

STALACTITES IN MUSLIM ARCHITECTURE

BY

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Stalactites ⁽¹⁾ are decorative motives used as transitional zone between the corners of a square and a circle or curved line, above which sets a circular dome or shallow hood. They are one of the most important decorative elements which played an essential role in Muslim architecture.

Other terms, given to stalactites, are "Muḳarnaṣ" and "Honey-comb work". The word "Muḳarnaṣ" is the Arabic translation for "Stalactite".

Stalactites, as means of setting *domes* :—

The stalactite's unit, the "Squinch", is of a Sassanian origin. It was used in most of the Sassanian buildings in Persia before Islam, *i.e.* about the third century A.D.

The Squinches are arches thrown across the corners of a square whereby it is converted into an octagon, upon which it is easy to set a dome. Examples of domes, set as this type, were found in Persian Sassanian Palaces such as those of Firūzabād, Qasr-i-Shīrīn and Sarvistān.

(1) The word "Stalactite" is Greek by origin. Generally it stands for the vertical hanging columns resulting from the calcification of salts due to seepage of water.

The word "Stalagmites" stands for the rising columns formed in the same manner. This natural form has been adopted in architecture and is generally called stalactites, as an imitation to nature.

The squinch was invented in Persia⁽¹⁾ as early as third century. Later it spread to the Eastern Provinces of the Byzantine Empire during the fifth century and Armenia in the seventh century. Several trials of the squinch problem were used in Syria, 'Irāq, Anatolia and Turkistān. Squinches were in the shape of conical forms, niches or arches resting on pairs of little collonettes. Building materials of squinches varied in different countries. Thus in Persia and 'Irāq, they were built in bricks, in Syria; in stone.

Squinches went through continuous development and re-appeared during the times of the 'Abbasids in 'Irāq, such as in Bāb El-'Ammah of the Palace of Khalif Al-Mu'tassim at Samarra so called "Al-Jausaq Al-Khāqāni" and also in several parts of Palace at Ukhaidir. Each of the two semi-domes behind the frontal arch of both lateral liwans, flanking the entrance of Bāb El-'Ammah are carried by squinches.

Squinches, also conquered architecture in North Africa and Spain i.e. along the shores of the Mediterranean. Types of squinches, found in the dome in front of the mihrāb of the great mosque at Qairawān 248 H (862/3), were of the forms of "Shell-like" and "Embryo" squinches. The prototype of this last form of squinches was previously found at Bamiyān.

Al-Muntaṣir was the first Khalif, whose grave was generally known, for his Greek mother obtained permission to erect a mausoleum for him, known as "Qubbat as-Ṣulaibiya". It was of an octagonal form and in the centre was a domed tomb chamber resting on squinches. This mausoleum contained the tombs of three 'Abbasid khalifs: Al-Muntaṣir, Al-Mu'tazz and Al-Muhtadī.

The multiplication of squinches in the form of a "Muḳarnaṣ", spread mostly all over the Eastern countries during the eleventh century. In Persia, stalactites first appeared in the clear window

(1) Creswell, K. A. C., Early Muslim Architecture. Vol. II.

of the door in Gunbed-i-Kabūs⁽¹⁾ at Djurdjān (1007 A.D.). The following example occurred by the niches of mugharnat in the domical tomb chamber of Masdjid-i-Djāmi' at Iṣfahān⁽²⁾.

In these last two cases of "Muḵarnaṣ", the stalactite appeared in the form of three-lobed pointed arch resulting from the combination of a squinch in the middle, flanked by niches and crowned by a second niche.

In Egypt, according to Hauteœur, an ancient example was found in the church of Abu Saifain in Old Cairo (1074-1121), where the squinch of Persia-Syrian type, flanked by two niches. The same type of stalactite as at Iṣfahān was found in the Chapel of Saint Georges of the same church.

The earliest Muslim domes in Egypt such as those found in mosques of Al-Hākim and Al-Guyūshī, rest on semi-domed niches, known as squinches, which are placed in the corners of the square below the dome. The square is thus converted into an octagon, on which it is easy to set a dome. Domes of Sayyeda 'Atika and Moḥammed Al-Ga'fari, c. 1125 are stated to be the first type of dome on Stalactites in the evolution of "Stalactite pendentive". They are constructed of two tiers of niches, the lower composed of three, surmounted in the upper tier by one niche only. The next step was to fill the blank space on either side of the upper niche with another one, producing a pendentive of two tiers of three niches. This type is found in the mausoleum of the "Abbasid Khaliphs (1242-43). The next step appears in the dome of the mausoleum of Sultan Aṣ-Ṣaliḥ Ayyūb (1250). Here we find a pendentive modelled on that of the "Abbasid Khaliphs, the squinch shrunk into the corner and the final transition effected by a row of four niches placed above.

Prof. Creswell (Art of Egypt through the Ages; Sir Denisson, Ross) gives a series of domes which are the following

(1) Diez-Van Berchem; Churasanische Baudenkmaler, p. 39-186. pl. 14.

(2) Encyclopédie de l'Islam Supplément. 1938, Leiden, Holland, (Fig. 3. Facing p. 166)

steps to previous domes. He said that the next stages was to make the pendentive of four tiers of stalactites (Mausoleum of Baybars II, Al-Gashankīr, 1306-9). Five tiers first appear in the mausoleum of the Emir Sorghatmish (1365). Prof. Creswell also states that "this type must have been evolved in Egypt, as the Syrian type is constructed quite differently, the tiers of niches, instead of being curved in plan, run straight across, and are really nothing more than blind niches carved on tiers of oversailing lintels. Moreover, the number of niches in each tier is generally more or less equal in Egypt, while in Syria there is only one in the lowest tier, two in the next, and so on".

One of the best examples of domes carried on stalactite pendentives, is that of Imām Ash-Shafei, constructed by Sultan Al-Malik Al-Kāmil (608 H.—1211 A. D.). The stalactite pendentive is composed of three tiers of stalactites. The lower is composed of five niches, the middle of seven and the upper tier contains three only. The number of tiers continued to increase in Egypt, until it reached to sixteen tiers of niches in some domes.

After the Turkish conquest in Egypt, a struggle took place and the dome on spherical triangular pendentives of Byzantine origin began to appear and continued to develop during the last few centuries. One of the best examples of this type is that of the mosque of Moḥammed 'Ali at the Citadel in Cairo which was built after the tradition of the mosque of Aya-Sophia at Constantinople.

"The dome on stalactite pendentives" also spread along the shore of the Mediterranean. About the year 1100, the stalactites appeared in the Kal'a at Beni Ḥamnād in North Africa. Stalactite Pendentives were seen in the mosques of Merrakesh, Kutubiya and at Tinmal (1153). It appeared also at Palermo, the Zisa (1180) and at Palestine.

The tomb of *Zobeida*, Baghdād, is another example in which the stalactites are the most attractive features of the building.

It was erected for the favourite wife of Harūn Al-Rashīd, who reigned from 786 to 805 A.D., consequently the tomb dates probably from the end of the eighth century. The tomb is an octagonal structure surmounted by an unusual pyramidal roof of stalactites in which Muslim builders developed a cunning device in the use of alternating arches, carrying internally those overhanging pointed niches which were possibly the origin of stalactite vaulting, which became such a prominent feature in Islamic decoration. It is an example of functional architecture recalled in modern times. The dome is of brick, constructed by corbelling out gradually and building a kind of conical roof, similar in section to the building known as the Treasury of Atreus. Two bonding courses of bricks might be built, spread out on the outside, to form a platform for the future work.

The main part of the niche behind each arch should rest on the solid base beneath, so that the centre of gravity of each niche would be behind the front line of the arch beneath so that it could be constructed without centering. Internally the structure thus formed would present a series of niches similar to those found in the stalactite vault, externally this would form a series of miniature domes in the shape of prism.

Being octagonal in plan, there was no necessity for pendentives. Probably, the tomb was built at the end of the eighth century, thus giving five centuries for the subsequent development of the vaulting as found at Tabreez and Sulṭānieh.

As the method of construction of stalactite pendentives, the plan of the pendentives and lower portion of the dome could be set on the ground, and the projection, one over the other, of the horizontal courses of masonry determined by plumbing from above.

Building materials of stalactites varied in different countries. In Egypt and Syria, stalactites were carved in stone or wood; in Persia and India in bricks and stone whereas in the Alhambra, in Spain, they were carved in plaster. Brackets were carved out

of the solid and frequently consisted of series of small wooden niches.

