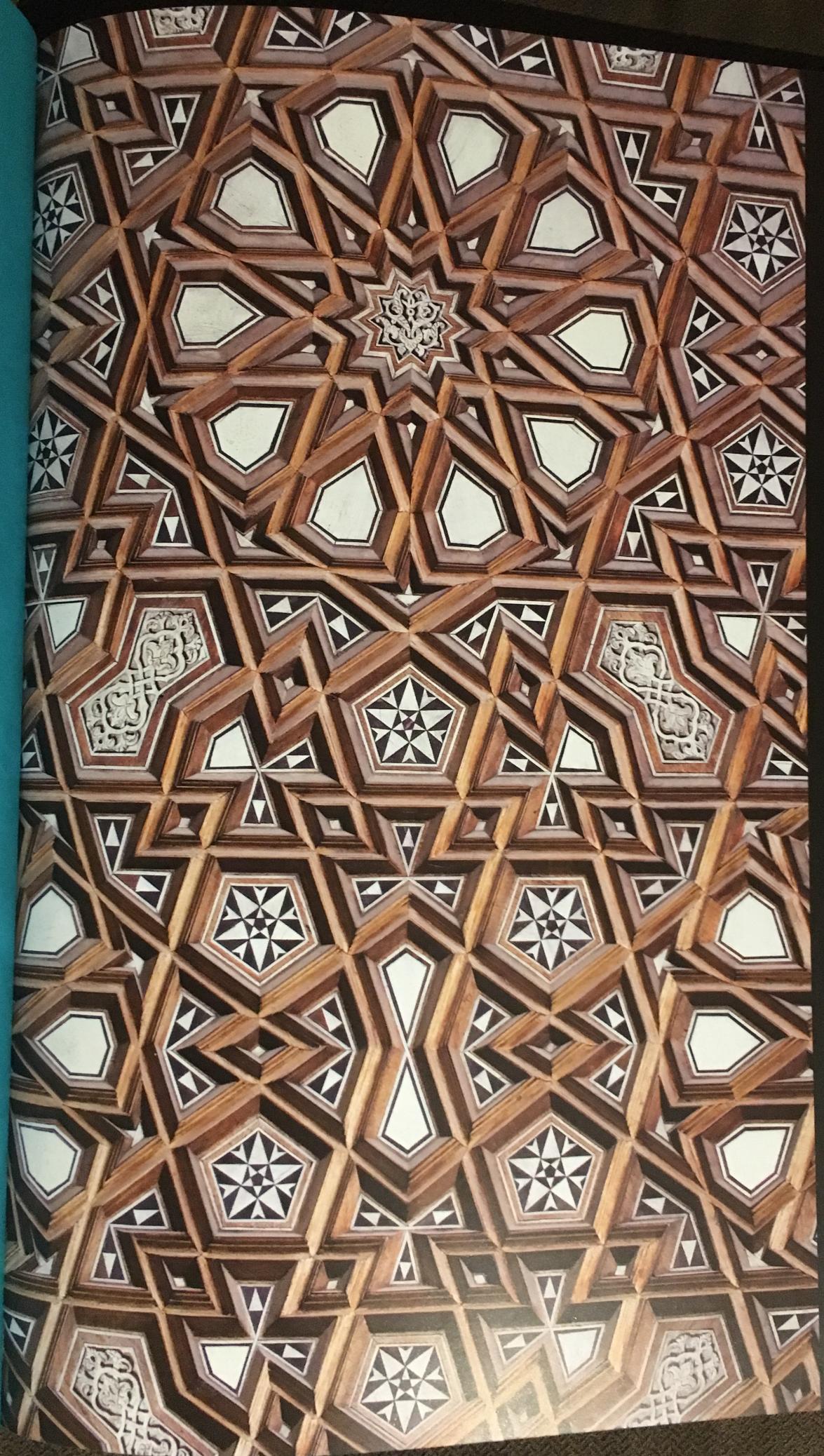


ISLAMIC GEOMETRIC DESIGN



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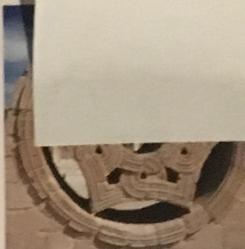
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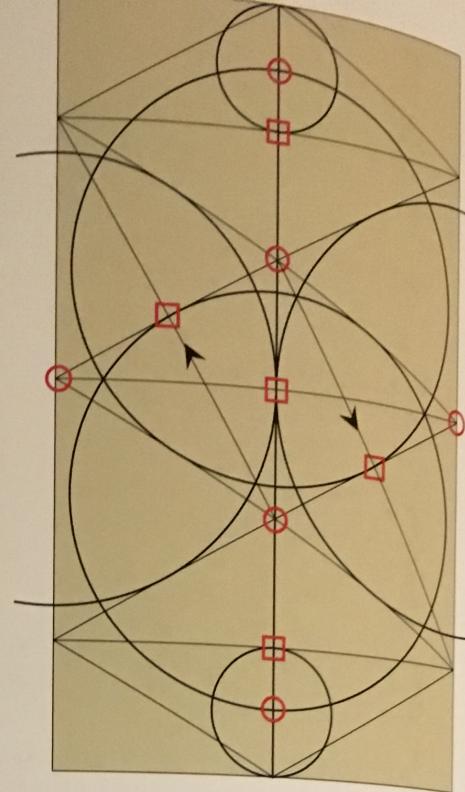
Round stone window at Kh
al-Malj (Kisham's Palace),
Jericho (724–

Minbar and mihrab of the
Ahmad al-Bundayni
Mosque, Cairo, Egypt (1616). Although it w
during the Ottoman era, the
of the mosque is distinctly M

1.3
Illuminated page from the Qur'an of the calligrapher Ibn al-Bawwab. From Baghdad, Iraq (1000–1).



1.5
Stucco decoration inside the main prayer hall of al-Azhar Mosque in Cairo, Egypt (970–72). The small circular composition on the left shows three intersecting circles, and that on the right shows four intersecting circles.



1.4
The geometric construction of the al-Bawwab Qur'an's unique design.



1.8
A wooden door in the royal residence of Tash Khauli in Khiva, Uzbekistan. The residence was built in the 1830s by the Khivan ruler Ala Kuli Khan, but the door may be much older.

