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The Celestial Element Light as
the Integral Component in
Circassian Mamluk Religious
Architecture

LOAI OMRAN

2001

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THE AMERICAN UNIVERSITY IN CAIRO

SCHOOL OF HUMANITIES AND SOCIAL SCIENCES

525 —
THE CELESTIAL ELEMENT

LIGHT AS THE INTEGRAL COMPONENT IN

CIRCASSIAN MAMLUK RELIGIOUS

ARCHITECTURE
—

A Thesis Submitted to

The Arabic Studies Department

in partial fulfillment of the requirements for the degree of

Master of Arts

By

Loai Omran
—

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A THESIS SUBMITTED BY

LOAI ALI OMRAN

TO THE DEPARTMENT OF ARABIC STUDIES

JUNE 2001

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER OF ARTS

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For my grandmother, who granted me things that time cannot efface....

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Preface

This thesis is supplemented with catalogues of the thirteen monuments used as a study sample. The catalogues are listed chronologically and each of them contains the basic information of a monument under study. The information contained in each catalogue includes index no., name, date, inscriptions, location, plan type, illustrations and interior photos.

The inscriptions' key indicates the location of inscriptions as represented on the drawing of the interior facades. Inscriptions that were unreadable or lost are only numbered to indicate their locations in the building while the area next to them is left blank in the key.

The location of each monument is both listed by district name and location on the map. The type classification includes the type of building, its plan type and the current state of its *sahn* (roofed or not) respectively.

The photos are ordered in three columns each of which contains views of a certain space. The column to the left is that of the qibla *iwan*, the middle is that of the *sahn* and the one to the right corresponds to the anti-qibla *iwan*.

Abbreviations were used to differentiate between the two madrasas (included in the sample) that carry the name of the same patron; Qaytbay. The

madrasa in his funerary complex in the Northern Cemetery is referred to as Qaytbay N. C. His other madrasa at Qal'at al-Kabsh is referred to as Qaytbay Q. K.

Introduction

Regarding Islam's first book, the Quran, the word *al-nur* (light) occurs forty three times. More remarkable than its occurrence is the way in which it is employed, as it is usually incorporated in some cosmological verses. There is no better example of the meaningful role of this word than the *ayat al-nur* (verse of Light). This verse probably planted the seed for a certain understanding of *al-nur* within the philosophical and mystical circles of Islam.

In general *al-nur* often plays one of two roles within the context of the verse containing it. The first is the metaphorical contrast with *al-thulumat* (the darkness). According to the mode of employment of the two words a variety of themes could be evoked. They might manifest the opposing forces of good and evil, symbolize correct and incorrect paths and/or indicate the domination of truth over lies. The second role *al-nur* performs is the elucidation of one of God's attributes (*sifat*). He is described as *nur 'ala nur* (light upon light) and *nur al-samawat wa' l-ard* (the light of Heavens and the earth).

The question whether *al-nur* in the Quranic context stands for the corporeal, the spiritual or even all possible attributes of the word, remained open through the ages of Islamic history. The pursuit of the meaning of this abstract word marked a turning point from which Islamic thought diverged. During medieval times the subject became of great interest to Muslim and Sufi philosophers and scholars. As a matter of fact the issue seems to have

received most attention from Sufi philosophers through their ontological quest. Sufi ideology and mystical poetry like the works of al-Hallaj (d. 309/922), al-Ghazali (d. 505/1111) and al-Suhrawardi (d. 587/1191) provide much evidence of this.

Light plays one of the most critical roles in the perception of architecture, an element that no architect can afford to neglect. Among other natural phenomena that affect the form of architecture, light is very special. Lighting in architecture can solve the problems of visibility or answer the call of spirituality. It can be a subject of mere function or reflect the allure of symbolism.

With regard to the above it is tempting to generally question the implementations of light in Muslim religious architecture in service of both function and symbolism. During the late Circassian period the feature of roofed *sahns* (courts) appear in *iwan* mosques/madrasas. This feature partially replaced the previously common open *sahn* ones.

To me this was a perfect opportunity to trace the development that took place when the main light shaft of the madrasa was roofed. This starting point was constantly undermined by the question of the originality of the roof. The installation of a roof could always be attributed to a later restoration given the smaller scale *sahns*, of that period, that would make its greater span within the limits of wooden beam lengths.

There is no single example with a surviving original roof owing to the low durability of wood as a material. Most of the existing roofs of *sahns* were the result of Comite restorations. Unfortunately, the Comite reports are barely informative about the issue of roof originality. They seemed to be concerned with preserving the interiors of the restored mosques by roofing them. Their decision based on this will, left little space in the Comite reports for the recording of such information as the roof's originality. They even went as far as roofing madrasas, which they for sure knew were never roofed. An example of this is the madrasa of Abu Bakr Muzhir (884/1479-80).¹

I checked through the endowment deeds (*waqfiyyas*) of two currently roofed ones; Jawhar al-Lala (833/1430) and Qaytbay N. C. (877-79/1472/74). The *waqfiyya* of the first does not inform of any roofing for the *sahn* although it includes almost full details of the interior.² The later specifically mentions that the *sahn* was roofed.³ Upon this information I based my starting point.

Initially I made a quick search for other presently roofed examples that are contemporary to Qaytbay N. C. Three were selected for their resemblance of the style and plan of Qaytbay N. C., which are Qaytbay Q. K. (880/1475), Qijmas al-Ishaqi (884/1479-80) and Azbak al-Yusufi (900/1494-95).

As an initial assumption, I classified those four madrasas as being originally roofed. In the early stages of this research, they would be referred to

¹ Comite de Conservation des Monuments de l'Art Arabe, Rapport de la Deuxieme Commission, 9 (1891-9), 77.

² Wizara al-Awqaf, ,d. 917 H, 17-19.

as "the roofed examples" until the opposite is proved, for any of them, as a formula for the roofed type (mainly based on the features of Qaytbay N. C.) is deduced.

The madrasa of Abu Bakr Muzhir was added to the sample as an open type contemporary to that of Qaytbay N. C. I classified it as such depending on initial personal analysis and the above-mentioned Comite report. The madrasa of Abu Bakr Muzhir together with the four supposedly roofed examples from Qaytbay's period were catalogued.

In order to trace the path of development that led to the roofed type of Qaytbay, a sample was selected for comparison. *Iwan* mosques founded within the range of time back to fifty years before the date of Qaytbay N. C. (877-79/1472-74), were catalogued as well. The selection of the earlier period's sample was limited to the buildings that were previously documented, which were eight mosques. However, this number represents most, if not all the *iwan* mosques/madrasas, erected through the period from 1420 to 1472 (the date of Qaytbay N. C.'s foundation).

Thus the complete sample contained thirteen mosques/madrasas altogether that were catalogued for analysis. The monuments selected for this study, were chronologically numbered in the catalogues, they are as follows:

Catalogue 1. Index. 60 - Qadi 'Abd al-Basit (823/1420).

Catalogue 2. Index. 175 - Barsbay (829/1425).

³Wizara al-Awqaf, Daft., No. 888, d. 879 H, 24.

Catalogue 3. Index.119 – Janibek (830/1426-27).

Catalogue 4. Index.134 – Jawhar al-Lala (833/1430).

Catalogue 5. Index.97 – al-Jawhariyya (before 844/1440).

Catalogue 6. Index.209 – Taghri Bardi (844/1440).

Catalogue 7. Index.182 – Qadi Yahya Zayn al-Din (848/1444).

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Catalogue 10. Index.223 – Qaytbay Q. K. (880/1475).

Catalogue 11. Index.49 - Abu Bakr Muzhir (884/1479-80).

Catalogue 12. Index.114 – Qijmas al-Ishaqi (885-86/1480-81).

Catalogue 13. Index.211 – Azbak al-Yusufi (900/1494-95).

The architectural maturity of the Circassian period is one aspect I bore in mind when approaching the subject of light study. The Circassian period's architecture has long been characterized by its well-integrated components. It presents a compact package in which the detail plays a vital role in the whole. This fact imposes the essentiality of a comprehensive approach if the architecture of that period is to be studied.

More demanding to this type of approach is the fact that part of this research is targeted to decode symbolic connotations of lighting. Accordingly all the different components in the *iwan* mosques under study will be compared in both their individual development and their relation to the whole.

However more stress will be directed towards architecture and fenestration, as they are the subjects directly influencing the main target of this research: light.

To begin with the religious, social and political environment of the period under study will be reviewed. Architecture is an applied art and consequently could not be fully understood without the consideration of the way it functioned. The interaction between the madrasa and its users will then be discussed in the conclusion, and the relation between the development of the *iwan* mosque and its changing role will be compared. This might give some idea of the functional and /or symbolic demands that led to the roofing of some madrasas' *sahns*.

Chapter I

The Social and Political Environment

The general structure of social and political life during the late Circassian Mamluk period is mainly a continuation of the early Bahri one. Nevertheless some changes that took place within the different levels of the structure. The pyramidal form of the society was preserved but its shape was slightly altered. This in turn reflected several aspects of life during the given period.

The way religious buildings functioned during the late Circassian period was influenced by these slight changes in society.⁴ These changes are indicative of how these institutions interacted with the society they served. Therefore, if the factors behind their development are decoded, those religious institutions can thus be used as evidence for changes in the surrounding environment.

Doris Abouseif has marked the changes in form of Mamluk religious institutions in the light of an understanding of the way they function.⁵ They seem to have developed a kind of function more comprehensive and less specific. The interactions of the political, economic and social forces are behind these changes. A close look at these factors independently and collectively can help elucidate the extent of their influence. Accordingly, this

⁴Behrens-Abouseif, D., "The Change in Function ", 92.

⁵Ibid., 75-81 .

might give an idea of the way the religious foundations under study have functioned in their early days.

The Mamluks ruled Egypt for more than two hundred and fifty years. Nevertheless they do not seem to have ever been integrated into the society. We know that in general they rarely spoke Arabic and the majority of them were not personally religious⁶. This was the norm to the extent that individual cases of sultans or *amirs* who displayed piety or spoke Arabic were carefully reported by contemporary historians.⁷

The gap between this ruling military regime and the public unexpectedly remained, or even increased towards the end of their long rule. Perhaps the decline in the level of education (religious and Arabic language) for young Mamluks and the involvement of *amirs* and Sultans in the increasing political and economic struggles were responsible for this process. Al-Maqrizi comments that the deplorable situation of his time was due to the deterioration of religious teaching for newly recruited Mamluks.⁸

On the other hand we are faced with an abundance of religious monuments left behind by the Mamluks. This contradiction could be explained by looking in more detail at their social status. This can point out how the Mamluks viewed society and themselves as well.

