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THE MUQARNAS DOME: ITS ORIGIN AND MEANING

One of the most original inventions of Islamic architecture is the muqarnas, and one of the most effective and widespread of its applications is without doubt the muqarnas dome or semidome. Brick vaults and domes have been known in the Near East since Sassanian times, if not before, but the dome in muqarnas is a truly Islamic creation without precedent in any civilization. Whether made of wood, stucco, brick, or stone, muqarnas vaults were among the most characteristic features of medieval Islamic architecture from Iran to Spain. It is therefore not surprising that a good number of studies have been dedicated to the description and analysis of this architectural form.¹ What is surprising, however, is that in spite of all these studies such basic problems as origin, chronology, geographic distribution—not to mention meaning—remain unclear and subject to debate. My intention here is to discuss these problems, though not for all types of muqarnas in all periods. I shall limit myself to muqarnas domes and vaults constructed between c. 1050 and c. 1250, that is, to the earliest known examples.

Limiting the scope of the discussion to the earliest known muqarnas domes requires some explanation. My reasons are two. First of all, any attempt to discern meaning in such a common architectural form faces the danger of falling into a morass of overgeneralization unless it is focused in some way.² The problems of interpreting Islamic architecture have been discussed by Oleg Grabar both very recently³ and in a number of earlier essays.⁴ Grabar attributes the disjunction, or at least the weak connection, between form and meaning (or symbol) to the “low symbolic charge” of Islamic architectural forms, a characteristic that ultimately led to “an ambiguous visual system.”⁵ While that conclusion is generally correct, it overlooks the point that certain forms in certain specific times and places had a “high symbolic charge” at the moment of their inception. How long these forms continued to be used with full awareness of their highly charged meaning depended

on a variety of factors, but generally speaking that awareness was lost, and the concomitant debasement of meaningful forms into mere decoration took place, much more quickly in Islam than in other cultures and religions.⁶ It therefore becomes imperative in searching for meaning in any given form of Islamic architecture to begin with the origin of this form and to focus on its earliest development—particularly its first use outside its place of origin.

Because equally early “muqarnas-like” elements have been found in both northeastern Iran and central North Africa, most authorities assume that the muqarnas (and hence the muqarnas dome) either originated in one or the other place or was invented simultaneously in both. Specialists in Iranian architecture postulate a continuous line of development that begins with the tenth-century fragments found near Nishapur and the tripartite squinches of the late-tenth-century Arab Ata mausoleum at Tim, continues with the numerous eleventh-century Seljuq domes, and ends with Ilkhanid and Timurid muqarnas domes and portal vaults.⁷ The problem with this theory is that no direct link can be established between Seljuq domes and Ilkhanid muqarnas domes and portal vaults. Large smooth Seljuq domes which spring from a multipartite squinch zone continue unchanged until well into the Ilkhanid period, as a comparison between the domes of the Great Mosques of Isfahan (1088) and Veramin (1322-26) shows.⁸ Therefore, although the differentiation of the squinch into muqarnas cells does indeed occur first in northeastern Iran, the total muqarnas dome of the Ilkhanid period is not a product of this development and must therefore be attributed to some other source.

As for the North African development, I doubt if the so-called muqarnas fragments discovered at Qal‘at bani Hammad and dated to the late eleventh century are muqarnas at all.⁹ They share no properties with true muqarnas cells, and in any case they could never have been assembled to fill the cavity of a dome or even a

niche. Not by any stretch of the imagination could they have led to the well-known twelfth-century muqarnas vaults in a number of North African mosques.¹⁰ Both northeastern Iran and North Africa therefore have to be eliminated as likely places for the origin of the muqarnas dome.

Another possibility is Iraq, since it has provided us with the earliest example of a fully fledged muqarnas dome in the so-called shrine of Imam al-Dawr, located some twenty kilometers north of Samarra in a village

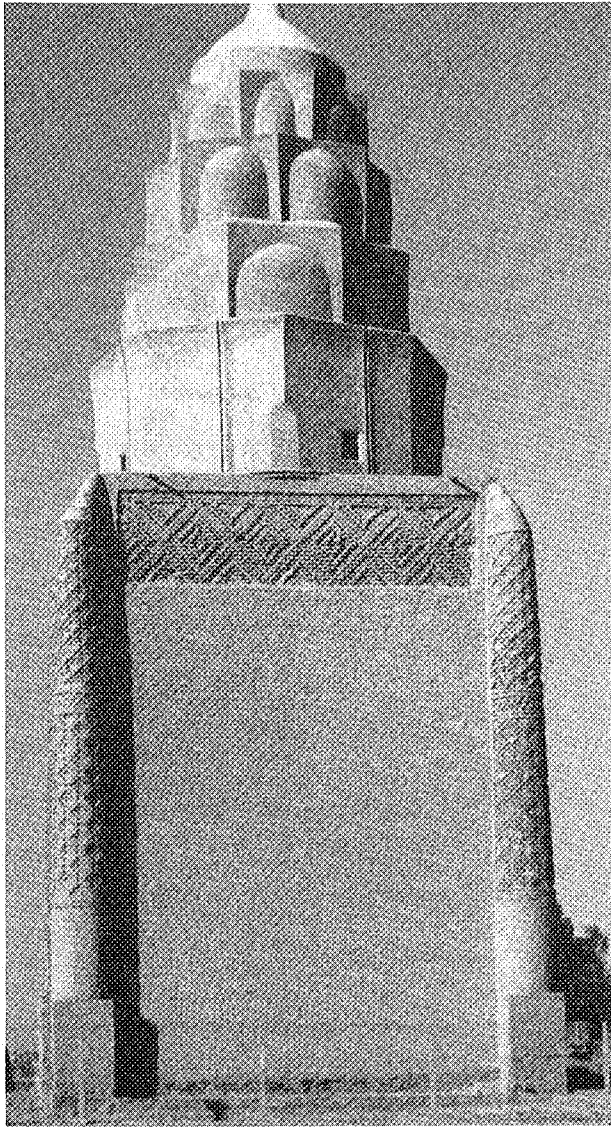


Plate 1. Al-Dawr. Shrine of Imam al-Dawr (1075-90). Exterior. (Unless otherwise stated, all photographs are by the author.)

called al-Dawr.¹¹ It is a shrine dedicated to Imam Muhammad ibn Musa ibn Ja'far, an alleged son of the fifth Shi'ite Imam. It was begun by the 'Uqaylid prince Muslim ibn Quraysh, who died in 1085, and was completed before 1090 by officials of his court.¹² The mausoleum consists of an elongated chamber with tapering walls about twelve meters high and a muqarnas dome almost exactly the same height (plate 1). As an early example of its type, this dome betrays certain affinities with the regular squinch dome. The square of the chamber is transformed into an octagon through the use of large and heavily profiled squinches (plate 2). Eight smaller squinches (or, in fact, large muqarnas cells) rest on this octagon and form an eight-pointed star with four windows. The rest of the dome is made up of three more eight-celled tiers with ever-diminishing cells, each with a 45-degree rotation and a little cupola on top (plate 3).

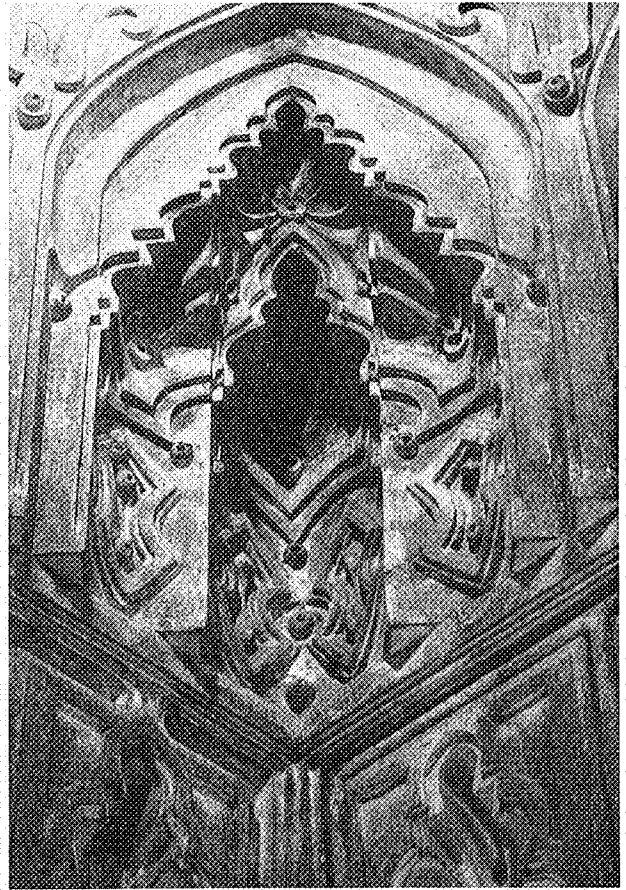


Plate 2. Al-Dawr. Shrine of Imam al-Dawr. Detail of squinch.