1.6
The geometric construction of the door of the mosque al-Azhar Mosque.



1.7
The geometric construction of the door of the mosque al-Azhar Mosque.

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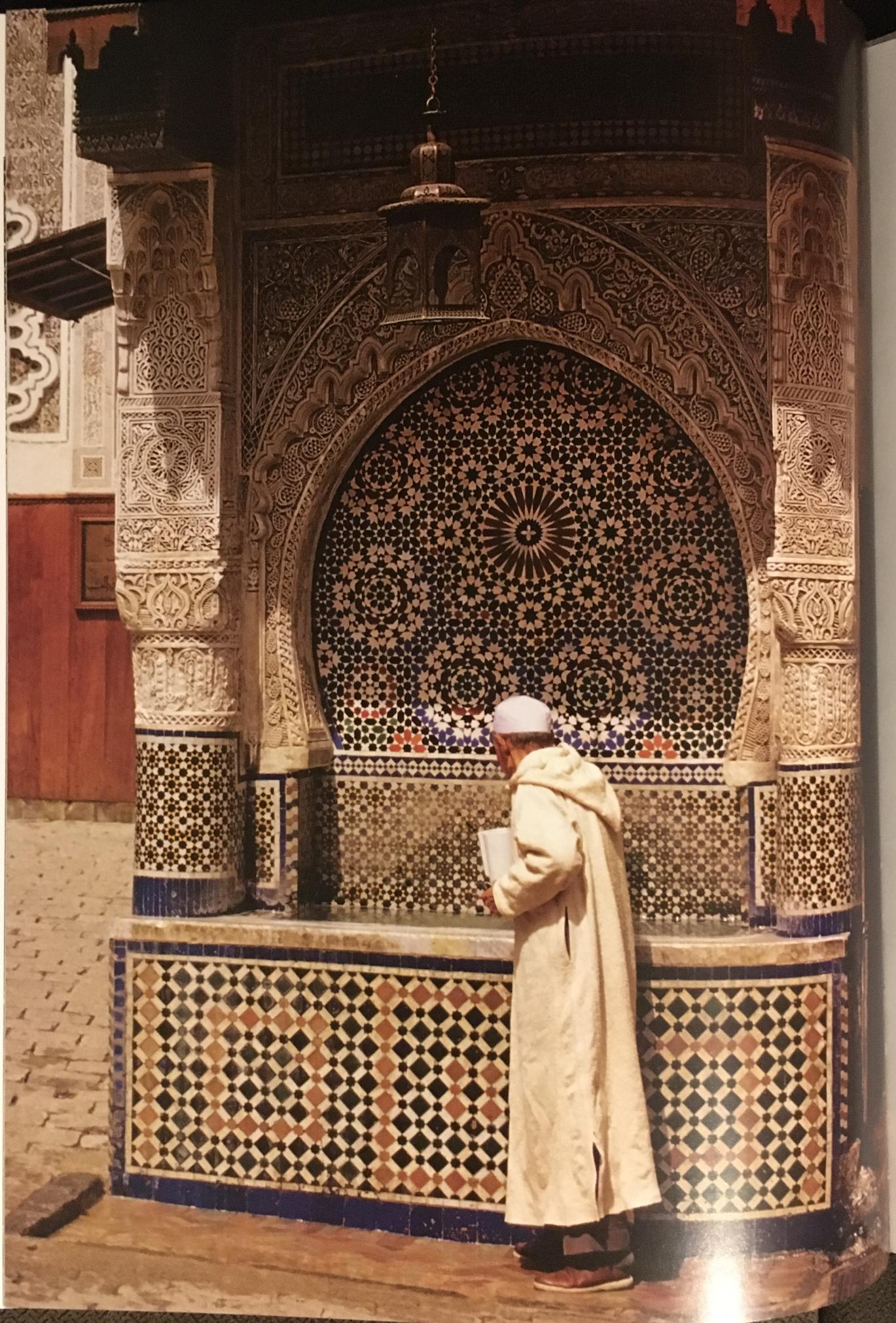
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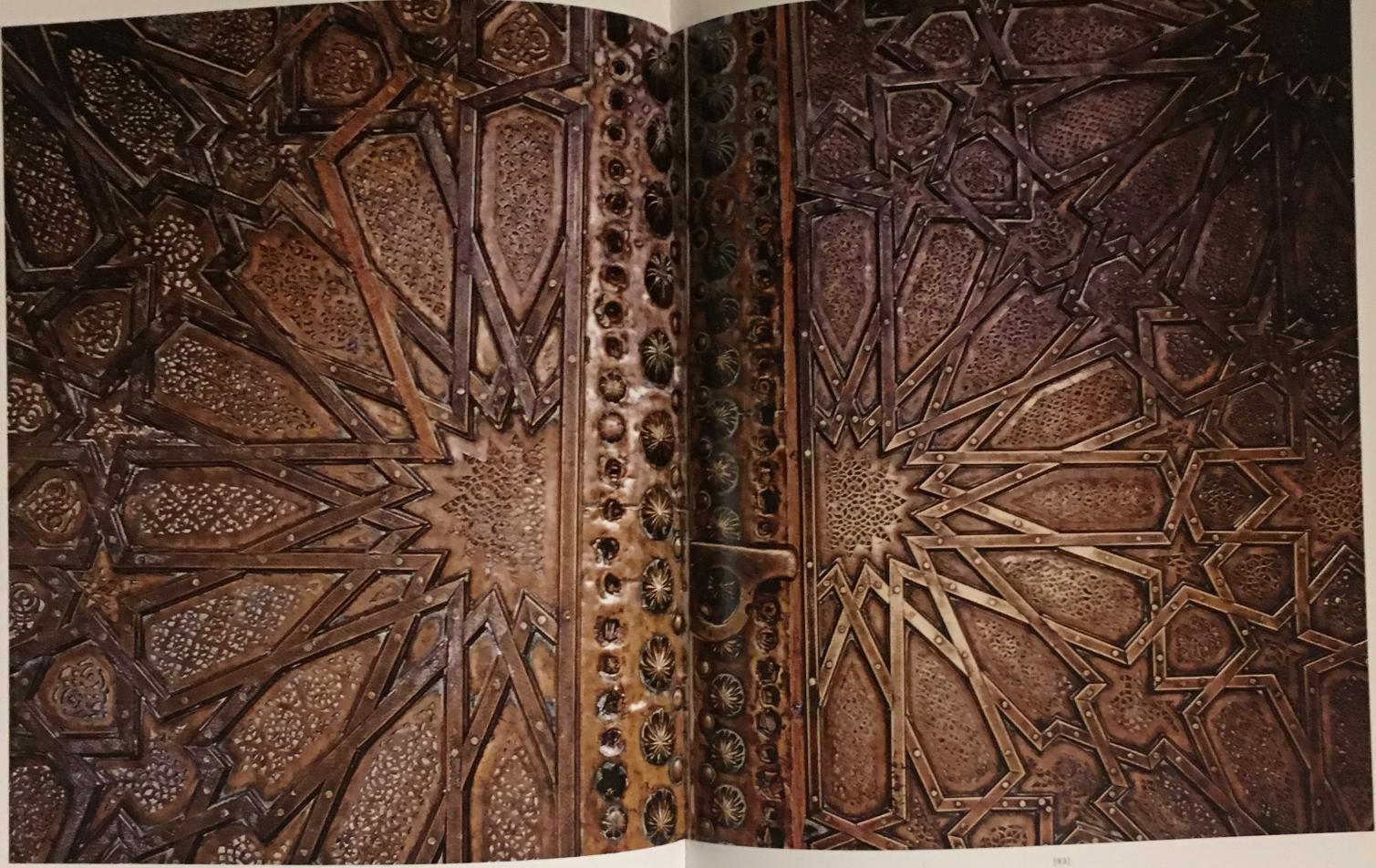
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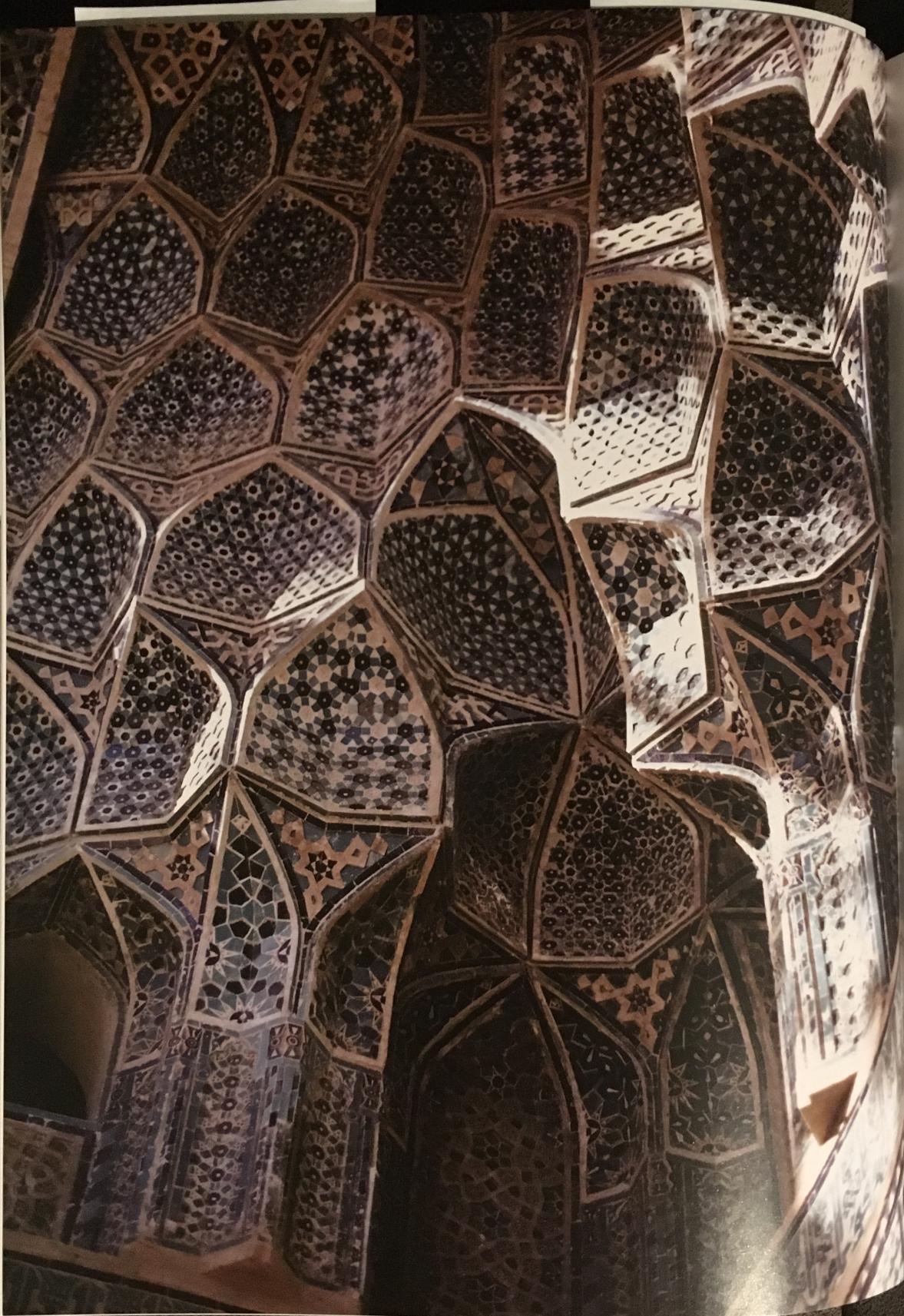