⁶Schimmel, "Religious Life in Egypt", 356.

⁷Ibid., 356-359.

⁸Ibid., 356.

Continuous supplies of Mamluks were provided yearly by slave merchants.⁹ They did not all belong to the same race, consisting of Turks, Circassians, Mongols, Chinese and Greeks.¹⁰ Although they were raised in almost the same manner and circumstances, they were accommodated according to their racial groups.¹¹ Apparently, this reflects a fragmentation among the military regime itself. This division might have been further amplified with time. Two observations support this suggestion. The first is the profitable trade of white slaves during that time.¹² This might have attracted merchants from all over the world and should have increased with time, as they were becoming more aware of the profits they could make from the prevailing situation. The need of Sultans and wealthy *amirs* to strengthen their political power by buying the best mamluks kept the market in a continuously rising demand. The second observation is the racial identification of the later dynasty as Circassian, in most of the primary sources, compared to the earlier one as Bahri, which just referred to the position of their barracks.¹³

In spite of their differences, some sort of unity still existed among the Mamluks. As mentioned above, they lived the same military life and shared common circumstances. Above all, they remained a military minority that

⁹Ibid., 356.

¹⁰Ashur, *al-'Asr al-mamaliki*, 308.

¹¹Ibid., 309.

¹²Ibid., 308.

ruled a public majority whom they remained unlinked to, except by religion. Hence the field of religious practices was the main means of communication by which they could interact with the community they ruled.

Islam does not approve of racial discrimination. If there is any kind of differentiation that could exist in the realm of Islamic ideology, it is that of piety and good deeds. Therefore, religion could not be used against this military regime, as long as they represented themselves as the guardians of God's path. This is exactly what they did to secure their rule. Consequently, the active religious patronage during this period reflects the extent of their sensitive situation. They founded an abundance of religious institutions at a rate, the like of which had never been witnessed in Islam.

Furthermore, it seems that this type of propaganda was made the Mamluks' exclusive practice. Although they were known to have controlled most of the wealth and resources of Egypt, it is still hard to explain the rarity of other kinds of patrons. The only occasional exceptions to this were some high religious officials, who were again working under the Mamluks' authority. This becomes even more striking in the light of the economic situation of the time.

Under the rule of the Mamluks, Egypt became one of the greatest centers of the civilized world. All the pilgrimage and trade routes from east and west passed through it. This helped maintain Cairo as a cosmopolitan city,

¹³An example of this is al-Maqrizi, see al-Maqrizi, *Khitat*, 3: 173, 180.

which contained a very active international market that created a rich economy. There thus existed a large class of wealthy merchants, who should have been able to finance religious institutions just like their rulers.¹⁴ Accordingly, the reluctance of such a class to participate in religious patronage might be because they feared that they would upset the ruler and his regime. In other words such patronage was abandoned informally. This prevailing ethos made the state the sole provider of religious services. In fact during the period of study, all the religious celebrations and decisions were under the control of the state as will be shown below.

From the start of their rule, the Mamluks always were keen on presenting themselves as the protectors of the true faith¹⁵. Most of the titles used for the Sultan usually enhance the qualities of being the warrior in the path of God (*mujahid*).¹⁶ This is not affected, to any extent, by the personal qualities of the ruler. If we are able to trace the real existence of such qualities among some of them, it is from the chronicles. In other words, the rare individual cases of religious Sultans are not distinguished as such in the foundation inscriptions for example.

¹⁴The fact that the Circassians controlled the trade during that period, is still not enough to eliminate the possibility of the presence of a wealthy class of merchants in such a big market.

¹⁵Schimmel, "Religious Life in Egypt", 359.

¹⁶Ibid., 360.

The presence of the Abbasid Caliph in the Mamluk court was first introduced by Baybars in 659/1261.¹⁷ The role of the Caliph in Cairo was always no more than ceremonial.¹⁸ According to Schimmel:

“the Caliph sent Baybars a document of investiture and thus, the Mamluk dynasty got official sanction. In later centuries, it was nearly the only duty of the Caliph to invest the Sultan with the black robe of honor.”¹⁹

All historians have agreed upon the limited role of the Caliph. He seems never to have been influential in either political or religious fields. He was barely more than a prisoner at the Mamluk court, whose importance never went beyond a living justification for the rule of this dynasty.

Nowhere else was the name of the Caliph mentioned except sometimes in the Friday prayers, which were mainly held in the name of the Sultan.²⁰ Reading the *khutba* in the Sultan's name was viewed as the official announcement of his sovereignty. This is confirmed by the fact that an *amir* who proclaimed himself Sultan had to erect a *minbar* at his house from which the *khutba* would be given in his name.²¹

The Birthday of the Prophet is an occasion that was given a lot of attention by the rulers. The act of celebrating that day in the Islamic world

¹⁷Al-Qalqashandi, *Subh al-a'sha*, 3: 264.

¹⁸Ibid., 3: 280.

¹⁹Schimmel, “Religious Life in Egypt”, 354.

²⁰Ibid., 363.

²¹Ibid., 363.

occurred at least a century before the Mamluk dynasty appeared.²²

Nevertheless it was given special attention particularly during the Circassian period. On this occasion, since the time of Barsbay a big celebration was held in a great round tent, erected in the court of the Citadel. The tent made by Qaytbay is said to have cost him 30,000 *dinars*.²³ It was blue and was made in the form of a large *qa'a* of four *iwans* opening unto a central space covered with a dome on four columns.²⁴

The Sultan attended the celebration himself accompanied by high military and religious officials. The event included Quranic recitation, large tables of food, singing in praise of the Prophet and dancing. Finally the *sama'a* started after the first third of the night and continued until dawn.²⁵ The Sultan's expenditure that night once exceeded 4000 *dinars*.²⁶

During Ramadan the *Sahih* of al-Bukhari was read in the Citadel. When this was completed by the last third of the month, a celebration was held. This took place in a tent that was erected in the court of the Citadel,²⁷ which probably indicates that the celebration followed the same manner as that of *al-mawlid al-nabawi*. Again the Sultan used the opportunity of this occasion to display the signs of generosity and piety. He usually gave out

²²Ibid., 370.

²³Ibn Iyas, *Bada'i' al-zuhur*, 3: 112-113.

²⁴Ibid., 3: 113.

²⁵Ashur, *al-Mujtama' al-misri*, 179.

²⁶Ibid., 179-180.

money and bestowed robes of honor among the attendants and participants of this event.²⁸

In addition to the reading of the *Sahih* of al-Bukhari, the month of Ramadan witnessed other pious behavior by the Sultans. All through the month they gave alms and made sacrifices, sometimes to exaggerated effect. Sultan Barquq is known to have slaughtered a total of twenty five cows on each day of the holy month, while others were known to have released a slave daily.²⁹ *Amirs* participated in the Ramadan religious activities, almost in the same manner of the Sultan, but on a smaller scale.

'Id al-Fitr takes place on the first three days of Shawwal. Again the sermon was held in the big *maidan* of the Citadel. According to al-Maqrizi, after the Sultan performed the prayer and listened to the *khutba*, he returned to the *iwan kabir* where a big table of food (one once cost 50,000 *dirhams*) was offered.³⁰ Later the Sultan bestowed robes of honor among the attendants.³¹ In addition the Sultan used to release some prisoners on this holy occasion.³²

Around mid Shawwal one the greatest events took place. This was the *khuruj al-mahmal* (the departure of the pilgrimage procession to the Hijaz).

²⁷Schimmel, "Religious Life in Egypt", 364.

²⁸Ashur, *al-Mujtama' al-misri*, 187.

²⁹Ibid., 187.

³⁰Ibid., 190.

³¹Schimmel, "Religious Life in Egypt", 363.

³²Ibid., 363.

This is not to be confused with the *dawaran al-mahmal* (the circling of the *mahmal*) that took place earlier during the last half of Rajab.³³

In 670/1272, Baybars introduced *dawaran al-mahmal* for the first time.³⁴ Depending on the chronicles, 'Ashur mentioned that the reason behind the circling of the *mahmal*, at such an early time of the year (second half of Rajab which is long before the hajj period), was to inform people that route to Hijaz was clear and secured.³⁵ In other words it was an announcement of the approach of the pilgrimage period, to encourage whoever might consider performing it. On the other hand, the descriptions of the processions that took place on this occasion indicate other reasons.³⁶ The mere aim of announcing the approach of the pilgrimage time would not have needed such expenses. The only possible explanation then, would be that the rulers found this partially beneficial for propaganda reasons.

The two rituals of *dawaran* and *khuruj al-mahmal* were almost identical repetitions of one another. In both cases after touring all around Cairo the parade passed by the Citadel, where the Sultan was seated to watch the colorful processions.³⁷ It was actually after passing the Citadel that the routes

³³Schimmel seems to fall in the trap of considering both as one, which is not the case, and consequently she only talks about the *dawaran*, Schimmel, "Religious Life in Egypt", 365-367.

³⁴Al-Suyuti, *Husn al-muhadara*, 2: 88.

³⁵'Ashur, *al-'Asr al-mamaliki*, 321-322..

³⁶For a detailed description of the procession see Schimmel, "Religious Life in Egypt", 366-367.

³⁷*Ibid.*, 367.

of the two processions differed. In the case of *dawaran al-mahmal*, the procession headed towards al-Fustat, while for the *khuruj al-mahmal* it left for the Hijaz after passing by Bab al-Nasr and Raydaniyya.³⁸ Three days before the procession the people were informed so that they could prepare the decoration of their shops and houses.³⁹ Probably this was to insure the participation of the public.

Historical incidents show the extent to which the Mamluks were proud of their rule over the Hijaz, and keen for the provision of the *kiswa* as a symbol of this authority. Sultan Barsbay violently attacked the Timurid ambassador when he requested permission for Shah Rukh to send the *kiswa*.⁴⁰ Later in 848 / 1444 Sultan Jaqmaq showed more diplomacy in handling the same issue by allowing it once. Nevertheless he allowed it only under the condition that the offered *kiswa* would depart with the Egyptian caravan.⁴¹

This compromise indicates that the act was more important to the Sultan than its meaning. In other words, even if they would allow another to providing the *kiswa* itself, they would never have accepted it being sent with any caravan other than the Egyptian. Clearly this supposedly religious ceremony was nothing but another chance for the ruler to emphasize his religious authority.

³⁸ Al-Qalqashandi, *Subh al-a`sha*, 4: 58.

³⁹ Ashur, *al-Mujtama` al-misri*, 181.

⁴⁰ Ibid., 365.

⁴¹ Ibid., 365.

