4
Mediaeval astronomy

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- P.Kunitzsch (p.155)

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4.1 AN UNKNOWN ARABIC SOURCE FOR STAR NAMES

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Arabic star names are well known in two areas: in the Orient itself, i.e. in the Arabic-Islamic civilization, and in the West where many of them were adopted since mediaeval times and continued to be used until today.

The complex known in modern Western astronomy as "Arabic star names" is the result of a historical development of almost exactly one thousand years. In mediaeval times, those names were introduced into Western use by Latin translations of Arabic astronomical and astrological works. Afterwards, since Humanist and Renaissance times, and until this present century, Western astronomers used to pick up more "Arabic" names from philological studies of orientalists who tried to describe and explain the stellar nomenclature of the Arabs and other Oriental peoples. As outstanding examples, I mention the studies of Joseph Scaliger and his follower Hugo Grotius (both printed in 1600) whose nomenclature was borrowed by Johannes Bayer into his star atlas *Uranometria* of 1603; Thomas Hyde's commentary to his edition of Ulugh Bēg's star catalogue (Oxford, 1665) from which Giuseppe Piazzi borrowed a great number of names into the second edition of his Palermo Catalogue, 1814; German studies by F.W.V. Lach (1796) and Ludwig Ideler (1809) which were used by continental astronomers such as J.E.Bode and many others; and still the book on star names by R.H. Allen (1899) from which several new names appear in astronomical books and atlases of our times.

But let us come back to the Orient itself. The star names used throughout in astronomy and astrology in the Arabic-Islamic civilization are generally called "Arabic". A more detailed analysis of the Oriental material shows that the star nomenclature generally called "Arabic" is composed of two elements: on the one hand names of indigenous Arabic origin, and on the other hand names derived from Arabic translations of ancient Greek sources. See for example the name of the star alpha Tauri, Arabic *al-dabarān* (borrowed into the West as Aldebaran), which is a name of old Arabic origin, and on the other hand the name of the star alpha Piscis Austrini, Arabic *fam al-ḥūt al-janūbī* ("the Mouth of the Southern Fish", borrowed into the West as Fomalhaut), which is derived from Ptolemy's description of the position of the star in the star catalogue of his *Almagest*.

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In the past three hundred years a great number of Arabic source texts has been studied and edited so that it can be assumed that, today, we have a fairly complete and well founded knowledge of the Arabic star nomenclature, both of its indigenous and the translated Greek-based branches.

As far as the indigenous Arabic star nomenclature is concerned, this has been collected and transmitted down to us by several mediaeval Arabic philologists and lexicographers of whom I mention the following whose related works have already been published: Quṭrub (d. after 825), Ibn Qutayba (d.884, or 889, in two works), Ibn ᶜĀṣim (d.1013), al-Marzūqī (d.1030), Ibn Sīda (d.1066), Ibn al-Ajdābī (d.prior to 1203), and pseudo-Ibn Fāris. To these are to be added the famous scholar al-Bīrūnī (d.1048, in a work written in 1029) and the well-known astronomer Abu'l-Ḥusayn al-Ṣūfī (d.986) who wrote a special work on the fixed stars and the 48 classical constellations according to the *Almagest* tradition in which he also mentioned a great number of indigenous Arabic star names identifying them astronomically with the respective Ptolemaic stars.

As for the 28 lunar mansions, they are part of the indigenous Arabic star traditions (although, ultimately, received from India); they are included in all of the sources mentioned above and are listed and described in many other texts.

For the Greek-based Arabic stellar nomenclature, there is equally a reasonable number of souces available. The point of departure for this branch of nomenclature were of course the Arabic translations from the Greek. The main work to be considered here is Ptolemy's *Almagest* of which several translations were made into the Arabic. Of these, two versions have survived until today, the translation of al-Ḥajjāj ibn Yūsuf ibn Maṭar, and the translation of Isḥāq ibn Ḥunayn with the emendations of Thābit ibn Qurra. A critical edition of these is presently in press. Apart from the *Almagest*, also numerous other Greek texts were translated into Arabic containing individual star names or lists of the 48 classical constellations. Of these I only mention Ptolemy's astrological work *Tetrabiblos* (of which several Arabic translations have survived, in manuscript form, but still unpublished) which in book I, chapter 9 contains a description of the constellations and many prominent stars. Further, the great star catalogues by al-Battānī, al-Ṣūfī, al-Bīrūnī, al-Ṭūsī, and Ulugh Bēg have passed on a good portion of the Greek-based stellar nomenclature. To these must be added the astrological work *Introductorium maius* of Abū Maᶜshar, al-Bīrūnī's astrological handbook *Tafhīm*, the *Encyclopaedia of Sciences* by Muḥammad ibn Aḥmad al-Khwārizmī (late 10th century), the *Cosmography* of al-Qazwīnī (d.1283),and the world history (in Syriac) of Barhebraeus (d.1286), all of which contain lists and surveys of the 48 classical constellations.