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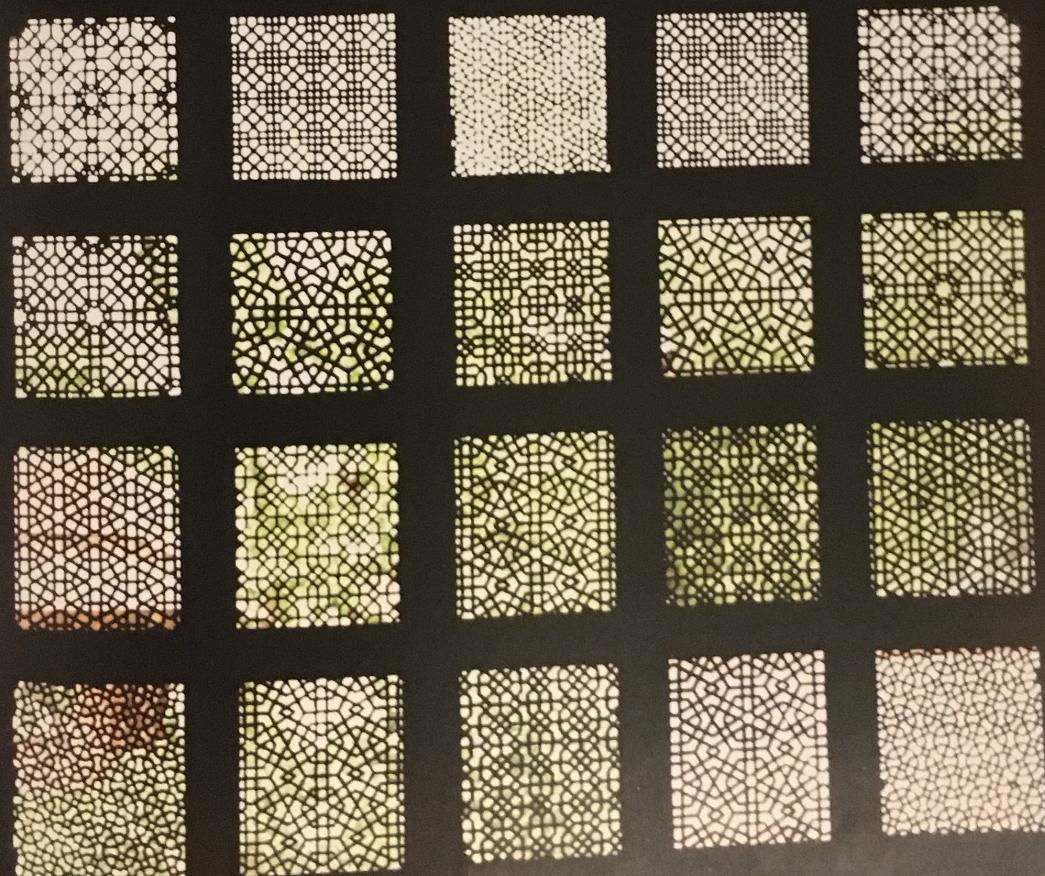
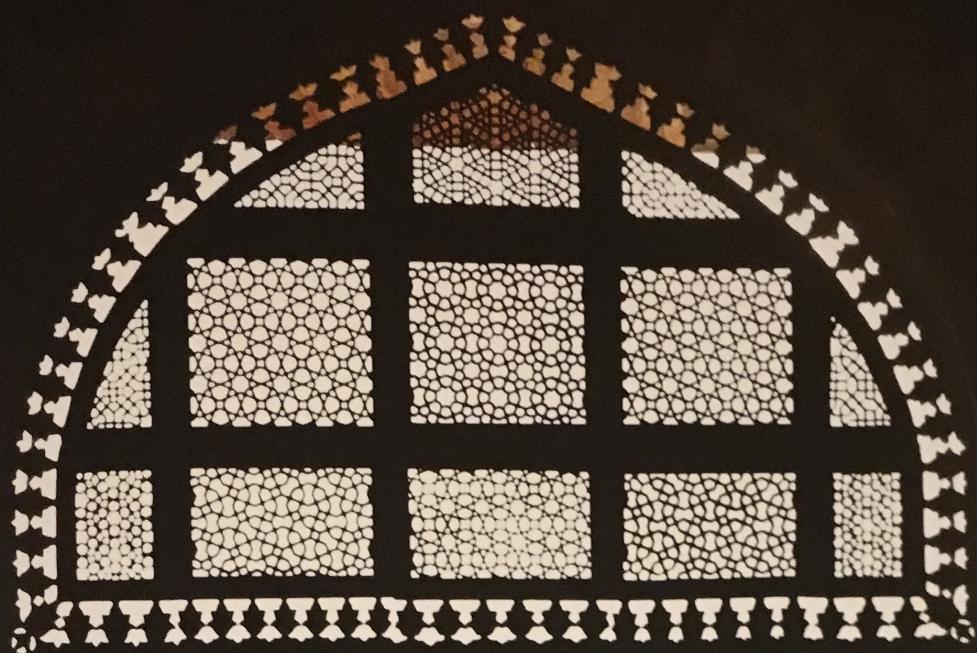
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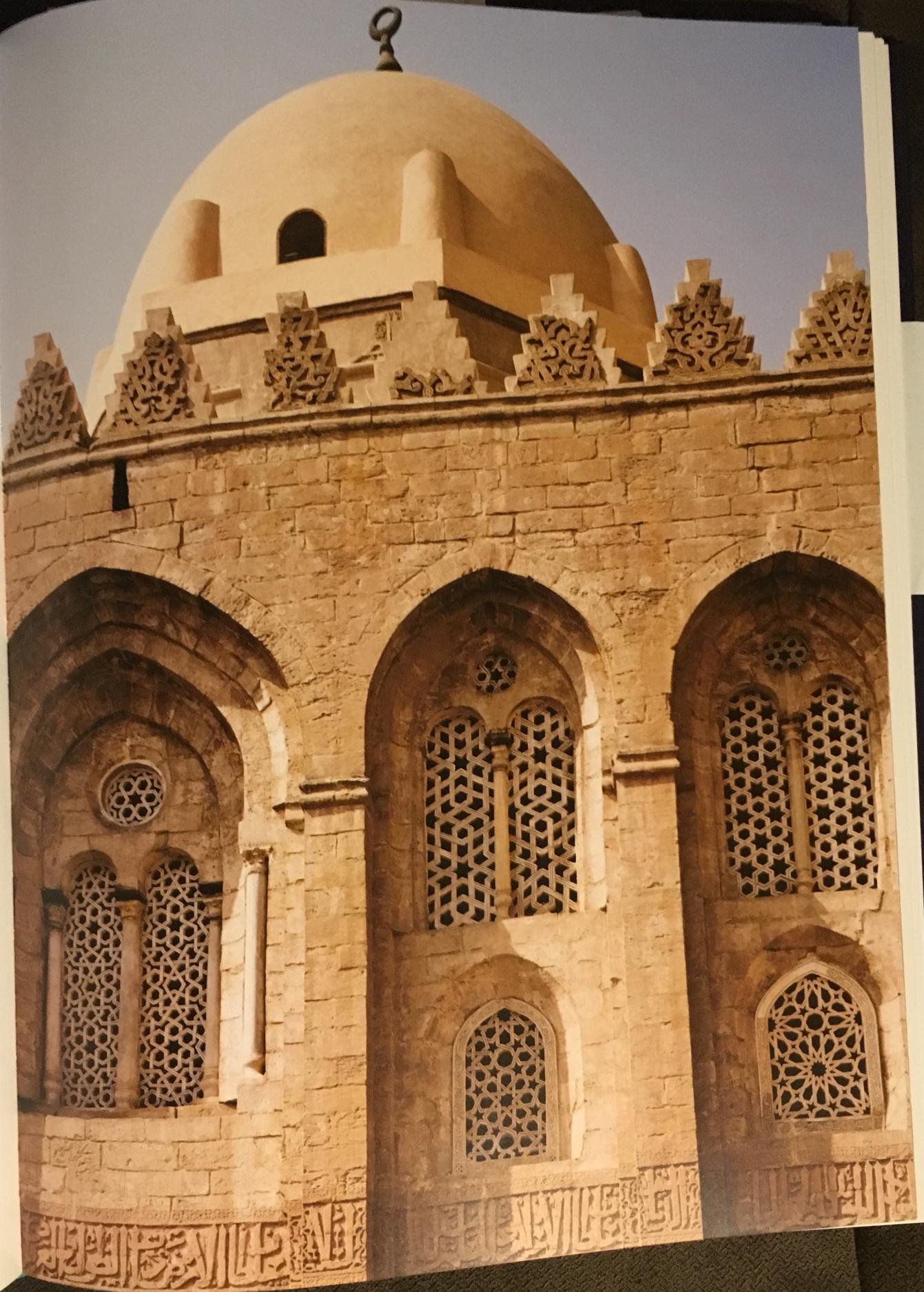