Finally the *'id al-adha* was celebrated at the end of the *hajj* during the month of Dhu'l-Hijja. After the Sultan attended the *'id* prayer accompanied by *amirs* and high religious officials, he headed towards the great *iwan* where he slaughtered the first sheep.⁴² Later he went to Bab al-Sitara then to the great courtyard to slaughter again. The *amirs* who accompanied him did the same after him, and the sacrificed animals were given out to Mamluks and the public.⁴³

The amount of sacrificed animals on this day was enormous, since the fixed share of every mamluk was two sheep (increased to three on 861/1457) and there were approximately 24, 000 mamluks.⁴⁴ In addition, more sheep were sacrificed by the religious officials and the attendants at the tombs in al-Qarafa.⁴⁵ The people were disappointed if the Sultan was away on this occasion, since they missed these generous offerings that he would provide somewhere else.⁴⁶

The information mentioned above indicates the extent to which religion was the main channel of political propaganda during the Circassian period. Here, underlying political aims are quite traceable in the religious life and vice versa.

⁴²Schimmel, "Religious Life in Egypt", 369.

⁴³Ashur, *al-Mujtama' al-misri*, 191.

⁴⁴Schimmel, "Religious Life in Egypt", 370.

⁴⁵Ibid., 370.

⁴⁶Ibn Iyas, *Bada'i' al-zuhur*, 2: 110.

It seems that the concept of political propaganda through religion was inherited from the Bahri period. However its mode of application was slightly modified under the Circassians' rule. This new dimension was the direct outcome of the political conditions of the Circassian period.

The high expenditure that was the result of this propaganda does not seem to have formed a burden on the ruling regime. Furthermore their investment was quite limited to religious patronage since they rarely participated in any other national occasions.⁴⁷ Given that the economic situation was not always flourishing, and with reference to the above, this is a direct indication for the essentiality of religious propaganda to the ruling regime. For example, several primary sources that inform us of numerous occurrences of plagues and famines, but this barely influenced the religious activities patronized by the rulers.⁴⁸ In fact it even catalyzed those activities with the aim of asking God to take away the catastrophe.

Another contribution of the Circassians is the introduction of what could be called popular Sufism.⁴⁹ This was a direct result of the state promoting it among the masses.⁵⁰ This was done by introducing Sufi groups to

⁴⁷Examples of such occasions that were mainly celebrated among the public were *wafa' al-nil* and *kasr al-kahlij*. For a detailed description of the celebrations on these two feasts see 'Ashur, *al-Mujtama' al-misri*, 197-200.

⁴⁸For a full report on the catastrophes that occurred during the Circassian period see 'Ashur, *al-Asr al-mamaliki*, 325-328.

⁴⁹Fernandes, L., *The Evolution of the Khanqah*, 202.

⁵⁰Idem, "Some Aspects of the *Zawiya*", 9-10.

the madrasas and assigning them a greater share of the *waqfiyya* revenue compared to the *'ulama*.⁵¹

Fernandes suggests that the objective of this action was political: "the proselytization of the masses, i.e. that section of society which could hardly be touched by the intellectual dogmatic form of Islam preached by the doctors of law."⁵² This approach was very shrewd on the part the Circassians since the majority of the population fitted the description of Fernandes.⁵³ This indicates how the Mamluks studied society and selected the channels in which to invest so that to optimize the support their rule by means of religious popularity.

⁵¹Behrens-Abouseif, D., "Change in Function", 88-93.

⁵²Fernandes, L., "Some Aspects of the *Zawiya*", 10.

⁵³For a classification of the society during the Circassian period see 'Ashur, *al-'Asr al-mamaliki*, 311-313.

Chapter II

Spatial Characteristics

Introduction:

Although the four-*iwan* plan remained in common use for mosques and madrasas, some spatial modification took place when the *sahn* was covered. Whether these modifications were made merely to cope with the change of illumination level or for other reasons will be discussed in this section.

The origins of the four-*iwan* plan and the path of its development until the period under study will be considered. This will help to decide which modifications were merely made for lighting adaptations and which were no more than a part of the overall development of this type of plan.

Finally the changes in dimensions relative to one another and to themselves from one mosque to the other will be traced during the period of study. When these are studied they will then be compared with the overall development of the four-*iwan* plan. Consequently it will give some idea of what exactly happened, if anything, to the proportions of various spaces while the *sahn* became roofed.

The origins of the plan:

The four-*iwān* plan was not the earliest form of madrasa plan known. In fact the earliest we know of is the two-*iwān* type. Surviving examples of this are the remains of the madrasa al-Kamiliyya (622/1225) (Fig. 1) and the madrasa al-Salihiyya (641-48/1243-50) (Fig. 2). Creswell gives a list of early two-*iwān* madrasas from the Ayyubid and early Mamluk period, most of which are no longer extant.⁵⁴

The introduction of the four-*iwān* concept did not mark the end of other types of *iwān* mosques. In other words the four-*iwān* was not the only type of madrasa plan that prevailed during the Mamluk era.

Fernandez fails to differentiate between four-*iwān* plan and other composition of plans with *iwāns*. This is clear from the way she generalizes when mentioning that the four-*iwān* was preferred in the Circassian period.⁵⁵ This was not the case for the whole Circassian period as proved earlier in this research.

In my opinion Fernandez made two mistakes when handling the qibla wall. Her research would have presented us with a more precise understanding of the qibla wall development during the Circassian period had she avoided them.

The first is that she does not differentiate between the different stages of the Circassian period. This dynasty ruled for almost one hundred and fifty

⁵⁴Creswell, K. A. C., *M.A.E.*, 2:129-131.

years, a time long enough to contain several stages of development (particularly given the clearer classification of that period as a result of its individuality compared to the Bahri one).

The second is that she looks at the madrasa from a narrow perspective and with only one concern, the qibla wall. This approach made her conclusion less comprehensive and more conjectural rather than proved in some parts.

The type that coexisted with the four-*iwan* was more a variation of it that produced other types of *iwan* mosques. Such types are rarely found in the early Bahri period as the four-*iwan* was newly introduced. Examples of irregular non four-*iwan* plans from this period are the mausoleum of Mustafa Pasha (666-72/1267-73), Salar and Sanjar al-Jawli (703/1303-4). However the popularity of irregular plans seemed to increase towards the end of the Bahri period. Examples here were Abu'l-Yusufayn (730/1330), Aydmur al-Bahlawan (747/1346) and Tatar al-Hijaziyya (748&761/1348&1360).

More occurrences of irregular plans (compared to the four-*iwan* type) were found in the early Circassian period. Examples are Aytmiş al-Bagasi (785/1383), Inal al-Atabki (794-95/1392-93), Mahmud al-Kurdi (797/1395), Qanibay al-Muhammadi (816/1413) and Fayruz (830/1426-27).

By the mid-Circassian period the four-*iwan* plan starts to be reintroduced at the expense of the other types. By the end of the Circassian

⁵⁵ Fernandez y Espinosa, *Visual Composition*, 177-178.

period the four-*iwan* type is almost completely dominant again.⁵⁶ In other words the four-*iwan* plan underwent revivalism towards the end of the Circassian period.

During the late Bahri and early Circassian period it was more likely to find four-*iwan* plans in the larger scale madrasas. At the same time the opposite was true for the other variations of the *iwan* plan. From the mid-Circassian period onwards although the smaller scale was more common madrasas usually had four-*iwan* plans. Examples of these madrasas are Jawhar al-Lala (833/1430) (Cat. 4), Jawhariyya madrasa (before. 844/1440) (Cat. 5), Taghri Bardi (844/1440) (Cat. 6), Qadi Yahya (848/1444) (Cat. 7) and Azbak al-Yusufi (900/1495) (Cat. 13).⁵⁷ Yet they all have a four-*iwan* plan regardless of their different qualities (amount of decoration), types (open or roofed) and site conditions.

The origin of the form of the four-*iwan* or madrasa plan dates back to the early Bahri period. The earliest known example in Cairo is the madrasa of al-Zahir Baybars (660-62/1262-63) of which only a small fraction exists, (Fig. 3). The earliest fully surviving example is that of Qalawun (683-84/1284-85) (Fig. 4) while the four-*iwan* form is more developed in the later one of al-Nasir Muhammad (695-703/1295-1304) (Fig. 5).

⁵⁶The only exception to this from the period of Qaytbay is the madrasa of Gulshani (about 879/1474-75).

⁵⁷Furthermore after the madrasa of Barsbay (829/1425) we no longer see madrasa of that scale which were common in the Bahri period.

Those early four-*iwan* plan madrasas seem to be modeled after the reception hall of Sultan al-Salih Najm al-Din Ayyub (639/1243). This hall in the sultan's palace at al-Roda does not exist any more but its plan was published in the *Description de l'Egypte* (Fig. 6). If the columns supporting the dome over the central court of this cruciform plan are omitted, the plan presents the prototype four-*iwan* madrasa of that period. It is especially very similar to the madrasa of al-Nasir Muhammad, particularly in the longer sides of the court containing the smaller *iwans*.

Later on, this type of plan becomes common only for larger scale buildings like Sultan Hasan (757-64/1356-62) and Umm al-Sultan Sha'ban (770/1368-69). For the smaller ones other varieties of proportion were introduced starting with that of AlMalik al-Jukandar (719/1319).⁵⁸ This variation in proportion first exercised on the smaller scale finds its way later to the larger scale madrasas. The first example of this is Sarghatmish (757/1356) and later Uljay al-Yusufi (774/1373).

The lack of flexibility in larger scale buildings could be the result of functional and structural obligations. The sides of the court with the greater length being assigned for the lateral *iwans* allow more area to be occupied by the student cells. This would not be the case if the longer side was that of the main *iwans* given the larger width they would occupy. In other words the share of area allowed for the cells would decrease.

On the other hand the greater scale of those buildings impose the form of their main *iwans*. Bearing in mind the structural system of the roofing of those *iwans* explains this clearly. The use of a barrel vault dictates that the direction in which the vault is sprung is that of the shortest span. At the same time according to the spatial layout of the *iwān* this direction had to be that aligned with the *iwān* opening and the qibla wall. In large scale buildings with the requirement to provide large *iwans* to go with the whole scale of the structure the only dimension allowed for expansion was that perpendicular to the springing of the vault. In other words it was that direction perpendicular to the qibla wall which resulted in the qibla *iwān* with the proportion described above.

By the mid-Bahri period the four-*iwān* plan reaches its optimum development and peak maturity. This is present in the grand scale examples of Sarghatmish (757/1356), Sultan Hasan (757-64/1356-62) and Umm al-Sultan Sha'ban (770/1369).