It is to be noted that the stalactite problem was solved in Alhambra in the middle of the 14th century, *i.e.* long time after the problem had been worked out in the east.

Stalactite Forms :

The *stalactite cornice* : The earliest existing example of a stalactite cornice in Egypt appeared in the minaret of Al-Guyūshī (478 H.-1085 A.D.). Prof. Creswell⁽¹⁾ states that "there is a slightly earlier example in Persia, the cornice of the octagonal mausoleum at Abarquh known as Gunbad-i Ali, which dates 448 H. (1056/7)". The next example is the minaret of Ani in Armenia, built in 465 H. (1073). Creswell continues to state that "the following example was the minaret of Al-Guyūshī, then the example in the wall of Cairo next Bāb Al-Futūḥ (below; p. 189)⁽²⁾, and then the mosque of Al-Aqmar (below p. 242)". He also adds that "as the first two examples in Egypt are due to the Armenian Wazir Al-Gamālī, and the next oldest example is in Armenia, it very looks as if Armenians were the intermediaries whereby this *Persian* motif was transmitted to Egypt".

The materials used in building the mosque of Al-Guyūshī are roughly shaped blocks of stone (*talatāt*) from 17 to 18 cm. high to 25-30 cm. long set in a thick bed of mortar.

Stalactites forms were not used only for *niches*, *recesses*, and *domes*, but were also applied in other ways such as corbelling out to support balconies and galleries with an endless variety in Cairo and elsewhere. The principle lends itself also to *capitals* of columns, for which it is admirably adapted.

⁽¹⁾ K. A. C. Creswell: *Muslim Architecture in Egypt. (Ikhshids and Fatimids).*

⁽²⁾ K. A. C. Creswell, *Muslim Architecture in Egypt.*

Capitals of Columns:

Capitals of columns, in the birth of Islam, were carried (or copied) from churches to mosques. First, they were of classical forms until a new form appeared in the Palace of Al-Mu'tassim (Al-Jawsaq Al-Khaqāni) at Samarra. That capital, so called, "clock-form capital, was of Sassanian origin. It was seen afterwards in Egypt, flanking the tierce-pointed arched openings of the Nilometer in Cairo, during the time of Al-Mutawakkil, the Abbasid Khalif. Then afterwards "clock-form" capitals, spread all over the country in the following years.

A new design of capitals of columns "the stalactite-capital", thus became special for Islamic buildings which was admirably adapted in various forms. The earliest form of this type might be found as stated by R. Ph. Spiers, in the Imaret or Hospital of Oulou Jami, at Erzeroum in Persia, of the 12th century.

Portals:

Stalactites took a more complicated form when used in decorating portals of mosques, houses, or public buildings in Muslim Architecture. Best examples could be seen in the portals of Sultan Barḳouḳ⁽¹⁾ (1390 A.D.), Sultan Ḥassan and the entrance of Beyt Al-Qaḍi at Naḥāssīn. The illustration, given by Spiers, shows how gradually the plan of each course of stone, from the semi-circular form at the top, comes down to a parallelogram at the base. The Bāb El-Shorbah, one of the back entrances of the mosque of Al-Azhar, Mon. 97 (1167 H.-1753 A. D.), is surmounted by a cusped arched recess resting on stalactites. The hood of the arch is decorated with a shell-like motif and the stalactites are ornamented with open-work arabesque motifs and swastikas.

This developed form had already been achieved at Tabreez, 1294 A.D., and Sulṭānieh, 1306 A.D.; so that it is a development of brick, or brick and plaster, and not of stone construction.

(1) R. Ph. Spiers: Honey-comb (Stalactite) vaulting in Architecture, East and West ill. 13, p. 40.

Another important point is to be noticed, concerning the depth of the portals in relation to the span of the opening. The depth of the recess in the portals of the mosques is equal to half the width of its opening; but in the entrances to private houses and khāns, architects tried to economise space and the depth is sometimes one-third or one-quarter only of the span.

Some peculiar examples of "Portals" of the 18 century in Cairo are of the cusped arched forms with hoods resting on pierced stalactites decorated with either arabesque or geometrical ornaments.

The Ottomans took from the Saljūks in Konia, elements which became later most characteristic of their own architecture. One of these elements is the peculiar rectilinear type of stalactite, very different from the pointed form of Egypt and Syria.

Stalactites, sometimes were used magnificently to stand as *Consoles* or *Brackets*. They were also employed as decorative elements in most of the furniture of ancient Arabic house in Cairo, such as cupboards, shelves, etc. Some of these are still preserved in most of the Arabic Cairene houses, while others are preserved in the Cairo Museum of Muslim Arts. A good example for the use of Stalactites in the Cairene Ka'a, is given by Prisses d'Avennes, presenting a mandarah of an Arabic house in Cairo.

Stalactites are also used to carry *balconies* and they are mostly seen carrying the different platforms of minarets. A great variety in Cairo and elsewhere may still be seen, especially in Mameluke Egyptian minarets. An attractive example for the use of stalactites is found in the cap standing at the summit of the minaret of Al-Hākim. Also magnificent forms of stalactites appear carrying the upper platform of most of the *Persian* minarets and *memorial columns*, such as the minaret at Bustam (514 H-1120 A.D.) and minaret at Samnan (5th century H. 11th century A.D.).

A splendid and magnificent example of stalactites used for carrying balconies is seen in Cairo at the Zawiya of Abd el-Rahmān at Megharbelīn, Mon. No. 214 dating 1142 H. The small balcony which stands above the entrance, served as a minaret and was used for the call to prayer. This balcony is trapezoidal in plan with a parapet of pierced stone-work with flower motives. It is carried on pierced stalactites and its door is covered by a segmental arcuated lintel.

Stalactites are also met with in the *ceilings* decorating rectangular panels or suspending from the corners of the ceiling with attractive and beautiful designs. The ceiling of the entrance vestibule of Sabil-Kuttāb at Nahassīn, Mon. No. 21 (1157-1744), has in the middle a square panel, decorated with beautiful and magnificent stalactites.

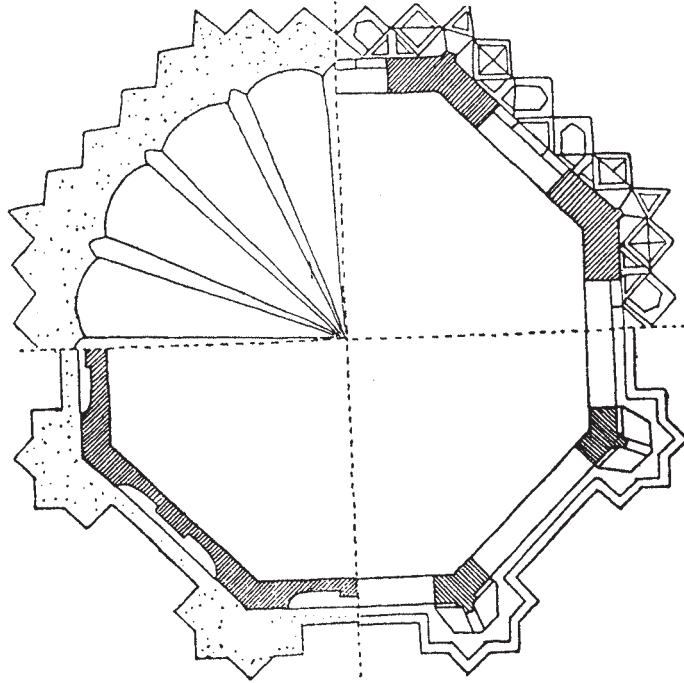
Another good example of using stalactites, appeared in some of the arched Persian *mihrābs* carrying their upper hoods. One of the best examples is seen in the "mosaic" mihrāb of the mosque of Al Sheikh Loṭf Allah at Iṣfahān.

Stalactites are also seen decorating the summits of rectangular recesses and openings and also ending the horizontal lines of the upper courses of the vertical rectangular panels running along the façades of most Muslim buildings. The earliest example was to be seen in the two vertical panels flanking the entrance of the Fatimid mosque of Al-Aqmar. In this last mosque, another use for stalactites was employed for splaying the sharp right corners.

Thus, for all the above-mentioned types of stalactite forms, they became prominent features in Islamic decoration.

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4. Diez. *Kunst des Islam*. Volker, p. 79.
5. Diz Van Berchem, *Churasanische Baudenkmaler*, (p. 39 and following—106. Pl. 14).
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11. Hauteceur, op. cit., p. 37, and Fig. 12.
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17. Sarre-Herzfeld, *Arch Reise*. II, 157, note 4.
18. Vogué, M. de *Syrie Centrale*.



