

Possible Sources for Bourgoïn (1879) "Le Trait des Entrelacs".

Tony Lee

Introduction.

The primary aim of this document is to try and identify the actual artefacts from which Bourgoïn derived the many line plates in his "Le Trait des Entrelacs". Many of the patterns shown in this work occur in one form or another throughout the Islamic world, on a variety of artefacts, from monumental architecture to illuminated korans. Some of the patterns have a more limited distribution, and may in some cases be represented by a unique example, which, if truly unique could therefore be confidently identified as the source from which Bourgoïn made his drawing.

It seems that most, if not all of Bourgoïn's material derived from Middle Eastern countries, which included Turkey, Syria, Palestine and Egypt. Even though many of Bourgoïn's patterns may be found further afield, for example Morocco in the west or Central Asia to India to the east, the author does not seem to have made personal visits to these areas, although he was certainly aware of the variety of patterns to be seen in such areas from a number of publications which had appeared prior to his own work.

Thus, we might begin the attempt to identify Bourgoïn's sources by limiting our search to the Middle Eastern regions named, ideally of course by actually travelling to these areas and visiting as many likely sites as possible, perhaps over a number of years' researching, armed with a modern digital camera. However, in my own case the search is necessarily confined to photographs in published works, aided by images supplied by friends or colleagues, or obtained from internet sources. Unfortunately Bourgoïn does not identify the sources of his line plates, and supplies only the briefest of descriptions identifying some of his coloured plates. It seems that many of Bourgoïn's personal notes and records relating to his visits to Middle Eastern countries are at present held in various museums and libraries in France, but have apparently never been catalogued or sorted in any detail.

I think we must accept that we are not going to achieve complete success in identifying the sources of every pattern in Bourgoïn's collection, for a number of reasons. Some patterns, as I've indicated already, are so commonly distributed, in so many different locations, that there cannot be a specific site from which Bourgoïn derived his drawing, for example Plate 1, one of the earliest patterns to appear, and which subsequently spread over the whole of Islam. Many of the more distinctive patterns, including some which could well be unique examples, may be hidden away in obscure corners of out-of-the-way buildings, some of which may now be inaccessible, or even no longer extant. Only a really dedicated search among all likely sites could hope to locate all such patterns. Many of Bourgoïn's plates appear to have been expanded from the tiniest fragments - the smallest part of a pattern which can be enclosed by a rectangular panel. In such cases one can often assume that the edges of the panel act as mirror axes, thus enabling the whole pattern to be reconstituted, as it were. Finding fragmentary patterns of this kind is not always easy, as the panels are often small, and positioned high up on a wall, or fill an odd corner of decoration, and so can easily be overlooked.

There is such a profusion of patterns, even within the limited regions in which Bourgoïn collected, that he must initially have felt quite overwhelmed by their sheer variety. The choice of what to include, and what to leave out, must have exercised him continuously. Nevertheless, some of his final choices are peculiar, to say the least. It is also difficult to account for the absence from his collection of a number of typical patterns which are quite common in the countries which he visited, in preference for a few odd looking patterns of little geometrical worth. Which leads us to question just how good were Bourgoïn's powers of observation and construction in the "drawing of interlacing patterns".

How accurate are Bourgoïn's copies of Islamic geometric patterns?

As a general rule, for those patterns with a more simple geometry, Bourgoïn's drawings are perfectly faithful copies of the original patterns. He frequently falls down badly when attempting patterns with geometrical stars or rosettes of two or more kinds, and his plates showing the more complex star patterns are often only a rough indication of the appearance of the originals. Many of his drawings in fact are rather clumsily executed, and in one or two cases they are atrociously poor representations of authentic originals, e.g. plates 125, 158, 160 and 162. In general, any serious student of Islamic geometrical ornament would be well advised to avoid relying on the drawings of Bourgoïn or other 19th-century authors, and if possible to work entirely from photographs.

How representative of the Middle East are Bourgoïn's patterns?

Most of his collection seems typical of the types of patterns to be found in the regions he visited. Many from Mamluk Egypt seem restricted to that time and location, although of course Bourgoïn gives no indication of this. Some of these occur also in Syria, but are not typical of Turkish sites. There are many patterns widespread and common in his chosen area, but which are not represented in Bourgoïn's collection. Instead, Bourgoïn seems often to choose obscure or infrequent patterns or variants, which therefore become extremely difficult to identify. It doesn't help that often his drawings of these are very obviously clumsy and incorrect. On the whole, however, given the omissions, his collection provides a good picture of the Middle Eastern corpus.

The text in blue represents a [hypertext link](#) to either the [tilingsearch.org](#) web site or the [patterninislamicart.com](#) web site.

References to the [Thesaurus Islamicus Foundation](#) site can be found by going to the [Search page](#), then fill in the Monument Number (M), press search, then select the monument name, then press thumbnail to select the picture specified (P). The reference given here is the form MdddPdddd. For M?, see page 30.

References to the [Archnet](#) system can be found by going to the [Search page](#), then fill in the photo identifier specified in the text below.

Plate 1. (top): [Bourgoïn, Plate 1](#)(with interlacing), [Bourgoïn, Plate 1, top](#) (without interlacing)

Extremely common throughout Islam. Early sources are:

Ibn Tūlūn mosque (876-79) at Cairo.

Madīnat al-Zahrā palace (936-76) near Cordoba in Spain.

Al-Ḥākīm mosque (1003) at Cairo, North minaret.

(bottom): a fairly common variant of the above, which replaces the straight lines by arcs of circles. To cite a few examples, it can found as a border on the minbar of the al-Ghuri madrasa in Cairo ([EGY 1715](#)), and as a stone lintel in Aleppo, Syria ([SYR 0329](#)).

Plate 2. [Bourgoïn, Plate 2, top figure](#).

Very common throughout Islam.

Cairo: Ahmad al-Mihmindar mosque, ceiling above vestibule, west end (Thesaurus Islamicus M115P0022).

Iran: Bistam, mosque of Bāyazīd al-Biṣṭāmī. ([\[hill\]](#), fig.190).

Proportions are widely variable.

Plate 2B, [Bourgoin, Plate 2, bottom figure](#): I've seen this only as a lintel above the south entrance of the mosque of Imam al-Shafi'i, in Cairo (Thesaurus Islamicus M281P0117). A version with 6-stars on the midedges of the larger hexagons is shown in an example in the Damascus National Museum (Dick Osseman collection 5300).

Plate 3. [Bourgoin, Plate 3](#). - no source so far.

Plate 4. [Bourgoin, Plate 4](#).

Cairo: mosque of Barquq, three panels of inlaid floor mosaic in front of mihrab in the qibla iwan. (Thesaurus Islamicus M187P0031, M187P0032).

Cairo: al-Maridani mosque, mihrab (Thesaurus Islamicus M120P0030).

With triad hexagons instead of triangles: window grille in Ibn Tulun mosque ([EGY 0227x](#)).

Plate 5. [Bourgoin, Plate 5](#).

Not all that common (?), but an early source is

The later Kharrāqān Tomb Tower (1093)

[\[seherr\]](#) Pl.26.

In Bourgoin's area it occurs in Cairo as marble inlay in the mosque of Aqsunqur ([EGY 1625](#), [EGY 1626](#)), and as a window grille in the mosque of Ibn Tulun ([EGY 0219x](#)).

Plate 6. [Bourgoin, Plate 6](#),

Cairo: Qūṣūn mosque, window grille.

Cairo: madrasa-mausoleum of Zain ad-Dīn Yūsuf.

([\[hill2\]](#), fig. 59).

Cairo: Salar and Sanjar al-Jawli, remains of wall in SW area (Thesaurus Islamicus M221P0016).

Plate 7. [Bourgoin, Plate 7](#) .

(cf. [Pope, Photograph number 182, left arch, Abas and Salman, page 369](#)).

An extremely common pattern, appearing very early in numerous guises. Probably of eastern origin (cf. [\[dye\]](#), p.72, C5a), [Stevens, Page 276](#) is a variant. Often used merely as an area filler in various media - stucco, metalwork, stone - the history of this pattern needs a whole chapter to itself. An early source in Islam is

Cairo: Fatimid mihrab (1094) , Ibn Tūlūn mosque. ([\[hill2\]](#), fig. 17).

Cairo: Madrasa-mausoleum of Zain ad-Dīn Yūsuf (1298). ([\[hill2\]](#), Figs. 58,59).

Plate 8. [Bourgoin, Plate 8](#).

Cairo, mausoleum of Imam al-Shafi'i. Stone inlay lintel. ([EGY 1130](#))

Plate 9. [Bourgoin, Plate 9](#). - see Plate 15.

Plate 10. [Bourgoin, Plate 10](#).

Natanz, entrance to the Khanqah (14th century) ([\[hill\]](#), fig.269)

Cairo, madrasa of Sultan Baibars (1262-3) ([\[hill2\]](#), fig.46).

Cairo, stone lintel in Azbak al-Yusufi mosque

(Thesaurus Islamicus M211P0096, M211P0098).

Plate 11. [Bourgoin, Plate 11](#). - no source, but see Plate 15 (bottom).

Plate 12. [Bourgoin, Plate 12](#).

Cairo: mausoleum of Imām Ash-Shāfi‘ī (1211)
([\[creswell\]](#) vol 2 Pl.26)
Cairo: madrasa Qaytbay, base of minbar
([\[wahhab\]](#) vol 2, fig.191)
Cairo: Mausoleum of al-Ashral Khalil, pierced window grille
([EGY 0801](#), [EGY 0802](#))

Plate 13. [Bourgoin, Plate 13](#).