4.1
Detail of the muqarnas vaulting
from the shrine complex of
'Abd al-Samad in Natanz, Iran
(1304–25).

Opposite
Dividing a circle into six by drawing
six circles of the same diameter
around the original circle.

4.2
Detail of the muqarnas vaulting
from the shrine complex of
'Abd al-Samad in Natanz, Iran
(1304–25). This is one of the
best-preserved Ilkhanid shrine
complexes. 'Abd al-Samad, who
died in Natanz in 1299, was
a sheikh of the Suhrawardi
Sufi order.





of the complex
Qala'un in Cairo.
Located on
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4.79

the minaret of the mosque Mamluk Emir Khushqadam al-Ahmadī, Cairo, Egypt. The composition and its hexagonal unit can be seen in ill. 4.80 and 4.82 respectively. Ill. 4.81 uses a grid structure of a narrow band of half-hexagons.



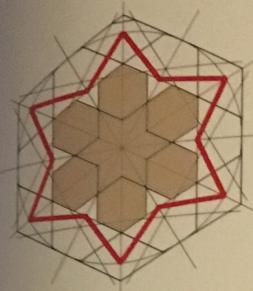
4.80

Section of the composition on tier on the minaret of Emir Khushqadam al-Ahmadī in Cairo. A row section of a hexagonal grid is used to structure the composition. A hexagonal repeat unit is used (ill. 4.82).