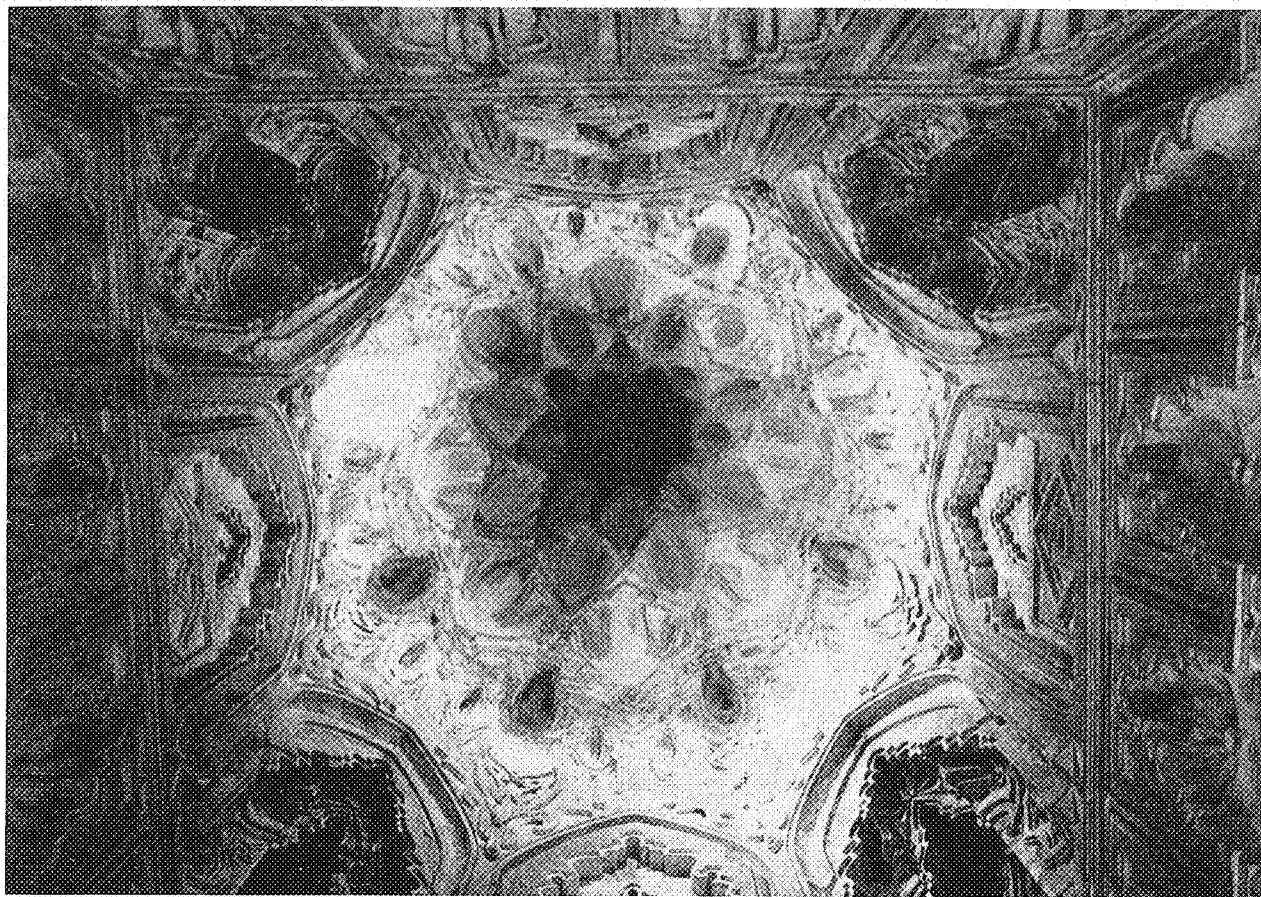


Plate 3. Al-Dawr. Shrine of Imam al-Dawr. Interior of dome.

It would have been quite feasible to build a smooth dome after the squinch zone, but a deliberate choice was made instead to continue the intricate layering of eight-celled muqarnas tiers until the desired height and complexity were reached. Structurally, the effect is to make the dome appear insubstantial, as the play of light on its intricate surfaces dissolves its mass. This visual display, totally missing in Seljuq Iranian domes, is one of the most important features of muqarnas vaults.

This earliest muqarnas dome, appearing as it does in a small village of little historical significance, is unlikely to have been the first of its kind or the model for all later muqarnas domes. First of all, because Islamic architecture prospered mainly in cities, it is in cities that one should look for major innovations. Second, Muslim ibn Quraysh, the patron of the shrine, was in certain respects a vassal of the Abbasid caliph, and despite his Shi'ite inclinations, maintained strong and generally

friendly links with the caliphate.¹³ Third, although no early muqarnas domes are preserved in Baghdad, two miniatures, one dated 873 (1468) and the other 944 (1537) show bird's-eye views of the city with numerous muqarnas domes (plates 4-5). Taken together, these suggest that Baghdad might have been the center in which the muqarnas dome originated. It was certainly a very common feature of the cityscape by the late medieval period.¹⁴

It is curious therefore that the next dated examples of the muqarnas dome are not from Baghdad at all, nor are they from anywhere in Iraq, but come from such diverse places as Damascus, Palermo, Fez, and Tinnis. All date from the twelfth century. Possibly the earliest example is in the mosque of the Qarawiyyin at Fez; it dates from the restoration under the Murabitun (Almoravid) dynasty between 1135 and 1140. The whole axial nave of this mosque is covered by a series of

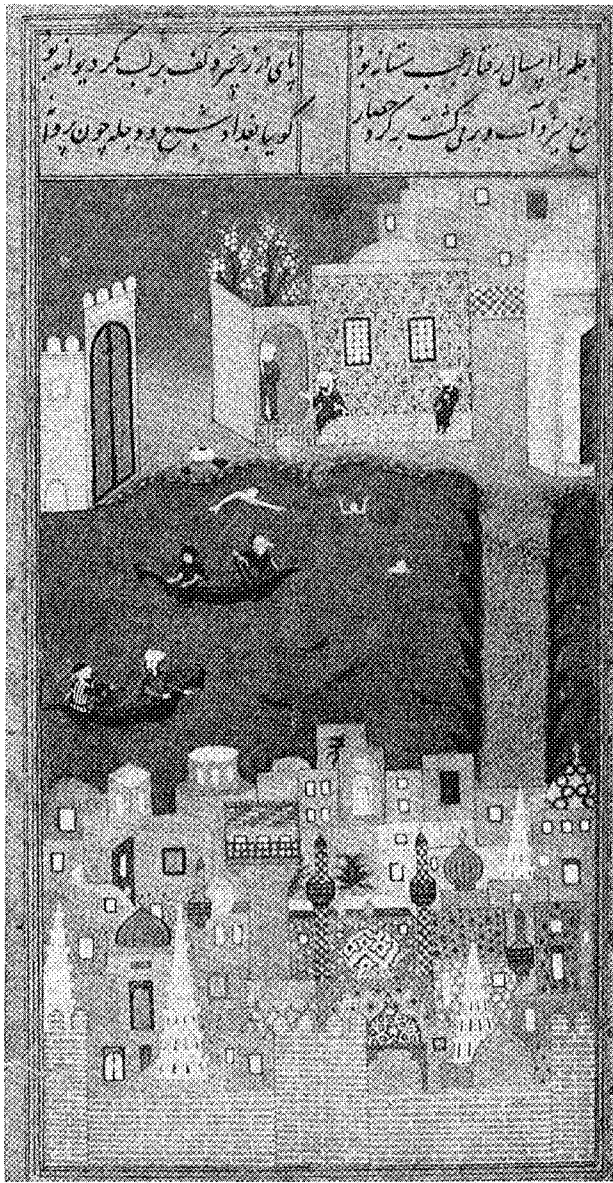


Plate 4. "Flood of Baghdad," from a dispersed Turcoman manuscript (1468). British Library Add. 16561, fol. 60a.

stucco muqarnas vaults of great complexity and excellent execution (plate 6).

The sudden appearance of an architectural form at such an advanced level of development has posed a major problem for architectural historians. Henri Terrasse, who devoted a monograph to the mosque of the Qarawiyyin, asserts that, although earlier examples of the muqarnas exist in Iran, the muqarnas vaults at Fez

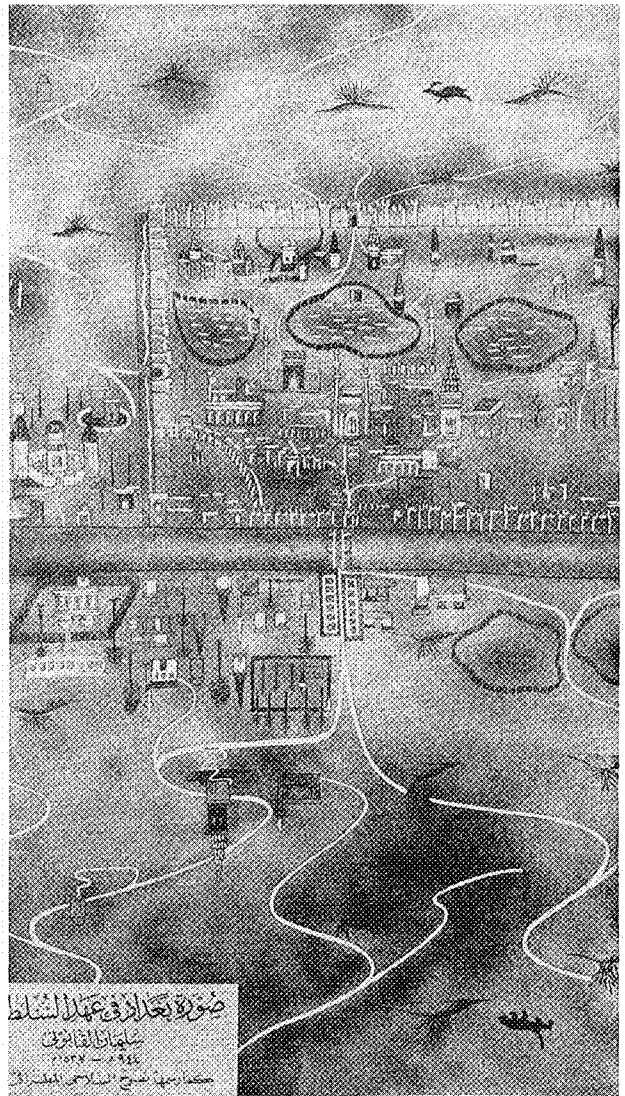


Plate 5. View of Baghdad. Matrakçı, *Beyan-i Menâzil-i Sefer-i İrâkîyn* (1537).