Kharraqān tomb tower (1093)
([\[seherr\]](#) Pl.18) but this version is somewhat elaborated, with swastikas in the squares and inner 6-stars.
Tamelhat: Zawiya, stucco in mausoleum ([\[hill2\]](#) fig.258).
A *p4m* version occurs in the [Great Mosque, Damascus](#).

Plate 14. [Bourgoin, Plate 14](#).

Fairly common in obscure corners.
Cairo, Khayrbak mausoleum, carved decorated panels on W. façade.
(Thesaurus Islamicus M248P0003).
Cairo: Al-Rifa'i mosque, panel on minbar door (fragment)
Cairo: Ghanim al-Bahlawan mosque, border along bottom of minbar
(Thesaurus Islamicus M129P0035).
Cairo: Qaitbay mosque, marble inlay floor ([EGY 1423](#)).
Cairo: Al-Azhar mosque, panel at base of minaret ([EGY 0905](#)).
Syria: Damascus Museum, marble inlay panel ([SYR 0728](#)).
Isfahan, Masjid-i-Jami, S.W. Ivan. ([\[seherr\]](#) Pl.83 left.)

Plate 15 top. [Bourgoin, Plate 15 \(top\)](#) (cf. [Wade, page 49](#)).

Turkey: Sultan Han, Aksaray-Konya Road. ([\[aslanapa\]](#) fig.87).
Turkey: Konya, minbar, mosque of ‘Alā ad-Dīn ([\[aslanapa\]](#) fig.20).

Plate 15 bottom. (cf. Plate 9)

Plate 9 has an angle of 90°, while Plate 15 has an angle of 60°.
Cairo: Azbak al-Yusufi mosque, lintel of door, north wall of west iwan
(Thesaurus Islamicus M211P0101). This photo appears to have an angle
of about 70° which implies no exact source is available for either plate.

Plate 16 top left. [Bourgoin, Plate 16, top left.](#)

The simple pattern at the top left of this plate is extremely common, the other variants less so. I have not attempted to identify examples of any of these variants. The variant at lower left occurs as wood lattice, and the others in various media.

Cairo: edge strip of bronze door, madrasa and Khanqa al-Azāhr Barqūq. ([\[wahhab\]](#) Vol 2, fig.129).
Cairo: Ghanim al-Bahlawan mosque, kursi (Thesaurus Islamicus M129P0033)
Cairo: Mosque-madrasa Sultan Barquq, border round ceiling ([EGY 1709](#))
Iran: Natanz, Khanqah (1316-17) ([\[hill\]](#) fig.268, 270).
Iran: Mashhad, Shrine of Imam Reza, Gold ivan of Ali Shir Nawai ([\[pope\]](#) Plate XXVIII, band above main doorway).
Iran: Natanz, Masjid-i-Jami (1304-09) ([\[pope\]](#) fig.233).
Turkey: Great Mosque, Aksaray, balustrade of minbar ([\[aslanapa\]](#) fig.209).
India: Fatehpur Sikri, Raja Birbal's House, carved pilasters ([\[smith2\]](#) Plate LV-7).

Plate 17. [Bourgoin, Plate 17.](#)

Cairo, Barsbay al-Bagasi and Amir Sulayman complex. Stone carving round portal in N. wall, but sides of 6-stars convergent not parallel. (Thesaurus Islamicus M124P0092).
Cairo, Mosque of ibn Tulun ([EGY 0226x](#))
Edirne, Selimye Mosque ([TUR 0101](#))

Plate 18. [Bourgoin, Plate 18.](#)

Common and widespread. Essentially the same as Plate 20 ([Bourgoin, Plate 20](#) and [Stronge, Plate 27](#)) with a different style of inserted rosettes. Occasionally presented as vertical bands with local mirror axes each side, potentially destroying the $p6m$ symmetry of the complete pattern.

Syria: Aleppo, entrance to Zahiriyah madrasa, border round top of arch ([\[hill\]](#) fig.516).
Syria: Aleppo Citadel, mihrab of Nur ad-Din (1165-75) (Herzfeld 1943, *Ars Islamica* **10**: 14-70).
Turkey: Dunaysir mosque (1200) mihrab ([\[hill\]](#) fig.511).
Turkey: Sivas, mausoleum of Sultan Kaykā'ūs, entrance.
Cairo: Zayn al-Din Yusuf mosque, blind lattice window on drum of dome (Thesaurus Islamicus M172P0007) ([\[hill2\]](#) fig. 56.)
Cairo: door in courtyard of old house ([\[briggs\]](#) fig.155).

Plate 19. [Bourgoin, Plate 19.](#) - no source.

Plate 20. [Bourgoin, Plate 20.](#) ([Stronge, Plate 27](#) with triad triangles).

Same as Plate 18, but with different style of rosettes. More common with small triad triangles instead of 6-stars. The sources I quote are all of this latter variety, but these would not have been seen by Bourgoin.

Uzbekistan, Tim, Arab-Ata mausoleum (977-8 A.D.). (Pugachenkova 1963 fig.16, p.24).
Tilework, palace of Shahr-i Sabz near Samarkand ([\[hill\]](#) fig.98).
The earlier Kharrāqān Tomb Tower (1067-8). ([\[seherr\]](#) Pl.24).
Balkh, minaret of Dawlatabad (1108-9). ([\[hill\]](#) fig.167).

Plate 21. [Bourgoin, Plate 21.](#)

This, and the following plate 22 show similarities to two separate patterns occurring in Cairo. The present plate, with 6-rosettes composed of regular hexagons, corresponds roughly to two Egyptian examples: (1) two lintels on the North face of the Qaitbay mosque (Thesaurus Islamicus M75P0017, M75P0008); and (2) marble inlay panels above the entrance of the Qijmas al-Ishaqi mosque (Archnet INA0080 and INA0081; [EGY 0831](#)). But in these two sources the pentagons have been drawn nearly regular. Bourgoin's plate seems to be a direct derivative of his plate 85, in which the tiny triad triangles have been expanded to overlap the outer cells of the 12-stars, but with no attempt to regularise the resulting pentagons. However, Bourgoin's plate 21 seems to have been copied in modern Moroccan zellij - See [paccard](#) Vol. 1, p. 151, fig. 6. Bourgoin's source for this may be the pattern illustrated in his 1873 work, on plate 61, from the Qubba al-Fadawiyya in Cairo. Other patterns from the same source are shown in Bourgoin (1873) plates 56 to 62.

Plate 22. [Bourgoin, Plate 22.](#)

I know no source in this exact form, but with more logical "divergent/obtuse" 6-rosette it occurs on the minbar, originally from the Sultan Shah mosque in Cairo, now in the Victoria & Albert Museum in London. ([\[wahhab\]](#), Vol.II, fig.202). Did Bourgoin see this minbar, or was Plate 22 taken from a different source? Bourgoin's plates 21, 22 in fact seem suspiciously non-authentic, compared to the sources quoted here. The minbar pattern can be found at [Sultan Shah minbar](#).

Plate 23. [Bourgoin, Plate 23.](#)

A common Middle East and Central Asian pattern, but with varying proportions.

Turkey: Pozar, Hatun Han (1238-9). ([\[hill\]](#) fig.351).

Turkey: Avanos, Sari Han, niche in main entrance portal. ([\[hill\]](#) fig.508).

Nakhichevan, mausoleum of Mumine Khatun, typanum over door.

([\[useinov\]](#), Plate 6).

Nakhichevan, mausoleum of Yusuf b. Kathir (1161-2). ([\[hill\]](#) fig.228).

Plate 24. No source, and personally I would not have included this one. ([BOU 024](#), not on web site, has curves)

Plate 25. [Bourgoin, Plate 25.](#)

Cairo: Qala'un madrasa, window grilles ([EGY 1105](#)).

Damascus, Great Mosque, marble inlay on pillar round courtyard, but with different proportions to Bourgoin's drawing (on the same pillar are Plates 58 and 93). ([\[dury\]](#) p.22).

Plate 26. [Bourgoin, Plate 26.](#)

dikka on the west wall of west iwan of al-Ghuro mosque, Cairo.
Thesaurus Islamicus ID=8062 M189P0065.

Plate 27. [Bourgoin, Plate 27.](#)

Turkey: Selimiye mosque, Edirne, window grilles ([TUR 0105](#)).
Turkey: Selimiye mosque, Edirne, painted tympanum above doorway ([TUR 0119](#)).
With a zig-zag:
Samarkand, Tilia-Kari madrasa ([TRA 0524](#) = [Isfahan - Chahar Bagh Madraseh](#))
Bukhara, Lab-i-Hawz complex ([TRA 0922](#)).
Barsian (Isfahan) masjid, minbar ([smith1](#), fig.39).

Plate 28. [Bourgoin, Plate 28.](#) - no source.

Plate 29. [Bourgoin, Plate 29.](#)

Syria, Damascus. Door panel ([SYR 0125](#)), Hama Museum ([SYR 0722](#)).
Turkey, ([TUR 0105](#)) without the diamonds.

Plate 30. [Bourgoin, Plate 30.](#)

I have no source for this exact pattern, but with the swastika motif replaced by a square it is common in India.
Tomb of Humayun near Delhi, pierced marble grille
([volwah](#), plate 69; Glenn D. Lowry 1987 "Humayun's Tomb ...",
Muqarnas 4 pp.133-148, see figs. 15,16).
Fatehpur Sikri, Salim Chisti's Tomb, marble grilles.