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(Gayet)

Fig. 20.—Sectional Plan, showing details of Summit of Minaret of Al-Hākīm



(Diez)

↑ Fig. 21.—Mosque of Ani (Armenia)

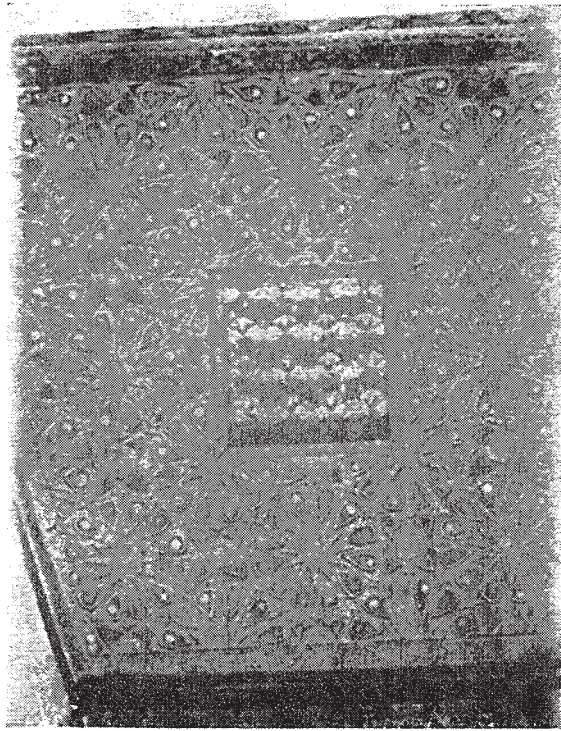


← Fig. 22.—Gar Gunbad near Golkonda

Fig. 23.—Mosque of Al-Guyūshī, Cairo



(Creswell)



(Sameh)

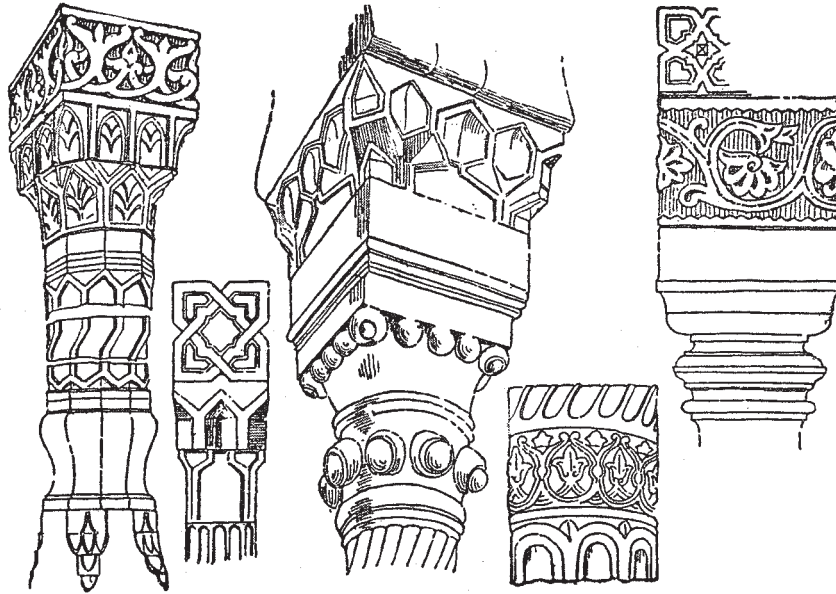
Fig. 35.—Ceiling, entrance vestibule of Sebil of Abd El-Rahmān
Katkhuda at Nahassīn



(Sameh)

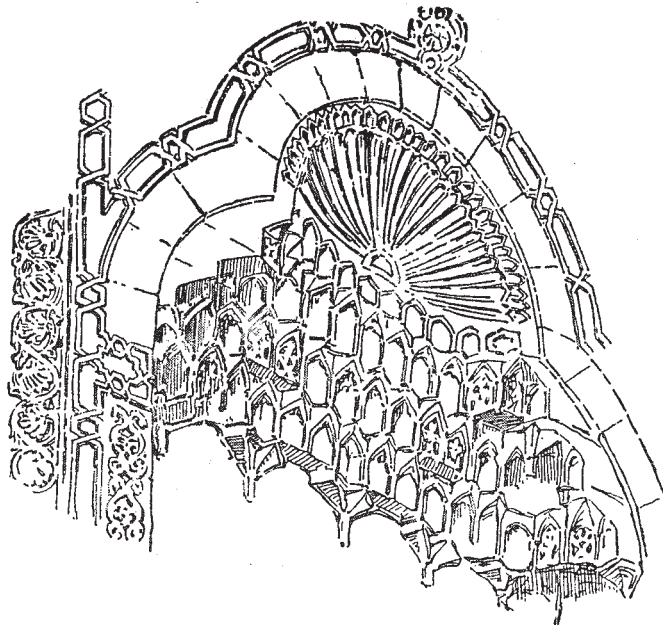
Fig. 36 —Balcony resting on stalactites above entrance of Zawiya of Abd El-Rahmān Katkhuda at Megharbelin

PLATES



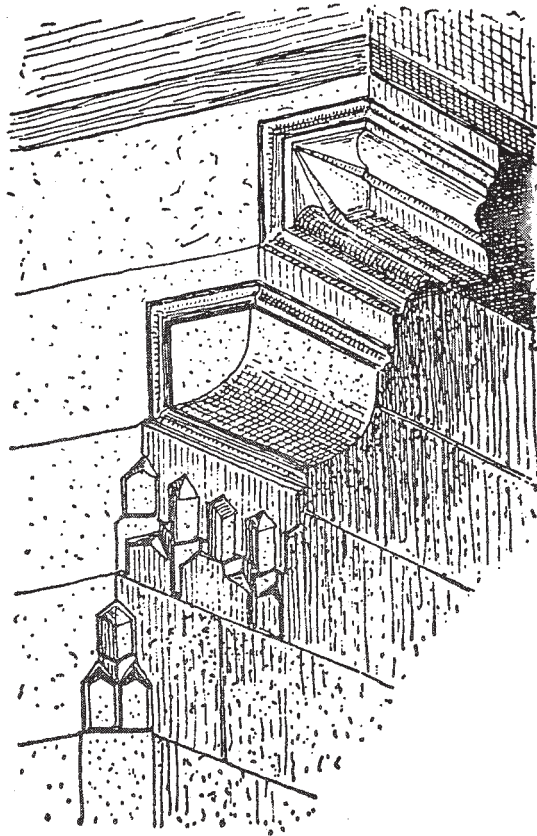
(Spiers)

Fig. 1.—Types of Capitals of Columns, Cairo



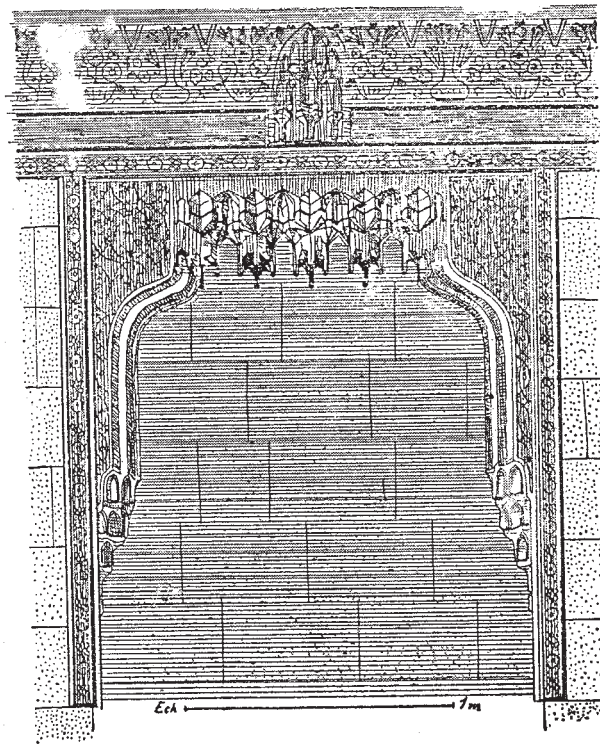
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Fig. 2.—Arched Portal of a mosque, Cairo (16th Century)

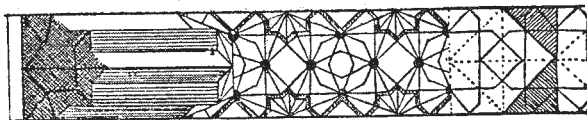


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Fig. 3.—A Console with a Stalactite treatment

