/519H	Sotheby's Lot34	Sheikh Sa ^c ūd Collection, Qatar.
•	al-Ṣūfī	1125AD/519H	F.3422	Süleymaniye Library, Istanbul.
•	al-Ṣūfī	1131AD/525H	A.3493	Topkapı Library, Istanbul.
•	Globe	1144-45AD/539H	MAO 824	Musée du Louvre, Paris.
•	al-Ṣūfī	1171AD/566H	Hunt 212	Bodleian Library, Oxford.
•	al-Ṣūfī	1203AD/600H	5659	Staatsbibliothek, Berlin.
•	al-Ṣūfī	1224AD/621H	Ross.1033	Vatican Library, Rome.
•	al-Şūfī	(mid 13 th C.)	Ar.2488	Bibliothèque Nationale, Paris.
•	Globe	1225-26AD/622H	1137	Museo Naz. di Capodimonte, Naples.

⁸³ The full references to manuscripts and globes are given in Appendices One and Two.

•	al-Ṣūfī	1233AD/630H	5658	Staatsbibliothek, Berlin.
•	al-Ṣūfī	1250AD/648H	A.S.2595	Süleymaniye Library, Istanbul.
•	al-Ṣūfī	1266-67AD/665H	Ar.2489	Bibliothèque Nationale, Paris.
•	Globe	1275-76AD/674H	71.3.1.	British Museum, London.
•	Globe	c.1278-1310AD?	Staatlicher Math	aPhysik. Salon, Dresden.
•	Globe	1285-86AD/684H	SCI 21	Khalili Collection, London.
•	al-Şūfī	late 13 th century	Or.5323	British Library, London.
•	al-Ṣūfī	1306-07AD/703H	Pococke 257	Bodleian Library, Oxford.
•	al-Ṣūfī	(c.1306AD)	3777	Muze-yi Melli, Tehran ⁸⁴
•	Globe	c.1309-15AD?	MAO 825	Musée du Louvre, Paris.
•	Globe	1362-63AD/764H	44790	History of Science Museum, Oxford.
•	Globe	1383-84AD/785H	763	History of Science Museum, Istanbul.
•	al-Ṣūfī	c.1400AD	Acc.13.160.10	Metropolitan Museum, New York.

Usually, the pose of a constellation is dictated by the location of its stars. In this section, the most typical iconography is noted for each constellation, followed by references to exceptional variations, and suggested explanations for such differences. Repeatedly, certain iconographical groups of globes and/or manuscripts become distinct, as they are shown to share exceptional versions of constellation-images. These emerging groups are summarised at the end of the section. Perhaps unsurprisingly, the greatest range of iconographical diversity is among the human figures, rather than the animals and inanimate objects.

Although it is iconography, not regional or "dynastic" style, which is under discussion in this section, it will be seen that changes in constellation iconography can occur under influence from contemporary style, even when a particular element is a specific iconographical feature of a figure. For example, *Cepheus* is usually depicted with a beard and a tall mitre. In the 1266AD Paris al-Ṣūfī, both are discarded in favour of a cleanshaven youth, wearing a tall *sharbūsh* [PLATE 27C]. The facial type occurs throughout the manuscript, and the *sharbūsh* is evidently a reflection of contemporary style. The same features occur in other illustrated manuscripts of the thirteenth century (see below under *Cepheus*).

There is a tendency to stylistic conservatism among most early al-Sūfī illustrations, which survives at least until court styles become sufficiently distinct as to dominate. The principal feature of this "archaic" style is an energetic linear pattern on the figures' costumes. Billowing curls and folds adorn skirt-hems, sleeve-ends, collars, and scarf-ends. Although early manuscripts may date two centuries apart, they share an intense similarity of style, especially in these details of costume. Wellesz defined this "conservative group" as "Group A". Aside from the common style of distinctive curling folds, Group A constellation-images shared elements of iconography, such as the omission of *Virgo*'s wings and of *Andromeda*'s chains. The group was transmitted separately from a "less elaborate" group ("B"), which was

⁸⁴ This manuscript is not dated, but is almost identical in style to the previous copy, Bodleian Library Pococke 257.

⁸⁵ I suggest a border of the year 1400AD between these phases of stylistic allegiance in al-Ṣūfī images. The early "conservative" style is discussed in Chapter Four.

These distinctive rippling curls also occur in the unlikely place of the saggy throat-folds of Taurus (1009-10AD Oxford al-Ṣūfī; reproduced in Wellesz 1965 fig.15).

"intimately connected with the iconography of the celestial globe". To Group B constellation-images tended to "follow classical usage": Virgo is winged, Andromeda is enchained, and the three southern constellations of Hydra, Crater and Corvus are depicted together rather than separately. Also, "Group B" images do not reproduce the characteristic curling folds exemplified in the 1009-10AD al-Ṣūfī illustrations, but depict figures in contemporary dress.

Wellesz admits that this model does not work perfectly, noting that neither the 1224AD Vatican al-Şūfī, nor our British Library al-Sūfī submit fully to either definition, and suggesting they both be regarded as "interesting variations of those manuscripts which follow the A Group tradition".88 An examination of al-Sūfī manuscripts and celestial globes demonstrates that these two groups are by no means watertight. Wellesz's exclusive association of the distinctive curling folds with "Group A" is flawed. As mentioned in an earlier footnote, very few al-Şūfī images of pre1400AD do not at least attempt this "conservative" style, however successfully. Even in the first manuscript she identifies as "Group B" (the 1125AD Süleymaniye al-Sūfī), Wellesz notices a rather unsuccessful attempt to represent the pattern of drapery folds.89 This suggests that "Group A" images must include a successful depiction of the pattern, which implies a dangerous value judgement. For example, the 1203AD Berlin al-Sūfī is evidently copied from an early and "conservative" copy of the treatise, and might otherwise qualify as "Group A" except that the artist has reproduced the distinctive curls and folds very summarily. Although only "Group B" images should reflect contemporary styles, the "A" Cepheus in the 1266AD Paris al-

⁸⁷ Wellesz 1959 p.23.

Sūfī is depicted wearing a fur-lined sharbūsh (recognisable from other thirteenthcentury manuscript-paintings), instead of the conventional mitre. Although Wellesz states that an enchained Andromeda is a feature of "Group B" manuscripts and of celestial globes, the figure appears without chains in all of the celestial globes listed in this study. The distinction between manuscripts which represent Hydra, Corvus and Crater alone or together becomes meaningless in the face of manuscripts which do both, such as the 1125AD Qatar al-Sūfī. As Corvus and Crater overlap Hydra, it is unusual to find any image of Hydra which does not at least indicate the stars of the two smaller constellations.

The variety of iconography among these manuscripts and globes points rather to geographical regions, than hierarchical distinctions of function. This has the rather simple explanation, that new constellation-images were drafted from the nearest copy available. How different versions came about in the first place is less easy to explain, but may relate to independent "non-Sūfī" sources of constellation imagery, such as the illustrated *Phaenomena* of Aratus, or late classical celestial globes.

⁸⁸ Wellesz 1959 p.24.⁸⁹ Wellesz 1959 p.22.

⁹⁰ Reproduced in Brend, Hillenbrand & King 1998 p.46.

6. The iconography of the constellations

The Latin constellation-titles used are from medieval European tradition, and are still current today. The first account of all forty-eight classical constellations was made by Eudoxus of Cnidos (c.390-340BC). Poetic descriptions followed, such as Aratus' *Phaenomena*, the *Catasterisms* falsely ascribed to Eratosthenes of Cyrene (c.275-194BC), the *Poetica astronomica* of Hyginus (second century AD), derivative versions by Marcus Manilius (early first century AD), Germanicus (early first century AD) and Rufius Festus Avienus (fourth century AD), and also more scientific catalogue lists by Hipparchus and Ptolemy. Pseudo-Eratosthenes gave each constellation a mythological identity, relating *Leo* to the Nemaean lion killed by Hercules and *the Kneeling Man* to Hercules (etc.), although these two constellations (and others, particularly the Zodiac) date from Babylonian tradition, and were not designed after Greek mythology. Nonetheless, poetic works inclined towards "the transformation of the firmament into a rendezvous of mythological figures" and today's Latin names sometimes vary from the names used by Aratus and later Ptolemy in further attributions of proper names, such as *Hercules* or *Pegasus*.

There is often more than one Arabic name given to a constellation, deriving from various translations, mistranslations, and corruptions. A brief translation or explanation follows the Latin and Arabic names. Appendix Three is a concordance of native Arabian star-names with the forty-eight classical constellations, and sheds light on some of the Arabic names for the constellations listed below.

91 Panofsky & Saxl 1933 p.232.

Northern Hemisphere

Ursa Minor, the lesser bear

the lesser bear - الدب الاصغر

The bear stands in profile with lowered head and on all fours, usually with the forelegs together and the back legs "walking." This pose is not determined by the location of stars, as all seven occur only in the body and tail. It may be in imitation of *Ursa Major*, where there are stars in all four legs. In the 1125AD Qatar al-Ṣūfī, the legs have been truncated – this may reflect al-Ṣūfī's remark in the text that this constellation has neither limbs nor head, and is only called the bear because it

resembles the constellation of Ursa Major [PLATE 25].92

Ursa Major, the greater bear

the greater bear - الدب الاكبر

The bear stands in profile with the forelegs together, the back legs "walking" and the tail raised. In the 1171AD Oxford al-Ṣūfī and British Library al-Ṣūfī, the second foreleg is raised in a pose of arrested movement, giving a livelier image while still respecting the star-distribution.

Draco, the dragon

the dragon - التنين

A long snake, with one to three coils. Usually the head is in profile, and the snout ends in a tight curl. The toothy jaws open wide to show a forked tongue, accommodating a star on the tip. In the al-Ṣūfī manuscripts of (our) British Library, 1250AD Süleymaniye, 1266AD Paris, and c.1400 New York, the dragon has long trailing eyebrows and a beard. *Draco* in the 1171AD Oxford al-Ṣūfī has pointed ears.

92 al-Şūfī (1) p.44.

125

In the 1250AD Süleymaniye and our British Library manuscripts, the dragon has small round ears at the back of the head. The dragon is horned on the 1285-86AD Khalili and c.1278-1310AD Dresden globes [PLATE 26]. Exceptionally, on the c.1278-1310AD Dresden globe, the dragon coils in the heart-shaped knot typical of the eclipse-dragon, as identified by Hartner. *Draco* is not related to the eclipse-dragon of Islamic astrology, and this is the only representation known to me of *Draco* coiled in the characteristic eclipse-dragon knot.⁹³ The Dresden globe also depicts the constellation of *Serpens*, the snake, coiled in a heart-shaped knot, and it can be assumed that the addition reflects local iconography not direct astrological reference [PLATE 34A].⁹⁴

Cepheus (the Ethiopian king, father of Andromeda)

'Qifāwūs' - قيفاوس the flaming - الملتهب

A bearded man, with one knee raised up, and the other leg bending behind him. Similarly, one arm is held up, bent at the elbow, and the other is held behind, also bending at the elbow. The legs and arms are in profile, and the body and face in full view. He wears a tall mitre, termed a **beautification** by al-Sūfī, which is usually shaped like a thimble [PLATE 27A], but is pointed in the 1171AD Oxford and 1224AD Vatican al-Ṣūfīs. A fur lining is added to the British Library al-Ṣūfī, 1125AD Qatar and 1266-67AD Paris manuscripts [PLATES 27B, 27C]. (In the latter version, the mitre is a Turkish *sharbūsh*, a two-part fur cap with a high frontal peak). The two Valencian globes (c.1085AD Paris, 1085AD Florence) depict *Cepheus* bare-headed.

93 Schmitz mistakenly identified *Draco* as "the Dragon of the Eclipse" in a description of a 1630-(Foot-note continued on the next page.)

Bootes, the herdsman

the herdsman - البقار

the howler - العوا

the shouter - الصياح

- corruption of above?

guardian of the north - حارس الشمال

A man stands with legs apart, lifting one arm above his head, and holding a long

bending stick close behind his back in the other hand. More conservative al-Sufi

manuscripts include a curve at the top of the stick (1009-10AD Oxford, 1203AD

Berlin, 1250AD Süleymaniye, 1266AD Paris – and the British Library copy

PLATES 28A, 28B). This derives from classical versions, such as the Farnese globe

Bootes, and a ninth-century Western Aratus manuscript, where the figure holds a

similar bending implement. Vaguely straight sticks occur in most other cases

(1125AD Qatar [PLATE 28C], 1125AD Süleymaniye, 1131AD Topkapı, 1233AD

Berlin, c.1400AD New York al-Şūfīs, and 1144-45AD Paris, 1275-76AD London,

1278-1310AD Dresden, 1362-63AD Oxford globes), while the 1285-86AD Khalili

globe converts the straight stick into a sword.95 On the c.1085AD Paris globe,

1085AD Florence globe and 1224AD Vatican al-Sūfī, Bootes is empty-handed.

Corona Borealis, the northern crown

the northern crown - الإكليل الشمالي

the coins (?) - الفكة

The constellation is shown as a plain circle, or as a ring, in all cases except the

c.1085AD Paris globe and the 1085AD Florence globe, where it appears in the rough

shape of a horseshoe. This derives from classical images of Corona Borealis as a

33AD al-Şūfī manuscript (Schmitz 1992 p.124).

94 Hartner 1938 pp.134-138. Cf. also Hartner 1973 pp.106-108.

95 The c.1430-40AD version of Bootes holds a plain straight stick (Bibliothèque Nationale Ar.5036).

127

wreath, and demonstrates that these two globes referred to more classical sources than the illustrations in al-Sūfi's treatise.

Hercules

the kneeling giant (?) - الخاثي على ركبته the dancer

A man kneels on one knee, holding one arm out straight. In the other hand, he holds up a sickle behind his head — although neither al-Ṣūfī nor Ptolemy mention any weapon. Hercules is empty-handed in the 1125AD Qatar al-Ṣūfī, 1362-63AD Oxford globe, and four examples from the Western Islamic world: the two Valencian globes, the 1224AD Vatican al-Ṣūfī from Ceuta, and the mid-thirteenth-century Paris al-Sūfī. These may reflect classical iconography: the Farnese globe Hercules is also empty-handed. The attribution of an instrument may be a late classical addition, then taken up by artists in the central lands of Islam: Hercules holds a long curved stick, like a shepherd's crook, in the ninth-century Leiden Aratea. An important early European star-map of the northern hemisphere (c.1440AD) shows Hercules bearing a short curved sword, which suggests that the map had some sources in Islamic constellation imagery [PLATE 29A]. Later European star-maps, including Albrecht Dürer's 1515AD woodcuts, used the c.1440AD map as a reference, but tend to attribute to Hercules the knobbly wooden club of classical iconography [PLATE 29B].

_

⁹⁶ Leiden University Library Ms. Voss. Lat. Q.79: fol.6v; reproduced in Savage-Smith & Katzenstein 1988 p.20.

⁹⁷ Many of the star-labels are part Latin, part transliteration of Arabic names, such as that of the ghoul's head in *Perseus*, "caput algol". Noticeably, *Sagittarius* is drawn wearing a headband with trailing scarf-ends, in an iconography typical of Islamic versions. For another example of Islamic-inspired iconography, see the entry for *Lyra*. Islamic images were not the only source for this map however, as the figures are drawn with their backs to the viewer, and some are nude, in the classical style. Whitfield states: "the origin of this map is unknown, but it became the pattern for all future star charts" (Whitfield 1995 p.69).

⁹⁸ Panofsky and Saxl trumpet Dürer's reinstatement of the correct classical iconography for *Hercules*, "bringing together again both scientific and mythological antiquity, classical meaning and classical (Foot-note continued on the next page.)

Lyra, the lyre

"lūrā" - لهرا "al-lūzā", copyist's error after above? the tortoise - السلحفاة (corruption of above, or of χέλειον ?) - الشلباق - cymbal? ladle - المغرفة

An ornate urn with two handles, sometimes on a stem. On the c.1085AD Paris, 1085AD Florence, and 1362-63AD Oxford globes and the c.1430-40AD Paris al-Sūfī, this figure is a tortoise [PLATE 23A]. This may demonstrate that these four examples referred to other sources than the Suwar al-Kawākib canon for constellation images. Aratus describes Hermes making the first lyre from a tortoise shell.99 and Ptolemy mentions the shell in his star-table, referring to two horns attached to a shell with a bridge between them, though not directly to a tortoise. 100 In classical representations such as the Farnese globe, the constellation is depicted as a lyre with a large tortoise shell fixed to the base, as its sounding-board [PLATE 30A]. 101 In a ninth-century Carolingian version of the Phaenomena, Lyra is depicted as the musical instrument, with a small tortoise shell just discernible at its base.¹⁰² The outline shape of the Carolingian image (without the shell) is consistent with the urn of typical al-Sūfī versions of Lyra, even though al-Sūfī retains Ptolemv's

form" (Panofsky & Saxl 1933 p.240). Cf. Whitfield 1995 pp.71-73 for three examples from the sixteenth century AD, and Graves 1981 pp.164, 170, 171, for classical Greek examples of Heracles with his trademark club.

⁹⁹ Aratus' description of Lyra is as follows: "The Tortoise too is small; when Hermes was actually still in his cradle, he hollowed out the shell and bade it be called a Lyre. He set it down in the front of the unknown figure [=Hercules], when he had brought it to the sky. The figure, as he crouches, comes near it with his left knee, while the Bird's [=Cygnus] head at one extremity circles opposite it: the Lyre is set fast between the Bird's head and the knee" (Aratus p.93).

100 Ptolemy p.350. The first star in Lyra is described as "the bright star on the shell", and the fifth is

[&]quot;the northernmost of the two stars close together in the region to the east of the shell".

¹⁰¹ Reproduced in Whitfield 1995 p.23.

¹⁰² Leiden University Library Ms. Voss. Lat. Q.79: fol.44v; reproduced in Savage-Smith & Katzenstein 1988 p.28. The tortoise of the Farnese Lyra is far more prominent than that of the Leiden image.

description of stars' positions on the shell (خرفة). In his text, al-Şūfī mentions that he had seen Lyra represented as a tortoise on some globes, but he nonetheless chooses to depict the constellation as the ornate urn – as though the relation of the instrument to the shell was not apparent to him. 103 Two separate versions of this constellation evidently developed, although the tortoise image was far less popular. This may be due to the success of al-Sūfi's text, and his decision to use the image of the urn. Examples of the tortoise Lyra were still available in the fourteenth and fifteenth centuries, as is clear from the Oxford globe and the Ulugh Beg image. Both types evolved from a classical source, although one discarded the main features of the classical lyre, keeping only the shell complete with the tortoise beneath. The more resilient "urn-type" occurs via the gradual diminution of the shell in late classical images: eventually the shell is omitted completely, while the silhouette of the musical instrument is retained.

An important Arabian star in Lyra is النسر الواقع, the falling vulture. This starname was adopted in Western Europe as vultur cadens, and influenced the figure's iconography in Renaissance star-maps: the symmetrical layout of the ornate urn (of Islamic images) was easily converted to a bird assuming a spread-eagled heraldic pose. Unlike many cases in Islamic astronomical tradition, 104 European mapmakers understood the meaning of the classical title, and tried to amalgamate both Islamic and classical "accounts" of the constellation into one unique iconography: a flying bird with a viol superimposed on its chest. Dürer's Lyra is among the earliest

 $^{^{103}}$ al-Şūfī (3) p.68. 104 See the numerous proposed Arabic meanings of *Lyra* in the title above.

(1515AD) of these versions [PLATE 30B]. 105 In an early Renaissance star-map of

the northern hemisphere (c.1440AD), Lyra is depicted simply as the spread-eagled

bird, with its wings echoing the shape of the ornate urn of Islamic images [PLATE

30C]. This image, and also the use of the Latin translation of النسر الواقع, show

reference to an Islamic source. No two-dimensional star-maps survive from Islamic

astronomy, and it would be tempting to suggest that this map was copied from one

such planisphere. However, the map has many characteristics alien to Islamic

constellation imagery, such as the rear view presented by many of the figures, and

their nudity. The source of the map's layout was probably a classical manuscript, or a

later copy of one. Islamic sources were also used, as a reference for the constellation

images.

Cygnus, the swan

the chicken - الدجاجة the bird - الطائر

A long-necked bird, splayed on its back. Most versions give the bird wattles and/or a

comb, in keeping with its Arabic name. The British Library al-Sūfī shows a different

bird, with a falcon's rounded head and curved beak. The symmetrical pose of the

bird may have inspired the artist to copy a heraldic image of a bird of prey. The

Farnese globe version is a swan, true to the classical name.

Cassiopeia (the Ethiopian queen, mother of Andromeda)

she with the chair - ذات الكرسي

A woman sits on a cushioned high-backed chair, holding onto the back with one arm,

and holding out the other arm in front of her. This arm's pose is only dictated by

105 Reproduced in Whitfield 1995 p.71.

•

131

underlying stars in the upper arm, but the outstretched arm is nonetheless a persistent convention. The legs and arms are in profile, and the body and face in full view. In some versions, the chair's feet are decorated in the shape of lion's feet or heads (1009-10AD Oxford, 1125AD Süleymaniye, 1250AD Süleymaniye al-Ṣūfī mss, and the 1275-76AD London and 1278-1310AD Dresden globes). The cushion on the chair is mentioned specifically in al-Ṣūfī's text, ¹⁰⁶ but is omitted from the British Library and 1125AD Süleymaniye al-Ṣūfī mss, and the c.1085AD Paris, 1085AD Florence, c.1309-15AD Paris, and 1362-63AD Oxford globes. The 1171AD Oxford al-Ṣūfī shows the constellation superimposed on an image of an Arabian constellation: the She-Camel [PLATE 11A].

Perseus (the hero who beheaded Medusa)

"barshāwūsh" - برشاوش

the bearer of the demon's head - حامل راس الغول

A man holds a monstrous decapitated head by the hair, and in the other hand a long straight sword, high overarm. The sword is absent from the Farnese globe, but appears as a thin straight stick in the Leiden *Aratea*. The monster's head derives from classical images of the Gorgon Medusa, but has fangs and a beard, often parted in two or three forks [PLATE 14B]. The c.1306AD Tehran al-Ṣūfī ghoul radiates spikes of hair and beard. The face, legs and arms are in profile, and the body in full view. As discussed earlier, the iconography of *Perseus* resembles that of the warrior planet Mars. The 1171AD Oxford al-Ṣūfī depicts a lion's head in *Perseus*' grasp. On the Valencian globes, *Perseus* holds a cluster of three heads, and the tip of the

106 al-Sūfī (1) p.82.

¹⁰⁷ Cf. above under Introducing foreign material.

sword is shaped in a half trefoil¹⁰⁸ (Florence globe), or into a fork (Paris globe, PLATE 15A). The 1362-63AD Oxford globe version has an unusual feature in that a long twisting line leads from the ghoul's chin to the hands of neighbouring constellation *Auriga*, where that figure usually holds a ribbon.

Auriga, the charioteer

the holder of the reins - ممسك الاعنة

A beardless youth stands with one knee raised. One hand holds a looped ribbon in to the waist and the other holds up a whip: a thin rod with two short sashes tied to the end. The legs and arms are in profile, and the face and body in full view. The British Library al-Ṣūfī figure does not hold the ribbon in his lower hand, and both feet stand flat [PLATE 31A]. On the Valencian globes, Auriga holds no attributes, and is hunched up in a crouching pose [PLATE 31B]. A crouching Auriga (retaining the whip and "ribbon") also features on the 1171AD Oxford al-Ṣūfī, and the three late thirteenth-century globes [PLATES 31C, 31D]. [100] (In the al-Ṣūfī and the Dresden and Khalili globes, the figure also wears cross-garters.) This pose for Auriga survives into late copies of Kitāb Ṣuwar al-Kawākib al-Thābita, and is very close to the "sleeping groom" figure, identified by Ettinghausen and Guest on a thirteenth-century lustre-painted plate in the Freer Gallery [PLATE 32]. [110] The link between "the holder of the reins" and the young groom is obvious, and it is interesting to see that this crouched pose can be identifiable specifically to the figure of the stable-boy in these separate contexts. There is a related version, depicting a figure with a normal

¹⁰⁸ It looks like an elephant-goad. This weapon, and the severed head(s), may point to an Indian image of the warrior planet Mars.
¹⁰⁹ There are other such links between the 1171AD al-Ṣūfī and these globes, presented together in the

There are other such links between the 1171AD al-Şūfī and these globes, presented together in the summary.

torso and extremely short legs, on the c.1309-15AD Paris globe. The source of this crouched or dwarfish figure may originate in a classical image of the charioteer (not represented by the Farnese globe or the Leiden *Aratea*), in which the figure is truncated from view by the front of his chariot.¹¹¹

Serpens and Serpentarius, the serpent and the serpent-holder

the serpent-holder and the serpent - الحوا و الحية

A man stands holding a long snake in both hands. The snake winds behind the man, and coils just before the neck. Its mouth is opened wide to reveal a long tongue, similar to *Draco*. Serpens is depicted with horns in the 1171AD Oxford al-Ṣūfī, 112 and small round ears in the British Library al-Ṣūfī. 113 In the c.1278-1310AD Dresden globe, the snake coils in a heart-shaped knot, similar to the eclipse-dragon identified by Hartner [PLATE 34A]. 114

The man is often drawn with strangely squared shoulders, in response to the location of four rather high stars. He wears a cone-shaped hat in the 1131AD Topkapı and c.1400AD New York al-Ṣūfī versions, and on the 1275-76AD London, c.1278-1310AD Dresden, and 1362-63AD Oxford globes [PLATE 34B]. In the c.1400AD New York al-Ṣūfī, a group of external stars is accommodated within a flaring scarf

¹¹⁰ Ettinghausen & Guest 1961. Later versions of *Auriga* in the same pose occur in the c.1430-40AD Paris al-Ṣūfī (Bibliothèque Nationale Ar5036), 1577AD *Taqrīr* (Chester Beatty Library Ar4220), and 1643AD Paris al-Ṣūfī (Bibliothèque Nationale Ar6528).

¹¹¹ Auriga is thus depicted in an illustrated copy of Bede's astronomy treatise, De Signis Coeli [PLATE 33A]. There exists another occasion of a truncated classical charioteer becoming a crouched figure in Islamic art, in the images of the planets as ruling astrological figures, e.g. the figures on the "Vaso Vescovali" [PLATE 33B]. The figures are shown with their legs tucked underneath, seated on a small platform, with a pair of animals below. For a classical example, cf. a silver-gilt disc showing the sun-god Helios and his chariot of four horses, reproduced in Graves 1981 p.58. For a post-classical example, the central disc of the sun as a charioteer, in the zodiac mosaic (sixth century AD) at Beth Alpha (reproduced in Dequeker 1986).

Hvdra of the same manuscripts is also horned.

¹¹³ The other "snakes" in this manuscript are depicted the same way (Draco and Hydra).

over the man's shoulder. On the Farnese globe, the figure stands with his back to the

viewer (in keeping with classical tradition), holding the snake in front of him. As

Islamic celestial globes depict figures facing the viewer, Serpentarius is slightly

rearranged - and the snake now hangs behind the man. A complete inversion of the

classical version should show the snake winding in front of the man, as it does in the

exceptional image in the 1131AD Topkapı al-Şūfī. (The artists of the 1233AD Berlin

al-Şūfī and 1362-63AD Oxford globe both opted for a compromise, and depicted the

snake passing between the man's legs.)

Sagitta, the arrow

the arrow - السهم

the short spear - العنزة

A small arrow, usually with a u-shaped tail. In the two Valencian globes and the

Leiden Aratea, the arrow is held in the claws of Aquila.

Aquila, the eagle

the eagle - العقاب

the flying vulture - النسرالطائر

An eagle stands, with both wings spread. The body and head are in profile, and the

wings in full view. In both the British Library and 1171AD Oxford al-Sūfī

manuscripts, Aquila has a pronounced round head and short curved beak, in

comparison with other examples [PLATE 4].

Delphinus, the dolphin

the dolphin - الدلفين

114 See also *Draco* on the same globe (Hartner 1938 pp.134-138).

135

A composite animal, with the head of a lion and the body of a fish, in profile. Both the Farnese globe and Leiden Aratea depict a profiled version of a bottle-nosed dolphin, with a short snout and a crest. The 1009-10AD Oxford al-Sūfī, 1125AD Oatar al-Sūfī, and the 1362-63AD Oxford globe depict a fish-composite creature, with a profiled squarish head and small round ears, which could resemble either a lion or a bear [PLATE 35A]. 115 The same representation of a sea-creature appears in an Armenian stone relief cycle at the Church of the Holy Cross (915-21AD), Achtamar Island on Lake Van [PLATE 35B]. 116 The image incorporates three scenes from the life of Jonah: a lion-headed fish lurks under the boat, ready to swallow Jonah as he is thrown overboard. These early versions are in profile, but the first "typical" Delphinus appears only six years after the Qatar manuscript in the 1131AD Topkapı al-Şūfī, probably produced in Mayyāfāriqīn.117 It is depicted as a fish with a full-face lion's head, and this seems to become the norm for this constellation in al-Sūfī and on celestial globes (1131AD Topkapı, 1171AD Oxford, 1203AD Berlin, 1233AD Berlin, 1250AD Süleymaniye, 1266AD Paris, c.1400AD New York al-Sūfī versions, and 1144-45AD Paris, 1309-15AD Paris and the three late thirteenthcentury globes) [PLATES 36A, 36B]. A transitional Delphinus occurs in the 1125AD Süleymaniye al-Sūfī, demonstrating just how the type transformed: the silhouette of the head matches earlier "profile versions", but both eyes and the nose are drawn. This makes an awkward combination of profiled head and mouth, together with a full-face view of eyes and nose, illustrating the first and second versions of the constellation at once. The two Valencian eleventh-century globes

¹¹⁵ The c.1306AD Tehran al-Sūfī Delphinus is a fish body with a very small lion's head (in profile)

¹¹⁶ Cf. also the iconography of Cetus (below).

117 See Appendix One for two views, which attribute this manuscript to Mayyāfāriqīn or Mosul.

simply show a fish, as do the two Maghrebi al-Sūfī manuscripts (1224AD Vatican

and mid-thirteenth-century Paris). The Western provenance of the fish Delphinus

may highlight the possibility that the "lion-fish" is specific to the region of northern

Iraq and north-western Iran. This is strengthened by the relatively late date of the

1362-63AD Oxford globe version. Although its place of production is not known, the

craftsman's nisbah is al-Kirmānī, and the object may be from south-eastern Iran. 118

In the British Library al-Ṣūfī, the dolphin's head is that of a simurgh, complete with

cheek wattles and long eyebrows [PLATE 4]. This is a unique depiction of

Delphinus, and the decision to replace the usual lion's head may have been made by

the individual artist. In the same manuscript, a rounded head with short curved beak

also occurs in Aquila, Cygnus, in the animate wing-ornaments of Pegasus, and on the

prow of Argo. In all five of these constellations, the rounded head is exceptional, and

must relate to contemporary fashion rather than constellation iconography. 119

Equuleus, the lesser horse

part of the horse - قطعة الفرس

the preceding horse - الفرس المقدم

A horse's head, truncated at the neck. The head is bridled in the two Maghrebi al-

Sūfī manuscripts, and in the c.1400AD New York al-Sūfī. The constellation is

omitted from the Farnese globe and the Leiden Aratea.

Pegasus

the greater horse - الفرس الاعظم

The globe is inscribed with a statement which says that the stars were taken from a copy of al-Sūfi's treatise (Savage-Smith 1985 p.222). Another simple "fish" version is in the 1630-33AD New

York al-Şūfī (Spencer Pers.Ms.6: fol.63r).

119 The simurgh head ornament is discussed in Chapter Four.

137

the second horse - الفرس الثاني

A winged horse in profile, truncated at the lower torso. Al-Sūfī describes the horse in the text without mentioning its wings, but goes on to identify stars on the wing in his star-table.¹²⁰ In some versions, the horse's wing covers the truncated body (1125AD Süleymaniye and c.1306AD Tehran al-Şūfī mss), the wing is rather plain in these two and other versions (1233AD Berlin and two Maghrebi al-Sūfī mss, and the two Valencian globes). Aside from these examples, Pegasus is usually a rather elegant figure: the long wing sprouts from a curl around the shoulder, and bends up at the tip. In the 1009-10AD Oxford Pegasus, the wings are held vertical, and form large curls on the wing-tips [PLATE 37A]. The 1266AD Paris version has a decorated medallion around the shoulder, while the 1250AD Süleymaniye fills the wingfeathers with dense pattern. The British Library al-Sufi version is particularly elaborate: the long narrow feathers curl into individual scrolls, some containing round bird heads [PLATE 3]. There is an immediate parallel with the three late thirteenth-century globes: the 1275-76AD London Pegasus has an animal-head in one curling wing-tip, and the c.1278-1310AD Dresden and 1285-86AD Khalili wings curl out in the same directions [PLATES 38A, 38B].¹²¹ Significantly, the 1171AD Oxford al-Sūfī Pegasus also has long narrow curling wings, with a halffoliate scroll curled under the oxter - just as the British Library version does [PLATE 37B]. All three globe versions have a single curl in this place. The 1362-63AD Oxford globe offers an odd combination of the two wing-types described: the

 ¹²⁰ al-Sūfī (1) p.112.
 121 This motif also occurs in Seljuk architectural decoration: other local occurrences are discussed in Chapter Four.

horse has a large straight wing covering much of the back torso, and also a slender

flourish which sprouts from the shoulder and curls up behind the neck. 122

Andromeda (the princess chained to rocks as a sacrifice to a sea-monster)

the enchained woman - المراة المسلسلة

the woman who didn't have a husband - المراة التي لم تر بعلا

"andrūmīdā" - انذروميذا

A woman standing, holding out her arms to either side. In spite of her principal

Arabic name, Andromeda is rarely shown wearing her chains. Only three of the

selected al-Şūfī manuscripts do depict an enchained figure: 1125AD Süleymaniye,

1131AD Topkapı and 1233AD Berlin al-Şūfī. 23 Although Wellesz stated that

Andromeda is usually depicted enchained on Islamic celestial globes, the figure

appears unchained in all the celestial globes listed in this study. The figure wears a

Sasanian-style crown in the British Library al-Sūfī, the 1125AD Qatar, 1250AD

Süleymaniye, and c.1400 New York manuscripts, and the 1309-15AD Paris globe

[British Library al-Saft- PLATE 39, New York al-Saft- PLATE 77B]. 124 This may reflect

late classical iconography, where the constellation referred to a mythical princess,

although neither the Farnese globe nor the Leiden Aratea depict the figure with a

crown or chains.

At this point in copies of Kitāb Şuwar al-Kawākib al-Thābita, there are various extra

versions of Andromeda, in which the figure is superimposed with other constellation-

12

The narrow flourish resembles the inner profile of Ulugh Beg's c.1430-40AD al-Ṣūfī *Pegasus*, both versions may have been referring to similar models (Bibliothèque Nationale Ar.5036; fol.93v).

123 Certain later versions are also enchained, such as the 1630-33AD New York al-Sūfī Andromeda

(New York Public Library Spencer Pers.Ms.6: fols.71r, 72v).

139

¹²⁴ In a 1428AD Latin translation of al-Sūfī, Andromeda wears a small, rather European crown (Gotha, Schloß Friedenstein M.II.141: fol.21r; reproduced in Strohmaier 1984). Copying from Islamic constellation-imagery, this artist must have selected a local version of a Sasanian-style crown.

images. These are (a) one of the fish from *Pisces* crossing her feet, (b) two fish (from Arabian astronomy) superimposed on her torso [PLATE 10A], and more occasionally (c) an Arabian She-Camel. A separate illustration of the Horse constellation from Arabian star nomenclature is also inserted here: 125 it appears in the 1009-10AD Oxford, 1125AD Qatar, 1125AD Süleymaniye, 1131AD Topkapı, 1224AD Vatican, mid-thirteenth-century Paris, 1233AD Berlin, 1266AD Paris, 1306-07AD Oxford, c.1306AD Tehran [PLATE 10B] and c.1400AD New York manuscripts. 126 Exceptionally, the 1125AD Qatar al-Şūfī depicts *Andromeda* overlapping the Arabian Fish, Horse and She-Camel, together in one image [PLATE 11B].

Triangulum, the triangle

the triangle - المثلث

A triangle.

Zodiac Constellations

Aries, the ram

the lamb - الحمل

A profiled ram with curling horns, and its head turned back over its back. The forelegs are raised up, as though running. One back leg stretches forward in an awkward pose, to accommodate a star. In some images, the second leg stretches forward to join the first one, while other images stretch the second leg backwards, as though all four legs are running.

125 For a precise account of the distribution of these images, see Appendix Three. These Arabian constellations do not figure on celestial globes, which only ever depict Ptolemaic constellations.

although the names of prominent Arabian stars are often inscribed.

126 Its absence from the remaining two al-Şūfī manuscripts in this group (British Library and 1250AD Süleymaniye copies) is probably due to accidental loss of folios.

Taurus, the bull

the bull - الثور

A long-horned bull, truncated at the lower torso. The face is shown frontally, and the body in profile. The face is often rather distorted. The forelegs are raised up together, and there is a large hump on the back, accommodating the dense star group known as the *Pleiades*.

Gemini, the twins

the twins - التؤمين

' al-jawzā - الجوزا

Two nude standing figures, with their arms crossing awkwardly over each other's bodies. 127 The figures are usually depicted in profile, facing the same direction, often in notably "conservative" al-Ṣūfī versions (1009-10AD Oxford, 1125AD Süleymaniye, 1131AD Topkapı, 1203AD Berlin, 1250AD Süleymaniye, 1266AD Paris, c.1400AD New York al-Ṣūfī manuscripts — and the British Library copy [PLATE 40]). In the c.1085AD Paris globe and 1171AD Oxford al-Ṣūfī, one twin is drawn full-face, and the other is in profile [PLATE 41A]. Both are full-face in the 1233AD Berlin, c.1306AD Tehran and the two Maghrebi al-Ṣūfī copies, the three late thirteenth-century globes, and the 1362-63AD Oxford globe. In most examples, the diplomatic distribution of legs and arms prevents an attribution of gender, although there are breasts on the twins in the al-Ṣūfī manuscripts of 1224AD Vatican [PLATE 41B], 1233AD Berlin, c.1306AD Tehran and British Library copies. In the British Library, 1250AD Süleymaniye and the 1131AD Topkapı manuscripts, both figures wear long locks of hair. The Farnese globe shows two male figures in a slight three-quarter view, with their backs to the viewer, with their arms around each

other's shoulder. As discussed above under *Serpens* and *Serpentarius*, Islamic constellation images discard the classical rear-view poses, and figures face the viewer. The rearrangement of complex figures occasionally has particularly distorting results, and *Gemini* is one such example.

Cancer, the crab

the crab - السرطان

A crab, drawn in varying degrees of realism, as round, heart-shaped or square. The most naturalistic version is in the 1250AD Süleymaniye al-Şūfī.

Leo, the lion

the lion - الاسد

A running lion, its body in profile. The face is shown either in profile (1250AD Süleymaniye, 1266AD Paris, c.1400AD New York al-Ṣūfī manuscripts, two Valencia globes, 1362-63AD Oxford globe) or in full-face such as the British Library and 1009-10AD Oxford al-Ṣūfī versions [PLATES 42, 43A]. The 1125AD Süleymaniye and two Maghrebi al-Ṣūfī versions have unusually distorted faces [PLATE 43B]. The tail curls upwards, and its tip is usually tufted, flared, or emphasised in some way. The position of the tail is dictated by the situation of the twenty-seventh star in *Leo*, which is the twelfth lunar mansion location of the dogtooth of fortune. Aside from being a trait of the Asian lion, a possible reason for the conspicuous tuft on the tail is the nearby location of a nebulous cluster of stars, known to Ptolemy as *Coma*, the lock of hair. 128 Al-Ṣūfī mentions that Ptolemy's label

¹²⁷ Later al-Ṣūfī manuscripts tend to depict *Gemini* clothed, such as the 1630-33AD New York copy.

Ptolemy p.386, footnote 223. The story of *Coma Berenices* (the hair of Berenice) is told by Catullus, and also by Callimachus. Berenice was the wife of Ptolemy III. She offered to dedicate a lock of her hair to the gods, on condition of her husband's safe return from the Third Syrian War (247-246BC). The hair was duly dedicated in the temple of Arsinoe Aphrodite at Zephyrium, but later (Foot-note continued on the next page.)

is الضفيرة, the tress, and that the Arabs use الصفيرة, the tuft of hair. 129 The tuft is particularly prominent in the c.1085AD Paris globe, in the shape of an ivy-leaf. The ivy-leaf also appears in "more classical" Islamic constellation images, such as the c.711-715AD fresco at Qusayr ^cAmra (although neither the Farnese globe nor the Leiden Aratea depict Coma Berenices). Saxl uses the occurrence of the ivy-leaf in Quşayr ^cAmra and in two Greek manuscripts¹³⁰ as part of his argument to demonstrate the classical character of the Umayyad fresco. He asserts that Coma Berenices does not feature in "the later Arabic globes", 131 which is not the case: the three late thirteenth-century globes depict a long switch of hair in the hand of neighbouring constellation Virgo, expressly labelled "the tuft of hair" [PLATES 44A, 44B].

Virgo, the virgin

the sheaf of corn السنيلة

the virgin - العذرا

A standing figure, in full face. Ptolemy's catalogue-entries for Virgo refers to wings. and to a sheaf of corn held in one hand, at the star Spica. 132 This describes the Farnese globe version. Al-Sūfī also mentions the sheaf, noting that he had seen Spica

vanished. The court astronomer, Conon, pretended to find the missing lock as a new constellation in the sky, and this is described by the Alexandrian poet and scholar Callimachus in his Aetia: "Having examined all the charted sky, and where (the stars) move... Conon saw me also in the air, the lock of Berenice, which she dedicated to all the gods" (Callimachus p.81).

131 Saxl 1969 p.428.

¹²⁹ The significance of these identical names, apparently used in two distinct traditions, is less coincidental than it seems. Kunitzsch observes the similarity between Greek and Arabian names, and notes that two lexicographers (Ibn Sīda and Ibn Qutayba) record a fuller name هلبة الاسد, the hair of the lion (Kunitzsch 1961 p.65). As an attribute of the large Arabian lion, the hair might conceivably refer to the lion's mane, judging by its location relative to the lion's other attributes. However, the lexicographers were writing at a time when Greek astronomical texts were available in Arabic, and Ptolemy's label may already have been current. Thus the Arabian provenance of the name may be a red herring. The prominent tuft, in the shape of a vine leaf in the c.1085AD Paris globe, must in some way reflect a Greek representation of Coma Berenices. There is no trace of a tuft of hair (or any figure) over Leo's tail on the Farnese globe, or in the ninth-century Carolingian Aratus manuscript.

130 Vatican Library Cod.Graec.1291 (ninth century AD) and Cod.Graec.1087 (fifteenth century AD).

represented as a corn-sheaf on many globes.¹³³ The corn-sheaf does not feature in our selected pre-1400AD group, although *Virgo* is depicted holding a slightly similar object in the other hand, representing the star-cluster of *Coma Berenices*, in the three late thirteenth-century globes [PLATES 44A, 44B].¹³⁴ Winged versions occur in the 1125AD Süleymaniye, 1125AD Qatar, 1171AD Oxford [PLATE 45A], 1233AD Berlin, 1250AD Süleymaniye al-Ṣūfī manuscripts and the 1144-45AD Paris, 1278-1310AD Dresden, 1285-86AD Khalili, 1362-63AD Oxford and two Valencian globes.¹³⁵ The 1009-10AD Oxford *Virgo* does not have wings, and the figure assumes a shrug in one shoulder in order to accommodate the fifth star in the catalogue [PLATE 45B]. This shrugging pose is retained in other particularly "conservative" al-Ṣūfī copies (1266AD Paris, 1131AD Topkapı, c.1400AD New York mss), and is never used in celestial globes. The c.1400AD New York al-Ṣūfī *Virgo* wears a Sasanian-style crown.¹³⁶

Libra, the scales

the scales - الميزان

A weighing-scales, with semi-circular pans hanging from a horizontal bar [PLATE 46A]. Exceptionally, Libra is depicted as a squatting figure holding a small pair of scales in both the c.1085AD Paris globe and the 1085AD Florence globe [PLATE 46B]. The accommodation of this new figure around the stars of the constellation has displaced them from their usual situations around the weighing-scales. The figure on

133 al-Şūfī (1) p.162.

iconography.

¹³² Ptolemy p.369.

The switch of hair is included in a 1630-33AD version (New York Public Library Spencer Pers.Ms.6: fols.105v-106r; reproduced in Schmitz 1992 fig.123).

 ¹³⁵ Virgo in the c.1430-40AD copy belonging to Ulugh Beg also has long wings, and is empty-handed (Bibliothèque Nationale Ar.5036) [PLATE 22B]. Virgo is missing from the British Library al-Şūfī.
 136 The figure of Orion in this manuscript also has a Sasanian-style crown, contrary to usual

the globes only just fits in between the other constellations, with its head between Virgo's feet, and an arm extending down to Lupus. 137 This crowded version of events may be an attempt to reconcile two different traditions of representing this constellation. Libra emerged as a distinct constellation from Scorpio relatively late in the evolution of the Zodiac. The two pans of the scales were previously associated with the two claws of a far larger scorpion, an ancient Babylonian constellation. In the mid-fifth century BC, the finalised system of an ecliptic belt, divided into twelve even Zodiac sections of 30° each, was in use. This required a division of the large scorpion-constellation, and the stars in the scorpion's claws were determined as a separate zodiacal constellation: the weighing scales. Both Aratus and Ptolemy call the constellation xnlai, the Claws, although Ptolemy occasionally also mentions the later name ζυγός, the Balance (i.e. Libra). Constellation imagery took longer to develop a distinct iconography for the devolved figure. The scales are placed into the hands of Virgo (the previous Zodiac constellation) in a fifteenth-century copy of an earlier Greek manuscript [PLATE 47A], 138 and in the claws of Scorpio on the Farnese globe [PLATE 47B]. In the same fifteenth-century manuscript, there are two facing folios, each with an illustration of the opposite sides of a celestial globe [PLATE 47C]. The signs of the zodiac are shown enclosed in twelve delineated segments of an ecliptic belt - which means that the identity of Libra must be made distinct from neighbouring Virgo and Scorpio. Interestingly, the figure of Virgo is shown holding a small pair of scales in one hand (and the characteristic ear of corn in the other), and Libra is a standing human figure, also holding a scales. The source of this iconography for Libra (as a human figure) may therefore derive from an earlier

¹³⁷ Cf Meucci 1878.

amalgamation with *Virgo*.¹³⁹ The two eleventh-century Islamic globes from Valencia show *Libra* as a human figure holding a scales, separate from *Virgo*, yet closely packed between constellation-figures [PLATE 46B].

Scorpio, the scorpion

the scorpion - العقرب

A scorpion, drawn as seen from above. Al-Şūfī writes "its form is well known". 140

Sagittarius, the archer

the bow - القوس

the archer - الرامي

A centaur, drawn in profile, aiming a bow and arrow straight ahead. The figure always wears some sort of headgear, from which two long scarf-ends trail, accommodating a group of stars. This may be a reminiscence to ancient Iranian images of galloping horsemen, with two fluttering scarves trailing behind. In Ptolemy's catalogue, a trailing cloak covers these stars. Sagittarius wears a cloak on the c.711-715AD fresco at Quṣayr cAmra, and in the ninth-century Leiden Aratea, to that not on the Farnese globe. Neither Aratus not Ptolemy named the constellation after a known centaur in Greek mythology, as though acknowledging it as a mysterious figure from an earlier age. The image comes from Babylonian Zodiac iconography, where the trailing cloak or scarf originally constituted wings. One of

¹³⁸ Vatican Library Vat.Gr.1087: fol.310v.