Plate 31. [Bourgoin, Plate 31.](#)

I have no source for this exact pattern, but a closely related pattern occurs in Iran, Isfahan - N.E. dome chamber of the Masjid-i-Jami (1088)
([seherr](#) plate 10, tympanum to right of picture).
This has simple 6-stars in place of the 6-rosettes of B.31, with their vertices pointing towards triads.
A similar pattern is Turkey, Hatuniye complex, Kayseri, stone carved panel at entrance ([TUR 0727](#)). This has 6-stars instead of 6-rosettes.

Plate 32. [Bourgoin, Plate 32.](#)

I have no source. Elements of this pattern recall both plates 31 and 108. In the present case the heptagons can be regular or the 5-stars can be regular, but not both at the same time. The construction is tricky in trigonometrical terms, and the data158 version is still not correct.

Plate 33. [Bourgoin, Plate 33](#) (or [Tash-Havli Palace, Khiva](#), without the diamonds).

with diamonds:

Iran: Mashhad, drum of dome of Madrasa Do-Dar, 15th cent.
([pope](#), fig.271)

without diamonds:

Turkey: minaret of Yakutiye madrasah (1310) ([hill](#) fig.341).

Plate 34. [Bourgoin, Plate 34](#). - no source.

Plate 35. [Bourgoin, Plate 35](#).

Syria, Damascus. Doors of Nur ad-Din's hospital (1154). ([hattstein](#)] p. 192 top).

Plate 36. [Bourgoin, Plate 36](#)- no source.

Plate 37. Cairo, border round entrance of Sultan al-Mu'ayyad Shaikh complex.
(Thesaurus Islamicus M190 F17S16).
([BOU 037](#), not on web site has curves)

Plate 38. Cairo, al-Burdayni mosque, side of inlaid minbar (but different proportions).
Also Azhar mosque, marble window grille ([hill2](#)] fig. 23).
Cairo, Barsbay al-Bagasi & Amir Sulayman. Mausoleum of Barsbay al-Bagasi, middle of mihrab (Thesaurus Islamicus M124P0059).
Cairo: Azbak al-Yusufi mosque, west iwan arch soffit (Thesaurus Islamicus M211P094).
([BOU 038](#), not on web site, has curves)

Plate 39. [Bourgoin, Plate 39](#).

Bourgoin's drawing, and the web site drawing are incorrect, according to the only source I have:

Jerusalem, pulpit of Qāḍī Burhān ad-Dīn, in the Ḥaram ash-Sharīf.
([briggs](#)] fig.112, p.121). In the original, the reflex 6-rosettes are inscribed in regular 12-stars, not 12-stars with alternating large and small outer cells (kites).

Plate 40.

According to Bourgoin (1873) plate 89 this pattern occurs on the minbar of the mosque of Omar at Jerusalem.
([BOU 040](#), not on web site, has curves)

Plate 41. [Bourgoin, Plate 41](#).

Occurs as wooden lattice in Central Asia and Middle East.
Cairo, Sultan Ḥaṣan mosque (Bourgoin 1873, plate 31).

Plate 42. [Bourgoin, Plate 42](#).

(variations are shown in [J C Murphy, Plate LIV](#) and [John Rigby's photo no 90](#)).

Extremely common throughout Islam, from Morocco to India.
Cairo: mausoleum of Sultan Qalāwūn ([hill2](#)] fig.52).

Plate 43.

Turkey, Istanbul, Topkapı Saray, lower panel on wooden door, but this example has additional curvilinear 8-stars inside the 8-rosettes ([TUR 0211](#)).
A number of examples in Cairo have curvilinear octagons in place of 4-stars, e.g. Mu'ayyad Shaykh bimaristan, north façade above portal (Thesaurus Islamicus M257 002).
([BOU 043](#), not on web site, has curves)

Plate 44. [Bourgoin, Plate 44](#). - no source. This is simply plate 48 with reflex 8-rosettes.

Plate 45. [Bourgoin, Plate 45](#). - no source.

Plate 46. [Bourgoin, Plate 46](#). - no source.

Plate 47. [Bourgoin, Plate 47](#). - no source.

Plate 48. [Bourgoin, Plate 48](#).

One of the commonest of all Islamic patterns, throughout Islam from Spain, Morocco to India.

Cairo: pierced windows round drum of dome, Khanqa of al-Bunduqdariya ([\[hill2\]](#) fig.50).

Cairo: pierced windows, madrasa-mausoleum of Sultan Qalāwūn ([\[hill2\]](#) fig.51).

Turkey: Niğde, Sunghur Bey mosque, carved wooden door (1338)

([\[hill\]](#) fig.456).

Turkey: Konya, minbar, mosque of ‘Alā ad-Dīn ([\[aslanapa\]](#) fig.20). (1155)

Turkey: Aksaray, minbar of Great Mosque ([\[aslanapa\]](#) fig.209).

Nakhichevan, Mu'minah Khatun mausoleum (1186-7). ([\[gink\]](#) plate 47.)

India, Fatehpur Sikri. (Burckhardt "Art of Islam" Plate 43).

Syria: Aleppo, Zahiriyah madrasah ([\[hill\]](#) fig.517).

Also [EGY 0925](#), [EGY 1109](#), [SYR 0502](#) and [SYR 0505](#).

Plate 49. - no source.

([BOU 049](#), not on web site, has curves)

Plate 50. [Bourgoin, Plate 50](#).

Syria, Hama, carved wooden door in Azem Palace. (Dick Osseman website)

Plate 51. [Bourgoin, Plate 51](#).

Cairo: al-Rifa'i mosque, panels on doors on west façade (Thesaurus Islamicus M?P0127).

Cairo: Azbak al-Yusufi mosque, main area, east side of south iwan, carved band round lintel of door (Thesaurus Islamicus M211P0054).

Turkey: Karatay Han, stone carving inside main entrance arch ([\[hill\]](#) fig.492).

Turkey: Çay, portal of Yusuf bin Yakub madrasa (A.Kuran 1969, "Anadolu Medreseleri" Vol.1 fig.131).

Plate 52. [Bourgoin, Plate 52](#). - no source.

This peculiar type of rosette occurs also in Bukhara, early 12th. century - façade of Maghak-i Attari mosque (part of a pattern surrounded by eight octagons).

Plate 53. [Bourgoin, Plate 53](#).

No source in this exact form, but the nearest similar pattern

I've seen is Yahya Zayn al-Din, south façade, carved band round lintel of portal. But this, while topologically similar, if not identical, differs in angles and proportions (Thesaurus Islamicus M182P0019).

Plate 54. [Bourgoin, Plate 54](#)

(a variant, [Castera, Fes, Royal Palace, page 120](#), has khatems instead of octagons).

Samarkand, Bibi Khanum mosque, spandrel over entrance to main prayer hall ([\[hill\]](#) fig.56; [\[rempel\]](#) fig. 183-2).

Turkey: Aksaray, Kebir Cami, side of wooden minbar (13th cent.).

If the octagons on tetrad2 are replaced by khatems, the pattern is common in the Maghreb, e.g. Granada, The Alhambra, cylindrical columns each side of the North central alcove in the Salon de Comares.

Plate 55. [Bourgoin, Plate 55](#). - no source.

Plate 56. [Bourgoin, Plate 56](#). - no source.

Plate 57. [Bourgoin, Plate 57](#).

Turkey: Ilyās Bek mosque, Balat. Right side of entrance.
([\[aslanapa\]](#) fig.136).

Syria, Damascus, mihrab of Jaqmaqiye madrasa (Dick Osseman website)

Plate 58. [Bourgoin, Plate 58](#).

Extremely common, especially in western Islam, giving rise to many variants.

Syria, Damascus, Great Mosque, marble inlay ([\[dury\]](#) p.22).

Granada, Alhambra, soffit of upper gallery aperture overlooking restroom in bathhouse; parts of ceiling, round Patio de los Leones, etc.

plate 59. [Bourgoin, Plate 59](#). - no source.

Plate 60. [Bourgoin, Plate 60](#).

Morocco, Fez: wooden screen in courtyard of Bu 'Inaniyya madrasa. This seems a typically maghribi pattern, not typical of the Middle East, so it's uncertain where Bourgoin would have obtained this. Having said that, many patterns which have become characteristic of the west do in fact occur in Middle Eastern countries, such as plate 58.

Plate 61. [Bourgoin, Plate 61](#) - no source.

Plate 62. [Bourgoin, Plate 62](#). - no source.

Plate 63. [Bourgoin, Plate 63](#). - no source.

There exist in Cairo a number of rearrangements of the shapes from plate 48, as in these three plates 61-63. Some of them do not in fact work out exactly in a precise mathematical sense. A few examples occur carved on walls of the Sultan Hasan mosque (e.g. Thesaurus Islamicus M133P0165).

Plate 64. [Bourgoin, Plate 64.](#)

Cairo, al-Azhar mosque, wooden doors (Thesaurus Islamicus M97P0444).

Although unlikely to have Bourgoin's source material, the pattern occurs in Turkey, Sari Han on the Aksaray/Kayseri Road, stone-carved border round entrance arch ([TUR 0626](#), [TUR 0627](#)).

12th. century panel from Rayy madrasa in Teheran Museum.

Plate 65. [Bourgoin, Plate 65.](#) - no source.

Plate 66. [Bourgoin, Plate 66, top.](#)

Top: A ceramic mosaic fragment of Mamluk origin occurs in the Victoria and Albert Museum ([VA 035](#)), but this is unlikely to have been Bourgoin's source material.