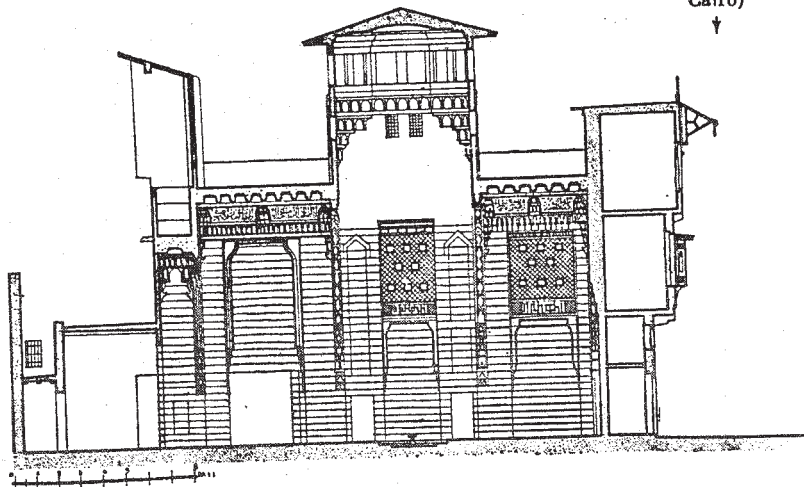


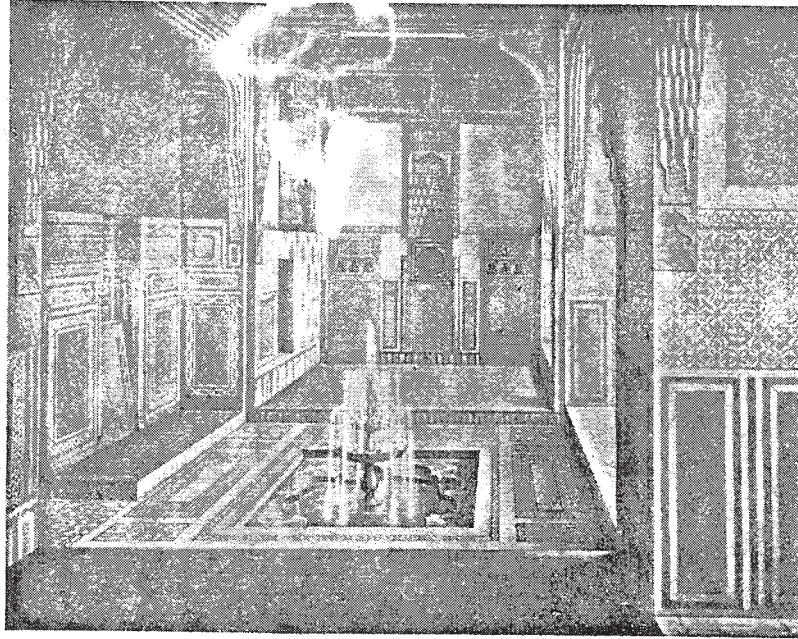
(Gayet)
 Fig. 4.—A rectangular
 recess with a Stalactite
 treatment



SALLE OSMAN KATKHODA.
 COUPE A.B.C

Fig. 5.—A Sectional
 Elevation of Qa'a of
 Osman Katkhuda,
 Cairo. (Conserv. of
 Arabic Monuments,
 Cairo)

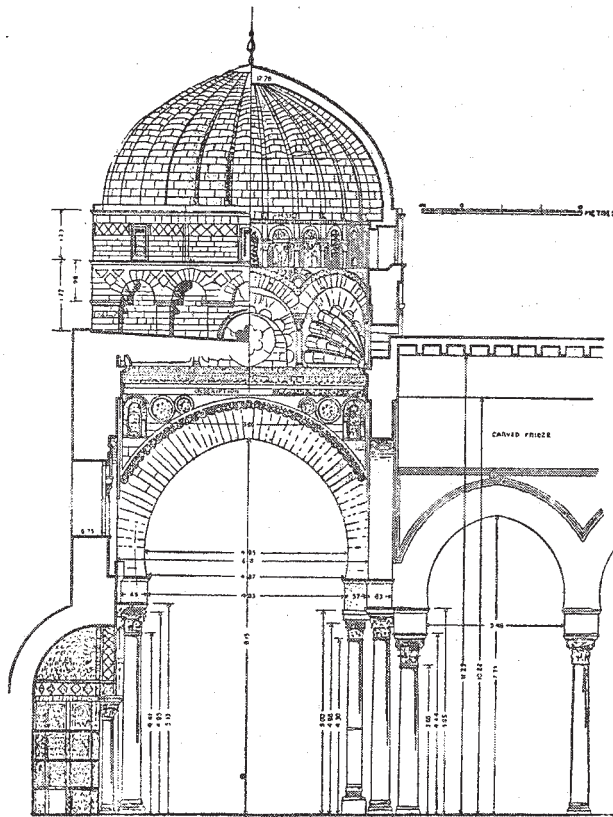




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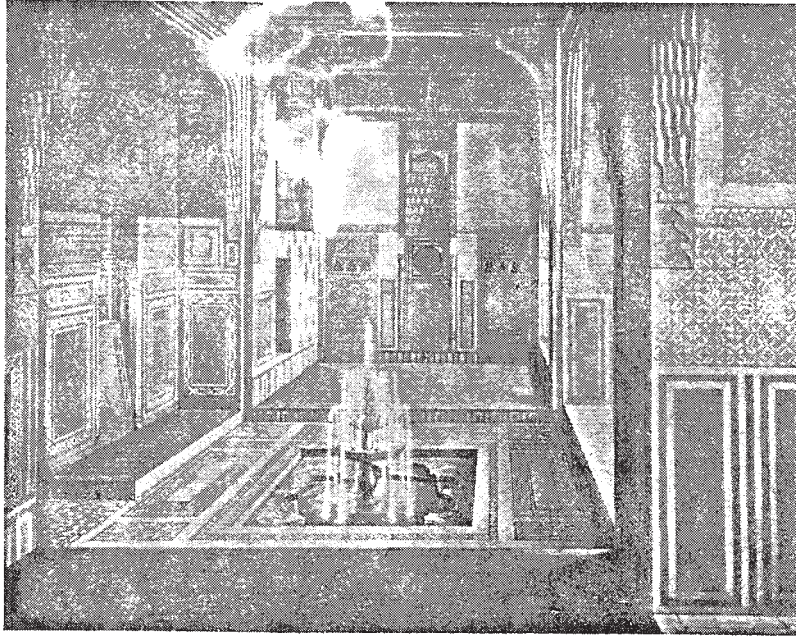
(Prisses d'Avennes)

Fig. 6.—A View of a Mandara with a Durqa'a in the middle



(Creswell)

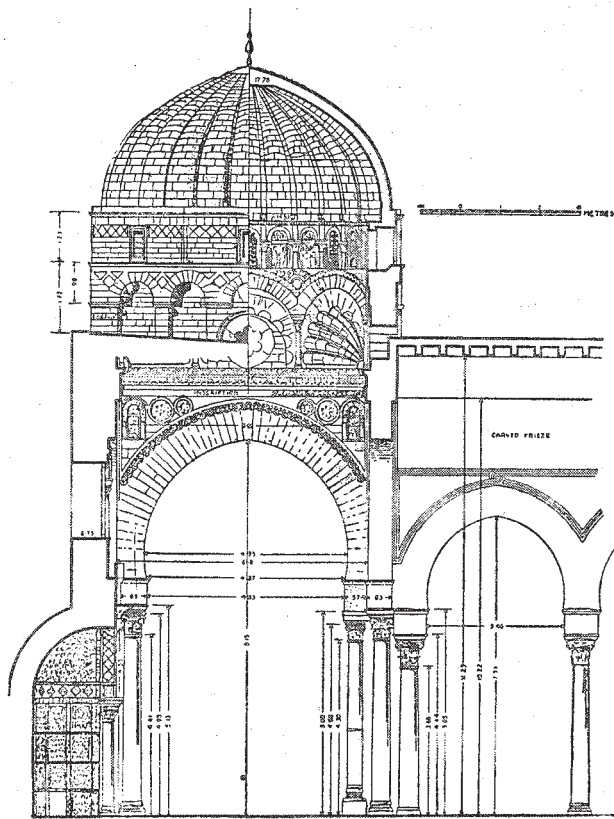
Fig. 7.—Dome on Squinches, in front of Mihrab of Mosque at Qairawān.



