Encyclopædia Iranica

Published: December 15, 1995
Last Updated: November 20, 2013

DOMES

DOMES, circular vaulted roofs or ceilings. The variety of forms and decoration of Persian domes is unrivaled.

The Sasanian and early Islamic periods. The dome on squinches first appeared in Persia in the Sasanian period in the palace at Fīrūzābād in Fārs and at nearby Qalʿa-ye Doḵtar, both erected by Ardašir (224-40) in the early 3rd century. Although the dome chambers at these sites are impressive in size, their conical squinches (arches across the corners of a cube, forming a zone of transition) are crude in design and execution (Plate XXXII). The rubble masonry was so haphazardly applied that it is difficult to distinguish the outer edges of the squinches from the corbeled walls between them. The extreme thickness of the walls in proportion to the height of the dome is another indication that these chambers stood at the beginning of the series. There is no evidence of precursors. Roman domes on circular bases or smaller domes on pendentives obviously sprang from a different tradition (Ward-Perkins, p. 338). Evidence for the simpler pitched-brick dome exists from as early as the 3rd millenium B.C.E. in Mesopotamia (Reuther, p. 501; see ČAHĀRṬĀQ i), but the absence of any known intermediaries between them and the Fīrūzābād domes, even from the Parthian period, attests to the originality of the Sasanian examples.

The most numerous surviving Sasanian domes are those over *čahārṭāq*s, frequently the central chambers of fire temples. It is in the large dome of the structure variously identified as a palace and a fire temple at Sarvestān in Fārs that two constant features of later dome design first become apparent: the use

of lighter materials, in this instance brick, for the dome itself and decorative emphasis on the zone of transition, which at Sarvestān is carefully set off by dogtooth moldings above and below and lightened by four windows between the squinches. The squinches are also more clearly articulated, each consisting of intersecting segments of two tunnel vaults (Bier, figs. 24-28). These features are, however, consistent with an early Islamic rather than a late Sasanian date for Sarvestān, a possibility also mooted for several *čahārṭāq*s.

The survival of the dome on squinches in the Islamic period may have been encouraged by the transformation of several *čahārṭāq*s into mosques, documented in a few instances (see ČAHĀRṬĀQ ii; *EIr.* V, *Addenda and Corrigenda*). The building of isolated dome chambers to serve as mosques ("kiosk mosques") may have followed, though the evidence comes not from the usually cited congregational mosques of major cities but from a few, mostly Saljuq examples in small villages in Khorasan.

It was the appearance of the domed mausoleum that was to prove most important for the development of the dome in early Islamic Persia. Despite initial Islamic hostility to tomb structures, by the 10th century several had probably been built by the ʿAbbasid caliphs for themselves (Allen). Domed tombs had also been erected over the graves of many Shiʿite martyrs (Blair, 1983, pp. 83-84), and the respect paid to them by pilgrims may well have hastened the spread of the form. Two early mausoleums in Transoxania stand out: that of the Samanids in Bukhara (before 331/943) and the ʿArab Atā at Tīm (possibly 367/977-78), between Bukhara and Samarqand. In the zone of transition in the former the squinches are of the same width as the arches between them, resulting in a regular octagonal plan at this level; this scheme was followed in virtually all later examples. At Tīm the zone of transition is further unified by trilobed squinches composed of large *moqarnas* (oversailing courses of niche sections) separated by trilobed arches. This mausoleum is also the earliest extant to incorporate a *pīšṭāq* (an arched portal projecting vertically or horizontally from a facade), a feature that also became usual in domed-square mausoleums but that, even at this early stage, often made its impact at the expense of the dome.

Tomb towers represent another tradition in Persian mausoleums; many survive from the beginning of the 11th century onward. They are circular or polygonal in plan, thus reducing the importance of the zone of transition, and they frequently have conical roofs masking interior domes. Although the domes of the earliest tomb towers are plain, the shafts often display the

inventive decorative brickwork of the period, as at the Pīr-e ʿĀlamdār (417/1026-27) and Čehel Doḵtarān (446/1054-55) at Dāmḡān. Two other notable examples are at Ḵarraqān on the Qazvīn-Hamadān road 33 km west of Āb-e Garm (460/1067 and 486/1093); the earlier had the first masonry double dome known from Persia.