[Bourgoin, Plate 66, bottom.](#)

Bottom: Ayman Soliman has provided us with a photo from Complex of Sultan Qalawun. A number of variants of this pattern exist in Cairo and Syria, and also occur in Moorish Spain. The basis itself is in fact quite common, consisting of a $p4m$ arrangement, with 6-stars on diads, a square or 8-star on one tetrad, and basically a 4-star on the other tetrad - modified in Bourgoin's example to contain an octagon. Outside the square or 8-star on the first tetrad there is usually a non-regular octagon, whose sides are paralleled by the sides of the 4-star on the other tetrad. Trust Bourgoin to choose a less common variant!

Plate 67. [Bourgoin, Plate 67.](#)

A very early pattern, common in Middle East and Central Asia from 11th. century onwards. Patterns of this type seem less common in Egypt.

Turkey: Ahlat, Erzen Khātūn mausoleum, carved stone band round entrance and high frieze 1396-7. ([\[aslanapa\]](#) fig.117).

Afghanistan, Balkh, minaret of Dawlatabad 1108-9 ([\[hill\]](#) figs. 167, 168).

Iran, Sava, minaret (1110). ([\[pope\]](#) fig.166).

Iran, minaret at Damghan (1026-29). ([\[pope\]](#) fig.163).

Iran, Jam minaret of 'Alā ad-Dīn. ([\[pope\]](#) fig.98)

Iran, Bistam, mosque of Bāyazīd al-Biṣṭāmī shrine c.1120. ([\[hill\]](#) fig.191).

India: Fatehpur Sikri, Raja Birbal's House, various locations. ([\[smith2\]](#)).

Plate 68. cf. [DeGeorge, Page 267, bottom](#) (parallel rosettes)
[Bourgoin, Plate 68](#) (badly drawn)

This general arrangement is common - 12-rosettes in contact on a triangular grid - but there is great deal of variation in angles and proportions. It is not always easy to decide whether or not the artisans intended the triad hexagons to be regular, and the decision here may have been Bourgoin's own.

Cairo: al-Rifā'ī mosque, Mausoleum in southwest corner, middle part of south wall, window. Stained glass window. (Thesaurus Islamicus F6934)

This example agrees with Bourgoin's plate in having convergent-sided 12-rosettes; hexagons are regular.

Cairo: madrasa-mausoleum of Amir Taz Palace. window grille under cupola ([\[hill2\]](#) fig.73). Convergent-sided 12-rosettes.

Cairo: Khanqa of al-Bunduqdariya, window grille round drum of dome. ([\[hill2\]](#) fig. 50).

Cairo: mosque of Sarghatmish, window grilles on main façade ([EGY 0518](#), [EGY 0521](#)) - non-regular hexagons.

Iran: Isfahan, essentially the same pattern, with 6-stars inside 12-stars, in South iwan of Friday Mosque ([\[orazi\]](#) figs.124,125).

Iran: Varamin, portal of Masjid-i-Jami ([\[poppe\]](#) fig.240).

Plate 69. [Bourgoin, Plate 69.](#)

Sources differ in the angle of the crossovers halfway between each pair of 12-stars: some are 60°, others 30°, and some examples seem unable to make up their minds, even in a single pattern.

Different constructions:

Syria, Damascus, Great Mosque, mihrab ([SYR 0203](#)).

Turkey, Divriği, Great Mosque, side of minbar ([\[aslanapa\]](#) fig.13).

Alhambra, Sala de los Reyes, ceramic mosaic dados.

Plate 70. [Bourgoin, Plate 70.](#)

Geometrically this is derived from a $p4m$ arrangement of 60° 12-stars on alternate tetrads. In this example the complete symmetry of one of the stars is destroyed by completion of four regular hexagons surrounding it. The pairs of kites between the two types of 12-stars should be equal. Bourgoin has obviously not noticed this, and draws them unequal. I know of no Middle Eastern example of this pattern, but it is one of a number of dodecagonal patterns typical of the Maghrib.

Plate 71. [Bourgoin, Plate 71.](#) - no source as yet, but almost certainly Cairo.

Plate 72. [Bourgoin, Plate 72.](#)

Cairo: Qijmas al-Ishaqi mosque, door at rear of minbar (Thesaurus Islamicus M114P0185).

Cairo: doors of minbar, madrasa of Abū-Bakr Ibn-Muzhir ([\[briggs\]](#), fig.119).

Cairo: middle of balustrade of minbar of Mu'ayyad mosque. ([EGY 1215](#); Burckhardt 1976, Plate 74).

Cairo: door of mausoleum of Shaikh Mu'ayyad ([EGY 1208-1210](#); [\[wahhab\]](#) II, fig.142; [\[briggs\]](#), fig. 208).

Plate 73. [Bourgoin, Plate 73](#). - no source.

Plate 74. [Bourgoin, Plate 74](#).

Cairo: mausoleum of Mustafa Pasha, fragment in stucco.

Plate 75. [Bourgoin, Plate 75](#).

Cairo: mosque of Abd al-Gani al-Fakhri. ([\[wahhab\]](#) II fig.151).

Plate 76. [Bourgoin, Plate 76](#).

Common and widespread - Egypt, Middle East, Central Asia.
Syria, Damascus, Great Mosque, minbar doors ([SYR 0201](#)).
Syria, Damascus, Great Mosque, mosaic on mihrab ([SYR 0203](#)).
Syria, Damascus, Darwish Pasha, outside doors ([SYR 0230](#)).
Cairo: mosque of Aqsunqur ([EGY 1619](#)).
Cairo: al-Rifa'i mosque, mausoleum of Shaykh Abu Shibak, carved wooden panel (Thesaurus Islamicus M?P0213).
Turkey, Eski mosque, Edirne, wooden panel ([TUR 0128](#)).
Farumad: Masjid-i-Jami ([\[wilber\]](#), Plate 127).

Plate 77. [Bourgoin, Plate 77](#).

Common and widespread, especially Cairo, as the main pattern on the side of many minbars.
e.g. mosque of al-Maridani (Thesaurus Islamicus M120P0019)
 mosque of Sultan Qayt Bay (15th cent.)
 mosque of al-Burdayni ([\[briggs\]](#) fig.214).
 etc.
Damascus, mihrab of Jaqmaqiye madrasa (Dick Osseman collection).
Syria, Aleppo, Great Mosque, carved and inlaid doors ([SYR 0503-0504](#))
Syria, Hama, Beit al-Azem, minbar ([SYR 0704](#)).
Cairo: Al-Nasir mosque, minbar ([EGY 0732](#)).
Cairo: Qaitbay mosque ([EGY 1426](#)).
Cairo: al-Rifa'i mosque, west hall, door in south wall (Thesaurus Islamicus M?P0119).
Turkey: Karatay Han, side of main entrance porch ([\[hill\]](#) fig.488)

Plate 78. [Bourgoin, Plate 78](#)

Abd al-Ghani al-Fakhri mosque, Minbar, N. balustrade
[Topkapi Scroll, page 321, Figure 63](#) (but this version omits the triad hexagons).

B74, B75, B76, B78 form a natural group of related $p6m$ patterns, in which 12-rosettes are separated by pairs of interstitial cells. In B78 the interstitial cells are identical to the outer cells of the rosettes. Version [Topkapi Scroll, page 321, Figure 63](#) achieves this congruence but omits the triad hexagons, and this omission is the only essential difference between B75 ([Bourgoin, Plate 75](#)) which lacks the hexagons, and B74 ([Bourgoin, Plate 74](#)) which has them. All can be transposed to a $p4m$ pattern, with the introduction of a 4-fold motif on tetrad2. For example, B78 to B118, B76 to B77, and so on.

Cairo: al-Ghuri madrasa, minbar doors ([EGY 1725-1727](#))
in these doors the pattern includes both plates 78 and 118.
Cairo: mosque of 'Abd al-Ghani al-Fakhri, two panels on balustrade of the minbar ([\[wahhab\]](#) vol. 2 fig. 151).

Plate 79. - no source for this exact pattern, which is a curvilinear version of plate 78, but a $p4m$ may be seen on the side of the minbar in the Sultan al-Ashraf Barsbay complex (Caroline & John Williams collection on Archnet, images INA0045 to INA0047).
([BOU 079](#) not on web site, has curves)

Plate 80. [Bourgoin, Plate 80](#). Umayyad Mosque, Damascus, photo by Peter Horree.

Plate 81. [Bourgoin, Plate 81](#); - no source.

Plate 82. [Bourgoin, Plate 82](#).

Cairo: Aqsunqur mausoleum, inlaid panel. (Thesaurus Islamicus M123P0002).
Damascus, Great Mosque ([\[castera\]](#), p.303).

Plate 83. [Bourgoin, Plate 83](#).

Cairo: mosque of Sultan Qayt Bey, minbar. ([\[gluck\]](#) Pl.III, fig.182)
Cairo: minbar of Qijmās al-Ishāqī mosque
(Thesaurus Islamicus M114P0093).
Cairo: kursi in prayer hall, al-Rifā'ī mosque (Thesaurus Islamicus M?P0414).

Plate 84. [Bourgoin, Plate 84](#). - no source in this exact form.

Without the small hexagons, see [\[creswell\]](#) II, Pl.79a. A number of similar patterns exist, which use a variety of sub-motifs on hexads or triads. For example, from the Ibn Tulun mosque in Cairo, various window grilles: [EGY 0220x, 0222x](#), without the reflex 6-rosette inserts and without the triad hexagons.

Plate 85. [Bourgoin, Plate 85](#). Also [Mosaic wall tiles, 13th century Seljuk, Turkey](#) without hexagonal net. cf. also [Pope, Photograph number 240](#) which omits net and triad triangles.