¹³⁹ Saxl states that some of the maps in this manuscript are closely copied from a ninth-century manuscript, also in the Vatican (Vatican Library Vat.Gr.1291; Saxl 1969 p.428), and this blurring of iconography may also have come from the older manuscript. Perhaps the figure of *Virgo* was the most plausible place to insert the image of a new constellation into an older tradition of constellation-maps. 140 al-Şūfī (1) p.171.

¹⁴¹ Cf. reproductions in Dutz & Matheson 1997 pp.27, 29, 43, 45, 47, etc.

¹⁴² Reproduced in Savage-Smith & Katzenstein 1988 p.29.

the oldest images of *Sagittarius* is on a *kudurru* of c.1200BC,¹⁴³ and shows the winged man-horse composite, at full gallop, aiming a bow and arrow.

In most al-Ṣūfī manuscripts, the archer sports an unravelling turban [PLATES 48A, 48B], but a second group of manuscripts and globes depict a simple headband with two trailing ends: the 1125AD Süleymaniye, 1131AD Topkapı, 1233AD Berlin, 1250AD Süleymaniye manuscripts and the 1145AD Paris and c.1278-1310AD Dresden globe. In the 1171AD Oxford al-Ṣūfī [PLATE 49A] and the three late thirteenth-century globes [PLATE 49B], the streaming headband is wrapped around a pointed helmet. The angular shape, combined with two trailing scarves, resembles the winged headwear of Sasanian kings. 144

Sagittarius in the British Library al-Ṣūfī wears a saddle [PLATE 48A], which is very unusual, and occurs also on the "Vaso Vescovali" (c.1200AD Khurāsān). 145 Perhaps unsurprisingly given the frequently maverick character of their iconography, the two eleventh-century globes from Valencia share an exceptional version of Sagittarius as a man holding a bow and arrow in one hand [PLATE 50A]. A similar figure is depicted in a fifteenth-century Byzantine commentary on the Phaenomena, with the upper body of a man, hairy goatish legs and cloven hooves, like a classical satyr [PLATE 50B]. The coincidence of an unusual version of this zodiac constellation is remarkable, especially given the iconographical conservatism which usually binds the signs of the zodiac. It must therefore be concluded that Ibrāhīm b.

¹⁴³ Reproduced in Hartner 1938.

¹⁴⁴ See Dutz & Matheson 1998 p.18, for a comparative diagram showing the distinct crowns of thirty-six Sasanian kings from Ardashir I (d.243AD) to Yazdagird III (d.652AD), as taken from Sasanian coinage.

Sa^cīd al-Sahlī al-Wazzān, the Valencian globe-maker, drew from a particular iconographical 'strand' of the *Phaenomena*'s "comparatively late and debased constellation pictures" for constellation imagery, not from material from the central

Capricorn, the horned goat

lands of Islam, nor conventional classical examples.

the goat-kid - الجدي

A composite animal with the front half of a horned goat and a curling fish-tail [PLATE 51A]. The two Valencian globes depict *Capricorn* as a full goat [PLATE 51B].

Aquarius, the water-carrier

the bucket - الدلو the water-pourer - ساكب الماء

A man standing (usually barefoot), holding out both arms. In one hand is an indistinct vessel, from which runs a long stream of water. The Farnese globe version is a nude woman, pouring from a cup. In many versions, the form of the vessel merges with the stream, and the figure appears to hold a long ribbon, rather than to pour from a jug. On the 1362-63AD Oxford globe, *Aquarius* holds a looped rope (?) in his other hand, which leads to the back of *Capricorn*'s neck. The figure wears a stacked cone-shaped hat in the 1131AD Topkapı [PLATE 52A] and 1203AD Berlin al-Ṣūfī manuscripts: the same-style hat is worn by a gardener rolling up his sleeves in the 1199AD *Kitāb al-Diryāq* [PLATE 52B], ¹⁴⁷ and may be a recognisable as a labourer's hat. The ninth-century Leiden *Aratea* figure also wears a short pointed hat,

¹⁴⁵ British Museum OA 1950.7-25.1; reproduced in Ward 1993 p.20.

147 Bibliothèque Nationale Ar.2964: fol.27; reproduced in Farès 1953 plate 16.

¹⁴⁶ Wellesz 1959 p.6. In conventional classical examples, Sagittarius is also a centaur.

resembling a Phrygian cap: perhaps Islamic artists reproduced the classical headpiece

with an equivalent local version.

Pisces, the fish

the two fish - السمكتين

the fish - الحوت

Two fish, linked by a winding band, described as a fishing-line by Ptolemy. 148

Southern Hemisphere

Cetus, the sea-monster

"gītus" - القيطس

A composite animal in profile, with a monster's head and forepaws, and a fish-tail. In

his catalogue, Ptolemy refers to the creature's mane, tail and tail-fins. 149 Cetus can

mean whale, porpoise, dolphin or sea-monster. The last translation seems the most

suitable, as the Farnese globe, ninth-century Leiden Aratea and fifteenth-century

Byzantine Aratus commentary show a fantastic reptilian animal with a slightly

canine pointy nose, open mouth, long ears, long narrow neck, leonine forelegs and

scaly curling tail [PLATES 53A, 53B]. Although scarcely discernible, the Qusayr

^cAmra Cetus is also reptilian. Aratus simply calls the constellation "the Monster". 150

The three late thirteenth-century globes' Cetus has a very pointed (rather reptilian)

profiled face with open mouth, similar to these [PLATES 54A, 54B]. Aside from

these, there are two typical Islamic versions, distinguished by their treatment of the

monster's head. The first is closer to classical images of Cetus, and also to the

¹⁴⁸ Ptolemy p.380.

¹⁴⁹ Ptolemy p.382.

150 Aratus p.99.

149

Senmurv of Iranian imagery. There are twelve examples, including the 1009-10AD Oxford al-Ṣūfī version [PLATE 55A]. The sea-monster's profiled head has a long straight muzzle and an open mouth. The long face has a square end, and slightly resembles a dog. At the top of the head, there are either pricked ears or upright tufts of mane. The 1362-63AD Oxford globe Cetus also has a fin-like shape on its back, which might echo winged versions of the senmurv. Most images include an ornate collar around the creature's long neck: 1125AD Süleymaniye, 1203AD Berlin, 1250AD Süleymaniye, 1266-67AD Paris, and c.1400AD New York al-Ṣūfī, and the 1085AD Florence and three late thirteenth-century globes. The 1224AD Vatican al-Ṣūfī Cetus has the full (four-legged) body or a lion or dog, and a small forked fishtail [PLATE 55B].

The second Islamic version of *Cetus* is less common (only six examples), and seems to be specific to an iconographical tradition found in the Jazīra and western Iran. Although the same composite creature, this *Cetus* has a round lion's head, shown in full-face. This version occurs in the British Library [PLATE 56], 1125AD Qatar, 1171AD Oxford, 1233AD Berlin, and c.1306AD Tehran al-Ṣūfī manuscripts, and also on the 1309-15AD Paris globe. This development from the profiled canine head may be related to the iconography of *Delphinus*, the dolphin, which undergoes a similar change. Profiled images of both creatures appear together in the Armenian stone relief cycle of Jonah, at the Church of the Holy Cross, at Achtamar Island on Lake Van (915-21AD) [PLATE 35B]. In Islamic constellation iconography, there

¹⁵¹ For reproductions of Iranian examples of the *senmurv* from Scythian forerunners (sixth century BC) to the images on Sasanian silver vessels, see Schmidt 1980 plates 1-15.

¹⁵² Although obviously different creatures, both are used to represent the same animal in the story: the whale who swallows the prophet when he is thrown overboard by fellow sea-travellers, and later spits (Foot-note continued on the next page.)

evolve versions of both creatures with a full-face lion's head. However, the evolution was not simultaneous, as the round-faced lion *Delphinus* often occurs in the same manuscript or globe as the *Cetus* with a canine profile.

Orion (the hunter)

the southern jawzā' - الجوزا الجنوبي

the giant - الجبار

A barefoot man, holding a stick behind his head as though to throw it [British Library al-Ṣūfī version: PLATE 57]. The other arm is held forward: the sleeve is twice too long for the arm, and dangles down from the hand. He raises one bending leg in front of him. In some versions, a short sword or scabbard hangs from the belt. According to the descriptions in the star-table for *Orion* in the *Almagest*, there is a pelt on the figure's left arm, as worn by huntsmen as an arm-guard, 153 and the figure wears a dagger. The iconographical "evolution" of *Orion*'s long sleeve-end from the hunter's pelt is discussed earlier in this chapter. Aratus mentions *Orion*'s "stout club", and Ptolemy his "staff". 154 In most globes and al-Ṣūfī manuscripts, the stick is drawn vaguely, sometimes with a kink in the middle – reproducing the Farnese globe version [PLATES 11A-11C]. The c.1278-1310AD Dresden globe and the 1285-86AD Khalili globe depict *Orion* holding a long-handled sickle, iconography usually reserved for *Hercules*. This resembles the ninth-century Leiden *Aratea* version, where *Orion* holds a long thin rod curved at the tip. The c.1400AD New York al-Ṣūfī *Orion* wears a Sasanian-style crown.

him out onto dry land. The "Delphinus" creature is shown beneath the boat, ready to swallow Jonah, while the "Cetus" creature lurks beside the shore where Jonah has just been deposited.

Ptolemy p.383.
 Aratus p.119; Ptolemy p.383.

Eridanus (a mythical name for the river Po)

the river - النهر

A winding band, in a slight fork at the top end.

Lepus, the hare

the hare - الارنب

A hare, with ears pricked up. Most examples have one forepaw raised.

Canis Major, the greater dog

the greater dog - الكلب الاكبر

A dog, sometimes with one foreleg raised. In five versions, the tail curls back in a circle, flaring in spiky tufts (1009-10AD Oxford, 1131AD Topkapı, and 1266AD Paris al-Ṣūfī manuscripts, and the c.1278-1310AD Dresden and 1285-86AD Khalili globes) [PLATE 58]. The image of *Canis Major* is added to the *Argo Navis* illustration, depicted against the hull, in the 1125AD Qatar and mid-thirteenth-century Paris al-Ṣūfī versions. The two constellations overlap on the 1362-63AD

Canis Minor, the lesser dog

the lesser dog - الكلب الاصغر the preceding dog

A small dog, usually with short floppy ears, and a collar.

Argo Navis (the "Argo", ship of Jason and the Argonauts)

the ship - السفينة

Oxford globe.

A ship, with a mast, sail, ropes, two steering oars, and sometimes a poop-deck. A

square mast-head, crenellated along the top, features in the 1009-10AD Oxford

[PLATE 59A], 1125AD Süleymaniye, and 1250AD Süleymaniye al-Şūfī versions.

The ship is often assembled in a very haphazard way (in particular the 1233AD

152

Berlin al-Sūfī), which suggests that artists were copying only from previous versions, rather than contemporary sea-vessels [1224AD Vatican al-Ṣūfī version: PLATE 59B]. The confusing shape comes from the fact that Ptolemy's constellation-image is truncated, like *Taurus* and *Pegasus*. Only the stern should be visible, and the prow disappears into the ether, as can be seen on the Farnese globe [PLATE 17]. Aratus described the ship's truncated appearance: "Dark and starless from the prow as far as the actual mast she goes, but the rest is all bright." This little-understood aspect of the constellation's iconography has prompted much re-invention in Islamic manuscripts and globes. In some versions, the ship has a curved prow at one end, and comes to a straight truncation at the other end, where a large rudder is attached (1125AD Süleymaniye, and 1131AD Topkapı al-Ṣūfī). This goes against the sense of Ptolemy's descriptions in his catalogue: stars number one and two are "in the sternornament", 157 not at the prow. Also, by placing a rudder at the other end of the ship, the implication of the steering-oars' location (at the back of the ship) has been overlooked. In 1266AD Paris al-Sūfī, the ship is curved at both ends.

If featured, the animal figure-head can provide an occasion to repeat motifs typical to the manuscript or globe itself. In the British Library al-Ṣūfī, the figure-head is a simurgh (see also Pegasus and Delphinus of this manuscript), as it is in the 1131AD Topkapı and 1171AD Oxford al-Ṣūfī versions, and the c.1278-1310AD Dresden globe [PLATE 60A]. The c.1400AD New York al-Ṣūfī has a cat's head at the prow – its round head and small pointed ears may be copied from an earlier simurgh version. The 1285-86AD Khalili globe has a large lion's head at the prow, with a

155 Reproduced in Whitfield 1995 pp.22-23.

three-part forelock (similar to that globe's Leo and Delphinus) [PLATE 60B]. 158 The

raised curved stern of early Western images was in the outline of a bird's head, for

example in the ninth-century Carolingian Phaenomena manuscript. 159 In the

Almagest, star 10 is described "the star on the goose[-neck]", because the top of the

stern-post "was often given this shape".160 The 1125AD Qatar and mid-thirteenth-

century Paris al-Sūfī versions show a dog attached to the stern, but this is a

demonstration of where the eighteenth star of Argo overlaps with Canis Major, not a

figure-head. Most manuscripts outline the external stars by the stern in squares and

polygons, rather than redraft Canis Major.

Hydra, the sea-serpent

the valiant?

- 'adras', a transliteration from ΰδρος

A long snake, usually coiled once. The following constellations, Crater and Corvus,

overlap this figure, and are occasionally included in manuscript-illustrations of

Hydra. They are also illustrated individually. The 1171AD Oxford al-Sūfī and

c.1278-1310AD Dresden globe depict Hydra with short horns.

Crater, the cup

the cup - الكاس

the cup - الباطية

A stemmed cup.

156 Aratus p.99.

157 Ptolemy p.388.

¹⁵⁸ A Persian version of al-Şūfī, from 1630-33AD, depicts a horse's head at the prow of Argo (New

York Public Library Spencer Pers.Ms.6: fol.163r; reproduced in Schmitz 1992 fig.128).

159 Leiden University Library Ms. Voss.lat.Q.79: fol.64v; reproduced in Savage-Smith &Katzenstein 1988 p.32.

154

Corvus, the raven

the crow - الغراب

A bird in profile, with outstretched wings, leaning down as though to peck at Hydra.

Centaurus, the centaur

"qantūris" - قنطورس the date cluster?

A centaur, holding a bunch of leafy stalks in one hand, and the hind-legs of a lion (the constellation Lupus) in the other. One foreleg is raised slightly, to reach star number thirty-five in the constellation. The leafy stalks are based on classical images of the thyrsis, a branch entwined with vine-leaves, ivy or fir-cones, and an emblem of Dionysus, Greek god of wine. The translation of thyrsis used in Kitāb Suwar al-Kawākib al-Thābita is قضيب الكرم, the vine branch. 161 The vine-leaves are executed with some care in the 1009-10AD Oxford [PLATE 61A] and 1266-67AD Paris al-Şūfī manuscripts, and on the 1145-46AD Paris globe [PLATE 61B]. Other versions are usually very summary and confused, as two or three stalks with leaves on the tips [British Library al-Şūfī version: PLATE 62]. The 1125AD Süleymaniye and 1250AD Süleymaniye al-Şūfī versions are identical: the thrysis has become a large club with ridged edges. 162 The Farnese globe shows Centaurus carrying only a pointed lance - possibly a representation of the fir-cone version of the thyrsus [PLATE 17]. On the two Valencian globes, Centaurus holds a long lance with a circle around the tip, again perhaps reflecting a more classical acquaintance. The figure wears a stacked conical hat with a finial in the 1275-76AD London and

¹⁶⁰ Ptolemy p.389 note 103.

¹⁶¹ Isḥāq b. Ḥunayn first used this term in his translation of the *Almagest*, al-Ṣūfī's main source of Ptolemy's text (Kunitzsch 1986A p.77).

¹⁶² In the 1250AD manuscript, the illustrations were carried out by two different artists, apparently using different sources. The illustrations from the *Ursa Minor* to *Leo* closely follow the 1266AD Paris al-Ṣūfī. From *Virgo* to the end, there are rough copies of 1125AD Süleymaniye al-Ṣūfī.

c.1278-1310AD Dresden globes: both globes also feature the same hat on the Serpentarius figure. (The 1285-86AD Khalili globe Centaurus wears a finialled hat of similar profile, although its Serpentarius is bare-headed.)

Lupus, the wolf

the wild beast - السبع

A lion, with its head usually in profile, held by its back legs. It seems to float in front of *Centaurus* rather than dangle from his grasp. The 1125AD Qatar al-Ṣūfī attempts a slightly more plausible pose: the lion stands one hind-leg on the ground and seems to confront the centaur [PLATE 63A]. The Farnese globe seems to show a lion, and it would seem that *Lupus*' identity as a wolf is a Western medieval attribution. The two Maghrebi al-Ṣūfī versions are identical, depicting *Lupus* with a canine face and a long tail, perhaps reflecting reference to Western sources [PLATE 63B].

Ara, the altar

the censer -المحمرة

A concave brazier, with rows of flames streaming from the top. This roughly resembles the concave image on the Farnese globe, and in the ninth-century Leiden Aratea. The 1171AD Oxford and British Library al-Ṣūfī, and late thirteenth-century globes all depict an urn, similar to Crater, filled with rising flames. The two Valencian globes and 1224AD Vatican al-Ṣūfī depict a semi-circle resting on a square. The globe versions also have long handles [c.1085AD Paris globe: PLATE

¹⁶³ Leiden University Library Ms. Voss.lat.Q.79: fol.72v; reproduced in Savage-Smith & Katzenstein 1988 p.33.

64A]. These properly represent censers rather than altars, resembling cast brass Islamic incense-burners [PLATE 64B].¹⁶⁴

Corona Australis, the southern crown

the southern crown - الإكليل الجنوبي

The simple outline shape of a teardrop. Classical images show a laurel wreath, and the pointed shape of the Islamic *Corona Australis* may reflect this.

Piscis Austrinis, the southern fish

the southern fish - الحوت الجنوبي

A fish, often with an open mouth to accommodate star number three.

¹⁶⁴ Cf silver-inlaid cast brass burners from thirteenth-century Mosul and Syria (British Museum OA 1878.12-30.678, 679, 680 and 681 (Henderson Bequest); reproduced in Ward 1993 p.83).

7. Summary

In conclusion, it can be seen that the iconography of the forty-eight constellations changed gradually, if at all, both in Western and Islamic medieval astronomy tradition, and sometimes with surprising results. As the composition of the images was relevant to their function as star-maps, the artists producing constellation-images were obliged to refer closely to earlier versions, be they Western or Islamic. Iconographical change could occur over successive copying, when a prototype image was misinterpreted with increasingly distant results. The least complicated or culture-specific images, such as animals, survived the most intact.

A comparison of classical, late classical and Islamic constellation iconography shows that classical scientific imagery, as we know it, was not as influential on Islamic tradition as late classical pseudo-scientific versions. For example, once the ancient constellation of the *Kneeling Man* was identified by "mythologising" classical poets as the demi-god *Hercules*, further images were dictated by the iconographical norm for that mythical figure. The (previously empty-handed) constellation was depicted holding a large club, later distorted into a curved sword, and then a sickle [PLATES 19A, 19B, 5]. Iconographical types from within the Islamic world also influenced Islamic constellation imagery. The charioteer *Auriga* came to be depicted in a crouched pose, following the typical "sleeping groom" pose found in Islamic art [PLATES 31D, 32A]. This is not to say that there was a single linear evolution of Islamic constellation iconography - the internal iconographical variety demonstrates that there was no single unified "Islamic version" for each constellation. Indeed, particular regional strands can be identified, such as the Maghrebi group, and the proposed late thirteenth-century Marāghā group, which includes British Library

Or.5323, the focus of this study. There also exists a "conservative group" of al-Sūfī illustrations, which retains slightly archaic stylistic details, and many elements of iconography (1009-10AD Oxford, 1250AD Süleymaniye, 1266AD Paris, c.1400AD New York manuscripts).

The Maghrebi Group

This study includes four artefacts from the Western Islamic world: two celestial globes, both produced in late eleventh-century Valencia by the same craftsman, Ibrāhīm b. Sacīd al-Sahlī al-Wazzān, and two thirteenth-century Maghrebi copies of Kitāb Suwar al-Kawākib al-Thābita. One manuscript has a known provenance, of 1224AD Ceuta, in Morocco, while the other is undated but has been assigned to the mid-thirteenth-century AD. The two Valencian globes are the most distant from standard al-Sūfī iconography, and it seems clear from their variation that they relied on sources other than Kitāb Şuwar al-Kawākib al-Thābita for constellation imagery. The iconography of some figures demonstrates reference to a late classical source: Orion holds a dangling object rather than the oversize sleeve typical of Islamic versions [PLATE 13B], Lyra is a tortoise [PLATE 23A], and the ivy leaf of Coma Berenices is depicted. Other constellation versions are more pseudo-scientific: Sagittarius features as a human figure rather than the classical centaur [PLATE 50A], Capricorn as a goat rather than a goat-fish composite [PLATE 51B], and Libra as a man holding a pair of scales [PLATE 46B]. Whether the late classical source was another globe or an Aratean manuscript can only be guessed at, but it is clear that the makers of the globes also referred to Islamic material. This is evident in the image of *Perseus*, who holds three severed heads, fitting the iconography of the warrior planet Mars [PLATE 15A]. In the 1224AD Vatican al-Sūfī, Perseus holds a strange three-faced head by a single pig-tail, perhaps trying to reconcile a current Maghrebi version with the typical al-Sūfī Perseus [PLATE 15B]. The second Maghrebi copy of al-Sūfi's treatise depicts Perseus holding a single (bearded) demon's head, observing standard al-Sūfī iconography. 165 The Valencian globes' Ara is also independent of classically-derived versions, depicting a long-handled brazier instead of al-Sūfī's usual distorted version of the classical altar [PLATE 64A]. The two Maghrebi al-Şūfī manuscripts are obviously closer to standard al-Sūfī iconography than the globes, but they also observe 'more classical' versions of some constellations, such as Hercules who is depicted without the long-handled sickle of many al-Sūfī manuscripts and Islamic celestial globes. Neither the globes nor the manuscripts in the Maghrebi group represent Delphinus in the "lion-headed fish" composite, typical of most other contemporary Islamic sources. The distinctiveness of this iconographical group may be accountable to its geographical distance from a "mainstream" of Islamic constellation iconography. Like the "mainstream", the Maghrebi group developed in response to classical and late classical material, but it did so independently. Different iconographical elements were absorbed or rejected, and different Islamic versions were inserted. This demonstrates that the "Islamicisation" of the classical constellations was not an inevitable, uniform procedure, but the result of individual decisions and alterations made gradually.

The Marāghā Group

The proposed group contains four items, of which only one has been firmly attributed to Marāghā. 166 This consists of our British Library al-Ṣūfī manuscript, the 1275-76AD globe in the British Museum, the c.1278-1310AD globe in the staatlicher

¹⁶⁵ Mid-thirteenth-century Paris al-Şūfī.

mathematisch-physikalischer Salon Dresden, and the 1285-86AD globe in the Khalili Collection. All four share aspects of constellation iconography and style, and were produced in the late thirteenth century. 167 They also have no confirmed connection with other objects or places. By assessing the objects individually, and the similarities between them, I hope to demonstrate that all four were produced in the Il-Khānid observatory at Marāghā in north-western Iran, founded by Hūlāgū Il-Khān in 1259AD [PLATE 68]. 168

The three globes use the same signature format of the work of hand indicate c.1025 stars. They are signed by three different craftsmen: Muḥammad b. Hilāl al-Munajjim al-Mawsilī (British Museum), Muḥammad b. Mucayyad al-curdī (Dresden), and Muḥammad b. Maḥmūd al-Tabarī (Khalili), and are of different diameter (London globe: 240mm, Dresden globe: 146mm, Khalili globe: 130mm).

The c.1278-1310AD Dresden globe is signed by Muḥammad b. Mucayyad al-cUrḍī, certainly the son of Mucayyad al-cUrḍī al-Dimashqī, who worked in Marāghā with Naṣīr al-Dīn al-Ṭūsī (d.1274AD) from the foundation of the observatory in

¹⁶⁶ The Dresden globe (Destombes 1959 p.307, Pinder-Wilson 1976 p.319), "clearly made at the court of Hūlāgū Khān in Marāghā" (Savage-Smith 1985 p.26).

¹⁶⁷ Pinder-Wilson noticed many similarities of iconography and style between the three globes, and hinted that they may have been produced at Maragha (Pinder-Wilson 1976 pp.317-319).

To compare these measurements with the other globes in this survey: the Valencian globes measure 190mm (Paris) and 209mm (Florence), 1144-45AD Paris globe - 175mm, 1225-26AD Naples globe - 223mm, c.1309-15AD Paris globe - 209mm, 1362-63AD Oxford globe - 165mm, and 1383-84AD Istanbul globe - 114.3mm.

¹⁶⁸ A fourth celestial globe, uninscribed, date-able to c.1309-15AD, has been attributed to Il-Khānid Marāghā, Sultaniye or Tabrīz (Musée du Louvre MAO 825; Destombes 1959 p.307). Destombes states that the globe is analogous in style with the Dresden globe, although this is unconvincing (Destombes 1956 p.8). Furthermore, the Paris globe indicates only 930 stars, unlike the other three "Marāghā" globes which have c.1025. It may well be an Il-Khānid instrument, but its constellationimages do not have the distinctive style or iconography shared by the four artefacts of this group.

1259AD.¹⁷⁰ Muḥammad b. Hilāl al-Munajjim al-Mawsilī, the maker of the 1275-76AD London globe, was a native of Mosul in northern Iraq. If anything, the addition of a toponym suggests that the astronomer and instrument-maker Muḥammad b. Hilāl was no longer resident in Mosul in 1275-76AD. The city was sacked by Hūlāgū in 1262AD, by which time the Marāghā observatory had been established. The Mongols were known to deport the skilled citizens of conquered lands, and an astronomer would certainly have been brought straight to the new observatory, if he had not managed to flee the invaders. If Muḥammad b. Hilāl had not already joined the staff at Marāghā, therefore, he may have been obliged to do so in 1262AD. His 1275-76AD globe may therefore have been constructed at Marāghā. Less is known about Muḥammad b. Maḥmūd al-Tabarī, the maker of the 1285-86AD Khalili globe, besides his origins in Tabaristān in northern Iran. He may have been deported to Marāghā by Hūlāgū during the Ĭl-Khānid invasion of Iran, or travelled there independently.

What most links these three late thirteenth-century globes is that they share unusual elements of constellation iconography or costume detail, and their figures are very similar in style. The figures are also exceptionally fine and detailed for Islamic celestial globes of the period, and the presence in the group of a Mosul metalworker might explain this.¹⁷¹ Al-Mawsili's (London) globe features the most interior detail of all, and was made first: the other craftsmen may have followed his example [PLATE 65].

¹⁷⁰ Another of his sons, 'Umar b. Mu'ayyad al-Urdī, collated a medical commentary (Ibn Abī Sādiq, on Ḥunayn b. Isḥāq's Kitāb al-masā'il fī'l-tibb) in the British Library (Or.6690). I am grateful to Dr Emilie Savage-Smith for bringing this manuscript to my attention, and showing me al-Urdī's signature in a marginal note on fol.213v.

Unusual versions in common include Auriga depicted in a crouching pose, Ara as a footed urn, a slightly reptilian profiled version of Cetus [PLATES 54A, 54B], and the exceptional depiction of Virgo as a winged figure holding up a wand for the starcluster of , "the tust of hair", equivalent to the classical group Coma Berenices [PLATES 44A, 44B].¹⁷² The Dresden and Khalili "tuft" resembles a large hairy flowerbud on a thin stalk, while the plainer London version is an oval switch of hair. Common costume-elements include cross-gartered stockings (worn by the Dresden and London Auriga), cone-shaped hats (worn by both Centaurus and Serpentarius on the Dresden and London globes) [PLATES 34A, 34B], and particularly, a curved triangular helmet with two trailing scarf-ends, worn by Sagittarius on all three globes, and Centaurus on the Khalili globe. The unusual iconographical connections and stylistic detail, the similar dates, and the arguments for the drafting of these three scientific craftsmen to the new Il-Khānid observatory in particular, support the attribution of these objects to the same centre. Although not identical to the globe figures in every way, the British Library al-Sūfī images share certain aspects of constellation iconography and also decorative motifs, with the three globes. Some are exclusive to this particular group, while others are also found in the 1171AD Oxford al-Sūfī, attributed to Mosul.¹⁷³ Common iconography suggests similar chains of transmission, if not simultaneity, while shared decorative motifs suggest a similar cultural area. On these grounds, the manuscript seems closely related to the globes:

¹⁷¹ The other globes in this survey depict figures in much more summary fashion. ¹⁷² See above under Leo, for an account of the "birth" of this constellation.

¹⁷³ The stylistic links between the British Library al-Şūfī illustrations and thirteenth-century Seljuk art of the Mosul area are discussed in Chapter Four, as is my attribution of a late thirteenth-century date on stylistic grounds.

produced late in the thirteenth century, heavily influenced by stylistic traditions emanating from Mosul.¹⁷⁴

In terms of five of the constellation figures just mentioned, the British Library al-Ṣūfī does differ from the globes. The sixth, *Virgo*, is missing from the manuscript. The similarities occur in two of the manuscript's most distinctive figures: *Pegasus* and *Leo*. The *Pegasus* figure [PLATE 3] has long elaborate wings, which curl out behind the head, along the wing, and at the shoulder. There are single half-foliate scrolls under the oxter, at the base of the wing, and at the tips of the primary feathers. Some of the scrolls are round bird-heads. Although obviously less detailed (given the different medium), the globe versions are similar in execution. The feathers curl in the same directions, there is a curl under the oxter, and there are animate scrolls on the 1275-76AD London globe *Pegasus* [PLATE 38A]. All three globes and the manuscript include a collar with a tassel.

The al-Şūfī Leo is another flamboyant image, with the forelock of the lion's mane rising vertically from the forehead, and waving in different directions [PLATE 42]. All three globes follow this style, in particular the Dresden and Khalili versions [PLATES 66A, 66B], in which the fringe parts in three directions, almost forming a loose trefoil. The London version is somewhat tamer than the al-Ṣūfī and other two globes, parting upwards in three straight forks [PLATE 66C]. However, it shares

_

¹⁷⁴ Another manuscript should be mentioned as it has a faint connection with Marāghā – the Persian translation of Kitāb Şuwar al-Kawākib al-Thābita made by Naṣīr al-Dīn al-Ṭūsī (d.1274AD), the first director of the observatory. The extant manuscript was produced in 1250AD, six years before al-Ṭūsī joined Hūlāgū's entourage. Although it is not al-Ṭūsī's autograph (suggested in Storey 1958 p.41), the manuscript was probably copied from the original, given its very early date. Iconographically, there is no strong similarity with the "Marāghā group".

with the al-Ṣūfī the lion's 'ogee' frown, not found in the Dresden and Khalili globe versions. The flamboyant lion's head with three-part forelock is repeated in all three globes for the constellation *Delphinus*, the lion-headed fish [PLATES 67A-C], and also at the figure-head of the *Argo* on the Khalili globe [PLATE 60B]. In the al-Ṣūfī, the 'full-face' lion with vertical fringe and 'ogee frown' occurs again in *Cetus* [PLATE 56] and *Lupus*. The iconographies are therefore not identical between the globes and the manuscript, but the decorative motif is common to all four. A second motif occurs in the al-Ṣūfī manuscript, and is unusual: the round head, with tufty ears and wattles, of a *simurgh*. In the al-Ṣūfī, this appears in the wing-ornament of *Pegasus* [PLATE 3], as the head of *Delphinus* (a unique version of this constellation) [PLATE 4], and as the figure-head of the *Argo*. A *simurgh* figure-head also occurs on the Dresden globe [PLATE 60A].

These three distinctive decorative elements are unusual in Islamic constellation imagery, but common among the artefacts in this group. Each can appear as a minor decorative embellishment or as a central feature of a constellation-figure. On examination, there is no uniform distribution of these elements between the three globes and the manuscript: the constellation iconography is not strictly identical among the globes themselves, nor do the al-Ṣūfī images fully match any single globe. This does not rule out the attribution of all four to the same location, especially given the character of the proposed location. The Marāghā observatory had been founded very recently, and was probably staffed with a range of scientists and craftsmen, abruptly brought together from different places. The production of objects would not yet be controlled as in a 'formal atelier situation', and there may have been an impetus to furnish the new workshop with instruments — or to replace older

instruments using the new methods or designs developed at this ground-breaking observatory.

To conclude, the British Library al-Ṣūfī manuscript has numerous similarities of iconography with these three celestial globes, probably produced at Marāghā. If a possible Marāghā provenance for the manuscript can be accepted on these grounds, the earliest date of its production is c.1260AD because construction began on the observatory in 1259AD.

Chapter Four:

Stylistic orientation of the British Library al-Ṣūfī illustrations – the conservative al-Ṣūfī tradition versus contemporary Seljuk style.

1. Introduction

The illustrations in our British Library al-Ṣūfī manuscript are drawn in an exquisite monumental style. As the manuscript bears no certain textual indication of date or provenance, such as a colophon, the illustrations themselves must be examined for useful signs of similarity with images of sound provenance. The illustrations are the work of one artist, whose style is in my opinion clearly related to thirteenth-century Seljuk-style art. I suggest that the manuscript was produced in the late thirteenth century, under Il-Khānid patronage. Different 'pre-Mongol' styles continued in the early Il-Khānid period, but they were gradually superseded. The British Library al-Ṣūfī illustrations therefore represent a pivotal moment in Islamic art, just before the artistic impact of the Mongol invasions became manifest.

The British Library al-Ṣūfī images combine elements from two different figural traditions, one conservative and one contemporary. These can be observed in facial and figural types, and in the figures' costumes and headwear. Firstly, the conservative tradition is typical among early copies of al-Sūfī's treatise, and derives

-

¹ I have found no grounds to justify previous attributions to the fourteenth century. (See Chapter One for an account of previous scholars' attributions of the manuscript.)

² A conclusive and systematic assessment of all the "pre-Mongol" painting styles of the thirteenth century has yet to be published, although recent scholarship has focussed on smaller groups (Ward 1985, Nassar 1985, Carboni 1992, Contadini 1992, 1998A). It is not my intention to make an all-(Foot-note continued on the next page.)

from Eastern Hellenistic art of Sasanian Iran and Sogdia. Although its presence in the British Library al-Ṣūfī is rather vestigial, the continuity of this archaic style only in al-Ṣūfī illustrations is a significant factor of the genre. Secondly, the contemporary tradition features in late twelfth and thirteenth-century Seljuk-style art. This particular stylistic group includes Kāshān lustreware and $min\bar{a}^c\bar{\imath}$ ceramics, and certain contemporary manuscripts attributed to the Jazīra region.³ One manuscript in this group has been attributed to Konya.⁴ The British Library al-Ṣūfī illustrations are also related to a second smaller group of illustrated manuscripts from this region, attributed to the Artuqid court, in details of depicting costume.⁵

Other thirteenth-century illustrated manuscripts have also been attributed to Seljuk art of this area, but I find a distinction between them and the main group defined above.⁶ That distinction lies in facial types, figural build and the representation of

_

inclusive assessment here, but to identify those manuscripts which relate most to the British Library al-Sūfī.

³ 1199AD Kitāb al-Diryāq (Bibliothèque Nationale Ar.2964); mid-thirteenth-century Kitāb al-Diryāq (Vienna, Nationalbibliothek A.F.10); six volumes of Kitāb al-Aghānī dated 1217AD (vols. 17 & 19: Millet Library Feyzullah Efendi 1565, 1566), 1216-17AD (vols. 2, 4 & 11: National Library of Cairo Adab579) and 1218-19AD (vol. 20: Royal Library Copenhagen Cod.Ar.168). The province of Jazīra is in northern Iraq, between the Tigris and Euphrates rivers. It consists of three territories: Diyār Rabī^ca (including Mosul and Mārdīn), Diyār Bakr (including Mayyāfāriqīn and Āmid) and Diyār Mudar (including Raqqa and Harrān) cf. LeStrange 1930 map III.

⁴ c.1225AD Warqa wa Gulshāh (Topkapı Library Haz. 841). The artist's name ^cAbd al-Mu'min b. Muḥammad al-Naqqāsh al-Khuyī occurs as a witness to the endowment deed of the madrasa founded by the Seljuk amir Jalāl al-Dīn Karātāy in 1253-54AD. The artist's signature is fol.58v of the Warqa wa Gulshāh manuscript. The nisbah al-Khuyī shows that he was from Khuy, Azerbaijan. (Grube 1966 p.73; Melikian-Chirvani 1970 pp.79-80; Rogers 1986 p.50).

³ 1206AD Automata (Topkapi Library A.III 3472); c.1240AD Maqāmāt (Bibliothèque Nationale Ar.3929). See Ward 1985, for attribution of both manuscripts to the Artuqid court.

They include the c.1220AD Na^ct al-Hayawān (British Library Or.2784), 1224AD De Materia Medica (dispersed), and c.1200-20AD Kalīla wa Dimna (Bibliothèque Nationale Ar.3465) (all three attributed to northern Iraq in Contadini 1998 p.2), and the 1222AD Maqāmāt (Bibliothèque Nationale Ar.6094) (similarly attributed in Nassar 1985 p.85). However, Buchthal proposed a Syrian production for both the Kalīla wa Dimna and Maqāmāt manuscripts, on account of their classicising style (Buchthal 1940 p.126). His attribution is accepted tentatively by Grube 1991A p.374. On textual grounds, de Blois raised doubts (but no overt conclusion) about the manuscript, describing the text as (Foot-note continued on the next page.)

costume drapery – although there are similarities in the treatment of landscape, animals, furniture and themes. Some of these elements, particularly landscape, may belong to a "common language of thirteenth-century Arabic illustrated manuscripts", rather than confirm the same provenance. Quite possibly we may speak of many different styles current in the Jazīra area, such as those centred on Zangid Mosul, Artuqid court centres (Āmid, Mayyāfāriqīn and Mārdīn) and the many Christian monastic ateliers near Mosul, but the obvious similarity between paintings produced in quite separate locations – such as Kāshān ceramic-decoration, Zangid Mosul manuscripts and the c.1225AD Warqa wa Gulshāh illustrations (attributed to Konya) – shows that each urban centre did not foster its own unique painting style. The style of our main group was current across the region, and can not be associated exclusively with one centre.

The British Library al-Ṣūfī figures share facial type, figural type, hairstyles, and costume-details with the main stylistic group (discussed further below), although the similarity is not so close that exactly the same date, provenance or artist as any one

•

an "abridged recension in which numerous genuine passages are missing", inferior to known dated thirteenth- and fourteenth-century copies (De Blois 1990 p.70).

⁷ Contadini 1998 p.3. Contadini pointed to the widely common currency of certain landscape elements, to show that the c.1220AD Na^ct is not necessarily part of a so-called Baghdad School simply because it shares these elements with two confirmed Baghdad manuscripts.

⁸ The Aghānī volumes are dedicated to Badr al-Dīn Lū'lū' (d.1259AD) of Mosul.

⁹ The 1206AD Automata and c.1240AD *Maqāmāt* have been attributed to Artuqid Āmid (Ward 1985), the 1125AD Süleymaniye al-Şūfī was produced in Artuqid Mārdīn, and a c.1152-76AD Dioscorides manuscript (in Mashhad) and 1131AD Topkapı al-Şūfī were both produced in Artuqid Mayyāfāriqīn.

¹⁰ c.1220AD Na^ct al-Hayawān, 1224AD De Materia Medica, and c.1200-20AD Kalīla wa Dimna (Contadini 1998 pp.5, 9-10). Contadini demonstrates their similarity with two Syriac gospel manuscripts produced in the Mosul area, one dated 1219-20AD and produced in Mar Mattai monastery, c.40km north-east of Mosul (Vatican Library Syr.559), the other c.1216-20AD, probably also from Mar Mattai (British Library Add.7170).

of these manuscript may be suggested.¹¹ The links with the Artuqid court manuscripts (also discussed below) further complicate the attribution. There are iconographic connections with architectural decoration in Baghdad, Mosul, and Jazīrat ibn ^cUmar, from the first half of the thirteenth century.

Although all of this comparative material cited dates from the first half of the thirteenth century, this does not necessarily mean that the British Library al-Şūfī manuscript is precisely contemporary. The recurrence of figural style and decorative motifs does suggest the same cultural area, however, and the illustrations may have been produced later in the century, by an artist following the same regional tradition.

Restrictions imposed by function

Characteristic poses and group compositions, perhaps typical of particular painting traditions, will not feature here, because of the figures' status as individual constellation-maps. For example, all but one of the human constellations are standing figures with outspread legs. In each case, the pose of legs is dictated by an underlying arrangement of stars.¹² Here, it is of no relevance to make observations about the absence of typical poses or gestures which feature throughout other

_

¹¹ So close a similarity has been found in other cases, bringing the scholar to identify the work of the same artist in different manuscripts: Carboni suggested that one artist produced paintings in the c.1300AD ^cAjā'ib al-Makhlūqāt (British Library Or.14140) and 1307AD Āthār al-Bāqiya (Edinburgh University Library Ms.161) (Carboni 1992 p.432). Schmitz identified the hands of (at least) two artists common to the 1297-1300AD Manāfī al-Ḥayawān (Pierpont Morgan Library M.500), c.1300AD ^cAjā'ib al-Makhlūqāt and 1307AD Āthār al-Bāqiya (Schmitz 1997 pp.13-15).

¹² Ettinghausen's descriptions of constellation-figures from the 1009-10AD Oxford al-Ṣūfī manuscript in the Bodleian Library ("involved in some specific steps of a performance", "an entertainer dancing before a royal audience", "an intricate dance", etc.) are therefore purely fanciful (Ettinghausen 1962 pp.52-53). Similarly, Wellesz's observation about the figures in the same manuscript: "There is a curious lack of poise in their appearance, as if they were treading on air" (Wellesz 1959 p.15).

thirteenth century art, such as the recurrent 'waiting attendant' figure, standing with one raised and bending leg, or the cross-legged 'seated ruler'. Similarly, there are no direct comparisons to be made with architectural or landscape elements, as there are none. The particular status of constellation-images conditions all comparative observations, and confines the field of discussion. The absence of familiar poses and compositions is of no consequence, because the artist was under an unusual restriction. For example, there is a closeness of costume style between the 1009-10AD Oxford al-Ṣūfī and Sasanian dynastic art. This might prompt some comparison of the image of Sagittarius [1009-10AD Oxford al-Ṣūfī Sagittarius - PLATE 48B] with similar Sasanian images of archers on horseback, and the immediate observation that the centaur does not hold the bow in the overarm pose depicted in all Sasanian examples [PLATE 69]. Nonetheless, the centaur's underarm pose is dictated only by the position of a straight line of six stars, and further speculation about the 'new' pose is meaningless. The true field of comparable characteristics consists of facial and figural types, and costume-details.

The British Library al-Ṣūfī images are line-drawings, executed in a fine and fluent style, except for the figures' long tresses of hair which is painted over the drawings in dilute brown ink [Gemini - PLATE 40]. This causes obvious difficulties of comparison when searching for an exact match among the mostly painted images in Islamic manuscripts of this period, as the stylus offers greater refinement of line than the paint-brush, however fine. A measure of leeway should therefore be granted to associations made between the British Library figures and comparable images. This is not to say that the different medium indicates different provenance or workmanship from painted examples. As al-Ṣūfī's images were to demonstrate the

layout of stars, the decoration of the figures in opaque painted colours and patterns would distract from their primary didactic purpose, and is usually avoided in copies of al-Ṣūfī's treatise. A clear justification for the linear style comes from Ptolemy. After the last star-tables in Book Eight of the *Almagest*, there follow instructions on the construction of a celestial globe, and on suitable constellation-images:

"As for the configurations of the shapes of the individual constellations, we make them as simple as possible, connecting the stars within the same figure only by lines, which moreover should not be very different in colour from the general background of the globe. The purpose of this is, [on the one hand], not to lose the advantages of this kind of pictorial description, and [on the other] not to destroy the resemblance of the image to the original by applying a variety of colours, but rather to make it easy for us to remember and compare when we actually come to examine [the starry heaven], since we will be accustomed to the unadorned appearance of the stars in their representation on the globe too." 14

The exclusive use of line-drawing is therefore due directly to the subject-matter of the treatise, and not necessarily to an identifiable 'school' or style of representation.¹⁵

Each constellation is depicted twice, in accordance with al-Ṣūfī's format of illustrating the figure as seen on the celestial globe, and also as in the sky. 16 In terms

When colour is introduced in later al-Şūfī manuscripts, it is often a transparent wash of watercolour, against which the stars are clearly marked as bright red, gold, blue or black circles, such as the c.1430AD manuscript produced for the Timurid Ulugh Beg (d.1449AD) (Bibliothèque Nationale Ar.5036) [Virgo - PLATE 22B]. Certain copies do introduce opaque colour, using gold circles for the stars (Malek Library; reproduced in Nasr 1976 plates 48, 50, 53, 56, 58, 59). Many later manuscripts retain a grisaille palette, reserving colour for the star-markers, such as a seventeenth-century copy (Majles Library 196; reproduced in Nasr 1976 plates 54, 48). For an example of how decorative detail interfered with an image's function as a star-map, see Carey 1997 p.57 regarding a 1577AD Persian version of al-Şūfī (Chester Beatty Library Ar.4220), whose illustrations are probably copied from Ulugh Beg's c.1430-40AD al-Şūfī manuscript [Virgo - PLATE 22C].

¹⁵ Nonetheless, a similar linearity of the figures' costumes does feature in a group of thirteenth-century illustrated manuscripts: the 1199AD Kitāb al-Diryāq, mid-thirteenth-century Kitāb al-Diryāq, c.1225AD Warqa wa Gulshāh, and the 1216-1219AD Kitāb al-Aghānī volumes. Melikian-Chirvani describes the style: "cette tradition de plis linéaires tracés à la plume presque sans couleur" (Melikian-Chirvani 1967 p.9).

of costume elements and facial expressions, there are often differences between the two versions of a single constellation, so occasionally I will refer to individual versions, abbreviated to "globe *Hercules*", "sky *Perseus*", "both versions of *Bootes*" etc.

Recent re-assessment of Marsh144

The most famous copy of al-Ṣūfī's treatise is the Bodleian Library manuscript Marsh144, the earliest surviving illustrated book in Islamic art. Its illustrations are an excellent example of the distinctive 'al-Ṣūfī style'. 17 The manuscript is well known because of the high quality of the constellation-images, and also because a statement on the final folio gives the early date 400H (1009-10AD), and the name of the scribe and artist: Ḥusayn b. 'Abd al-Raḥmān b. 'Umar b. Muḥammad. He has been taken to be the son of al-Ṣūfī, the author of the treatise, whose full name is Abū'l-Ḥusayn 'Abd al-Raḥmān b. 'Umar b. Muḥammad al-Ṣūfī. In recent years, this statement has been the subject of new debate, 18 which should be rehearsed before entering further discussion of the al-Ṣūfī stylistic tradition and its history. Both Brend and Soudavar have suggested that the images do not date from 1009-10AD, and Soudavar further suggests that the colophon statement is a forgery, added at a later period to increase the manuscript's value. I hope to demonstrate that neither suggestion is valid.