Apart from these major works, there are innumerable minor or non-specialized Arabic writings which also transmit the Arabic stellar nomen-

clature, be it in astronomy or astrology, in lexicography or poetry or philology, etc. A case of special interest is the Persian romantic verse epic *Vīs u Rāmīn* by the poet Fakhr al-Dīn Gurgānī (around 1050) which in a kind of a greatly expanded horoscope contains a full description of the 48 Ptolemaic constellations.

In practical usage, no difference was made by astronomers and astrologers between indigenous Arabic and Greek-based Arabic star names: the two types of names mentioned above (*al-dabarān*, alpha Tauri, and *fam al-ḥūt al-janūbī*, alpha Piscis Austrini) were used indiscriminately through all centuries in the Arabic-Islamic world. Equally, in that mixed form they were borrowed into mediaeval Western translations from the Arabic and continued to be used as "Arabic star names" in modern astronomy until today.

Thus it can be affirmed that our present knowledge of the nomenclature of the constellations and the stars used in the Arabic-Islamic world and, subsequently, in the derived Western sources, is rather comprehensive and complete, both under historical and philological aspects.

The mediaeval Western sources using Arabic star names can be divided into two groups: translations made from the Arabic which borrowed the names directly from the Arabic original texts and made them available to Western readers; and Western writings and compilations which gleaned the Arabic names from translated works, or from earlier Western writings or compilations, that means which used these names on the basis of second hand knowledge.

Methodically, therefore, it must be possible to trace all those Arabic names in Western texts back to their ultimate source and their Arabic origin. This rule has proved successful in all my related research work in the past 35 years, with one exception which will be the subject of the following discussion.

In 1246, in Paris, one John of London composed a star table for the astrolabe containing 40 stars with ecliptical coordinates. The table has been edited in 1966 from seven manuscripts (including one manuscript containing a revised version of the table by John of London's disciple Roger Linconus, dated four years later, i.e. 1250). More manuscripts containing the table certainly exist in Western libraries.

While the identity of this John of London is not yet safely established, his authorship of the star table is well attested. The French scholar, Monsieur Fontès, has published in 1897-98 a letter of John of London addressed to a scholarly friend, R. de Guedingue, in which John has answered a number of astronomical and astrological questions of that person and in the course of which he mentions his star observations in Paris, 1246, and the star table which he had composed subsequent to these observations. The same manuscript, some folios later, also contains a copy of the star table. As it seems, John of London was a well-informed and well-read man. In his letter he quotes, among his

authorities, Albategni (= al-Battānī), Thesbith (= Thābit ibn Qurra), Ptolemy's *Almagest*, Abrachis (= Hipparchus), Pythagoreus (perhaps an astrological pseudepigraphon), Arzachel (= al-Zarqāllu), and the astrologer Aomar with his work *De nativitatibus* (= ʿUmar ibn al-Farrukhān).

Two things in John of London's star table are of special historical interest. The first point is of a purely astronomical character. John of London states that his star table is the result of his own star observations which he carried out in Paris by means of an armillary sphere. This statement is corroborated by the fact that the coordinates of his stars, both the longitudes and the latitudes, are not identical with those of the *Almagest*. In mediaeval times it was most usual to construct star tables by merely computing the precessional difference to be added to Ptolemy's longitudes, for the respective epochs, and to retain Ptolemy's values for the latitudes. Such star tables, therefore, can easily be compared directly to Ptolemy's catalogue in the *Almagest*. This is not the case with John of London's coordinates which are throughout more or less different from Ptolemy's. Therefore, his contention to present in his table the results of his own star observations appears to be true and confirmed by the dates.

The second point is that he adds to nearly every single of his forty stars an Arabic name or designation. And here lies our problem, because among those names there are four which cannot be traced in any of all the Arabic original sources known to us until today.

It may be worthwhile mentioning that John of London, through his Table, has introduced into astronomical use a good number of Arabic star names many of which are living on until our present time. The most famous of these names may be Betelgeuse (for alpha Orionis), which in his spelling was *bedalgeuze* (formed, through a misreading, from the Arabic *yad al-jawzā'*, "the Hand of *al-jawzā'*, or Orion"), which in Renaissance times was wrongly explained and transformed into Betelgeuse (with a *t* in the middle instead of the original *d*).