No source in this exact form, i.e. with superimposed net of hexagons, but in its pure form common & widespread from Morocco to Central Asia. Early sources are:

The earlier Kharraqān Tomb Tower, Iran (1067-8). ([\[hill\]](#), fig.558)
Morocco, Taza, Great Mosque, arch soffit, 13th century. ([\[hill2\]](#) fig.382)
Morocco: Rabat-Challa, Marinid mausoleum ([\[hill2\]](#) fig.512)
- Moroccan examples have small triad 6-stars.
Cairo: madrasah-mausoleum of Amir Taz Palace, marble grille round drum of cupola ([\[hill2\]](#) fig.71).
Cairo: madrasah-mausoleum of Salar and Sangar al-Gawli mihrab, marble inlay. ([\[hill2\]](#) fig.67).

Curiously, Bourgoin missed the equally common $p4m$ version of this pattern of 60° 12-stars.

Plate 86. - [Bourgoin, Plate 86](#)
no source.

Plate 87. - [Bourgoin, Plate 87](#)
no source.

Plate 88. - [Bourgoin, Plate 88](#)
no source.

Plates 86 to 88 are the first in Bourgoin's collection to employ this peculiar 6-fold motif with inserted 12-rosette (one could almost refer to it as a "6-finished" 12-rosette). Bourgoin shows a number of such patterns or related ones, e.g. plates 99, 100, 139 and 153. There are further examples in existence in Cairo, some with 10-fold motifs. Many exhibit slight variations, and finding exactly the ones Bourgoin might have seen is often difficult.

Plate 89. [Bourgoin, Plate 89, top](#). - no source in this exact form, but see under Plate 85.

Top right of the bottom half of the plate (with reflex 6-rosettes) occurs as lattice windows on the drum of the dome of the Hasan Sadaqa, Cairo.

(Thesaurus Islamicus ID=3191).

Top left of the bottom half of the plate (with inserted 6-rosette) occurs among the pierced windows of the Ibn Tulun mosque in Cairo ([EGY 0212x](#)).

Plate 90. [Bourgoin, Plate 90, top](#). [Bourgoin, Plate 90, bottom](#).

For the top pattern, Cairo: Sultan Qalawun complex. Two mosaic inlay panels. a version on two of the gravestones at Ahlat, Turkey has hexagons inside the 6-stars, continuing the pattern lines. Ayman Soliman has provided us with the photo of this pattern from the Sultan Qalawun complex.

For the bottom pattern: no source.

Plate 91. [Bourgoin, Plate 91](#). - no source.

Claimed by Hessemer to occur in Cairo, mosque of Sultan az-Zāhīr Bībars (1266-69) as a wall mosaic, but this mosaic no longer exists. Also occurs as Moroccan *zellij*, possibly as a late borrowing (from Bourgoin?).

Plate 92. [Bourgoin, Plate 92.](#)

Cairo: mosque of Sultan Baybars (1266-9), NW end of transept. ([Creswell](#) II, Pl.52c). Transferred to *p4m* the pattern occurs as window grilles on the madrasa-mausoleum of Sultan Qala'un ([EGY 1109](#)).

Plate 93. [Bourgoin, Plate 93](#), with additional inner star [El-Said tiling, page 107, Figure 92i](#)

Cairo: minbar of mosque of Sultan Qaytbay ([EGY 1401-1407](#)).
Syria, Damascus, Great Mosque, marble inlay on pillar, central courtyard.

Plate 94. [Bourgoin, Plate 94](#). Translation of Pl. 93 to *p4m*.

Cairo: al-Maridani mosque, mosaic band on mihrab - this includes a combination of both plates 93 and 94 ([EGY 1606-1607](#); Thesaurus Islamicus M120P0031).
Cairo: side of minbar, mosque of Aṣ-Ṣāliḥ Ṭalā'i' ([Creswell](#), I Pl.30).
Turkey: Bursa, Muradiye, tomb of Sultan Murad II, eaves of porch. ([Aslanapa](#), fig.248).

Plate 95. [Bourgoin, Plate 95](#). - no sources.

Plate 96. [Bourgoin, Plate 96](#).

Cairo, marble inlay (as in Bourgoin Pl.VIII) round fountain in men's reception room at Kritiya House (Caroline & John Williams collection on Archnet, images INA0143, INA0144).
Morocco, probably as a recent borrowing ([Paccard](#) 1 p.456).

Plate 97. [Bourgoin, Plate 97](#), . - no source in this form (stellated 12-rosettes), but but with parallel 12-rosettes in contact occurs on door at rear of minbar of the al-Ashraf Barsbay madrasa ([EGY 1030](#); Thesaurus Islamicus F44S7).

Plate 98. - no sources.

([BOU 098](#), not on web site, several patterns on one sheet)

Plate 99. [Bourgoin, Plate 99](#)

Cairo, Azbak al-Yusufi mosque, lintel, S. wall of W. iwan, but with small hexagons on triads, and *convergent* 12-rosettes (Thesaurus Islamicus M211P0107).
Cairo, al-Rifa'i mosque, doors of W. portal of N. façade (Thesaurus Islamicus F6815).
Syria, marble inlay panels, Damascus Museum ([SYR 0728](#), [SYR 0737](#)), with small 6-stars on triads.

Plate 100. [Bourgoin, Plate 100](#).

Cairo, stone carved lintel, madrasa-mausoleum of Amir Taz Palace. With lines

continuing across the short axes of the small rhombs at the tips of the 6-stars.
([EGY 0527](#)).

Bourgoin (1873) also shows this, from a panel in the "convent of the Dervishes" in Cairo.

Plate 101.

Cairo, Kubba Fadawiya (Hautecoeur & Wiet 1932, Pl. 203 of volume 2).
([BOU 101](#) not on web site, some tiles not polygons)

Plate 102.

Cairo, Kubba Fadawiya (Hautecoeur & Wiet 1932 Pl. 203).
(Bourgoin 1873 plate 62).
([BOU 102](#) not on web site, some tiles not polygons)

Plate 103. - no sources.

([BOU 103](#) not on web site, has curves)

Plate 104. - no sources.

([BOU 104](#) not on web site, has curves)

Plate 105. [Bourgoin, Plate 105](#)- no sources.

Essentially the same as Plate 98. Bourgoin's construction based on the tiling of 12-gons, hexagons and squares.

Plate 106. [Bourgoin, Plate 106](#).

Cairo: bronze-plated door, mosque of Aṣ-Ṣālih Ṭalā'i' (1160).
([\[creswell\]](#) I Pl.102).

Cairo: bronze-plated door, Mu'ayyad Shaykh mosque/bimaristan ([EGY 1514](#)).

Plate 107. - no sources.

Plate 108. [Bourgoin, Plate 108](#).

Cairo: Qaitbay mosque, rear door on minbar ([EGY 1405](#); [\[wahhab\]](#) II fig.191). This version has slightly *convergent* 9-rosettes; Bourgoin has parallel-sided 9-rosettes.

Turkey, Alay Han, near Aksaray ([TUR 0601](#)). This version has parallel-sided 9-rosettes and 60° 6-stars.

(A number of Turkish examples have octagons in place of heptagons)

plate 109. [Bourgoin, Plate 109](#). - no sources.

Plate 110. [Bourgoin, Plate 110](#).

Common in Egypt, various media, all with correct *divergent*-sided 6-rosettes.

Cairo: al-Ghuri mosque, bronze door ([\[wahhab\]](#) II fig.220)

Cairo: al-Ghuri mosque, balustrade of minbar ([\[wahhab\]](#) II fig.224)

Cairo: Ibn Alālā' mosque, balustrade of minbar ([\[wahhab\]](#) II fig.210)

Cairo: al-Ghuri madrasa, minbar ([EGY 1718](#)).

Cairo: Qaitbay mosque, minbar ([EGY 1407](#)).

Plate 111.

Cairo, Sultan Hasan mosque-madrassa, square panel in vestibule, south wall.
(Thesaurus Islamicus M133P0193).
([BOU 111](#) not on web site, has curves)

Plate 112. [Bourgoin, Plate 112.](#)

Cairo, Imam al-Shafi'i mosque, lower back pattern on minbar, door
(Thesaurus Islamicus M281P0145).

Plate 113. [Bourgoin, Plate 113.](#)

The Great Mosque at Damascus, ceiling. Dick Osseman's Syria collection.

Plate 114. [Bourgoin, Plate 114.](#)

No known source. The nearest authentic pattern appears to be:
[al-Rifai mosque, caved panel](#)

Plate 115. - no source.

([BOU 115](#), not currently on web site)

Plate 116. [Bourgoin, Plate 116, version A, Mosque of al-Ghuri, Minbar.](#)

Bourgoin's plate has parallel-sided 8-rosettes with obtuse terminal segments, which would be unusual for an authentic version of this type of pattern. I have seen only *reflex* 8-rosettes, as in the examples below, but following the normal rules for this type during the Mamluk period in Egypt, it is perfectly possible to draw standard rosettes, but in this case the 8-rosettes would become *divergent*-sided, as in the first of the two data¹⁷² graphics quoted.

Cairo: Al-Ghuri mosque, minbar balustrade, but with reflex 8-rosettes and convergent 12-rosettes ([\[wahhab\]](#) II fig.224).

Cairo: Qaitbay mosque, panels on east façade (Thesaurus Islamicus M223P0027).

Cairo: Sultan Hasan mosque, inlaid polychrome border round lintel ([EGY 0617](#)).

Plate 117. [Mosque of Qaitbay, minbar.](#)

Cairo: side of minbar, mosque of QaitBay ([\[wahhab\]](#) II fig.191).

Cairo: al-Ghuri madrasa (Hauteœur & Wiet 1932 Pl.209a)

Cairo: mosque of Ghanim al-Bahlawan, side of minbar (Thesaurus Islamicus M129P0035).