Several features identify this stage clearly. The center of the plan is the *sahn* that spatially dominates the entire building. Following the *sahn* in hierarchy was the qibla *iwān*. It was recognizable by being the largest *iwān* in addition to the presence of a mihrab in it. The anti-qibla *iwān* came next in hierarchy with a slightly greater scale compared to the lateral *iwans*. The

⁵⁸A variety of proportions are present in such Bahri examples as Ahamd al-Mihmandar (725/1324-25), Aslam al-Silahdar (746/1345) and Mithqal al-Anuki (763/1361-62).

longitudinal axis of the principal rectangular *iwans* (qibla and anti-qibla) was that perpendicular to the qibla wall.

As mentioned earlier during the beginning of the Circassian period the fashion for the four-*iwan* plan madrasa was lessened. It was not until the middle of this period that the revival of this type started. During this phase several features were both newly introduced and readopted from the Bahri period.

The *sahn* remained dominant but started to be rivaled by the qibla *iwan*. This feature appears in large-scale structures for the first time in the madrasa of Sultan Barquq (786-88/1384-86) (Fig. 7). Here there is a feature that presages the path of the later development of the qibla *iwan*. This is the expansion of its scale to rival that of the *sahn* by means of increasing its width. At Uljay al-Yusufi (774/1373) (Fig. 8) the qibla *iwan* has the same width as the *sahn* but the depth is very small compared to its width which makes the qibla *iwan* much smaller in area than the *sahn*.

In fact this feature is only found in smaller scale madrasas from the Bahri period where the qibla *iwan* is even a bit wider. Examples of this are Almalik al-Jukandar (719/1319) (Fig. 9a), Ahmad al-Mihmandar (725/1324-25) (Fig. 9b) and Mithqal al-Anuki (763/1361-62) (Fig. 10). In these examples the qibla *iwan* is not just a rectangle with its greater length aligned with the qibla wall but the whole *iwan* is equal or greater in width and area than the *sahn*.

The widening of the qibla *iwan* has its roots in large scale structures of the Bahri period at the *khanqah* of Baybars al-Jashankir (706-9/1306-10) (Fig. 11) and the madrasa Sarghatmish (757/1356) (Fig. 12). In both cases this result was achieved by means of *sidillas* opened into the side walls of the *iwan*. The use of *sidillas* only indicates the fulfilling of a function like widening the rows of those praying.⁵⁹ In addition this feature could have allowed a multiplicity of functions in the *iwan*. The way it was done in Barquq (786-88/1384-86) was indicative of more than these two benefits.

In the case of al-Jashankir the *sidillas* are opened so that their side would add to the qibla wall's width. In Sarghatmish the section of the *iwan* width that was increased by means of *sidillas* was stepped away from the qibla wall. Consequently this does not produce the same result obtained in al-Jashankir which is the widening of the qibla wall. In both cases the qibla walls do not benefit spatially from this widening as they do not overlook the street and contain no openings.

On the other hand, the qibla wall of Barquq overlooks the main street and contains intensive fenestration. Consequently, when the whole *iwan* width was increased it allowed the qibla wall to have a share of it and its fenestration increased. Therefore the benefits introduced from the widening of the *iwan* included more lighting and street communication. Here the clear form of *sidillas* was reduced. The whole space extends behind the two columns

⁵⁹Richmond, E. T., *Moslem Architecture*, 146.

flanking the mihrab axis and was aligned with the limits of the arch opening onto the *sahn*.

The madrasa of Barquq was the first reintroduction of this tendency to dominate the street façade with the qibla wall, a feature although quite common in the early Bahri period almost disappeared towards the end of it. This madrasa was an early instance that signaled the return of this feature which was not fully revived until the mid-Circassian period.

Earlier Bahri examples of this included Qalawun (683-84/1284-85) (Fig. 4), al-Nasir Muhammad (695-703/1295-1304) (Fig. 5), Almalik al-Jukandar (719/1319) (Fig. 9a) and Ahmad al-Mihmandar (725/1324-25) (Fig. 9b). These examples offer a variety of scales which indicates that this feature was not exclusive to a certain scale.

Towards the end of the Bahri period the instances of this feature became rare. The only surviving example from that period is the madrasa of Umm al-Sultan Sha'ban (770/1369) (Fig. 13).

However by the mid-Circassian period this feature regains popularity. Numerous examples from that period, most of which are of the four-*iwan* type, include Qadi 'Abd Al-Basit (823/1420) (Cat. 1), Barsbay (829/1425) (Cat. 2), Jawhar al-Lala (833/1430) (Cat. 4), Taghri Bardi (844/1440) (Cat. 6), Qadi Yaha (848/1444) (Cat. 7) and Sultan Inal (855-60/1451-56) (Cat. 8). Later on during the last third of the Circassian period there are no instances of the four-*iwan* type that do not have this feature.

Nevertheless the revival of this feature coincides with the increasing tendency to expand the width of the qibla *iwān*. The revival of the two features simultaneously indicates the new concept behind their re-adoption. In that case it could be assumed that it was no longer increasing the prayer row width as much as the increase of the width of the qibla wall itself that was the main concern at that time.

More interesting is that the revival of these two features coincides with that of the four-*iwān* madrasa. There is a possibility of a hidden link between the three revived features. This possibility is highlighted by the limited range of time of their adoption. Such a link could only be found in the light of more understanding of the traces of their development.

Structural considerations are particularly important to understand how the qibla *iwān* underwent development. They are probably the main reason why the *iwān* passed through certain stages to reach that of the period this research is concerned with. This becomes more obvious when bearing in mind the grand scale of the earlier structures and their roofing.

As argued earlier, the structural restrictions present in the earlier large-scale madrasas imposed the form of their qibla *iwāns*. This resulted in the rectangular form of qibla *iwān* the longer side of which was perpendicular to the qibla wall.

The result was that the qibla walls of the early grand scale madrasas were restricted to a width not exceeding 7-8m. This is true in all the cases

with the exception of Qalawun, which shares some structural similarities with Barquq.⁶⁰ In the case of Barquq the structural solution offered a span almost double that of the other earlier grand scale madrasas. The way the structural problem was solved with no *sidillas* effectively doubled the length of the qibla wall as well.

Four columns were used to interrupt the large span.⁶¹ Consequently it was possible to roof the space that has both sides longer than the maximum span limit.

This was no longer a point to worry about during the late Circassian period due to the rarity of such grand-scale buildings. The result was that the qibla *iwan* was on a smaller scale with dimension that didn't create risks for the spans of the structure any longer. Resulting from this were two types of qibla *iwan* form; the square type and the rectangular (this time with its longer axis parallel with the qibla wall). The first occurred frequently in the early stages while the later became more common during the period prior to the *sahn*'s roofing.

The *sidillas* continued to be used during that phase (mid-Circassian period) of development. They were exclusively attached to the square type of *iwan* and never appeared with the rectangular one. This solution coexisted

⁶⁰However the solution of Qalawun results in a basilica type of space which is not the case of Barquq. For more information about the original roofing of Qalawun madrasa see Creswell, *MAE*, 2: 197-198.

⁶¹Such use of columns appears only once later in the madrasa of 'Abd al-Ghani al-Fakhri (821/1418) (Fig. 14).

with the wider *iwan* one for at least twenty five years ('Abd al-Basit 823/1420 to Taghri Bardi 844/1440). After this period there was no appearance of *sidillas* in this *iwan*.⁶²

It seems that for this given period of time each solution was applied for a specific case. While the wider *iwan* form was used for the larger scale buildings the *sidilla* solution was used for the smaller ones.

Larger scale buildings like Barsbay (829/1425) (Cat. 2) and Janibek (830/1426-27) (Cat. 3) adopt the wider *iwan* system. In these two cases and starting with that of Barsbay the *iwan* width starts to be greater even than that of the *sahn*.

Other smaller structures adopted the *sidilla* solution. These included 'Abd al-Basit (823/1420) (Cat. 1), Jawhar al-Lala (833/1430) (Cat. 4), Jawhariyya madrasa (before 844/1440) (Cat. 5) and Taghri Bardi (844/1440) (Cat. 6). The last example presents clearly the death of such style. In Taghri Bardi the *sidillas*' depth was reduced to such an extent that they became more like recesses.

From the time of Qadi Yahya Zayn al-Din (848/1444) (Cat. 7) there was no presence of *sidillas* in the qibla *iwan*. On the other hand, no mosques during the period of study had such a large scale as Barsbay for example. This means that the wide *iwan* type, first introduced to the larger scale madrasa, was later adopted by the smaller ones. Looking at this from a general point of

⁶²The only exception is from the early 16th century is madrasa of al-Ghuri (909-10/1504-5).

view one notices that new features were always introduced in the larger scale monuments first. This could be understood by relating to the greater expenses and investment in them, experimentation with new ideas or employing more expensive professional builders.

From the time of the mosque of Sultan Inal other features were introduced to the four-*iwan* plan of the Circassian period. Three major modifications were included in this building. The first was the shrinkage of the *sahn*. The *sahn* here and for the first time starts to become of a smaller area than the qibla *iwan* that in turn increased in both width and overall scale. The second was the alignment of the qibla wall with the street façade. The third was the introduction of *sidillas* to the anti-qibla *iwan*.

The last feature is very interesting to look at. The widening of the anti-qibla *iwan* to be almost the same as that of the *sahn* has roots as early as Qadi 'Abd al-Basit (823/1420) (Cat. 1). This form of anti-qibla lasts for at least twenty five years with barely any changes. At the same time the depth of this *iwan* was lessened and became smaller than the width. In other words the anti-qibla followed the same path of development as that of the qibla *iwan*.

In Inal (855-60/1451-56) (Cat. 8) for the first time *sidillas* were introduced to the side walls of the anti-qibla *iwan*. Hence this added to the maximum width of the *iwan*, but there is more than this. The *sidillas* here took the full length of the side walls so that the only thing marking them spatially is the *kurdis* coming down from the ceiling. The same feature is adopted latter in

Qaytbay, N.C. (877-79/1472-74) (Cat. 9) that seems to have been modeled after Inal. Later in Qaytbay, Q.K. (880/1475) (Cat. 10) the *sidillas* were lost and there was no trace of their presence. The whole *iwān* became one rectangular space that was substantially wider than the *sahn*.

It seems as if the anti-qibla *iwān* followed the same path of the qibla one in becoming wider than the *sahn*. Nevertheless this was done over a shorter period of time and with less examples overlapping with the two solutions as in the case of the qibla *iwān*.

In my opinion, Barquq was the prototype of the four-*iwān* plan madrasa for the first half of the Circassian period, so was Inal for the second half. Inal's experience seemed to have particularly influenced the roofed *sahn* examples. This would sure be a good motive to consider the possibility of it being the actual first roofed *sahn* mosque. This could be only confirmed with the aid of further research and therefore will be left for a later stage of this study.