The Saljuq period. The introduction by the Saljuqs of a *maqṣūra* (enclosure) in front of the mihrab of the hypostyle mosque helped to transform the skylines, characteristically punctuated with domes, of Persian towns. Although in the early Islamic period dome chambers may have been used for small neighborhood mosques, it was only after the vizier Neẓām-al-Molk introduced the domed *maqṣūra* (ca 479-80/1086-87) in the congregational mosque at Isfahan that dome chambers on the *qebla* become the norm in Persian congregational mosques. It was the largest masonry dome in the Islamic world in its time and embodied a new form of squinch, in which a barrel vault above two smaller quarter domes was substituted for the weaker central unit of the squinch at ʿArab Atā. The classic status of this squinch form is clear from numerous copies, not only in the Isfahan oasis (Barsīān, Ardestān, Zavāra), but also in Khorasan (Rebāṭ-e Šaraf) and Transoxania (Yarty [Yortī] Gonbad; Karriev et al., pp. 88-89). At the Isfahan mosque Neẓām-al-Molk's rival Tāj-al-Molk built a second dome chamber (481/1088) on the axis opposite the southern chamber, for purposes that are still unclear (see Blair, 1992, pp. 166-67). It is justly famous as the cynosure of Saljuq domes (Pope). The emphasis on verticality and on lightening the walls of the lower square became typical of Il-khanid dome chambers. The interior of the dome of Tāj-al-Molk is patterned with interlacing ribs that form pentagons and five-pointed stars, among other geometric figures. This arrangement represents a considerable technical advance over the eight ribs in the southern dome and could well have inspired subsequent designers of patterns for this hitherto neglected surface. The much smaller domes over the bays of the hypostyle portion of the Isfahan mosque also display a wealth of geometric ornamentation (Galdieri, I, pls. 60-62).

The numerous Saljuq dome chambers of northwestern Persia usually have much simpler zones of transition than those at Isfahan but, perhaps in compensation, are abundantly decorated with carved stucco and are also sometimes articulated on the exterior (Hillenbrand, 1976). This concern is most apparent in the largest Saljuq domed chamber, the tomb of Sultan Sanjar at Marv. Although the dome is decorated on the interior with a system of

intersecting ribs, the squinches and lower walls are plain. The exterior zone of transition received the greatest emphasis, with the squinches disguised by alternating large and small arches, echoed by smaller superposed arches at the base of the double-shelled dome. Stucco work on the soffits of the main arcade, probably by the same artisans who had earlier worked at Rebāṭ-e Šaraf (cf. Cohn-Wiener, pl. VIII; Hill and Grabar, fig. 546), underlines the new importance of this zone.

The Il-khanid period. The dome chamber of the congregational mosque in Varāmīn provides an example of changes in Persian domes in the Il-khanid period. Its taller proportions result primarily from the increased height of the zone of transition, with the addition of a sixteen-sided zone above the main zone of *moqarnas* squinches. Extra light enters through eight windows in this upper tier, although, as the Persian climate necessitated avoidance of sunlight during most of the year, architects of Persian dome chambers never aspired to the walls of light that characterized Ottoman examples.

The major Il-khanid domes were those of the mausoleums of Ḡāzān Khan at Tabrīz and Öljeitü (Ūljāytū) at Solṭānīya, each at the center of a larger complex of buildings. Ḡāzān's mausoleum was twelve-sided; although it is no longer extant, its magnificence may be judged by that of ÖÚljeitü, which was built to rival it. The dome of Öljeitü's mausoleum is 50 m high and nearly 25 m in diameter, dimensions unsurpassed in later Persian examples. The decoration of tile, stucco, and painting (the last forming part of a remodeling of the interior; Blair, 1987) is the finest surviving from the period. The thin double-shelled dome was reinforced by arches between the shells. Galleries on the upper part of the octagonal exterior differ from earlier arcades in that they were easily accessible. They were the first in a series that can be traced through Timurid and Shaybanid examples to a culmination at the Taj Mahal in Agra.