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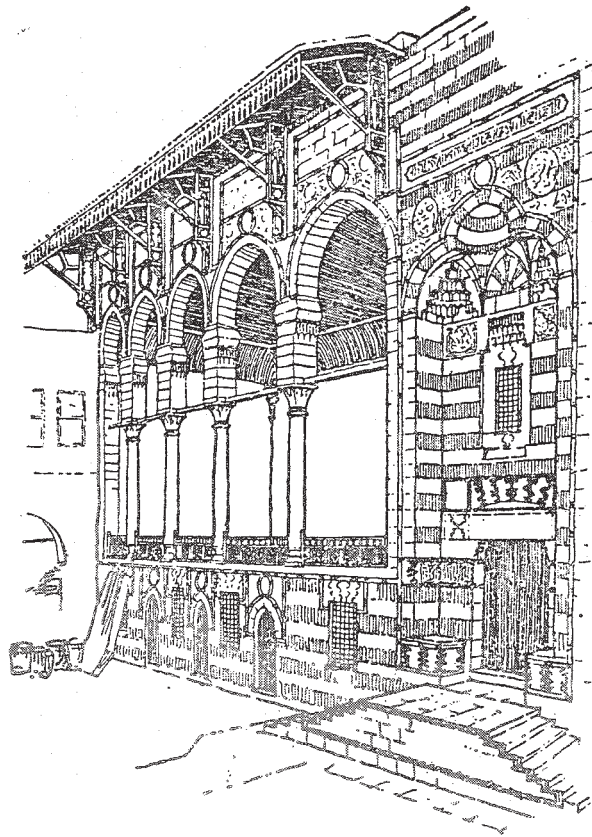
(Prisses d'Avennes)

Fig. 6.—A View of a Mandara with a Durqa'a in the middle



(Creswell)

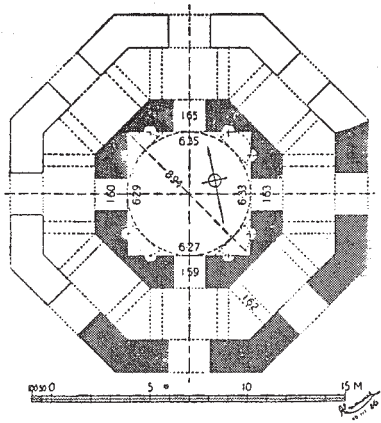
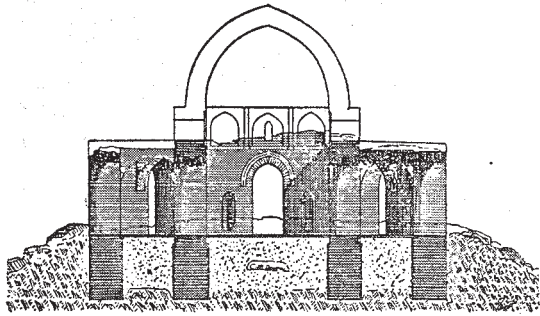
Fig. 7.—Dome on Squinches, in front of Mihrab of Mosque at Qairawān.



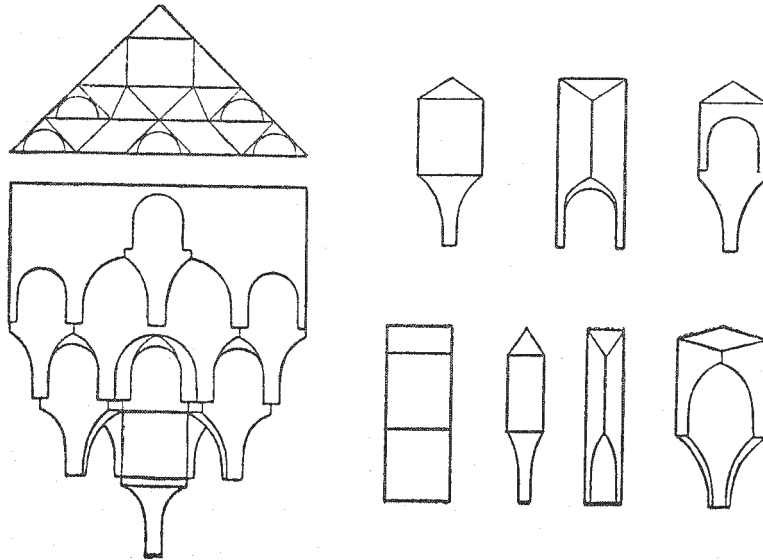
(Briggs)

Fig. 8.—Maq'ad of Al-mir Mamay, Known as Beyt Al-Qāḍī, Cairo.

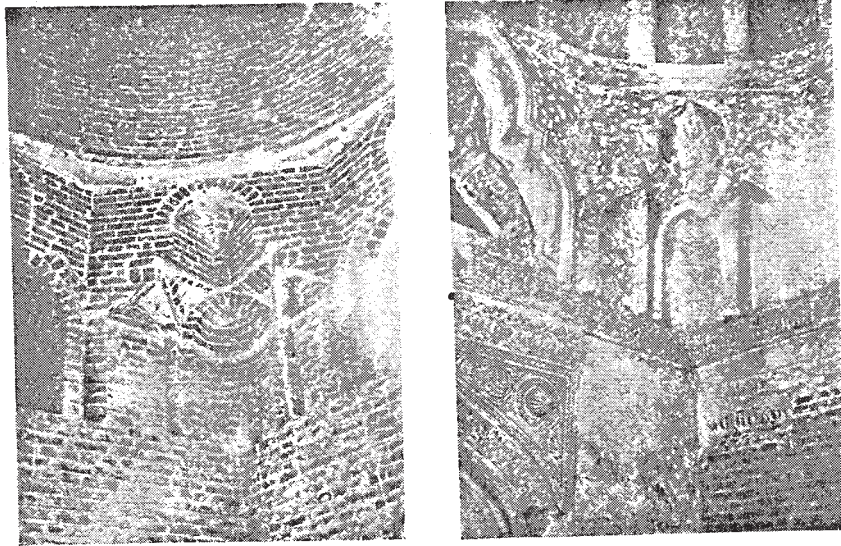
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(Creswell)
 Fig. 9.—Qubbat As-Sulaibiya
 at Samarra

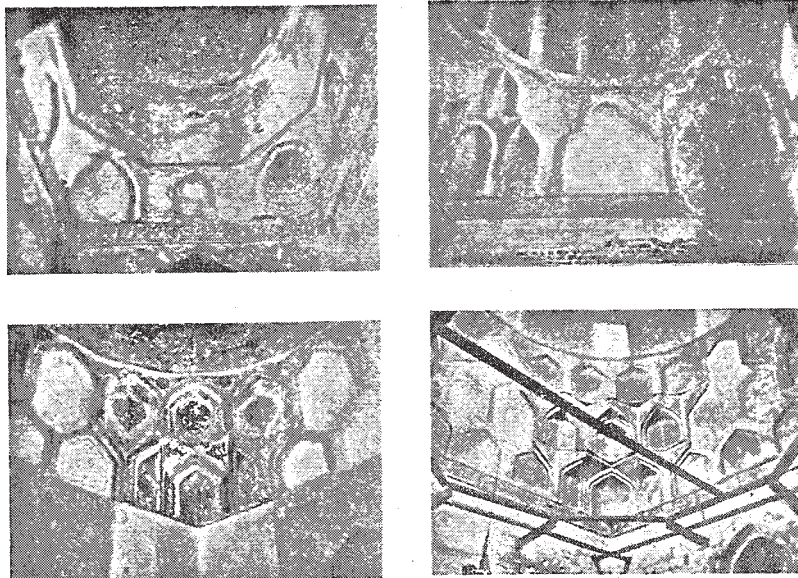


(Spiers)
 Fig. 10.—Examples of plaster casts used in the stalactite
 vaults of Alhambra