4.81

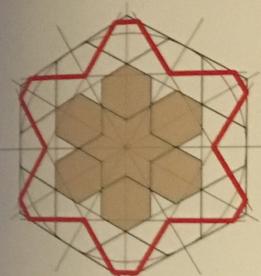
A stone frieze on one of the gates in Fatehpur Sikri in India. The composition uses a grid of half-hexagons. These are also integrated into the composition. The grid structure has been used on the minaret in ill. 4.79.



4.82

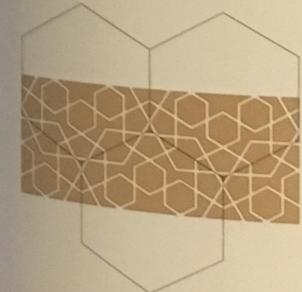
The hexagonal repeat unit (A) used to create the composition on the tier on the minaret (ill. 4.79).

The only thing the craftsman has changed is the red star, using construction lines already available.



4.83

The hexagonal repeat unit (B) that the Mamluk craftsman has used as a starting point from which to arrive at a modified version (ill. 4.82).



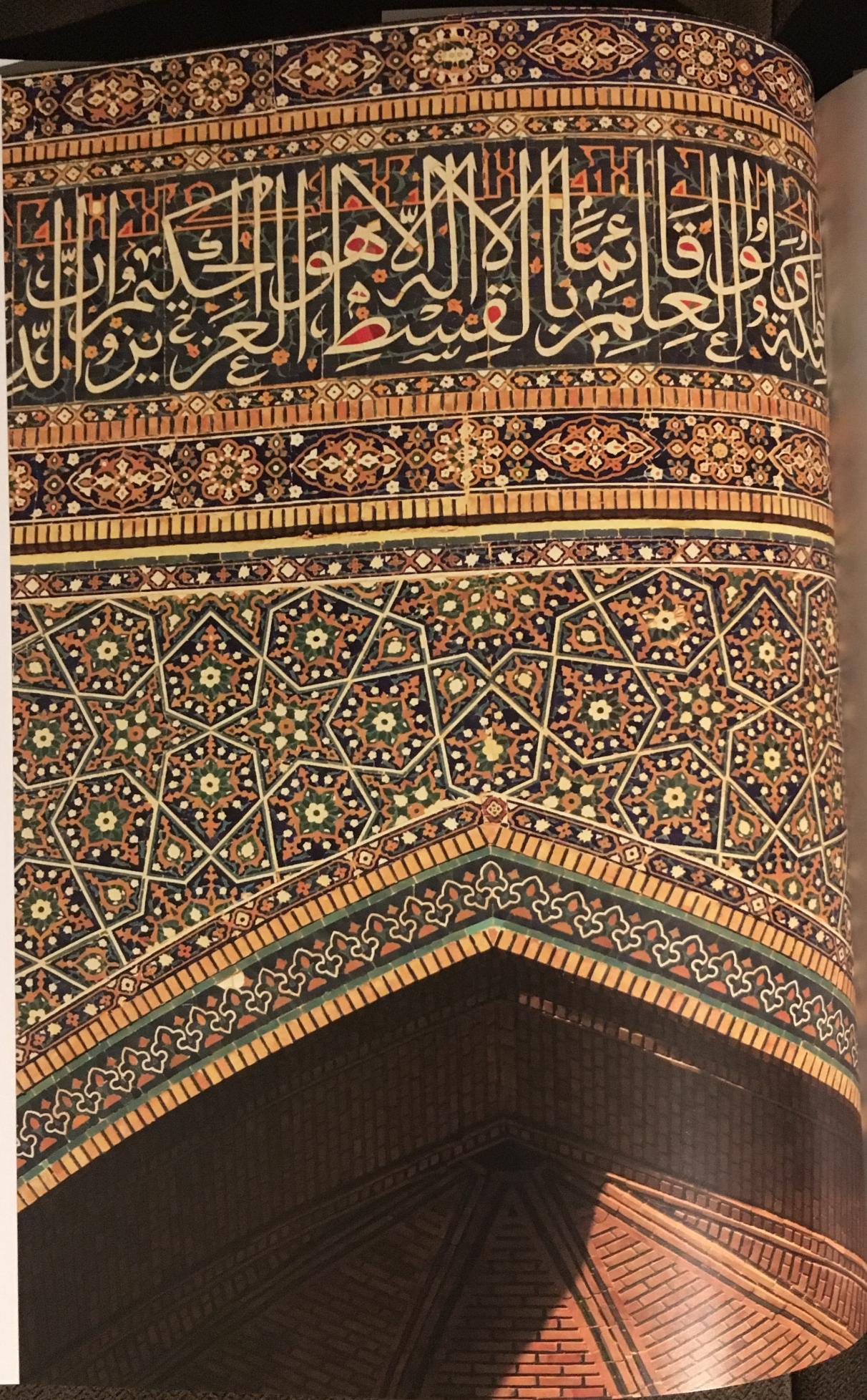
4.84

A section of a composition on which the Khushqadam design is based. It can be seen in a pair of windows on the facade of the complex of Sultan Qala'un in Cairo (ill. 4.38 on p. 107). Hexagonal repeat unit (B) is used (ill. 4.83).

an existing pattern the large six-point stars that are base

So, what would modified? The ans the minaret comp it is necessary to This repeat unit (unmodified six-po an unmodified dis small. For this reas (B). Analysing a co ing point was a co lines that were al fits into a circle th to draw this star v intersections to us on the minaret. Us elements, has bee develop new patte seen in various diff

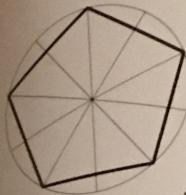
SHARED COMPOSITIONS
Different patterns can be shared by several structures. Other patterns, such as the one shown here, are unique to a single structure. This pattern can be found in several different structures. The construction of this pattern is relatively straightforward when compared to other patterns. In other words, it is possible to construct this pattern quite independently of identical patterns. This knowledge was transferred from one structure to another, allowing the craftsman to connect structures that were otherwise unrelated. It can be argued that this transfer of knowledge led to the development of complex compositions in Islamic architecture.



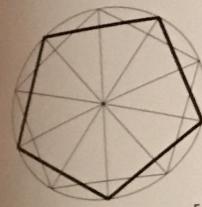
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5.2
How to draw a ten-pointed star.
Step 1: Draw a pentagon in a circle.