By the time of roofing the *sahn*, the four-*iwān* madrasa was transformed into what I would call the I-shaped plan type, the two typical examples of which were the two madrasas of Qaytbay. Although the clearest origin of the form was found in Inal the two examples of Qaytbay present the form more boldly.

To my amazement, a prototype of the I-shaped plan type could be found in a quite early example of Bahri religious architecture. This is the mosque of

Almalik al-Jukandar (719/1319)(Fig. 9a). What is more interesting is the possibility that its roofing was original.⁶³ The question would be then was that a characteristic of the roofed four-*iwan* madrasa that did not find popularity in the Bahri period and was readopted by the Circassians? If that was the case the question would be why was it unpopular early and became so later? Again that is another question that requires an answer including the understanding of how the society changed from the Bahri to the Circassian period.

The same form of plan type finds roots even earlier than the mosque of al-Jukandar. The form is present in the *qa'a* of Alin Aq (693/1293) (Fig. 16). The fact that this *qa'a* is the only surviving example of this plan type in domestic architecture calls for attention. Other existing *qa'as* like Ahmad Kohya (710/1310) (Fig. 17), Sharaf al-Din (717-38/1317-37) (Fig. 18 Tashtumur (735/1334) (Fig. 19), Muhib al-Din al-Muwaqqi' (751/1350) (Fig. 20) and Ghannam (774/1372-73) (Fig.21) are not related to this type of plan.

⁶³Creswell, K. A. C. *MAE*, 2: 271-272.

Development of the dimensions and proportions of the qibla *iwan*:

In the examples under study the more common square plan of the qibla *iwan* seems to have been substituted by a rectangular one. The longer axis of this rectangular space was parallel to the qibla wall.

Chart 2.1 shows the overall increase in width (the dimension parallel to the qibla wall) from the time of the mosque of Sultan Inal (855-60/1451-56) onwards. In addition what is noticeable from the chart is that the variation in width became more limited in the case of the ones with roofed *sahns*. For example the open *sahn* ones have a maximum value of 16m (Barsbay 829/1425), while the minimum is 4.75m (Jawhar al-Lala 833/1430). On the other hand, the roofed examples have a maximum value of 14m (Qaytbay, Qal'at al-Kabsh, 880/1475), while their minimum is 10.1m (Azbak al-Yusufi 900/1495). Abu Bakr Muzhir (884/1479-80), the open contemporary example, does not seem to fall in their category.

Almost the same rule applies to the depth of the *iwan* (dimension perpendicular to the qibla wall). Chart 2.1 shows a maximum depth of 11.25m (Barsbay 829/1425) and minimum of 4.55m (Jawhariyya, before 844/1440) for the unroofed examples. For the roofed ones the chart shows a maximum value of 7.25m (Qijmas al-Ishaqi 885-86/1480-81) and a minimum of 5.5m (Azbak al-Yusufi 900/1495).

The standardization of dimensions for the four roofed examples is most noticeable in the bars of the chart representing the height. A big variation is

noticed for the open type (12.4m for 'Abd al-Basit, 13.4m for Barsbay, 7.8m for Jawhar al-Lala, 9m for Taghri Bardi). However, for the roofed type the range of heights becomes limited to between 11.2m and 12.4m.

In general the unroofed type could be distinguished by their variation in dimensions. It could be argued that this was the result of different site conditions. Nevertheless, while the same rule should apply to the roofed examples, they tend to present almost the same formula in the chart.

The diagram helps in tracing the dimensions' development individually, but it also reveals the change of their relation to one another with time. These dimensions operate together to produce the proportions of the space. If they are compared with one another, the resulting ratios reveal the development of the proportions of space they enclose. No trace of a formula could be derived from the open type, while a constant relation stands out clearly in the roofed one.

The width is kept at an almost constant proportion to the depth after the mid 15th century. It is always greater than the depth by a nearly fixed value (from one and a half to two times the depth). This was not the case in the earlier period. In some examples like Jawhar al-Lala they were equal and in 'Abd al-Basit the depth was even greater. The contemporary case of Abu Bakr Muzhir does not belong to this rule.

When comparing width to height, the diagram shows they are not in a constant relation in the roofed examples. Nevertheless the difference between

them is limited to a small range. This is unlike the open type that varies in this proportion completely.

The only common factor among all mosques displayed in chart 2.1 is that in all cases, roofed and open, the height is always greater than the depth. Nonetheless it is clear how their relation remains constant in the late examples, in a way similar to that of the width-depth proportion. On the other hand there is a great variety of relations in the examples pre-Qaytbay.

Either singly or together the *iwan* opening and the qibla wall were the main sources of lighting for the space. Therefore, the axis perpendicular to the qibla wall was the main path for daylight. The side walls were no more than internal partitions (in most cases) and consequently contained no exterior openings that could supply light. Some exceptions to this are later examples like Qaytbay, Qal'at al-Kabsh (880/1475) (Cat. 10), Abu Bakr Muzhir (884/1479-80) (Cat. 11) and Qijmas al-Ishaqi (886/1481) (Cat. 12). A unique case here is that of Sultan Inal (855-60/1451-56) (Cat. 8) the openings in the side walls were placed at about 5m height. This does not show in the plan and is the result of the qibla *iwan* having greater height than adjacent spaces (Pl. 1). All these exceptions will be highlighted later in the fenestration section.

The main concern here is how the dimensions affect the level of illumination, particularly the depth which is the dimension aligned with the above-mentioned axis. In the light of this it would be valid to consider the depth inversely proportional to the level of illumination. Two reasons are

behind this. The first is that the light obviously fades away with increased depth. Second it increased the area of the side walls that were in most cases no more than internal partitions. In other words it added to the length of walls that did not supply light through their fenestration.

On the other hand, both height and width are dimensions that are directly proportional to illumination levels. Their increase would give more area to walls opening onto exteriors, especially the qibla wall. Window height in particular has another influence. Since the light always would penetrate the window at an angle, the height of the top of the opening would affect the depth of light penetration. Fig 22 demonstrates this effect diagrammatically.

The depth is the dimension that is inversely proportional to the level of illumination (in most of the cases studied). On the contrary are the height and width of the qibla *iwan*. Therefore a comparison of the change in the ratios width/depth and height/depth will help to draw a full picture of the development of the light plan from the open to the roofed type. Chart 2.2 shows what happened to those ratios with time.

By examining the width/depth bars it is noticeable that there is an overall increase in the roofed type. This indicates how the depth was sacrificed for the width. Again the bar readings tend to fall in a smaller range for that class, unlike the bars of the mosques pre-Qaytbay which show more variation.

As to the height/depth ratio, again the diagram shows an overall increase for the roofed examples. Nevertheless the increase of this ratio is not like that of the width/depth one. This last observation is worth a closer look.

The height/depth ratio controls light obtained from both the *sahn* and the qibla wall. However since the expansion of width went beyond that of the *sahn* (for the later period), the increase in width did no longer help obtaining light from the *sahn*. It becomes merely in the favor of light supplied through the qibla wall. Accordingly the rise of the ratio width/depth against that of height/depth is a direct indication of the increasing dependence on lighting from the qibla wall. Consequently, the results obtained here reflect the increasing dependence on the qibla wall for the supply of light compared to the *sahn* in the roofed type.

More noteworthy is the fact that the lowest two readings obtained for the Qaytbay period were that of Abu Bakr Muzhir (884/1479-80) and Qijmas al-Ishaqi (886/1481). The first was not originally a roofed mosque,⁶⁴ and in addition it has one side wall open to the street. The latter, although roofed, has one side wall opening onto the exterior. In both cases the increase in depth which would present a low ratio increase in the level of illumination.

Some conclusions can now be made. A great tendency is present to increase any dimension that is directly proportional to the level of illumination for the roofed type of mosque. The opposite tendency takes place in the

dimensions inversely proportional to the level of illumination. The coexistence of the two approaches to deal with positive and negative factors affecting illumination points out the hidden intention to utilize lighting in the interior.

The result of this was a change in the proportions of the qibla *iwan*. It increased any dimension that would render an overall increase in the surface area of the qibla wall. Particularly here the width was increasingly emphasized for the reasons discussed earlier. At the same time the depth shrank resulting in a space that is broader and shallower than before. This development is diagrammatically presented in fig 23.

The above-mentioned development coincides with the roofing of the *sahn*. It even remains exclusively related to the roofing due to the fact that unroofed *sahn* examples coexisted with the roofed ones but never possessed the same features.⁶⁵ Therefore it becomes beyond doubt that this modification served to compensate for the drop in the lighting supplied to the qibla *iwan*, due to the roofing of the *sahn*.

Rare was the case when this proportion (represented in fig.2.2) was sacrificed. Whenever that was the case it was mainly because the increase in the total length of the side wall was to the advantage of lighting the space. This was simply when one or both side walls opened onto exteriors and consequently had potential to supply light.

⁶⁴Comite report of 1891-9 mentions on page 77 that the deteriorating state of the *sahn* flooring was the result of the total absence of a roofing ('*adam wujud saqf*').

Development of the dimensions and proportions of the *sahn*:

The nearly square shape of the *sahn* was retained all through the period of study. This is the case regardless of whether it was covered or not. Chart 2.3 shows the changes in dimensions of the *sahn* for the mosques under study. From the diagram it is clear how the width (the dimension parallel to the qibla wall) remained either quite close or equal to that of the depth (the dimension perpendicular to the qibla wall).

Another remarkable feature about the width and depth bars is that they both vary greatly in the pre-Qaytbay period. Later they fall within a limited range. For example the width varies from 14.75m (Barsbay 829/1425) to 5.25m (Jawhar al-Lala 833/1430) for the open type. For the roofed examples the width ranges from 8.75m (Qaytbay, N.C. 879/1474) to 7.5m (Azbak al-Yusufi 900/1495). The same trend took place with the depth ranging from 16.5m (Barsbay) to 5.25m (Jawhar al-Lala) in the early examples while only ranging from 9m (Qaytbay, Q.K. 880/1475) to 7m (Azbak al-Yusufi) in the later ones.

The bars representing the height show a general increase during the later period. More noteworthy here is the relation of the height to the other two dimensions. From the bars of the later period two things can be noticed. The first is a general increase in the difference between the bars of the height

⁶⁵Contemporary examples of this were Gulshani (C. 879/1474) and Abu Bakr Muzhir

and the other two dimensions. This means that the general increase in height was not accompanied by an increase in the area of the *sahn*. The second is that the relation of height to width and height to depth becomes more constant. Note that the mosque of Abu Bakr Muzhir (884/1479-80) still remains odd among its contemporary roofed examples just like the case of qibla *iwan* discussed earlier.