In the Il-khanid period tomb towers mirroring the splendors of Öljeitü's mausoleum proliferated. Several have *moqarnas* domes. This feature was found in brick at the Saljuq congregational mosque at Sīn, and an example covered with painted plaster in the congregational mosque at Nāʾīn may date from as early as the 10th century (Hillenbrand, 1987, fig. 11). In Il-khanid examples they usually consist of plaster shells masking the underlying structures. The finest example is probably that at the tomb of ʿAbd-al-Ṣamad in Naṭanz. The form may have been adopted from the tomb of Shaikh Sohravardī, founder of the order to which ʿAbd-al-Ṣamad belonged, near

Baghdad (Blair, 1986). In the Mesopotamian examples (that of Imam Dūr at Samarra, 478/1085-86, is the earliest) the *moqarnas* are frequently expressed on the exterior as well. This form is occasionally found in Persia, for example, at the *emāmzāda* of Mīr Moḥammad on Ḵarg island, dated 738/1337 (Watson, p. 187). A plaster slab discovered at Taḵt-e Solaymān in Kordestān is incised with a plan of the *moqarnas* vaulting for a room restored by Abaqa Khan (671-74/1271-74; Harb).

The dome over the chamber adjoining the Do Manār Dardašt in Isfahan marks a major advance in dome design. If contemporary with the gravestone of Solṭān-Baḵt Āqā inside (753/1351-52; Honarfar, *Eṣfahān*, p. 317), it is the earliest known example of a double dome in which the inner and outer shells have substantially different profiles. It has been claimed that the dome of the Solṭānīya complex in Cairo (probably built by Sultan Ḥasan, ca. 1356-60) was the origin of this form, which then spread to Persia (Meinecke, p. 175), but the interior buttressing at the Solṭānīya complex betrays the influence of a brick tradition, suggesting a Persian origin. The trend toward taller drums continued in the Timurid period, finally reaching the inordinate proportions of the ʿEšrat-ḵāna in Samarqand (ca. 869/1464). One factor responsible was the increasing height of *pīšṭāq*s, which at the *boqʿa* (shrine) of Zayn-al-Dīn Ḵᵛāfī at Tāybād (848/1444-45) led the architect to abandon the outer shell of the dome altogether (Plate XXXIII). Where the drum was retained, however, it usually rose straight from a lower square, resulting in the loss of an external zone of transition.

There were two divergent trends in the interior decoration of domed chambers from the Saljuq period onward. The most prominent was the substitution of plain or painted plaster for brick. The other was increased use of tilework. A spectacular early example of nearly complete tile revetment is the dome chamber of the congregational mosque at Yazd (765/1364; Plate XXXIV). The same craftsman's signature appears in the dome of this monument and in the congregational mosque at Sāva (O'Kane, 1984, p. 84). The interiors of several of the mausoleums in the Šāh-e Zenda in Samarqand (e.g., that of Šād-e Molk, 773/1371) are totally reveted in tilework.

In the 15th-17th centuries. After the turn of the 15th century the Timurids built very few freestanding mausoleums, attaching them instead to *madrasa*s (religious schools), often in pairs. The dome chambers erected within these *madrasa*s revolutionized the design of interiors, as in the *madrasa* of Gowhar Šād at Herat (820-36/1417-33) and the *madrasa* at Ḵargerd (ca. 840-46/1436-43;

O'Kane, 1987, nos. 14, 22). This change probably originated in 14th-century experiments with small lantern domes set at right angles to the main transverse vaults, from which arose the concept of using intersecting arches to support a dome with a diameter smaller than the width of the square below. The chamber was also modified, with a deep recess added to each side to produce a cruciform plan. The result was a much more fluid space than had been possible with the rigid tripartite division of lower square, zone of transition, and dome. In particular, the intersecting arches provide a visual link between the dome and the dado level, an illusion, as the thrusts are taken up by concealed masonry (O'Kane, 1987, pp. 108-09). In the *madrasa* of Gowhar Šād the dome is actually a triple shell, the first of its kind; the intermediate dome presumably was added for reinforcement.