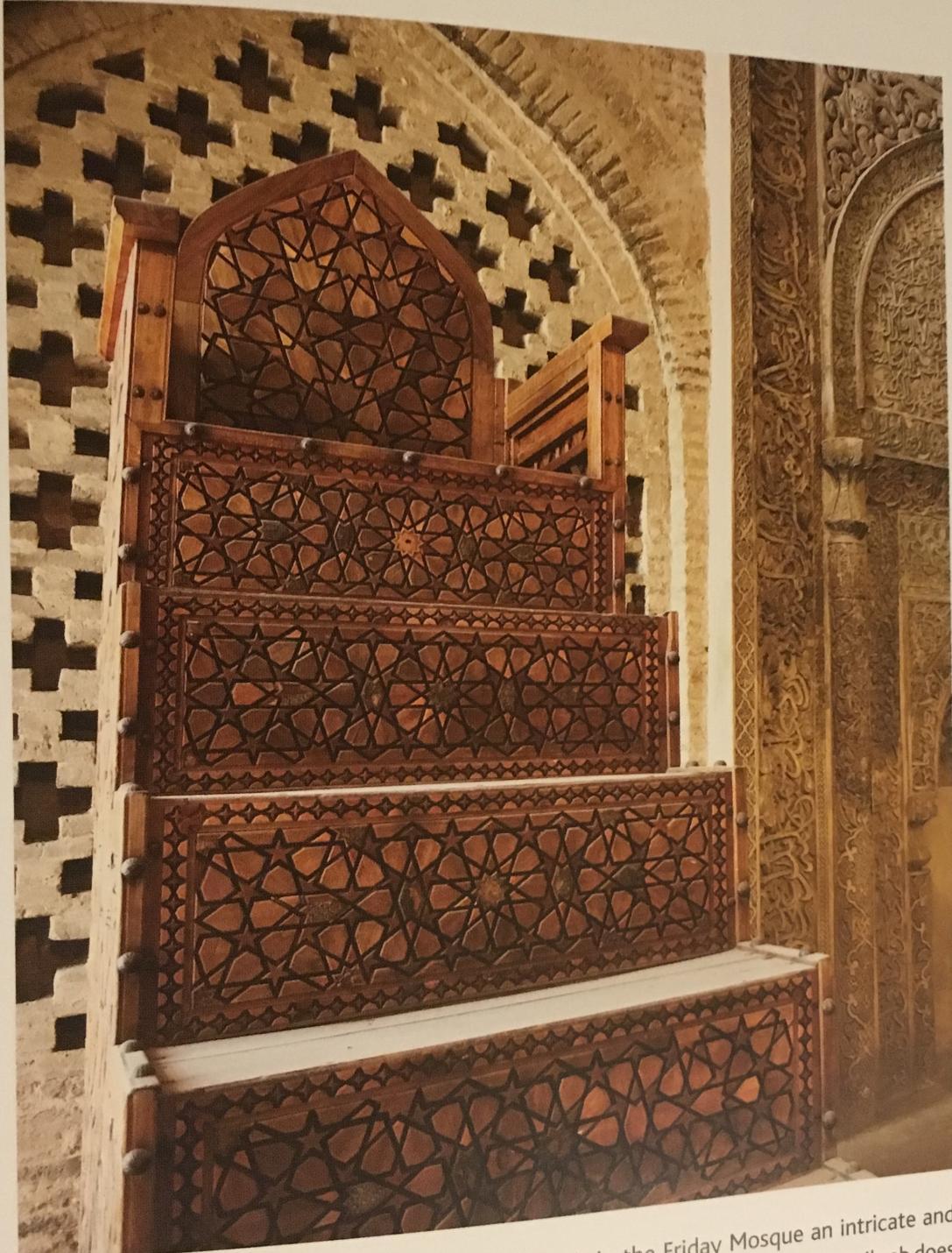
5.3
Step 2: Draw another pentagon in
the circle.



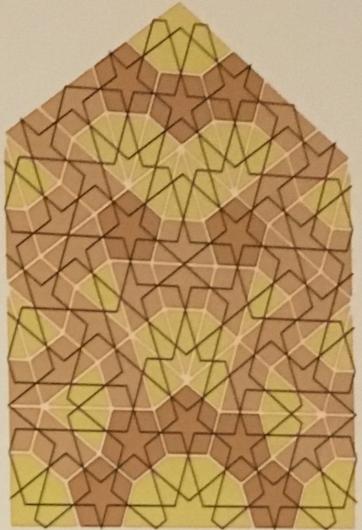
5.4
The ten-pointed star that is
created using the lines of two
overlapping pentagons.

5.1
Opposite
A tenfold star composition on the
pishtaq of Mir-i-Arab Madrasa
in Bukhara, Uzbekistan. Built
between 1535 and 1536, during the
Shaybandi dynasty, it has continued
to function as a madrasa.

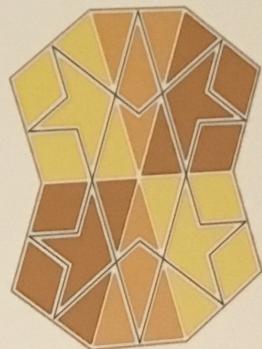
FIVEFOLD GEOMETRIC DESIGN



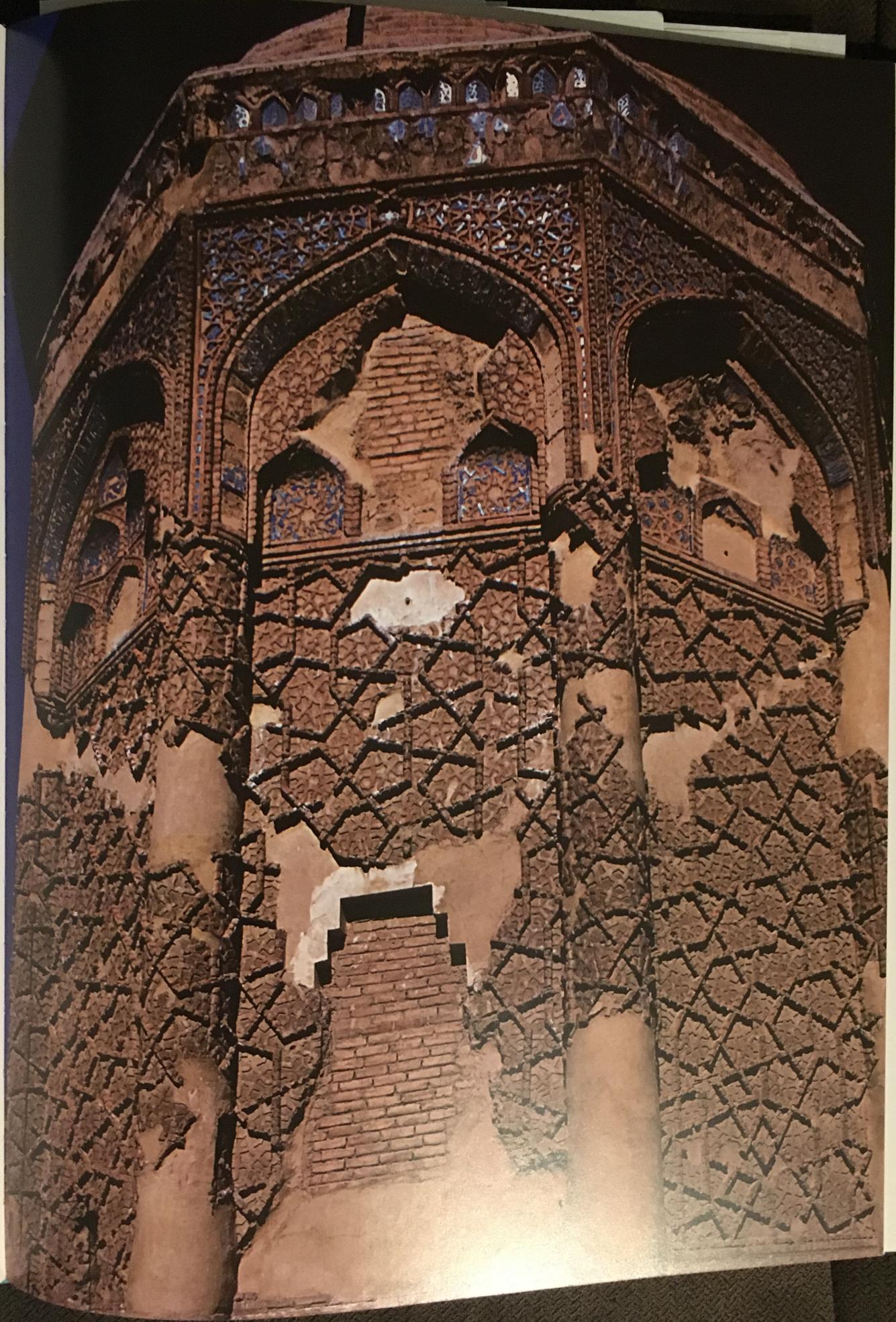
Genghis Khan who ruled from 1256 to 1353, built in the Friday Mosque an intricate and delicately detailed stucco mihrab in memory of one of their rulers, Uljaytu. The mihrab does not have any geometric patterns but it is flanked by two minbars. The one to the right of the mihrab is decorated with a fourfold octagonal pattern, but it is the minbar to the left [5.45] that is of most interest here (it is evidently from a much later period than the mihrab). Its steps and backrest are decorated with fivefold geometric patterns that are similar to the pattern on the wooden door from Bukhara (ill. 5.43) and that use the same repeat units. The hexagonal repeat unit that contains the pak of arrows (see ill. 5.22) has been halved so that that unit. There are still only three different repeat units that