are the earliest of their kind and are therefore the product of local development.¹⁵ This argument can be refuted in part because an earlier example does exist, in the form of the shrine of Imam al-Dawr of 1087 already mentioned. A much closer, though slightly later, parallel can be found in the maristan of Nur al-Din in Damascus, built in 1154.¹⁶ The maristan al-Nuri contains four specimens of muqarnas vaulting used in three different ways: as a portal vault (the earliest of its kind), as a muqarnas dome (plate 7), and as a vault for a niche (plate 8). The similarity between the Fez vaults and

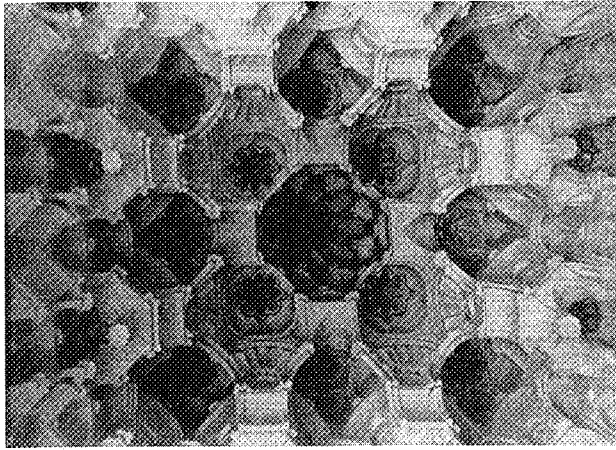


Plate 6. Fez. Mosque of al-Qarawiyyin. Muqarnas vault, 1132-42.
From Terrasse, *Mosquée al-Qaraouyin*, pl. 32.

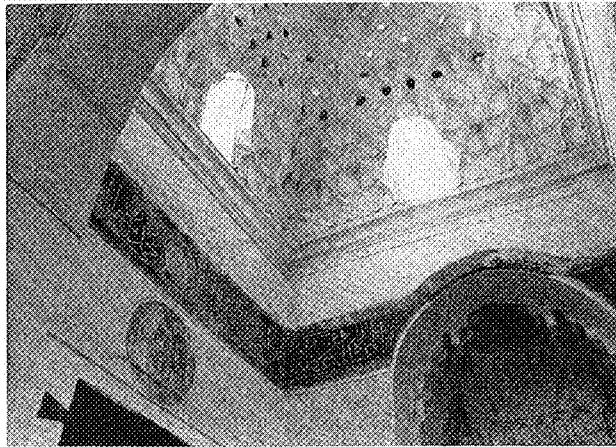


Plate 7. Damascus. Maristan al-Nuri (1154). Dome over the vestibule.

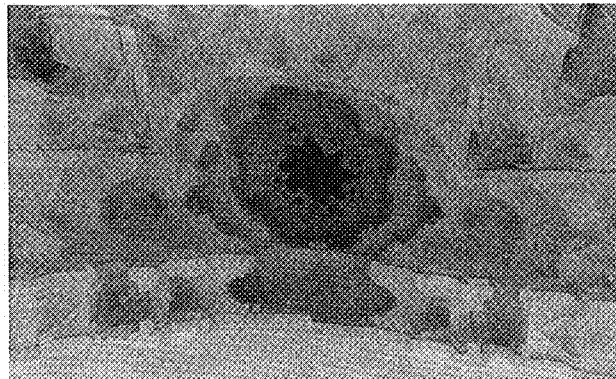


Plate 8. Damascus. Maristan al-Nuri. Vault over niche.

those of the maristan (especially the two niches) is quite clear (cf. plates 8 and 6). These vaults are also made of stucco and serve no structural purpose—they are merely suspended by a wooden framework from the load-bearing vault above them. They are equally intricate, and they both contain pendants and terminate in eight-pointed stars. The muqarnas vaults of the maristan, like other features in it, such as its co-axial four-iwan plan, reflect Iraqi influence.¹⁷ It is reasonable to suggest, therefore, that the vaults of the mosque of the Qarawiyyin are not a local development but rather a direct import from Baghdad.

By far the largest number of independent muqarnas domes are found in Iraq and the Jazira, over an area extending from Basra and Khuzistan in the south to Mosul and Raqqa in the north (fig. 1). The majority of these shrines are dated, or datable to, between the middle of the twelfth century and the Mongol invasion,¹⁸ a period of great building activity in Iraq and the Jazira. A preliminary typology, largely based on building material and construction method, of the more than twenty shrines known to me can yield the essential features of the muqarnas dome.

The first, but least common, type in Iraq is the vault made of stucco and suspended from the exterior vault above it by a wooden framework. This is the method found in the maristan al-Nuri and the mosque of the Qarawiyyin (plates 6-8), and it later became extremely popular in North Africa and Spain.

The second type, which became most common in Iraq, is made of brick and consists of a single shell: it is the only type in which the interior articulations of the muqarnas are reflected on the exterior. The shrine of Imam al-Dawr illustrates its earliest manifestation, but it is not really typical of later, more developed examples. Its cells are too large to suggest a true muqarnas, even though their multiple profiling was meant to convey that impression. In addition, the cells spring only from the corners of the octagon, in contrast to later instances where they spring from the walls as well. Three outstanding examples of this type are the mausoleum of Nur al-Din in Damascus, the shrine of Zumurrud Khatun in Baghdad, and a little-known shrine called al-Najmi in south Iraq.

The mausoleum of Nur al-Din, dated 567 (1172), is part of a larger complex which includes a madrasa and a masjid.¹⁹ Unlike its prototype at the maristan of Nur al-Din, which is made of stucco, the muqarnas dome over this shrine is made of brick, and its interior articulation is reflected on the exterior (plate 9).²⁰ The

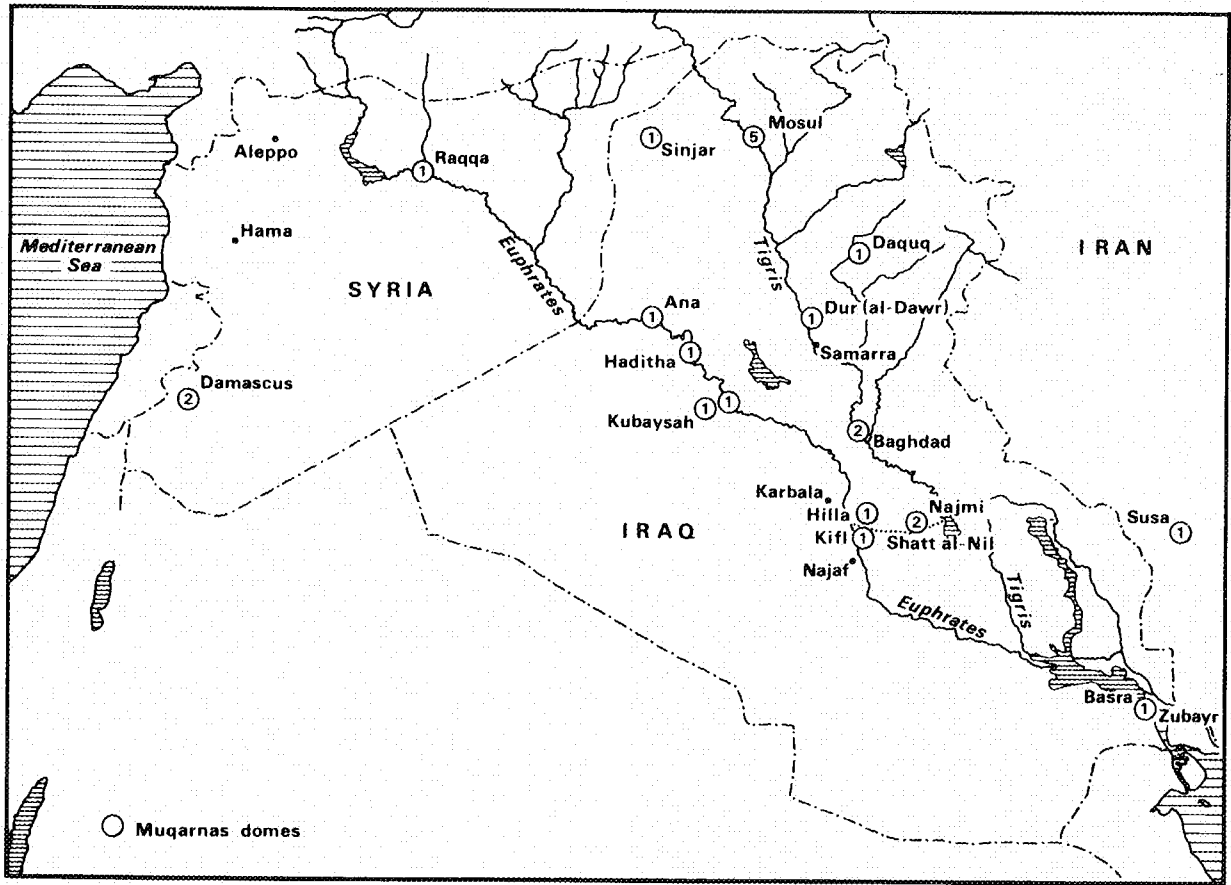


Figure 1. Muqarnas domes in Iraq and Syria.