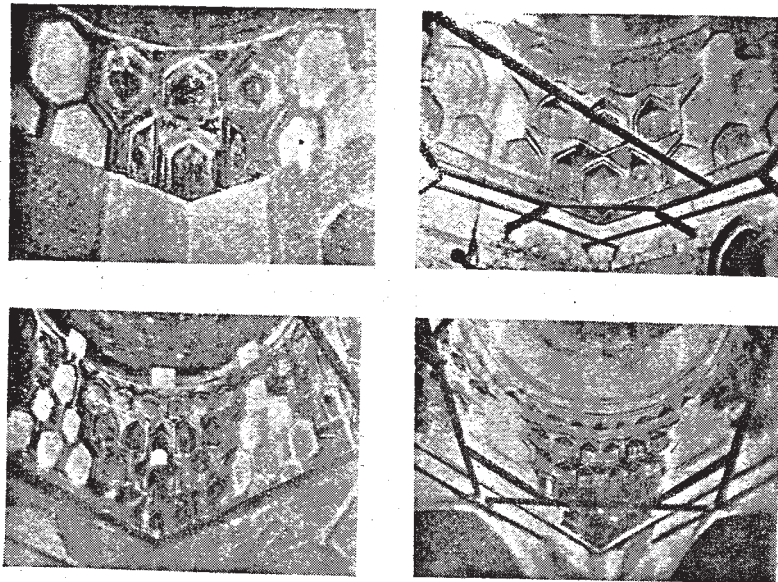
(Wiet)

Fig. 11.—Domes of Tombs of Sayyida 'Atika and Mohamed Al-Ga'afari



(Creswell)

Fig. 12.—Domes of 1: Al-Guyūshī, 3. Al-Ga'afari 3. Abbasid Khalifs, 2 tiers, 1242
4. Sultan Salih Nigm Al-Din Ayyūb (3 tiers), 1250



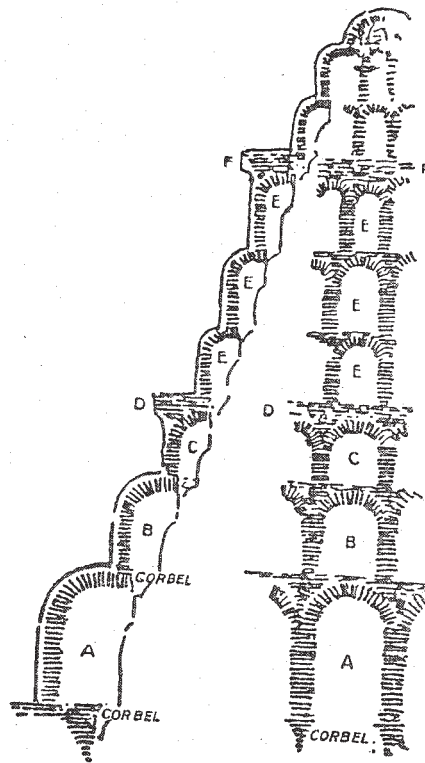
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Fig. 13.—Evolution of Stalactite pendentives in some Cairo Mosques



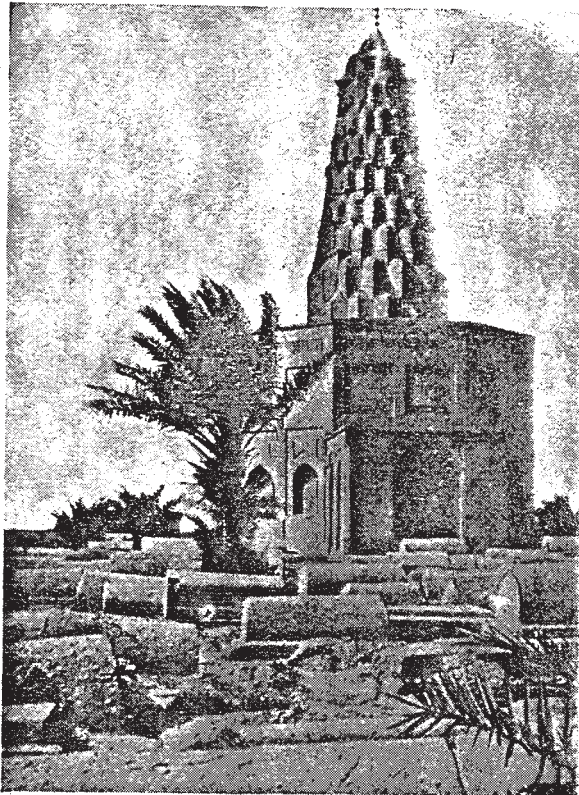
(Wiet)

Fig. 14.—Dome of Imām Ash-Shafei.



(Spiers)

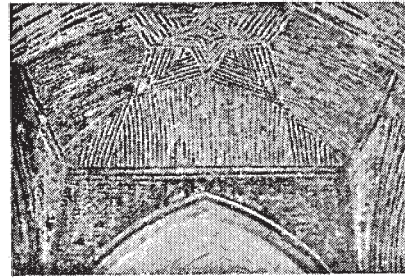
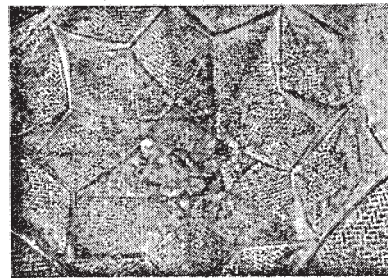
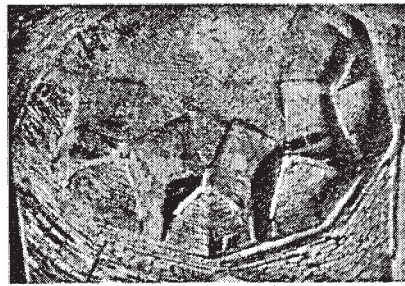
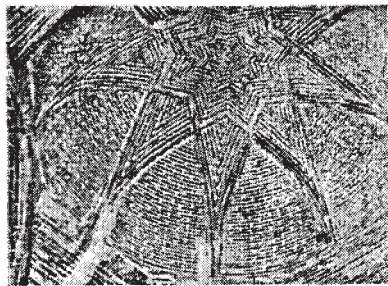
Fig. 15.—Section of tomb of Zobeida, Baghdad,
partly conjectural



† Fig. 16.—Tomb of Zobeida,
Baghdad

(Pope)

▣ Fig. 17.—Types of Persian
Domes at Isfahān



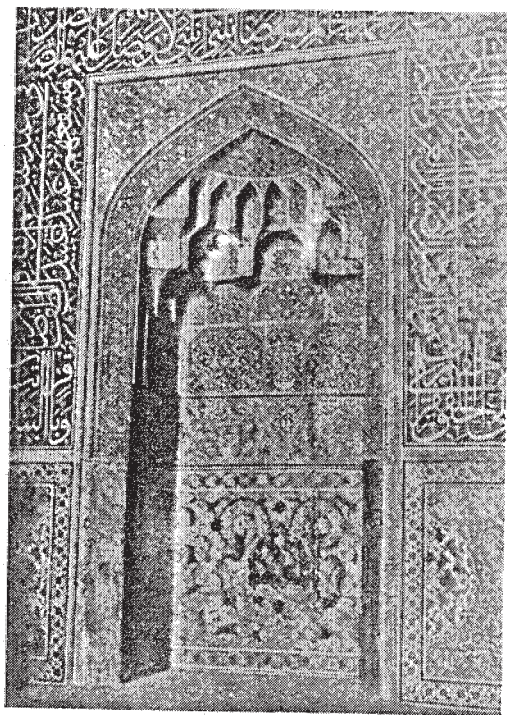
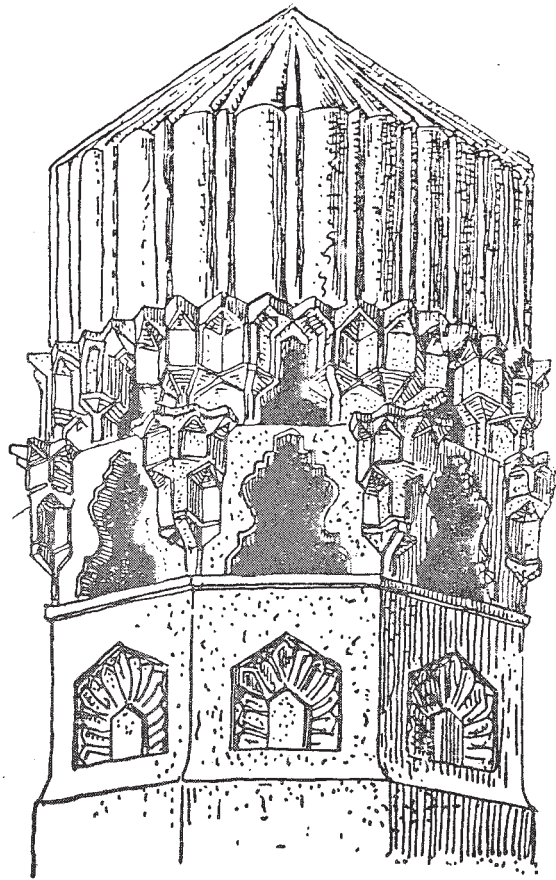
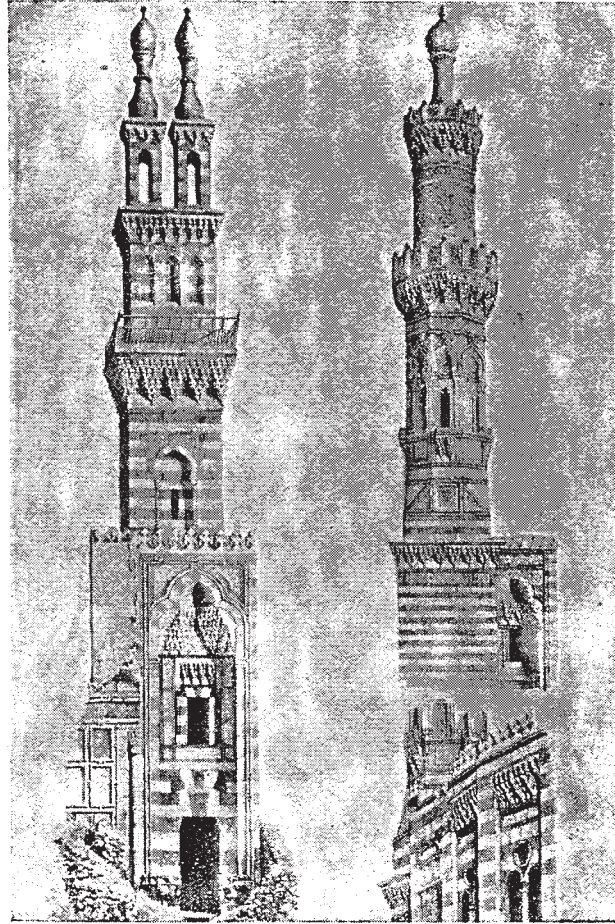