The four names that have remained undocumented in the original Arabic tradition are the following:

Nr.6 in John's table (alpha Arietis), is called in two of the seven manuscripts of the 1966 edition *enif* which is clearly derived from the Arabic word *anf*, "nose". But the Arabic translations of the *Almagest* and all the subsequent Arabic sources use another term, *al-khaṭm* ("the muzzle"), instead, in congruence with Ptolemy's Greek text.

The same word, *enif* (from Arabic *anf*, "nose"), is also used in John's star no.37 (epsilon Pegasi), and in this position the name Enif has survived until our present time. Here again, the Arabic original sources use other terms, *viz. al-jaḥfala* ("the lip", for a horse's lip) in the two versions of the *Almagest*, and *al-ḥulqūm* ("the throat") in al-Battānī's catalogue. These stand in the place of the

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original Greek term for the "muzzle" of the Horse. In both stars, alpha Arietis and epsilon Pegasi, John has inserted the Arabic word for "nose" contrary to the existing Arabic and Greek traditions which had both stars on the "muzzle" (or the "lip", respectively). No known Arabic text (or inscribed instrument, as an astrolabe or celestial globe) ever used the word *anf*, "nose", in relation to these two stars.

Further, no.9 in John's table, the star gamma Eridani (which was the 10th star in Ptolemy's constellation of Eridanus). Ptolemy described the star as "The rearmost of the four stars in the next interval" (English translation of G.J. Toomer, London, 1984). The word "interval" appears in the Arabic translations as *al-buᶜd* or *al-masafa* (i.e. "the distance"). But John of London calls the star *algetanar* which seems to be a Latin transliteration of an Arabic form *ᶜarjat al-nahr*, "the Bend of the River". Such a "bend" is not mentioned by Ptolemy for this star, moreover a "bend" occurs with Ptolemy in the descriptions of the 2nd, 18th and 29th stars of Eridanus. Further, the Arabic sources do not use for these "bends" the word *ᶜarja* which was applied by John of London to the 10th star, gamma Eridani. That means both the Arabic word as such and its application to the star gamma Eridani remain undocumented in the sources. By the way, John's mediaeval name has lived on in some modern sources, in the revised spelling Angetenar, as a name for the star tau^2 Eridani (which was the 19th star of the constellation with Ptolemy).

The fourth case is John's star no.17 (rho Puppis, i.e. the 2nd star in Ptolemy's constellation Argo). To this star John adds, in Latin characters, the word *markeb* which doubtlessly is derived from the Arabic word *markab* which, among other things, can designate a "ship". In all the surviving Arabic original sources, however, Ptolemy's ship Argo is unanimously called *al-safīna*, and never anything else. (In modern astronomy the name Markeb is applied to the star kappa Velorum.)

That means that in these four stars John of London has used Arabic terms that never appear in any of the Arabic original sources known to us, some of them even contrary to the Ptolemaic location of the respective stars.

To these four can be added a few doubtful cases. For John's star no.39 (beta Pegasi) two of the seven manuscripts used in the edition of 1966 give a transliteration of its common Arabic, Greek-based name *mankib al-faras*, "the Horse's Shoulder", while the other manuscripts, instead, give a transliteration of a rarer Arabic designation, *yad al-faras*, "the Horse's Forefoot" (spelled *bedalferaz*, with the same misreading as in the name of alpha Orionis, cited above, which was *bedalgeuze*, for Arabic *yad al-jawzā'*, "Orion's Hand"). At least, *yad* for the "forefoot" of the Horse is documented in al-Ḥajjāj's translation of the *Almagest* and in al-Ṣūfī's description of the constellation. But it is surprising to find two entirely different names given in the various manuscripts to the same star.

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In star no.7 (alpha Ceti), John applies the Arabic name *menkar* (which is still in use for the same star in our times). This is certainly the original Arabic *al-minkhar*, "the nose", and correctly translated into Latin as *naris ceti* by John of London. The term is well documented in the Arabic astronomical tradition - the problem, however, is that this designation originally was applied to lambda Ceti (the 1st star in Ptolemy's constellation of Cetus), while John gives it to alpha Ceti (which is the 2nd star in the constellation). So, here, the term itself is correct and historically documented, but the location is wrong. Should John have confused the two stars in his source, the *Almagest*, jumping over from the star alpha to the preceding line which contained the description of lamda?