Cairo: Sultan Hasan mosque-madrassa, inlaid band above lintel, east side of south wall (Thesaurus Islamicus M133P0165).

Cairo: al-Azhar mosque, a number of stone-carved panels on west façade:
(Thesaurus Islamicus M97P0624, M97P0732, M97P0773, M97P0775, M97P0795).

([BOU 117](#) not currently on the web site)

Plate 118. [Bourgoin, Plate 118, standard construction,](#)
[Bourgoin, Plate 118, non-standard construction.](#)

Common and widespread, but proportions extremely variable. A $p4m$ pattern with 12- and 8-rosettes on alternate tetrads, and with a pair of interstitial cells meeting at the diads. In the "standard" construction - the usual method in Mamluk Egypt - the interstitial cells are congruent to the outer cells, or "petals" of the 12-rosettes. However, knowledge of how to achieve this correctly was often lacking in many authentic examples at different times and in different locations. The problem has been, in many cases, a mistaken comparison with the $p6m$ pattern with 9- and 12-rosettes (see plate 120) in which the larger and smaller rosettes are differently related to the internal geometry of the pattern in the two cases. In plate 120 both rosettes can be made parallel-sided, and the interstitial cells remain congruent to the petals of the 9-rosettes. In the case of plate 118 this cannot be achieved without destroying the congruence of interstitial cells and 12-petals.

Cairo: Qijmas al-Ishaqi mosque, qibla iwan, incised wood border round door (Thesaurus Islamicus M114P0145).

Cairo: Maridani mosque, polychrome marble inlay ([EGY 1609](#)).

Cairo: Barquq madrasa, inlaid wood panel ([EGY 1711-1712](#)).

Cairo: Barquq madrasa, kursi (Thesaurus Islamicus M187P0034).

Cairo: Abd al-Ghani al-Fakhri mosque, balustrade of minbar ([\[wahhab\]](#) vol. 2 fig. 151).

Cairo: Zain al-Din Yahya mosque, balustrade of minbar ([\[wahhab\]](#) vol. 2 fig. 181).

Cairo: Sultan Shah mosque, balustrad of minbar ([\[wahhab\]](#) vol. 2 fig. 202; this minbar is now in the Victoria and Albert Museum).

Cairo: Imam al-Shafi'i zawiya, side of minbar (Thesaurus Islamicus M281P0139; this is an extremely poorly constructed version!).

Cairo: al-Barsbay madrasa, polychrome inlay ([EGY 1102](#)) In this version the interstitial cells are truncated to heptagons).

Cairo: Ghanim al-Bahlawan madrasa, minbar balustrade (Thesaurus Islamicus M129P0034). Two panels show curvilinear varieties, while two half-squares have interstitial cells truncated to heptagons.

Turkey, Sirçali madrasa, Konya ([TUR 0406, 0409](#)). Interstitial cells truncated to heptagons horizontally, but not along vertical edges.

Turkey, Doner Khatun, Kayseri ([TUR 0806](#)). Interstitial cells truncated to heptagons.

Turkey, mausoleum of Khudavend Khatun, Niğde ([TUR 0830](#)). Interstitial cells truncated to heptagons horizontally but not vertically.

Turkey, Erzurum, Yakutiye madrasa, carved stone (D. Osseman collection on pbase.com).

Syria, ([SYR 0507](#)). A curvilinear version.

Further examples, with a variety of proportions, occur in the Maghrib, Central Asia and Moghul India. Although the Maghrib generally prefers its rosettes with parallel-sided outer cells (petals), examples of this pattern in the Alhambra curiously have *convergent*-sided petals in the 12-rosettes - see the pierced windows in the alcoves of the Salón de Comares, and elsewhere.

Plate 119. - I've seen no source which matches this exactly, but it is similar to a number of

ceilings in Cairo, e.g. Barquq madrasa (Thesaurus Islamicus M187P0013) and al-Rifa'i mosque (Thesaurus Islamicus M227P0337).

([BOU 119](#) not on web site, has curves)

Plate 120. [The Alhambra, All four corners of the Mirador de Lindarja](#),
[Version of Bourgoin, Plate 120 from Tony Lee, Bourgoin, Plate 120.](#)

Common and widespread, proportions variable. A $p6m$ pattern, with 9-rosettes on triads and 12-rosettes on hexads, rosettes touching on lines between hexads and triads. On the basis of this "definition" many varieties are possible, some more geometrically "correct" than others. Occurs throughout Islam, from Morocco and Spain in the west, to the Middle East, Central Asia and India. Bourgoin's plate 120 is something of a mixture of characteristic features from a number of different sources, and in the precise form in which he draws it, does not seem to occur anywhere. But this is a common property of so many of Bourgoin's plates. In any case, the pattern is so common, in so many different locations, that it would be impossible to pin down the exact source of his drawing, even if he had produced an accurate copy. Turkey and the Maghrib have a preference for parallel-sided rosettes, whereas other regions usually have at least the 12-rosettes convergent-sided. In Mamluk Egypt, where they generally preferred a more precise geometry, a choice of parallel-sided 12-rosettes led inevitably to *divergent*-sided 9-rosettes (see bronze doors from the khanqa of Baybars al-Jashankir (Thesaurus Islamicus M32P0013).

Turkey, madrasa of Dundar Bek, Egridir ([TUR 0925, 0926, 0936](#)).

Turkey, Ak Han, Aksaray/Konya road ([TUR 0908, 0911-9015](#)).

Turkey, Sahabiye madrasa, Kayseri ([TUR 0812](#)).

Cairo: Mu'ayyad Shaikh mosque, balustrade of minbar ([EGY 1216](#)). This variety has divergent-sided 9-rosettes.

Cairo: al-Ghuri madrasa, carved lintel ([EGY 0927](#)) parallel 9s, convergent 12s.

Cairo: Khanqa of Baybars al-Janshankir, bronze doors (Thesaurus Islamicus M32P006, detail in M32P0013) This has parallel-sided 12-rosettes and divergent-sided 9s.

Plate 121. Curvilinear versions of plate 120.

Cairo, bronze door, Sultan Hasan mosque-madrasa (Thesaurus Islamicus M133P0137, M133P0226).

Cairo, Qijmas al-Ishaqi mosque, east façade, stone carved panel (Thesaurus Islamicus M114P0036).

([BOU 121](#) not on web site, has curves)

Plate 122. [Bourgoin, Plate 122](#). - I've not so far seen any authentic example of this pattern, which is essentially the same pattern as plate 120 but with "stellated" rosettes. I can't say, therefore, how accurate a copy Bourgoin's plate is.
Geometrically related to Plate 187 ([Bourgoin, Plate 187](#)).

Plate 123. Bourgoin, Plate 123. - no photographic source available with 9-rosettes, which should strictly be divergent-sided, not parallel, as Bourgoin has drawn them. Sarre gives a source at Imam Yahya, Mosul, but the drawing he gives could well be derived from Bourgoin.

Plate 124. [Bourgoin, Plate 124.](#)

This seems to be the more usual variety of plates 123 and 124, with "reflex" 9-rosettes.

Cairo: Qaitbay, paired panels above entrance in west façade (Thesaurus Islamicus M324P0036).

Cairo: al-Ghuri madrasa, panel at rear of minbar, under canopy ([EGY 1722-1723](#)).

Cairo: Ghanim al-Bahlawan, minbar doors (Thesaurus Islamicus M129P0042).

Cairo: minbar of mosque of Amir Zayn ad-Dīn Abū Bakr (1479)
(Burlington Magazine 1919 **35**: 243).

Plates 123, 124 are virtually the same, except for the treatment of the 9-rosettes. I very much doubt that Bourgoin's Plate 123 shows the 9-rosettes accurately. I would have expected divergent-sided 9-rosettes in Plate 123. Considering the number of examples in Cairo of divergent-sided rosettes (where geometrically appropriate), it is curious that Bourgoin chooses to change the majority of these to either parallel-sided or convergent. In combination with obtuse terminal segments (as in B123) - which demand divergent-sided petals - this produces, to my eye, a very ugly effect. The few examples of divergent-rosettes in Bourgoin are Plates 110 (6-rosettes) and 115 (8-"rosettes").

Plate 125. - [Bourgoin, Plate 125.](#)

Cairo: Qijmas al-Ishaqi mosque, doors of minbar. (Thesaurus Islamicus M114P0084, M114P0055).

Bourgoin's drawing is particularly ugly, and I doubt that it accurately represents any authentic example.

Plate 126. - no source. Shows misalignment between 10- and 12-rosettes.
([BOU 126](#) not currently on web site)

Plate 127. [Bourgoin, Plate 127.](#)

Cairo: Mausoleum of Barqūq, pierced wooden screen
([\[briggs\]](#) figs. 2 18, 249; [EGY 1324-1325](#)).

Cairo: main entrance, mosque & madrasa of Sultan Sha'bān (1368-69).

Plate 128. [Bourgoin, Plate 128.](#)

A single source, labelled merely "Egypt". Differs from Bourgoin's drawing in having very slightly convergent 15-rosettes and very slightly divergent 12-rosettes. Also the disconnected hexagonal interstitial cells between a 15- and 12-rosette are truncated to heptagons in my only source. The general effect is slightly more elegant than in Bourgoin's picture, but it is quite possible that Bourgoin has produced a "more or less" accurate copy of some unknown original.