When looking in detail at the development of the *sahn* it is very important not to forget its original function. Spatially it functioned as a lobby unto which the four-*iwans* opened, but what is more vital was its role as a light well. The latter is of importance here since it is the factor directly affected by the roofing, hence it is vital to this research.

On the basis of this understanding two factors should be taken into consideration. They are the two variables directly responsible for the level of light supply by the court; its area and the height of walls enclosing it.

The level of illumination is directly proportional to the area, i.e. an increase in the area would result in more light being supplied. Therefore the area occupied by the *sahn* within the total area of the mosque (4 *iwans* + *sahn*) is one factor reflecting the overall level of lighting in the space. Chart 2.4 displays the changes in this relation between the *sahn* area and the total area. From the chart it is clear how the share taken by the *sahn* of the total area

(884/1479). A later example was Qanibay al-Sayfi (908/1503).

decreases suddenly from the time of Qaytbay onwards. Again notice how Abu Bakr Muzhir stands out differently from the roofed type.

On the other hand the height is inversely proportional to the level of lighting, due to the greater area covered by shadows that would result from a higher wall. Fig 24 represents this point diagrammatically.

From the drawing in fig 24 it is clear how the increase in the height of the wall in a light well would decrease the area exposed to light. This remains valid for any sunray angle (except perpendicular) given that the other dimensions of the court are kept constant.

Chart 2.3 shows an increase in the height of the *sahn* in the later period. This indicates that the height did not shrink with the area. Chart 2.3 shows how the difference between the height and the other two dimensions increased in the mosques with roofed *sahns*.

The results presented in the above section reflect diminishing of the *sahn*'s role as a light shaft. This is the case coinciding with its roofing. This is clear from the drop in the factors that increase the efficiency of this particular function.

In the new context the *sahn* was no longer responsible for the supply of light for more than its own requirements. Hence other spatial considerations became more influential on its form. This resulted in the increasing variability of the ratio between the *sahn* area and that of the mosque in the later roofed

examples. This was never the case in the unroofed ones where the variation in relation between these two areas was quite limited.

This reflects the interference and perhaps prioritization of other factors influencing the spatial design of the *sahn*, factors which might have been present earlier but were never given as much consideration.⁶⁶ Now that the *sahn* was released from the obligation of lighting adjacent spaces, such factors seem to have taken more priority.

Development of the dimensions and proportions of the anti-qibla *iwan*:

The anti-qibla *iwan* contains more variety in its form for the period post-Qaytbay. This is clear from a comparison of the later and earlier plans. The anti-qibla *iwans* of the earlier period buildings are more standard in form. They almost all have the same proportions regardless of their different scale.

In fact, the early period presents a greater variety of scales but rarely of proportions. The opposite was the case for the later period. The areas of the anti-qibla *iwan* were kept within a limited range in the Qaytbay period examples.

Chart 2.5 clearly indicates this change in feature. It shows how the earlier period has almost fixed relations between the bars of the chart.

The depth is almost half the width while the width is almost half the height. This is clearly noticeable to the extent that if lines are drawn linking

the maximum values of each dimension together they will have very close inclinations. Furthermore the dimensions of the anti-qibla of the open *sahn* type are indicative of the scale of the whole mosque. Again by looking at the chart one can easily identify the scale of each one compared with the other. This is necessarily true for the roofed type buildings presented in the chart.

For the period post-Qaytbay a general increase in depth against height is noticed compared to the case of the pre-Qaytbay examples. The depth value rises from being one quarter to one third the height in the open type to reaching half of the height for roofed one.

The width values in chart 2.5 vary greatly from one building to the other in the post-Qaytbay period. The depth is kept within a quite limited range while the height becomes almost fixed to a value a bit above eleven meters.

Noteworthy here is the fact that the width increases against the depth value for the cases where only one or both side walls are not opening onto exteriors. Cases having a single wall are Qaytbay, N.C. (879/1474) (Cat. 9) and Qaytbay, Q. K. (880/1475) (Cat. 10) while the one with both side walls separating interiors is Azbak al-Yusufi (900/1495) (Cat. 13). On the other hand the case of Qijmas al-Ishaqi (886/1481) (Cat. 12) which has the greatest depth (compared to width) is the case with both side walls externalized.

⁶⁶By this I mean monumentality, proportions of openings and space and/or other aesthetic considerations.

The case of Azbak al-Yusufi with its blocked side walls presents the ideal example of this approach. This seems to be compensated by increasing the perimeter of the front wall (the only one opened onto the exterior) by means of a recess. The resulting total perimeter of the walls opened onto exteriors here is 15.7m. Therefore the low reading in the diagram of the width of the *iwan* of Azbak is not so misleading. This is because its total perimeter is greater even than Qaytaby, Q. K. (the one with the greatest width) which is 11.5m.

The ambiguity this variation presents could be explained by looking at one factor. In fact this variation in width and depth explains the whole approach to designing the space of the anti-qibla *iwans* of the roofed example. They all have one common factor. Being backed up by the flexibility of this *iwan*, the architect tends to increase any dimension that would increase the total perimeter of walls opening onto exteriors.

In the light of the above a full picture could be drawn for the way the anti-qibla *iwan* developed with the roofing of the *sahn*. This could be brought into more focus by looking first at the case of the *iwan* prior to the roofing.

In the earlier period the *iwan* volume seems to depend on that of the whole mosque (*sahn* and 4 *iwans*). Consequently, it depended on the size of the *sahn* that in return offered a level of lighting depending on its scale. Therefor the anti-qibla *iwan* was a subject of the *sahn*'s lighting and accordingly depended on its scale.

This theory would only be valid given that the proportions are kept constant, which is exactly the case. In addition the height is always much greater than the depth making the trip shorter for the light to reach the end of the *iwan*.

The case is different for the roofed type when the proportions were freed from any restriction imposed by the *sahn* and its lighting. On the contrary they show flexibility and are employed to supply light through other means.

In fact it is the flexibility of the anti-qibla *iwan* itself that allowed this approach. This is highlighted when compared with the qibla *iwan* which was more restricted to a regular form imposed by its function as the main prayer area.

Conclusion:

Four-*iwan* plans with regular forms underwent revivalism as early as the first third of the Circassian period. From the mid-Bahri period, and until the time of their revivalism, their appearance was quite rare particularly in smaller scale madrasas. Unlike the case earlier (when it was most common in the large scale) such plan type revivalism became standard regardless of the scale.

The qibla façade occupying a share of the street façade underwent a revivalism during the same stage. Both revived features were proven to have shared common fate. The frequencies of their appearance always coincided with one another, which would suggest a possible link between them.

The three major areas of the four-*iwan* mosque, that were subject to analysis in this chapter, underwent modification coinciding with the roofing of the *sahn*. In addition each space developed in a different way depending on its role and spatial characteristics. Nevertheless, this individuality in development always shared a common target; optimizing light supply without the dependency on a light shaft (*sahn*). This is traceable in several modifications that presented us (through the charts) with an initial idea of the spatial formula for the roofed type.

There is noticeable increase in the surface area of walls opening onto exteriors and the reduction in any dimension, that is inversely proportional to the efficiency of light supply. The overall development of the roofed example' plan resulted in what I identified as the I-shaped plan that is unique of this type.

Finally there is a clear tendency to increase the height of walls relative to the areas they enclose. It is understandable at this stage of the research how this might be useful to supply light more efficiently in the case of the two main *iwans*. However the case is not the same for the *sahn* since none of its walls open onto exteriors. At the same time the *sahn* was the area that shows the

highest increase in such proportion (height relative to area). This might be only explained later with the aid of further research.

Chapter III

Fenestration

Introduction:

When dealing with fenestration two aspects have to be considered so that a full picture can be drawn. The first is the study of the fenestration as a mere area of openings compared to the solid of the walls. In other words a direct study of the solid to void percentage and how far was it affected by the *sahn* coverage. The second is the type of fenestration installed within these openings themselves and their disposition.

The solid to void percentage comparison is a direct look at the possible requirements that an opening can serve, regardless of which type of functions are provided by such an opening. The structural system of the buildings under study is retaining walls. Therefore the increase in the openings' area will indicate direct needs for certain utilities given the structural challenges of increasing their percentage within the wall.

The fenestration type study offers a filter that classifies every opening and will help bring the first level of study (solid to void) to completion. The type of installation that fills an opening and its height may give an idea of how it functions within the wall. The type of wall itself in which a given opening is made will be discussed in terms of what types of spaces the wall separates. Of concern here are the walls opening onto exteriors for they are the ones that

have the potential to supply light through their fenestration compared to any other internal partition. This will help to point out which of the openings are serving as light sources, and if not then for ventilation and/or communication only. It can further tell whether some of them are a combination of some or all of those functions at the same or different times.

At the end of this section the two levels of study will be brought together and compared. Accordingly some openings will be considered negligible in terms of lighting.

The Solid to Void Percentages:

As mentioned above this section is only dealing with the area of void compared to the solid area of the walls. This will give a primary idea of the changes in this factor. Nevertheless this study will be further elaborated by the consideration of the types of windows installed in it.

i. Qibla Iwan:

The three walls of the qibla *iwan* do not usually open onto exteriors. This feature is reflected in the study of the direction of light and ventilation supply and the factor of dependency between different spaces. In particular the walls on the sides do not follow the same rule in all cases but are adjustable to site conditions. The only wall that is always externalized (opening onto an exterior) in this *iwan* is the qibla wall itself. There were more occurrences of

externalized side walls in the qibla *iwan* in later examples than in earlier ones, but this is not an absolute rule.

For example two out of the four roofed examples under study (Qaytbay, Q. K. and Qijmas al-Ishaqi) have externalized side walls. In the case of Qaytbay, Q. K. (Cat. 10) one of the walls is that of a *sidilla*. Nevertheless the spaces of the *iwan* and the *sidilla* are barely distinguishable. This was discussed in detail above in the section on space proportions.

On the other hand only three out of nine of the earlier buildings have externalized side walls. They are Qadi 'Abd al-Basit (823/1420) (Cat. 1), al-Jawhariyya (before. 844/1440) (Cat. 5) and Abu Bakr Muzhir (884/1479-80) (Cat. 11). In the first two cases they have their openings within *sidillas*. Particularly in the case of al-Jawhariyya the *sidillas* are too deep to be expected to light the qibla *iwan* with efficiency.

In the case of Abu Bakr Muzhir (the only one with no *sidillas*) the surface of the inner wall that is not aligned with the outer results in one column of openings being quite deep. In consequence the efficiency of such openings in terms of light supply is questionable.