dome springs from a square base which is divided into twelve parts: four tiny squinches and eight small muqarnas columns (plate 10). The muqarnas columns support the central portion of the four sides which consist of three tiers of corbeled muqarnas cells. In the second zone the middle sections taper upward to resemble a trapezoid with considerable horizontal projection; the one-cell squinches expand into two, three, and finally four cells (plate 11). By the third zone, the square base changes into an irregular octagon formed by the shrunken middle sides and the expanded squinches. This zone contains four axial windows, the lowest of them on the exterior. In the fourth zone, the octagon is transformed into an approximately uniform circle of twenty elements. Ten intersecting arches in the fifth zone reduce the number of the cells to ten, and a little scalloped dome of ten elements rests on this drum. The drum also contains ten tiny windows. Thus, by using

extremely unobtrusive squinches in combination with corbeled muqarnas cells, it was possible to move gradually and almost imperceptibly from the square to the octagon to the circle.

The shrine of Zumurrud Khatun in Baghdad has the most graceful profile and one of the most integrated interiors among the monuments of its kind (plate 12).²¹ One reason for the success of this dome is that its base is octagonal; that is, half the transition has already been made. Above an extremely unobtrusive squinch zone (plate 13), the octagonal base is transformed into a muqarnas dome of sixteen cells. Seven tiers of sixteen cells make up the majority of the dome; their number is cut to ten in the last three tiers (plate 14). Each cell contains a tiny opening covered by thick glass.

More interesting than either of these two domes is the ruined shrine of al-Najmi, located on a once major canal called Shatt al-Nil in what is today a desolate salt

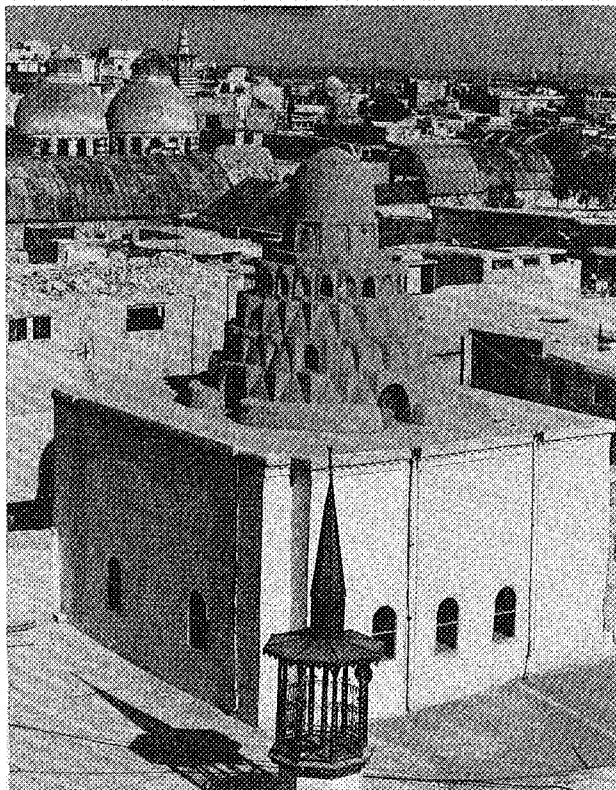


Plate 9. Damascus. Madrasa al-Nuriyya al-Kubra (1172). Mausoleum of Nur al-Din. Exterior.

desert.²² Although poorly preserved, enough has survived to reconstruct it as a tall muqarnas dome with an especially large span, around a hundred meters square (plate 15). This feat was accomplished by the use of large triangular cells and brackets skillfully arranged in such a manner as to form corner squinches which alternate with four muqarnas pendentives, one in the middle of each side (plate 16). In this manner, the square base is gradually transformed into a forty-part base which begins just above a zone of eight windows. The conical part of the dome would have begun just above this base.

The third type of Iraqi muqarnas has an exterior pyramidal roof and is made of fired brick. In the earliest examples, the pyramidal roof was usually covered by green-glazed tiles; traces of revetment are still visible in the shrine of Yahya Abu'l-Qasim.²³ This type is restricted to Mosul, where it seems to have developed around the beginning of the thirteenth century under the influence of Baghdad.²⁴ Five examples are pre-

served there; the finest of them is the shrine of Imam 'Awn al-Din (plate 17).²⁵ The design of this dome is more precise and rigorous than that of the Baghdad examples or even of the mausoleum of Nur al-Din, which it otherwise resembles, perhaps because muqarnas cells are faced with tiny color-glazed tiles, a feature unique to Mosul. As in the mausoleum of Nur al-Din the gradual transition from the square to the octagon is made by the use of muqarnas squinches and small muqarnas colonnettes. Here, however, the squinches are themselves turned into tiny muqarnas domes which end in eight-pointed stars (plate 18). Above the octagonal zone, the dome is further divided into sixteen cells; the number is reduced to eight in the last two tiers (plate 19), producing a large eight-pointed star in the middle surrounded by four small eight-pointed stars. This ingenious and pleasing design is imitated and further developed in the shrine of Shaykh 'Abd al-Samad at Natanz.²⁶

All these muqarnas domes share some basic features: (1) they are made of small but distinct cells; (2) their squinches, colonnettes, and other structural features are obscured; (3) layers of stucco, paint, or glazed tiles are often used to embellish the cells, and (4) windows are used frequently, though of course in a double-shell design they are only possible at the base of the dome.

Having established the origin and the geographic and temporal distribution, typology, and basic features of the muqarnas dome, it is reasonable to inquire into its *raison-d'être*. What led the Muslim architect in this period to abandon the smooth hemispherical dome with its age-old symbolic associations and take up this fragmented conical vault? What meanings were intended which differed from those inherent in the hemispherical dome, and how did this new form carry these meanings? We know that the form may have originated in Baghdad sometime in the early eleventh century, that it very rapidly spread to Syria and North Africa, and that it was used first as a funerary monument and later in mosques, hospitals, fountains,²⁷ and even palaces.

To my knowledge, the only explanation that has been offered is that provided by Oleg Grabar for certain muqarnas domes in his book on the Alhambra. Grabar's interpretation is not derived from the form of the muqarnas itself, but rather rests on evidence external to it: water symbolism, Koranic and poetic inscriptions, and poems written in praise of the muqarnas domes of the Alhambra.²⁸ From this evidence, Grabar comes to the conclusion that the Abencerrajes and the Hall of the

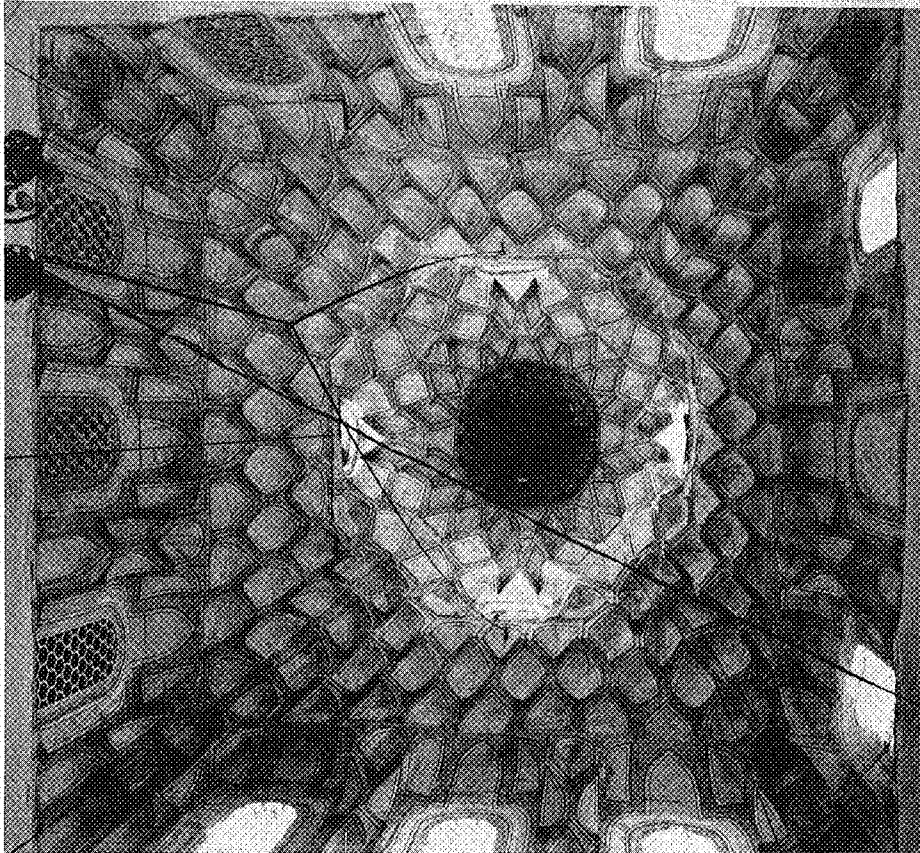


Plate 10. Damascus. Madrasa al-Nuriyya al-Kubra. Dome over mausoleum. Interior.