¹⁶ An exception to this format, *Andromeda* is depicted four times: the third and fourth versions demonstrating first the constellation as overlapped by a second, native Arabian constellation of a fish, and secondly overlapped by one of the fish from *Pisces*.

¹⁷ Certain of the Marsh144 figures have been retouched in a thicker black line, as discovered by my supervisor, Dr Anna Contadini, on a joint visit to the Bodleian Library (13.6.00). The retouches may have been by a later artist wishing to thicken the lines so as to trace them through thin paper more easily.

The colophon reads:

.: و صلى الله على نبيه محمد و آله و سلم تسليما .:

["The book is completed, praise be to God, Lord of both worlds, and may God bless His Prophet Muhammad and his family, and grant them full salvation."]

An addendum follows:

["Wrote it and illustrated/plotted it, Ḥusayn b. Abd al-Raḥman b. Umar b. Muḥammad, in the year four hundred."]

Brend proposed that the manuscript-illustrations were added to the 1009-10AD manuscript in the early Seljuk period before the 1130s, and that the illustrations are strongly influenced by Central Asian art. Although the latter proposal is both interesting and demonstrable, several of her arguments for the former are self-contradictory, and do not show conclusively that the illustrations were executed any later than the rest of the manuscript.

She distinguishes two hands in the manuscript, and suggests that the illustrations were added to the manuscript long after 1009-10AD, at which time the text was copied out and the stars were plotted out for each constellation. Much later, "within the historical period of the Seljuks", an artist added the images around these plotted star-markers. This reconstruction collapses under Brend's proposal that the 1009-10AD scribe, al-Ṣūfī's son Ḥusayn, added some internal details to five constellation-images — the fur of the two bears *Ursa Minor* and *Ursa Major*, the scales of the

¹⁸ Brend 1994; Soudavar 1999.

dragon *Draco*, the beard and mitre of *Cepheus*, and details of the ship *Argo Navis*.¹⁹ Brend's reconstruction is self-contradictory: if the outline drawings were executed much later in the Seljuk period, how could Ḥusayn, working in 1009-10AD, have made any additions to them?²⁰

Notwithstanding her Seljuk attribution to the images, Brend defends the colophon addendum, which states that Ḥusayn not only wrote out but illustrated the manuscript (کتبه و صوره). She interprets صوره to mean that Ḥusayn "plotted" the stars onto the constellation-images, thus releasing the addendum from its apparent contradiction of her attribution of the images to a later period.²¹

Brend then compares the Marsh144 images with examples of Buddhist art from Central Asia, and makes a compelling argument for a Central Asian connection with the facial types and headwear depicted in Marsh144. However, her comparative examples date from the eighth and ninth centuries, and she further admits that this distinctive style may have entered Islamic art as early as the tenth century, and that "aspects of the style had a wide currency". This does not assist her attribution of the al-Ṣūfī illustrations to the early Seljuk period. She presents nothing to suggest that the images were produced later than 1009-10AD, except the seemingly irrelevant fact that missing folios were replaced at some point in the manuscript's

¹⁹ Brend 1994 p.89.

²⁰ Also, Brend identifies the Seljuk-period artist as the scribe of the first eleven folios, apparently solely because of the common use of black ink. Clearly, those folios were indeed added long after production, when the manuscript had fallen into disrepair, but there is no real evidence that the restorer-scribe had anything to do with the illustrations.

²¹ Brend 1994 p.90.

²² Brend 1994 p.92.

history. Her demonstration of Central Asian influence on the distinct Marsh144 style is nonetheless interesting, but she withdraws from discussing the obvious and closer stylistic similarities between the Marsh144 images and examples of Sasanian and Sasanian-influenced Islamic metalwork.²³ These connections are surely too important to put aside, and are discussed further below.

Soudavar proposes that the colophon addendum is a forgery.²⁴ Many of his objections are of little weight, such as the proposal that the colophon addendum is written in a different script to the rest of the manuscript, which is disproved below.²⁵ He rejects Brend's explanation of Husayn's claim to have illustrated the manuscript, claiming that the word "in no way insinuates a partial responsibility for the drawing".²⁶ He dismisses outright her proposal that one artist might have plotted out the stars, and that a second then drew the constellation-figures around them, as "without precedence and highly unlikely". I disagree with his conclusion: firstly, as a minor point, he does not allow that the word "ocan mean either "he painted it" or "he shaped/plotted it out". Secondly, there has been so little research into the production of constellation-images that the absence of a recorded precedent is of no consequence. There is evidence for some division of labour in very early copies of al-Şūfī's treatise, in the colophons of two related al-Şūfī manuscripts, of 1233AD

-

²³ "The date and place of origin of post-Sasanian metalwork being somewhat unsure, it does not seem profitable to discuss whether the use of the folds in the manuscript is a re-introduction, a survival or a revival" (Brend 1994 p.91).

²⁴ Soudavar 1999 pp.262-263.

²⁵ For example, he is also suspicious that an artist's name is mentioned (in the colophon addendum): "In the climate of orthodoxy that prevailed in the Persian lands prior to the Mongol invasions, painting was not encouraged and painters rarely dared to inscribe their names." He immediately qualifies this, mentioning three illustrated manuscripts of the early thirteenth century which bear painters' signatures, without commenting on these apparent exceptions (Soudavar 1999 p.263, note 28).

²⁶ Soudavar 1999 pp.262.

(Mosul) and 1601-02AD (Medina).²⁷ According to both colophons, each manuscript descends from an exemplar manuscript which was written out by an assistant (مولى) of al-Ṣūfī's, one Faraj b. ^cAbd Allah al-Ḥabashī ("the Abbysinian"), in which the tables and images were by the hand of al-Ṣūfī himself.²⁸ It is not extraordinary, therefore, that Ḥusayn should state that he had produced both the text and images – when his father tended to produce copies of his treatise in collaboration with a second person.²⁹

The suggestion of "shared responsibility" for the illustrations is not so unlikely as Soudavar deems it. While two artists might not have divided their labour, it seems at least possible that an astronomer might plot out the stars himself to ensure their accuracy, before handing the manuscript to an artist for the addition of constellation-images. The star-markers in al-Ṣūfī illustrations tend to represent the correct appearance of the relevant constellation. If there were not some measure of control over the layout of the stars in Islamic constellation-images, the images would have evolved in the same manner as European examples, in which the stars are often peppered about the constellation-image with little regard for their true arrangement.³⁰

_

²⁷ Berlin Staatsbibliothek 5658 (1233AD); Royal Library Copenhagen no.83 (1601-02AD). Although not identical texts, both colophons also note that the prototype manuscript was at the *Bayn al-Surayn* library in Buyid Baghdad, destroyed by the Seljuks in 1055AD, and probably refer to the same manuscript. See Appendix One on al-Ṣūfī manuscripts, and Chapter One for a discussion of the library.

²⁸ 1233AD Mosul colophon:

^{...} كتبت من نسخة كانت بخط فرج بن عبد الله الحبشي مولى ابي الحسين الصوفي و كانت الصور و الجداول بخط ابي الحسين

²⁹ Holter concluded that the 1131AD Topkapı al-Şūfī was also copied and illustrated by the same person (Ibn al-Shawqī), who writes كتبه لنفسه [he wrote it for himself] in the colophon (Holter 1937B p.36, note 74). Without a verb which definitely indicates the drawing of constellation-figures, this can only be an assumption.

³⁰ These two approaches also affect constellation iconography in the different traditions, see Chapter Three.

Certain al-Ṣūfī images of the three neighbouring constellations of *Hydra*, *Crater* and *Corvus* present the underlying stars of all three figures, but depict the image of one constellation only.³¹ In such a case, the stars were evidently plotted out by one person, who expected a second person to complete all three constellation-images. It is not impossible, therefore, that two persons could contribute to the production of a constellation-image in this way.

Soudavar also dismisses interconnection between the main colophon and the addendum, on the grounds that the ink is "black-brown" in the former, and red in the latter. The change of ink between the main colophon and the addendum is likewise unremarkable. It is not unknown for a proof-reader or collator to make corrections throughout the main text, using a different type of ink, and also to write a final statement (perhaps mentioning any collation made) which concludes the colophon. He avoids Brend's observation that a brown ink is used for the main text, and black ink for the illustrations, and appears to misconstrue her proposal that the images were executed at a different period to the text: "[In] a recent study by Barbara Brend, [...] the original black and brown ink is associated with the rest of the drawings". 33

-

³³ Soudavar 1999 p.262.

³¹ For example, the 1125AD Süleymaniye al-Şūfī, fol.205r.

³² For example, the 1125AD al-Ṣūfī manuscript sold at Sotheby's in 1998 (See Brend, Hillenbrand & King 1998). Two shades of ink are used in the same hand: brown ink for the main text and colophon, and black ink for a series of corrections and an addendum to the colophon. The addendum explains that the scribe came across an autograph al-Ṣūfī manuscript one month after first copying out the manuscript, and decided to collate it with his own version. The catalogue authors describe how "the whole process of editing comes alive before one's eyes" (Brend, Hillenbrand & King 1998 p.34). Similarly, in the British Library al-Ṣūfī manuscript, a different colour ink corrects the text, tables and illustration-labels, and also writes the conclusion-statement of the colophon.

Soudavar observes that each line of the main colophon is punctuated on either side with a triangle of three small circles, which does not feature around the colophon addendum. This symbol is "usually added to prevent additions to the colophon", although its absence does not conclusively prove anything, as there are other examples in which these circles are absent.³⁴

More importantly, Soudavar compares the handwriting of both parts of the colophon, and concludes that the scripts are different - dismissing Brend's assertion that the scripts are identical. By Soudavar's logic, the signatory of the colophon addendum was not the copyist of the main text, which falsifies the addendum statement in relation to the manuscript's date and scribe. Soudavar's own theory is that the manuscript was copied and illustrated in the twelfth or thirteenth century, and that the colophon addendum was forged at some later time, in order to increase the manuscript's value by a sensational connection with al-Sūfī's son.

The assertion that a different script features in the addendum is crucial, and can be disproved. Soudavar points to the different treatment of the sarkesh, or slanted upper line, of the letter $k\bar{a}f$. Throughout the main text and main colophon, the sarkesh is written slightly concave, in a very thin line which extends beyond the ascending line. In the colophon addendum, the sarkesh is written straighter, and meets the ascending line neatly. Or so Soudavar confidently asserts. He does not observe the extent to which the final folio has been retouched. Relative to the rest of the manuscript, this

-

³⁴ Soudavar 1999 p.263. Cf. the colophon of the 1233AD Berlin al-Ṣūfī manuscript, in which the final line giving the date has been written – without the triangle-points used on all previous lines – in the same scribe's very distinctive hand. The Or.5323 colophon, such as it is, has no triangle-points at all.

folio is very weathered. The paper is also darker than other folios, although this is due to the extra abuse to which the outermost folio will always be subject, especially if the binding became lost.³⁶ Most of the upper half of the folio has been cut out where the image of *Piscis Austrinis* on the recto was removed.³⁷ All that remains on the verso is the last four entries of the constellation's star-table, and the colophon lines. Brend has already observed that the (brown ink) main colophon was retouched.³⁸ The (red ink) colophon addendum has also been retouched, as can be seen with close examination.³⁹ The retouching has obscured many distinguishing characteristics of the original script - including the shape of the sarkesh of the first On very close examination, however, the faded red ink of the original. pen-line can be seen: a pale, distinctively concave upper line visibly dips below the later retouching, and extends beyond the ascending line of the letter $k\bar{a}f$, matching the script in the rest of the manuscript.⁴⁰

The script of the main colophon is less distorted by re-touching because it is larger than that of the colophon addendum, and could be followed more easily by a

³⁵ Soudavar 1999 p.263.

³⁶ The paper is otherwise identical to the rest of the manuscript.

³⁷ A marginal note in Latin explains that missing parts were replaced in 1644, by one Christianus Ravius in Constantinople (Wellesz 1959 pp.1-2). Ravius reproduced the star-table, by copying from a complete manuscript of the treatise - although he did not replace the image of Piscis Austrinis. It may also be he who replaced the missing folios at the beginning of the manuscript.

38 Brend 1994 p.90. Soudavar does not mention Brend's observation.

³⁹ Many diacritical and vocalisation marks were left untouched, demonstrating how faded the original red ink had become. The fragment of the star-table above the colophon was not re-touched, and is also extremely faint. The different inks diverge most visibly at the end of the note, each making a different final flourish.

⁴⁰ Similarly, more features of the original faded script can be discovered among the retouched letters: in the word l, the curl of the letter $r\bar{a}$ can be seen to meet the following letter, as is the case throughout the main text. In the retouched script, this letter remains separate from the next.

different scribe. 41 Though by the same hand, these two sizes of script correspond to the larger scale used in the main text, and the more compact script used in the startables throughout the treatise. I propose that the manuscript was copied out in two stages. The main colophon, a standard pious formula, was written as the scribe, Husayn b. ^cAbd al-Rahmān b. ^cUmar b. Muhammad, completed the main text. Next, he plotted out the star-markers, drew the constellation-figures, labelled the stars, and filled in all forty-eight star-tables. Having completed these tasks, he wrote the addendum, signing and dating the manuscript, and explaining that he had carried out both the writing and the drawing (کتبه و صوره) – which was not necessarily typical of contemporary constellation-book production, as we have seen by the references in the 1233AD and 1601-02AD manuscripts. The star-labels and table-entries are written in a much smaller hand than the main text: this is unsurprising because the labels and entries are allocated less space. It is less obvious why the colophon addendum should be written out in smaller script than the main colophon: why should a scribe suddenly adjust his handwriting? My proposed sequence of events shows the scribe completing the small-scale labels, table-entries and colophon addendum in one sequence, which would explain the scale of the latter. The brown retouches made to five of the illustrations were probably additions made by a later owner. Similar (though more destructive) 'retouches' were also made, in thick pale blue paint, to six constellations at the start of the 1131AD Topkapı al-Sūfī manuscript [PLATE 19C].

-

⁴¹ The "retoucher" was nonetheless careful, using the appropriate colour ink to re-touch each note. Perhaps this figure was Christianus Ravius, who restored part of the manuscript in 1644? (See note above.)

I have found no stylistic ground on which to attribute Marsh144 to the Seljuk period, as both Brend and Soudavar have done. Brend's discussion of stylistic links is treated above. Soudavar's stylistic attribution is vague: he dismisses an eleventh-century date for Marsh144 on the grounds that the images are of too high a quality to be isolated works, and that "no illustrated manuscript appears before the twelfth century". He mentions that there exist "stylistic similarities" with twelfth and thirteenth century al-Ṣūfī manuscript-illustrations, and concludes: "this manuscript must be dated to the same period". The excellent quality of the Marsh144 images should hardly disturb the credibility of the 1009-10AD date, especially given their strong stylistic relationship with engraved silver from Sasanian and early Islamic Iran, and to Central Asian painting of the eighth and ninth centuries (to be discussed in the next section).

⁴² Soudavar 1999 pp.263-64.

2. 'The conservative al-Ṣūfī style': conservatism within the al-Ṣūfī figural tradition

Early al-Ṣūfī illustrations show that elements of a particular style continued, to different degrees, after they had been abandoned in other media. After the early eleventh century, these archaic features are almost exclusive to al-Ṣūfī's treatise. In the context of that period of Islamic art, I therefore describe this style as "the conservative al-Ṣūfī style".

Two distinctive features enjoyed considerable longevity in this stylistic tradition.⁴³ The first is a three-quarter facial type with curls of hair at the cheeks, and the second a particular mannerism of depicting falling drapery as raised bell-shaped gathers, usually flared out to the side of the skirt [1009-10AD Oxford al-Ṣaft Bootes, 1131AD Istanbul al-Ṣaft Virgo - PLATES 70A, 70B].⁴⁴ Both were current in Eastern Hellenistic art of Iran and Central Asia from the third and fourth centuries onwards, and survive into early Islamic art, in the frescoes of the Umayyads and early chbbāsids. The facial type became more established in Islamic art than the drapery style, and extended to Fatimid and then thirteenth-century Maghrebi painting. The drapery style had far more restricted currency: aside from the early frescoes, it occurs in eastern

⁴³ Wellesz described the longevity as "striking [...] faithfulness with which throughout the centuries a number of illustrators clung to an established pictorial tradition" (Wellesz 1959 p.20).

⁴⁴ There is also a "plain gather", a drapery-fold along a skirt-hem, collar, or other loose fabric, which has the same lower profile as the bell-gather. The drapery style and its origins are discussed below.

Iranian engraved silver until the early eleventh century, and seems to continue only in al-Sūfī illustrations until c.1400AD, when it disappeared from use altogether.⁴⁵

That being said, the pre-1400AD al-Ṣūfī images follow this stylistic tradition with different levels of success. Many pre-1400AD al-Ṣūfī manuscripts, including our British Library manuscript, are only faintly derivative of the style, while others are conscious, often flamboyant, imitations. The 'derivative' illustrations reproduce the key stylistic features rather summarily, either because the artist is barely competent (such as the 1203AD Berlin al-Ṣūfī), or unwilling to abandon the style of his own training – such as the manuscripts of 1125AD Süleymaniye, 1224AD Vatican, mid-thirteenth-century Paris, 1233AD Berlin, and our British Library copy. The style of the style of

Elements of the conservative style are evident in the British Library illustrations: the figures wear a similar costume, the hair curls in at the temples on fourteen figures, ⁴⁸ and the distinctive billowing drapery occurs on twenty figures - although these are mostly drawn as small curling scrolls⁴⁹ or flaring versions of the 'plain gather', ⁵⁰ -

-

The style is best represented by the following manuscripts: 1009-10AD (Oxford), 1131AD (Topkapi), 1250AD (Süleymaniye) and 1266AD (Paris).

⁴⁵ Retention of the "conservative style" becomes less frequent during the fourteenth century: the two Syrian manuscripts of c.1306-07 are only faintly derivative, while the latest example of c.1400AD (Samarkand? See Appendix One and Upton 1933) imitates all features of the style.

⁴⁶ The style is best represented by the following manuscripts: 1009-10AD (Oxford), 1131AD

⁴⁷ In either event, the process of close reference to a prototype image allows stylistic elements to surface. The continuity of both style and iconography in constellation-imagery is greatly due to the necessity to copy closely from an earlier image. The Vatican and Paris manuscripts are both Maghrebi copies illustrated in a distinctive regional style, the 1125AD Süleymaniye manuscript (produced in Mārdīn) recalls the figural style of twelfth-century "Garrus ware" ceramics, and the 1233AD Berlin manuscript (produced in Mosul) is in an unusual and distinctive style.

⁴⁸ Or.5323: both of *Perseus* (fol.21v), sky *Auriga* (fol.22r), both of *Serpentarius* (fols.23v, 24v), sky

⁴⁸ Or.5323: both of *Perseus* (fol.21v), sky *Auriga* (fol.22r), both of *Serpentarius* (fols.23v, 24v), sky *Andromeda* (fol.32v), globe *Gemini* (fol.41v), sky *Sagittarius* (fol.54r), both of *Aquarius* (fols.58r, 58v), both of *Orion* (fols.63v, 64v), both of *Centaurus* (fol.80r).

⁴⁹ Or.5323: globe *Cepheus* (fol.12r), both of *Bootes* (fol.13v), both of *Perseus* (fol.21v), both of

[&]quot;Or.5323: globe Cepheus (fol.12r), both of Bootes (fol.13v), both of Perseus (fol.21v), both of Andromeda (fol.32v), globe Aquarius (fol.58r), globe Orion (fol.63v).

rather than the characteristic bell-shaped gather, which is only attempted once⁵¹ [Aquarius- PLATE 71]. Generally, the conservative style is not directly imitated, but applied to the artist's contemporary stylistic idiom. The typical bell-shaped 'conservative' folds are often replaced by a small curling scroll motif [Auriga-PLATE 31A], which also prevails throughout the illustrations: in the ornate wings of Pegasus [Pegasus - PLATE 3], and as a decorative frieze on tirāz bands [Bootes-PLATE 28A], or on furniture.⁵² The artist has chosen to repeat the essence of the traditional style (its flaring drapery) but draws from his own decorative vocabulary.⁵³

The 'conservative al-Ṣūfī style' is best represented in four of the manuscripts under discussion, those of 1009-10AD (Oxford), 1131AD (Topkapı), 1250AD (Süleymaniye) and 1266AD (Paris) [1266AD Paris Andromeda, Virgo- PLATES 72A, 72B]. The four share costume elements, facial types and a distinctive treatment of costume details. As the latter three manuscripts feature archaic costume styles for their times, certain differences between them can not be accounted for by the 'external' prompting of contemporary style. Instead their variety may be due to the range of 'first-generation al-Ṣūfī' constellation-images which were still available as models in the twelfth or thirteenth century. The 1266AD Paris al-Ṣūfī manuscript, for example, features a particularly elaborate variety of archaic costume-details, in excess even of the 1009-10AD Oxford al-Ṣūfī manuscript illustrations. This shows

_

³¹ Or.5323: sky-version of *Orion* (fol.64v).

⁵⁰ Or.5323: sky Cepheus (fol.12r), both of Cassiopeia (fol.19r), both of Auriga (fol.22r), both of Serpentarius (fols.23v, 24v), the two fish versions of Andromeda (fols.33r,33v), sky Aquarius (fol.58v). The drapery style and its origins are fully described below.

⁵² For example the chair-seat of both Cassiopeia versions (fol.19r).

that the Oxford manuscript does not represent the acme of what may be termed 'the conservative al-Ṣūfī style', even though it is the oldest known. It may also show that different, sometimes more elaborate, early manuscripts were available to al-Ṣūfī artists in the thirteenth century. For example, there are no Sasanian-style crowns depicted in the 1009-10AD manuscript, although such crowns are almost standard in al-Ṣūfī manuscripts of the twelfth and thirteenth centuries. Perhaps, from the example of later copies, such as the 1250AD Süleymaniye and 1266AD Paris manuscripts, we receive an echo of the early manuscript-illustrations now lost, and a demonstration that variety once prevailed among illustrated al-Ṣūfī manuscripts of the early period.

Typical figures are usually barefoot, but some wear small flat shoes. (The British Library al-Ṣūfī is the same, ⁵⁴ except for *Serpentarius* (fols.23v, 24v), who wears long boots found in other thirteenth-century manuscript-painting. ⁵⁵) Jewellery is depicted frequently, such items as rings, earrings, necklaces, bracelets and ankle-rings. Comparison with artefacts shows that the depiction is detailed and well observed. For example, the 1266AD al-Ṣūfī *Virgo* [PLATE 72B] wears crescent-shaped earrings, set with a row of bosses and hung about with small pearls. These match a gold earring of eleventh-century Egypt or Syria. ⁵⁶ In the British Library al-Ṣūfī, jewellery is comparatively plain and summarily drawn: plain rings on the fingers, wrists and

-

⁵³ The ubiquitous curling scroll is a central feature of this manuscript's decorative style, and is also common to other thirteenth-century illustrated manuscripts, ceramics and architectural decoration (discussed below).

⁽discussed below).

54 Sixteen figures are barefoot, Cepheus (fol.12r), Bootes (fol.13v), Auriga (fol.22r), Andromeda (fol.32v), Gemini (fols.41v, 42r), Aquarius (fols.58r, 58v) and Orion (fols.63v, 64v); six wear small flat shoes, Cassiopeia (fol.19r), Perseus (fol.21v), Andromeda (fols.33r, 33v).

⁵⁵ The contemporary aspects of the manuscript are discussed separately, below.

ankles, or earrings composed of a single round bead (pearl?) [Gemini- PLATE 40],⁵⁷ or a round bead and a bell-shaped pendant [Aquarius- PLATE 71].⁵⁸

Recurrent facial types

There are two typical faces in the al-Şūfī tradition. The first is a three-quarter face, and the second a profile view. The three-quarter face is rather wide, almost turned into a full face [1131AD Istanbul al-Ṣāfī Virgo- PLATE 70B]. The eyes are long, with thin arched eyebrows almost spanning the full width of the face. Horizontal kohl lines may run from the outer corners of the eyes towards the edge of the face. The nose is long and thin, with a small tip, and may be drawn in a continuous line from one of the eyebrows (making a three-quarter face). The mouth is small, and the rounded upper outline of the chin meets the lower lip. The face is broad, and the rounded line running along the jaw is interrupted by the small chin-tip. The hair is black and usually shoulder-length, the only part of these line-drawn figures to be rendered in areas of opaque colour. There are large curls at both temples of the face, and also at shoulder-length, tucked behind the ear. This facial type occurs in early Islamic art: a fresco fragment from the early eighth-century Umayyad palace of Qaṣr al-Hayr al-Gharbī [PLATE 73A], and three frescoes from the ninth-century Jawsaq al-Khaqānī palace in cabbāsid Samarra [PLATE 73B]. It appears in a fragmentary

⁵⁶ Kuwait, al-Sabah Collection LNS 45J; reproduced in Institut du monde arabe 1998 p.132. ⁵⁷ Or.5323: Serpentarius (fol.23v), Gemini, (fols.41v, 42r).

⁵⁸ Or.5323: Cassiopeia (fol.19r), Andromeda (fols.32v, 33r), Aquarius (fols.58r, 58v), Orion (fols.63v, 64v).

⁵⁹ The first (although much restored) depicts two female attendants pouring out bowls of wine, the second a huntress wrestling down a stag, the third a dancer surrounded by animals (reproduced in Herzfeld 1927 plates I, VI, XVIII).

mural from an early eleventh-century Ghaznavid palace, in Lashkari Bazar,⁶⁰ and of course in the 1009-10AD Oxford al-Ṣūfī manuscript. The facial style is taken up in Faṭimid art, featuring on eleventh- and twelfth-century lustre-painted pottery,⁶¹ and passes to the c.1140AD Faṭimid-style ceiling paintings at the Cappella Palatina in Palermo,⁶² and the thirteenth-century manuscript Ḥadīth Bayād wa Riyād, produced in Spain.⁶³ The British Library manuscript retains the curling temple-locks and general outline of the face, but the figures also have narrow waist-length tresses of dark hair, and far narrower facial features [Aquarius-PLATE 71].

Pre-Islamic versions of the three-quarter face with curling temple-locks occur in both Iran and Central Asia, in the "Eastern Hellenistic" style, generated following the conquests of Alexander the Great in the fourth century BC. The facial type is not found in surviving Sasanian dynastic art, such as monumental rock-reliefs and commemorative silver [PLATE 69]. For the most part these are depicted in profile, with finely-coiffed beards (whose full sideburns occupy the temples and outer face), and tightly-curled bouffant hair gathered at the back of the neck. As the figure depicted in royal Sasanian contexts was usually the king himself, these profiled images, broadcast on coinage and other propagandist media (rock-reliefs and engraved silver), were constructed according to a specific iconography, not subject to

-

⁶⁰ The fragment depicts the head and shoulders of a turbanned youth, with a three-quarter face, and short locks of hair resting at each cheek (reproduced in Schlumberger 1952 plate 32). The ruins of the palace are in modern-day Afghanistan.
⁶¹ Cf. a fragmentary lustre-painted bowl (Museum of Islamic Art Cairo No.9869, reproduced in

⁶¹ Cf. a fragmentary lustre-painted bowl (Museum of Islamic Art Cairo No.9869, reproduced in Ettinghausen 1962 p.55). The Samarran derivation of Fatimid art is generally agreed by scholars. See Ettinghausen 1942, and also Grabar 1972. Grabar observed that ninth-century Abbāsid art had "an undeniable impact" on Fatimid art, but emphasised that other traditions were also influential, such as Coptic folk art and Macedonian illustrated manuscripts (Grabar 1972 pp.175, 180-181).

⁶² Reproduced in Monneret de Villard 1950.

⁶³ Vatican Library Ar.368.

variation – and are linked to the classical tradition of medallion portraits and coins.⁶⁴ It may be speculated that other media in Sasanian art, such as (now lost) manuscript-paintings and frescoes, might have featured this linear three-quarter-face style. Supporting this speculation is the existence of examples to the east of the central lands of Islam, in the outer regions of Iran, where Sogdian painting had also inherited Eastern Hellenistic stylistic traditions. Azarpay defined the facial type of "a distinctive early medieval school" of Sogdian painting in the seventh and eighth centuries, which matches the al-Ṣūfī facial type:

"The idealized heads of the later Sogdian paintings are characterized by an oval face, elongated and narrow eyes, thin and often angular nose placed close to a small mouth, and smooth black hair defined by a sharp and angular hairline and dangling sidelocks or tresses." 65

In a discussion of identifiable painting styles in early Islamic art, Grube proposed that there were two separate traditions, both with Central Asian origins. Each tradition is defined according to its typical facial type. The first is a late-classical style, found in the third-century Buddhist wall-paintings at Mirān, and features large round eyes and curls of hair at the temples. This describes the style in Umayyad wall-painting, Samarran frescoes, Faṭimid art, the twelfth-century paintings at the Cappella Palatina, and thirteenth-century Maghrebi manuscript-painting such as

-

⁶⁴ The profile bust occurs on coins and very early Sasanian silver. Cf. the earliest known dynastic silver piece, dated by Harper to the third/early fourth century (Tblisi, Museum of the Society for the History of Ethnography of Georgia Acc.P134; reproduced in Harper & Meyers 1981 plate 2 and discussed pp.125-126).

⁶⁵ Azarpay 1981 p.150. Azarpay proposed that Sogdian art contributed both westward to early Islamic wall-painting, and eastward to Turfanese art (Azarpay 1981 p.180). Her proposal would explain the occurrence of a similar facial type in eighth and ninth-century Buddhist silk paintings at Dunhuang, observed by Brend, who commented on the resemblance between the three-quarter face in Dunhuang paintings and the 1009-10AD Oxford al-Şūfī, which she held to be of later date (Brend 1994 p.90). See above under *Recent re-assessment of Marsh144* for a discussion of Brend's re-attribution of date.

66 Grube 1968 pp.11-20.

Hadīth Bayād wa Riyād.⁶⁷ The second is found in Uighur court painting in Turfan, and derives ultimately from Chinese art. The style features long narrow eyes, thin nose and eyebrows, and is represented in the eleventh-century Ghaznavid wallpaintings at Lashkari Bazar, Seljuk painted pottery, twelfth- and thirteenth-century Mosul manuscript-illustrations (such as Kitāb al-Aghānī), fourteenth-century Mamluk painting and fifteenth-century Ottoman painting.⁶⁸ While far narrower facial features do indeed differentiate Uighur painting from Miran painting, and Seliuk art from Fatimid art, the styles are not altogether independent from one another. Azarpay's description of the Sogdian facial type (above) has both narrow eves and a lock of hair at the side of the face. The 1009-10AD Oxford al-Şūfī images seem to comply fully with the Miran style, except that the figures' eyes are longer and narrower than should be typical.⁶⁹ The Lashkari Bazar fragment (described above) is attributed to the Uighur style, but has typical 'Mirān' temple-locks. The latter two examples have a slightly narrower eye, not particularly conforming to either style. These examples suggest that the differentiation between the traditions was not absolute. Also, the argument is challenged by the absence of an intermediate example between the third-century Mirān paintings, and Umayyad fresco fragment from Qasr al-Hayr (c.724-27AD), Grube's second example. The rounder eye of the early Islamic examples may relate to the more immediate influence of contemporary Byzantine art. The early eleventh-century date of the al-Sufi and the Ghaznavid fragment present the 'pre-Seljuk' appearance of Islamic art in Iran. The extremely narrow eye of the Uighur style may have come directly into Islamic art with the

⁶⁷ Grube 1968 pp.11-13. ⁶⁸ Grube 1968 pp.13-16.

Seljuk conquests of the eleventh century, invading from Transoxiana to storm Baghdad in 1055AD.

The second facial type used in typical al-Sūfī illustrations is a pronounced profile, in which the small pursed lips, fleshy jaw-line, and long bending nose are emphasised. This type is reserved for the constellations Perseus, Gemini, Sagittarius, Centaurus and occasionally also Bootes [1266AD Paris Perseus- PLATE 74]. In the 1009-10AD Oxford al-Sūfī, the pairs of profiled constellation-figures are depicted with different noses; one is long and bends downwards from a high bridge, the other is notably larger and straighter [1009-10AD Oxford Sagittarius- PLATES 75A, 75B]. The large straight nose recalls the profiled faces of Sasanian kings, as depicted on Sasanian silver plates featuring royal hunting scenes [PLATE 69]. This is an association between the 1009-10AD images and earlier Sasanian art which did not transmit to later al-Şūfī images - with one apparent exception. In other al-Şūfī manuscripts, profiled faces all present long slightly hooked noses with sloping foreheads, and there is no contrast between paired figures [PLATE 74] Seven out of the eight profiled constellation figures in the British Library al-Sūfī also have small hooked noses with curling nostrils [Gemini- PLATE 40], 72 but the globe version of Perseus has a pointy straight nose against the typical hooked nose of the sky Perseus on the

⁶⁹ Grube does not mention this manuscript. Other al-Ṣūfī manuscript-illustrations also combine the narrower eye and the "Mirān" temple-locks, including of course the British Library copy.

⁷⁰ The 1203AD Berlin, 1250AD Süleymaniye and 1266AD Paris al-Şūfī manuscripts feature a profiled *Bootes*. These three manuscripts are closely related to each other.

⁷¹ Note also both versions of Perseus.

⁷² Or.5323: globe *Perseus* (fol.21v), both versions of *Gemini* (fols.41v, 42r), both of *Sagittarius* (fols.53r, 54r), both of *Centaurus* (fol.80r).

same folio [PLATE 76].⁷³ This is not to argue for a direct link between these two manuscripts, but to remind that the British Library illustrations refer to an earlier al-Sūfī model, of which some traces remain.

Traditional al-Şūfī costume (1): Sasanian-style crowns

Most typical al-Ṣūfī male figures wear turbans, except *Cepheus* who wears a tall mitre, as specified by classical constellation iconography [*British Library Cepheus*-PLATE 27B]. The female figures, *Andromeda*, *Cassiopeia*, *Gemini*, *Virgo*, (and in one case *Orion*) may wear a range of extraordinary crowns and diadems, which derive from Sasanian dynastic art. For example, an elaborate tripartite crown often features, which is derived from the crowns of the Sasanian kings [1125AD Qatar al-Ṣafī Andromeda, c.1400AD New York al-Ṣafī Andromeda - PLATES 77A, 77B]. This crown appears in the following al-Ṣūfī manuscripts: 1125AD Qatar, 1250AD Topkapı, 1250AD New York, 1250AD Topkapı, 1250AD New York, 1250AD Topkapı, 1250AD New York, 1250AD Topkapı, 1250AD Topkapı, 1250AD New York, 1250AD Topkapı, 1250AD To

⁷³ The face has been transformed to a near three-quarter view, by drawing the further eye and forehead "beyond" the profiled face and nose (fol.21v).

⁷⁴ References to specific costume-details are unusual in Ptolemy's star-catalogue (al-Şūfī's late classical source), and tend to be honoured in al-Ṣūfī's constellation-images. The tall mitre of *Cepheus* is sometimes drawn as a Turkish fur-lined *sharbūsh* (British Library, 1125AD Qatar, and 1266AD Paris al-Ṣūfī manuscripts).

⁷⁵ Sotheby's Lot34: Andromeda (fols.63v, 64r).

⁷⁶ AyaSofya2595: sky Cassiopeia (fol.26r), sky Andromeda (fol.41r), both versions of Virgo (fols.57v, 58r).

⁷⁷ Acc.34.33: globe Cassiopeia, both of Andromeda, Virgo, Orion (reproduced in Upton 1933).

⁷⁸ As usual with this manuscript, a classic al-Şūfī traditional feature is reproduced in the artist's own style: the Sasanian-style crown is drawn with the characteristic curling scroll for internal decoration.

palmettes are replaced by flaring wings of similar shape: these are closer to the Sasanian prototypes, as no palmettes occur in Sasanian crowns.⁷⁹

In official iconography, each Sasanian crown has a design specific to one ruler, ⁸⁰ but beyond the Sasanian court, the crowns were often imitated without much regard to the precise specifications of particular versions. Sasanian-style crowned figures are depicted on coins and vessels imitating Sasanian objects, but also in other less consciously derivative contexts in manuscript-painting.

The official crowns were known beyond the realm (and era) of the Sasanian kings, because broadly-circulated silver coins depict their crowned heads. At first, early Islamic rulers imitated the coinage of their Sasanian predecessors, with a profile bust wearing a Sasanian-style crown [679-80AD silver coin from Basra - PLATE 78A]. Certainly another conscious quotation from royal Sasanian images is a 970AD gold portrait medal of the Buyid ruler Adud al-Dawla (d.983AD), shown wearing a large crown of two flaring wings, surmounted by a small crescent [PLATE 78B].

A diagram showing the official crowns of each Sasanian monarch is reproduced in Dutz & Matheson 1998 p.18.

⁷⁹ Derivative crowns, featuring stepped segments of crenellation, were also depicted. This feature is used throughout Sasanian crown iconography, from Shapur I (r.243-273AD) to Yazdagird III (r.632-652AD). Other features of the official Sasanian crowns are ram's horns, spikes, globes, crescents and stars, although these were less popular among imitative versions.

⁸⁰ This might be seen as an infallible means of dating Sasanian royal images, but Harper notes of the crowns of rulers on Sasanian silver vessels that "this element of design does not in fact provide a precise indication of date" (Harper & Meyers 1981 p.125).

⁸² Very early Islamic coins were copied from Sasanian and Byzantine coinage, but could also include the *bismallah*, name and title of the local governor (or occasionally the reigning Caliph), and Hijra year. Cf. also an "Arab-Sasanian" drachm in the style of Khusrau II, bearing the *bismallah* and Caliph Mu^cawiya's name (reproduced in Broome 1985 p.8).

⁸³ The gold medal is inscribed in Pahlavi and Arabic, and was minted in Fars (Tehran, private collection). The Buyids promoted their dynasty as a continuation of Sasanian tradition, re-introducing the title shāhinshāh, and fabricating a Sasanian genealogy (Morgan 1988 p.24). Ghouchani has (Foot-note continued on the next page.)

Sasanian silver plates depicting enthronement assemblies of crowned Sasanian kings and courtiers were imitated in early Islamic art, both in silver and the cheaper medium of ceramics. Early Islamic bowls from north-eastern Iran may also refer to an older iconographic tradition of representing local pre-Islamic goddesses, such as a 658AD silver bowl from Khwarazm, depicting the goddess Nānā wearing a Sasanian-style crown [PLATE 79A], and a c.1000AD slip-painted bowl from Nīshāpūr or Afrasiyāb (probably referring to the same theme), also depicting a seated woman wearing a Sasanian-style crown [PLATE 79B]. Sasanian manuscripts illustrated with official royal portraits were also known and copied in early Islamic times: Mascūdī records seeing an illustrated history of the Sasanian dynasty in 915AD, compiled from Sasanian archives in 731AD. In twelfth and thirteenth century Islamic (and related Christian) manuscript illustrations, the Sasanian-style crown is used as a generic identification for a ruler, when there exists no other iconographical convention by which to identify the ruler or his nationality. In the

demonstrated that other Sasanian motifs were copied in Buyid art, tracing Sasanian textile motifs to silver plates of the tenth and eleventh centuries (Ghouchani 1991, 1998).

⁸⁴ British Museum OA 1975.5-16.1.

⁸⁵ Khalili Collection POT 99. I do not suggest that this crowned woman demonstrates a continuation of the cult of Nānā into Islamic times, rather that a cult theme had survived as a decorative subject. The same occurred with Dionysian themes in late classical silver (see below).

The portraits were stored in "the Persian archives", and had been taken at the death of each ruler. (D.S.Rice 1959 p.208). The tenth-century geographer Abū Isḥāq al-Fārisī saw a similar manuscript in Shīz castle, Western Iran (Arnold 1928 p.63). Ibn Hawqal also mentions an academy at Shīz with an extensive library (DeLacy O'Leary 1949 p.70).

⁸⁷ Cf. 1. two painted panels depicting an unidentified seated king, at the c.1140AD Cappella Palatina (reproduced in Monneret de Villard 1950 figs. 189, 190); 2. the central figure on the frontispiece of the 1199AD Kitāb al-Diryāq (reproduced in D.T.Rice 1975 p.2); 3. illustrations of kings such as Anūshirwan of Iran and Dabishlim of India (and others) in Kalīla wa Dimna manuscripts, of 1200-1220AD (Bibliothèque Nationale Ar.3465: fols.10r, 15v, 23v, 78r, 131v, 134v; reproduced in Buchthal 1940 figs. 23, 25, 30, 36, 38, 39) and two fourteenth-century Mamluk copies (Bodleian Library Pococke400 (1354AD): fol.10r; Bibliothèque Nationale Ar.3467 (fourteenth century): fols.106v, 110r); 3. the three Magi, and a guest at the Marriage of Cana in a 1216-1220AD Syrian Jacobite Gospel (British Library Add.7170: fols.21r, 67r; reproduced in Buchthal 1939 plates XIII.1, XXII.1.); 4. King Herod in a 1299AD Arab Christian manuscript from Mardīn (Florence, Laurentian Library Orient.387: fol.6v; reproduced in Farès 1948 plate VIIIb), 5. Iblīs, the demon-king in a (Foot-note continued on the next page.)

al-Şūfī tradition, the female constellation-figures of Andromeda and Cassopeia may wear crowns because of the influence of late classical constellation-illustrations. According to Greek mythology, Cassiopeia was the Queen of Ethiopia, and Andromeda her daughter. While Ptolemy does not elaborate upon their identities in his star-catalogue (the source of al-Ṣūfī's star-tables), their story is certainly recounted by Aratus, in the Phaenomena. This poetic work circulated widely in illustrated manuscripts, which may have influenced the iconography of al-Ṣūfī's treatise. If so, al-Ṣūfī artists could have encountered and copied late classical versions in which both constellation-figures wore crowns, adjusting the design of the crowns to a more familiar local version.

Other al-Ṣūfī figures wear a diadem, which is composed typically of a central floral shape (sometimes framed within a crescent) set above the forehead, and bound around the head with a plain or beaded band. On more complex versions, more elements are added to this composition, and the diadem is converted to a low black cap: a second or third band crosses the crown of the head, from the central floral shape to the back of the neck [1266AD Paris al-Ṣaft Andromeda - PLATE 72A]. The 1266AD Virgo wears an exceptional outsize crown, shaped like a flaring cylinder, and filled with ornamentation derived from the typical diadem and its decorative motifs [1266AD Paris al-Ṣaft Virgo-PLATE 72B].

.

c.1300AD astrological compendium (Bibliothèque Nationale Ar.2583: fol.1r); 6. Potiphar in 1314AD Jāmi al-Tawārīkh (Nasser D. Khalili Collection Ms727: fol.288r; reproduced in Blair 1995 p.81), etc. See Chapter Three for discussion of the possible impact of the illustrated *Phaenomena* on al-Ṣūfī's format and constellation-iconography. The *Phaenomena* was translated into Arabic in the ninth century.

Traditional al-Sūfī costume (2): Sasanian-derived drapery style

For costume, typical figures wear a knee-length robe, gathered at the waist, with elbow-length sleeves [1009-10AD Oxford al-Ṣaft Bootes, 1131AD Istanbul al-Ṣaft Virgo-PLATES 70A, 70B]. The robe wraps a little across the body, leaving a low v-necked collar. A plain undershirt is suggested by a rounded line around the neck. Some figures also wear a longer underskirt or leggings beneath the robe. The British Library figures wear the same costume: six wear a second longer skirt beneath the robe, descending below the knees. Nine figures wear baggy leggings beneath their skirts. 90

Drapery-folds are depicted in a purely linear style, signifying depth and volume with grouped lines along the figures' outline, and around the joints. A pattern of distinctive rippling folds features along the flaring skirt-hem, waist-line, sleeve-ends and the tips of the collar. When at the edge of a skirt or trousers, a swag of these folds flares out to the side, in a stylised depiction of wind-tossed drapery. These exuberant stylised folds are the outstanding feature of the al-Ṣūfī style [1266AD Paris al-Ṣūfī Andromeda- PLATE 72A]. Usually, the folds are arranged in an interlinking

⁸⁹ Or.5323: both versions of *Bootes* (fol.13v) and *Auriga* (fol.22r), and two versions of *Andromeda* (fol.32v). Over the two images of *Perseus* (fol.21v), a later hand has sketched in the outline of a second, lower skirt, as though adjusting the images to conform to the al-Şūfī costume tradition.

second, lower skirt, as though adjusting the images to conform to the al-Şūfī costume tradition.

Or.5323: both versions of *Bootes* (fol.13v), *Cassiopeia* (fol.19r), *Perseus* (fol.21v), and *Auriga* (fol.22r), and three versions of *Andromeda* (fols.32v, 33r, 33v).

They have been variously described. Wellesz tried to encapsulate the garment's "cascading scroll"

They have been variously described. Wellesz tried to encapsulate the garment's "cascading scroll motif": "The ends of these [looped draperies] are turned up as if windblown, falling back in a swirl, and ending in a scroll pattern at the bottom" (Wellesz 1959 pp.14-15). Gray wrote of "the old Sasanian style of flying draperies and pleated skirts" (Gray 1961 p.13). Ettinghausen described the distinctive folds as "frilled" and "fluttering", and wrote that "the treatment of the garment-folds [...] is closely related to that of Samarra" (Ettinghausen 1962 p.52). Melikian-Chirvani's description is more helpful, summarising the shape of the curling hem-line: "des plis sinueux dessinés à la plume qui reproduisent parfois au bas de la robe un motif semblable à un as de pique" (Melikian-Chirvani 1967 p.8). Azarpay uses "heavy folds that terminate in double spiral shapes" (Azarpay 1981 p.171), Brend (Foot-note continued on the next page.)

row of 'bell-shaped gathers' of fabric. Each gather pleats together at the top and broadens out around a horizontal mouth at the bottom. On solitary examples, the corners of the horizontal mouth are emphasised with down-turned trailing flourishes. Typically, a large version of the 'solitary gather' features at the end of flying scarves, trailing out from the turbans of male figures [1009-10AD Oxford al-Ṣaft Sagittarius, 1266AD Paris al-Ṣaft Aquarius – PLATES 48B, 80]. PA At its most plain, the bell-gather is depicted only as its lower feature, the horizontal mouth of the bell, which occupies the hem-line of robes, and terminates a long cone of falling creases rather than a bell-shape. This version features in our British Library al-Ṣūfī illustrations, where the distinctive lower profile appears in skirt-hems, baggy leggings and collars [Aquarius-PLATE 71]. PATE 71].

This plainer gather also occurs in early Hellenistic art, such as a Parthian stone sculpture from Hatra (northern Iraq),⁹⁴ and late Antique or early Byzantine silver, such as the "Corbridge Lanx", an oblong silver tray, possibly produced in Byzantine Asia Minor in the fourth or fifth century [PLATE 81].⁹⁵ This may be considered the starting point from which the decorative bell-gather theme was elaborated, as the bell-gather seems to derive from wind-tossed versions of the plain folds, found in

-

[&]quot;bracket-like folds" (Brend 1994 p.91), and Marshak "rinnenförmigen Gewandfalten" (Marshak 1986 p.256).

⁹² Cf. also *Bootes* and *Sagittarius*, in the 1266AD al-Sūfī; *Hercules* and *Bootes* in the 1250AD al-Şūfī.