The tilework of the Qara Qoyunlū Moẓaffarīya mosque (also known as the Blue Mosque, 870/1465) at Tabrīz is outstanding. Above a marble dado the whole of the interior of the dome chamber on the *qebla* was faced with dark-blue hexagonal tiles with stenciled gilding, creating a richness that was unparalleled until construction of the mosque of Shaikh Loṭf-Allāh in Isfahan (1012-28/1603-18), the quintessential Persian dome chamber. In the latter the blending of the square, zone of transition, and dome was achieved by unifying the first two, rather than the upper two, as in the Timurid examples with intersecting arches. The form of the squinches is plain, recalling those of Sarvestān and the Saljuq domes of northwestern Persia, but the way in which the framing arches and the enclosed tilework patterns continue in an uninterrupted sweep down to dado level was an innovation. The four identical arches between the squinches are edged by a bold twisted turquoise cable, lending the interior a new unity and simplicity. The exterior of the dome displays another innovation, the use of multiple levels of arabesque, interwoven with the brick ground with such finesse that it has often been mistakenly presumed that the ground, too, was glazed. The domes of the 17th-century Masjed-e Šāh and Mādar-e Šāh madrasa in Isfahan show how effective a similar arabesque pattern can be against a light-blue tiled ground.

In Transoxania and neighboring regions the Uzbeks carried on the Timurid tradition of dome building with little change, though dome chambers were sometimes surrounded with axial *ayvān*s and corner rooms, as in the *ḵānaqāh* (Sufi monastery) of Qāsem Shaikh in Kermān (Golombek, fig. 16). Where these corner rooms are part of an octagonal plan and on two stories, as in the shrine of Ḵᵛāja Pārsā at Balḵ (ca. 1598), the form was a prototype for the major Indian

mausoleums of Persian inspiration, that of Homāyūn in Delhi and the Taj Mahal. The domed *tīmča*s (markets) that survive at major intersections in Shaybanid Bukhara (McChesney) are among the earliest survivors of the type.

In the 19th and 20th centuries. In the Qajar period the major architectural focus was the *ayvān*, leading to comparative neglect of the dome, even when it was on the *qebla* axis (as at the Solṭānī mosque in Semnān, 1242/1826-27, and the Sepahsalār *madrasa* in Tehran, 1296/1878-79). The "onion dome," with an exaggerated swelling above a short drum, first appeared in Persia in this period (e.g., at Šāh Čerāḡ in Shiraz, 1269/1852-53), but it is difficult to view the resulting top-heavy appearance as other than an aesthetic step backward. More impressive are the Qajar *tīmcā*s at Qom (Plate XXXV) and Kāšān, each of which features a sea of stalactites supporting a central dome flanked by two smaller ones (Ministry, pp. 218-19, 228-33).

In the 20th century the dome has declined further in importance, especially since reinforced steel has usurped its role as a substitute for wooden beams. It has remained central in mausoleums, however, perhaps echoing an original paradise symbolism (Daneshvari), as at the 20th-century tombs of Ḥāfeẓ and Saʿdī in Shiraz and those of Reżā Shah in Ray (now destroyed) and Ruhollah Khomeini (Rūḥ-Allāh Ḵomeynī) in Tehran.

In vernacular architecture. Throughout Persian history the dome also played an important role in vernacular architecture. On many parts of the Persian plateau where wood is scarce whole villages with domed roofs are to be observed (Beazley, fig. 1). From Sasanian to Qajar times caravansaries were frequently constructed with the domed bay as the module. Domed cisterns (*āb-anbār*; Plate XXXVI) and icehouses (*yakčāl*s), still common sights in the Persian countryside (Beazley), are other reminders of the variety, pervasiveness, and permanence of the dome in Persian history.

BIBLIOGRAPHY

T. Allen, "The Tombs of the ʿAbbāsid Caliphs in Baghdād," *BSO(A)S* 46, 1983, pp.

421-31.

E. Beazley, "Some Vernacular Buildings of the Plateau," in R. W. Ferrier, ed., *The Arts of Persia*, London, 1989, pp. 109-17.

L. Bier, *Sarvistan. A Study in Early Iranian Architecture*, University Park, Pa., 1986.

S. Blair, "The Octagonal Pavilion at Natanz. A Reexamination of Early Islamic Architecture in Iran," *Muqarnas* 1, 1983, pp. 69-94.