Two Sisters represent rotating domes of heaven.²⁹ This plausible but specific interpretation tempts one to work backward using similar, though scantier, evidence to interpret earlier muqarnas domes in the same manner. There are, however, two difficulties in this approach: first, since it is based on external, and often unavailable, evidence it can be used to explain some muqarnas domes but not the phenomenon in general. Second, since any dome can be a dome of heaven it does not really tell us why a muqarnas dome was used.

To avoid these objections I chose an approach that was exactly the opposite of Grabar's and sought the meaning of the form in the form itself. I started with the premise that subdividing matter into tiny interrelated segments implied a certain attitude toward matter, or, more specifically, that the division of a dome into segments implied a certain conception not just of the dome but of its referent, the universe.

Muslim philosophers and theologians devoted considerable thought to the nature of matter and the universe and their relationship with God. The Aristotelian concept of an eternal cosmos was rejected by most Muslim theologians from the first because it contradicted the Islamic conception of God as the only absolute and eternal. From very early on and "with hardly a single exception, the Muslim theologians accepted the atomic view of matter, space and time and built upon it a theological edifice over which God presided as absolute sovereign."³⁰ Accordingly, matter was neither eternal and immutable nor infinite in composition, but rather composed of particles which cannot be divided any further: *al-juz' alladhi lā yatajazza'*.³¹ The Ash'arites of the tenth and eleventh centuries, in particular al-Baqillani (d. 1013), modified this atomistic theory into one of strict occasionalism—that is, a theory of atoms and accidents (*a'radh*, pl. of *'ardh*). Al-Baqillani

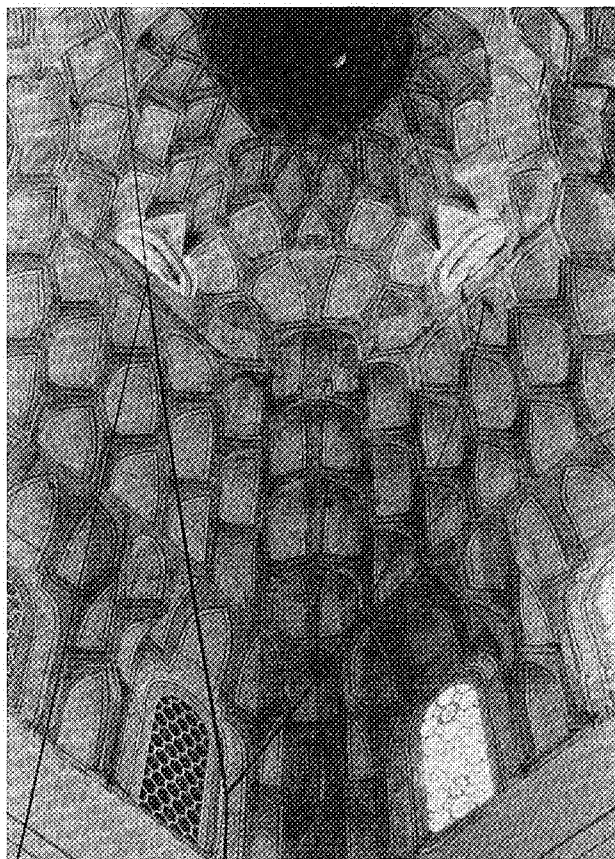


Plate 11. Damascus. Madrasa al-Nuriyya al-Kubra. Dome over mausoleum. Detail of corner.

argued that the world, which to him was everything other than God, was composed of atoms and accidents; accidents could not endure within matter (*jawhar*) for longer than an instant, but were continuously being changed by God.³² It follows then that the attributes of matter (color, luminosity, shape, etc.) are transitory accidents which change according to the will of God and that even the preservation of matter—the collocation of its atoms—requires the continuous interference of God. This was a solid argument for the existence of God as the only creator, for since such a world was created and is continually being created, then it must by necessity have a creator.³³

I would like to suggest that the muqarnas dome is an architectural manifestation of this thoroughly orthodox Islamic concept. Its likely origin in Baghdad in the early eleventh century coincides well with the triumph of the atomist-occasionalist view of the universe as formulated

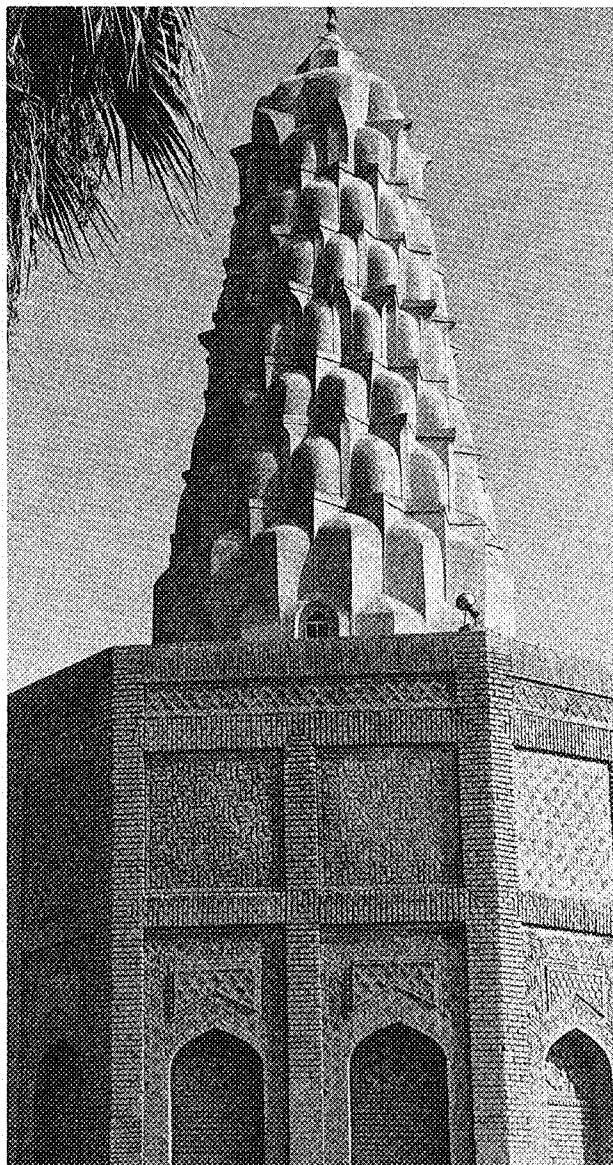


Plate 12. Baghdad. Shrine of Zumurrud Khatun (1180-1220). Exterior.

by al-Baqillani and supported by Caliph al-Qadir (991-1031).³⁴ It must have become obvious to al-Qadir, or a mathematician-architect in his court, that the usual smooth dome which rests on squinches could no longer express this truly new Muslim view of the universe: it was too solid and continuous; its particles were imperceptibly small; and it was visibly supported by squinches.³⁵ To reflect an occasionalist view of the

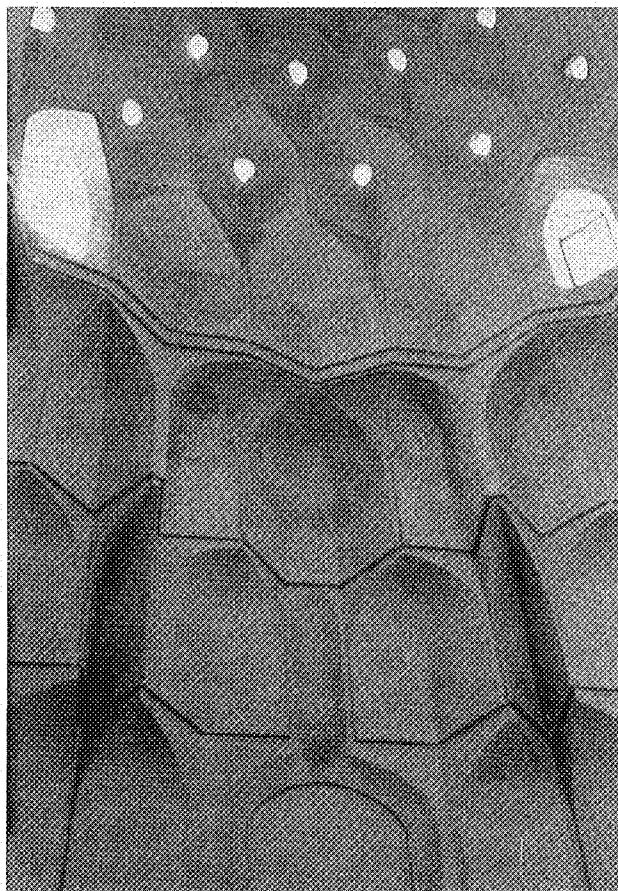


Plate 13. Baghdad. Shrine of Zumurrud Khatun. Springing of dome.