²² Cf. also *Bootes* and *Sagittarius*, in the 1266AD al-Sūfī; *Hercules* and *Bootes* in the 1250AD al-Şūfī.

⁹³ In spite of the far greater simplicity of the drapery, the locations of the gathers, and their lower profiles, demonstrate that they remain versions of the traditional al-Şūfī style, and may suitably be compared with more conservative examples.

⁹⁴ The sculpture depicts Allat, the goddess of war, flanked by two lesser female deities ("Baghdad")

The sculpture depicts Allat, the goddess of war, flanked by two lesser female deities ("Baghdad Museum"; reproduced in Ghirshman 1962 plate 103).

⁹⁵ British Museum PRB P1993.4-1.1; discussed in Buckton 1994 pp.36-39 by Marlia Mundell Mango. Other Byzantine examples are: a silver paten of 565-578AD, depicting the Communion of the Apostles (Istanbul, Archaeological Museum; reproduced in D.T.Rice 1959 plate 69), and a tenth-(Foot-note continued on the next page.)

Byzantine silver. On two fourth-century silver plates from the Mildenhall Treasure, attributed to the Eastern (Byzantine) Empire, a dancing Maenad of Dionysos wears a costume consisting of a long skirt, a sleeveless upper garment and a long billowing scarf [PLATE 82A]. The light costume is tossed by the girl's movements, and the drapery-folds along every hemline arrange themselves in our familiar bell-gather – flaring out to the either side of the figure. The side of the figure of the side of the figure.

Arguably, Byzantine pieces of this kind could stimulate a derivative style in (neighbouring) Sasanian silver, in which wind-tossed draperies were represented regardless of whether the figures were intended to be mobile or stationary, with a more purely stylistic intention. The mannerism then became established throughout Sasanian art (discussed further below). It is probably relevant that the Dionysian scenes on the Mildenhall plates and Hermitage bowl belong to a series of "neutralised mythological subjects", which were commonly used in the decorative arts of Late Antiquity, "largely devoid of a specific pagan character". The same "neutralised" decorative theme was also popular in Sasanian silver, as demonstrated by a series of silver ewers depicting beautiful semi-nude women, drawn from classical images of dancing Maenads [PLATE 82B]. These women's draped clothing flares out on either side in bell-shaped folds of fabric – just like the

century ivory casket (the Veroli casket, Victoria & Albert Museum; reproduced in D.T.Rice 1959 plate 109).

⁹⁶ British Museum PRB 1946.10-7.2 and PRB 1946.10-7.3.

⁹⁷ A later Byzantine example is served on a silver dish from 610-629AD, depicting a similar theme: a Maenad dancing with Silenus. Again, the Maenad's loose clothes gather into bell-shapes at either side. (St Petersburg, Hermitage Museum; reproduced in D.T.Rice 1959 plate 75).

Marlia Mundell Mango in Buckton 1994 p.40. Mango further notes that "popular deities have become mere personifications of natural forces or human qualities: Dionysus of earthly fertility, Aphrodite of beauty".

'conservative' al-Ṣūfī images. Another such example is a Sasanian silver drinking-bowl from sixth-century Māzandarān, featuring women playing musical instruments beneath a vine, the hems of their long skirts fluttering in familiar bell-gathers. These popular themes, made devoid of cultural exclusivity, travel easily beyond borders – and may become unwitting carriers of a distinctive style of representing billowing drapery. The service of the same of their long skirts fluttering in familiar bell-gathers. These popular themes, made devoid of cultural exclusivity, travel easily beyond borders – and may become unwitting carriers of a distinctive style of representing billowing drapery.

This distinctive drapery style occurs throughout Sasanian art, in silver, of either royal or provincial manufacture, and monumental rock-reliefs. 102 The third-century relief at Naqsh-e Rustam depicts the triumph of Shāpūr I (r.243-273AD) over the Roman emperor Valerian and Philip the Arab, and is executed in this style: rows of bell-gathers ripple along the base of Shāpūr's tunic, and through his trailing cloak [PLATE 83]. Noticeably, this flamboyant drapery style is reserved for the Sasanian emperor: the robes of Valerian and Philip are delineated with plainer drapery-folds. 103 The drapery style also occurs in Sasanian silver vessels, such as most "Royal Hunt" plates [PLATE 69], in which the king is depicted on horseback,

⁹⁹ Ettinghausen identified this mythological theme, and suggested that the Bacchic concepts were assimilated into the Iranian fertility cult of the water-goddess Anahita (Ettinghausen 1967-68 p.41). ¹⁰⁰ "Tehran Museum"; reproduced in Ghirshman 1962 plate 257.

¹⁰¹ The animated gathers remain in Byzantine art, but do not achieve the acute stylisation of the Iranian bell-gathers. Cf. the fifth-century silver gilt "Concesti Amphora", (St Petersburg, Hermitage Museum; reproduced in D.T.Rice 1959 plates 6, 7) and two silver plates of 610-629AD from Nicosia (Istanbul, Archaeological Museum; reproduced in D.T.Rice 1959 plate 72).

¹⁰² Harper categorises Sasanian silver as either "central Sasanian", officially controlled by the royal

court, or "provincial", produced beyond the royal workshop, perhaps for governor-princes in outer provinces, or independent minor rulers beyond the Sasanian realm (Harper & Meyers 1981 p.124).

103 The same allocation is observed in another relief at Naqsh-e Rustam, of Hormuzd II (r.302-

The same allocation is observed in another relief at Naqsh-e Rustam, of Hormuzd II (r.302-309AD) defeating the plainly-draped Karens (reproduced in Dutz & Matheson 1997 p.47), and the relief at Tang-e Chogan in Bishapur (also third century AD), commemorating the victory of Bahram II (r.276-293AD) over the Arab nomads (reproduced in Dutz & Matheson 1997 pp.62-63).

hunting down lions, boars, stags, bears or mountain goats, ¹⁰⁴ bowls depicting royal banquet scenes, ¹⁰⁵ and footed ewers [PLATE 82B].

The bell-gather occurs from the third to eleventh centuries AD, in Sasanian and early Islamic art in Iran.¹⁰⁶ The drapery style also appeared in the central lands of Islam, transmitted either by migrating artists or by imported decorative objects, where the style is applied occasionally rather than predominantly, and in a looser form.¹⁰⁷ The bell-gathers feature in two ninth-century frescoes of ^cAbbāsid Samarra (as does the distinctive three-quarters facial type described above) [PLATE 73B].

The drapery style continued in a less adulterated form in Iran itself. So much is clear from the 1009-10AD al-Ṣūfī manuscript, and a contemporary silver dish, attributed to early eleventh century Iran or Afghanistan [1009-10AD Oxford al-Ṣūfī Bootes, early eleventh-century silver bowl- PLATES 70A, 84]. Together, these two artefacts demonstrate the continuity of this distinct Iranian style up to the eleventh-century. Three engraved and repoussé figures resemble the 1009-10AD Oxford illustrations in

The bell-gathers assemble along the lower hem of the king's tunic, and at the streaming ends of his cummerbund and headscarf. Cf. also two silver-gilt plates from the third or early fourth century, reproduced in Harper & Meyers 1981 plates 8 and 10 (Tehran, Iran Bastan Museum Acc.1275; Baku, Museum of the History of Azerbaijan). Harper & Meyers 1981 is a full study of the "Royal Hunter" genre in Sasanian silver.
 Cf. late Sasanian silver plates reproduced in Grabar 1967 plate 13; Gunther & Jett 1992 p.131

¹⁰⁵ Cf. late Sasanian silver plates reproduced in Grabar 1967 plate 13; Gunther & Jett 1992 p.131 (Baltimore, Walters Art Gallery Acc.57.709; Washington DC, Sackler Gallery S1987.113.) Iranian silver vessels depicting banquet scenes are usually attributed to the late Sasanian and early Islamic periods, see Gunther & Jett 1992 pp.131-132.

periods, see Gunther & Jett 1992 pp.131-132.

106 Wellesz elected to use the term "post-Sasanian" to describe "objects that were made in Persia during the first centuries of Islam whose derivation from Sasanian art is obvious [...] this rather vague term was chosen for works in which the Sasanian tradition survives, the age and provenance of which cannot be defined, however, except within a rather wide margin" (Wellesz 1959 p.18).

As the drapery style is only occasional, Wellesz proposed that the artists of Samarra copied from imported Sasanian engraved silver objects (Wellesz 1959 p.15).

almost every detail of costume. 109 This shows that the style was still current when al-Sūfī's treatise was illustrated for the first time, although it was soon to disappear from general decorative use. Beyond that period, the style occurs in certain al-Sūfī images. It has been suggested that the drapery style was exclusive to silverwork, and that al-Sūfī's constellation-images were similar because they had been derived from an engraved silver celestial globe. There is an early eleventh-century anecdote, which reports that the astronomer al-Sufi traced out his constellation-images from the surface of a celestial globe. Al-Bīrūnī (973-1048AD) recites a story about al-Şūfī tracing images from a globe onto thin paper, told to him by his friend, the geometer Abū Sa^cīd Ahmad b. ^cAbd al-Jalil al-Sijzī (c.951-c.1024AD). ¹¹⁰ This anecdote is often cited as proof of the link between al-Sūfi's illustrations and the images on celestial globes. 111 Such a link seems rather obvious even without the anecdote – which may be a misconstruction of a method which al-Şūfī himself describes, in his treatise on the construction and use of the astrolabe. 112 On five occasions in that

¹⁰⁸ State Hermitage Musuem, St Petersburg, inv.S-499. Cf. also two other early Islamic silver bowls: a 658AD silver bowl from Khwarazm (British Museum OA 1975.5-16.1: PLATE 79A), and a seventhcentury AD (?) silver bowl (Walters Art Gallery, Baltimore; reproduced in Wellesz 1959 fig.38).

109 All three figures wear knee-length v-neck robes, wrapping across the body, with a round-necked

undershirt beneath. Bell-shaped gathers fall from the waistline and form along the skirt-hem, and a small gather flares out to the side on two of the figures. On the sleeves, drapery-folds collect at the wrist. The ruler's robe consists of a short skirt over a longer one. The main figure wears a Sasanian-

style crown.

110 Wellesz 1959 p.19. Wellesz assumes that the celestial globe used by al-Şūfī was made of silver, supporting this by reference to a recorded description of a large silver globe made by al-Sūfī for his patron 'Adud al-Dawla, which was exhibited in Cairo in 1043AD. She also quotes al-Bīrūnī, who wrote that large celestial globes were rare, heavy and costly, and assumes that these were "obviously made of silver" (Wellesz 1959 p.19).

111 For example, Ettinghausen and Grabar state that al-Şūff's images are linear in style because they

were traced from a celestial globe (Ettinghausen & Grabar 1987 p.250).

112 See Chapter Two for a list of al-Şūfī's works.

treatise, al-Ṣūfī describes how to measure distances on the plate of an astrolabe, using strips of paper. 113

According to Wellesz, this anecdote – even if unfounded - shows that there was a connection "obvious to the eye" between the earliest al-Ṣūfī images and contemporary silver celestial globes (of which there survives one account, but no examples). Wellesz proposes that this obvious connection was stylistic, citing the similarity between the 1009-10AD Oxford al-Ṣūfī illustrations and surviving examples of contemporary decorative metal objects from Iran, such as engraved silver plates and ewers. The style is indeed common to both media, but it does not immediately follow that one directly imitated the other, in the manner described by Wellesz. Her exclusive association of this particular figural style with engraved silver (and derivative constellation illustrations) seems too simplistic, not least because many key elements of the style feature in other media, such as rock-reliefs and murals, and in the arts of neighbouring regions also influenced by Hellenistic art.

Hellenistic art had gestated in Iran and the 'outer Iranian' regions of Bactria and Sogdia, since Hellenistic provinces were established there by the conquests of Alexander the Great (d.323BC). An 'altered' version of Hellenistic style, labelled "Graeco-Iranian", had a strong presence in subsequent Iranian and Sogdian art 114 -

•

¹¹³ Kennedy & Destombes 1966 p.9. The authors add: "Doubtless by al-Şūfī's time paper was in common use in the Islamic world. Nevertheless, we know of no other astronomical writing in which it is mentioned at all". Al-Sijzī worked with al-Ṣūfī in Shīrāz, where al-Ṣūfī's unusual practice must have caught his attention. When later recounted to al-Bīrūnī and committed to writing, details of the story may have become confused.

[&]quot;Graeco-Iranian" is a term coined by Schlumberger to describe the "non-Mediterranean descendants of Greco-Roman art", in *Der hellenisierte Orient, die griechische und nachgriechische* (Foot-note continued on the next page.)

typified by a transformation of the relatively more plastic Hellenistic style, towards a controlled linearity of form. 115 However, the bell-gather found throughout al-Sūfī manuscripts does not appear until the Sasanian period. The fourth-century date of the Mildenhall Treasure is pivotal (and admittedly that date is only an attribution), but the silver trays may demonstrate that the animated bell-gathers of Sasanian art grew from wind-tossed versions of Hellenistic drapery in fourth-century Byzantine metalwork 116 - not the earlier first accommodation of Hellenistic art.

Close versions of the bell-gather can also be found at Panjikent in Sogdia, on murals dating between the fifth and eighth centuries. A representation of an enthroned goddess, dated to the end of the fifth century, depicts a row of 'bell-gathers' along the waist-line of her tunic, and on the ends of her fluttering scarf [PLATE 85A]. 117 Although fragmentary, an eighth-century Sogdian mural of enthroned deities

Kunst ausserhalb des Mittelmeerraumes, Kunst der Welt, Baden-Baden, 1969, pp.181-189, quoted in

Azarpay 1981 p.82, and in Bussagli 1963 p.121.

Bussagli describes a change in Sasanian sculpture and metalwork, "which passed from a moderate emphasis on relief to a flat linear stylization of the utmost elegance" (Bussagli 1963 p.47). In certain confined cases, the initial Hellenistic plastic style was perpetuated, such as the Buddhist wallpaintings at Miran in Eastern Turkestan (second half of the third century AD, reproduced in Bussagli 1963 pp.18, 24, 25). The style was adopted for Buddhist art in Kushan Bactria, in the second century AD. Preserved within religious imagery, and termed "Graeco-Buddhist" style, the early "Graeco-Iranian" traits outlived the erosion or transformation they suffered in other contexts, much as the "al-Sūfī idiom" outlived its time in the confinement of conservative constellation-imagery. (Cf Azarpay 1981 pp.84-86).

¹¹⁶ Wellesz makes a similar remark about al-Şūfī drapery: "To some extent the folds comply with the conventions of classical drapery; and it is apparent that in the last instance they derive from the excitedly fluttering garments of late so-called "baroque" antiquity. Their specific stylization, however, was devised in the semi-classical sphere of eastern Hellenism" (Wellesz 1959 p.14). For a different opinion, see Melikian-Chirvani 1967, who held Bactrian and Sogdian art to be more influential on the 1009-10AD al-Sūfī illustrations than Byzantine art (Melikian-Chirvani 1967 pp.8-9).

¹¹⁷ Eastern wall of the northern chapel of Temple II, Panjikent.

includes a row of 'bell-gathers' along the hem of a sitter's robe. ¹¹⁸ The same features occur along the skirt-hem of a battling female warrior in another Paniikent mural. ¹¹⁹

The linear drapery style also migrated beyond the Hellenized cultural area of Iran and Sogdia, further eastwards into Central Asia. ¹²⁰ This movement was facilitated by an assortment of eastbound traffic, such as the illustrated scriptures of Manichean and Nestorian Christian communities, diplomatic gifts of royal Sasanian silver, their Hephthalite imitations, and exported luxury goods. ¹²¹ This extension of Hellenistic cultural influence explains the occurrence of bell-gather drapery in a Manichean miniature, produced in Turfan in the eighth or ninth century [PLATE 85B]. ¹²² A stiff row of bell-gathers also runs along the skirt hems of fragmentary stucco figures at a shrine in Dandān-oilik. ¹²³ Elements of this linear drapery style can also be found still further east along the Silk Road, in the Buddhist cave-paintings at Dunhuang, where they are much submerged among other stylistic traditions. ¹²⁴ For example, in an 864AD silk painting of six figures the drapery style features along only one figure's

¹¹⁸ Panjikent, Temple XXIV:2 (sketch reproduced in Azarpay 1981 p.32).

Panjikent, Temple VI:55 (sketch reproduced in Azarpay 1981 p.107).
 Azarpay proposed that Sogdian art contributed further eastward to the development of Turfanese

art (Azarpay 1981 p.27).

Bussagli comments that Manichean and Nestorian influences moved as far eastward as Turfan and Qoco (Bussagli 1963 p.96).

The scene depicts two seated rows of white-robed Elect, writing at long desks draped by a large

 $^{^{1\}bar{2}2}$ The scene depicts two seated rows of white-robed Elect, writing at long desks draped by a large cloth which ripples at groundlevel in distinct raised bell-gathers (Berlin, Staatliche Museum; reproduced in Widengren 1965 plate 3). Gray writes: "They are unmistakably Iranian" (Gray 1961 p.14). Widengren noted that the Uighur Manicheans often preferred the western codex over eastern forms of book such as the folding book and the Indian $poth\bar{i}$ (constructed from long palm leaves or paper pages, held together between two boards, and cord strung through two punched holes on either end) (Widengren 1965 p.112): this is another example of the Manicheans extending cultural practices beyond their original spheres.

Shrine D. II, expedition photograph from December 1900 reproduced in Whitfield 1982 p.19.

Bussagli comments that the Dunhuang caves display the mutual influence of Central Asia and China, and "the course taken by aesthetic and stylistic features originating in India, Iran and Central Asia", although the cave-paintings were nonetheless "effectively Chinese" (Bussagli 1963 p.115).

hemline.¹²⁵ In another ninth-century silk painting of Bodhisattva Avalokiteśvara, the figure is depicted with recognisable bell-gathers assembled along the base of his long robe.¹²⁶

Thus, the typical costume of 'conservative' al-Sūfī illustrations belongs to a long-standing stylistic tradition developed in Iran and 'outer Iran', which passed into Central Asia, but derived ultimately from the reception and accommodation of Hellenistic art. During the first centuries of Islamic art, this stylistic tradition continued to a certain extent, as shown by east Iranian decorated silver influenced by Sasanian court art and in the 1009-10AD Oxford al-Ṣūfī illustrations. Marshak suggests that the style was retained as an evocative nostalgic reference to the glory days of the Sasanian empire. ¹²⁷ In subsequent centuries, the style survives well in al-Ṣūfī manuscript-illustrations, even when contemporary painting is quite different subject to new developments and the influence of other artistic traditions. To a different extent, a derivative 'evolved form' of the linear drapery style also continues in other examples of twelfth- and thirteenth-century Islamic manuscript-painting, although that treatment develops the original design towards further mannerism.

The leftmost Avalokiteśvara of the group. The other figures are Samantabhadra, Mañjuśrī, and three other manifestations of Avalokiteśvara (British Museum Stein painting 5.Ch.iv.0023; reproduced in Whitfield 1982 plate 23-1).

reproduced in Whitfield 1982 plate 23-1).

126 British Museum Stein painting 13.Ch.liii.005; reproduced in Whitfield 1983 plate 1. Whitfield attributes the painting to the T'ang dynasty, and the second half of the ninth century.

Brend also observed that this drapery style occurs at Dunhuang, in a (different) late ninth-century silk painting of Avalokiteśvara (British Museum 1919.1.1.0104; reproduced in Brend 1994 plate 88). The figure's long skirt gathers at his feet, and the folds collect in a single central bell-gather. "The drapery of the figure has some hint of the bracket-like folds which are characteristic of the [1009-10AD al-Şūfī] manuscript, though to a less marked degree" (Brend 1994 p.91). Brend proposes that Central Asia (by which she only refers to Dunhuang) influenced the distinctive style of 1009-10AD Oxford al-Sūfī illustrations, citing similarities of facial type, headwear and drapery folds.

127 "...ein Art Souvenirs ... die an die 'Wunder' des sasanidischen Iran erinnerten" (Marshak 1986)

[&]quot;...ein Art Souvenirs ... die an die 'Wunder' des sasanidischen Iran erinnerten" (Marshak 1986 p.292).

rather than directly quoting it.¹²⁸ The curious longevity of the 'conservative al-Ṣūfī style' may be accountable to the popularity of the treatise and its illustrations. The importance of the illustrations could contribute to the fidelity with which they were reproduced, thus enshrining an archaic drapery style in a perennially-popular manuscript tradition - initiated while the style was still current.

I propose that the significance of the conservatism is linked to the authority exerted by autograph copies of *Kitāb Ṣuwar al-Kawākib al-Thābita*, used by later copyists. An al-Ṣūfī manuscript, dated 1601-02AD/1010H, states that it was copied from a 1013-14AD/404H prototype. A sixteenth-century copy was copied from an eleventh-century manuscript which cites its pedigree from two source manuscripts, one an autograph (copied 1005AD/396H), the other copied from an autograph in 1011AD/402H. The closest surviving example of such an authoritative manuscript is the 'second generation' 1009-10AD Oxford al-Ṣūfī, copied and illustrated by al-Ṣūfī's son Ḥusayn. The distinctive Sasanian-derived style of its illustrations was contemporary fashion at the Buyid court where the manuscript was produced. Unfortunately, there are no other illustrated manuscripts of the period to confirm this, although the Sasanian style of the gold medal of 'Aḍud al-Dawla demonstrates such a vogue [PLATE 78B], as do the Buyid metalwork designs which imitate Sasanian textile patterns. The 1009-10AD manuscript must be a reliable copy of the treatise, considering its links with the author. Such an early manuscript, particularly on a

-

¹²⁸ Discussed below as a key feature of Seljuk style.

¹²⁹ Copenhagen, Royal Library Ms83.

¹³⁰ St Petersburg, Institute of Oriental Studies C.724.

¹³¹ Ghouchani 1991, 1998.

scientific topic, is of course valuable, as there is less risk of obscure errors caused by intermediate generations of copyists. Given the functional nature of constellation-images, new al-Ṣūfī illustrations should also have been copied very closely from prototype manuscripts. A deliberate 'tenth-century style' of illustration might intend to demonstrate that the images had been copied faithfully. In this context, a more conservative image is more desirable. Such self-advertisement would only have been impressive while the style of the desirable 'first generation' manuscripts was still familiar, and the conservative style may have been abandoned gradually for this reason.

3. A thirteenth-century artefact: the British Library al-Şūfī manuscript

The artist of the British Library images was sufficiently skilled to season his thirteenth-century figural style with aspects of the conservative al-Ṣūfī idiom. Over all, the figural and drapery styles confirm that this manuscript is a product of thirteenth-century 'Seljuk' art. The illustrations bear definite stylistic links to two distinct groups of manuscripts from the late twelfth and early thirteenth centuries, as well as examples from ceramics, metalwork, and architectural decoration. All were produced within the realms of the Seljuks or their vassal dynasties, in Anatolia, Iraq, or Iran. ¹³² In particular, details of iconography, such as a *simurgh*-head scroll motif,

¹³² This explains why Turkish costume-elements, such as the fur-lined sharbūsh hat, are typical in twelfth- and thirteenth-century art of all these areas. The impending Mongol invasions in the 1220s and 1250s are frequently cited as the impetus that brought skilled craftsmen to migrate westwards from eastern Iran, spreading once regional styles and techniques across the Islamic world, into northern Iraq. However, two centuries prior to the commencement of the Mongol threat, much of the Islamic world had already been united in the Seljuk Empire, from Transoxiana to Anatolia.

and elaborate curling wings, occur in certain British Library illustrations, and appear to be typical Seljuk decorative features.

The Central Asian origin of the Seljuk Turks had injected new style (and iconography) into the arts of conquered regions, which can be seen by similarities between Central Asian and Seljuk art of the Islamic world. As discussed in the previous section, the arts of early Iran and Central Asia have a common source in Eastern Hellenism, but the stylistic changes brought by the eleventh-century Seljuk invasions show that the two regions had not developed in identical fashion.

By joining distant areas under Seljuk rule, the new empire also caused a pooling of artistic techniques and the swifter spread of style across former borders. Iranian influence has been proposed in Seljuk art of northern Iraq. ¹³⁴ Melikian-Chirvani proposed that the Seljuk figural style derived from eastern Iranian art, ¹³⁵ and therefore that the Sasanian-derived style of the 1009-10AD Oxford al-Ṣūfī images was an ancestor of the Seljuk linear style, a weak dilution of that original drapery

¹³³ Compare especially a seventh-century painting on a wooden tablet from Dandān-oilik (1907.11-11.70, D.vii.5; reproduced Whitfield 1985 plate 69), with a miniature from the c.1225AD Warqa wa Gulshāh manuscript (fol.22/21v), both depicting a horse-rider. See also Holter 1937A p.12 for comparison of Seljuk paintings with Bezeklik murals.

Discussing Seljuk art of northern Iraq and south-east Anatolia, Carboni described Seljuk art as "ultimately linked to Central Asian origin of the Seljuks, filtered through their Iranian experience, [...] to be regarded as a new cultural wave which was superimposed on previous traditions in the area" (Carboni 1992 p.448). These factors make it difficult to put unequivocal attributions of Seljuk examples to single places, although the common style has been a springboard for much theorising as to the existence of different schools of painting (Melikian-Chirvani 1967, 1970; Nassar 1985).

¹³⁵ Examining illustrations in a group of Seljuk manuscript, he cited depictions of the bicorn hat, indisputably typical of eastern Iran in early Islamic times (cf. an engraved brass bowl found in Afghanistan: Kevorkian Foundation; reproduced in D.S.Rice 1958 plate 13; and an early eleventh-century silver bowl attributed to eastern Iran or Afghanistan: State Hermitage Musuem, St Petersburg, inv. S-499; reproduced in Piotrovsky & Vrieze 1999 p.157), and identified metal objects and buildings typical of Khurāsān in the c.1225AD Warqa wa Gulshāh scenes (Melikian-Chirvani 1970 pp.78-80).

style. This may demonstrate that the two 'conservative and contemporary' traditions discernible in the British Library al-Ṣūfī images are actually different stages of the same style, with pre-Islamic Iranian origins. A similar ancestral relationship was proposed in 1937 by Holter, who suggested that early copies of both al-Ṣūfī's treatise and al-Jazarī's *Automata* were the stylistic forerunners of thirteenth-century manuscript-painting in northern Iraq and western Iran, entitled the "Mosul School". His earliest al-Ṣūfī examples are the copies from 1009-10AD (which he had not seen), 1125AD (Süleymaniye) and 1131AD (Topkapı). 139

These connections concur with my estimation of the British Library al-Ṣūfī images as a thirteenth-century dilution of a more ancient formal style, preserved in the conservative tradition of carefully reproduced al-Ṣūfī manuscript-illustrations. Related 'non-Ṣūfī' manuscripts show that this thirteenth-century dilution was not specific to a stylistic chain of al-Sūfī illustration, but common to contemporary

¹³⁶ "[...] il ne reste des plis que le coeur inversé – mais la filiation est évidente" (Melikian-Chirvani 1967 p.9).

As proposed at the end of the previous section, the continuity of the original style in the al-Şūfī tradition may relate to the importance of the constellation images. In more general artistic tradition, the style could have simplified much further, though still retaining the linear rendition of drapery.

Holter 1937A pp.14-17. Holter labelled this group without intending to convey that all manuscripts therein were produced in Mosul itself. The name of this important cultural centre serves only as a convenient label for the painting style found in this area. Holter suggested that the style continued in fourteenth-century Mamluk painting, but was gradually subsumed in Il-Khānid art. Melikian-Chirvani proposed a north-Iranian "Jebāl School" with similar origins. Although he credited Holter with the first attribution to the "Mosul School", Melikian-Chirvani does not refer to Holter's observation of continuity from early al-Sūfī images to this thirteenth-century group.

139 The 1125AD Qatar manuscript only came to light in 1998. Some of Holter's dates need to be

The 1125AD Qatar manuscript only came to light in 1998. Some of Holter's dates need to be revised. He dates the Süleymaniye al-Şūfī to 1130-31AD. On examining the colophon, I read the date 519H rather than 529H: the middle number was read by Holter as عشرو (20) but says عشرو (10 +). (519H corresponds to February-December 1125AD.) He also states that a manuscript in St Petersburg (Oriental Institute, no.85) dates from 1005-06 and 1011AD (Holter 1937A p.3). Holter had not seen the manuscript, but referred to Rosen's 1877 catalogue of the Oriental Institute (Rosen 1877 p.118). Rosen had written that the manuscript was copied from two manuscripts, of 1005-06 and 1011AD, which is not the meaning taken by Holter. I have studied a microfilm of the manuscript, and it is certainly later – perhaps sixteenth century. Both of these dates are often cited in more recent publications (cf. Kunitzsch 1986A p.58).

painting of former Seljuk areas.¹⁴⁰ Thus the British Library manuscript relates to two chains of transmission, with the same ultimate root.

The continuity of what may be defined as 'Seljuk' style, after the Seljuk Empire had disintegrated and the Mongols had made their conquests, is relevant to this al-Şūfī manuscript. Its illustrations are similar but never identical to the pre-Mongol comparative examples, and they may represent a later stage of the same style. Comparison with the earliest Il-Khānid period manuscript-paintings seems to rule out certain production-centres, and leave questions. It should be considered that we do not know how much stylistic variety existed among the paintings produced in one centre, nor how common it was for artists to travel between court ateliers.

Seliuk styles and motifs

The British Library al-Ṣūfī illustrations are related to the style of two groups of painting and a school of ceramics overglaze-painting, from the first half of the thirteenth century. In each case, the shared stylistic elements are significant, such as facial types, costume-detail and the linear pattern of the costume-drapery. I would not suggest that our manuscript was produced by the same hand as any of these manuscripts or ceramic-paintings mentioned, but that all belong to the same linear Seljuk style, and possibly that the British Library images were produced at a later stage in that style's lifetime. The manuscripts are as follows:

¹⁴⁰ The convoluted style of the near contemporary 1266AD Paris al-Şūfī images also shows that the British Library al-Şūfī style was not the inevitable petering-out of a formal style.

Mosul area		
1199AD	Kitāb al-Diryāq	(Bibliothèque Nationale, Arabe2964) ¹⁴¹
	Kitāb al-Aghānī:	
1217AD	vols. 17 and 19	(Millet Library, Feyzullah Efendi 1565, 1566) ¹⁴²
1216-17AD	vols. 2, 4 and 11	(National Library of Cairo, Adab579) ¹⁴³
1218-19AD	vol. 20	(Royal Library Copenhagen, Cod.Ar.168) ¹⁴⁴
mid-13 th century	Kitāb al-Diryāq	(Nationalbibliothek Vienna, A.F.10) ¹⁴⁵
Konya?		
c.1225AD	Warqa wa Gulshāh	(Topkapı Library, Hazine 841) ¹⁴⁶
Artuqid Āmid		
1206AD	Automata	(Topkapı Library, AhmetIII 3472) ¹⁴⁷
c.1240AD	Maqāmāt	(Bibliothèque Nationale, Arabe3929) ¹⁴⁸

The two Kitāb al-Diryāg manuscripts and the Kitāb al-Aghānī volumes have been attributed to the Mosul area of northern Iraq. 149 The Automata and Maqamat manuscripts have been attributed to the Artuqid court at Āmid. 150 The Warqa wa Gulshāh manuscript has been attributed to Konya, the capital of the Rum Seljuks, on the grounds that the artist's name, cAbd al-Mu'min b. Muhammad al-Naqqāsh al-Khuyī, has been found on a document related to the Karatay madrasa of Konya. 151 A

¹⁴¹ Miniatures fully published in Farès 1953 plates 1-21.

¹⁴² Both frontispieces published in D.S.Rice 1953 figs.18, 19.

¹⁴³ The frontispieces to volumes 4 and 11 are published in D.S.Rice 1953 figs.16, 17, the frontispiece to volume 2 is published in Holter 1937B plate 6.

¹⁴⁴ Frontispiece published in Raby 1985, inside cover.

¹⁴⁵ Miniatures fully published in Holter 1937B plates I, II, figs.1-9.

¹⁴⁶ Miniatures fully published in Melikian-Chirvani 1970 figs.1-65.

¹⁴⁷ Three miniatures published in Ward 1985 figs. 3, 4, 8, and six in Rogers 1986 plates 7-12.

¹⁴⁸ Seven miniatures published in Blochet 1929 plates 3-9.

¹⁴⁹ Holter 1937A pp.14-17; Ettinghausen 1962 pp.206, 208; Nassar 1985 p.85, etc. The multi-volumed Aghānī set was produced for Badr al-Dīn Lū'lū' (d.1259AD), the ruler of Mosul (D.S.Rice 1953) p.130). His name is inscribed upon the ruler portrayed on vols 11, 17, 19.

150Using convincing internal evidence, Ward showed that the 1206AD manuscript was produced for

the Artugid dynasty. Indicating the very similar style, she concluded that the same Artugid painting school had produced the Maqāmāt manuscript of c.1240AD. Discussing these two manuscripts. Ward describes the significance of studying detail, even if a manuscript hails from a highly conservative tradition: "There are small sub-conscious details shared [...which] represent the fundamental technique of the artist, whatever the subject matter being illustrated, or the model being copied" (Ward 1985 pp.76-77).

151 See foot-note 4 of this chapter.

closely related group of decorated ceramics was definitely produced at Kāshān, in western Iran. 152

Now follows a more detailed discussion of shared characteristics.

Monumentality and the Moon-Face: the British Library al-Sūfī figures

There are eleven constellations depicted as human figures in our British Library al-Suff manuscript. The male constellations are Cepheus, Bootes, Perseus, Auriga, Serpentarius, Aquarius and Orion, and also the two centaurs Sagittarius and Centaurus. There are three female constellations: Cassiopeia, Andromeda and the twins of Gemini [PLATE 40]. All but five pairs occupy close to one full folio in height. The five smaller pairs, Andromeda (both pairs), Cassiopeia, Sagittarius and Centaurus [PLATE 62], have shorter legs and are less well-proportioned, showing that the artist was more comfortable drawing larger scale figures. The main figures are well drawn: they have long torsos, defined bellies and hips, and long thighs. The hands are drawn with a characteristic outheld curved thumb, to different degrees of success. The down-held hand of Cepheus, for example, is drawn very gracefully [PLATE 27B]. An open-palmed hand is quite simple, with a long middle finger, and

¹⁵² Once attributed to Sava, Gurgan, Rayy and Kāshān, the provenance of these ceramics has now been attributed only to Kāshān (Watson 1974). The close relationship between manuscript-painting and decorated ceramics of the twelfth- and thirteenth-century has also been treated in R.Hillenbrand 1994.

¹⁵³ In astronomy imagery, the gender of the *Gemini* twins tends to be ambiguous, despite their (usual) nudity. Both of these British Library figures have sagging breasts, and wear earrings. A comparison with the similarly bare-chested (male) *Cepheus* on folio 12r demonstrates that the twins are indeed female.

¹⁵⁴ This preference will be relevant to a discussion of comparative examples in thirteenth-century figural art.

usually a plain ring on the little finger.¹⁵⁵ A grasping hand tends to be drawn clumsily, with the little finger extended.¹⁵⁶ Many figures (male and female) wear plain items of jewellery, such as rings, earrings, bracelets, necklaces, armbands and ankle-rings.

The faces are broad, with large rounded chins. Ten are haloed, of which eight are plain circles behind the head, and two (both versions of the constellation Auriga) [PLATE 31A] are summarily decorated with curling scrolls or radiating lines. Similar decorated haloes occur in a c.1300AD ^cAjā'ib al-Makhlūgāt, attributed to Mosul.¹⁵⁷ Most figures have very long hair, which hangs in pigtails down the front and back. In some cases, the hair also breaks off into tight curls around the face. echoing the traditional al-Sūfī facial type with curling locks of hair hanging at the temples [British Library Orion-PLATE 57]. As outlined in the previous description of 'conservative' al-Sūfī images, there are two types of faces. The most common is a three-quarter face, approaching a full-face. The eyes are small and narrow, more so than most conservative al-Sufi types. They are elongated with two or three almost horizontal thin lines running to the edge of the face – like crow's feet wrinkles, or lines of kohl. The lowest line often curves downwards to outline the cheek. The eyebrows are also drawn in very thin lines, and arch from the top of the nose to the edge of the face. The nose is long and thin, drawn in an almost straight vertical line which leads from its small tip, across the junction of the eyebrows, and up into the forehead. Two pairs of constellation-figures wear thin beards, drawn in short pen-

-

¹⁵⁵ Or.5323: Cepheus (12r), Bootes (13v), Andromeda (32v), Gemini (41v, 42r) and Aquarius (58r).
¹⁵⁶ Or.5323: Bootes (13v), Cassiopeia (19r), Auriga (22r), Sagittarius (53r), Serpentarius (23v), and Centaurus (80r).

strokes, and thickly-drawn moustaches [British Library Auriga- PLATE 31A]. The mouth is very small, drawn as two short curving lines, with a tiny stroke on either side, suggesting dimples. Another line curves under the mouth, suggesting a rounded chin.

This wide face with miniature features occurs throughout thirteenth-century Seljuk art: the two Kitāb al-Diryāq manuscripts of 1199AD and the mid-thirteenth-century [mid-thirteenth-century Diryāq detail- PLATE 86], the c.1216-19AD Kitāb al-Aghānī volumes (all attributed to the Mosul area), the c.1225AD Warqa wa Gulshāh manuscript (attributed to Konya) and overglaze-painted minācī and lustre ceramics from Kāshān. The strongest link between this group is the degree of the figures facial symmetry: the long narrow eyes follow a straight horizontal axis, emphasised by kohl lines and the narrowness of the small eyes themselves. The figures' noses also obey an emphatically straight narrow rule. The regular alignment of the features, set within a broad face, differentiates this Seljuk group from contemporary styles. Melikian-Chirvani proposed that this facial type conveys the "Moon-Face" or māhrūy, a specifically Iranian aesthetic. The British Library figures feature a second, 'frowning' version of the Moon-Face, also found by Melikian-Chirvani in

٠.

¹⁵⁷ British Library Or.14140: fols.12r, 13r. This similarity is discussed further below.

¹⁵⁸ Or.5323: Cepheus (fol.12r) and Auriga (fol.22r). Both versions of Bootes have thin stubble around the chin (fol.13v).

¹⁵⁹ The following manuscripts have also been attributed to northern Iraq, and do not conform to the narrow symmetrical facial type (or the typical drapery style): c.1220AD Na^ct al-Ḥayawān (British Library Or.2784), 1224AD De Materia Medica (dispersed), c.1200-20AD Kalīla wa Dimna (Bibliothèque Nationale Ar.3465) and 1222AD Maqāmāt (Bibliothèque Nationale Ar.6094). Buchthal compared a rather round-faced youth in fol.103v of the latter manuscript (reproduced Buchthal 1940 fig.3) with our al-Ṣūfī Gemini (fol.41r). Both are profiled faces with pursed lips and large chins, but the Maqāmāt youth has round eyes – different to the tiny pinched eyes typical of the British Library al-Ṣūfī figures.

the c.1217-19AD Kitāb al-Aghānī, the c.1225AD Warqa wa Gulshāh, and in minācī ware of the early thirteenth century. The al-Ṣūfī illustrations are not entirely identical to these examples, in that this particular (al-Ṣūfī manuscript) style applies extra lines to define the face: a down-turning line from the outer corner of the eye towards the jawline, and the vertical line of the nose extending beyond the eyebrows into the forehead.

The second facial type is less common in the British Library manuscript, and presents a profile, or near-profile [Perseus - PLATE 76]. In profile, the large rounded chin is emphasised further, almost into a caricature, especially in contrast with the outline of the small pursed mouth and nose, and the receding forehead. The nose bends in a short pointed hook, and the nostrils curl upwards. Profiles are also less common than the round three-quarter "Moon-Face" in the Seljuk manuscripts mentioned, and show a similar hooked nose, but not such a prominent bulging chin, nor such small eyes [1199 Diryāq detail- PLATE 87]. The features are less pinched than the British Library figures, but there is a similar stylistic approach.

He identified the "moon-face" throughout the Kitāb al-Diryāq and Kitāb al-Aghānī manuscripts (listed above), and proposed an Iranian provenance for them (Melikian-Chirvani 1967 p.17).
 "Le visage de Lune aux sourcils froncés" (Melikian-Chirvani 1967 p.17). This version is discussed

below, under Communicative Pairs.

¹⁶² Cf. also Gemini (fols.41v, 42r), Sagittarius (fols.53r, 54r), and Centaurus (fol.80r). See above under The conservative al-Şūfī style for further discussion of profiles in the British Library al-Şūfī.

163 Cf. 1199AD Kitāb al-Diryāq: fols.19, 57, (reproduced in Farès 1953 plates 13, 18); c.1225AD Warqa wa Gulshāh, fol.3/6a (reproduced in Melikian-Chirvani 1970 fig.2).

Robes, turbans, and boots: costume in the British Library al-Sufi

The costumes present a combination of the distinct 'traditional al-Ṣūfī' costume style, and more 'contemporary' elements from thirteenth century figural art. ¹⁶⁴ All of the figures are fully dressed, with the exception of the twins of *Gemini*, who are nude in accordance with classical constellation iconography, and *Cepheus*, who wears only a short skirt and a tall fur-lined hat [*Cepheus*- PLATE 27B]. ¹⁶⁵ The other constellation-figures wear a knee-length robe, which wraps across the body, gathering at the waist [*Auriga*- PLATE 31A]. Compared to traditional al-Ṣūfī types, the sleeves are relatively long, and the sleeve-ends are either very long, loose and droopy, or quite close-fitting, gathering in creases around the wrist. Both of these types feature in the c.1240AD Artuqid *Maqāmāt* manuscript [PLATE 88]. ¹⁶⁶ Around the upper arms of the al-Ṣūfī figures, there are often *tirāz* bands decorated with a frieze of curled half-palmette scrolls, a contemporary decorative feature to be discussed further below. The *tirāz* bands of two figures contain pseudo-inscriptions [*Perseus*- PLATE 76].

Instead of dense rows of convoluted al-Ṣūfī 'bell-gathers', the British Library manuscript places occasional groups of small rippling curls along loose hanging drapery on the sleeve, waist-line or collars [Perseus – PLATE 76]. Draped areas of the body, such as the chest, thighs and lower arms, are outlined with plain ovals, and the drapery-folds fall between these loops. The plain profile of the bell-gather

164 Connections with the "traditional" al-Şūfī style were noted in the section The conservative al-Sūfī style above.

Or.5323: fol.12r. The inclusion of the tall hat relates to the classical iconography of the constellation, but its shape is that of a Turkish sharbūsh. This is the only al-Ṣūfī manuscript in which Cepheus wears only a skirt.

(described in the section on the conservative al-Ṣūfī style) terminates these falling pleats, at the centre and two sides of the figures' skirts.

Comparison with more conservative al-Ṣūfī images has shown these to be abbreviations of a more complex drapery style with a long tradition, but near identical 'abbreviations' can also be found in other thirteenth century paintings not related to al-Ṣūfī's illustrations. For example, the young servant depicted in a scene in the c.1240AD Artuqid *Maqāmāt* compares closely with the British Library *Serpentarius*: small curls align themselves along the close-fitting sleeve-end, the skirt-hem gathers in three places only, and the collar ripples slightly [PLATE 88]. ¹⁶⁷ The automatons depicted in the 1206AD Artuqid *Automata* manuscript wear robes with the same delineation of folds. ¹⁶⁸ Both manuscripts produce a less refined version of the British Library drapery style, ¹⁶⁹ but their very different facial types prevent any closer associations with the al-Sūfī.

The costumes in the c.1225AD Warqa wa Gulshāh manuscript-paintings are also drawn with three plain gathers sitting along the figures' skirt-hem, rounded loops

¹⁶⁶ Ar.3929: fol.131v.

¹⁶⁷ Cf. also c.1240AD Maqāmāt fol.79r; reproduced in Ward 1985 fig.5.

¹⁶⁸ A second link between our al-Şūfī and both Artuqid manuscripts is the mitre worn by the constellation Cepheus (fol.12r) [PLATE 27B]: a tall form of the Turkish fur-lined sharbūsh. This constellation always wears a tall hat, but a fur-lined version is rare. (The only other example is the 1125AD Qatar al-Şūfī, fol.24r). Ward argued that different shapes of sharbūsh were typical of different regions, and that this tall version is exclusive to the Artuqid court: "The distinctive shape of the sharbūsh seen in Artuqid painting is not seen in manuscripts produced elsewhere" (Ward 1985 pp.77-78).

This could be partly accountable to the larger scale of the al-Şūfī figures, which allows better detail.

outlining the upper legs [PLATE 89].¹⁷⁰ Baggy leggings (worn under a long skirt by men or women) crease into a pair of gathers at the lower hem, and a succession of loops hanging from knee-level.¹⁷¹ The Sasanian-style raised bell-gather is also occasionally depicted, demonstrating the ultimate origins of this drapery style.¹⁷²

In the 1199AD Kitāb al-Diryāq, many figures wear densely patterned costumes, but a minority wear robes drawn with stylised folds and creases [PLATE 87]. These also relate to the linear costume style under discussion. Tight curls and creases fit between oval or almost rectangular loops on the stomach, thigh or upper arm. The tight curls recall the al-Ṣūfī figures, but the decorative system is far more dense, which gives a different effect: the loops do not outline individual limbs to create a sense of volume, but are applied as small packed units irrespective of the body beneath. The same occurs in the mid-thirteenth-century Kitāb al-Diryāq, although the drapery style is more organised and varied than the 1199AD manuscript [PLATE 86]. The mid-thirteenth-century manuscript offers a more mannered version of the curls and folds, which distances its relation to the al-Ṣūfī. The Aghānī frontispieces feature an even more stylised version of drapery-folds, multiplying and minimising looped areas and folds to the appearance of tile pattern [PLATE 90].

_

¹⁷⁰ Compare the British Library Auriga (fol.22r) with two figures, the leftmost and second from right, on fol.5/8v of Warqa wa Gulshāh (reproduced in Melikian-Chirvani 1970 plate 4).

Compare the British Library sky *Perseus* (fol.21v) with the figure on the lower left on fol.3/6r of *Warga wa Gulshāh* (reproduced in Melikian-Chirvani 1970 plate 2).

¹⁷² Haz.841: fol.45/43a, (reproduced in Melikian-Chirvani 1970 fig.42). On the second figure from the right, there are two raised bell-gathers along the hem of his robe.

Holter discussed these Seljuk drapery folds in detail, distinguishing two main types (plus various subtypes) in the mid-thirteenth-century *Kitāb al-Diryāq* illustrations.¹⁷³ He notes that these fold-types may feature all together or separately, which is also true of other Seljuk-style manuscript-paintings. Most of the fold-types derive from Sasanian-style drapery, such as tumbling bell-gathers or plainer gathers, found in more original versions in conservative al-Sūfī illustrations. The plainer gather occurs in all of the Seljuk manuscripts cited above, while the bell-gather version appears occasionally in the c.1225AD *Warqa wa Gulshāh*, and mid-thirteenth-century *Diryāq*.¹⁷⁴ A subtype of Holter's Type 1 consists of a row of tight ripples, found in the British Library al-Ṣūfī, 1199AD *Diryāq*, 1206AD *Automata*, c.1240AD *Maqāmāt* and mid-thirteenth-century *Diryāq*.