Chart 3.1 displays the percentage of the void area (the total area of fenestration) in the total solid area of the qibla wall. A general increase is to be noted in the void percentage of the roofed examples. The earlier buildings all fall under the 20% value. The only exception to this is Jawhar al-Lala (833/1430) with a 23% void area. On the other hand, all the mosques under

study from the second half of the 15th century, with one exception, have void percentages above 20%.⁶⁷

The rise in percentage of fenestration in the qibla walls is not a direct indication of increase in the level of illumination. This would only be true if the area onto which these windows open remained the same. This is not necessarily the case, since all the mosques under study have different qibla space volumes.

In the light of this understanding chart 3.2 helps to achieve a clearer idea of the relation between openings and the spaces they serve. The diagram represents the total areas of openings and the corresponding space areas they light. Comparing these variables gives rise to another realization: chart 3.1 shows that the area of void generally increased within the wall, while chart 3.2 shows that increase in relation to the space. It is obvious how the openings' total area became relatively larger in comparison with the space.

For the early examples, the area of the void ranges approximately from one eighth (Qadi 'Abd al-Basit 823/1420) to two-fifths (Jawhar al-Lala 833/1430) of the *iwan* area. The roofed examples range from one quarter (Qaytbay Q. K. 880/1475) to almost half (Azbak al-Yusufi 900/1495) the area of the *iwan*.

It is worth mentioning here that in the early Circassian period there are some mosques that are missing the lower tier of windows in their qibla walls.

⁶⁷The exception is Qaytbay, Q. K. (880/1475) (Cat. 10) with a void percentage of 18.6%.

Instead the shapes of the windows are substituted with recesses of the same proportions. Inal al-Atabki (794-95/1392-3)(Pl. 2), Mahmud al-Kurdi (797/1395) (Pl. 3). This only occurs once in the sample under study in the case of al-Jawhariyya madrasa (before 844/1440).⁶⁸

ii-The Sahn:

The case of the *sahn* is quite different from that of the qibla *iwan*. This is because of the fact that all the walls of the *sahn* are surrounded by interior spaces opening onto it. In fact the *sahn* always remained independent of any other space for its own lighting, both before and after it became covered. This space was the main source of illumination for all surrounding spaces in the earlier open *sahn* buildings. Even in the later roofed types it was at least (if not light-providing to other parts) self sufficient in terms of lighting due to the presence of the lantern.

Consequently, the differentiation that was applied for the study of the walls of the qibla, on basis of their externalization, could no longer be applicable. Meanwhile, the reversing of the study process from considering a space receiving light (the qibla *iwan*) to another that supplies it (the *sahn*) gives rise to another type of differentiation. Here the difference lies in the type of spaces in terms of the functions they perform and the characteristics they possess in return.

⁶⁸ Another example that was not included in the sample of study is the mosque of Qaytbay at

There exist two main types of spaces behind the *sahn* walls in all the cases under study. Either it was an *iwan* that takes the full height of the building or cells and circulation spaces that only took a portion of the wall height. This resulted in the existence of two types of walls.

The first is the type that contains a single arch, at least open to almost the full width of the *sahn*. That was the case of arches of the qibla and anti-qibla *iwans*. The second type of wall is that containing the lateral *iwans*. Such walls are occupied with the *iwan* arches in addition to other smaller openings. Those smaller openings fit in the area of solid wall, formed as a result of the difference in dimension between the width of the *sahn* and the narrower width of the lateral *iwans*. These openings correspond to circulation areas and cells on the ground and upper stories respectively.

Chart 3.3 displays the void percentage in the total solid area of the *sahn* walls containing the greater arches (qibla and anti-qibla). A general decrease is clearly noticeable in the void percentage of the roofed examples. This later group have values ranging from 52% to (Qaytbay N. C.) to 60% (Azbak 900/1495).

On the other hand most early buildings have values above 55%. They generally range from 57% to 70%. The only exception with the lowest reading in all examples is Barsbay (829/1425) with a reading of 49%. This case is exceptional in the general ranges of that period due to its grand scale. The

arches of Barsbay have the greatest span of all the mosques under research in the sample. This is most likely made to suit the width of the *sahn*, which is the largest compared to the others as well. Nevertheless the difference in width between the arch and the width is greater than all the rest. Why was that the case? Why doesn't the arch stretch to take almost all the width like the other cases?

The answer to this lies in a closer look at the proportions of that arch. In the opening of the arch of Barsbay, the height of the lower part beneath the springing of the arch is the shortest in proportion to the height of the tympanum area (the void bordered by the two arcs) compared to other mosques. This is so to the extent that it is doubtful that it could be reduced without creating an odd proportion. That would result if the width of the opening were increased while retaining the same wall height. This is because maintenance of the arch's proportions would demand an increase in height relative to width.

One solution would be to increase the whole wall height to preserve as far as the springing in proportion. That would in return affect the whole mosque's proportions, and raise the question of whether the site conditions allow this or not. The other solution would be to sacrifice the height of the lower part to make up for the increase in the arched area's height. That would also raise safety concerns from creating an arch of such odd proportion.

Chart 3.4 displays the void percentage in the total solid area of the *sahn* walls containing the lateral *iwān* arches. It is quite impossible to find any link that classifies any group within the buildings represented in the graph. If there could be any traceable link from this graph it is found in the early buildings. The percentage of void seems to be inversely proportional to the area of the *sahn*.

The inversely proportional relation mentioned above could be pointed out by looking at the highest and lowest values and the corresponding areas. For example, the lowest value of void percentage is that of Barsbay (33.7%), corresponding with its greatest area which is 243.4 sqm. On the other hand the highest value is at Jawhar al-Lala (44.8%), corresponding to its smallest area of 27.6 sqm. This type of relationship does not continue to exist in the later examples and there are no other ones apparent that links them.

iii- The Anti-Qibla *Iwān*:

The way the walls of the anti-qibla *iwān* enclose the space is very similar to that of the qibla *iwān* walls. There is the wall with the *iwān* arch, the side walls and one main wall facing the *iwān* arch. The main difference between the two *iwāns* is the higher flexibility of anti-qibla *iwān* in both form and fenestration.

This flexibility probably was because of its lower priority as a space compared to the qibla *iwān* and the *sahn*. Accordingly it came first in terms of

form sacrifice when dealing with site conditions and other obligations.

Consequently, a variety of fenestration cases are found in this *iwān* all through the period of study. In addition, there is a number of buildings listed in this research where openings are completely absent from their anti-qibla *iwān* walls. Examples of this are Barsbay (829/1425) (Cat. 2), Jawhar al-Lala (833/1430) (Cat. 4) and Taghri Bardī (844/1440) (Cat. 6). This diversity of fenestration makes the use of graphs quite pointless.

There is no rigid system of fenestration that is as standardized as that of the qibla and *sahn* walls. In spite of this, there is one general feature that differentiates the early and the late period. This is the clear tendency found in the roofed *sahn* examples towards more fenestration, particularly those walls supplying light. Further evidence is that the cases of completely solid walls in this *iwān* no longer exist later.

Fenestration contained in the anti-qibla *iwān* of roofless *sahn* buildings seems to be for functions other than supplying light in most of the examples in this research. The cases referred to here are Qadi 'Abd al-Basit (823/1420) (Cat. 1), Janibek (830/1426-27) (Cat. 3), Qadi Yahya (848/1444) (Cat. 7) and Sultan Inal (855-60/1451-56) (Cat. 8) form the early period. There is one more from the Qaytbay period, namely Abu Bakr Muzhir (884/1479-80) (Cat. 11).

In the case of Qadi 'Abd al-Basit (Cat. 1), a careful look at the plan shows the possible function of its intensive fenestration. There is a thin

corridor surrounding the north *iwan* from the north and the west sides. This corridor leads to the entrance of the mosque that is on the east façade. The fact that this corridor was originally roofed is unquestionable (Pl. 5 a and b). This leaves the corridor with only the anti-qibla *iwan* as its source for light and ventilation. Therefore most of these windows are probably to provide light and ventilation to that space behind the *iwan*.

The feature of a roofed circulation space (or any other that demands the provision of light and ventilation) existing behind the anti-qibla *iwan* is unique. In other cases (early and late) this did not occur. The walls of the anti-qibla usually form the north western limit of the mosque. Sometimes they would have doors to storage rooms (that do not require light or ventilation) as in Barsbay (829/1425) (Cat. 2), Jawhar al-Lala (833/1430) (Cat. 4) and Taghri Bardi (844/1440) (Cat. 6). In other cases (mostly later ones) they open onto courts as in Qadi Yahya (848/1444) (Cat. 7), Qaytbay Q. K. (880/1475) (Cat. 10), Abu Bakr Muzhir (884/1479-80) (Cat. 11), Qijmas al-Ishaqi (886/1481) (Cat. 12) and Azbak (900/1495) (Cat. 13).

This means that this corridor was dependent on the anti-qibla *iwan* for its lighting. The anti-qibla *iwan* is an interior space that is not light providing. Rather it depends on the *sahn* for its light. Nevertheless it can provide enough light and ventilation to such a space as a corridor, particularly in the case of Qadi 'Abd al-Basit with its roofless *sahn*.

This demand might explain why it has such a shallow depth of *iwan*,

which would bring closer to the corridor the space of the *sahn*. This explains the reason for the intensive fenestration in this *iwān* wall of 'Abd al-Basit. Particularly in the eastern wall (opening onto the street) that might be to provide surplus light and ventilation for the *iwān*'s own requirements. It is worth mentioning here that the void percentage of the two symmetrical side walls is higher than the main one. This resulted in the lighting at the first portion of the corridor before the turn is not as intense as it is after. The reason behind this might be explained with the aid of the fenestration type and disposition; a subject to be dealt with later in this section.

The mosque of Janibek (830/1426-27) (Cat. 3) presents another type of application for the fenestration other than supplying light for the anti-qibla *iwān*. In this case the main wall of the anti-qibla *iwān* is the one facing the street. This feature is also found earlier in the two nearby mosques of Inal al-Atabki (794-95/1392-93) (Pl. 6) and Mahmud al-Kurdi (797/1395) (Pl. 7). In all cases the main walls contain fenestration and form part of the main street façade.

The presence of a roofless *sahn* in the case of Janibek eliminates any dependence of the anti-qibla *iwān* on any other open space for requirements of light and ventilation. This would leave any openings made here to be merely for street communication or façade articulation. That is the most likely explanation. This is because of the absence of any openings on the level close to the ground other than a door.

The mosque of Sultan Inal (855-60/1451-56) (Cat. 8) is another example with fenestration in the anti-qibla *iwan*. Here there is quite intensive fenestration in all the walls that seemingly similar to the case of Qadi 'Abd al-Basit. In fact this can not be the case because the plans are not at all related.