Fig. 18.—Mosaic Mihrāb of the Mosque of Al-Sheikh
Loṭf Allah at Isfahān



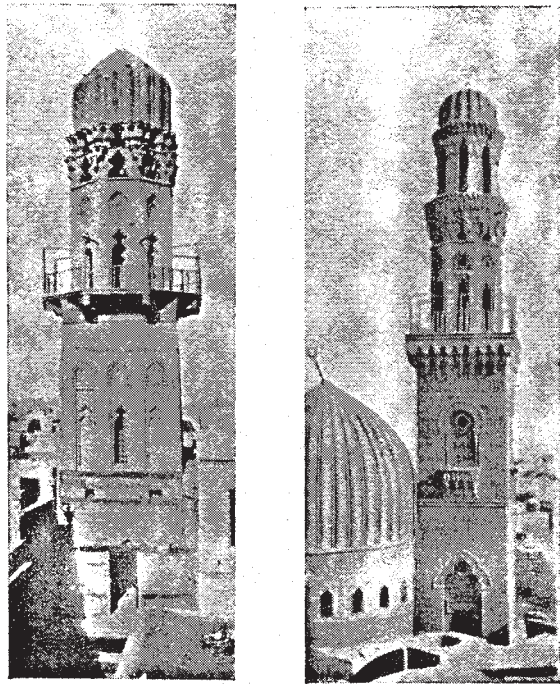
(Gayet)

Fig. 19.—Detail of Summit of Minaret of Al-Hakim



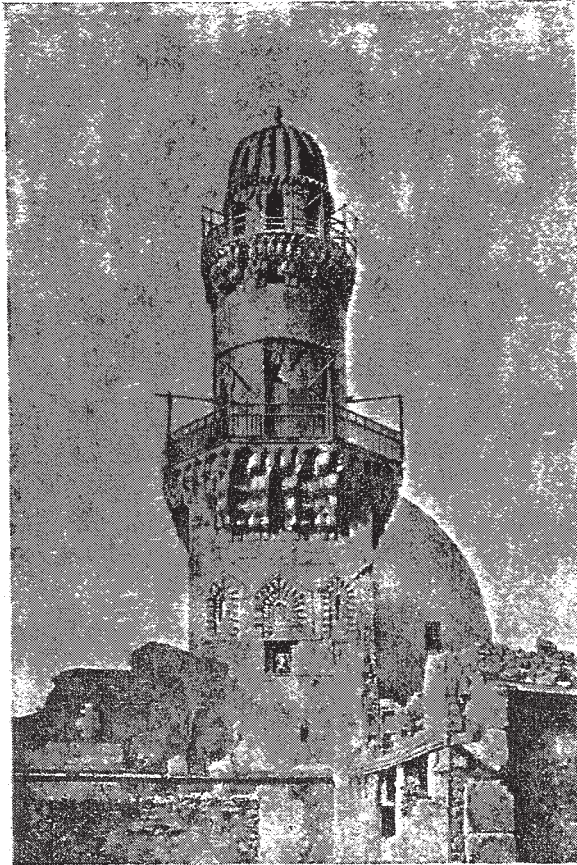
(Bourgoin)

Fig 24.—Several treatments of Stalactites in minarets, Portals, recesses, cornices of Façades



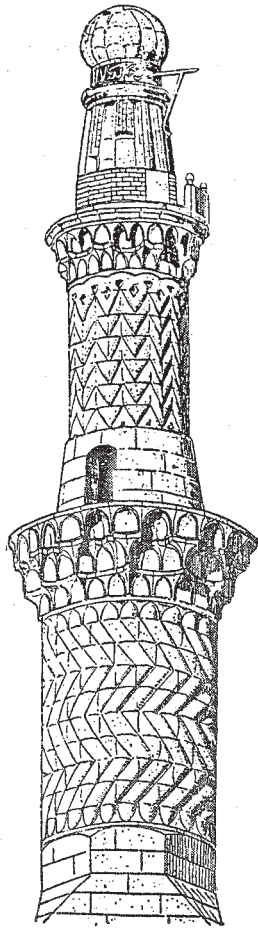
(Creswell)

Fig. 25.—Minarets of Madrasa of Sultan Ṣāliḥ, A. D. 1242
and Madrasa of Mausoleum of Ṣalār
and Sangar Al-Gawli, A. D. 1303



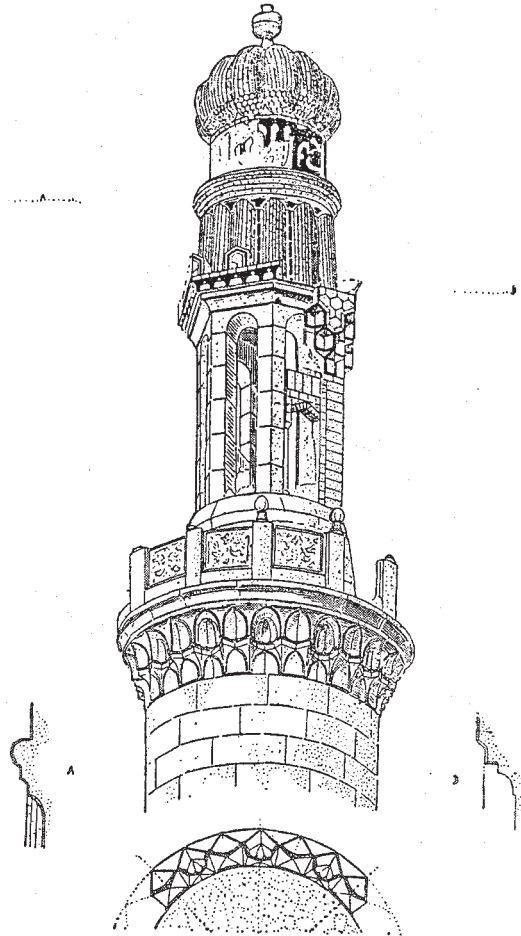
(Bourgoin)