Eight male figures in the British Library al-Ṣūfī wear one of two types of turban. ¹⁷⁵ Both types include *tirāz* bands decorated with half-palmette scrolls or pseudo-calligraphy, similar to the *tirāz* bands on the upper sleeves of many figures. The first type is worn by five figures, and consists mainly of two fabric bands wrapped across each other in an x-shape, criss-crossed over the forehead [Auriga- PLATE 31A]. ¹⁷⁶ The end strip of turban-fabric juts out almost horizontally from the crown of the head, forming a small narrow diamond, and terminating in a single pen-line. This horizontal feature also occurs in a Maqāmāt of 1222AD, although the turbans are in a

¹⁷³ Holter 1937B pp.14-15. He describes the convoluted folds as "Schnörkelfalten...Faltenformen, die außerordentlich stark verschnörkelt und ornamentalisiert sind, ohne aber zunächst alles organische Leben einzubüßen."

¹⁷⁴ A.F.10: fol.5v (reproduced in Holter 1937B plate 2).

The exceptions are *Cepheus* who wears an Artuqid *sharbūsh* (fol.12r), and *Perseus* (fol.21v), *Orion* (fols.63v, 64v) and *Centaurus* (fol.80r) who wear a diadem. The diadem features a small (Foot-note continued on the next page.)

different style [PLATE 91]. 177 The criss-cross turban, minus its small horizontal finial, does not occur in the two Artugid manuscripts mentioned. It does feature. occasionally, in the 1199AD Diryāq, 178 the c.1225AD Warga wa Gulshāh [PLATE] 89], and the mid-thirteenth-century Dirvāa. 179 As a variety of headwear prevails in these manuscripts, such as diadems, helmets, and crowns (as well as bare heads), even the occasional occurrence of the criss-cross turban remains relevant. It is also relatively common in early twelfth and thirteenth-century Kāshān ceramic decoration. 180

The second turban type in the British Library al-Sūfī is worn by the remaining three figures, and consists of narrow horizontal bands of fabric, bound together with a single triangular band, tied diagonally from the nape of the neck to above the forehead [Serpentarius-PLATE 92]. 181 This type of turban is found in the two Artugid manuscripts, and also throughout thirteenth-century Islamic manuscript-painting. 182

vertical teardrop shape, set above the forehead on a thin band around the head. The Perseus diadem consists of a more elaborate teardrop shape: a single palmette.

176 Or. 5323: Bootes (fol.13v), Auriga (fol.22r), and the sky-version of Sagittarius (fol.54r).

¹⁷⁷ Ar.6094: fols.49v, 93r, 133v, 181v (reproduced in Buchthal 1940 figs.1, 6, 13, 16). Nassar attributed the manuscript to Seljuk Jazīra (Nassar 1985 p.85), while Buchthal proposed a Syrian production, observing a Byzantine style (Buchthal 1940 p.126).

178 Ar.2964 (reproduced in Farès 1953 plate 15), the seated physician on the left.

A.F.10: fol.1r (reproduced in Holter 1937B plate 1), the figure to the centre right.

¹⁸⁰ Cf. 1187AD minā i bowl (Metropolitan Museum of Art, 64.178.2; reproduced in Watson 1994 plate 163). Discussion of the significant parallels between ceramics and manuscript-painting of the thirteenth-century period is continued below.

Or.5323: Serpentarius (fols.23v, 24v), and the globe-version of Sagittarius (fol.53r).

¹⁸² Cf. 1206AD Automata (fol.220r; reproduced in Ward 1985 fig.4), c.1240AD Maqāmāt (reproduced in Blochet 1929 plate 4), 1222AD Magāmāt (Bibliothèque Nationale Ar.6094; fol.147r; reproduced in Ettinghausen 1962 p.79), 1287AD Rasā'il Ikhwān al-Safā (fol.4r, reproduced in Ettinghausen 1962 p.98), etc. A similar version, with vertical folds bound beneath a diagonal sash. occurs in c.1220AD Nact al-Hayawan (British Library Or.2784: fols.96r, 103v; reproduced in Contadini 1992 plate 25); 1224AD De Materia Medica (Metropolitan Museum of Art, 57.51.21; (Foot-note continued on the next page.)

Both British Library versions of Auriga [PLATE 31A], Serpentarius [PLATE 92] and Sagittarius [PLATE 48A] also have a distinctive final strip of unravelling turban-fabric, which flares out behind the head in a dramatic flourish. The fabric fans out into a sharp triangle, with both corners accented with a single pen-line. This feature is also found in more traditional al-Sūfī manuscripts, though only in images of the constellation Sagittarius, where a group of stars behind the archer's head necessitates some figural element to extend well backwards [1009-10AD Oxford al-Saft Sagittarius - PLATE 48B]. 183 In the British Library al-Sūfī, the extensive flaring turban-sash is repeated in Auriga and Serpentarius, for decoration rather than function. The character of the folds and gathers is nonetheless different to the 1009-10AD version, and achieves something of a shorthand version of the typical arrangement. This is consistent with the derivative drapery style of Seljuk-style painting, and it is therefore unsurprising that a similar costume-detail can be found in the 1225AD Warqa wa Gulshāh manuscript [PLATE 93]. Similar though smaller examples, in which the pointed bell-gather juts horizontally from the turban, occur in the 1250AD Süleymaniye al-Şūfī and 1266AD Paris al-Sūfī. 184

Both British Library versions of *Serpentarius* wear distinctive knee-length riding-boots, with pointed toes [PLATE 92]. There is an oval cartouche of decoration at the front and back of the shin, and wrinkles around the ankle. The boot opens by means

reproduced in Ettinghausen 1962 p.87), and 1237AD Maqāmāt (Bibliothèque Nationale Ar.5847: fol.138r; reproduced in Ettinghausen 1962 p.116),

¹⁸³ This costume-feature is probably of Sasanian origin [PLATE 69]. Cf. 1009-10AD Oxford and 1266AD Paris al-Şūfī, where (as just mentioned) far smaller versions were used for decoration only, in other constellation-images. In classical western versions, these stars were accommodated in a trailing cloak. Islamic versions depict an unravelling turban. (See Chapter Three.)

¹⁸⁴ Compare especially the 1266AD *Bootes* and the Or.5323 Sagittarius (fol.53r).

of a slit running diagonally down the sides, from the back of the knee around to the top of the foot. Exactly the same type of boot is worn by many of the men illustrated in the c.1225AD Warga wa Gulshāh manuscript [PLATE 94], c.1218-19AD Kitāb al-Aghānī¹⁸⁵ and both the 1199AD and mid-thirteenth century Diryāq manuscripts. 186

Communicative Pairs: monumental paired figures in constellation images and ceramic decoration.

Just as the other thirteenth-century manuscripts discussed, so do the al-Sūfī illustrations find many parallels with the figural decoration on contemporary overglaze-painted ceramics. These were produced from the late twelfth to the thirteenth century, in Kāshān in Iran. They are painted in two spectacular techniques of luxury overglaze decoration: $min\bar{a}^c\bar{i}$ enamel and lustre-painting. ¹⁸⁷ Their glazed surfaces tend to be painted over with figural scenes, which might be anticipated in manuscript-painting: solitary figures, couples, rulers presiding at courtly assemblies, hunting horsemen, and so on. Ceramic painting is usually either small-scale and full of dense narrative action (recalling the c.1225AD Warga wa Gulshāh images), or large-scale, monumental and somewhat formal. 188

¹⁸⁵ Feyz.1566: fol.1r (reproduced in D.S.Rice 1953 fig.18).

¹⁸⁶ Ar.2964 (reproduced in Farès 1953 pl.11, 14); A.F.10: fol.1r (reproduced in Holter 1937B pl. 1). 187 Although it was once thought that (Iranian) lustre-painted ceramics were produced in Sava, Gurgan, Rayy and Kāshān, Watson has argued convincingly that Kāshān was the only place of

production for this luxury ware (Watson 1974).

188 Watson described three interrelated styles of Kāshān lustreware decoration, entitled a "Monumental", "Miniature", and culminating "Kāshān" style. The miniature and monumental styles occur on pieces dating between 1179 and 1191, and all dated examples from 1202AD onwards are in the Kāshān style (Watson 1974 pp.6-9, 12). All three styles can also be identified in contemporary minā^cī ware, also produced in Kāshān. The Monumental style may derive from Fatimid lustreware thought to have come to Iran with Egyptian craftsmen migrating to relative stability after the collapse of the Fatimids in 1171AD (Lane 1947 pp.37-38; Watson 1974 p.12).

The latter monumental format is an immediate point of comparison with the al-Ṣūfī illustrations. Their large-scale format tends to set them apart from contemporary Seljuk manuscripts, which rather suit the small-scale ceramic compositions filled with figures and isolated landscape details. The monumental format features large-scale figures, in pairs or small groups, drawn in a fluent sketchy style [PLATE 95]. The larger scale allows for fine detail in the facial features, although less attention is usually paid to the hands. The faces are very similar to the al-Sūfī figures: broad, with narrow eyes, long thin noses, small nose-tips and arched pen-line eyebrows neatly joining the line of the nose.

The paired constellation-figures of al-Ṣūfī's treatise are echoed in the couples depicted in these "monumental" $min\bar{a}^c\bar{\imath}$ and lustreware scenes. This is a coincidence of theme, but the British Library manuscript's treatment of the subject is exceptional to copies of al-Ṣūfī's treatise and characteristic of the stylistic group under discussion. Pairs of figures are produced in an innovative humorous style, new to the tradition of al-Ṣūfī illustrations, which injects liveliness into the strict format of detached figures. Nine of the twelve human constellation pairs are depicted facing one another, either both together on the same folio, or on facing folios [Bootes - PLATE 28B]. 190 One figure looks into the other's face, both figures may raise their

¹⁸⁹ Both lustre and minācī ceramics compare with the al-Ṣūfī illustrations, although delineation of costume-detail is more common in lustre than minācī, as the latter tends to apply flat multicolour patterns across the costume, disregarding the niceties of the figures' volume.

190 The exception are Andromeda (fol.32v), Sagittarius (fols.53r, 54r) and Centaurus (fol.80r)

The exception are Andromeda (fol.32v), Sagittarius (fols.53r, 54r) and Centaurus (fol.80r) (centaurs count here as humanoid). All three are drawn on a smaller scale to the other figures. Andromeda and Centaurus are depicted one above the other on the same folio, Sagittarius appears on separate folios. This is to demonstrate that these three constellations are depicted in an uncharacteristic format to the rest of the manuscript.

hands to one another as though in salutation, and in the case of the constellation Perseus, the pair cross swords in a seemingly tense combat [PLATE 76]. 191

The pairs also have distinct facial expressions: one has perfectly rounded arching eyebrows, joining at the centre. The other raises his eyebrows at the centre, in a quizzical expression. Both expressions are also to be found in the 1216-17AD Kitāb al-Aghānī illustrations [PLATE 96A], the c.1225AD Warga wa Gulshāh, 192 the midthirteenth century Kitāb al-Diryāq frontispiece [PLATE 96B], and also in Kāshān lustreware [PLATE 95] and minācī ware. 193 Melikian-Chirvani concluded that the frowning versions of the classic Iranian "Moon-Face" signified almost any extreme emotion, citing various examples of sorrow, surprise, and battle rage in the c.1225AD Warqa wa Gulshāh paintings. 194 Although such emotions would be appropriate to the characters in the tragic romance, the alternative version to the typical placid Moon-Face may have another function, which applied to non-narrative contexts. In Kāshān lustreware particularly, there is a frequency of densely grouped assemblies, featuring rows of near identical Moon-Faces. 195 (The courtly production milieu of the manuscripts prompts similar depictions of assemblies, especially in the frontispiece where it is normal to depict the patron.) The occasional interruption of the typical facial expression with rounded eyebrows, by one slightly frowning face.

¹⁹¹ This in no way detracts from the didactic purpose of the treatise. Indeed, by presenting the two mirror-images side by side, the artist allows the student to perceive at once the relationship between

¹⁹² Haz.841: fol.23/22a (reproduced in Melikian-Chirvani 1970 fig.22). Gulshāh on horseback.

¹⁹³ Melikian-Chirvani noted the frowning version of the "Moon-Face" in Kāshān minācī, the midthirteenth-century Kitāb al-Diryāq, and also volumes 17 and 19 of Kitāb al-Aghānī. (Melikian-Chirvani 1967 pp.17, 21).

194 Melikian-Chirvani 1970 p.54.

is a simple and effective device to avoid monotony. In representations of paired figures, the apparent axial symmetry is jogged by this simple difference between the figures' expressions. This occurs in Kāshān ceramics, particularly in the Monumental or Kāshān styles, where a lone couple is frequently the subject. Axially symmetric pairs are very traditional in the decorative arts of Islam, and this suggestion of communication between the apparently identical figures is stimulating to the viewer. Similarly, al-Ṣūfī images are restricted by tradition, but can still be enlivened.

Thus, into this apparently static tradition of constellation-mapping comes the narrative spirit so typical of thirteenth-century Islamic figural art. Usually, these are two otherwise identical mirror-images, conceived as static scientific diagrams, independent of one another. In the other al-Ṣūfī manuscripts, constellation pairs may be on the recto and verso of the same folio, back-to-back on opposite folios, facing one another on the same page-opening, or on unrelated folios. The consistent format of the British Library al-Ṣūfī is not repeated, and in the event of constellation pairs facing one another, the figures do not 'interact' with variety in facial expression, eyecontact, nor do they touch.

The significance of this device in the British Library al-Ṣūfī figures, is that it extends the manuscript's stylistic similarity with Seljuk manuscript-painting and ceramic decoration. Comparative links have been made with linear style, figural type, drapery-folds, and elements of costume. As well as the placid "Moon-Face" type, the

•

¹⁹⁵ Cf. a 1203-04AD bowl (Ashmolean Museum 1956.33; reproduced in Brend 1991 p.89), and an early thirteenth-century tray (Tareq Rajab Museum CER-669-TSR; reproduced in Fehérvári 1998 p.39).

constellation images employ the less common frowning alternative facial type, also a resort in the cited miniatures and ceramics.

Rearing horses in manuscripts and ceramics: companions for Pegasus

With the common characteristics of linearity, and preference for single or paired "monumental" figures, further comparable examples between the British Library al-Sūfī and Kāshān ceramics present themselves. In particular, the truncated figure of the al-Sufi Pegasus, the winged horse [PLATE 3], 196 compares with two pieces of Kāshān lustreware, both depicting a horse and rider. One is a bowl decorated with a single horse and rider, reserved against a foliate lustre ground [PLATE 97A]. 197 The other is a star-tile dated 1211AD, on which is painted in reserve a trotting horse with a rider on its back and two hunting dogs alongside [PLATE 97B]. 198 The bulky shape and precise linear character of the horse's profiled head is common to all three examples, and to many more from lustreware, minācī, and related manuscriptpainting. A circle runs around the horse's heavy cheek to meet the eye, where a second line runs straight down the nose. The muzzle features a prominent upper lip. The forelock splits into two strands, one tossed up over the forehead, the other curling back around the ear. The flowing mane is depicted with single waving lines. The bridle is of identical design, featuring curved pieces projecting forward from the bit, and a beaded double collar close behind the head. 199 A furry tassel hangs from

¹⁹⁶ Or.5323: fol.30v.

¹⁹⁷ Victoria & Albert Museum; reproduced in Pope vol.10 plate 632.

¹⁹⁸ Boston, Museum of Fine Arts Ross Collection 07.903; reproduced in Watson 1974 plate 7.

¹⁹⁹ The distinctive bridle is not restricted to this painting-style or region however, as the same design also occurs in unrelated contemporary manuscripts, in which animals are drawn in a different style. Cf. "Horsemen waiting to participate in a Parade", 1237AD *Maqāmāt* produced in Baghdad (Bibliothèque Nationale Ar.5847: fol.19r; reproduced in Ettinghausen 1962 p.118).

the beaded neck-collar.²⁰⁰ The forelegs rear out together, and the head is held close in, as though restrained by the reins. A near circle is drawn at each knee. The rearing horse controlled by its rider is a common theme in Islamic art, and features in the same style on several other pieces of Kāshān ceramics, of both lustreware and minā^cī. The same skilful treatment of horses is also consistent throughout the manuscript group, and similar horses feature in the 1199AD Kitāb al-Diryāq,²⁰¹ c.1225AD Warqa wa Gulshāh²⁰² and the mid-thirteenth century Kitāb al-Diryāq [PLATE 86].²⁰³

Half-palmettes and simurgh-heads in curling scroll motifs

As well as a bulky linear style of depicting horses, the al-Ṣūfī *Pegasus* has another distinctive feature which links with Seljuk art: its elaborate ornate wings. These are long, narrow, and held high with the tips curling forward behind the horse's head. Single half-palmette scrolls or animate bird-head scrolls project from the tips of each primary feather. The wings sprout from around the shoulder, where another curled scroll sits behind the foreleg. Further flourishes project from shorter feathers at the base of the wing.

²⁰⁰ Cf. also 1199AD Kitāb al-Diryāq (reproduced in Melikian-Chirvani 1967 fig.12, etc.); fols.4/7b (etc.) of c.1225AD Warqa wa Gulshāh (reproduced in Melikian-Chirvani 1970 plates 3, 11); the 1211AD star-tile; a mid-thirteenth-century stemmed cup (Bibliothèque Nationale; reproduced in D.S.Rice 1957 p.307); etc.

²⁰¹ Ar.2964: fol.5 (reproduced in Farès 1953 pl.14).

²⁰² Haz.841: fol.19/19v, "Rabī^c rides out to fight Warqa" (reproduced in Melikian-Chirvani 1970 plate 18).

A.F.10: fol.1r (reproduced in Holter 1937B plate 1). The upper register of the three-tiered frontispiece depicts four horse-riders hunting down an onager and a deer.

Although both Pegasus figures revel in particularly fine examples, this style of ornate wing occurs throughout thirteenth-century Seljuk decorative art, on winged horses, griffins and winged dragons.²⁰⁵ Although less complicated, the most immediately comparable example is a Kāshān lustre-painted bowl depicting a winged horse, with its head turned back over its shoulder [PLATE 98]. 206 Drawn in the same style (including the same ornate bridle described above), the horse also has a long wing held vertical, tapering towards its curling tip. The ornate wing occurs again on a twelfth- or thirteenth-century engraved bronze tray from Iran, depicting a griffin.²⁰⁷ The griffin's wing is long and narrow, sprouting from around the shoulder. curling forwards at the tip and terminating in a forked palmette – as does the sky version of the al-Sūfī Pegasus. As with the Pegasus, round flourishes project from the primary feathers. A similar wing occurs in a c.1220AD stone-relief of a knotted winged dragon, from Konya.²⁰⁸ On a thirteenth-century gold-inlaid steel mirror from Anatolia, a frieze of hunting animals runs around the outer rim. 209 Many of the animals are winged, such as two centaurs, two griffins and two dragons, and their long narrow wings curl around the shoulder and at the tips of the main feathers. Among early al-Sūfī versions of *Pegasus*, the wing is always drawn with a curved tip, from the 1009-10AD Oxford manuscript on. The closest versions to the British Library Pegasus are those of 1131AD (Mayyāfāriqīn/Mosul?), 1171AD (Mosul)

_

²⁰⁴ These have a similar profile: the broad half-palmettes with their curved tips echo the shape of the round-headed short-beaked bird's head. The larger of the bird-scrolls has a short curved beak and small ears, like a mythical *simurgh*.

²⁰⁵ A related version of this ornate wing style has a pre-Seljuk history, and features in tenth-century

²⁰⁵ A related version of this ornate wing style has a pre-Seljuk history, and features in tenth-century Buyid silk design (Karachi Museum; reproduced in Kühnel 1967 plate 1506b). A more formal version occurs in Sasanian silks (example reproduced in Kühnel 1967 p.3075), and in "conservative" al-Ṣūfī manuscripts such as 1009-10AD Oxford, 1250AD Topkapı, 1266AD Paris.

²⁰⁶ Metropolitan Museum of Art, 16.87 (late twelfth century).

²⁰⁷ Victoria & Albert Museum; reproduced in D.T.Rice 1975 p.74.

²⁰⁸ Konya, Ince Minareli Museum; reproduced in Curatola 1989 fig.38.

[PLATE 37B] and 1250AD. The former two are simpler, but also composed of long primary feathers of which the longest curls forward. In the more elaborate 1250AD version, every second main feather is curled.

A particular feature of the al-Sūfī Pegasus wing is a simurgh-head scroll: a round bird's head with short curved beak, tufty ears and cheek wattles. This precise motif occurs in three stone relief archways, in the wings of two dragons on the 1221AD Talisman Gate in Baghdad [PLATE 99A], 210 on the wings of two dragons on an archway (c.1233-59AD) at al-Khān in the Sinjār mountains (c.100km west of Mosul),²¹¹ and in the tail-tips of intertwined dragons around the doorway of Imām Bahir mausoleum, also near Mosul [PLATE 99B]. In the first two stone-reliefs, the dragons have long narrow wings, sprouting from a palmette scroll under the oxter. The Talisman Gate wings are extremely similar to the Pegasus: the wings are held vertical, shorter feathers gather at the base of the wing, around the round profile of the shoulder, each primary wing-feather terminates with a small round curl, and the long tip of the wing flourishes into a scroll encircling a simurgh-head. The dragon relief at al-Khān features long meandering wings, flourishing with curls and the simurgh-head. On the Imam Bahir relief, two simurgh-heads are addorsed, each sprouting from the end of a snake-like knotted dragon. Facing paired simurgh-heads occur in the same context on a cast bronze door-knocker from twelfth-century Iraq: two simurgh-heads sit in the curling tails of two entwined winged dragons. 212 The

²⁰⁹ Topkapı Museum, reproduced in Grube 1966 p.97.

²¹⁰ The gate was blown up in 1917; reproduced in Preusser 1911 plate 16.

²¹¹ Reproduced in Preusser 1911 plate 17. Date given in Gierlichs 1996 p.29.

²¹² Berlin. Museum für Islamische Kunst; reproduced in Grube 1966 fig.46. Another example is reproduced in situ on a doorway at Jazīrat ibn 'Umar (Preusser 1911 plate 36), and two more are in the (Foot-note continued on the next page.)

simurgh-head occurs elsewhere in Seljuk-style art as a decorative scroll. A later example is a 1271-72AD stone relief on the Gök madrasa in Sivas, Anatolia, depicting various animal-heads entwined together, including a simurgh-type bird. 213

The distinctive bird's head with cheek-wattles and pointed ears also features on a double-headed eagle used as a heraldic emblem for different early thirteenth-century rulers, such as the c.1208-09AD Artugid relief on a wall-tower in Āmid, for Mahmūd b. Muhammad b. Qarā-arslān b. Dawūd b. Sukmān b. Urtuq²¹⁴ and a stone-relief for Rum Seljuk ruler, Kai Oubādh I (d.1237AD), in Konva.²¹⁵

The simurgh-head occurs as a decorative motif throughout the British Library al-Sūfī, as do the half-palmette scrolls. The half-palmette scrolls appear in a frieze, on tirāz bands on upper arms and turban-cloth [Bootes- PLATE 28B], 216 and along the base of Cassiopeia's chair. 217 Plainer tiny versions of the individual scroll appear as rippling curls in the costume-drapery of most figures [Auriga- PLATE 31A]. 218 The

Khalili collection (early thirteenth-century, MTW1407, 1428: PLATE 100). Gierlichs records a fifth, at the Ulu Cami, Cizre (Gierlichs 1996 p.32). Grube wrote: "The motif of a dragon with a snake-like body and a tail ending in a griffin's head is quite common in Seljuk art of Anatolia and Iraq. Its special significance is not clear; it may have been heraldic, or it may have been cosmologicalsymbolical."

Reproduced in Diez 1949 p.100.

²¹⁴ The double-headed bird has been linked with Mahmūd's possession of both Āmid and Kaifa (Von Berchem & Strzygowski 1910 pp.95-96). Reproduced fig.41.

²¹⁵ Konya Museum; reproduced in Von Berchem & Strzygowski 1910 fig.47. The representation of birds in thirteenth-century heraldry and rulers' titles is discussed on pp.92-99, with relation to the Seljuks, Zangids, and Artuqids.

²¹⁶ Or.5323: Bootes (fol.13v), Cassiopeia (fol.19r), Auriga (fol.22r), Serpentarius (fols.23v, 24v), Andromeda (fols.32v, 33r), Sagittarius (fols.53r, 54r), Aquarius (fols.58r, 58v).

217 Or.5323: Cassiopeia (fol.19r).

²¹⁸ Cf. especially Perseus (fol.21v), Auriga (fol.22r) and Andromeda (fol.32v). In both Andromeda images, the bottom hem of the figure's leggings stretches backwards, and terminates in a flourishing curl. A broader pattern of half-palmettes features on the saddlecloth of Sagittarius (fols.53r, 54r).

simurgh-head also features at the bow of the ship constellation Argo Navis,²¹⁹ and replaces the usual lion's head of Delphinus, the dolphin [PLATE 4].²²⁰

Carboni compared the British Library *Pegasus* image with three miniatures of the archangels Jibrā'il, Mikā'il and 'Izrā'īl from a c.1300AD copy of Zakarīya al-Qazwīnī's 'Ajā'ib al-Makhlūqāt, describing the angels' wings as "a simpler exploitation of the same treatment", though "much less ornamental" [PLATES 101, 102].²²¹ The angels have two or three pairs of wings each, which curl at the very tip into a tight round scroll of two entwined half-palmettes. However, the rest of each wing is quite straight and indeed far plainer than the al-Sūfī *Pegasus*, showing a different, almost naturalistic approach: the different types of feathers are treated differently, and drawn individually in straight rows.²²² Aside from the curled tip, the connection with the al-Ṣūfī *Pegasus* wing is not very strong.²²³ Carboni makes two other stronger comparisons between the manuscripts: the archangels Jibrā'il and Mikā'il wear a *tirāz* band on their upper sleeves, which matches the half-palmette

²¹⁹ Or.5323: Argo Navis (fols.75r, 75v).

Or.5323: Delphinus (fol.28v). The simurgh-head has long feathery eyebrows tufting out from the back of the head. This Delphinus iconography is unique to the British Library al-Şūfī, although the simurgh head also features in the constellation iconography of three Islamic celestial globes of the late thirteenth century, probably all produced in Marāghā, north-western Iran. (See Chapter Three for discussion of constellation iconography, and conclusions about the relationship between the British Library al-Şūfī and the three globes.)

221 Carboni 1992 p.455. British Library Or.14140: fols.12r, 13r. Carboni attributed the manuscript to

²²¹ Carboni 1992 p.455. British Library Or.14140: fols.12r, 13r. Carboni attributed the manuscript to the court of Fakhr al-Dīn ^cIsa b. Ibrahīm (d.1302-03AD), the governor of Mosul, and proposed the date c.1300AD (Carboni 1992 pp.533-534). There is further comparison between the Qazwīnī and al-Sūfī images below, under *Late thirteenth-century styles of painting*.

²²² Aside from the very tip of the wing, the Qazwīnī primary feathers do not curl out individually. In

Aside from the very tip of the wing, the Qazwīnī primary feathers do not curl out individually. In the al-Ṣūfī and the related Seljuk examples cited, the wings consist of a single row of long curl-tipped feathers, and sometimes also a short cluster around the base. There are two types of feathers in the Qazwīnī angels' wings: rounded feathers drawn like fish-scales at the base, and rows of long straight feathers with pointed ends in the main part of the wing, curling towards the tip.

²²³ Carboni does not discuss three other versions of ornate wings, in minor illustrations in the Qazwīnī manuscript. All three curl at the shoulder and the wing-tip: the bull-shaped angels of the first heaven (fol.13v), the hippopotamus – depicted as a winged horse (fol.51v), and a horned horse (fol.135v).

frieze from the al-Sūfī images. The patterned silhouette inside the archangels' haloes resemble the (plainer) sky Auriga in the al-Sūfī [PLATE 31A].²²⁴ Versions of the half-palmette scroll also occur in early thirteenth-century Seljuk art: in architectural spandrels and in a figure's patterned robe in the c.1225AD Warqa wa Gulshāh.²²⁵ and in the large crescents of the 1199AD Diryāq frontispieces [PLATE 103].

Carboni attributes the British Library al-Şūfī to the second half of the thirteenth century, and suggests eastern Anatolia as its provenance - on the grounds of undiscussed "similarities" with the constellation-images in a 1286AD copy of an al-Bīrūnī astrology treatise, which he attributes to Konya.²²⁶ In terms of figural style and constellation iconography, the astrology treatise is largely unrelated to the al-Sūfī manuscript.²²⁷ There is one common decorative motif: a half-palmette scroll, occurring mainly in different contexts to the al-Sūfī manuscript, which is set in the shoulder-blade of most quadruped constellations²²⁸ and in decorative friezes in the fish-tail of Capricorn and the bowl of Crater. 229 The only close link is the al-Bīrūnī Pegasus and its long narrow wing, with a half-palmette scroll at the wing-tip, base of

²²⁴ Carboni 1992 p.455. Or.5323: Auriga (fol.22r). This is the only such decorated halo in the al-Sūfī manuscript, and haloes (even plain) only feature on ten (out of thirty) figures. Less convincingly, Carboni suggests that al-Şūfī illustrations inspired the style of the Qazwīnī archangels "in their size and general features" (Carboni 1992 p.456). This seems unlikely given the iconographic tradition of winged genii in contemporary manuscripts and monumental architectural reliefs. ²²⁵ Haz. 841: fols.5/8v, 21/20v (reproduced in Melikian-Chirvani 1970 plates 4, 20).

²²⁶ Carboni 1992 pp.454-455, and footnote 21. British Library Add.7697: Kitāb al-tafhīm li'awā'il altaniim. (Titley attributed the manuscript to Maragha, Titley 1983 p.17.) Fols.41v-54v contain single images of the constellations, including an exceptional example of the Arab constellation of the shecamel (fol.54r). The manuscript is dated 1286AD, and contains a note written in Konya stating that the manuscript was sold in Sivas in 1332AD. The scribe's name, Ibn al-Ghulām al-Qunawī, shows that he was a native of Konya, but the manuscript's provenance is not stated.

²²⁷ The only common detail of iconography is a simurgh head at the prow of Argo Navis (fol.52v). ²²⁸ Add.7697: Ursa Major (fol.41v), Aries (fol.46v), Taurus (fol.46v), Leo (fol.47v), Canis Major (fol.52r), etc. The British Library al-Sūfī animal-constellations are not depicted in this style. ²²⁹ Add.7697: Capricorn (fol.49r), Crater (fol.53v).

the wing, and by the oxter.²³⁰ As has been suggested earlier however, this style of ornate wing is also found in Seljuk art from Anatolia, Iraq and Iran, dating from the twelfth and thirteenth centuries, and therefore its presence in both manuscripts does not prove that they share close regional provenance. Most of the human figures have a decorated halo, drawn as a double-line, some with a ridged outer profile.²³¹ This differs from the al-Şūfī and Qazwīnī haloes, and seems instead to be a simplified version of 'laurel wreath' haloes found in the 1199AD *Kitāb al-Diryāq*.²³² A second stylistic link with that manuscript, the wings of constellation *Virgo* are extremely similar to the winged genii on the 1199AD frontispieces.²³³ In conclusion, there are shared motifs between the al-Şūfī and al-Bīrūnī manuscripts, but the similarity is not enough to propose the same provenance, as their common elements are somewhat widespread in Seljuk art.

Late thirteenth-century styles of painting

As mentioned above, the fact that the British Library al-Ṣūfī illustrations have aspects of Seljuk figural style and iconography does not prove they were produced during the political rule of the Seljuks or their "successor states".²³⁴ Production in a

-

²³⁰ Add. 7697: Pegasus (fol. 45v). Otherwise, the style of the horse itself is quite different.

Add.7697: Cepheus (fol.42r), Bootes (fol.42v), Hercules (fol.43r), Cassiopeia (fol.43v), Andromeda (fol.46r), Gemini (fol.47r), Virgo (fol.47v), Sagittarius (fol.48v), Orion (fol.50r), Centaurus (fol.51v).

²³² Cf. reproductions in Farès 1953 plates 3, 4, 7-9, 11-15.

Reproduced in Farès 1953 plates 3, 4. Of course, these two manuscripts have different figural styles, and date almost a century apart, but the al-Bīrūnī illustrations seem to refer to the same decorative tradition. The "laurel wreath" halo also occurs in a c.1240AD Maqāmāt (fol.151r).

²³⁴ This term was coined by C. Hillenbrand, and describes the Artuqids of Diyar Bakr, and Zangids of Mosul (C. Hillenbrand 1985 p.11).

Seljuk style could easily continue under new patrons, by the same artists.²³⁵ Although infamous for their grand-scale massacres of conquered populations, the Mongols are also known to have retained the skilled craftsmen of their new territories, for future employment. There was therefore no abrupt stylistic change in Islamic art immediately after the Mongol invasions of the 1220s and 1250s, although the gradual influence of Chinese style began in the last decade of the century. 236 Initially, this influence was felt with the introduction of distinctly 'Mongol' decorative motifs, such as lotus flowers²³⁷ and curling clouds.²³⁸ and costume details, such as the cloud collar and long-brimmed feathered hat.²³⁹ None of these manifestly 'post-conquest' Mongol elements can be identified in the al-Sūfī manuscriptillustrations however, and consequently I would date the manuscript before the 1290s.²⁴⁰ Late thirteenth-century Il-Khānid painting should therefore be examined for Seljuk stylistic links to the al-Sūfī illustrations. The key post-conquest manuscripts are:

²³⁵ On the subject of the development of Seljuk style after the mid-thirteenth century, there have been proposals that Mamluk painting of Syria and Egypt also developed from Seljuk art (Holter 1937A, Grube 1968). An early example, the 1273AD Risālat Dacwat al-Attibā' of Ibn Butlān, attributed to Mamluk Syria (Biblioteca Ambrosiana, Milan, A.125 Inf; fol.35v reproduced in Ettinghausen 1962 p.144) is markedly different from the al-Sūfī images, although derivations of the Moon-Face and the stylised drapery-folds are nonetheless present. This comparison demonstrates the style's bifurcation in two different environments. [Contadini presented a more complex encapsulation of Mamluk style: "a combination of Syro-Iraqi elements in the Byzantine and late-classical tradition, and Arab elements peculiar to the Baghdad School; [with the addition of] Seljuk [and] Mongol elements" (Contadini 1988-89 p.43).]

^{236 &}quot;...it is evident that in many areas of artistic creativity pre-Mongol traditions form an essential part in the creation of the new Mongol style in Islamic art which emerged towards the end of the thirteenth century" (Grube 1978 p.162). The continued production of high-quality manuscripts in post-conquest Baghdad is discussed in Simpson 1982.

²³⁷ Lotus flower: 1299AD Marzubānnāma (Istanbul Archaeology Museum Library no.216: fol.7r; reproduced in Simpson 1982 p.104).

²³⁸ Chinese curling clouds: 1297-1300 Manāfi^c al-Ḥayawān (Pierpont Morgan Library M.500:

fols.42r, 42v, 48v, 49v; reproduced in Schmitz 1997 figs. 20-23).

²³⁹ Occurrence of Mongol-style clothes: 1290AD Ta'rīkh-i Jahān-Gushā frontispiece (Bibliothèque Nationale Suppl.Pers.205: fols.1v-2r; reproduced in Simpson 1982 p.112). Soucek suggested that all of these motifs could have been introduced on imported textiles (Soucek 1980 p.89).

<i>Wasit</i> 1280AD	^c Ajā'ib al-Makhlūqāt	(Bayerische Staatsbibliothek, Arab.464) ²⁴¹	
Baghdad			
1287AD	Rasā'il Ikhwān al-Safā	(Süleymaniye Library, E.E.3638) ²⁴²	
1290AD	Ta'rīkh-i Jahān-Gushā	(Bibliothèque Nationale, Sup.Pers.205) ²⁴³	
1299AD	Marzubānnāma	(Istanbul Archaeology Museum, no.216) ²⁴⁴	
Marāgh ā			
1297-1300	Manāfi ^c al-Ḥayawān	(Pierpont Morgan Library, M.500) ²⁴⁵	
Mosul (?)			
c.1300AD	^c Ajā'ib al-Makhlūqāt	(British Library, Or.14140) ²⁴⁶	

The 1280AD ^cAjā'ib al-Makhlūqāt was copied in Wasit during the author's lifetime (Zakarīya al-Qazwīnī died in 1283AD). Its illustrations are related to another style of early thirteenth-century painting, a related but distinct group to the primary group of Seljuk manuscripts discussed in previous sections [PLATE 104]. The Qazwīnī animals, figures' faces, turbans, and especially depiction of drapery closely resemble both the c.1220AD Kitāb Na^ct al-Hayawān [PLATE 105A]²⁴⁷ and 1224AD

²⁴⁰ As discussed in Chapter One, the presence of a diagram dated 1279-80AD at the back of the al-Sūfī manuscript brings back the latest possible point by another decade.

²⁴¹ Two miniatures reproduced in Ettinghausen 1962 pp.138-139.

²⁴² Double frontispiece reproduced in Ettinghausen 1962 pp.98-99.

²⁴³ Double frontispiece reproduced in Richard 1997 p.41.

All three miniatures reproduced in Simpson 1982 pp.100, 102, 104. Cf. Simpson's discussion of why only the introductory section was illustrated (Simpson 1982 pp.105-106).

The question over the date of this manuscript arises from a difficulty of reading the third number in

²⁴⁵ The question over the date of this manuscript arises from a difficulty of reading the third number in the colophon date. The final number may be a seven or a nine, making the date 697H (1297-98AD) or 699H (1299-1300AD) (Schmitz 1997 p.11; cf. Grube 1978 fig.1 for a reproduction of the colophon). Thirty-eight miniatures are reproduced in Schmitz 1997.

All miniatures reproduced in Carboni 1992, where the manuscript was the focus of a doctoral thesis. Carboni proposed c.1300AD Mosul as the provenance.

²⁴⁷ British Library Or.2784. This manuscript was also the focus of a recent doctoral thesis, and has been attributed to a manuscript atelier perhaps connected to Syriac Christian monasteries near Mosul, c.1220AD (Contadini 1992 pp.287-292). Contadini identified many Seljuk aspects in these illustrations, which I do not dispute. The stylistic group under discussion here features a different facial type and drapery style to the Na^ct (or related 1224AD Dioscorides). Perhaps a broader assessment would identify the two groups as branches of the same style, but such a discussion is beyond the scope of this thesis.

Dioscorides herbal manuscript [PLATE 105B].²⁴⁸ An important differentiation from the primary Seljuk manuscripts discussed (and the British Library al-Ṣūfī) is the treatment of the face, which lacks the symmetry of narrow "Moon-Face" features. Unlike the long narrow eyes, the eyes are drawn small and round, though still with horizontal kohl lines running to the edge of the face. The eyes are often slightly joggled, sitting on different levels to one another, and there is a definite preference for the profile compared to the al-Ṣūfī illustrations. In profile, the Qazwīnī figures have larger noses with rounder tips than the al-Ṣūfī profiles (such as the four *Gemini* figures), and no necks.²⁴⁹

The 1287AD Rasā'il Ikhwān al-Safā [PLATE 106] and the 1299AD Marzubānnāma were both copied in Baghdad, and also show stylistic derivation from the 1224AD Dioscorides and 1280AD 'Ajā'ib al-Makhlūqāt. Again, there is no significant connection with our al-Ṣūfī manuscript. Both manuscripts share a distinctive aspect of style: the folds of the figure's robes and turbans are drawn in thick gold lines, recalling figures on inlaid metal. The 'metal inlay style' of gold outlines is also

_

²⁴⁸ The colophon is in the Topkapi Library (A.S. 3703), and twenty-nine detached illustrated folios are dispersed in international collections. The detached miniatures are described and reproduced in Buchthal 1942. Although Buchthal linked this manuscript to a "Baghdad School of Painting", there is no solid basis for such an attribution – or even for the existence of such a school (see Grabar 1984 p.10; Contadini 1992 pp.280-285.). Similarities between the *Na^ct* and Dioscorides illustrations are discussed in Contadini 1992 pp.216-227.

²⁴⁹ The four al-Ṣūfī Gemini figures make particularly appropriate comparison with many Qazwīnī illustrations of the natives of weird and distant islands, as these are often depicted nude, in profile and in groups (cf. fols.59v, 60r, 62v).

²⁵⁰ Fol.5r of the 1299AD Marzubānnāma is an interior scene, depicting a scholar discussing literature

before four seated listeners (reproduced in Simpson 1982 p.102). The theme, composition and setting recall similar scenes of intellectual debates in scientific manuscripts such as the c.1220 Na^ct al-Hayawān and 1224AD Dioscorides (cf. single folio: British Museum OA1934.10-13.01; reproduced in Buchthal 1942 fig.15).

251 Allan comments on "the relationship between painted designs on paper and inlaid designs on

²⁵¹ Allan comments on "the relationship between painted designs on paper and inlaid designs on metalwork", referring specifically to the 1287AD Rasā'il Ikhwān al-Safā, 1290AD Ta'rīkh-i Jahān-Gushā and 1299AD Marzubānnāma (Allan 1995 p.73). Soucek suggested that the gold outline (Foot-note continued on the next page.)

used in the double-frontispiece of the 1290AD *Ta'rīkh-i Jahān-Gushā*, although to a lesser extent [PLATE 107]. That manuscript has been attributed to Baghdad, ²⁵² and its two paintings are also unrelated to the al-Ṣūfī. Even though the faces of the figures (and animals) have been defaced, the paintings can be read as an interesting moment in the accession of Mongol style into Islamic art. The artist has employed Islamic motifs, such as the young groom seated beneath the ruler's waiting horse, the bird of prey hunting down another bird, the seated author-figure, and a simple tree filling out the picture-space around the figures. These are delivered in Mongol style: the figures' costumes, the horse's decorated saddle, the curling Chinese clouds overhead, and the large lotus blossoms hanging in the pomegranate tree. ²⁵³ The paintings are far too integrated with novel Mongol elements to assist a discussion of the British Library al-Ṣūfī illustrations.

The 1297-1300AD Manāfi^c al-Ḥayawān was completed in Marāghā, the first capital of the Il-Khānid dynasty.²⁵⁴ Schmitz identified the hands of three thirteenth-century artists among the hundred and three miniatures. The first artist, named Painter I by Schmitz, worked in the most 'old-fashioned' style for the period. He is obviously relevant to our discussion of the continuation of early thirteenth-century styles in the early Mongol period: "Work by Painter I reflects an old and soon to be superseded

•

imitates Chinese tapestries or embroidered panels, and discussed the influence of imported Chinese textiles and "domestic" Il-Khānid textile ateliers on Islamic painting (Soucek 1980 pp.88-89).

²⁵² Simpson 1982 p.114; Richard 1997 p.41. Thick gold lines also feature in the c.1300AD Qazwīnī archangels, on cuffs and skirt-hems, belt-sashes and the upper profile of wings.
²⁵³ The dichotomy is discussed in Ettinghausen 1959 pp.44-52, and Simpson 1982 pp.111-114.

²⁵³ The dichotomy is discussed in Ettinghausen 1959 pp.44-52, and Simpson 1982 pp.111-114. Simpson described "a series of elements derived from the artistic repertoires of both Islamic and Oriental visual traditions and juxtaposed in a somewhat discordant manner" (Simpson 1982 p.113). See also Soucek 1980.

Seljug painting style and shows almost no Chinese influence". 255 Eleven of the Manāfi^c paintings are attributed to Painter I.²⁵⁶ as are (tentatively) four paintings, of the planet Mercury and three archangels, from the c.1300AD 'Ajā'ib al-Makhlūgāt in the British Library.²⁵⁷

One of Painter I's Manāfi^c images depicts a man and woman standing together between two trees [PLATE 108]. Both are naked, except for long cloaks wrapped around their shoulders and held up to their chests. The man has black shoulder-length hair, curling at the ends, and the woman has long black hair, hanging in two long tresses to knee-level. Both have plain gold haloes, and broad faces. Their eyes are narrow, and the man has a moustache and a light beard. Grube wrote that these figures derive "directly" from Seljuk painting, 258 as did Schmitz. 259 Schmitz described similarities between the Painter I miniatures and the two Seljuk-style copies of Kitāb al-Diryāq: hairstyles, gold haloes, drapery, the man's pose, leafy backdrop, and general layout of text and chapter-headings. While there is certainly a connection with the text format, the other factors are not exclusive to the Seljuk style of painting. Gold haloes and long dark pigtails are also common in other thirteenthcentury Islamic manuscript-painting, as is the landscape backdrop of leafy bird-filled

²⁵⁴ Although the text had just been translated for Ghazan Khān, this is not his personal copy – the actual patron's name is provided within a shams on fol.2r: Shams al-Dīn ibn Ziyā' al-Dīn al-Zūshkī (Schmitz 1997 pp.15-16). 255 Schmitz 1997 p.13.

²⁵⁶ M.500: fols.4v (Man & Woman), 11r (Lions), 13r (Elephants), 14v (Rhinoceros), 15v (Tiger), 16r (Giraffe), 16v (Camel), 18r (Leopard), 18v (Cheetah), 19r (Wolf), 20v (Hyena). Or.14140: fols.8r, 12r, 13r.

²⁵⁸ He attributed the figures to Seljuq style, and landscape to the "Baghdad School" (Grube 1978 p. 164). Barrett had linked these paintings to the "Baghdad School" (Barrett 1952 p.4). ²⁵⁹ Schmitz 1997 p.13.

trees upon a simple grass strip. 260 The man's pose, resting on one leg with the other bent at the knee, occurs throughout early thirteenth-century manuscripts. 261 The Manāfi^c drapery style is not related to Seljuk types however, even as a later derivation. The cloaks are filled with parallel pleats, and the woman's cloak falls behind her in an angular zigzag. 262 The hemlines are gold. Similar falling gold zigzags, and rather plainly pleating drapery, feature in a 1222AD Maqāmāt manuscript attributed to Syria, 263 c.1225-35AD Maqāmāt produced in Iraq, 264 and 1237AD Maqāmāt from Baghdad [PLATE 109], 265 - and also in early fourteenth-century Il-Khānid paintings of Tabrīz, such as the Jāmīc al-Tāwārīkh volume of 1314AD. 266 The Manāfīc woman's ankle-rings and bracelets recall those worn by the Queen of Waqwaq and four courtiers in the 1280AD cAjā'ib manuscript, 267 which I have connected to the style of the c.1220AD Nact al-Ḥayāwan and 1224AD Dioscorides. The man's cloak, gathered around the upper arms and fastened below

²⁶⁰ c.1220AD Na^ct al-Ḥayawān (reproduced in Contadini 1992); 1224AD Dioscorides (reproduced in Buchthal 1942); and also the 1237AD Baghdad Maqāmāt (Bibliothèque Nationale Ar.5847: fol.121r, 122v; reproduced in Ettinghausen 1962 p.121-122).

²⁶¹ c.1200-20AD Kalīla wa Dimna (Bibliothèque Nationale Ar.3465: fols.30v, 70v; reproduced in Buchthal 1940 figs.35, 32); 1218-19AD Kitāb al-Aghānī (vol. 17, Feyz.1566: fol.1r; reproduced in D.S.Rice 1953 fig.18); c.1240AD Maqāmāt (Ar.3929: fol.131v; reproduced in Ward 1985 p.79), etc. The convention is played with in c.1225-35AD Maqāmāt, where two figures are depicted in the same pose – with their bending knee wrapped around slender architectural columns (Oriental Institute C.23: fols.99r, 128r; reproduced in Musée du Petit Palais 1994 p.122, 125).