Idem, *The Ilkhanid Shrine Complex at Natanz, Iran*, Cambridge, Mass., 1986.

Idem, "The Epigraphic Program of the Tomb of Uljaytu at Sultaniyya. Meaning in Mongol Architecture," *Islamic Art* 2, 1987, pp. 43-96.

Idem, *The Monumental Inscriptions from Early Islamic Iran and Transoxiana*, Leiden, 1992. E. Cohn-Wiener, *Turan*, Berlin, 1930.

A. Daneshvari, *Medieval Tomb Towers of Iran. An Iconographical Study*, Lexington, Ky., 1986. E. Galdieri, *Esfahān. Masǧid-i Ǧumʿa*, 3 vols., Rome, 1972-84.

A. Godard, "Les coupoles," *Āthār-éĪrān* 4, 1949, pp. 259-325.

L. Golombek, "From Tamberlane to the Taj Mahal," in A. Daneshvari, ed., *Essays in Islamic Art and Architecture in Honor of Katharina Otto-Dorn*, Malibu, Calif., 1981, pp. 43-50.

U. Harb, *Ilkhanidische Stalaktitengewölbe*, AMI, Ergänzungsbd. 4, Berlin, 1978.

D. Hill and O. Grabar, *Islamic Architecture and Its Decoration*, London, 1967.

R. Hillenbrand, "Saljūq Dome Chambers in North-West Iran," *Iran* 14, 1976, pp. 93-102.

Idem, "ʿAbbāsid Mosques in Iran," *Rivista degli Studi Orientali* 59, 1985, pp. 175-212.

A. K. Karriev et al., *Pamyatniki arkhitektury Turk-menistana* (Architectural monuments of Turk-menistan), Leningrad, 1974.

R. D. McChesney, "Economic and Social Aspects of the Public Architecture of

Bukhara in the 1560's and 1570's," *Islamic Art* 2, 1987, pp. 217-42.

M. Meinecke, "Mamluk Architecture. Regional Architectural Traditions. Evolution and Interrelations," *Damas-zener Mitteilungen* 2, 1985, pp. 163-75.

Ministry of housing and development, *Masterpieces of Iranian Architecture*, n.p. (Tehran), n.d. (1970).

B. O'Kane, "Timurid Stucco Decoration," *Annales Islamologiques* 20, 1984, pp. 61-84.

Idem, *Timurid Architecture in Khurasan,* Costa Mesa, Calif., 1987.

A. U. Pope, "Notes on the Aesthetic Character of the North Dome of the Masjid-i Jāmiʿ of Iṣfahān," in *Studies in Islamic Art and Architecture in Honour of K.A.C. Creswell*, Cairo, 1965.

O. Reuther, "Sāsānian Architecture. A. History," in *Survey of Persian Art* I, pp. 493-578.

J. Sauvaget, "Observations sur quelques mosquées seldjoukides," *Annales de l'Institut d'Études Orientales, Université d'Alger* 4, 1938, pp. 81-120.

E. B. Smith, *The Dome. A Study in the History of Ideas,* Princeton, N.J., 1950.

D. Stronach and T. C. Young, "Three Octagonal Seljuq Tomb Towers from Iran," *Iran* 4, 1966, pp. 1-20.

J. B. Ward-Perkins, *Roman Imperial Architecture*, Harmondsworth, U.K., 1981.

O. Watson, *Persian Lustre Ware*, London, 1985.

D. Wilber, *The Architecture of Islamic Iran. The Il Khanid Period*, Princeton, N.J., 1955.

Plate XXII. Detail of dome chamber, palace of Ardašīr I, Fīrūzābād, 3rd century.

Plate XXIII. Exterior of the dome of the boqʿa of Zayn-al-Dīn Ḵᵛāfī, Tāybād, 848/1444-45, from the southwest.

Plate XXIV. Interior of dome faced with tiles, congregational mosque, Yazd,

765/1364.

Plate XXV. Domed carpet market (Tīm-e bozorg), Qom, 19th century.

Plate XXVI. Domed cistern with wind funnel (bādgīr), at Bašnīgān, near Yazd.

[Plate numbers in this entry have been corrected; the numbers given in the print edition's version of the entry are in error.]