Fig. 26.—Minaret of Mosque of Beybarsiyah



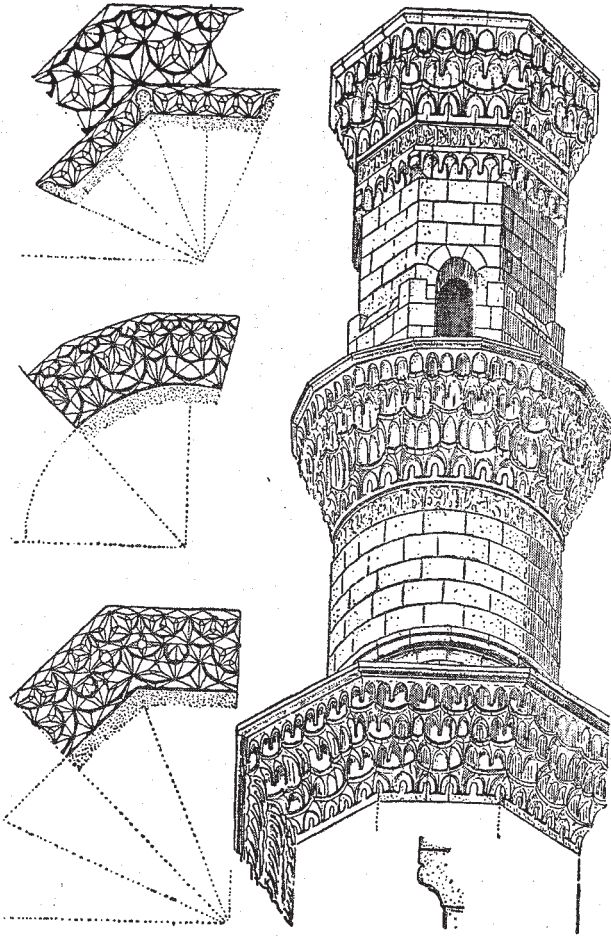
(Bourgoin)

Fig. 27.—Minaret of Al-Nāṣir Mohamed, Citadel, Cairo, 1318 A. D.



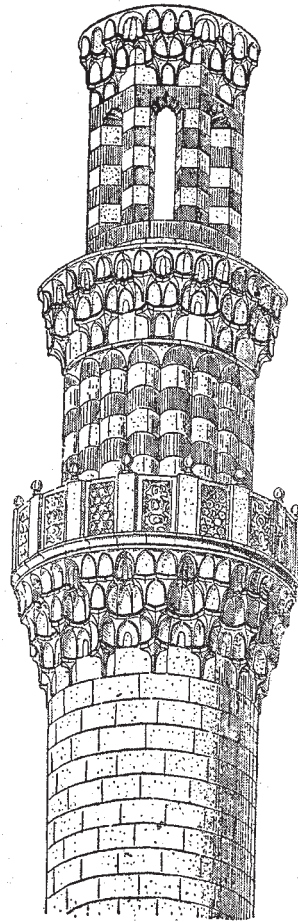
(Bourgoin)

Fig. 28.—Minaret of Mosque of Al-Nāṣir Moh. Citadel, Cairo, 1318 A.D., upper part decorated with coloured mosaics



(Bourgoin)

Fig. 29.—Minaret standing at the cemetery of Imām
Al-Shafei, Cairo (XIV)



(Bourgoin)

Fig. 30.—Minaret of mosque
of Amir Aḳ-Sonḳor,
Cairo (1437)

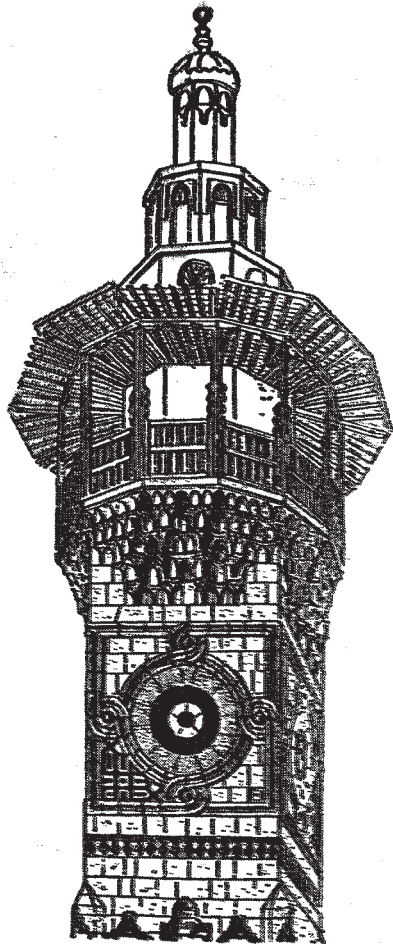


Fig. 31.—A minaret at Damascus
(XV A. D.)

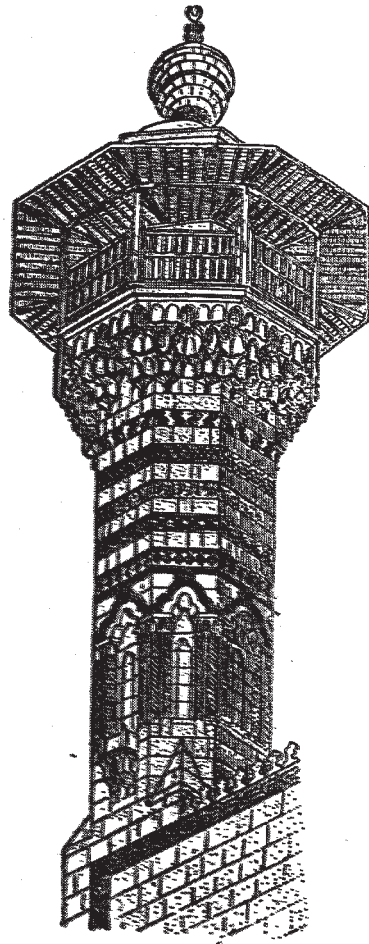
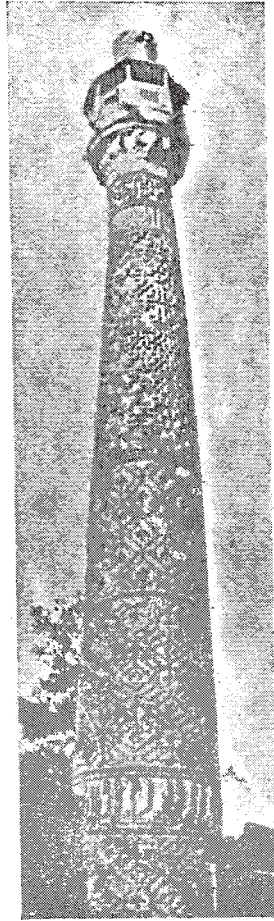


Fig. 32.—A Minaret at Damascus
(XVI A. D.)

Types of Strobilites carrying upper parts of minarets. (Bougnin)

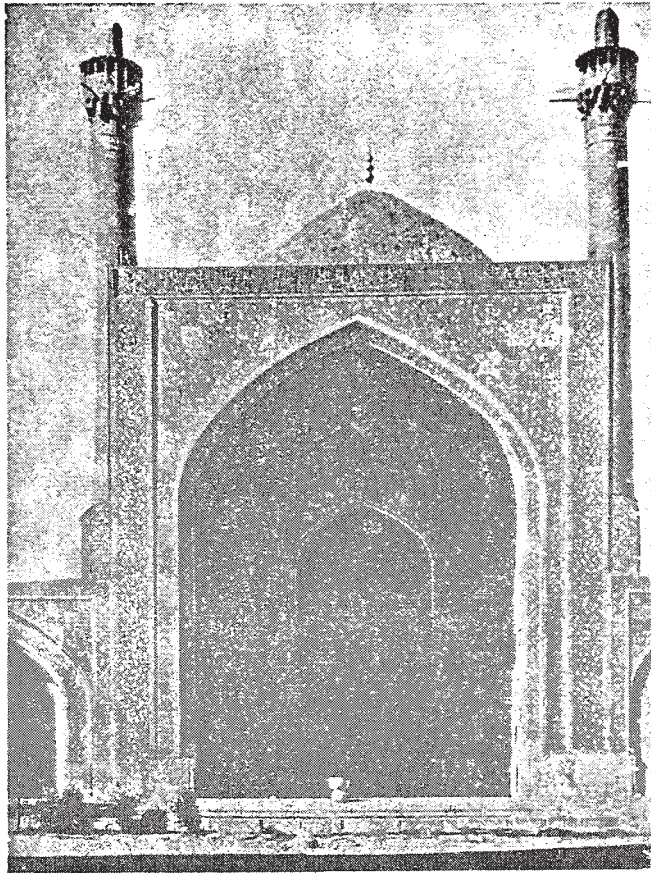
125



(Biron)

(Pope)

Fig. 33.—(a) Left (Manara at Samman) (5th H.—11th A.D.)
(b) Right (Manara at Bustam) (5th H.—11th A.D.)



(Fope)
Fig. 34.—Entrance to mosque of Masjid-i-Gami at Isfahan