²⁶² Schmitz describes the extent of later overpainting on this miniature, and does not suggest that the

Schmitz describes the extent of later overpainting on this miniature, and does not suggest that the costumes were re-done (Schmitz 1997 p.17).
 1222AD Maqāmāt (Bibliothèque Nationale Ar.6094: fols.6r, 103v, 147r, reproduced in Buchthal

²⁶³ 1222AD Maqāmāt (Bibliothèque Nationale Ar.6094: fols.6r, 103v, 147r, reproduced in Buchthal 1940 figs.3, 9, Ettinghausen 1962 p.79). Fol.103v depicts Abū Zaid wearing a cloak across his bare shoulders, filled with simple parallel pleats. 1222AD has long been accepted as the date for this manuscript (Blochet 1925 p.185). The date 619H appears twice in the illustrations: on a ship's hull (fol.68r) and on a schoolboy's slate (fol.167r) (D.S.Rice 1959 p.216), although Rice thinks these inscriptions to come from an earlier manuscript, copied by this artist.

²⁶⁴ Oriental Institute C-23: fols.16v, 37r, 128r (reproduced in Musée du Petit Palais 1994 pp.117, 118, 125).

²⁶⁵ Bibliothèque Nationale Ar.5847: fol.100v.

²⁶⁶ 1314AD Nasser D. Khalili Collection, Ms727, fol.262a: the mountains between India and Tibet (reproduced in Blair 1995). The woman on the left wears a shawl across her shoulders, which falls in an angular zigzag.

²⁶⁷ Arab.464: fol.60r. The figures are nude, wear long waving pigtails, and haloes.

the neck, recalls the author portrait in the c.1220AD Na^ct , linked to painting styles produced at Christian monastic ateliers near Mosul [PLATE 110]. The $Man\bar{a}fi^c$ faces are an interesting combination of different stylistic types. Both figures have narrow eyes elongated by kohl lines, in the Seljuk style. However, the man's nose is too large for the typical (Seljuk) Moon-Face, and the woman's eyes are joggled on different levels – a classic feature of the faces in the 1224AD Dioscorides and $1280AD^cAj\bar{a}'ib\ al-Makhl\bar{u}q\bar{a}t$ manuscripts (described above).

Compared to our al-Ṣūfī illustrations of human constellations, the *Manāfi^c* couple seems only slightly Seljuk in style. Many features of these "Painter I" images are common to various styles of pre-Mongol Islamic painting, such as the treatment of landscape, gold haloes, and long locks of hair. Two factors exclude an attribution to a purely Seljuk style: the characteristic Seljuk drapery, combining loops and pleats, is absent, and the classic Moon-Face is perhaps attempted rather than reproduced. Comparison of the animals in the al-Ṣūfī and *Manāfi^c* illustrations also shows the stylistic distance between them. Relative to the al-Ṣūfī *Leos*, the two *Manāfi^c* lions are bulkier, and have longer faces, rounder eyes and broader straighter noses [PLATE 111].²⁶⁹ The al-Ṣūfī lions are among the most outstanding images of that manuscript: the manes are drawn in fine wavy lines (recalling the wispy manes on the *Pegasus* images) as are the outlines of upper legs, belly, neck and tail-tip [PLATE 42]. The faces, shown in full-face, are rounder than the *Manāfi^c* lions, the

²⁶⁸ Or.2784: fol.2v.

²⁶⁹ M.500: fol.11r; Or.5323: fol.45v. Schmitz attributes the two *Manāfi*^c bears (fol.24r) to Painter III. These are quite similar in style to the al-Ṣūfī *Ursa Minor* and *Ursa Major*, although other Painter III images do not correspond to the style of the British Library ms.

bridge of the nose is concave, and the forehead is covered by a centrally-parted fringe (in the globe-version of *Leo*).²⁷⁰

From these stylistic differences, it would seem unlikely that the al-Şūfī illustrations were produced in the same atelier as the Manāfi^{c271} ... if one assumes that artists in royal ateliers necessarily painted in the same style. That assumption may be anachronistic, and unsuitable for the situation in the first decades of the Il-Khānid court. Having conquered a vast area, the Mongols established their capital at Marāghā in 1259AD. No doubt the new court was soon 'furnished' with learned courtiers just plucked from the conquered regions. In this particular situation, the newly-assembled court atelier quite likely contained artists trained in various styles of Iraqi/Iranian/Anatolian painting, so a single court style should not be anticipated immediately.²⁷² Neither, probably, was an identifiable text layout yet determined: the al-Şūfī is not laid out in the text format typical of late thirteenth-century Marāghā manuscripts, such as a 1277-78AD Z_{ij}^{273} and 1297-1300AD Manāfi^c. In both, the text-boxes are framed within near red double-lines, and chapter-headings are in angular eastern kufic.²⁷⁴ The two Maragha manuscripts are written in similar spacedout naskh. The al-Sūfī text is not framed, and the script is relatively dense. The al-

²⁷⁰ In the sky-version, the "ogee" outline of this central parting is repeated by a pair of lines, giving the appearance of raised eyebrows. This distinctive facial feature also occurs in a leopard in the c.1220AD Nact al-Hayawan attributed to the Mosul area (reproduced in Brandenburg 1982 ill.95), and a lion in the c.1200-20AD Kalīla wa Dimna attributed to Syria (Bibliothèque Nationale Ar.3465;

²⁷¹ As stated in its colophon, the *Manāfi^c* was produced in Marāghā (Schmitz 1997 p.9).

²⁷² Mere anticipation of the Mongols' arrival might also have scattered craftsmen from established production-centres. The net change to Islamic painting may have been a disintegration and dispersal of regional painting-styles.
²⁷³ British Library Or.7464.

Şūfī manuscript could yet have been produced in the Marāghā environment, some twenty or thirty years earlier, and illustrated by an artist trained in the Seljuk painting style.²⁷⁵

Schmitz also suggested that Painter I of the Manāfī^c might have painted four images in the c.1300AD ^cAjā'ib al-Makhlūqāt, depicting ^cUṭārid (the planet Mercury), and the archangels Jibrā'il, Mikā'il and ^cIzrā'īl [PLATES 101, 102]. ²⁷⁶ Carboni did not share this opinion, writing that the Qazwīnī images show too complex a range of influences to suggest the same artist or provenance as the Manāfī^c. ²⁷⁷ He attributed the Qazwīnī to Mosul. The figures feature ornate gold haloes, long black pigtails and also the characteristic Seljuk drapery style – although far more complex and mannered than the British Library al-Ṣūfī (or indeed the Manāfī^c). ²⁷⁸ Another late example of this mannered drapery style is an early fourteenth-century Kalīla wa Dimna, attributed to Iran. ²⁷⁹ The angels' ornate wings were discussed in comparison with the British Library al-Ṣūfī earlier, and the differences and similarities of stylistic approach noted. Sadly, these Qazwīnī faces have been damaged, either completely lost through the application of corrosive solvent, or painted over. Only the face of Mercury, and part of ^cIzrā'īl's face, can be used for comparative discussion: again the style varies from our al-Ṣūfī manuscript, and no close relationship can be

Holter 1937B figs.11-34).

These frame-lines and headings also occur in the c.1300AD ^cAjā'ib al-Makhlūqāt attributed to Mosul, and two copies of Kitāb al-Diryāq (1199AD and mid-thirteenth-century) also attributed to the Mosul area. Perhaps the two Marāghā manuscripts were laid out by a scribe trained in Mosul.

²⁷⁵ See Chapters One and Three for other links to production at Marāghā.

²⁷⁶ Schmitz 1997 p.13.

²⁷⁷ Carboni 1992 p.441. Carboni compared the archangels' ornate wings and *tirāz* bands with those of the British Library al-Ṣūfī *Pegasus*, already discussed above under *Half-palmettes and simurgh-heads*.

²⁷⁸ The relationship of Seljuk and Mamluk drapery-styles is well illustrated by comparing these figures with the 1334AD *Maqāmāt* illustrations (Vienna, Nationalbibliothek A.F.9; reproduced in

proposed. The Qazwīnī eyes are wide, and the noses too rounded. The chin seems to taper, unlike the broad al-Sūfī Moon-Face. Considering the differences (facial type and drapery style), the similarities between these two manuscripts (long hair, tirāz motif and one al-Sūfī halo) are not sufficient to attribute the same provenance.

The continuation of Seljuk style in early Il-Khānid times

The al-Sūfī manuscript has definite stylistic links with Seljuk painting: in the overall linear style, the figures' broad faces with refined symmetrical features, the robust build of the figures, costume-details such as the decorated riding-boots and turbans with long flaring sashes, similar depiction of drapery creases. There are also connections with decorative elements found throughout Seljuk art, in architecture and metalwork, such as the simurgh-head, the half-palmette scroll motif, and the particularly ornate wings of the al-Sūfī Pegasus. However, the inclusion of other features apparently typical to particular stylistic groups, such as the angular turbandetail also found in two manuscripts of 1200-20AD and 1222AD,²⁸⁰ and the curling folds and tall sharbūsh found in two Artuqid manuscripts of 1206AD and c.1240AD, should warn against the construction of single 'watertight' styles of painting, and the perceived need to force a solid attribution to one or the other.²⁸¹ Painters may have travelled from one centre to another, ²⁸² and individual ateliers may not necessarily

²⁷⁹ Bibliothèque Nationale Sup.Pers.1965: fol.23r; reproduced in Grube 1991B p.42.

p.126).

281 The apparent combination of elements from different regional styles may show that the manuscript was produced in a new, later or otherwise different environment.

282 Carboni also remarked that the question of whether artists travelled between production-centres

²⁸⁰ These two manuscripts have been attributed to Jazīra (Nassar 1985 p.85) and Syria (Buchthal 1940

makes scholars' attempts to identify different centres seem hopeless (Carboni 1992 p.433). Holter noted that as "al-Mawsili" metalworkers were also active beyond Mosul itself, so could paintingstyles attributed to Mosul be produced elsewhere (Holter 1937B p.36).

have produced paintings of identical style. As mentioned above, the Mongol invasions must have had a big effect on established production-centres, by scattering far-sighted craftsmen away from endangered cities, or re-locating craftsmen from various captured centres to a new court. Also, many illustrated manuscripts of this period have not survived the centuries, and we do not have a complete picture of thirteenth-century painting.

The al-Ṣūfī illustrations do not match any other known manuscript exactly. All this may mean is that there survive no other works by the same artist. The continuation of early thirteenth-century Islamic painting-styles in various centres during the early Il-Khānid period is demonstrated by the 1280AD 'Ajā'ib al-Makhlūqāt (Wasit) [PLATE 104], 1297-1300AD Manāfī' al-Ḥayawān (Marāghā) [PLATE 108] and the c.1300AD 'Ajā'ib al-Makhlūqāt (Mosul?) [PLATES 101, 102]. The British Library al-Ṣūfī is probably another such manuscript, continuing aspects of Seljuk style. The large scale of the 'old-fashioned' illustrations in all four of these manuscripts is interesting, and indicates a "monumental" style in manuscript-painting. In the early thirteenth century, large-scale figures are found in Kāshān ceramic-decoration [PLATE 95] and very occasionally in manuscript-painting: in an illustration of a slave-girl in the c.1240AD Maqāmāt [PLATE 112], 284 and various

²⁸³ The "monumental" painting-styles relevant to this discussion are: the angels in the 1280AD Qazwīnī, "Man and Woman" in the 1297-1300AD Manāfī, the archangels in the c.1300AD Qazwīnī, and all the illustrations of the British Library al-Ṣūfī, except the small-scale Cassiopeia (fol.19r), Andromeda (fols. 32v-33v), and Centaurus (fol.80r).

²⁸⁴ Ar.3929: fol.151r. The painting depicts a beautiful slave-girl holding a mirror, and standing beside

²⁸⁴ Ar.3929: fol.151r. The painting depicts a beautiful slave-girl holding a mirror, and standing beside a (relatively tiny) tree. She is almost double the height of other illustrated figures in the manuscript. Grabar describes the image as "a unique representation of that paragon of beauty [...] totally different from any other woman shown in the *Maqāmāt*" (Grabar 1984 p.58).

illustrations of single automata in the 1206AD *Automata* [PLATE 113].²⁸⁵ We may perhaps assume that the monumental format was reserved for the portrayal of significant figures, whose characteristics are important. The three archangels are identifiable personalities in Islamic culture, and the beautiful slave-girl of the eighteenth *Maqāmah* is the focus of a careful description in the text – as is the *Automata* machine. Likewise, the constellations must be depicted clearly, as each limb is relevant to the student, trying to memorise the figures. The large-scale figures on Kāshān ceramics are also in especially clear focus: perhaps they too indicate particular types.²⁸⁶

During the thirteenth century, Seljuk drapery-style evolved into complex mannered patterns, which are absent in the British Library al-Ṣūfī figures – perhaps its relative restraint (compared to other developments) demonstrates a separation from the centres of Seljuk style in the Mosul area. Rather than develop a dense pattern to cover draped figures, as is found in the c.1217-19AD Kitāb al-Aghānī volumes and c.1300AD ^cAjā'ib al-Makhlūqāt, the al-Ṣūfī drapery retains broad looped areas between concentrated curling folds. As such, the al-Ṣūfī illustrations represent an interesting (and short) branch of developing Seljuk drapery pattern in the late thirteenth-century, holding to some of the simplicity of early thirteenth-century versions. The faces retain the key characteristics of the Seljuk Moon-Face, gracefully

²⁸⁵ A.3472: fol.121v (25.5 x 18cm). The painting depicts a hand-washing automaton which pours water from a ewer, and then offers a mirror, comb and towel.

²⁸⁶ Certain examples of twelfth-century Garrus ware seem to refer to specific characters: a man with snakes sprouting at each shoulder must depict Zahhak the usurping king of the *Shāhnāma* (Metropolitan Museum; reproduced in Grube 1966 p.42), while a man holding a sword and decapitated head may refer to common iconography for the planet Mars (Oxford, Ashmolean Museum).

minimising the small symmetric features even more (almost to the point of caricature sometimes). The result seems to be unique among known manuscripts of the early Il-Khānid period, as no later paintings seem to continue this particular style.

Different angles of research suggest that the British Library al-Ṣūfī manuscript was produced in the Il-Khānid observatory at Marāghā, in north-west Iran, between 1260 and 1280AD.

The added diagram and its geographical co-ordinates on folio 86r show that the owner of 1279-80AD was in Qazwīn, and that he was acquainted with recent scientific literature (by using the new co-ordinates) - but not so proficient as to avoid a simplified and rather inaccurate method of calculating the *qibla* direction. The geographical co-ordinates may have been established at Marāghā, where an important observatory was founded by Hūlāgū Īl-Khān in 1259AD. At the observatory, new geographical tables were included in a *zīj* compilation, produced c.1270AD. The Marāghā tables referred to an older catalogue of geographical locations (probably compiled earlier in the thirteenth century), but adjusted the longitude values to a convention used by Ptolemy. This adjustment *may* have been made at Marāghā, but this is not proven. If so, the presence of these co-ordinates in the al-Ṣūfī diagram reduces the time of the addition to the period 1270-1280AD, and the manuscript's latest possible date to 1280AD.

Other notes and inscriptions at the end of the manuscript provide information about the object's history. It remained in Iran during the first half of the nineteenth century, until deposited by its owner, a Qajar prince, at a religious sanctuary in Baghdad. Before 1898, when the British Museum bought the manuscript, a copy was made of

one illustration (the pair of *Pegasus* images) onto an engraved copper plaque, presumably to cater to the commercial art market of the day.

Reviewing al-Sūfī manuscripts and celestial globes dating before 1400AD, it becomes clear that the iconography of our manuscript's constellation images are related to three celestial globes, made in 1275-76AD, 1285-86AD and c.1278-1310AD. The latter globe was produced by the son of a known astronomer at the Marāghā observatory, and the stylistic and iconographical connections between all three globes bring me to agree with Pinder-Wilson's suggestion that they were produced in Marāghā. The al-Ṣūfī manuscript shares decorative motifs with the globes, as well as iconography, and I suggest that all four were produced in the same environment. This reinforces the manuscript's connection with scientific activity at Marāghā, proposed on the basis of the added diagram, and puts the manuscript's earliest possible date at 1260AD. A second identified 'group' of shared constellation iconography is also confined to a geographical region: the proposed 'Maghrebi group' of two al-Sūfī manuscripts and two celestial globes. Previous scholarship on constellation iconography has suggested that iconographical groups become distinct according to their function, separating the ornamental from the plainly functional. This argument is not convincing, and I propose that geographical area is a better basis for such groupings.

Among early al-Ṣūfī manuscripts (produced before 1400AD), it is typical to find a rather archaic and formal linear style of depicting figures and drapery, which imitates Sasanian court art. This mannered style was preserved within the tradition of illustrating al-Ṣūfī's treatise long after it was abandoned in other contexts of early

Islamic art. The British Library al-Sūfī images make certain references to this tradition, retaining the typical costume, and aspects of the facial type, but the dominant style of the manuscript is based on a linear style of Seljuk art, current in Anatolia, northern Iraq, and western Iran in the first half of the thirteenth century. (The Seljuk linear style may also derive ultimately from Sasanian art, but is less formal than the particularly "conservative" style identified in many al-Sūfī images. The stylistic history of illustrating al-Sūfi's constellation treatise is therefore relevant to the linear style of Seljuk art.) Examples of this Seljuk style were produced in Konya, Mosul and Kāshān, in manuscript-painting and overglaze-painted ceramics, and it does not therefore seem possible to make an attribution to a single urban centre on stylistic grounds only. Such attempted attributions would anyhow be futile if artists travelled between courts. It might however be speculated that the establishment of Maragha as the first capital of the conquering Il-Khanid dynasty in 1259AD prompted the congregation of artists, displaced by the destruction of their own cities. The Mongols tended to take local craftsmen prisoner, drafting them into their service.

The scale of the British Library al-Ṣūfī illustrations is unusual, compared to most earlier thirteenth-century Islamic manuscripts. Figure-paintings of a similar scale do occur in three other manuscripts of the late thirteenth century: the 1280AD ^cAjā'ib al-Makhlūqāt (Wasit), 1297-1300AD Manāfī al-Ḥayawān (Marāghā), and c.1300AD ^cAjā'ib al-Makhlūqāt (Mosul). The British Library al-Ṣūfī images show no apparent influence from Chinese art, which becomes increasingly evident in Il-Khānid painting from the 1290s onwards. The British Library al-Ṣūfī therefore demonstrates the continuation of a distinct "pre-Mongol" stylistic tradition in the late

thirteenth-century, and expands the corpus of identified early Il-Khānid painting-styles.

Appendix 1 – Towards a catalogue of the extant copies of al-Ṣūfi's *Kitāb*Suwar al-Kawākib

Date & Provenance	Catalogue No.	Collection	Comments/Colophon Remarks
1009-10 (400H) Shīrāz?	Marsh 144 ¹	Bodleian Library, Oxford	Colophon: copied and illustrated by al-Husayn b. Abd al-Rahman b. Umar b. Muhammad.
1125 (519H) Baghdad	Sotheby's Lot34 ²	Sheikh Sa ^c ūd, Qatar	Colophon: copied and illustrated in Baghdad by 'Alī b. 'Abd al-Jalil b. 'Alī b. Muḥammad, from a 1036AD ms copied by Hibatallah b. Bishr al-Sham'ī, which was copied from a ms of Faraj b. 'Abd Allah al-Ḥabashī, assistant (مولى) of al-Ṣufī. Soon afterwards, collated with pre986AD autograph ms. (Includes urjūza on the constellations, at end.)
1125 (519H) Mārdīn	Fatih 3422	Süleymaniye Library, Istanbul	Colophon: copied at the fortress of Mārdīn, by 'Abd Allah b. 'Abd al-Jabbar b. Ibrāhīm b. Ṣadaqah b. 'Alī b. Yūsuf b. Basam al-Jabalī.'
1131 (525H) Mayyāfāriqīn (?)	AhmetIII 3493	Topkapısaray Library, Istanbul	Colophon: copied by Wāthiq b. 'Alī b. 'Umar b. al-Ḥusayn, called Ibn al-Shawkī, from a ms of shaykh Abū Ṭāhir 'Abd al-Bāqī, son of [our] shaykh Abū Bakr Muḥammad b. 'Abd al-Bāqī b. Muḥammad b. 'Abd Allah.' Added frontispiece-note: in Rābi' II 544H (August 1149AD), one Ṣalāḥ b. Yūnis b. 'Azīz made a copy from this manuscript, which then belonged to the library of Maṣ'ūd b. 'Abd al-Malik, in Mosul.'

¹ Catalogue 926 in Uri 1787 p.201.

² Brend, Hillenbrand & King 1998.

Destombes also takes this reading (Destombes 1959 p.309), although Holter read the names 'Abd al-Jabban and Nassam (Holter 1937B p.36).
 The same figure may also be the patron of a medical Risāla, composed by 'Ubayd Allah b. Jibril b.

⁴ The same figure may also be the patron of a medical *Risāla*, composed by ^cUbayd Allah b. Jibril b. ^cUbayd Allah b. Bakhtishu^c (d. c.1058AD) who lived in Mayyāfāriqīn. That treatise is dedicated to Ustādh Abū Ṭāhir b. ^cAbd al- Bāqī, called Ibn Qatramīn (Contadini 1992 p.63). ⁵ The note is inserted inside the main text-frame of the frontispiece, and written in a different script.

⁵ The note is inserted inside the main text-frame of the frontispiece, and written in a different script. Although difficult to decipher completely, it first names Şalāḥ b. Yūnis b. 'Azīz, then (presumably) that [this manuscript is] "from the books [من كتب] of Mas'ūd b. 'Abd al-Malik [...] the catalogue [فهرس] in Mosul in Rabi II 544H" (the month is deciphered in Rogers 1986 p.29).

1171 (566H) Mosul	Hunt 212	Bodleian Library, Oxford	Title-page: dedicated to Sayf al- Din Ghazi II, Zangid Atabeg of Mosul (r.1169-1180AD).
1203 (600H)	5659 (Qu.704)	Staatsbibliothek, Berlin	
1224 Ceuta	Rossiano 1033	Vatican Library, Rome	Colophon: copied in Ceuta. Includes <i>urjūza</i> on the constellations, at end.
mid-13 th C Ceuta?	Ar 2488	Bibliothèque Nationale, Paris.	(Maghrebi script, very similar to 1224AD Ceuta al-Şūfī.)
1233 (630H) Mosul	5658 (Landberg 71)	Staatsbibliothek, Berlin	Colophon: copied in Mosul from a ms which was copied from a 1014AD ms, from a ms by Faraj b. Abd Allah al-Ḥabashī, assistant (مولى) of al-Ṣūfī's, the tables and images were by the hand of al-Ṣūfī, which belonged to the waaf library at the Buyid Dār al-Cllm bayn alsurayn institution in Baghdad.
1250 (647H) Alamut?	Aya Sofya 2595	Süleymaniye Library, Istanbul	(Persian translation made by Naşīr al-Dīn al-Ṭūsī (d.1274AD), though probably not the autograph copy. Al-Ṭūsī left Alamut in 1256AD) (Figures from start to Leo similar to 1266AD Paris ms. Figures from Virgo onwards are rough copies of 1125AD Süleymaniye ms.)
1266-7 (665H) Syria?	Ar 2489/1	Bibliothèque Nationale, Paris.	(No colophon.)
1260-80AD? Marāghā?	Or. 5323	British Library, London	End-Note: was in Qazwīn in 1279-80AD. Margin Note: copied from a ms compared with a ms in the waaf library at the Buyid Dār al-cIlm bayn al-surayn institution in Baghdad.
c.1300? (c.700H)	Dār al-Kutub mīqāt 390 ⁶	National Library, Cairo	
1306-07 (703H) Aleppo	Pococke 257 ⁷	Bodleian Library, Oxford	Note on title-page: examined by 'Alt Shah Ibn Kura'i al-Shamsi in Aleppo in 703H.
Early 14 th C, Aleppo?	3777	Muze-yi Melli, Tehran	(Illustrations very similar to 1306- 07AD Aleppo al-Şūfī)
1397 (c.800H)	5660	Staatsbibliothek, Berlin	(Only three figures executed.)
c.1400 Samarkand? ⁸	13.160.10 (Acc.No.)	Metropolitan Museum New York	(Pegasus resembles the c.1430-40AD Timurid manuscript. ⁹)

⁶ Dated estimated in King 1986 p.41 (Sagittarius and Canis Minor reproduced plate II).
⁷ Catalogue 916 in Uri 1787 p.199.

1417	T	Library of Congress,	T
820H		Washington D.C.	
c.1430-40	Ar 5036	Bibliothèque	Produced for Ulugh Beg (d.1449),
0.1 150 10	711 2030	Nationale, Paris	Timurid prince of Samarkand.
1497-8	Per 175	Chester Beatty	Persian
(904H)	1011/3	Library, Dublin	}
Early 15 th	No.26 ¹⁰	Sam Fogg Collection,	Single folio of Gemini
century	110.20	London	Iran. Text is in thuluth and
1	ļ <u> </u>		nasta ^c liq.
15 th or 16 th	Mss 975	Khalili Collection,	Persian astronomy treatise, constellation-images taken from al-
century		London	Suff.
1501	2953 ¹¹	Marsigli Library,	Includes urjūza on the
(906H)		Bologna	constellations, at end. Treatise and
,			urjūza were copied from an 1193AD (589H) ms. Collated with
1			a manuscript of 1166AD (561H)
1504-05	Ar 4119	Chester Beatty	
(910H)		Library, Dublin	1
1516	2490	Bibliothèque	
(922H)		Nationale, Paris	
1516	1578	Arkol. Muze,	<u> </u>
(922H)		Istanbul	
1590-91	3699	Raza Library,	
(999H)	(Acc.595M)	Rampur	\mathbf{I}_{\cdot}
16 th century	C.724 ¹²	Institute of Oriental	Copied from a manuscript, of which
Istanbul?		Studies, Russian	part 1 was copied in Cairo, 1011AD
		Academy of Sciences,	(402H), from an al-Şūfī autograph; and part 2 in 1005AD (396H),
		St Petersburg	collated with the exemplar of Abd
			Allah b. al-Maimun b.
			Muḥammad al-Ḥasanī al-
			Adhract, copied from an autograph.
			17 woodcut-printed pages of an illustrated Latin constellation text,
		•	by Julius Higinus, inserted beside
			each constellation image.
1			Belonged to Taqi al-Din Mişri,
			director of Ottoman observatory in Istanbul (late 1570s).
16 th century	Ar 4222	Chester Beatty	Safavid Iran
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Library, Dublin	
16 th century	Add 7488 ¹³	British Library,	
	120 100	London	
		1	<u> </u>

⁸ All of the constellation-images are reproduced (all redrawn, plus seven photographic reproductions) in Upton 1933 figs.7-51.

⁹ Upton 1933 fig.25.

¹⁰ Catalogue 26 in Fogg 2000.

¹¹ Catalogue 422 in Rosen 1884 pp.254-255.

¹² Catalogue 185 in Rosen 1877 pp.118-119, where the manuscript is also recorded as No.85.

¹³ Catalogue 393 in British Museum 1852 p.188.

16 th century	375	Pertev Paşa Library,	
16 century	313	Istanbul	
1 cth	Revan 1655	151111111111111111111111111111111111111	
16 th century	Revan 1655	Topkapısaray Library, Istanbul	
16 th century	Revan 1656	Topkapısaray Library, Istanbul	
Late 16 th	332/3	Staatsbibliothek,	Persian translation by Lutfallah
century	(Cod.Sprenge r 1854)	Berlin	"Muḥandis" b. Aḥmad al-Nadir al-Mi ^c mar al-Lahūrī, nasta ^c liq script. Attrib. to reign of Akbar (1556- 1605AD).
1600-01	6047	Malek Library, Tehran	1005/12).
1601-02	8314	Royal Library,	Colophon: Scribe: Muḥammad
(1010H)		Copenhagen	al-Maghribī, in Medina; 15 Patron:
Medina			Amir Ḥassan Afnadi Bash Khalīfa. Copied from a 1014AD (404H) ms belonging to al-Şūfī, copied by his colleague/assistant Farāj b. 'Abd Allah al-Ḥabashī, drawings and tables by al-Şūfī. This ms was in the waaf library of Dār al-'Ilm bayn al-sūrayn in Baghdad. (Nasta'liq script)
1606	191 (new	Institute of Oriental	Scribe: Muhammad b.
(1015H) Nayin, Iran	series)	Studies, Russian Academy of Sciences, St Petersburg	Muḥammad [], in Nayin, Central Iran. 16 Images in distinctive Safavid style. 17
1629	Louisiana	Jasim al-Homaizi	Persian translation
(1039H)	Revy Cat.	Collection, Kuwait ¹⁸	
Iran	No.241		
1630-33	Spencer,	New York Public	Persian translation and new preface
(1040-42H)	Pers. Ms. 6	Library ¹⁹	by Ḥasan b. Sa ^c d al-Qā'īnī, for Abū'l-Fath Manūchihr Khān,
Mashhad?		•	governor-general of Mashhad.
			Scribe: Muḥammad Bāqir al- Ḥāfīz.
1633	Sup. Pers	Bibliothèque	Abridged Persian version, by
	1551	Nationale, Paris	unknown editor. A note on fol.45

¹⁴ Westergaard 1851 pp.67-68. All of the constellation-images are illustrated (redrawn) in Schjellerup 1874 plates V-VII.

¹⁵ Upton comments that the turbans worn by some constellation-figures resemble Ottoman fashions of c.1600AD, as Medina was in the Ottoman empire at this period, and that the Perseus figure shows "a distinctly Western influence" (Upton 1933 p.182).

16 The scribe's surname has been deleted from the manuscript. Upton cites correspondence with staff-

members of the Public Library in St Petersburg about these details of the colophon (Upton 1933 p. 180).

17 All of the constellation-images are illustrated (redrawn) in Schjellerup 1874 plates I-IV.

18 Reproduced in Fehérvári & Fuller 1995 p.62.

19 Eight constellation-images reproduced in Schmitz 1992 figs. 122-128, plate 10.

	<u></u>		gives date 1633AD, images may be same date. ²⁰
1633-34 (1043H)	Mustafā Fādil fārisī 9 ²¹	National Library, Cairo	Persian translation and new preface by Ḥasan b. Sa'd al-Qā'InI, for Abū'l-Fatḥ Manūchihr Khān, governor-general of Mashhad. Scribe: 'Abd Allah b. Muḥammad Sharīf 'Abd al-Rabb al-SimnānI.
1640	Ahmad Musa 25	National Library, Cairo	Persian translation
1643 (1053H) India?	6528	Bibliothèque Nationale, Paris	Indian naskh
mid-17thC Iran?	Spencer Pers25	New York Public Library	Khulāsah Ṣuwar-i cAbd al-Raḥmān al-Ṣūfī Abridged Persian version, by unknown editor. Simple illustrations, copying midseventeenth-century Persian models. 22
mid-17thC Isfahan?	Ms9 ²³	Collection of Prince Sadruddin Aga Khan, Geneva	Arabic text with Persian translation filling the margins.
1653 (1063H)	23 ²⁴	Mashhad	Persian translation of Nasir al-Din al-Ţūsi
1659 (1070H)	2928/1	Nuruosmaniye Library, Istanbul	
1664 (1074H)	Or. 1407 ²⁵	British Library, London	Transliterations of Latin names added. Many figures are closely based on 1125AD Süleymaniye ms, though hands and feet are redrafted. Some whole figures of inanimate objects, such as Argo, Libra, Corona Borealis, are drawn in perspective.
1675 (1086H)	196	Majles Library, Tehran ²⁶	Persian translation of Nașir al-Din al-Ţūsī
Early 17 th century	2492 ff15- 295	Bibliothèque Nationale, Paris	
Early 17 th century	No.49 ²⁷	Sam Fogg, London	Persian translation. Thirty pairs of constellation-images. ²⁸

²⁰ Schmitz linked this manuscript with another Persian abridgement of al-Ṣūfī, in the New York Public Library (Spencer Pers 25) (Schmitz 1992 p.133).

²¹ One image is reproduced in King 1986 plate III.

²² Schmitz 1992 p.133. One image is reproduced: Schmitz 1992 fig.133.

²³ One image is reproduced in Musée d'art et d'histoire 1985 p.122.

²⁴ Listed as "(iii-fsl.17) Ms.23" in Storey 1958 p.41.

²⁵ Catalogue no. 755 in Rieu 1894 p.513.

²⁶ I'tisami 1311SH p.108, where an earlier catalogue number 5290 is also cited.

²⁷ Catalogue no. 49 in Fogg 2000.

²⁸ The artist has not drawn the paired images in mirror image of each other, but as identical versions.

17 th century	O. Nova 3 ²⁹	Uppsala University Library	Written in naskh, on paper, 102 folios, 20 lines/page. Acquired by Swedish Orientalist Matthias Norberg (1747-1826), possibly on travels in 1777-81.
17 th century	Revan 1657	Topkapısaray Library, Istanbul	
17 th century	4670	Bibliothèque Nationale, Paris	Persian naskh
17 th century	197	Majles Library, Tehran ³⁰	Arabic
17 th century	621 ³¹	India Office Library, London	
17 th century	2389 ³²	India Office Library, London	
17 th century	1757	Tehran University	
1711 (1123H)	2278	Veliyüddin Library, Istanbul	
1717-18 (1130H)	127	Muhammadiya madrasa, al-Zaywānī mosque, Mosul ³³	
1737-38 (1150H) Egypt?	Taymūr <i>riyād</i> 241	National Library, Cairo	Copied from a 1541AD (948H) manuscript. Produced in Egypt? ³⁴
1769-70 (1183H) Iran	2491	Bibliothèque Nationale, Paris	Safavid Iran
1785-86 (1200H) Egypt?	Taymūr <i>riyād</i> 288	National Library, Cairo	Produced in Egypt? ³⁵
18 th century	6091	Majles Library, Tehran	
18 th century India	4300	Bibliothèque Universitaire, Strasbourg	
(1312SH)	198	Majles Library, Tehran ³⁶	

²⁹ Catalogue no. 325 in Tornberg 1849. I am grateful to Håkan Hallberg, Dr Hans Nodesjö and Dr ^cAlī Mirmohades of Uppsala University Library for providing me with information on this manuscript.

³⁰ I ^ctisami 1311SH p.109, where an earlier catalogue number 5097 is also cited.

³¹ Catalogue no. 732 in Loth 1877 p.212.

³² Catalogue no. 731 in Loth 1877 p.212.

³³ al-Chelebi 1927 p.179.

³⁴ Suggested in King 1981 p.604.

³⁵ Suggested in King 1981 p.608.

³⁶ I ^ctisami 1311SH p.109, where an earlier catalogue number 5099 is also cited).

[date?]	1984	University Library, Princeton	
[date?]	Zaituna 366 ³⁷	University Library, Tunis	
[date?]	Zaituna 2843	University Library, Tunis	
[date?]	343	Madrasa of al-Bāshā mosque, Mosul ³⁸	
[date?]	Taymūr <i>riyād</i> 325/2	National Library, Cairo	Fragmentary: star-tables only.

³⁷ Listed in Sezgin 1978 p.214. ³⁸ al-Chelebi 1927 p.70.

Date &	Catalogue	Collection	Inscriptions or [Attributions]
Provenance	No.		
1085AD (478H) Valencia	Inv.2712	Istituto e Museo di Storia della Scienza, Florence ³⁹	Maker: Ibrāhīm b. Sa ^c īd al-Sahlī al-Wazzān, and his son Muḥammad Patron: Abū ^c Isa b. Labbūn, governor (qā'id) and wazīr.
c.1085AD (undated) Valencia	GeA325	Bibliothèque Nationale, Paris	[Unsigned, identified as the work of Ibrāhīm b. Sa ^c īd al-Sahlī. ⁴⁰]
1144-45AD (539H) Iran?	MAO 824	Musée du Louvre, Paris ⁴¹	Maker: Yūnus b. al-Ḥusayn al- Aşturlābī Positions updated from the Almagest.
1225-26AD (622H) Egypt	1137	Museo Nazionale di Capodimonte, Naples ⁴²	Maker: Qaysar b. Abī al-Qāsim b. Musāfir al-Ashrafī al-Ḥanafī Patron: Muḥammad b. Abī Bakr b. Ayyūb Positions updated from the Almagest.
1275-76AD (674H) Marāghā?	71.3.1	British Museum ⁴³	Maker: Muḥammad b. Hilāl al- Munajjim al-Mawsilī
1278- 1310AD (undated) Marāghā		Staatlicher mathematisch- physikalischer Salon, Dresden ⁴⁴	Maker: Muḥammad b. Muʿayyad al-ʿUrḍī
1285-86AD (684H) Marāghā?	SCI 21	Khalili Collection ⁴⁵	Maker: Muḥammad b. Maḥmūd al-Tabarī Positions updated from Kitāb Şuwar al-Kawākib al-Thābita.
1309-15AD (undated) Marāghā/ Tabrīz?	MAO 825	Musée du Louvre, Paris ⁴⁶	[Unsigned]
1362-63AD (764H) Kirmān.	44790	History of Science Museum, Oxford ⁴⁷	Maker: Ja ^c far b. ^c Umar b. Dawlatshāh al-Kirmānī; Patron: Muḥammad b. Asīl. ⁴⁸ Positions updated from Kitāb Şuwar al- Kawākib al-Thābita.

³⁹ Lithograph reproduction in Meucci 1878.

This attribution was made by David King, in the catalogue of a 1992 exhibition "al-Andalus, The Art of Islamic Spain" at the Metropolitan Museum of Art, New York (Dodds 1992 p.378).

All Reproduced in Makariou 1998 plate 6.

Lithograph reproduction in Assemani 1790. Colour photograph in Curatola 1993 p.297.

⁴³ Lithograph reproduction in Dorn 1830. Detailed photographs reproduced in Pinder-Wilson 1976.

⁴⁴ Lithograph reproduction in Drechsler 1873.

⁴⁵ Reproduced in Savage-Smith & Maddison 1997 pp.212-213. There is a nineteenth-century Indian copy of this globe in the Louvre Museum (Section islamique inv. 6013; reproduced in Makariou 1998 p.105).

46 Reproduced in Makariou 1998 p.106.

1383-84AD	763	History of Science	Maker: Jacfar b. CUmar b.
(785H)		Museum, Istanbul	Dawlatshäh al- Kirmanī
Kirmān.			Positions updated from al-Ṣūfī.

⁴⁷ Reproduced in Savage-Smith 1985 p.31. ⁴⁸ This patron's name has been deleted from the globe's inscription, but is still visible (inscription reproduced in Mayer 1956 plate 11).

This is a catalogue of the names of individual stars and star-groups from the system of Arabian folk astronomy, as they are mentioned in *Kitāb Şuwar al-Kawākib al-Thābita* and on Islamic celestial globes. They include the *Anwā'* constellations, a group of twenty-eight individual stars and small constellations along the ecliptic, which constituted a calendar and meteorological system. In each table below, the Arabian star-groups are listed according to their precise location within or near a classical constellation. When the star-groups overlap different classical constellations, they are listed under whichever constellation they most occupy.

In Ptolemy's Almagest, each star is catalogued against a number, within each constellation. Al-Ṣūfī retains the same numbers in Kitāb Ṣuwar al-Kawākib al-Thābita: he reproduces Ptolemy's star-tables in his text, and numbers the stars on his constellation-images accordingly, using abjad numerals.⁴⁹ Thus, Arabian names and

⁴⁹ The system of *hisāb abjad*, or alphabetical reckoning, uses single letters and letter-combinations from the Arabic alphabet to signify numbers. Greek astronomers also used an alphanumerical system (as did the Hebrews and Copts, Destombes 1962 p.35), and Arab scientists adapted the Greek system to Arabic letters (Irani 1955 p.2). The *abjad* numbers were used only in particular contexts such as chronograms, mathematics and astronomy (Weil 1960 p.97). They feature on astrolabes and celestial globes, and in zīj tables and al-Ṣūfī's star-tables and illustrations. The ciphers proper are the ancestor of the numerals used today in both the Western and Islamic worlds. They derive from Hindu numbers and were already known in eighth-century AD Baghdad. They were communicated via manuals of Indian arithmetic, such as that of Muhammad b. Mūsa al-Khwarizmī (c.825AD), although the scientific community was slow to abandon the *abjad* system taken from Greek methods (Souissi 1971). The ciphers are known both as *hindī* ("Indian") and *ghubār* ("dust") numerals, and slightly different versions existed in the East and West of the Islamic world. However, Sabra notes that "the ultimate source of the numerals and the manner of their diffusion and development [...] remains a subject of debate" (Sabra 1971 p.1140). For example, Destombes proposes that the ciphers correspond to the first ten letters of the Greek alphabet, placed in reverse order by the Arabs (Destombes 1962).

The first nine letters of the Arabic alphabet denote the units: l = 1, $\psi = 2$, and so on. After 9, an additional nine letters denote the tens: $\psi = 10$, $\psi = 20$, etc. (An additional nine letters denote the hundreds up to 900.) Letters can be combined to represent a number, e.g. $\psi = 22$. Although an Arabic symbol for zero is used among *abjad* numbers, the zero is not allocated a letter of the Arabic (Footnote continued on the next page.)

Ptolemy's numbers occur together as labels to the constellation-images in copies of Kitāb Ṣuwar al-Kawākib al-Thābita. On Islamic celestial globes, a combination of classical and Arabian names are inscribed as labels to the images. The Arabian names of prominent stars are also marked onto astrolabes.

Here, the name of each constellation is given in its modern (Latin) form with an English translation or explanation (if a proper name), and in Arabic translation, transliteration or corruption of the Greek name. Some of the zodiacal constellations have two similar names, due to the origins of the twelve zodiac signs in Babylonian astronomy, which influenced both Greek and (to a lesser extent) Arabian folk astronomy. In these cases, one name is a translation from Ptolemy, and the other has been inherited into Arab tradition from early Babylonian astronomy - without a Greek intermediary.

While astronomers assembled, translated and edited the works of foreign scientists and philosophers, Arab lexicographers and scientists of the ninth- and tenth-centuries were also gathering knowledge about their native folk astronomy, the $Anw\bar{a}$. The $Anw\bar{a}$ was a calendar measured in twenty-eight " $anw\bar{a}$ " (singular: naw), or periods of time, measured according to the simultaneous rising and setting of pairs of

.

alphabet. The symbol used derives from Greek numeration, as is demonstrated in plates 8 and 9 of Irani. (The zero of the Hindu-originating ciphers is a small circle, and does not resemble the abjad zero.) In hisāb abjad, zero is used only in isolation, not as a decimal place-value: the single letter I means 20 - i.e. there is no extra letter to show that there are zero units in the number twenty. Thus, the abjad system is not one of pure place-values. In spite of this, Irani claims that the "alphabetical numerals constitute place-value systems" (Irani 1955 p.1). He also states that the alphabetical numerals are sexagesimal (base 60), which is plainly not justified (see above), although the (decimal) abjad numbers were indeed used to express sexagesimal values in degrees, minutes and seconds. Sabra suggests that the chief achievement of Arabic arithmeticians "was to fuse together the various methods available [including] the ancient sexagesimal scale [of] Greek astronomical works" (Sabra 1971 p.1141).

prominent stars, also used to predict the weather at different times of year. A star on the tail of *Leo*, for example, is named الصرفة, "the dogtooth of fortune", and heralds the end of hot weather. The simultaneous rising of two large stars, الواقع, "the falling vulture" (in *Lyra*), and النسر, "the falling vulture" (in *Lyra*), and الهراران, "the malevolent two", in *Anwā* lore. 15

Some pre-Islamic Arabian constellations have the same Babylonian source as the Greek zodiacal signs, but were independently inherited from Mesopotamia well before the translation of Greek scientific texts into Arabic. ⁵² By Islamic times, some of these shared constellations had relocated to different parts of the sky, possibly owing to a gradual shift in folk memory – or to the incomplete state of Babylonian zodiac at the time of its transmission to the Arabian peninsula. ⁵³ So while the classical Aquarius is in its (modern) place on the ecliptic, an Arabian 'Aquarius' called like bucket) also appears in Islamic astronomy, just to the north in Pegasus. Other zodiac signs remain in the same place as their Greek counterparts, and this is reflected in the two names available for such constellations. For example, Virgo is identified both as like of corn (the Arabian name), and like of corn (the Oreek name), and Sagittarius as like of corn (the Oreek name) and

-

is also the twelfth lunar mansion.

⁵¹ The name derives from the verb مد , to hate.

⁵² Hartner & Kunitzsch 1993 pp.82-84.

⁵³ Cf. note above for which of the zodiac signs appear in Arabian astronomy. Forms of all zodiac signs, excepting *Leo* and *Libra*, were in use in 1300BC Babylon, and some of these may have been adapted in the Arabian peninsula before its final systemisation by the mid-fifth century BC, into twelve sections of thirty degrees along the ecliptic. As traditional Arabian astronomy includes a large lion, it can be assumed that the transmission to Arab folk astronomy occurred some time later than 1300BC.

It he archer (Greek name). Al-Ṣūfī provides both in his treatise. Arabian names for individual stars can also refer to parts of these ancient constellations, and these names give interesting information about early Babylonian constellation iconography. By comparison with Greek versions of the same constellations, it can be seen that changes occurred to constellation iconography when the astronomy passed from the Babylonians to the Arabs. For example, the figure of al-Jawzā' (in Orion) has a bow in Arabian nomenclature, but not in its Greek version. In early Babylonian astronomy, there was a bow in the (modern) region of Orion. 55

Some of the Arabian versions of zodiacal constellations are far larger than their eventual definition as the Greeks inherited them. An example is the "huge Arabic lion", ⁵⁶ a precursor of *Leo*, which sprawls across seven classical constellations. The hindlegs are in *Bootes* (north of the ecliptic), *Virgo* and *Corvus* (south of the ecliptic), and the forelegs are in *Gemini*. ⁵⁷ The lion's nose and mouth are in *Cancer*, while its eyes, forehead, heart and hackles are in *Leo*.

The large human figure الحوزا al-Jawzā' (the Arabian constellation spanning the Greek Orion, Lepus and Eridanus) has been identified as a relocated version of the zodiacal constellation of Gemini, which is just to the north of these three

⁵⁴ All constellation-names used are listed in this appendix.

⁵⁵ Whitfield 1996 p.49. More on this constellation below.

⁵⁶ Hartner & Kunitzsch 1993 p.83.

⁵⁷ There are two large stars in *Bootes* and *Virgo*, assigned to the two hindlegs of the lion, (al-Bīrūnī (1) p.346). Both are named *al-simāk*, which al-Ṣūfī explains to mean the upraised (al-Ṣūfī (1) p.61). Al-Ṣūfī also implies that the name could be broadly applicable to any important star, and cites other general names used for more than one star. *Simāk* is only used for these two stars, however, and they are differentiated as the armed *simāk*, السماك المالة, in *Bootes*, and the unarmed *simāk*, الاعرل, in *Virgo*. A pair of stars in *Bootes* is called the lance, الرمح, in *Anwā'* terminology, from whence the name for the neighbouring *simāk*.

constellations. The name is applied to both *Orion* and *Gemini* in Islamic astronomy. Both constellations have acquired other names, avoiding some confusion: al-Ṣūfī (and other Muslim astronomers) also refers to *Gemini* by the translated classical name الجواد (the twins). (the twins) the southern Jawzā'. (the giant), and can be still further defined as the الجوزا الجنوبي, the southern Jawzā'.