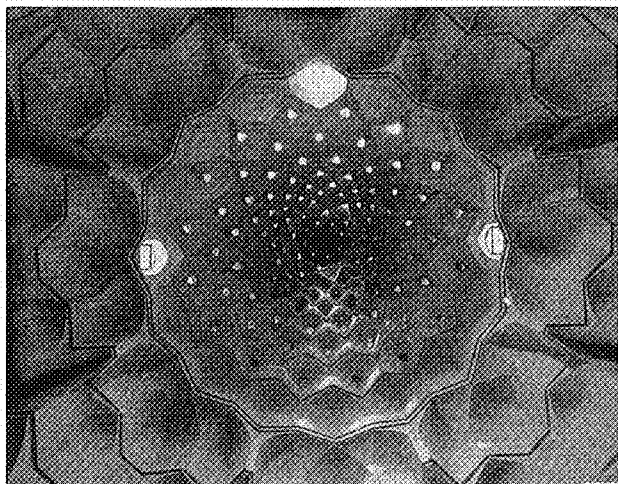


Plate 14. Baghdad. Shrine of Zumurrud Khatun. Interior.

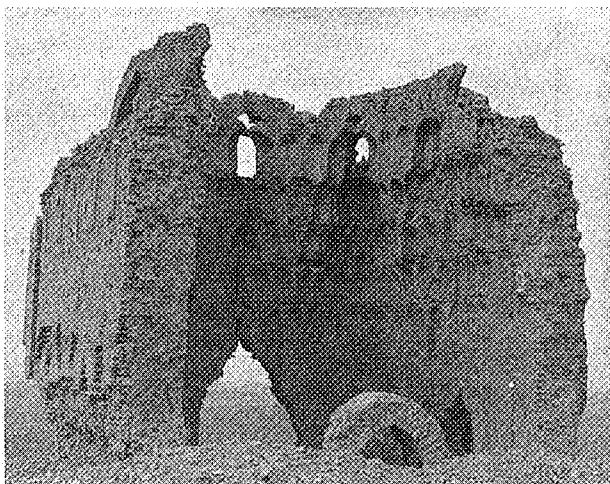


Plate 15. Shatt al-Nil. Shrine at al-Najmi. Exterior.

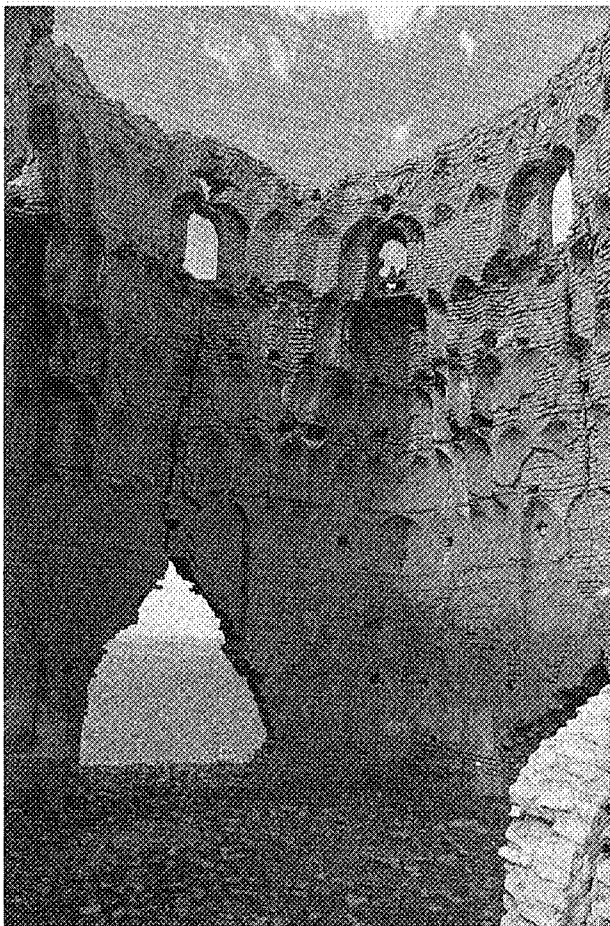


Plate 16. Shatt al-Nil. Shrine at al-Najmi. Detail of muqarnas.

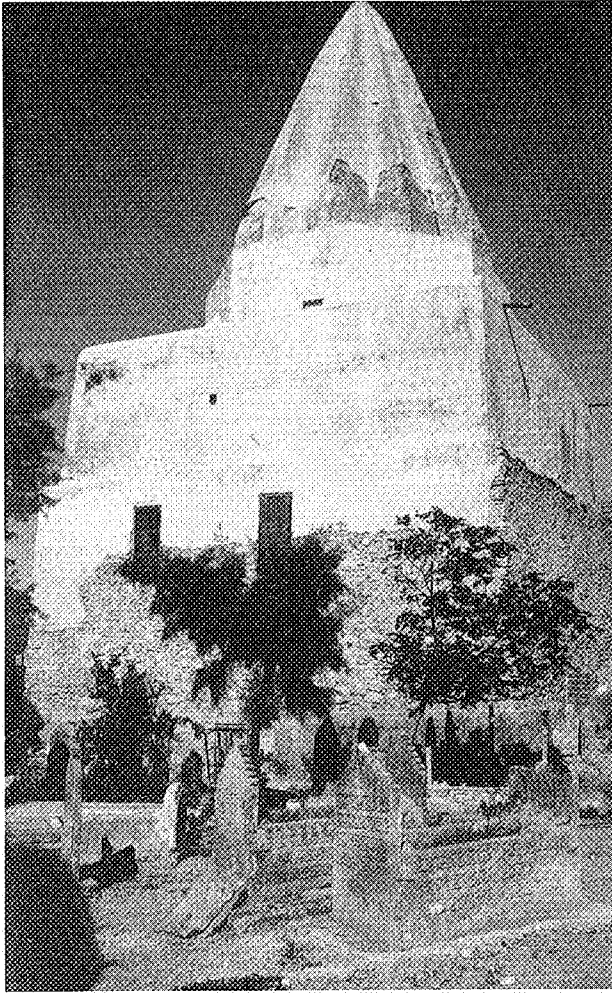


Plate 17. Mosul. Shrine of Imam 'Awn al-Din (1245). Exterior.

universe, the dome would have to be divided into small but distinct units arranged in a complex manner, and (like the universe) supported and kept whole by the will of God—thus the deemphasis of the squinches, clearly the work of man, a feature common to all muqarnas domes. In fact, the earliest muqarnas in northeastern Iran was nothing more than the division of the squinch zone into three or more parts, undoubtedly in order to deemphasize its structural appearance. The dome, like heaven, had to stand unsupported: “*khalāqa al-samāwāt bi-lā 'imād*” (Koran 31:10).

The muqarnas cells of many of these domes were painted, and windows were frequently and effectively used. This is nowhere truer than in the muqarnas

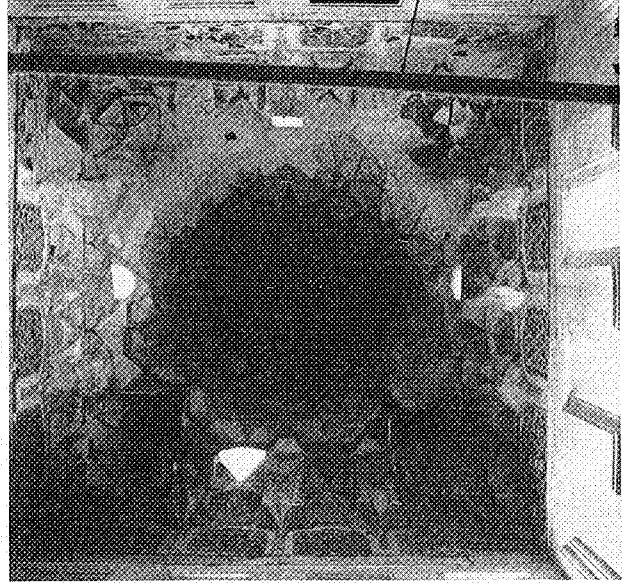


Plate 18. Mosul. Shrine of Imam 'Awn al-Din. Interior of dome.