Plate 129. [Bourgoin, Plate 129.](#)

This combination of 16- and 8-rosettes, but with varying proportions, is fairly widespread from Morocco, Moorish Spain, Egypt, Middle East. The widths of the 8-petals and interstitial cells should be the same, as in Egyptian examples ([A. Al-Wahhab, Figure 168](#)), but there the 16-rosettes are treated differently. Maghribi examples tend to keep petal width constant throughout the pattern ([Alcazar pattern like Bourgoin, Plate 129](#)). Bourgoin's drawing is ugly, and doesn't agree with the only example I've seen so far: Turkey, Sivas, Sifahidiye medersa (Dick Osseman collection on pbase.com, taken during recent restoration). This has convergent-sided 16-rosettes, and the 8-rosettes lack an inner *khatem*.

Plate 130.

Cairo, mosque of Ahmed al-Burdaini (1628), stained glass window behind minbar. (K. Otto-Dorn 1967 "L'Art de L'Islam" p. 21)
([BOU 130](#) not on web site, has curves)

Plate 131.

Cairo, Sultan Hasan mosque-madrassa, qibla iwan, minbar door, but with rather larger curvilinear heptagons (Thesaurus Islamicus M133P0124).
([BOU 131](#) not on web site, has curves)

Plate 132.

Cairo: bronze plated doors now in the Al-Mu'ayyad mosque, but originally from the Sultan Haşan mosque. (M.S. Briggs 1924 fig. 234; [\[wahhab\]](#) II fig. 112). Bourgoin (1873) also illustrates this pattern, Plate 73, which is rather better drawn than in his later (1879) work. The latter is inaccurate and ugly: the 16-rosettes should have been convergent-sided, while the 12-rosettes are slightly divergent on the original. The slight gap in continuity on the diad in Bourgoin's Plate 132 is not present in the authentic version. ([EGY 1222-1223](#)). This example is interesting in that we have here almost certainly the exact source of Bourgoin's plate 132, so it is possible to compare his drawing with an authentic version.

Plate 133.

Cairo: mosque Faraj ibn Barqūq, side of minbar. (Thesaurus Islamicus M149P0198).
([BOU 133](#) not currently on the web site)

Plate 134. [Bourgoin, Plate 134](#)

Cairo: stone minbar in mosque of Barqūq (1483), but 12s treated differently. Same

minbar as in plate 133, but the other side.
(Thesaurus Islamicus M149P0191).
Cairo, al-Ghuri madrasa ([EGY 1716, 1720, 1715](#))
Cairo, Qijmas al-Ishaqi mosque (Thesaurus Islamicus M114P0052 = B135 see below).
The constructions of the three sources differ among themselves, and none is an exact match for Bourgoin's plate.
For details, see: [Bourgoin's Plate 134 using Inkscape](#).

Plate 135.

Cairo: minbar, mosque of Qijmās Al-Ishāqī (Thesaurus Islamicus M114P0094).

Same pattern as in plate 134, but with curvilinear 16-rosettes.
([BOU 135](#) not on web site, has curves)

Plate 136. [Bourgoin, Plate 136](#).

Cairo: minbar, mosque of Qijmās Al-Ishāqī (Thesaurus Islamicus M114P0052, M114P0183) but the 9-rosettes lack inner stars.

Plate 137. [Bourgoin, Plate 137](#).

Cairo: madrasa & Khanqa al-Azāhr Barqūq ([\[wahhab\]](#) II fig.129).
Bourgoin (1873) Plate 79, says this is bronze door of Qalāwūn mosque, but his drawing is not as good as in the later (1879) work.

Plate 138. [Bourgoin, Plate 138](#).

Cairo: Qubba al-Fadiwiyya (Bourgoin 1873 colour plate 60)

Plate 139. Cairo, mosque of al-Qadi Yahya, twin carved panels over the west portal (Thesaurus Islamicus ID=9926 M344P0055). If this was Bourgoin's actual source, then he omits the 6-stars on triads, and his 24-rosettes are not quite correct.
([BOU 139](#) not currently on web site, has chelates)

Plate 140. [Bourgoin, Plate 140](#).

A version occurs in Turkey, in an unspecified mosque at Ermenek (D. Osseman collection). A fragment of a very similar combination of 24s, 12s and 8-rosettes occurs in Cairo, at the Zaynab Khatun, wooden doors. Here, the 24- and 12-rosettes are the stellated variety (Thesaurus Islamicus M77P0066).

Plate 141. [Bourgoin, Plate 141](#). - Funerary Mosque of al-Mu'ini, Damietta, Egypt.
See [okane2], page 197.

Plate 142. [Bourgoin, Plate 142](#). - no source.

Plate 143. [Bourgoin, Plate 143](#); also [D'Avennes, page 21](#) without khatems; also [Tilings, Calvert](#) without 8-rosette khatems and with khatems instead of tetrad octagons. According to Prisse D'Avennes present in Cairo rather vaguely as "ceiling decoration".

Cairo, side of minbar, Ibn Tulun mosque ([EGY 0504, 0505](#)).
Cairo: Imam al-Shafi'i mausoleum, ceiling at entrance (Thesaurus Islamicus M281P0067).

Turkey, Sivas, Sifahidiye Madrasa (Dick Osseman collection, taken during recent restoration work).

Plate 144. [Bourgoin, Plate 144](#). - no source.

Plate 145. [Bourgoin, Plate 145](#). - no source.

Plate 146. [Bourgoin, Plate 146](#). In this particular form (with stellated 16-rosettes) I have no source, but this is the style seen in various sites in Cairo with other patterns involving 16-and 8-rosettes. With ordinary 16-rosettes forming collinear links with 8-rosettes this is widespread in the Maghrib and occurs [The Alhambra, North end of Sala del Mexuar](#). See also [Alhambra, Fleurent, DeGeorge, Page 76](#).

The version in Bourgoin's Plate 146 is ugly: the interstitial pairs of "petals" should be the same size as the petals in the 8-rosettes, as in similar patterns in Cairo.

Plate 147.

This configuration of 16s and 8s is fairly common in Cairo, but quite differently proportioned compared to Bourgoin's drawing, which seems rather clumsily put together. Interstitial cells should be the same size as the 8-petals. See, for example, minbar doors of al-Ashraf Barsbay mosque (Thesaurus Islamicus M175 F45S12). ([BOU 147](#) not currently on the web site)

Plate 148. - no source, possibly a ceiling somewhere(?).
([BOU 148](#) not on the web site, has curves)

Plate 149. [Bourgoin, Plate 149 \(top\)](#), [Bourgoin, Plate 149 \(bottom\)](#). - no sources.

Plate 150. - no source.
([BOU 150](#) not currently on the web site)

Plate 151. [Bourgoin, Plate 151](#)
Saladin's mausoleum in Damascus, just outside the Great Mosque.
[\[singer\]](#) Page 41, top right of photo.

Plate 152. [Bourgoin, Plate 152](#)

Cairo, Qijmas al-Ishaqi mosque, W. iwan, N. wall, square panel between window arches (Thesaurus Islamicus M114P0152).

Plate 153. [Bourgoin, Plate 153](#)

Cairo, stone carved panel, Barsbay al-Bagasi & Amir Suleyman complex, N. wall, portal (Thesaurus Islamicus M124P0096, M124P0097). Without the tiny hexagons at "pseudo-triads", and without the extra "finials" on octagons. Cairo, Qubba al-Fadawiyya (Bourgoin 1873 colour plate 58). This version agrees with plate 153 here, and was probably Bourgoin's source for this pattern.

Plate 154. - no source.

([BOU 154](#) not on web site, has curves)

Plate 155. - no source.

([BOU 155](#) not currently on the web site)

Plate 156. - no source.

([BOU 156](#) not currently on the web site)

Plate 157. - no source.

([BOU 157](#) not currently on the web site)

Plate 158. [Bourgoin, Plate 158](#)

Cairo: minbar, upper part, mosque of Ghanim al-Bahlawan.
(Thesaurus Islamicus M129P0038, M129P0039).

Bourgoin's drawing is a particularly bad copy of the original, if the above source was really the one he copied. However, the geometrical conception of the original is not exact, and involves a number of ill-fitting joins between 8-, 10- and 12-rosettes.

Plate 159.

Fairly common in Middle East, and perhaps also Cairo.

Turkey: Kayseri, Agzikara Han, carved façade of main entrance (1236-46)

([hill](#) fig. 468).

Turkey: Kayseri, Çifte mausoleum, carved entrance façade (c.1270).

Turkey: Bursa, Ulu Jami, side of wooden minbar (c.1399).

Syria: Damascus, Great Mosque, open work arch (destroyed by fire in 1893 - see Bourgoin ('79) colour plate V).

This pattern involves a number of interlacing discontinuities, and other approximations. Bourgoin's drawing is probably not an accurate copy.

([BOU 159](#) not currently on the web site)

Plate 160.

Cairo: mosque of Sultan Qait Bay, upper part of minbar. ([wahhab](#) II fig. 191; see also [gluck](#) Plate III; [EGY 1404](#)).

Bourgoin's drawing is hopelessly inadequate and inaccurate, and certainly does not agree with the above source. The original geometrical conception is in any case rather "messy", and involves a number of interlace discontinuities and approximations.

([BOU 160](#) not currently on the web site)

Plate 161. - no source known.

Cairo: mihrab of Taybarsīya madrasa (1309-10).

([creswell](#) II Pl.113b).

([BOU 161](#) not currently on the web site)

Plate 162.

This recalls plate 160 which is on the same basis: 16s and 12s on alternate tetrads, 10s on diads. Again, Bourgoin's drawing looks rather clumsy and is probably inaccurate. Rather tantalizingly my marginal notes in my copy of Bourgoin say merely "better versions are in existence" but without providing further details! ([BOU 162](#) not currently on the web site)

Plate 163.