John's star no.31 (gamma Draconis) is called *razcaben*, which is a corruption of *raztaben*. The Ptolemaic constellation of Draco is called *al-tinnīn* ("the Snake") in all the known Arabic sources. John's spelling, therefore, seems to be a corruption of the correct Arabic name for this star, *ra's al-tinnīn*, "the Snake's Head". This seems to be confirmed by the spelling offered in one of the seven manuscripts used for the 1966 edition: *racaten*. Neverthless, in Renaissance times it has been ventured that John's spelling was derived from an assumed Arabic *ra's al-thuᶜbān*, using, for the constellation, the word *al-thuᶜbān* (which is undocumented in the original sources) instead of the common and well-documented *al-tinnīn*. I am not inclined to accept the Renaissance interpretation of John's form of the name and prefer its derivation from the singularly and well documented Arabic *al-tinnīn*. But there remains a slight doubt, especially in view of John's four other examples of a totally deviating nomenclature.

Another intricate case is John's star no.1, alpha Cephei, which is called by him *aldramin* (and in one manuscript, more completely, *aldheraymin* - still known today, in a modified Renaissance spelling, as Alderamin); John translated it into Latin as *dextrum adiutorium cephei*, i.e. "Cepheus' Right Arm". All these details do not fit together. In the *Almagest*, alpha Cephei (the 4th star in the constellation) is located in the right "shoulder" (not on the right "arm"). Only the 8th star (iota Cephei) in the *Almagest* is located on the "left arm" where "arm" was translated in the Arabic versions as *al-ᶜaḍud* ("upper arm"), while al-Battānī has *al-sāᶜid* ("lower arm"), instead. The explanation of John's form *aldramin*, in the sense of "right arm", therefore, remains utterly uncertain. A Renaissance scholar derived John's form from an assumed Arabic designation *al-dhirāᶜ al-yamīn* (in the sense of "right arm"), but this is not documented in the sources as we have just seen, with one exception: Abū Maᶜshar, in one instance, mentions Cepheus' left arm, i.e. the star iota Cephei, under the designation *dhirāᶜ qayfawus al-aysar*. But it is rather improbable that John of London saw this remote *topos* in an Arabic copy of Abū Maᶜshar's *Introductorium maius*. Further, in the *Almagest*, the word *al-dhirāᶜ* is normally used in the feminine gender so that, in our case, instead of the proposed *al-dhirāᶜ al-yamīn*, the designation should correctly read *al-dhirāᶜ al-yumnā* which would no

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longer bear an assonance to the Latinized form *aldramin*. Another suggestion,which I have supported all the time and continue to do so, is that the Latinized Arabic term *aldramin* is but a variant out of the many various Latinized spellings of the Arabic name of the star alpha Geminorum, both in astrolabe star lists and in lists of the lunar mansions (where alpha and beta Geminorum form the 7th mansion). This name would have been wrongly transferred to the star alpha Cephei in John's list. The problem cannot be definitely solved until the discovery of further documentary evidence.

To sum up we can state that John of London's star table is of twofold historical interest: astronomically, because the coordinates in the table represent values found by John of London himself, through observation; and philologically, because he has introduced a number of new Arabic star names many of which have lived on in astronomy until our present time.

From the textual descriptions of several stars it is obvious that John has really carried out observations of his own, because he describes these stars quite in his own words, according to his own experience and impression, and different from the traditional descriptions in the *Almagest*.

Further, in many other stars of his list we find literal quotations from Gerard of Cremona's Latin translation of the *Almagest* from the Arabic which proves that Gerard's text was one of John's written sources.

As for the Arabic names added by John to nearly all of the 40 stars in his table, all of them were introduced by him - either names that were already transmitted in earlier Western texts, but for which he found his own new spellings, or entirely new names that were never used before in any Western work derived from Arabic sources and which appear for the first time in Europe in his star table.

It is evident that he could not have gleaned his Arabic names - neither the new spellings of older known names, nor the entirely new names - from a translated Western text. At least, no such text preceding his star table of 1246 has ever become known to us.

The question, therefore, arises whence John obtained his Arabic material, and in which way he utilized it. An additional complication, in this connection, lies in the fact that among his new Arabic material he even offers four names which cannot be traced in all the Arabic original sources, written texts and inscribed instruments (such as astrolabes and celestial globes) known to us until today.

It can hardly be assumed that he himself had a working knowledge of Arabic sufficient to read and evaluate original Arabic text material. Rather it must be assumed that somebody knowing Arabic sufficiently assisted him in the composition of his star table. Through this helper John might have obtained all the Arabic names and terms which he added to his table.