5.46
Only three different repeat units are used to create the complex fivefold composition on the back panel of the minbar in ill. 5.45.



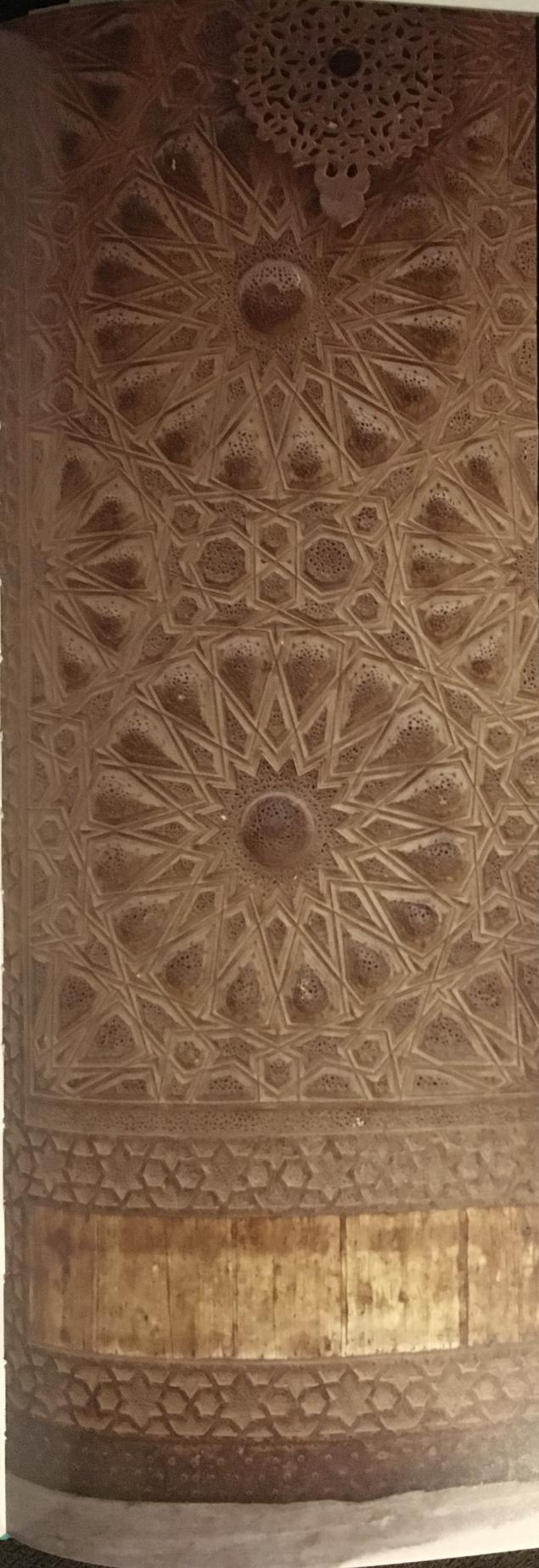
5.47
The central shape in this illustration features on the steps of the minbar (and also on a ceiling panel at Chihil Sutun – see ill. 5.48). It is created by an arrangement of two different repeat units: one containing an arrow, and the triangular repeat unit also seen in ills 5.43 and 5.44.