Although al-Ṣūfī gives this name to the constellation of *Orion* (defined by Ptolemy), the old Arabian constellation was far larger, and had a different iconography. This can be seen in the traditional names of the stars in the region of *Orion*. They refer to attributes of the Arabian figure, such as a bow, throne, foot, crown and locks of hair. In Greek, and subsequently Islamic constellation iconography, *Orion* stands, holding up a stick as though to throw it.⁶¹ The close historical identification of *Orion* and *Gemini* is unsurprising given their proximity to one another. In a Babylonian text from the fifth century BC, both *Orion* and *Gemini* are identified with the third month of the year.⁶² *Orion*'s distinctive formation makes it an obvious choice for inclusion in an evolving calendar system, as the early Zodiac.

Arabian tradition includes other constellations, such as the enormous al-Thurayyā (the Greek Pleiades), which crosses Perseus, Taurus and Cetus, and translates only vaguely into 'the abundant'. Like other large Arabian constellations, al-Thurayyā may be descended from Babylonian astronomy, but its origins are obscure.

⁵⁸ Hartner & Kunitzsch 1993 pp.82-84.

⁵⁹ Hartner & Kunitzsch 1993 p.83.

⁶⁰ Or.5323: fol.64r. The constellation of *Orion* is in the southern hemisphere, while *Gemini* is on the Eclintic

⁶¹ Islamic iconography also tends to show *Orion* wearing a robe with one outsize sleeve-end, hanging from the figure's arm. There is no bow, throne, or crown.

⁶² Whitfield 1996 p.49.

Individual star-names provide further attributes of the figure: a shoulder-blade, an elbow, a dyed hand and a mutilated hand. In a 1633AD al-Ṣūfī manuscript, there is a unique depiction of al-Thurayyā, showing a human figure, truncated at the waist. Other Arabian constellations are the She-Camel (in Cassiopeia), the Horse (near Andromeda) and the Date-Cluster, al-shāmārīkh (in Centaurus and Lupus).

Illustrations of these Arabian constellations are unusual in al-Sūfī manuscripts, and non-existent on celestial globes. When represented, they are shown overlapping a classical figure, or simply as an independent image. A rare illustration in an al-Ṣūfī manuscript of 1125AD shows three Arabian constellations together: the She-Camel, Fish and Horse, superimposed onto *Andromeda*. The Horse is usually depicted alone.

Other Arabian groups of stars are given collective names, but are not constellation-figures in the sense of a group of stars representing the shape of a given figure. Each star represents a single "figure" in these cases, such as two calves (in Ursa Minor), camels (in Draco), ostriches (in Cetus), horsemen (in Cygnus) and goats (in Auriga). These names are only used as labels in Ṣuwar al-Kawākib, and there are no illustrations of the single-star figures in either al-Ṣūfī manuscripts or on globes. However, images of some of these stars occur in astrology manuscripts and on astrolabes, as representations of the lunar mansions. The 1399AD astronomical miscellany Kitāb al-Bulhān includes images of the first fourteen of the twenty-eight lunar mansions, depicted according to their Arabian nomenclature. Many of the

⁶³ Fol.66r, reproduced in Brend, Hillenbrand & King 1998 p.39.

⁶⁴ Bodleian Library Or.133 (reproduced in Carboni 1988 fig.15).

names are obscure and difficult to represent, and some of the *Bulhān* images are quite bizarre: the fifth mansion is named the brand-mark, *al-han^cah*, and appears as a chicken with a bull's head. (Further efforts of translation might eventually clarify such oddities.) Other images match their Arabian names: the thirteenth mansion is named the howler, *al-cawwa*, and is depicted as a running dog. The second mansion appears as a short squatting man, and is called the little belly, *al-buṭayn*.

Extraordinarily, a German star-map from 1533AD depicts some "single-star" figures from Arabian astronomy, in the place of some northern classical constellations: the camels with their young (in *Draco*), the three daughters (in *Ursa Major*), the shepherd, his flock and his dog (in *Cepheus*)!⁶⁵

Those stars in the twenty-eight or lunar mansions, are also noted in the tables below. In pre-Islamic times, the lunar mansions were introduced from Hindu astronomy and amalgamated with the $Anw\bar{a}$ calendar system. Under the amalgamation, many names of prominent $Anw\bar{a}$ stars were attached to the lunar mansions. They are of marginal interest to this study, and are occasionally illustrated in astrology-treatises and on scientific instruments. While these illustrations might

_

⁶⁵ The German astronomer Peter Apian (d.1552AD) had access to a copy of al-Ṣūfi's treatise (see note above). Apian also mentions some Arabian constellations in his Astronomicum Caesareum of 1540AD (Kunitzsch 1987 p.121). His highly unusual map is reproduced in Kunitzsch 1987 p.119. 66 The precise history and provenance of the lunar mansions are disputed: a total of six different opinions are laid out in Yampolsky 1950 pp.78-80. Yampolsky himself proposes a Chinese origin from the Chou dynasty (c.1100BC), and a progression from China, through Central Asia to India, and thence to Arabia (Yampolsky 1950 p.78). Yampolsky presents a comparative list of Arab, Hindu and Chinese mansion-names and locations, repeating the information published by Hommel in 1891 (Hommel 1891 pp.600-607). Comparison of the three systems is interesting, revealing that the names only rarely resemble one another, and that the mansions are located in slightly different star-groups in each of the three traditions. For example, one lunar mansion is entitled k'uei, "striding legs" in Chinese, revatī, "wealthy" in Indian astronomy, and baṭn al-ḥūt, "the belly of the fish" in Anwā' terminology. The mansion occupies at least sixteen stars in Chinese astronomy, thirty-two in India, and one in Arabia (Yampolsky 1950 p.65). Cf. also Kunitzsch 1987, 1991.

be anticipated as the solution to the obscure ancient names of many of the lunar mansions, this is not generally the case. Many names of the mansions were already obscure and variously interpreted in early Islamic times, and this is evidenced by their different representations. On the back of an astrolabe from 1227-28AD Jazīra, ⁶⁷ the lunar mansions are depicted mainly as strange versions of the (classical) constellations they occupy: the twentieth mansion "the ostriches" is located in *Sagittarius* the archer, and features as a kneeling (human) figure holding a bow. The twenty-second lunar mansion "the sacrificing Sa^cd^n " is located in *Capricorn*, and is depicted as a fish-goat composite animal. By contrast, a 1399AD astrological treatise represents the lunar mansions with more respect to their names: the ostriches are indeed two ostriches, and the "sacrificer" is a seated man, cutting his own neck with a sword. ⁶⁸

The following tables do not constitute a complete account of all known Arabian constellation- and star-names, as it records only those asterisms mentioned in copies of *Kitāb Ṣuwar al-Kawākib al-Thābita*, and on Islamic celestial globes. It reproduces and explains the information presented as labels to al-Ṣūfī's constellation-images, and also illustrates the difference of scale and subject matter of Arabian constellations, relative to Ptolemy's figures.⁶⁹

-

⁶⁷ Oxford, History of Science Museum (reproduced in Gunther 1932 plate 54).

⁶⁸ Bodleian Library Or.133 (*Kitāb al-Bulhān*, 1399AD): fol.27v (reproduced Carboni 1988 plate 15). ⁶⁹ A more complete index of Arabian star-names is to be found in Kunitzsch 1961, drawn from other

Islamic astronomers, as well as lexicographers of pre-Islamic culture.

I - Northern Hemisphere

1. Ursa Minor, the lesser bear

the lesser bear - الدب الاصغر

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
l(1)	الجدي	The goat-kid	Tip of tail
ا (1) (2) ب (3) ج	بنات نعش الصغرى	The lesser daughters of the bier	Tail
(4) د (5) ه (6) و (7) ز	النعش	The bier [?]	Body
(6) و (7) ز	الفرقدان	The two calves	Shoulder

Both Hommel and Kunitzsch disagree with the common translation of lisaming as "the bier", dismissing it as folk etymology. Hommel proposes that the word is a corruption from two older Arabic names for the constellation: عبوث, meaning "lion", or يغوث, a pre-Islamic Arabian deity, worshipped in the form of a lion. 70 يغوث is mentioned in the Qur'an (71:23), where Noah warns his people against idolatry.

2. Ursa Major, the greater bear

the greater bear - الدب الاكبر

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
(16) يو (17) يز (18) يح (19) يط	النعش	The bier [?]	Body
(25) كە (26) كو (27) كز	بنات نعش الکبری	The greater daughters of the bier	Tail
(27) کز	القائد	The leader (of the daughters?)	End of tail
(26) کو	العناق	The young nannygoat	Middle of tail
(25) که	الجون	The gulf	Start of tail
(external)	السها	The overlooked	Beside tail
(7) ز (8) ح	الحوض	The basin/ pond	Neck, shoulder

⁷⁰ Hommel 1891 pp.594-595, Kunitzsch 1961 p.48.

		,	·
(9) ط			
(10) ي			
(11) يا			
(14) يد			
(15) يە		_	
l(1)	الظبا	The gazelles	Face
(2) ب			
(3) ج			
(4) د			
(5) ه			
(6) و			
(23) کج	القفزة الاولى	The first leap (of the	2 nd rear leg
(24) کد		gazelles)	
실 (20)	القفزة الثانية	The second leap	1 st rear leg
(21) کا	_		
(12) يب	القفزة الثالثة	The third leap	Forelegs
(13) يج	_		
(external)	اولاد الظبا	The gazelle's young	Below forelegs
(external)		Liver of the Arabian lion	Under tail

3. Draco, the dragon التنين - the dragon

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
1(1)	الراقص	The dancer	Tongue
(4) د	الربع	Spring-born camel	Head
(6) و (7) ز (8) ح (9) ط	العوايذ	The she-camels	Head
(14) يد (15) يه (16) يو	الاثافي	The tripod	Coil
(21) کا (22) کب (23) کج (24) کد (25) که (26) کا	اظفار الذئب	The wolf's claws	Tail
(27) کز	الذيخ	The hyena	Tail

Kunitzsch translates الراقص as the trotting [camel].

4. Cepheus (the Ethiopian king, father of Andromeda)

'Qifāwūs' - قيفاوس the flaming - الملتهب

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
(2) ب	الراعي	The shepherd	Ankle
(external)	كلبالراعي	The shepherd's dog	Between legs
(3) ج (4) د	الفرق	The hair-parting	Chest
(6) و	القرحة	The blaze (on a horse's brow)	Shoulder
ه (5) (6) + external	القدر	The urn or pot	Beside elbow
(external)	الاغنام	The sheep	Below feet

5. Bootes, the herdsman

the herdsman - البقار

the howler - العوا

the shouter - الصياح

- corruption of above?

guardian of the north - حارس الشمال

al-Şūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
l(1) (2) (3) (4)	اولاد الضباع	The hyenas' young	Arm
(16) يو (20) ك	الرمح	The spear	Hip and leg
(external)	السماك الرامح	The armed Simāk	Between legs
(21) کا	عذبة الرمح	The strap of the spear	Leg

The correct translation for *Bootes* is البقار, "the herdsman". العوا, "the shouter" may derive from a mistranslation of Boōtes, for Boetes.⁷¹

Al-Ṣūfī explains that "Imeans "the upraised", and could in theory be applied to any prominent star. However, the name is used for two prominent stars only, in *Bootes* and in *Virgo*. They are differentiated as the armed and the unarmed "male", because the former (in *Bootes*) is located beside

_

⁷¹ Wellesz 1959 p.8.

an Arabian star-group called الرمح, the spear. The two stars are also the hind legs of the large

6. Corona Borealis, the northern crown

the northern crown - الإكليل الشمالي - the coins (?)

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
l(1)	المنير من الفكة	The brilliant one of the coins (?)	Bottom

7. Hercules

the kneeling man - الخاشي على ركبته the dancer

al-Şūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
1(1)	كلب الراعي	The shepherd's dog	Head
(2) ب	النسق الشامي	The Syrian/ northern series	Chest
(3)	الشامي		
(4) د			
ه (5)			
(6) و			
(7) ز			
(8) ح			
(9) ط			
(10) ي			

Neither Aratus nor Ptolemy uses the name Hercules for this constellation. Aratus calls him "the unknown figure", and Ptolemy describes the constellation-figure only as "the [figure] on his knees". The kneeling man evidently survives from Babylonian tradition. As none of the various Arabic names for the constellation include a transliteration of Hercules, it can be concluded that the Latin name from classical mythology was attributed after the constellations were introduced to Western Europe, in medieval times.

8. Lyra, the lyre

"lūrā" - لورا

- "al-lūzā", copyist's error after above?

the tortoise - السلحفاة

- (corruption of above, or of χέλειον ?) - الشلياق

- cymbal?

ladle - المغرفة

⁷² al-Ṣūfī (3) p.52.

⁷³ Aratus p.93, Ptolemy p.348, note 121.

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
l(1)	النسر الواقع	The falling vulture	Handle

ألنسر الواقع, a star in Scorpio, whose simultaneous rising and setting mark a period in the Anwā' calendar.

9. Cygnus, the swan الدجاجة - the chicken الطائر - the bird

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
(3) ج (6) و (10) ي (12) يب	الفوارس	The horsemen	Chest and wings
٥ (5)	الردف	[The squire] riding behind [the horsemen]	Base of tail

In a 1558AD Mughal copy of Qazwīnī's cosmology, the constellation Cygnus is depicted as two men on horseback. This is evidently a reference to the Arabian group of stars, even though the image has the caption il. (the chicken).⁷⁴

10. Cassiopeia (the Ethiopian queen, mother of Andromeda) - the one with the chair

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
(12) يب	الكف الخضيب	The [henna-]dyed hand [of	Chair-back
	(الثريا)	al-Thurayyā]]
		also on the She-Camel's	
	سنام الناقة	hump	

is difficult to translate directly, but is the name of a large, ancient Arabian constellation. A female figure with outstretched arms can be re-constructed from various star-names, which mention attributes of الثريا. Kunitzsch proposes the name of an ancient Arabian deity, الثريا, the two-handed one, as the original figure. The etymological associations of الثريا with adaption, meaning wealth and abundance, may suggest a benevolent deity. One hand of الثريا (in Cassiopeia) is dyed with henna, while the other (in Cetus) is mutilated: this may be a deity with a dual aspect, like the Roman god Janus. The forehead of الثريا is in Taurus, upon the important group of stars known in the West as the Pleiades.

⁷⁵ Kunitzsch 1961 pp.114-115.

_

⁷⁴ British Library Add.16739 (1558AD): fol.328v.

11. Perseus (the hero who beheads the Medusa)

"barshāwūsh" - برشاوش the bearer of the demon's head - حامل راس الغول

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
l (1) (=nebula)	معصم الثريا	The wrist of al-Thurayya	Wrist
(7) ز	مرفق	Elbow of al-Thurayya	Waist
(25) که (26) کو	عاتق	Shoulder of al-Thurayya	Foot

12. Auriga, the charioteer

the holder of the reins⁷⁶ ممسك الاعنة

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
(3) ج	العيوق	[see below]	Shoulder
(7) ز	العنز	The goat	Arm
(11) یا	الجديان	The two goat kids	Whip

is not translated directly, being a transliteration of the star's Babylonian name iqu, goat. Hommel suggests that the name refers to a Babylonian deity, "the goatherd", linked with the nearby stars of the goat and goat-kids." The Greeks knew the star as ATE, probably also a transliteration." This nomenclature for this star-group has remained in continuous use for many ages: Aratus mentions the she-goat and the two kids, 79 the Arabs retained both names, and the larger star is known as Capella (the Latin for female goat) in the West, and universally today.

13 & 14. Serpens & Serpentarius, the serpent and the serpent-holder 80 the serpent-holder and the serpent - الحوا و الحية

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
l(1)	الراعي	The shepherd	Man's head
(2) ب	كلب الراعي النسق	The shepherd's dog, The Syrian/northern series	Shoulder
	الشامي		

⁷⁶ As described in Chapter Three, the constellation Auriga suffers a demotion in translation: the Greek charioteer acquires the characteristic Islamic iconography of the stable-boy.

⁷⁹ Aratus p.85.

⁷⁷ Hommel 1891 pp.595-596. Hommel proposes that a pre-Islamic deity pas a connection with this same star-name. يعوق is mentioned in the Qur'an (71:23), as one of the idols warned against by Noah.

⁷⁸ Kunitzsch 1961 p.46.

⁸⁰ Serpentarius is given the proper name "Ophiuchus" by both Aratus and Ptolemy.

(7) ز	ابتداء النسق	The beginning of the	Snake's coil
	اليماني	Yemeni/southern series	

15. Sagitta, the arrow

the arrow - السهم the short spear - العنزة

16. Aquila, the eagle

the eagle - العقاب the flying vulture - النسر الطائر

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
> (3)	النسر الطائر	The flying vulture	Chest
4 external	الظليمان	The two male ostriches	Behind back

is the name of a prominent Anwā' star, usually marked on the astrolabe. The same name also tends to be attached to the entire constellation of Aquila, the eagle, where the star lies. This is no doubt due to the coincidental reference to a bird, in the classical tradition. There is a second vulture in the Anwā' system, النسر الواقع (the falling vulture), which occurs in Lyra. نسر is also the name of a pre-Islamic Arabian deity, mentioned in the Qur'an (71:23), where Noah warns his people not to be led astray by idols.81

17. Delphinus, the dolphin

the dolphin - الدلفين

al-Şūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
د (4) ه (5) ه (6) ه (7)	القعود	The young camel	Body
l(1)	عمود الصليب	Column of the cross	Tail

is usually marked on the astrolabe.

18. Equuleus, the lesser horse

part of the horse - القطعة الفرس the preceding horse - الفرس المقدم

⁸¹ Fahd 1968 p.132; Ryckmans 1951 p.14.

19. Pegasus, the winged horse

the greater horse - الفرس الاعظم the second horse - الفرس الثاني

al-Şūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation	Lunar mansion
(3) ج (4) د	الفرغ المقدم الفرغ الاول	The preceding/first spout (of the Arabian Bucket)	Shoulder	26
(1) ا (2) ب	الفرغ المؤخر الفرغ الثاني	The other/second spout (of the Arabian Bucket)	Truncation	27
ه (5) و (6)	الكوب	The drinking-glass	Body	
(7) ز (8) ح	سعد مطر	Sa ^c d of rain	Knee	
(9) ط (10) ي	سعد البارع	The skilled Sa ^c d	Chest	
(11) يا (12) يب	سعد الهمام	The heroic Sa ^c d	Neck	
(15) يه (16) يو	سعد البهايم	The Sa ^c d of intelligence	Face	

Aratus names the constellation as "the monster horse", and Ptolemy refers only to "the horse". The attribution of a proper name evidently took place later. 82

There are at least six Arabian star-groups (usually pairs) with the name **Least**. It has been interpreted to mean "good luck star"⁸³ or "beneficient star", ⁸⁴ although Hommel acknowledges these as provisional. He proposes instead an ancient Arabian deity of the same name, referring to the Babylonian word *šēdu* (meaning demon). ⁸⁵ Kunitzsch further notes that the Arabs (i.e. medieval Arab authors on astronomy) treat the word as a proper name and do not offer explanation. ⁸⁶ Fahd records that Sa^cd was the name of a stone idol, which stood in the desert territory of the Banu Milkan b. Kinana b. Khuzayma b. Mudrika. Sa^cd's blessing was sought to ensure the success of the tribe's camel-herds, and sacrifices of camels were made in his honour. ⁸⁷ Ryckmans states that the idol Sa^cd was a long rock near Jedda, and was held to be a star transformed to stone. ⁸⁸

Four of the Sa^cd groups occupy the twenty-second to twenty-fifth lunar mansions, and are illustrated (as representations of these mansions) in a fourteenth-century Jalayirid astrological treatise. ⁸⁹ These images depict a man acting out the various titles: "the devouring www" (in Aquarius) eats from a spoon, and "the sacrificing "wal" (in Capricorn) cuts his own throat with a sword. Other images do little to explain obscure names: "the wal of the tents" (in Aquarius) kneels and grasps a nearby plant, and "the wal of 'lunge' (the plural of wal a seated figure...

⁸² Aratus p.89, Ptolemy p.358, note 165.

⁸³ Hommel 1891 p.606 ("Glückstern"), Yampolsky 1950 p.65 ("good luck star").

⁸⁴ Dorn 1830 p.384.

⁸⁵ Hommel 1891 p.606.

⁸⁶ Kunitzsch 1961 p.100.

⁸⁷ Fahd 1968 p.147.

⁸⁸ Ryckmans 1951 p.9.

⁸⁹ Reproduced in Carboni 1987 p.185.

20. Andromeda (the princess chained to rocks as a sacrifice to a sea-monster)

the enchained woman - المراة المسلسلة

the woman who didn't have a husband المراة الَّتي لم تر بعلا - the woman who didn't have a husband - انذروميذا

al-Şūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation	Lunar
(12) يب		Heart/belly/side of the great/other (Arabian) Fish	Hip	28
(15) يە	العناق العرض	Desert lynx	Foot	

21. Triangulum, the triangle

the triangle - المثلث

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
ا (1) (2) ب	الأنيسين	The two companions	One side

II - Zodiac

1. Aries, the ram the lamb - الحمل

al-Şūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation	Lunar mansion
(external)	الناطح	The thruster/striker	Over head	
(1) ا (2) ب	الشرطين	The two marks	Base of horns	1
(7) ز (8) ح (11) یا	البطين	The little belly	Tail	2

2. Taurus, the bull

the bull - الثور

al-Şūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation	Lunar mansion
(29) كط (31) لا (32) لب	الثريا	al-Thurayya	Back	3
(14) يد	الدبران	The follower (of al- Thurayya)	Forehead	4

is the Hyades in Greek astronomy. The "follower" is so named in Arabic because it follows close to الثريا.90°

3. Gemini, the twins

the twins - التؤمين "al-jawzā" - الجوزا

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation	Lunar mansion
1(1)	المقدم الذراعين	The preceding paw	First head	7
(2) ب	الذراع المبسوطة	The extended paws (of the Arabian lion)	Second head	
(17) يز (18) يح	الهنعة	The camel brand/ the entwined (?)	Ankle	6

In Arab lore, the two stars of الجوزا lie upon the handle of the bow of الجوزا. The bow lies along an arc of stars across *Gemini*, and is used by الجوزا to shoot the Arabian Lion's paw. 91 According to

⁹⁰ Kunitzsch 1961 p.51.

Hommel, the stars of الهقعة, the fifth lunar mansion, to form the spear of الجوزاً.92

4. Cancer, the crab

the crab - السرطان

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation	Lunar mansion
(1) (=nebula)	النثرة	The middle of the Arabian Lion's nose	Body	8
۵ (4) ۵ (5)	الحمران فم الاسد	The two asses The Arabian Lion's mouth	Body	

The "two asses" are also mentioned in Aratus' Phaenomena. 93

is also the name of a pre-Islamic Arabian deity, according to Hommel.⁹⁴

5. Leo, the lion

the lion - الاسد

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation	Lunar mansion
(2) ب	الطرف	Eyes(of the Arabian Lion)	Forehead	9
(5) ه (6) و (7) ز (8) ح	الجبهة	The forehead (of ditto)	Neck	10
(8) ح	قلب الاسد	Heart of the Arabian Lion	Chest	
ك (20) كب (22)	الزبرة	Hackles (of ditto)	Rump	11
(27) کز	الصرفة	The dogtooth of fortune, turns away the hot weather	End of tail	12
(external cluster)	الهلبة الضفيرة الذوابة	Tuft of hair Tress Strand of hair	Over tail (=location of Ptolemy's Coma Berenices)	

⁹¹ al-Şūfī (3) p.167, and Kunitzsch 1961 p.93.
92 Hommel 1891 p.602.
93 Aratus p.139.
94 Hommel 1891 p.603. Hommel is quoting Lane.

6. Virgo, the virgin

the sheaf of corn - السنيلة

the virgin - العذرا

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation	Lunar mansion
(5) ه (6) و (7) ز (10) ي	العوا	The howler	Above belt	13
(13) يج (14) يد	السماك الاعزل	The unarmed Simāk	Palm	14
(22) کب (23) کج (25) که	الغفر	The covering/obscured	Foot and hem	15

may refer to barking dogs pursuing the Arabian lion, and indeed the 1399AD *Bulhān* image of the thirteenth lunar mansion shows a running dog. 95 Hommel translates the name as "the yelping [bitch]". 96 Kunitzsch notes that the medieval Arab compilers of Arabian astronomy material were at odds with one another on the meaning of this name. 97

7. Libra, the scales

the scales - الميزان

al-Şūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation	Lunar mansion
(1) > (3)	الزبانا	The two claws [of the scorpion]	Over pans	16

Libra developed as a separate constellation from Scorpio relatively late, as remains evident in the name for these stars. 98

⁹⁵ Bodleian Library Or.133 (Kitāb al-Bulhān 1399AD): fol.27v (reproduced Carboni 1988 plate 15).
96 "die kläffende [Hündin]" (Hommel 1891 p.604).

⁹⁷ Kunitzsch 1961 p.45.

⁹⁸ Cf. Savage-Smith 1992B p.16: "Libra was not distinguished by an iconography distinct from that of Scorpio until after the time of Ptolemy."

8. Scorpio, the scorpion

the scorpion - العقرب

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation	Lunar mansion
l(1)	الإكليل	The crown	Forehead	17
(2) ب	الجبهة	The forehead		
(3) ج	-			
(4) د				
(6) و				
(8) ح	قلب العقرب	The heart	Body	18
(20) ك	الشولة	The sting	Tail-tip	19

9. Sagittarius, the archer

the bow - القوس the archer - الرامي

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation	Lunar mansion
ا (1) (2) (3) ج (25) که	النعام الوارد	The ostriches approaching the watering place	Hand, foreleg, bow.	20 (all 8 stars)
(6) و (20) ك (21) كا (22) كب	النعام الصادر	The ostriches returning from the watering place	Shoulder, arrow.	
(8) ح (nebula)	السحابي	The cloudy	Eye	
(Area empty of stars)	البلدة	The town	End of streamers	21
(9) ط (10) ي (11) يا (12) يب (13) يج (14) يد (15)	القلادة	The string of pearls	Streamers	
(26) کو (27) کز	الصردين	(two cold spells?)	Rear legs	

280

⁹⁹ Hommel 1891 pp.604-605.

10. Capricorn, the horned goat

the goat-kid - الجدي

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation	Lunar mansion
l(1)	سعد الذابح	The sacrificing Sa ^c d	Horn	22
(2) ب		Sheep to be slain	(nearby)	1
(24) کد (28) کح	سعد ناشرة	The announcing $Sa^{c}d$ (?)	Tail	
	و هما المحبان	The lovers		

Hommel notes that on the Dendera Zodiac, there appears a figure between Capricorn and Aquarius, holding a knife in one hand and an antelope in the other. 100

11. Aquarius, the water-carrier

the bucket - الدلو

the water-carrier - ساكب الماء

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation	Lunar mansion
(2) ب (3) ج	سعد الملك	The king's Sa ^c d	Shoulder	
(4) د (5) ه	سعد السعود	The Sa^cd of all Sa^cds	Shoulder	24
6) و (7) ز (8) ح	سعد بلع	The devouring Sa ^c d	Hand	23
(9) ط (10) ي (11) يا (12) يب	سعد الاخبية	The Sa ^c d of the tents [or concealed places] ¹⁰¹	Hand	25
(42) مب	الضفدع الاول الظليم	The first frog The male ostrich	End of stream	

12. Pisces, the fish the two fish - السمكتين the fish - الحوت

Hommel 1891 p.606.
 Alternative translation suggested by Hommel 1891 p.606.

III - Southern Hemisphere

1. Cetus, the sea-monster "qītus" - القيطس

al-Şūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
l(1)	الكف الجذما	The mutilated hand (of	Head
(2) ب		al-Thurayya)	
(3) (4)			
(4) د			
o (5)			
(6) و			
(7) ز (9) ط	النعام و النعامات	The male and female	Body
(ع) ط (11) یا	المعامر و المعامات	ostriches	Body
(11) يب (12) يب			
(13) يج			
(14) يد			
(15) يە			
(22) کب	الضفدع الثاني	The second frog	Tail

2. Orion (the hunter)
- الجوزا الجنوبي - the southern jawzā'
- the giant

Arabian name	Translation	Location on Ptolemy's constellation	Lunar mansion
الهقعة	Tuft of horsehair/	Face	_
			5
يد الجوزاء	Hand of the Yemeni/	Shoulder	
اليماني	southern Jawzā'		
النحد	(unclear meaning)	Shoulder	1
المرزم الجوزاء	mirzam of the Jawzā'		
البظم	String of pearls	Belt	
التاج	The crown	Sleeve	
الذوايب	The locks (of hair)		
	الهقعة يد الجوزاء اليماني النجد المرزم الجوزاء البظم	Tuft of horsehair/branding mark Hand of the Yemeni/southern Jawzā' (unclear meaning) mirzam of the Jawzā' String of pearls The crown	Tuft of horsehair/ branding mark Hand of the Yemeni/ Shoulder southern Jawzā' (unclear meaning) Shoulder line in interception in intercepti

(24) کد		
(25) که		

Mirzam is an adjective commonly attached to the lesser of a pair of stars in Arabian nomenclature. It occurs also in Canis Major and Canis Minor, as the name of the neighbouring star to Sirius and Procyon, respectively.

3. Eridanus (a mythical name for the river Po)

the river - النهر

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
(34) لد	الظليم	The male ostrich	Bottom end

Ptolemy refers to the constellation only as "the river". Aratus was the first to make the connection with the mythical river, into which Phaeton and his fiery chariot fell from the sky. 102

4. Lepus, the hare

the hare - الارنب

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
(7) ز	عرش الجوزا	The throne of al-Jawzā'	Body
(8) ح			
(9) ط			
(10) ي			

Kunitzsch translates this name both as "throne" and "foot-rest". 103

5. Canis Major, the greater dog

the greater dog - الكلب الاكبر

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
J (1)	الشعري اليمانية العبور	The Yemeni/southern Sirius The passage/ford	Face
(9) ط	المرزم	mirzam	Forepaw
(14) يد (15) يه (16) يو	العذاري	The virgins	Body

102 See Ptolemy p.384, note 77.103 Kunitzsch 1961 pp.44, 75.

(18) يح			
(external)	الفرود	The solitary ones	Below figure

See the entry under *Orion* for a reference to *mirzam*. There are two stars called **Linear Linear L**

6. Canis Minor, the lesser dog

the lesser dog - الكلب الاصغر the preceding dog - الكلب المتقدم

al-Şūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
1(1)	المرزم	mirzam	Neck
(2) ب	الشعري الشامية الغميصا	The Syrian/northern Sirius The undervalued/	Tail
		bleary-eyed (?)	

See the entry under Orion for a reference to mirzam.

7. Argo Navis (the "Argo", ship of Jason and the Argonauts) - the ship

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
(44) مد	سهيل	[=Canopus]	Tip of oar/rudder

8. Hydra, the sea-serpent

the valiant?

- 'adras', a transliteration from τδρος

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
(12) يب	الفرد	The solitary	Coil

9. Crater, the cup

the cup - الكاس

the cup - الباطية

الشعري Hommel 1891 p.598. Hommel does not suggest a linguistic origin for الشعري.

10. Corvus, the raven

the crow - الغراب

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
(7) ز	عرش السماك	The throne of the	Claw
+ 2 externals	الاعزل	unarmed Simāk	

11 & 12. Centaurus, the centaur, & Lupus, the wolf.

و السبع - "qantūris" and the wild beast the date cluster?

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
(36) لو (37) لز	حضار و الوزن	105	Forelegs

Ptolemy refers to Lupus only as "the wild beast", and so the Arabic translation is more faithful than the Latin. 106

13. Ara, the altar

the censer -المجمرة

14. Corona Australis, the southern crown

the southern crown - الإكليل الجنوبي

15. Piscis Austrinis, the southern fish

the southern fish - الحوت الجنوبي

al-Ṣūfī's Catalogue number	Arabian name	Translation	Location on Ptolemy's constellation
(external)	الضفدع الظليم	The frog The ostrich	Mouth

 $^{^{105}}$ The meaning of this pair of names is obscure, cf. Kunitzsch 1961 pp.65-66. Ptolemy p.396, note 138.

Primary Sources

al-Battānī (d.929AD), Abū ^cAlī Muḥammad b. Jabīr b. Sinān. Astronomer, active in Raqqa

Nallino, C.A., (ed., tr.), al-Battānī sive Albatenii, Opus Astronomicum, Pubblicazioni del Reale Osservatorio di Brera, Milan, 1907.

al-Bīrūnī, Abū Rayhān Muḥammad b. Aḥmad (d.1048AD). Polymath

(1)
Sachau, Edward, (ed., tr.), The Chronology of Ancient Nations, An
English version of the Arabic text of the Athar-ul-Bakiya of Albiruni or
"Vestiges of the Past"..., Allen & Co, London, 1879.

- (2)
 Nizamu'd-Din, M. (ed.), al-Qānūnu'l-Mas^cūdī (Canon Masudicus), An Encyclopedia of Astronomical Science, 3 volumes, Dāiratu'l-Maārif-il-Osmania, Hyderabad, 1954-56.
- (3) Wright, R. Ramsay (tr.), The Book of Instruction in the Elements of the Art of Astrology, by Abu'l-Rayhan Muhammad b. Ahmad, written in Ghaznah, 1029AD, Luzac & Co., London, 1934. Facing-page translation of the text, with facsimile reproductions from Or.8349, British Library.

^cAlī b. ^cIsā (al-Ḥarrānī al-Aṣṭurlābī) (fl.c.830AD). Astronomer, instrument-maker, active in Baghdad, Damascus, Sinjar

Schoy, Carl, "Alī ibn Isā, Das Astrolab und sein Gebrauch", *Isis*, 9, 1927, pp.239-254.

al-Ṣūfī, ^cAbd al-Raḥman b. ^cUmar (d.986AD). Astronomer, active in Shīrāz

Schjellerup, Hans C. F. C., Description des Etoiles fixes composee au milieu du 10e siecle de notre ere, par l'astronome persan Abd-al-Rahman al-Sūfī, Commissionaire de l'Academie Imperiale des Sciences, St Petersburg, 1874.

Translation of the full text of Kitāb Suwar al-Kawākib al-Thābita, based on Ms83 (1601AD), Royal Library Copenhagen, and Ms191 (1606AD), Institute of Oriental Studies St Petersburg. With an introduction by Schjellerup.

(2)
Caussin, Michel, "Les constellations d'Aboulhossain Abderrahman Es-Soufi", Notices et extraits des manuscrits de la bibliothèque du roi et autres bibliothèques, 12, Paris, 1831, pp.241-276.

Translation of the preface of *Kitāb Şuwar al-Kawākib al-Thābita*, based on Ar2488 (13th century AD), Ar2489 (1266AD), Ar2490 (1516AD), Bibliothèque Nationale de France. With an introduction by Caussin.

(3)

Nizamu'd-Din, M. (gen. ed.), Suwaru'l-Kawākib or Uranometry, Dāiratu'l-Maārif-il-Osmania, Hyderabad, 1954.

Critical edition of the Arabic text of Kitāb Şuwar al-Kawākib al-Thābita, based on Ar5036 (c.1437AD), Bibliothèque Nationale de France. With the text of the Urjūza of "Ibnu's-Sūfī", and a note by H.J.J. Winter.

(4)

Tarjama-i şuwar-i kawakib, be qalam-i Khwaja Nasir al-Din-i Tusi, Tehran, 1348Sh. (=1969).

al-Ţusi's translation into Persian of Kitāb Şuwar al-Kawākib al-Thābita, facsimile of a 1250AD manuscript, Aya Sofya 2595, Topkapı.

(5)
Sezgin, Fuat (ed.), The Book of Constellations, Kitāb Suwar al-Kawākib, by ^cAbd al-Rahman al-Sūfī, Abu'l-Husayn ^cAbd al-Rahman ibn ^cUmar ibn Muhammad (d.986AD), Publications of the Institute for the History of Arabic-Islamic Science, series C, vol.29, Frankfurt am Main, 1986.

(6)
Kennedy, E.S., Destombes, Marcel, Kitab al-cAmal bil Asturlab,
Osmania Oriental Publications, Hyderabad, Deccan, 1966.
Full Arabic text of al-Şūfī's treatise on the astrolabe, from Arabe2493 (1866-67AD),
Bibliothèque Nationale de France. With introduction and assessment by Kennedy and

Facsimile edition of Marsh144 (dated 1009-10AD/400H), Bodleian Library, Oxford.

Aratus of Soli (c.310-245 BC). Poet from Cilicia, active at court of Antigonos Gonatas, king of Macedonia, from 277BC

Kidd, Douglas (ed., tr.), *Aratus Phaenomena*, Cambridge University Press, Cambridge, 1997.

Callimachus (fl.280-240BC). Poet, scholar

Destombes.

Trypanis, C.A. (tr.), Callimachus, Aetia – Iambi - Lyric Poems – Hecale - Minor Epic and Elegiac Poems and Other Fragments, Harvard University Press, Massachusetts, 1975.

Ibn al-Qiftī, ^cAlī b. Yūsuf, (d.1248AD). Biographer, active in Aleppo Lippert, J. (ed.), *Ta'rīkh al-Ḥukamā' wa huwa Mukhtasar al-Zawzanī al-musamu'...*, (al-Zawzani's text of 1249AD), Leipzig, 1903.

Ibn al-Nadīm, Abū al-Faraj Muḥammad b. Abī Ya^cqub Isḥāq (d.995AD). Biographer, copyist and bookseller in Baghdad

(1)

Dodge, B., The Fihrist of al-Nadim, a Tenth Century Survey of Muslim Culture, Columbia University Press, New York & London, 1970.

(2) Flügel, Gustav, Kitâb al-Fihrist, Vogel, Leipzig, 1871-72.

Ibn al-Ṣalāḥ, Abū'l-Futūḥ Aḥmad b. Muḥammad al-Sarī Najm al-Dīn (d.1154AD). Astronomer, mathematician, doctor at Artuqid court in Mārdīn Kunitzsch, Paul (ed., tr.), Zur Kritik der Koordinatenüberlieferung im Sternkatalog des Almagest (qawl fī sabab al-khata' wa'l-tashīf al`āridayn fī jadāwil al-maqālatayn al-sābi `a wa'l-thāmina min Kitāb almajastī wa tashīh mā amkana tashīhuhu min dhālika), Vandenhoeck & Ruprecht, Göttinghen, 1975.

Ovid (43BC - 17AD) Poet

Innes, M. M. (tr.), The Metamorphoses of Ovid, Penguin, London, 1955.

Ptolemy (fl.150AD). Astronomer, mathematician, geographer, physicist, active in Alexandria

Toomer, G.J., Ptolemy's Almagest, Duckworth, London, 1984.

Secondary Sources

Al-Chelebi, Da'ud

1927

Makhtūtāt al-mausil [A catalogue of books and manuscripts in the mosques and other institutions of Mosul and its surroundings], al-Farāt, Baghdad.

Al-Janabi, Tariq Jawad

1982

Studies in Mediaeval Iraqi Architecture, Ministry of Culture and Information, State Organization of Antiquities and Heritage, Baghdad.

Allan, James

1995

"The Candlestick of Abu Ishaq Inju in the Homaizi Collection", Fullerton, Fehérvári (eds.), Kuwait Arts and Architecture, A Collection of Essays, Kuwait, pp.66-75.

1982

Islamic metalwork - The Nuhad es-Said Collection, Sotheby, London.

Almagro, Martin, Caballero, Luis, Zozoya, Juan, Almagro, Antonio

1975

Qusayr ^cAmra, Residencia y baños omeyas en el desierto de Jordania, Instituto Hispano-Árabe de Cultura, Madrid.

Amedroz, H.F.

1903

"The Marwanid Dynasty at Mayyāfāriqīn in the Tenth and Eleventh Centuries A.D.", Journal of the Royal Asiatic Society, 35, pp.123-154.

Arnold, Thomas W.

1928

Painting in Islam. A Study of the Place of Pictorial Art in Muslim Culture, Oxford University Press, Oxford.

1924

Survivals of Sasanian and Manichaean Art in Persian Painting, Clarendon Press, Oxford.

Assemani, Simone

1790

Globus Caelesti cufico-arabicus veliterni Musei Borgiani... Praemissa ejusdem De Arabum astronomia dissertatione et adjectis duabus epistolis Cl Josephi Toaldi.

Atil, Esin

(ed.), Islamic Art and Patronage. Treasures from Kuwait, Rizzoli International, New York.

1975

Art of the Arab World, Freer Gallery of Art, Washington D.C.

Azarpay, Guitty

1981

(with contributions by Belenitskii, Marshak, Dresden), Sogdian Painting. The Pictorial Epic in Oriental Art, University of California Press, Berkeley, Los Angeles, London.

1978

"The Eclipse Dragon on an Arabic Frontispiece-Miniature", Journal of the American Oriental Society, 98, pp.363-374.

Baer, Eva

1994

"Foreign Models and Islamic Interpretations in thirteenth-century Metalwork, A Preliminary Note", Hillenbrand, R. (ed.), The Arts of the Saljuqs in Iran and Anatolia: Proceeds of a symposium held in Edinburgh in 1982, Mazda, Costa Mesa, pp.218-225.

1020

Ayyubid Metalwork with Christian Images, Studies in Islamic Art and Architecture, Supplement to Muqarnas, 4, Leiden.

1981

"The ruler in cosmic setting: A note on medieval Islamic iconography", Daneshvari, A. (ed.), Essays in Islamic Art and Architecture in Honor of Katharina Otto-Dorn, Malibu, pp.13-19.

1972

"An Islamic Inkwell in the Metropolitan Museum of Art", Ettinghausen, R. (ed.), Islamic Art in the Metropolitan Museum of Art, The Metropolitan Museum of Art, New York, pp.199-211.

1965

Sphinxes and Harpies in Medieval Islamic Art, An Iconographical Study, The Israel Oriental Society, Jerusalem.

Barrett, Douglas

1952

Persian Painting of the Fourteenth Century, Faber&Faber, London

Barrucand, Marianne

1990/91

"The Miniatures of the Daqā'iq al-Haqā'iq (Bibliothèque Nationale Pers.174): A Testimony to the Cultural Diversity of Medieval Anatolia", Islamic Art, 4, pp.113-142.

Becker, C.H.

1906

"Das Wiener Qusair ^cAmra Werk", Zeitschrift für Assyrologie, 20, Strasburg.

Beer, Arthur

1969

"The Astronomical Significance of the Zodiac of Qusayr 'Amra", Creswell, K.A.C., *Early Muslim Architecture*, 1/2, Clarendon Press, Oxford, pp432-440.

1967

"Astronomical datings of works of art", Vistas in Astronomy, 9, pp177-187.

Belenitski, Alexander M.

1980

Mittelasien. Kunst der Sogden, Seemann, Leipzig.

1969

Hogarth, James (transl.), Central Asia, Barrie & Rockliff, London.

Belloli, Andrea

1985

"The Constellation Figures on the Smithsonian Globe", Savage-Smith, Emilie (ed.), *Islamicate Celestial Globes: Their History, Construction and Use*, Smithsonian Studies in History and Technology, 46, Smithsonian Institution Press, Washington D.C., pp99-113.

Binyon, Laurence

1925

Asiatic Art in the British Museum, Sculture and Painting, Van Oest, Paris & Brussels.

Binyon, Laurence, Wilkinson, J.V.S., Gray, Basil

1933

Persian Miniature Painting. Including a critical and descriptive catalogue of the Miniatures exhibited at Burlington House January – March 1931, London.

Blair, Sheila S.

1995

A Compendium of Chronicles. Rashid al-Din's illustrated history of the world, The Nasser D. Khalili Collection of Islamic Art, 27, Nour Foundation, Oxford & London.

Blair, Sheila S., Bloom, Jonathan M.

1994

The Art and Architecture of Islam 1250-1800, Yale University Press, New Haven & London.

Blochet, E.

1929

(Binyon, C.M., transl.) Musulman Painting XIIth – XVIIth century, Methuen. London & New York.

1925

Catalogue des manuscrits arabes des nouvelles acquisitions (1884-1924), Leroux, Paris.

1907

"Peintures de manuscrits arabes à types byzantines", Revue Archéologique, 4e S., 9, pp.192-223.

Bloom, Jonathan M.

1990

"The Classical Period (1050-1250)", Atil, Esin (ed.), *Islamic Art and Patronage. Treasures from Kuwait*, Rizzoli International, New York, pp.95-109.

Bowen, H.

1960

"Adud al-Dawla", *The Encyclopaedia of Islam* (new edition), 1, Brill, Leiden, pp.211-212.

Bosworth, C.E.

1991

"Ghars al-Ni'ma Hilāl al-Sābi"s Kitāb al-hafawāt al-nādira and Buyid history", Jones, Alan (ed.), Arabicus Felix: Luminosus Britannicus, Essays in Honour of A.F.L. Beeston on his Eightieth Birthday, Ithaca Press, Reading, pp.129-141.

Brandenburg, Dietrich

1982

Islamic Miniature Painting in Medical Manuscripts, Roche, Basle.

Brend, Barbara

1994

"A reconsideration of the Book of Constellations of 400/1009-1010 in the Bodleian Library", Hillenbrand, Robert (ed.), The Art of the Saljuqs in Iran and Anatolia. Proceedings of a Symposium held in Edinburgh in 1982, Mazda, Costa Mesa, pp.89-95.

1991

Islamic Art, British Museum Press, London.

Brend, Barbara, Hillenbrand, Robert, King, David

1998

"A Previously Unrecorded Illustrated Manuscript of the Kitab Suwar al-Kawakib of al-Sufi, Copied and Illustrated in Baghdad in A.D.1125", Sotheby's, *Oriental Manuscripts and Miniatures* (Sales catalogue: 29th April 1998), Sotheby's, London, pp.32-48.

British Museum

1852

Madden, F., Catalogus Codicum Manuscriptorum Orientalium qui in Museo Britannico Asservantur, Pars II, London.

1931

Guide to an Exhibition of Persian Art in the Prints and Drawings Gallery 1931, British Museum, London.

Brockelmann, Carl

1937

Geschichte der Arabischen Litteratur, Supp.1, Brill, Leiden.

Broome, Michael

1985

A Handbook of Islamic Coins, Seaby, London.

Buchthal, Hugo

1942

"Early Islamic Miniatures from Baghdad", *The Journal of the Walters Art Gallery*, 5, pp.19-39.

1940

"'Hellenistic' Miniatures in Early Islamic Manuscripts", Ars Islamica, 7, pp.125-133.

1939

"The Painting of the Syrian Jacobites in its Relation to Byzantine and Islamic Art", Syria, 20, 1939, pp.136-150.

Buchthal, Hugo, Kurz, Otto, Ettinghausen, Richard

1940

"Supplementary Notes to K. Holter's check-list of Islamic Illustrated Manuscripts before AD1350", Ars Islamica, 7, pp.147-164.

Buckton, David

1994

Byzantium. Treasures of Byzantine Art and Culture, British Museum Press, London.

Bussagli, Mario

1963

Painting of Central Asia, Skira, Geneva.

Cahen, Claude

1960

"Buwayhids or Būyids", *The Encyclopaedia of Islam* (new edition), 1, pp.1350-57, Brill, Leiden.

1971

"Ibn al-cAmīd", *The Encyclopaedia of Islam* (new edition), 3, pp.703-704, Brill, Leiden.

Caiozzo, Anna

1992

Étude Iconographique du Livre des Étoiles Fixes d'Abd al-Rahmān al-Sūfī [Manuscrit BN Arabe 5036], M.A. thesis, Institut d'Art et d'Archéologie, Université de Paris IV.