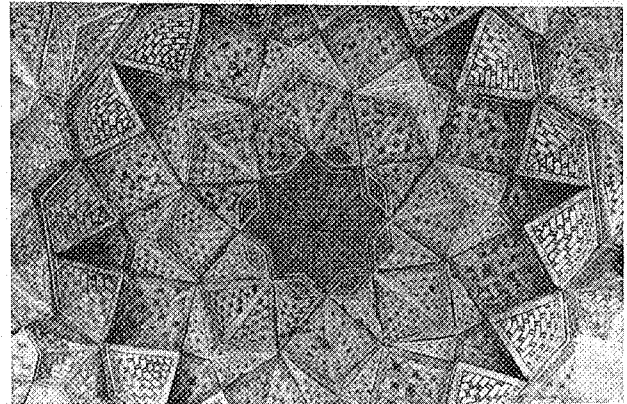


Plate 19. Mosul. Shrine of Imam 'Awn al-Din. Upper zone of dome.

domes at Imam 'Awn al-Din and of course the Alhambra. According to Grabar, the changing sun- and moonlight were intended to give the impression of a rotating dome of heaven, a view which is supported by Ibn Zmarak's poem inscribed in the halls of the Abencerrajes and the Two Sisters.³⁶ This is perhaps a secondary meaning that became attached to the muqarnas dome in its three centuries of evolution, but it was not the original intention. Rather the effect of light on

these intricate painted surfaces was meant to reflect certain very important Asha'ri concepts, namely that shape, color, and luminosity are accidents which by definition are subject to continuous change according to the will of God. The dome is therefore not just a physical manifestation of the occasionalist universe, but also a proof of the existence of a God Who can keep this seemingly unsupported, perishable, and ever-changing dome from collapsing, just as He can keep the universe from destruction.³⁷

The muqarnas dome should therefore be viewed not merely as a decorative device to fill some of the space left vacant by the Muslim injunction against religious images, but rather as a uniquely Islamic solution firmly grounded in the theology of its time. Although undeniably decorative—and in later periods admittedly used solely for decoration—at the time of its creation and up to the time of the Alhambra that was not its primary purpose. Neither could it have been the product of mathematical or architectural experimentation alone. Mathematics and architecture were simply the tools used to flesh out a major theological concept about the nature of the universe and its relationship to God. That the occasionalist concept permeated Islamic culture can be seen in the parallel developments of the eleventh and twelfth centuries in architectural ornament (the arabesque and overall star patterns)³⁸ and even in music (increasing embellishment around a common mode)³⁹ that are also explainable in terms of occasionalist concepts.

Conceived in these terms, the manifold functions of the muqarnas dome and its quick westward spread cease to be mysteries. Although it was a form deeply rooted in theology, it had no specific liturgical associations and could therefore be used in both religious and secular contexts to enhance the sanctity of the precinct and induce meditation. Its almost immediate appearance in Syria and North Africa can also be explained in both religious and political terms. On the religious level, the muqarnas dome was adopted by the rising Sunni forces of Syria and North Africa in the persons of Nur al-Din and al-Murabitun respectively. Doubtless it was used with full awareness of its theological associations, whether as a mausoleum for the martyr (*al-shahīd*) Nur al-Din or as vaulting for the axial nave and mihrab dome of some North African congregational mosques. On the political level, the muqarnas dome provided a formal link with the Abbasid caliphate, the heartland of orthodoxy and source of legitimation.⁴⁰

The importance of Baghdad, a city of vanished splendor, to this development cannot be overestimated. As Herzfeld wrote, "One must not underrate Baghdad, seat of the caliphate and one of the seats of the Seljuk sultanate and a cultural center down to its conquest by Hulagu in 656 H. (A.D. 1258). To underrate Baghdad is to underrate Rome."⁴¹

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NOTES

1. I would like to express my thanks to Professors Oleg Grabar and Wolfhart Heinrichs for their helpful comments on this paper. I am also indebted to Professor Heinrichs for his remarks on the influence of atomism on Islamic literature. The already large literature on the muqarnas and on the problem of geometry in Islamic architecture increases daily, but only a small portion of it deals specifically with the muqarnas dome. One of the earliest historical analytical studies of the muqarnas in general is by J. Rosenthal, *Pendentifs, trompes et stalactites dans l'architecture orientale* (Paris, 1928). Much more important are the short studies by Ernst Herzfeld on a number of muqarnas domes in Iraq, Iran, and Syria, published in sections of volume 2 of F. Sarre and E. Herzfeld, *Archäologische Reise im Euphrat und Tigris Gebiet*, 4 vols. (Berlin, 1911-1914); and Ernst Herzfeld, "Damascus: Studies in Architecture, I," *Ars Islamica* 9 (1942): 10-40. Michel Écochard, *Filiation de monuments grecs, byzantins et islamiques: une question de géométrie* (Paris, 1977), includes a chapter on brick and stucco muqarnas vaults with numerous analytical drawings. The only book so far published on the muqarnas domes of Iraq is 'Atṭa al-Hādīthī and Hanā' 'Abd al-Khāliq, *al-Qibāb al-Makhrūṭiyya fi'l-'Iraq* (Baghdad, 1974). Although useful as an inventory and for some factual information, the book is marred by poorly reproduced photographs.
2. For example, Titus Burckhardt, *Art of Islam; Language and Meaning* (World of Islam Festival Trust, 1976), and Nader Ardalan and Laleh Bakhtiar, *The Sense of Unity: The Sufi Tradition in Persian Architecture* (Chicago, 1973). See also a review of these works and others in the same genre by Oleg Grabar, "Reflections on the Study of Islamic Art," *Muqarnas* 1 (1983): 25-32.
3. Oleg Grabar, "Symbols and Signs in Islamic Architecture," in *Architecture and Community: Building in the Islamic World Today*, ed. Renata Holod (Millerton, N.Y., 1983), pp. 25-32.
4. Idem, "Islamic Art: Art of a Culture or Art of a Faith," *AARP* 13 (1978): 1-6, and "Das Ornament in des Islamischen Kunst," *Zeitschrift der Deutschen Morgenländischen Gesellschaft*, Suppl. 3 (1977).
5. Grabar, "Symbols and Signs," p. 27.
6. R. Stephen Humphreys, "The Expressive Intent of Mamluk Architecture of Cairo: A Preliminary Essay," *Studia Islamica* 35 (1972): 69-119. Although it deals with Mamluk architecture as a case study, the methodological discussion in this paper is very useful for all efforts at architectural interpretation.

7. The Nishapur fragments were first published by Charles K. Wilkinson et al., "The Museum's Excavation at Nishapur," *Bulletin of the Metropolitan Museum of Art* 33, pt. 2 (1938): 9 ff. Most recently, Ulrich Harb in *Ilkhamidische Stalaktitengevoelbe: Beiträge zu Entwurf und Bautechnik* (Berlin, 1978), p. 16, reiterated the same theory about the origin and development of the muqarnas in Iran without referring to Iraq. Another commonly accepted view is the one expressed by Oleg Grabar in *The Alhambra* (Cambridge, 1978), p. 175, that "the origins of the muqarnas lie in the almost simultaneous, but apparently unconnected, developments in northeastern Iran and central North Africa." See also idem, "The Visual Arts," in *Cambridge History of Iran*, vol. 4, *From the Arab Invasion to the Saljuqs* (Cambridge, 1975), p. 344-45.
8. Compare figures 247 and 338 in John Hoag, *Islamic Architecture* (New York, 1977).
9. These fragments have been published by Lucien Golvin in *Recherches archéologiques à la Qal'a des Banū Hammād* (Paris, 1965), pp. 125-27. Golvin reconstructs these fragments as bundles of pendants which decorated the corners of a ceiling (fig. 40). In a later work, *Essai sur l'architecture religieuse musulmane*, vol. 1, *Généralités* (Paris, 1970), pp. 157-59, he states that the earliest muqarnas may be found in Iran, although the chain of transmission to the Maghrib is incomplete. This being the case, Golvin concludes that, until we are better informed, the first appearance of muqarnas vaulting must be placed in Qal'at Bani Hammad. See also Henri Terrasse, *La Mosquée al-Qaraouiyyin à Fez* (Paris, 1968), pp. 31-32. Terrasse agrees with Golvin that the Qal'fa fragments came first and led to the developments of the twelfth century.
10. Several North African mosques were built or restored in this period with one or more muqarnas domes over the mihrab and the axial nave. Among them are the Great Mosque at Tlemcen, 1136 (Hoag, *Islamic Architecture*, fig. 124); the Qarawiyyin mosque at Fez, 1132-42 (Terrasse, *Mosquée al-Qaraouiyyin*, pls. 28-37); the Great Mosque at Tinmal, 1154; the mosque of al-Kutubiyya at Marrakesh, 1162 (Hoag, *Islamic Architecture*, fig. 133); and the somewhat earlier so-called Almoravid Qubba (1107-43) at Marrakesh. Although not quite a muqarnas dome, the Qubba nevertheless contains two tiers of highly ornamented squinches which resemble those in the shrine of Imam al-Dawr (ibid., fig. 2). See Richard Parker, *A Practical Guide to Islamic Monuments in Morocco* (Charlottesville, Va., 1981), pls. 10-12.
An astonishing use of a large muqarnas vault is displayed in the Palatine chapel at the Norman palace in Palermo, built in 1142. See U. Monneret de Villard, *Le Pitture musulmane al soffitto della Cappella Palatina in Palermo* (Rome, 1950), and Annabelle Simon-Cahn, "Some Cosmological Imagery in the Decoration of the Ceiling of the Palatine Chapel in Palermo," Ph.D. diss., Columbia University, 1978. This Christian monument poses some problems for my interpretation of the muqarnas dome as a form with well-established orthodox Muslim associations, especially since it employs a muqarnas vault with figural paintings on its cells. The Cappella Palatina is, in my opinion, a monument that reflects on the most general level the confluence of three architectural strains: Romanesque, Byzantine, and Islamic.
11. Herzfeld, "Damascus, I," pp. 18-22 with plan and section; and Hadithi and 'Abd al-Khaliq, *al-Qibab al-Makhrutiyya*, pp. 19-26.
12. This information is given in some detail in five inscriptions placed within star-shaped panels located on the inner walls. See Hadithi and 'Abd al-Khaliq, *al-Qibab al-Makhrutiyya*, pp. 20-21, for their transcription.
13. Khāshī' al-Ma'ādhi, *Dawlat banī 'Aqīl fi'l-Mawṣil* (Baghdad, 1968), pp. 75-79 and 105-07, for the biography of Muslim ibn Quraysh and his connection with the Abbasids and the Fatimids. The sources consulted by the author suggest that the Shi'ism of the Uqaylids had strong political and ethnic components. Politically the Uqaylids used their Shi'ism to keep in favor with the Fatimids while at the same time, by virtue of their geographic proximity, remaining close to the Abbasids. Ethnically, the Uqaylids stood for the independence of the Abbasids and other Arab dynasties against the Daylamite Persians and the Seljuq Turks.
14. The dome placed over the shrine of Imam Abu Hanifa in Baghdad by Sharaf al-Dawla, the finance minister of Alp Arslan, in 459 (1064-65) may have been a very early muqarnas dome. It is described in Ibn al-Jawzī, *al-Muntazam fi Tārīkh al-Mulūk wa'l-Umam* (Hyderabad, 1940), 8:245-46, as having been tall and well built. It is illustrated in Matrakçı, *Beyan-i Menāzil-i Sefer-i 'Irākeyn-i Sultān Süleymān Hān*, ed. H. Yurdaydin (Ankara, 1976), folio 53b. Two independent shrines are shown in the miniature, one octagonal with a hemispherical dome and the other square with a conical muqarnas dome. No further information is provided in the text.
15. Terrasse, *Mosquée al-Qaraouiyyin*, pp. 31-32.
16. Herzfeld, "Damascus, I," pp. 2-11. See also Yasser al-Tabbaa, "The Architectural Patronage of Nur al-Din, 1146-1174," Ph.D. diss., New York University 1982, pp. 100-02.
17. Al-Tabbaa, "Architectural Patronage," pp. 103-06.
18. For the dating of these shrines, see Hadithi and 'Abd al-Khaliq, *al-Qibab al-Makhrutiyya*, passim, where the authors attempt to date the undated shrines by comparing them with the firmly dated ones.
19. Herzfeld, "Damascus, I," pp. 11-14, and al-Tabbaa, "Architectural Patronage," pp. 125-29.
20. This is not the case with the maristan's dome, which originally was smooth on the exterior. See Jean Sauvaget, "Notes sur quelques monuments musulmans de Syrie à propos d'une étude récente," *Syria* 24 (1945), fig. 1, which shows the exterior of the dome before its faulty restoration.
21. Sarre and Herzfeld, *Archäologische Reise*, 2:173-79.
22. Ibid., p. 239.
23. Hadithi and 'Abd al-Khaliq, *al-Qibab al-Makhrutiyya*, pp. 51-57.
24. There are no muqarnas domes in Mosul that can be dated to the twelfth century. The shrine of Imam 'Abd al-Rahman, which was built by the atabek Mas'ud ibn Mawdud (1180-93), is conical on the exterior but smooth on the interior. The only dated examples—the shrines of Imam Yahya ibn al-Qasim and Imam 'Awn al-Din—are both from the reign of Badr al-Din Lu'lu' (1222-59).
25. Hadithi and 'Abd al-Khaliq, *al-Qibab al-Makhrutiyya*, pp. 63-66; Herzfeld, "Damascus, I," p. 37; and Sarre and Herzfeld *Archäologische Reise*, 2:263.
26. The shrine of Shaykh 'Abd al-Samad at Natanz was built by Uljaytu (1304-17) under Iraqi influence. Uljaytu had already commissioned one muqarnas dome in Iraq for the shrine of Dhu'l-Kifl (Ezekiel) at al-Kifl before the Natanz shrine. Ul-