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Most of these are identical to the traditional Arabic terminology found in the Arabic translations of the *Almagest*. Therefore, it appears likely that an Arabic copy of the *Almagest*, or an Arabic celestial globe using the *Almagest* nomenclature, was among the sources which John's assistant had at his disposal.

As for those four names that cannot be traced in all the existing Arabic original sources, one possibility is that these were not taken from a written source but rather that John's helper invented them by himself, perhaps in some places where the source was defective, or by mere indolence or carelessness. This possibility appears the more likely when we consider the remarkable stability and uniformity of the nomenclature in all the known Arabic original sources. Further search for the "unknown source" of those four star names of uncertain origin in John of London's star table, therefore, might never arrive at a result because such a "source" might never have existed.

REFERENCES

Fontès,M.(1897-98). ed. (John of London's Letter to R. de Guedingue), Bulletin l'Académie des Sciences Inscriptions et Belles-Lettres de Toulouse, **1**, 146-160, Toulouse.

Kunitzsch,P. (1959). Arabische Sternnamen in Europa, Wiesbaden : Otto Harrassowitz. (On Arabic star names in European modern astronomical use).

- (1961). Untersuchungen zur SternnomenKlatur der Araber, Wiesbaden: Otto Harrassowitz. (On indigenous Arabic stellar nomenclature).

- (1966). Typen von Sternverzeichnissen in astronomischen Handschriften des zehnten bis vierzehnten Jahrhunderts, Wiesbaden : Otto Harrassowitz, pp.39-46 ("Typ VI") (Includes edition of John of London's Star Table).

- (1974). Der Almagest, Die Syntaxis Mathematica des Claudius Ptolemäus in arabisch-lateinischer Überlieferung, Wiesbaden (On the terminology and nomenclature of the Stars and constellations in the Almagest).

- (1977). Arabische Sternnamen - Sternnamen der Araber, Sudhoffs Archiv, **61**, 105-117 (Arabic star names and star names of the Arabs, definitions).

- (1983). Über eine anwā'-Tradition mit bisher unbekannten Sternnamen, Bayerische Akademie der Wissenschaften, Philos.-Hist. Kl. Sitzungsberichte, Heft 5. (On indigenous Arabic Stellar nomenclature).

- (1986). John of London and his unknown Arabic Source, Journal for the History of Astronomy, **17**, 51-57.

Kunitzsch,P. and Smart,T. (1986). Short Guide to Modern Star Names and Their Derivations, Wiesbaden : Otto Harrassowitz.

DISCUSSION

J.A.Eddy : Do you know more about John of London than you allowed yourself time to tell?

P.Kunitzsch : I do not know much more beyond what I have said in the lecture. The editor of J. of L's letter, M.Fontès, assumes that our John of London is identical with one "Jo Lo" mentioned several times in the works of Roger Bacon. But this is not certain. There is a well known astronomer John of London, working 30-40 years later in England, but it can hardly be assumed that our John of London (in Paris 1246) is the same person as that second John of London in England.

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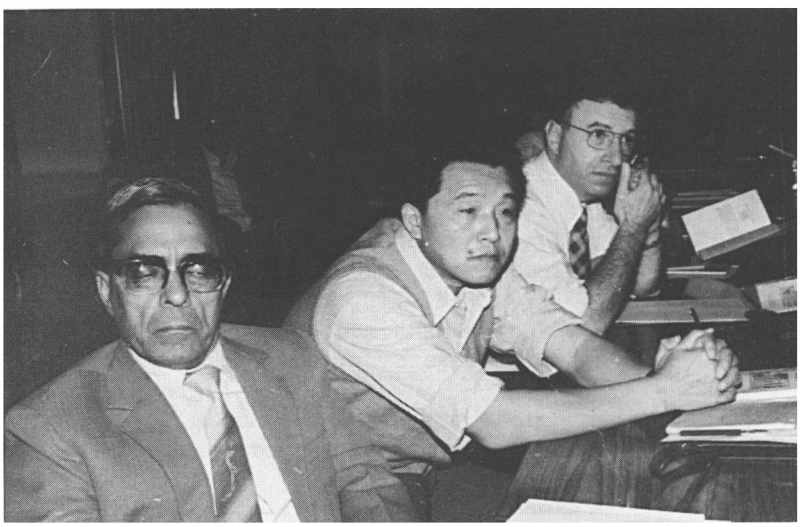

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