The mausoleum
Sultaniyah, Iran (c.
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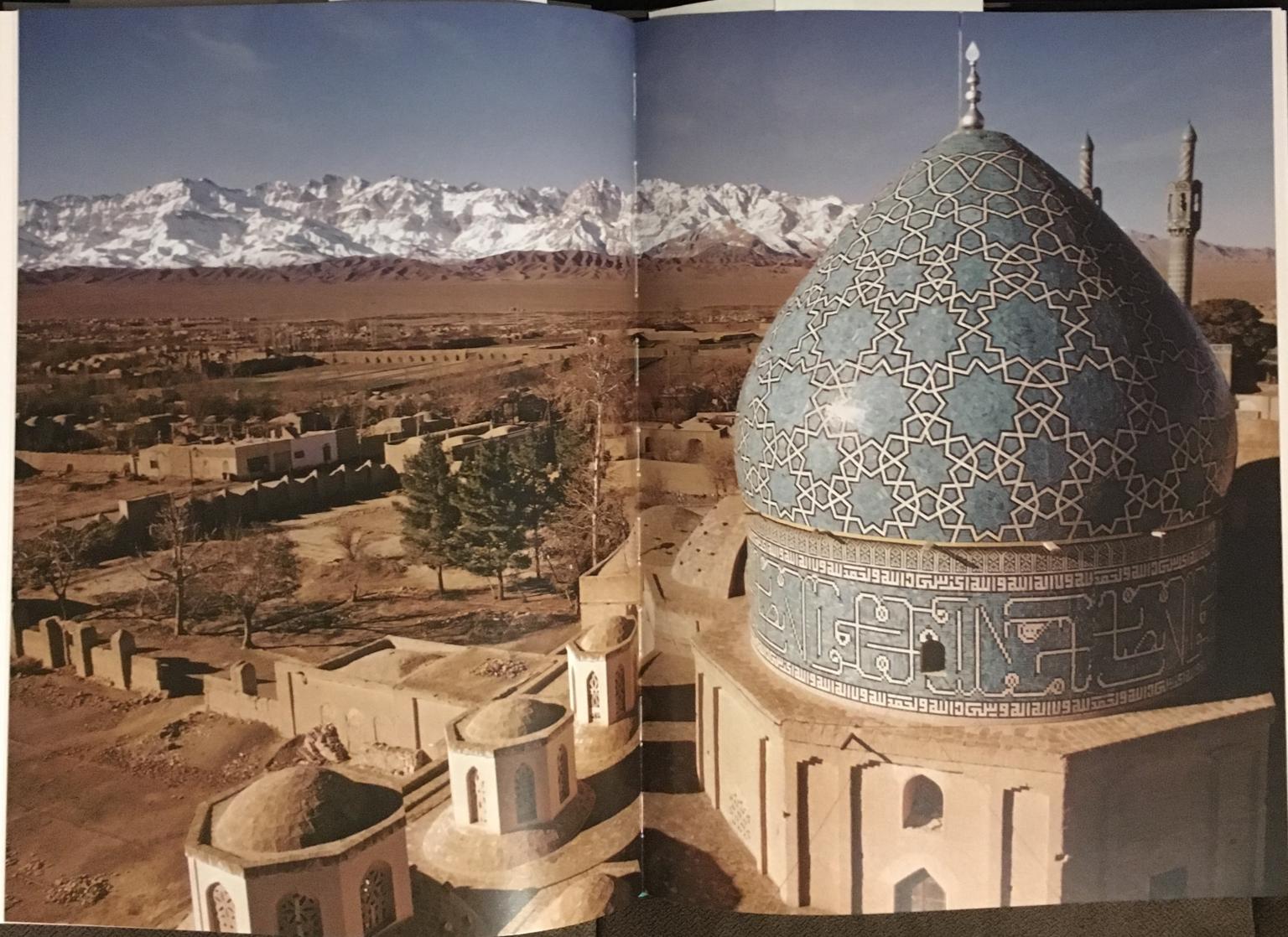
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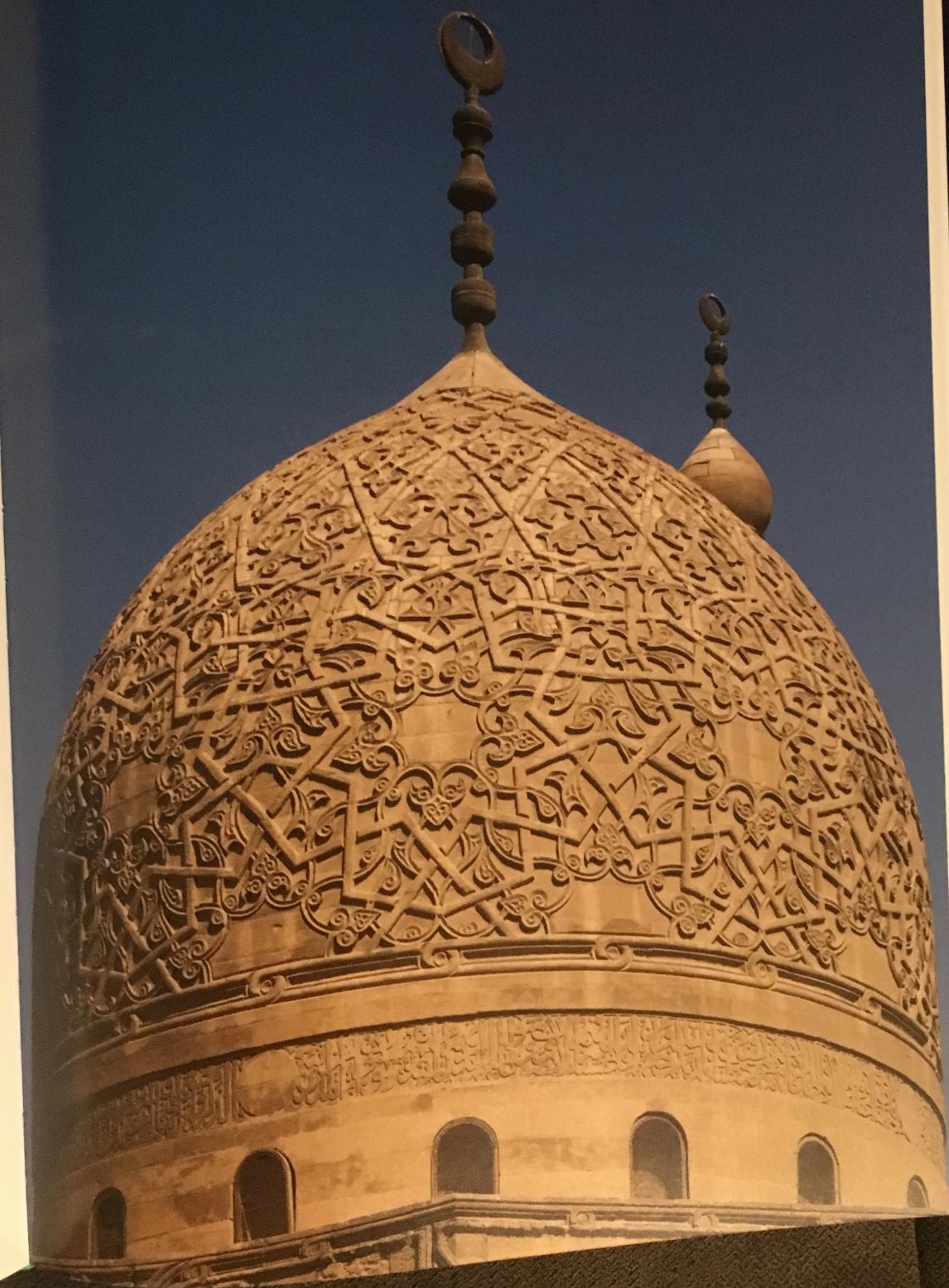
demonstrated, and the merit of visual impact.

Somehow, the knowledge of how to create these relatively complex compositions has been transferred from one Bukharan craftsman to another in such a way that it enabled a change in scale. In other words, the transfer medium cannot have been a physical template; it must have been a knowledge of the design process.

The bronze doors of the Sufi convent of Sultan Baybars al-Jashankir in Cairo feature a composition of nine- and twelvefold star patterns [6.28]. Essentially the composition is the same as the one on the minaret of the Bu 'Inaniyya Madrasa in Fez. The craftsman who made the doors emphasized the bands that create the geometric composition: they are raised from the rest of the door and they are relatively wide. There is relatively little adornment on the door; the wide bands attract the most attention and they give the composition a bold and dense appearance.







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Assembly Pattern Breakdown



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