- jaytu had the shrine rebuilt with a muqarnas dome and with a minaret adjacent to it, undoubtedly to emphasize its change from a Jewish to a Muslim sanctuary. The Natanz shrine, however, resembles, not the Kifl shrine, but the shrine of Imam 'Awn al-Din at Mosul. The points of similarity are the double-shell design, the exterior pyramidal roof with blue glazed tiles, and squinches that end in eight-pointed stars. The main difference is that the Natanz shrine has a cruciform plan, whereas 'Awn al-Din has the usual square one. There is, however, one muqarnas dome in Iraq with a cruciform plan, the so-called mashhad al-Shams at al-Hilla. See Hadithi and 'Abd al-Khalīq, *al-Qibab al-Makhrutiyya*, pp. 81-83, and Herzfeld, "Damascus, I," pp. 29-30 and 38. See also Sheila Blair, "The Shrine Complex at Natanz, Iran," Ph.D. diss., Harvard University, 1980.
27. I know of three twelfth-century instances of a water fountain emanating from a muqarnas niche: the first (now almost totally destroyed) in the west iwan of the madrasa al-Nuriyya al-Kubra (1172); the second in the Ziza palace outside Palermo (1180); and the third in the north iwan of the palace of al-Aziz Muhammad in the citadel of Aleppo (c. 1220).
 28. Grabar, *Alhambra*, pp. 144-48.
 29. Ibid, p. 147.
 30. Majid Fakhry, *A History of Islamic Philosophy*, 2d ed. (New York, 1983), p. 33.
 31. See *Encyclopaedia of Islam*, 2d ed. (henceforth *EI²*), s.v. "Djuz'."
 32. Fakhry, *Islamic Philosophy*, pp. 209-11; in *EI²*, s.v. "Djawhar"; Francis E. Peters, *Allah's Commonwealth* (New York, 1973), pp. 486-88.
 33. Fakhry, *Islamic Philosophy*, p. 211, and Abu Bakr al-Bāqillāni, *Kitāb al-Tahdīd* (Beirut, 1957), p. 18.
 34. For a brief history of Caliph al-Qadīr, see *EI²*, s.v. "al-Kādir Bi'llah"; Peters, *Allah's Commonwealth*, pp. 589-91; and George Makdisi, "The Sunni Revival," in *Islamic Civilization, 950-1150*, ed. D. S. Richards (Oxford, 1973), pp. 15-57.
 35. There are some indications in the sources that in the late tenth century Sunnis of Khurasan were creating new ceremonies and erecting new monuments (*qibāb*) designed to be counterparts to those of the Shi'is; see Makdisi, "Sunni Revival," p. 156, and Ibn al-Jawzī, *al-Muntazam*, 7:265-66.
 36. Grabar, *Alhambra*, pp. 146-48.
 37. Perhaps the first scholar to address the question of atomism in relation to the aesthetics of Islamic art was Louis Massignon in "Les Méthodes de réalisation artistique des peuples de l'Islam," *Syria* 2 (1924): 47-53, and 149-60, esp. pp. 50-53. His ideas were in part followed up by Bishr Farès in *Essai sur l'esprit de la décoration islamique* (Cairo, 1952). In the recent Istanbul conference entitled "The Common Principles, Forms and Themes of Islamic Art" (April 18-22, 1983) a presentation by Ali Louati, entitled "Khawātir ḥawl al-Wiḥda al-Jamāliyya li'l-Turāth al-Fanni al-Islāmi," suggested that Ash'arite atomism permeated Islamic artistic, architectural, and urban aesthetics in all periods and places. While his paper represents an advance over preceding work, it too overgeneralizes. It would be difficult—to give two examples far apart in time and space—to apply atomistic philosophy either to the austere architecture of the Ayyubids of Aleppo or to the naturalistic art and symbolic architecture of the Mughals of India.
 38. The best study on arabesque ornament is Ernst Kühnel, *The Arabesque*, trans. Richard Ettinghausen (Graz, 1976). The earliest examples of true arabesque occur in Fatimid Egypt, on both architecture and especially wooden objects. But its greatest development occurs under the Rum Seljuqs in Anatolia and the Ayyubids in Syria.
 39. Massignon, "Méthodes," pp. 154-58. At the Istanbul conference (above n. 37) the ethnomusicologist Mahmoud Guettat (of the Institute for Music at Tunis) dealt with improvisation and embellishment in Islamic Tunisian music. The situation in literature is not so clear, since characteristics that might be called "atomistic" are already present in pre-Islamic poetry. The problem has been discussed by G. von Grünebaum, "The Spirit of Islam as Shown in Its Literature," in *Islam: Essays in the Nature and Growth of a Cultural Tradition*, 2d ed. (London, 1961), pp. 95-110. According to von Grünebaum, in reference to Arabic poetry, "an exclusive attention seems to be given to the individual verse, phrase, or paragraph, at the expense of the consistent layout of the whole." He adds a little later (p. 98) that "it may be tentatively and somewhat hesitatingly suggested that there exists a certain psychological affinity between the leaping from topic to topic, these momentary shifts of attention and mood, and the occasionalist world view which dominates Muslim theology and scholastic philosophy." Although von Grünebaum states in his article that Ash'arism was most successful and effective around the time of al-Baqillani (late-tenth and early-eleventh centuries), he does not explain what might have influenced Arabic poetry and prose in the earlier centuries or whether Ash'arism enhanced a trend which had always existed in Arabic literature.
 40. There are other instances of architectural borrowing from Baghdad by North African dynasties in this period and before. Early and well-known examples are the polychrome lustre-glazed tiles which were imported from Baghdad under the Aghlabid Ziyadat Allah I (817-38) to decorate the vousoir of the arch of the Great Mosque of Qayrawan.
 41. Herzfeld, "Damascus, I," p. 38.