Canby, Sheila R.

1993

Persian Painting, British Museum Press, London.

Carboni, Stefano

1997

Following the Star: Images of the Zodiac in Islamic Art, Metropolitan Museum Studies, New York.

1995

"Constellations, Giants and Angels from al-Qazwini Manuscripts", Allen, James (ed.), *Islamic Art in the Ashmolean Museum*, 10, Part 1, Oxford University Press, Oxford, pp.83-97.

1992

The wonders of creation and the singularities of Ilkhanid painting: a study of the London Qazwini British Library Ms. Or. 14140, Ph.D. thesis, SOAS, University of London.

1988-89

"The London Qazwini: An early fourteenth-century copy of the 'Ajā'ib al-Makhlūqāt', Islamic Art, 3, pp.15-29.

1988

Il Kitab al-Bulhan di Oxford, Turin.

1987

"Two Fragments of a Jalayirid Astrological Treatise in the Keir Collection and in the Oriental Institute in Sarajevo", *Islamic Art*, 2, pp.149-186.

Carey, Moya

The Taqrīr of al-Dashtakī. Chester Beatty Library manuscript Ar4220, an illustrated treatise on astronomy written in Arabic in sixteenth-century Persia, B.A. thesis, Trinity College Dublin.

Casanova, Paul

1892

"Une sphère céleste de l'an 684 de l'hégire", Mémoires publiées par les membres de la Mission archéologique française au Caire, 6, pp.313-330.

Casiri, Michaelis

1770

Bibliotheca Arabico-Hispana Escurialensis sive librorum omnium Mss quos Arabice ab auctoribus magnam partem Arabo-Hispanis compositos Bibliotheca Coenobii Escurialensis complectitur, recension & explanatio.(...), Madrid.

Caussin, Michel

1831

"Les constellations d'Aboulhossain Abderrahman Es-Soufi", Notices et extraits des manuscrits de la bibliothèque du roi et autres bibliothèques, 12, Paris, pp.236-276.

Colledge, Malcolm

1987

"Greek and non-Greek Interaction in the Art and Architecture of the Hellenistic East", Kuhrt, A., Sherwin-White, S. (eds.), Hellenism in the East: the interaction of Greek and non-Greek civilizations from Syria to Central Asia after Alexander, University of California Press, Berkeley & Los Angeles, pp.134-162.

Contadini, Anna

1998A

"Early Thirteenth-Century Arabic Manuscripts: The Case for a North Jazīran Production", (unpublished) paper presented at the symposium Zangids and Ayyubids – Art and Patronage in Syria and the Jazira, School of Oriental and African Studies, Wednesday 18th November 1998.

1998B

Fatimid Art at the Victoria and Albert Museum, The Victoria & Albert Museum, London.

1994

"The Ibn Buhtīšū^c Bestiary Tradition. The Text and Its Sources", *Medicina nei Secoli Arte e Scienza*, 6, pp.349-364.

1992

The Kitāb Na^ct al-Hayawān (Book on the Characteristics of Animals, British Library, Or.2784) and the "Ibn Bakhtīshū^c" Illustrated Bestiaries, Ph.D. thesis, SOAS, University of London.

"Simone Assemani, Professore di Lingue Orientali a Padova", La Conoscenza dell'Asia d dell'Africa in Italia nei Secoli XVIII e XIX, 3, part 1, pp.209-245.

1988-89

"The Kitāb Manāfi^c al-Hayawān in the Escorial Library", Islamic Art, 3, pp.33-57.

Creswell, K.A.C.

1969

Early Muslim Architecture, 2 vols, Clarendon Press, Oxford.

Curatola, Giovanni

1993

(ed.), Eredità dell'Islam. Arte islamica in Italia, Silvana, Milan.

1989

Draghi, la tradizione artistica orientale e i disegni del tesoro del Topkapi, Università degli Studi di Venezia, Venice.

1978

"Il 'vishap' di Aght'amar: Nota sulla diffusione occidentale di un motivo iconografico", Oriente Moderno, 58, pp.285-302.

Daneshpajuh, Mohammad Taghi, Afshar, Iraj

1996

Catalogue of the Minavi Library and the central library of the Institute for Humanities and Cultural Studies, Institute for Humanities and Cultural Studies, Tehran.

Daneshvari, Abbas

1986

Animal Symbolism in Warqa wa Gulshah, Oxford Studies in Islamic Art, 2, Oxford University Press, Oxford.

De Blois, François

1990

Burzōy's Voyage to India and the Origin of the Book of Kalīlah wa Dimnah, Royal Asiatic Society, London.

Dequeker, L.

1986

"Le Zodiaque de la Synagogue de Beth Alpha et le Midrash", Tijdschrift voor filosofie en theologie, 47, pp.2-30.

De Lacy O'Leary, D.D.

1949

How Greek Science Passed To The Arabs, Routledge & Kegan Paul, London.

Destombes, Marcel

1962

"Un astrolabe carolingien et l'origine de nos chiffres arabes", Archives internationales de l'histoire des sciences, 58-59, pp.3-45.

1959

"Un globe céleste arabe du XIIé siècle", Comptes rendus de l'Académie des Inscriptions 1958, Paris, pp.301-313.

1956

"Globes célestes et catalogues d'étoiles orientaux du moyen age", Actes du VIIIé congrès international d'histoire des sciences (Florence, 3-9th September 1956), Bruschi, Florence, pp.313-324.

Diez, Ernst

1949

"The Zodiac Reliefs at the Portal of the Gök Medrese in Siwas", Artibus Asiae, 12, pp.99-104.

Dimand, M.S.

1958

A Handbook of Muhammadan Art, Metropolitan Museum of Art, New York.

Dodds, Jerrilynn D. (ed.)

1992

al-Andalūs, The Art of Islamic Spain, The Metropolitan Museum of Art, Granada & New York.

Dorn, Bernhard

1865

"Drei in der kaiserlichen öffentlichen Bibliothek zu St Petersburg befindliche astronomische Instrumente mit arabischen Inschriften", Mémoires de l'Académie Impériale des Sciences de St Petersbourg, 7th series, 9/1.

1830

"Description of the Celestial Globe Belonging to Major-General Sir John Malcolm... Deposited in the Museum of the Royal Asiatic Society of Great Britain and Ireland", *Transactions of the Royal Asiatic Society*, 2, pp.371-392.

Drechsler, Adolph

1873

Der Arabische Himmels-Globus angefertigt 1279 zu Maragha von Muhammad bin Muwajid Elardhi zugehörig dem Königlichen mathematisch-physikalischen Salon zu Dresden, Königl. Hofbuchhandlung von Hermann Burdach, Dresden.

Dutz, Felix, Matheson, Sylvia,

1998

Parsa (Persepolis), Yassavoli, Tehran.

1997

From Pasargadae to Darab, Yassavoli, Tehran.

Eche, Youssef

1967

Les bibliothèques arabes publiques et semi-publiques en Mésopotamie, en Syrie et en Égypte au Moyen Age, Institut français de Damas, Damascus.

Ellis, A.G., Edwards, Edward,

1912

A Descriptive List of the Arabic Manuscripts Acquired by the Trustees of the British Museum since 1894, British Museum, London.

EI (Encyclopedia of Islam entry, signed "Ed.")

2000

"CUtārid", The Encyclopedia of Islam (new edition), 10, Brill, Leiden, p.942.

Esin, Emil

1994

"The Oghuz Epics and Seljuq Iconography", Hillenbrand, Robert (ed.), The Arts of the Saljuqs in Iran and Anatolia: proceeds of a symposium held in Edinburgh in 1982, Mazda, Costa Mesa, pp.201-209.

Ettinghausen, Richard

1972

From Byzantium to Sasanian Iran and the Islamic World. Three Modes of Artistic Influence, Brill, Leiden.

1970

"The Flowering of Seljuq Art", Metropolitan Museum Journal, 3, pp.113-131.

1967-68

"A Persian Treasure", Arts in Virginia, 8, part 1/2, pp.29-41 (reprinted in Islamic Art and Archaeology: Collected Papers, Mann, Berlin, 1984.)

1962

Arab Painting, Skira, Geneva.

1959

"On Some Mongol Miniatures", Kunst des Orients, 3, pp.44-52.

"Early Realism in Islamic Art", Studi Orientalistici in onore di Giorgio Levi della Vida, 1, pp.1-24.

1942

"Painting in the Fatimid Period: A Reconstruction", Ars Islamica, 9, pp.112-124.

Ettinghausen, Richard, Grabar, Oleg

1987

The Art and Architecture of Islam 650-1250, Yale University Press, New Haven & London.

Ettinghausen, Richard, Guest, G.D.

1961

"The Iconography of a Kashan Lustre Plate", Ars Orientalis, 4, pp.25-64.

Fahd, Toufic

1995

"Sabi'a" The Encyclopedia of Islam (new edition), 8, Brill, Leiden, pp.675-678.

1968

Le Panthéon de l'Arabie Centrale à la Veille de l'Hégire, Paul Geuthner, Paris.

Farès, Bishr

1953

Le Livre de la Theriaque. Ms arabe à peintures de la fin du XIIe siecle conservé à la bibliothèque nationale de Paris, Institut français d'archéologie orientale, Cairo.

1948

Une miniature réligieuse de l'école Arabe de Bagdad. Son climat, sa structure et ses motifs, sa relation avec l'iconographie chrétienne d'orient, Mémoires presentés à l'institut d'Égypte, 51.

Fehérvári, Géza

1998

Pottery of the Islamic World in the Tareq Rajab Museum, Tareq Rajab Museum, Kuwait.

1985

La ceramica islamica, Arnoldo Mondadori, Milan.

Fehérvári, Géza, Fullerton, Arlene (eds.),

1995

Kuwait Arts and Architecture, A Collection of Essays, Kuwait.

Fogg, Sam

Black, Crofton, Saidi, Nabil (eds.), *Islamic Manuscripts*, Catalogue 22, Sam Fogg Rare Books and Manuscripts, London.

Fullerton, Arlene

1995

"A brief history of the Jasim al-Homaizi Collection", Fehérvári, Géza, Fullerton, Arlene (eds.), Kuwait Arts and Architecture, A Collection of Essays, Kuwait, pp.51-65.

Gaehde, Joachim E., Mütherich, Florentine

1976

Carolingian Painting, Braziller, New York.

Ghirshman, Roman,

1962

Gilbert, Stuart, Emmons, James (transl.), Iran, Parthians and Sassanians, Thames & Hudson, London.

Ghouchani, Abdullah

1998

"Sasanian Motifs and Early Islamic Metalwork", Curtis, V.S., Hillenbrand, R., Rogers, J.M. (eds.), The Art and Archaeology of Ancient Persia. New Light on the Parthian and Sasanian Empires, I.B. Tauris & BIPS, London & New York, pp.188-191.

1991

"Identifikation eines Tellers aus dem 4. Jahrhundert H.GH", Archaeologische Mitteilungen aus Iran, 24, pp.219-221.

Gibbs, Sharon, Saliba, George

1984

Planispheric Astrolabes from the National Museum of American History, Smithsonian Studies in History and Technology, no.45, Smithsonian Studies in History and Technology, Washington D.C.

Gierlichs, Joachim

1996

Mittelalterliche Tierreliefs in Anatolien und Nordmesopotamien, Ernst Wasmuth, Tübingen.

Godard, Andre

1965

Heron, Michael (transl.), Rogers, Michael (ed.), *The Art of Iran*, Allen & Unwin, London.

Goodman, L.E.

1000

"The Translation of Greek Materials into Arabic" Young, M.J.L., Latham, J.D., Serjeant, R.B. (eds.), *Religion, Science and Learning in the ^cAbbāsid Period*, Cambridge University Press, Cambridge, pp.477-497.

Gousset, Marie-Therese

1984

"Le Liber de locis stellarum fixarum d'al-Sûfi, ms.1036 de la Bibliothèque de l'Arsenal à Paris: une réattribution", Arte medievale, periodico internazionale di critica dell'arte medievale (Rome), 2, pp.95-108.

Grabar, Oleg

1988

"La Place de Qusayr ^cAmra dans l'art profane du Haut Moyen Age", Cahiers Archeologiques, 36, pp.75-83.

1984

The Illustrations of the Maqāmāt, University of Chicago Press, Chicago & London.

1972

"Imperial and Urban Art in Islam: The Subject Matter of Fatimid Art", Colloque International sur l'Histoire du Caire, 25 mars – 5 avril 1969, Ministry of Culture of the Arab Republic of Egypt, Cairo, pp.173-189.

1967

Sasanian Silver. Late Antique and Early Medieval Arts of Luxury from Iran (August-September 1967), University of Michigan Museum of Art, Ann Arbor.

Graves, Robert

1981

Greek Myths, Illustrated Edition, Penguin, London.

Gray, Basil

1961

Persian Painting, Skira, Geneva.

Grube, Ernst J.

1991A

"Prolegomena for a Corpus Publication of Illustrated Kalīlah wa Dimnah Manuscripts", Islamic Art, 4, pp.301-481.

1991B

"The Early Illustrated Kalila wa Dimna Manuscripts", Grube, E.J. (ed.), A Mirror for Princes from India. Illustrated Versions of the Kalilah wa Dimnah, Anvar-i Suhayli, Iyar-i Danish, and Humayun Nameh, Marg, Bombay, pp.33-51.

1978

Persian Painting in the Fourteenth Century, Supplemento n.17 agli Annali, 38, Istituto Universitario Orientale, Naples (reprinted in Studies in Islamic Painting, Pindar Press, London, 1995, pp.159-215).

"Part I: Fostat Fragments", "Part II: Pre-Mongol and Mamluk Painting", Robinson, B.W. (ed.), *The Keir Collection. Islamic Painting and the Arts of the Book*, Faber & Faber, London, pp.25-110.

1972

"The Earliest Known Paintings from Islamic Cairo", Colloque International sur l'Histoire du Caire, 25 mars – 5 avril 1969, Ministry of Culture of the Arab Republic of Egypt, Cairo, pp.195-198.

1968

The Classical Style in Islamic Painting, Oriens, Lugano.

1966

The World of Islam, Hamlyn, London

1962

Muslim Miniature Paintings from the XIII to XIX Century from Collections in the United States and Canada, Neri Pozza, Venice.

Gundel, Wilhelm

1922

Sterne und Sternbilder in Glauben des Altertums und der Neuzeit, Schroeder, Bonn.

Gunter, Ann C., Jett, Paul

1992

Ancient Iranian Metalwork in the Arthur M. Sackler Gallery and the Freer Gallery of Art, Smithsonian Institution, Washington D.C.

Gunther, Robert T.

1932

The Astrolabes of the World, 1, Oxford University Press, Oxford.

Harper, Prudence

1998

"Sasanian silver vessels. Recent developments", Curtis, V.S., Hillenbrand, R., Rogers, J.M. (eds.), The Art and Archaeology of Ancient Persia. New Light on the Parthian and Sasanian Empires, I.B. Tauris & BIPS, London & New York, pp.67-73.

1987

"Parthian and Sasanian Silverware; Questions of Continuity and Innovation", *Mesopotamia*, 22, pp.341-355.

Harper, Prudence, Meyers, Peters

1981

Silver Vessels of the Sasanian Period. Volume One: Royal Imagery, The Metropolitan Museum of Art, Princeton University Press, New York

Hartner, Willy

1973

"The Vaso Vescovali in the British Museum, A Study on Islamic Astrological Iconography", *Kunst des Orients*, 9, pp.99-130.

1970

"al-Battānī", Gillispie, C.C. (ed.), *Dictionary of Scientific Biography*, 1, Scribners, New York, pp.507-516.

1965A

"al-Djawzahar", Encyclopedia of Islam (new edition), 2, Brill, Leiden, pp.501-502.

1965B

"The Earliest History of the Constellations in the Near East and the Motif of the Lion-Bull Combat", Journal of Near Eastern Studies, 24, pp.1-16

1938

"Pseudoplanetary Nodes of the Moon's Orbits in the Hindu and Islamic Iconographies", Ars Islamica, 5, pp.114-154.

Hartner, Willy, Kunitzsch, Paul

1993

"al-Mintakat al-Burudj", Encyclopedia of Islam (new edition), 7, Brill, Leiden, pp.81-87.

Hauber, Anton

1918

"Zur Verbreitung des Astronomen Sufi", Der Islam, 8, pp.48-54.

1916

Planetenkinderbilder und Sternbilder. Zur Geschichte des Menschlichen Glaubens und Irrens, Studien zur deutschen Kunstgeschichte, 194, Heitz & Mündel, Strasbourg.

Hayward Gallery

1976

The Arts of Islam, Arts Council of Great Britain, London.

Herzfeld, Ernst

1927

Die Malereien von Samarra, Die Ausgrabungen von Samarra, 3, Verlag Dietrich Reimer, Berlin.

Herzfeld, Ernst, Sarre, Friedrich

1911

Archäologische Reise im Euphrat- und Tigris-Gebiet, Reimer, Berlin.

Hillenbrand, Carole

1985

"The History of the Jazīra, 1100-1250: A Short Introduction", Raby, Julian (ed.), *The Art of Syria and the Jazīra 1100-1250*, Oxford University Press, Oxford, pp.9-19.

Hillenbrand, Robert

1995

"Images of Authority on Kāshān Lustreware", Allan, James (ed.), *Islamic Art in the Ashmolean Museum*, 10, part 1, Oxford University Press, Oxford, pp.167-198.

1994

"The relationship between book painting and luxury ceramics in thirteenth-century Iran", The Art of the Saljuqs in Iran and Anatolia. Proceedings of a Symposium held in Edinburgh in 1982, Mazda, Costa Mesa, pp.134-145.

1991

"Mamluk and Ilkhanid Bestiaries: Convention and Experiment", Ars Orientalis, 20, pp.149-187.

Hoffman, Eva R.

2000

"The Beginnings of the Illustrated Arabic Book: An Intersection between Art and Scholarship", *Mugarnas*, 17, pp.37-52.

Holter, Kurt

1937A

"Die Islamischen Miniaturhandschriften vor 1350", Zentralblatt fur Bibliothekswesen, Heft 1, 54, pp.1-34.

1937B

"Die Galen-Handschrift und die Makamen des Hariri der Wiener Nationalbibliothek", Jahrbuch der Kunsthistorischen Sammlungen in Wien, neue Folge, 11, pp.1-49.

Hommel, Fritz

1891

"Ueber den Ursprung und das Alter der arabischen Sternnamen und insbesondere der Mondstationen", Zeitschrift der Deutschen Morgenländischen Gesellschaft, 45, pp.592-619.

Honigmann, Ernest

1950

"The Arabic Translation of Aratus' Phaenomena", *Isis*, 14, part 1, no.123, pp.30-31.

Institut du monde arabe

Trésors fatimides du Caire, exposition presentée à l'Institut du monde arabe du 28 avril au 30 août 1998, Institut du monde arabe, Paris.

1990

Chateaux Omayyades de Syrie. Collections du Musée National de Damas. 16 septembre 1990 – 17 mars 1991, Institut du monde arabe, Paris.

Irani, Rida A. K.

1955

"Arabic Numeral Forms", Centaurus, 4/1, pp.1-12.

Ictisāmī, Yūsuf

1311H (solar)

Fihrist kitābkhāneh-yi majlis-i shūrā-yi milli, Tehran.

James, David

1974

"Space-Forms in the Work of Baghdad Maqāmāt Illustrators, 1225-58", Bulletin of the School of Oriental and African Studies, 37, pp.305-320.

Kabir, Mafizullah

1964

The Buwayhid Dynasty of Baghdad (334/946 – 447/1055), Iran Society, Calcutta.

1961

"Ustadh Abu'l-Fadl ibn al-cAmid", Islamic Culture, 35, pp.8-11.

1959

"Libraries and Academies during the Buwayhid Period – 946AD to 1055AD", *Islamic Culture*, 33, pp.31-33.

Kennedy, Edward S.

1989

"al-Sūfī on the Celestial Globe", Zeitschrift für Geschichte der Arabisch-Islamischen Wissenschaften, 5, pp.48-93.

1968

"The Exact Sciences in Iran under the Saljuqs and Mongols", Cambridge History of Iran, 5, Cambridge University Press, Cambridge, pp.659-680.

1960

"A Letter of Jamshid al-Kashi to his Father, Scientific Research and Personalities at a Fifteenth-Century Court", *Orientalia*, 29, pp.191-213.

1956

"A Survey of Islamic Astronomical Tables", Transactions of the American Philosophical Society (new series), 46/2, pp.123-177.

Kennedy, Edward S., Destombes, Marcel

1966

"Introduction to al-Sūfī's Kitab al-cAmal bil Asturlab" (introducing the Arabic text of al-Sūfī's astrolabe treatise), Osmania Oriental Publications, Hyderabad, Deccan (reprinted in Studies in the Islamic Exact Sciences, American University of Beirut, 1983, pp.405-415).

Kennedy, Edward S., Kennedy, Mary-Helen.

1987

Geographical Co-ordinates of Localities from Islamic Sources, Publications of the Institute for the History of Arabic-Islamic Science, Frankfurt am Main.

King, David A.

1999

World-Maps for Finding the Direction and Distance to Mecca, Innovation and Tradition in Islamic Science, Brill, Leiden.

1986

A Survey of the Scientific Manuscripts in the Egyptian National Library, The American Research Centre in Egypt, Eisenbrauns, Indiana.

1981-1986

A Catalogue of the Scientific Manuscripts in the Egyptian National Library, 2 parts, The American Research Centre in Egypt, Smithsonian Institution, Cairo.

Knobel, Edward Ball

1917

Ulugh Beg's Catalogue of Stars, revised from all Persian manuscripts existing in Great Britain, with a vocabulary of Persian and Arabic words, Carnegie Institution of Washington, Washington D.C.

Kossolapov, Alexander J., Marshak, Boris J.

1999

Murals along the Silk Road (Combined Art Historical and Laboratory Study), Formica, Saint Petersburg.

Kraemer, Joel L.

1992

Humanism in the Renaissance of Islam. The Cultural Revival during the Buyid Age, Brill, Leiden.

Kühnel, Ernst

1967

"Some Observations on Buyid Silks", A Survey of Persian Art, 14, pp.3080-3089.

"Die Kunst Persiens unter den Buyiden", Zeitschrift der Deutschen morgenlandischen Gesellschaft, 31, pp.78-92.

Kunitzsch, Paul

1995

"al-Nudjūm", *The Encyclopedia of Islam* (new edition), 8, Brill, Leiden, pp.97-105.

1993

"The Chapter on the Fixed Stars in Zarādusht's Kitāb al-Mawālīd", Zeitschrift für Geschichte der Arabisch-Islamischen Wissenschaften, 8, pp.241-249.

1991

"al-Manāzil", The Encyclopedia of Islam (new edition), 6, Brill, Leiden, pp.374-376.

1987

"Peter Apian and 'Azophi': Arabic Constellations in Renaissance Astronomy", Journal for the History of Astronomy, 18, pp.117-124.

1986A

"The Astronomer Abu'l-Husayn al-Sufi and his book on the Constellations", Zeitschrift fur Geschichte der Arabisch-Islamischen Wissenschaften, 3, pp.56-81.

1986B

"Star Catalogues and Star Tables in Mediaeval Oriental and European Astronomy", *Indian Journal of History of Science*, 21, New Delhi, pp.113-122.

1976

"al-Sūfi", Gillespie, C.C. (ed.), *The Dictionary of Scientific Biography*, 13, Scribner's Sons, New York, pp.149-150.

1975

(transl., ed.), Ibn as-Salāh, Zur Kritik der Koordinatenüberlieferung im Sternkatalog des Almagest, Vandenhoeck & Ruprecht, Göttingen.

1974

Der Almagest. Die Syntaxis Mathematica des Claudius Ptolemäus in arabisch-lateinischer Überlieferung, Otto Harrassowitz, Wiesbaden.

1961

Untersuchungen zur Sternnomenklatur der Araber, Otto Harrassowitz, Wiesbaden.

Lane, Arthur

1947

Early Islamic Pottery, London.

Leach, Linda

1995

Mughal and other Indian Paintings from the Chester Beatty Library, 2 vols., Scorpion Cavendish, London.

Lehmann, C.

1945

"The Dome of Heaven", The Art Bulletin, 27, pp.1-27.

Le Strange, Guy

1900

Baghdad during the ^cAbbāsid Caliphate, from contemporary Arabic and Persian sources, Oxford University Press, Oxford.

1930

The Lands of the Eastern Caliphate, Cambridge University Press, Cambridge.

Loth, Otto

1877

A Catalogue of the Arabic Manuscripts in the Library of the India Office, London.

Makariou, Sophie

1998

"Une sphère céleste orientale datée de 1144 de Yunus Ibn Husayn al-Astourlabi", (unpublished) lecture delivered at the Louvre Museum, as part of *Oeuvre en direct* series, Paris 15th May 1998.

Makariou, Sophie, Caiozzo, Anna

1998

"La tradition des étoiles fixes sur les globes célestes et dans les manuscrits illustrés d'al-Sufi", Makariou, Sophie (ed.), L'apparence des cieux. Astronomie et Astrologie en terre d'Islam, Réunion des Musées Nationaux, Paris, pp.97-116.

Makdisi, George

1961

"Muslim Institutions of Learning in Eleventh-Century Baghdad", Bulletin of the School of Oriental and African Studies, 24, pp.1-56.

Marshak, Boris I.

1999

"A Sogdian Silver Bowl in the Freer Gallery of Art", Ars Orientalis, 29, pp.101-110.

"The Decoration of Some Late Sasanian Silver Vessels and its Subject-Matter", Curtis, V.S., Hillenbrand, R., Rogers, J.M. (eds.), The Art and Archaeology of Ancient Persia. New Light on the Parthian and Sasanian Empires, I.B.Tauris & BIPS, London & New York, pp.84-92.

1986

Silberschätze des Orients. Metallkunst des 3. – 13. Jahrhunderts und ihre Kontinuität, Seeman, Leipzig.

Martin, F.R.

1912

The Miniature Painting and Painters of Persia, India and Turkey from the eighth to the eighteenth century, 2 vols, Quaritsch, London.

Mayer, L.A.

1956

Islamic Astrolabists and their Works, Kundig, Geneva.

1942

"A hitherto unknown Damascene artist", Ars Islamica, 9, p.168.

Melikian-Chirvani, Asadullah Souren

1994

"The Light of the World", The Arts of the Saljuqs in Iran and Anatolia: proceeds of a symposium held in Edinburgh in 1982, Mazda, Costa Mesa, pp.146-155.

1970

"Le roman de Varqe et Golsâh. Essai sur les rapports de l'esthétique littéraire et de l'esthétique plastique dans l'Iran pré-mongol, suivi de la traduction du poème", Arts Asiatiques, (numéro spécial), 22.

1967

"Trois manuscrits de l'Iran Seldjoukide", Arts Asiatiques, 16, pp.3-51.

Mercier, Raymond

1997

"Ibn al-A^clam", Selin, Helaine (ed.), Encyclopedia of the History of Science, Technology and Medicine in Non-Western Cultures, Kluwer, pp.401-402.

1991

"The lost $Z\bar{i}j$ of al-Sūfī in the twelfth century tables for London and Pisa", Lectures from the Conference on al-Sūfī and Ibn al-Nafis, investigating astronomy and medicine and science 5^{th} - 8^{th} October 1987, University of Jordan, 15, House of Contemporary Thought, Beirut, pp.38-74.

"The Parameters of the Zīj of Ibn al-A^clam", Archives internationales d'histoire des sciences, 39, pp.22-50.

1977

"Studies in the Medieval Conception of Precession (Part II)", Archives Internationales d'Histoire des Sciences, 27/100, pp.33-71.

1976

"Studies in the Medieval Conception of Precession (Part I)", Archives Internationales d'Histoire des Sciences, 26/99, pp.197-220.

Meucci, F.

1878

Il globo celeste del secolo XI existente nel gabinetto degli strumenti antichi di astronomia, di fisica e di matematica del real istituto di studi superiori, Florence.

Monneret de Villard, Ugo

1950

Le Pitture Musulmane al Soffito della Cappella Palatina in Palermo, Libreria dello Stato, Rome.

Morelon, Régis

1996

"General survey of Arabic astronomy", "Eastern Arabic astronomy between the eighth and the eleventh centuries", Rashed, Roshdi (ed. with collaboration of Morelon, Régis), Encyclopedia of the History of Arabic Science, 1, pp.1-57.

Morgan, David

1988

Medieval Persia 1040-1797, Longman, London & New York.

Morley, William H.

1856

Description of a Planispheric Astrolabe constructed for Shah Sultan Husain Safawi, King of Persia, and now preserved in the British Museum, Williams & Norgate, London.

Musée d'art et d'histoire

1985

Falk, Toby (ed.), *Treasures of Islam*, Philip Wilson, London, in association with Musée d'art et d'histoire, Geneva.

Musée du Petit Palais

1994

Petrosyan, Yuri A., Akimushkine, Oleg A., Khalidov, Anas B., Rezvan, Efim A., "de Bagdad à Ispahan" Manuscrits islamiques de la Filiale de

Saint-Pétersbourg de l'Institut d'Études Orientales, Académie des Sciences de Russie, ARCH, Lugano.

Nallino, C.A.

1960

"al-Battānī", The Encyclopedia of Islam (new edition), 1, Brill, Leiden, pp.1104-1105.

Nasr, Seyyed Hossein

1976

Islamic Science. An Illustrated Study, World of Islam Festival, London.

Nassar, Nahla

1985

"Saljuq or Byzantine: Two related styles of Jaziran Miniature painting", Oxford Studies in Islamic Art, 1, pp.85-98.

Nau, F.

1929-30

"Le Traité sur les "Constellations" écrit, en 661, par Sévère Sebokht évêque de Qennesrin", Revue de l'Orient Chrétien, 27, pp.327-410.

Nersessian, Sirarpie der

1965

Aght'amar. Church of the Holy Cross, Harvard University Press, Cambridge Massachusetts.

Neugebauer, Otto

1975

A History of Ancient Mathematical Astronomy, 3 parts, Springer Verlag, Berlin-Heidelberg-New York.

Öney, G.

1969

"Lion Figures in Anatolian Seljuk Architecture", Anadolu, 13, pp.43-67.

Otto-Dorn, Katharina

1978-79

"Figural Stone Reliefs on Seljuk Sacred Architecture in Anatolia", Kunst des Orients, 12/1, pp.103-149.

1963

"Darstellungen des Turco-Chinesischen Tierzyklus in der islamischen Kunst", In Memorian E. Diez, Beitrage zur Kunstgeschichte Asiens, Istanbul, pp.131-165.

1961-62

"Turkisch-Islamisches Bildgut in den Figurenreliefs von Achthamar", *Anatolia*, 6, pp.1-69

Panofsky, Erwin, Saxl, Fritz

1933

"Classical mythology in medieval art", Metropolitan Museum Studies, 4, pp.228-280.

Pattie, Thomas Smith

1980

Astrology as illustrated in the collections of the British Library and the British Museum, The British Library, London.

Pellat, Charles

1960

"Anwā", The Encyclopedia of Islam (new edition), 1, Brill, Leiden, pp.523-524.

1955

"Dictons rimés, Anwa', et maisons lunaires chez les Arabes", Arabica, 2, pp.17-41.

Pinder-Wilson, Ralph

1976

"The Malcolm Celestial Globe", British Museum Yearbook, 1, pp.297-321. (Reprinted in Studies in Islamic Art, Pindar Press, London, 1985.)

Pingree, David

1971

"cIlm al-Hay'a", *The Encyclopedia of Islam* (new edition), 3, Brill, Leiden, pp.1135-1138.

Pinto, Olga

1929

"The Libraries of the Arabs during the time of the Abbasides", *Islamic Culture*, April, pp.210-213.

Piotrovsky, Mikhail B., Vrieze, John (gen.eds.)

1999

Earthly beauty, Heavenly art. Art of Islam (catalogue of exhibition held in De Nieuwe Kerk, Amsterdam, 16 December 1999 – 24 April 2000), Lund Humphries, Amsterdam.

Plessner, M.

1960

"Batlamiyūs", *The Encyclopedia of Islam* (new edition), 1, Brill, Leiden, pp.1100-1102.

Pope, Arthur Upham, Ackermann, Phyllis

1938-77

A Survey of Persian Art from Prehistoric Times to the Present, London & New York, 12 vols.

Preusser, Conrad

1911

Nordmesopotamische Baudenkmäler Altchristlicher und Islamischer Zeit, Hinrich, Leipzig.

Raby, Julian

1994

"Saljuq-style painting and a fragmentary copy of al-Sufi's Fixed Stars", Hillenbrand, Robert (ed.), The Art of the Saljuqs in Iran and Anatolia. Proceedings of a Symposium held in Edinburgh in 1982, Mazda, Costa Mesa, pp106-117.

1987/88

"Between Sogdia and the Mamluks: a note on the earliest illustrations to Kalila wa Dimna", *Oriental Art*, n.s. 33, Winter, pp.381-398.

1985

(ed.), The Art of Syria and the Jazīra 1100-1250, Oxford University Press, Oxford.

Rice, David Storm

1959

"The Oldest Illustrated Arabic Manuscript", Bulletin of the School of Oriental and African Studies, 22, pp.207-220.

1958

"Studies in Islamic Metal Work – VI", Bulletin of the School of Oriental and African Studies, 21, pp.225-253.

1957

"Inlaid Brasses from the Workshop of Ahmad al-Dhakī al-Mawsilī", *Ars Orientalis*, 2, pp.283-326.

1954

"The Seasons and the Labours of the Months in Islamic Art", Ars Orientalis, 1, pp.1-40.

1953

"The Aghānī Miniatures and Religious Painting in Islam", Burlington Magazine, 95, pp.128-135.

1952

"Medieval Harran", Anatolian Studies, 2, pp.36-83.

Rice, David Talbot

1975

Islamic Art, Thames & Hudson, London.

1959

The Art of Byzantium, Thames & Hudson, London.

Richard, Francis

1997

Splendeurs persanes. Manuscrits du XIIe au XVIIe siècle, Bibliothèque Nationale de France, Paris.

Richter-Bernburg, L.

1998

"Libraries, medieval", *Encyclopedia of Arabic Literature*, 2, Routledge, London, pp.471-472.

Rieu, Charles

1894

Supplement to the Catalogue of the Arabic Manuscripts in the British Museum, London.

Rogers, J.M. (translated, edited & expanded from the original Turkish by Çağman, Filiz, and Tanındı, Zeren)

1986

The Topkapı Saray Museum, The Albums and Illustrated Manuscripts, Thames & Hudson, London.

Rosen, Victor

1877

Les Manuscrits Arabes de l'Institut des Langues Orientales, Eggers & Comp., Saint Petersburg.

1884

Remarques sur les manuscrits orientaux de la Collection Marsigli à Bologne, Rome.

Rosen-Ayalon, M.

1973

"The problem of the 'Baghdad School' of miniatures and its connection with Persia", *Israel Oriental Studies*, 3, pp.159-171

Ryckmans, G.

1951

Les religions arabes préislamiques, Louvain.

Sabra, A.I.

1976

"The Scientific Enterprise", Lewis, Bernard (et al), *The World of Islam.* Faith, People, Culture, Thames & Hudson, London, pp.181-200.

1971

"Ellm al-Hisāb", *The Encyclopedia of Islam* (new edition), 3, Brill, Leiden, pp.1138-1141.

Saliba, George

1994

A History of Arabic Astronomy, Planetary Theories during the Golden Age of Islam, New York University Press, New York.

Sarre, Friedrich

1937

"Eine seltene Lusterschale der Rayy-Keramik", Ars Islamica, 4, pp.192-194.

1936

Der Kiosk von Konia, Verlag für Kunstwissenschaft, Berlin.

Sarton, George

1927

Introduction to the History of Science, vol.1: From Homer to Omar Khayyam, The Carnegie Institution of Washington, Washington D.C.

Savage-Smith, Emilie

1992A

"The Islamic Tradition of Celestial Mapping", Asian Art, 5/4, pp.5-28.

1992B

"Celestial Mapping", Harley, J.B., Woodward, D. (eds), Cartography in the Traditional Islamic and South Asian Societies, History of Cartography, 2/1, University of Chicago Press, Chicago, pp.12-70.

1985

Islamicate Celestial Globes: Their History, Construction and Use, Smithsonian Studies in History and Technology, 46, Smithsonian Institution Press, Washington D.C.

Savage-Smith, Emilie, Katzenstein, Ranee

1988

The Leiden Aratea: ancient constellations in a medieval manuscript, The J. Paul Getty Museum, Malibu.

Savage-Smith, Emilie, Maddison, Francis

1997

Science, Tools and Magic, The Nasser D. Khalili Collection of Islamic Art, 12 (2 parts), Nour Foundation, Oxford & London.

Savage-Smith, Emilie, Marion, B.

1980

Islamic Geomancy and a Thirteenth Century Divinatory Device, Undena, Malibu, 1980.

Saxl, Fritz

"The Zodiac of Qusayr ^cAmra", Creswell, K.A.C., *Early Muslim Architecture*, 1/2, Clarendon Press, Oxford, pp.424-431.

Sayili, Aydin

1960

The Observatory in Islam and Its Place in the General History of the Observatory, Publications of the Turkish Historical Society, series 7, no.38, Türk Tarīh Kurumu Basimevī, Ankara.

Schjellerup, Hans C. F. C.

1874

Description des Etoiles fixes composee au milieu du 10e siecle de notre ere, par l'astronome persan Abd-al-Rahman al-Sūfī, Commissionaire de l'Academie Imperiale des Sciences, St Petersburg.

Schlumberger, Daniel

1952

"Le Palais Ghaznevide de Lashkari Bazar", Syria, 29, pp.251-270.

1948

"Deux Fresques Omeyyades", Syria, 25, pp.86-102.

Schmidt, Hanns-Peter

1980

"The Senmurw, Of Birds and Dogs and Bats", Persica, no.9, pp.1-85.

Schmitz, Barbara

1997

Islamic and Indian Manuscripts and Paintings in the Pierpont Morgan Library, Pierpont Morgan Library, New York.

1992

Islamic Manuscripts in the New York Public Library, Oxford University Press, Oxford & London.

Sédillot, M.L.P.E.A.

1847

Prolégomènes des Tables Astronomiques d'Oloug-Beg, Firmin Didot, Paris.

Sezgin, Fuat

1986

(ed.), The Book of Constellations, Kitāb Suwar al-Kawākib, by ^cAbd al-Rahman al-Sūfī, Abu'l-Husayn ^cAbd al-Rahman ibn ^cUmar ibn Muhammad (d.986AD), Publications of the Institute for the History of Arabic-Islamic Science, series C, vol.29, Frankfurt am Main.

1979

Geschichte des Arabischen Schrifttums, 7: Astrologie – Meteorologie und Verwandtes bis c.430H., Brill, Leiden.

Geschichte des Arabischen Schrifttums, 6: Astronomie bis c.430H., Brill, Leiden.

1974

Geschichte des Arabischen Schrifttums, 5: Mathematik bis c.430H., Brill, Leiden.

Shepherd, D.G.

1994

"Saljuq Textiles – A Study in Iconography", Hillenbrand, Robert (ed.), The Arts of the Saljuqs in Iran and Anatolia: proceeds of a symposium held in Edinburgh in 1982, Mazda, Costa Mesa, pp.210-217.

Simpson, Marianna Shreve

1982

"The role of Baghdad in the formation of Persian Painting", Adle, C. (ed.), Art et societé dans le monde iranien, Bibliothèque Iranienne, 26, Paris, pp91-116.

Soucek, Priscilla

1980

"The Role of Landscape in Iranian Painting to the Fifteenth Century", Watson, William (ed.), Landscape Style in Asia: a colloquy held 25-27 June 1979, Colloquies on Art and Archaeology in Asia, 9, pp.86-110.

1975

"An Illustrated Manuscript of al-Biruni's Chronology of Ancient Nations", Chelkowski, P.J. (ed.), *The Scholar and the Saint*, New York, pp.103-168.

Soudavar, Abolala

1999

"The Concepts of "al-Aqdamo Asahh" and "Yaqin-e Sābeq", and the Problem of Semi-Fakes", *Studia Iranica*, 28, pp.255-273.

Souissi, M.

1971

"Hisab al-Ghubar", *The Encyclopedia of Islam* (new edition), 3, Brill, Leiden, pp.468-469.

Sourdel, D.

1965

"Dār al-cilm", *The Encyclopedia of Islam* (new edition), 2, Brill, Leiden, p.127.

1960

"Bayt al-Hikma", The Encyclopedia of Islam (new edition), 1, Brill, Leiden, p.1141.

Stchoukine, Ivan

1936

La Peinture Iranienne sous les derniers ^cAbbâsides et les Îl-Khâns, Ste Catherine, Bruges.

Steinschneider, Moritz

1870

"Zur Geschichte der Uebersetzungen aus dem Indischen in's Arabische und ihres Einflusses auf die arabische Literatur", Zeitschrift der Deutschen morgenlandischen Gesellschaft, 24, pp.325-392.

Stern, S.M.

1960

"Abd al-Rahmān b. "Umar al-Sūfi", *The Encyclopedia of Islam* (new edition), 1, Brill, Leiden, pp.86-87.

Storey, C.A.

1958

Persian Literature. A bio-bibliographical survey, 2/1, Luzac&Co., London.

Strohmaier, Gotthard

1984

Die Sterne des Abd ar-Rahman al-Sūfī, Miller & Kiepenhauer, Hanau/Main.

Suter, Heinrich

1900

Die Mathematiker und Astronomen der Araber und ihre Werke, Teubner, Leipzig.

Titley, Norah M.

1983

Persian Miniature Painting and its Influence on the Art of Turkey and India. The British Library Collections, The British Library, London.

Titley, Norah M., Waley, P.

1975

"An illustrated Persian text of Kalila wa Dimna dated 707/1307-8", British Library Journal, 1, pp.42-61.

Tirion, Will

1991

The Cambridge Star Atlas, Cambridge University Press, Cambridge.

Toomer, G.J.

1984

Ptolemy's Almagest, Duckworth, London.

"Ptolemy (or Claudius Ptolemaeus)", Gillispie, C.C. (ed.), *Dictionary of Scientific Biography*, 11, Scribners, New York, pp.186-206.

Tornberg, C.J.

1849

Codices Arabici, Persici et Turcici Bibliothecae Regiae Universitatis Upsaliensis, Upsala.

Tourkin, Sergei

2000

"Persian personal horoscopes", (unpublished) lecture delivered at the Islamic Art Society, SOAS, 11th October 2000.

Upton, John

1933

"A Manuscript of the Book of the Fixed Stars by Abd Ar-Rahman As-Sufi", *Metropolitan Museum Studies*, 4, pp.179-197.

Uri, Johannes

1787

Bibliothecae Bodleianae Codicum Manuscriptorum Orientalium. Pars prima, Hebraicorum, Chaldaicorum, Syriacorum, Ethiopicorum, Arabicorum, Persicorum, Turcicorum, Copticorumque catalogus, jussu curatorum preli academici a Joanne Uri confectus, Clarendon Press, Oxford.

Vardjavand, P.

1979

"La découverte archéologique du complexe scientifique de l'observatoire de Maraqé", Akten des VII. internationalen Kongresses für Iranische Kunst und Archäologie München 7.-10. September 1976, Dietrich Reimer Verlag, Berlin, pp.527-536.

Von Berchem, Max, Strzygowski, Josef

1910

Amida, Carl Winter, Heidelberg.

Von Euw, Anton

1987/88

Der Leidener Aratus. Antike Sternbilder in einer Karolingischen Handschrift, exhibition catalogue, Bayerische Staatsbibliothek.

Walker, Christopher

1996

Astronomy Before the Telescope, British Museum Press, London.

Walker, Paul E.

"Fatimid Institutions of Learning", Journal of the American Research Centre in Egypt, 34, pp.179-200.

Ward, Rachel

1993

Islamic Metalwork, British Museum Press, London.

1985

"Evidence for a School of Painting at the Artuqid Court", Oxford Studies in Islamic Art, I, pp.69-83.

Watson, Oliver

1994

"Documentary $m\bar{i}n\bar{a}^c\bar{i}$ and Abū Zaid's bowls", Hillenbrand, R. (ed.), The Art of the Saljuqs in Iran and Anatolia. Proceedings of a Symposium held in Edinburgh in 1982, Mazda, Costa Mesa, pp.170-180.

1986

"Pottery and Metal Shapes in Persia in the 12th and 13th Centuries", Vickers, M. (ed.), Pots and Pans. A Colloquium on Precious Metals and Ceramics in the Muslim, Chinese and Graeco-Roman Worlds, Oxford 1985, Oxford University Press, Oxford, pp.202-212.

1974

"Persian Lustre-Painted Pottery. The Rayy and Kāshān Styles", Transactions of the Oriental Ceramic Society, 1974-75, pp.1-19.

Weil, G.

1960

"Abjad", The Encyclopedia of Islam (new edition), 1, Brill, Leiden, pp.97-98.

Weinstock, S.

1950

"Lunar Mansions and Early Calendars", *Journal of Hellenistic Studies*, 69, pp.48-69.

Weitzmann, Kurt

1952

"The Greek Sources of Islamic scientific illustrations", Archaeologica Orientalia in memoriam Ernst Herzfeld, pp.244-266.

Wellesz, Emmy

1965

An Islamic Book of Constellations, Bodleian Picture Book No.13, Oxford University Press, Oxford.

1964

"Islamic Astronomical Imagery: Classical and Bedouin Tradition", *Oriental Art*, 10/2, Summer, pp.84-91.

"An Early al-Sufi Manuscript in the Bodleian Library in Oxford – A Study in Islamic Constellation Images", Ars Orientalis, 3, pp.1-26.

Westergaard, N.L.

1851

Codices Orientales Bibliothecae Regiae Hafniensis, Pars Altera, Codices Hebraicos et Arabicos Continens, Schultziana, Copenhagen, 1851.

Whitfield, Peter

1995

The Mapping of the Heavens, British Library, London.

Whitfield, Roderick

1985

The Art of Central Asia. The Stein Collection in the British Museum: Textiles, Sculpture and Other Arts, volume 3 of 3, Serindia Publications, London.

1983

The Art of Central Asia. The Stein Collection in the British Museum: Paintings from Dunhuang II, volume 2 of 3, Serindia Publications, London.

1982

The Art of Central Asia. The Stein Collection in the British Museum: Paintings from Dunhuang I, volume 1 of 3, Serindia Publications, London.

Widengren, Geo

1965

Mani and Manichaeism, Weidenfeld and Nicholson, London.

Wiet, Gaston

1971

Baghdad. Metropolis of the Abbadid Caliphate, University of Oklahoma Press, Norman.

Winter, H.J.J.

1955

"Notes on "al-Kitab Suwar al-Kawakib al-thamaniyya al-arba^cin...", Archives internationales d'Histoire des Sciences, 3, pp.126-133.

Yampolsky, Philip

1950

"The Origins of the Twenty-Eight Lunar Mansions", Osiris, 9, pp.62-83.

Zick-Nissen, Johanna

"Medieval ceramic bowl-decorations, interpreted as constellations", The Memorial Volume of the Vth International Congress of Iranian Art and Archaeology, Oxford, September 11-16th 1972, Tehran, pp.349-367.

1975

"Figuren auf mittelalterlich-orientalischen Keramikschalen und die Sphaera Barbarica", Archaologische Mitteilungen aus Iran, n.f. 8, pp.217-240.