Cairo: window grilles on the main façade of the mosque of Sarghatmish. ([BOU 163](#) not currently on the web site)

Plate 164. [Bourgoin, Plate 164.](#)

Cairo, Wakala of al-Ghuri, external door ([EGY 0933](#)).

Plate 165. [Bourgoin, Plate 165.](#)

Damascus, Jaqmaqiye madrasa, tile mosaic on mihrab. (Dick Osseman website)

Plate 166. [Bourgoin, Plate 166.](#)

Cairo: minbar, mosque 'Abd al-Gani al-Fakhri ([\[wahhab\]](#) II fig.151).
Cairo: minbar doors, mosque of Jamali Yusuf (Thesaurus Islamicus M178P0005). Much of the decoration in the body of this mosque is Moroccan.
Cairo: al-Rifa'i mosque, side of minbar (Thesaurus Islamicus M?P0362, M?P0378).

Plate 167. [Bourgoin, Plate 167.](#)

Cairo: doors of minbar, mosque of 'Abd al-Gani al-Fakhri. ([\[wahhab\]](#) II fig.151). Also visible, with magnification, on Thesaurus Islamicus M184.

Plate 168. [Bourgoin, Plate 168.](#) Photo provided by Ayman Soliman from Al-Suhaimi House, Cairo, Egypt.

Plate 169.

Cairo: upper part of minbar, mosque of Shaikh Malik al-Mu'ayyad ([\[hill2\]](#) fig.84; Burckhardt 1976 Pl.74; [EGY 1217](#)).

Plate 170. [Bourgoin, Plate 170.](#)

Cairo: stone-carved panel, spring of iwan arch, mosque of Amir Qijmas al-Ishaqi. (Archnet photoarchive ICR1365, from the Creswell Archive).

Iraq: Mosul, Abu al-Qāsim.
F.Sarre & E.Herzfeld (1911) Archäologische Reise im Euphrat- und Tigris-Gebiet, Berlin. Vol III Pl.CI).

Plate 171. [Bourgoin, Plate 171](#) (with inner stars),
[El-Said, Plate 34, Figure 65b](#) (without inner stars).

Widespread and extremely common, virtually everywhere from Morocco to India. In India sometimes combined with its underlying net of decagons and pentagons. Afghanistan, Bust, Qal'ah-i Bust, soffit of arch, probably 12th century. ([hill] fig.155). This, and the pattern of plate 175, have given rise to innumerable variations and rearrangements, which are extremely tedious to enumerate.

Plate 172. [Bourgoin, Plate 172](#) is a bad copy of the copy in Abas & Salman taken from Bourgoin.

No source for this precise arrangement. One very poor feature of this design is the vertical columns of interstitial cells, which doesn't suit an overall, two-dimensional pattern. The original may have been a narrow band with interstitial cells aligned along the edges of a panel.

Plate 173. [Bourgoin, Plate 173](#)
al-Maridani Mosque, Cairo. [EGY 1607](#)

Plate 174. [Bourgoin, Plate 174](#).

Turkey: Konya, Sahip Ata mosque gateway (1279)
([logell]).

Turkey: Kayseri, Huand Hatun madrasa.

Plate 175. [Bourgoin, Plate 175](#) (see also [Tilings, Clevenot and Degeorge](#))

Widespread and common, but does not seem to occur in Western Islam. Isfahan, Northeast dome chamber of Masjid-i-Jami, tympanum over corner arch. ([seherr] Plate 10) 1088.

Plate 176. [Bourgoin, Plate 176](#).

Turkey: Konya Road, Sultan Han, inner porch ([aslanapa] fig.90)
Iran, Ashtarjan, village mosque. c.1315, arch soffit ([hill] fig.299)
Iran, Isfahan, Darb-i-Kushk mosaic in entrance portal
([seherr] Plate 90).

Plate 177. [Bourgoin, Plate 177](#)

Cairo: balustrade of stone minbar, mosque of Faraj ibn Barquq. (Thesaurus Islamicus M149F7032). Two examples rotated 90° relative to each other. These are approximately square panels, which may account for Bourgoin's claim that the pattern has a square basis ("sur plan carré").

Plate 178. [Bourgoin, Plate 178](#).

Muradiye Mosque in Bursa, Turkey.
Imam Yahya, Mosul, Iraq

Plate 179. [Bourgoin, Plate 179](#).

Turkey: Niğde, mosque of Sunqur Bek ([aslanapa] fig.123).
Cairo: madrasa-mausoleum of Amir Taz Palace ([hill2] fig.74).
Common and widespread.

Plate 180. [Bourgoin, Plate 180](#).

Cairo, mausoleum of Shaikh Abu Shibak, South door.

Plate 181,
([BOU 181](#) not on the web site, has curves)

Plate 182. [Bourgoin, Plate 182.](#)

Cairo: ar-Rifā'ī mosque (Thesaurus Islamicus M?P0218).

Plate 183. [Bourgoin, Plate 183.](#) - no source, probably some obscure narrow panel.

Plate 184. [Bourgoin, Plate 184.](#) - no source.

Plate 185. [Bourgoin, Plate 185.](#) - see [SYR 0621](#).
Damascus, Great Mosque, balustrade of minbar.

Plate 186. [Bourgoin, Plate 186, top.](#)

Top pattern:

A very similar pattern, but without the tiny crossovers occurs on the upper side of the minbar from the Sultan Shah mosque, originally from Cairo, now in the V&A.
Cairo: Qijmas al-Ishaqi mosque, west façade, marble inlay panels above portal (Thesaurus Islamicus M114P0014).
Cairo: al-Rifa'i mosque, doors, north wall of mausoleum of Shaikh Abu Shibak (Thesaurus Islamicus M?P0225).

Bottom pattern:

Cairo: Qijmas al-Ishaqi mosque, minbar, qibla iwan (Thesaurus Islamicus M114P0093). The lower 10-stars are here rectilinear; Bourgoin's have curves.

Plate 187 top. [Bourgoin, Plate 187.](#)

Fairly common, Middle East.
Minbar of Sultan Shah mosque, balustrade. Now in the V&A.
Cairo: minbar doors, mosque of 'Abd al-Gani al-Fakhri. ([\[wahhab\]](#) II fig.151).

Plate 187. [Bourgoin, Plate 187 \(bottom\).](#) - no source.

Plate 188. [Bourgoin, Plate 188 \(top\).](#)

Cairo: façade of Taybarsīya madrasa ([\[creswell\]](#) II plate 164).
Cairo: al-Azhar mosque, lattice window ([EGY 0923](#)).

Plate 188. [Bourgoin, Plate 188, bottom.](#) no source.

Plate 189. [Bourgoin, Plate 189](#) - no source, but probably Turkey.

Plate 190. [Bourgoin, Plate 190.](#) Gate, Blue Mosque, Istanbul.

These last two plates are representative of large numbers of elongate decagonal compositions decorating mainly wooden doors in buildings of later dates in Turkey and Syria. In such cases the original composition was an *ad hoc* pattern intended to fill a given rectangular space, and some of them are not suitable for enlarging beyond the edges of their enclosing rectangle as two dimensional repeating patterns. Plate 189 is a good example of this, where the vertical string of

alternately convex and concave hexagons can look rather clumsy when seen as a whole in a larger repeating pattern, but is less noticeable in the original panel.

References

These reference are on the web system and are cited by a link:

[wahhab], [aslanapa], [briggs], [castera], [creswell], [dury], [dye], [gink], [gluck], [hill], [hill2], [paccard], [ogel], [orazi], [pope], [rempel], [seherr], [smith1], [smith2], [useinov], [volwah], [wilber].

References not on the web system

J.Bourgoin 1873 *Les Arts Arabes* Morel, Paris.

T.Burckhardt 1976 *Art of Islam: Language and Meaning* ISBN 0 905035 00 3.

L.Hautecœur & G.Wiet 1932 *Les Mosquées du Caire* Paris 2 vols (vol 2 album).

E.Herzfeld 1943 Damascus: Studies in Architecture II. *Ars Islamica* X: 14-70.

A.Kuran 1969 *Anadolu Medreseleri*. Vol 1. Ankara.

G.D.Lowry 1987 Humayun's Tomb: Form, Function, and Meaning in Early Mughal Architecture. *Muqarnas* 4: 133-148.

K. Otto-Dorn 1967 "*L'Art de L'Islam*"

G.A.Pugachenkova 1963 *Mavzolei Arab-Ata*. *Iskusstvo Zodchikh Uzbekistana* II. Tashkent.

F.Sarre & E.Herzfeld 1911 *Archäologische Reise im Euphrat- und Tigris Gebiet*. Berlin.

Internet References.

David Wade: <http://www.patterninislamicart.com/>

Thesaurus Islamicus Foundation photographic archive: <http://www.islamic-art.org/>
(Note that the URLs of individual photos can change. See also below.)

Caroline & John Williams Collection:

<https://archnet.org/collections/20>

Dick Osseman (Turkey, Syria): <http://pbase.com/dosseman/root>

Editorial notes by Brian Wichmann

Updated in November 2011 for consistency with the web site. Many changes also made to the web site material.

The word *chelates* refers to a polygon which has two distinct vertices at the same point, creating a hole in the polygon. An example of this appears in several of Bourgoin's drawing

including Plate 99. In that case, a web site pattern has been produced: [Bourgoin, Plate 99](#). However, there are technical difficulties to producing these patterns.

The Thesaurus Islamicus monument number M? Refers to the 19th-century al-Rifa'i mosque, which has a blank as its monument number. To access the photos of this monument one must put the name into the web system, then click on the name itself to access the thumbnails for each photo. It does not seem possible to provide a URL for this monument.