In Sultan Inal the main wall in addition to those of the two side *sidillas* are externalized.⁶⁹ The fact that the walls are all externalized in addition to the assumption that the mosque's *sahn* was originally unroofed imposes a question that could not be easily answered. Why the intensive fenestration if there is no obvious demand for such extra work to be done? The fact that none of those walls belongs to the main façade (other than the qibla wall) is an important clue to the answer. The conclusion is that this mosque was most likely a roofed *sahn* one. In that case it would make it the earliest example of this, rather than Qaytbay N. C.

A further investigation of the plan shows a clear similarity in architecture, scale and even fenestration between this mosque and the later Qaytbay N.C. This would provide the hypothesis that the mosque of Qaytbay N. C. was actually modeled on this mosque's experimental features.

⁶⁹ It is worth remembering here that this is the first instance of the presence of *sidillas* in this *iwan* until that of Qaytbay N. C. (879/1474).

Fenestration Types and Composition:

It is quite hard to trace the types of fenestration that were in common use during the period under study with exact accuracy. This is because the window is the least durable element in architecture (particularly if made of wood or stucco). Nevertheless a general idea could be given depending on some remaining fragments, restoration reports and earlier paintings like those of Pascal Coste and Prisse d'Avennes.

Bringing this data together and analyzing it showed that several types of windows were in use. There prevailed five main types; grilled, grilled with shutters, horizontally pivoted shutters, stucco grilled, and stucco inlaid with glass. Apart from this the *mashrabiyya* was present too but that should be considered more a type of enclosure (like a modern balcony) and not merely fenestration and hence will not be discussed.

Each one of those types is recognized by certain characteristics that gives rise to its appropriate function. For each type there are uses that are possible and others that are restricted or prevented completely. The bare opening itself is not included as a type because it could not be assured whether it was originally so or lost its filling. Furthermore it does not indicate any particular functionality on its own because there is nothing that it restricts.

The above types could be classified more fully as follows:

1- Grilled (either wood or metal): (Pl. 8)

The presence of the grill gives rise to certain characteristics that dictates the utilization of such openings. The function for which this opening would be installed is in turn dependant on its positioning. In other words its height of installation and type of wall in which it is installed would indicate which of its characteristics are functional and which are not. Generally and in all its cases its allows ventilation, visibility and lighting. On the other hand the features it restricts depend on the type of wall in which it is installed and its placement within it.

The grilled opening could be installed in a wall separating two interior spaces of the same or nearly the same level. In that case it would be used to allow verbal or visual communication and air circulation but prevent physical access through it. If the two spaces have a great difference in level (one that a human being cannot cross safely) it would be used in addition to the above as a barrier to prevent the person close to it on the higher level from falling down. In other words it would act as a balustrade.

When the same opening type is installed in a wall separating interior from exterior spaces it has another function. In that case it could also be needed for security reasons. Here as well the difference in level and the accessibility of the opening would decide whether it is used for a balustrade or not. This type is usually accessible at least from one side unless when used merely as a screen against birds, while supplying light and ventilation.

2- Grilled with shutters:

This type maintains the same function as the grilled one but further provides the feature of light, visibility and wind control if required.

This particular adjustable facility makes it a must that it would be accessible from the shutters' side; it is more common with walls separating interior from exterior spaces.

3- Stucco grills: (Pl. 9 and 10)

This type is very similar to the grilled one but it would not allow visibility. This type, although it could theoretically function as a screen, was rarely used in that sense. For example if one side of it is accessible then visibility would be allowed from the accessible side while allowing privacy like a *mashrabiyya*. Surprisingly this application never existed, particularly in Cairo. Instead they function in a similar way to the grilled type, that is they were installed at non-accessible heights. Nevertheless because of the quality of their material they are more concerned with aesthetics than the purely functional grill.

This type gives a diffused quality of light. Furthermore it was usually employed within the decorative scheme and hence was usually placed so that it was easily recognized. Worth mentioning here is that the open grill type of window was quite rare during the period of study compared to those inlaid with glass that partially replaced it with time.

4- Stucco inlayed with glass:

This type is similar to the stucco grill type but it blocks visibility as well as air circulation. Accordingly this type is used for openings that are not accessible at all. They are always used within walls with exterior faces so that the sunlight would be projected through the colored glass.

The uniqueness of this type lies in the quality of light, both colored and diffused, that it projects. In addition as part of the decorative scheme it is more prominent than the plain stucco grill type. This is due to the contrast between the white stucco and the colored glass that makes the designs of stucco stand out more clearly.

5- Shutters:

This type is more common in domestic buildings and can be seen in the drawings of Pascal Coste (Pl. 8 and Pl. 11). The shutters are usually on a horizontal pivot so that when in the open position they can operate as a shade from direct sunlight. This type is mostly found on upper stories of buildings (probably for privacy from opposite buildings) overlooking the street or exterior spaces. When open it does not restrict anything except that it provides

shade topping the bare opening. This might be why it was never used for openings that go down very close to the ground level since it cannot provide a barrier against falling.

i-The Qibla Iwan :

The style of fenestration of the qibla wall was retained all through the period of study. This was the case in more than one feature. The symmetry about the vertical axes containing the alignment of the mihrab and oculus is one feature. Others are found in the shapes, proportions and even the materials of filling that also continued to exist unaltered.

The upper tier of windows that flank the oculus have a pointed arch profile, at least from the inside. Those windows were not accessible. Hence their types of filling do not contradict the way they were expected to function. They are always filled with stucco inlaid with glass. In that case they would only supply diffuse quality lighting and at the same time, by means of their design and colors, form part of the decorative scheme.

All the fillings present in the examples under study are a result of recent restorations. This in turn raises the question of whether they match the original design. Nevertheless, and apart from the above mentioned suitability for their positioning, there are two reasons that support the originality of such fillings..

The first reason is the absence of any example in which any other material is used for this type of window all through the period under study. It seems like a convention to use stucco inlaid with glass for all the windows opening onto exteriors, where the filling is fitted on the interior face of the wall. The second reason is that in the nineteenth century paintings of Pascal Coste, there is a section made through the complex of Qaytbay N. C. (879/1474) and an interior view (Pl. 12 and Pl. 13), that show clearly the material used for these openings. It is obvious from the paintings that the material used was open work stucco. Whether this stucco was inlaid with colored glass or not remains unclear since the drawings are executed in black and white.

Another noticeable feature of the use of this material is that it only addresses the interior. This is a result of several characteristics. The installation of the material only on the inner surface in addition to the great thickness of the wall and height of its sill (that closes the viewing angle from the street level) all contribute to this result. This different language between the interior and exterior is also confirmed by the fact that the pointed arch shape of the window does not have a corollary on the outside (Pl. 14). It may be represented by a Qalawun-set of windows. This reason for this might be to maintain the uniqueness of the oculus above the mihrab. This would no longer exist in case the oculi of the Qalawun-sets that would be reflected on the

interior. This indicates that, unsurprisingly, the emphasis on the mihrab in the interior is greater than that from the exterior.

The lower tier of openings that goes down as low as about 20 cm above the floor level (sometimes less) are accessible from the inside. They are rectangular made within a pointed-arch recess repeating the profile and scale of the mihrab. However this does not subtract from the emphasis on the mihrab but adds to it. The rhythm of repetition repeats the profile of the mihrab and hence ensures its recognition. On the other hand the mihrab itself remains unique with its centered position and its concave form⁷⁰.

The profile of the recess of the openings is not reflected on the exterior. It is only the rectangular openings themselves that are reflected on the external side of the wall. This feature gives rise to two conclusions. One is that the profile of the recess only reflects the mihrab. Therefore, since the mihrab shape has no appearance on the exterior the profile of the recess is restricted to the interior. The second is more comprehensive and related to that discussed above (the arch opening reflected by a Qalawun-set on the outside).⁷¹ A closer look at the internal and external facades of all the examples under study affirms this theory.

The filling of this lower tier of windows is a metal grill with shutters. This is indicative of their function providing light, ventilation and

⁷⁰ Fernandez y Espinosa, *Visual Composition*, 2: 130.

communication. They also possibly prevent birds' passage, operate as a balustrade and provide control of light and ventilation due to the use of shutters.

Fernandez confirms their use for communication depending on early literary sources. According to several *waqfiyyas*, she attributes the recitation of the Quran and the dispersal of incense to the passerby were provided from these windows.⁷²

Some other functions of those windows do not seem so be vital in the cases of the earlier open *sahn* examples. Weather, lighting and bird access control would not be effective given the direct access to such a roofless space as the *sahn* from the other side. However with the covering of the *sahn* the efficaciousness of these other functions certainly became more applicable. Consequently, the increase in the area of these openings, discussed earlier, must be a direct answer to light and ventilation.

ii-The Sahn :

Unlike other spaces the *sahn* will be given more attention when handling its fenestration type. In the process of being roofed, it became integrated into the interior spaces opening onto it. Consequently the walls enclosing the *sahn* lost their external characteristics and one would think their

⁷¹It seems that a Qalawun-set of windows in the examples studied is never combined with a pointed arch opening in the same wall, particularly if they are to be aligned together, and vice versa.

windows were likely to follow. But was that really the case? To highlight this study these walls' surface treatments will be studied, to trace the adaptation, if any, that accompanied the coverage.

The *sahn* is the area that witnessed the main change in its environment. Unexpectedly, this is not reflected clearly either in the style of its fenestration nor in its decorative scheme. Even if there is any trace of change it is so discreet that it results in ambivalence when used as evidence for the originality of permanent roofing.

The *iwān* opening was always a pointed arch. The rare exceptions to this substitute *kurdis* for the arch.⁷³ One typical example of this is the anti-qibla *iwān* opening of the mosque of Qaraqoja al-Hasani (Pl. 15).

The fenestration that shows some variety is that flanking the arches of the two lateral *iwāns*. The windows are opened within the solid area that results due to the difference in width between the *sahn* and the *iwān*'s arch. They are right above the two doors flanking the arches that lead either to passages into the *sahn* or to other spaces behind.

The variety in the composition of such windows encourages the seeking of certain factors that might be attributed to either open or covered *sahn* mosques. Looking at those windows carefully shows that no connection can be traced in order to differentiate between the two cases.

The openings are rectangular rather than arched. The *iwān* arches are

⁷² Fernandez y Espinosa, *Visual Composition*, 2: 210, 222-223.

the only openings in the *sahn* that do not have a flat lintel. This insistence on keeping these arches unique with such shape might be the reason for the scarcity of using *kurdis*. In addition, while *kurdis* are just very rare, there is no single example of arched opening used for these windows. This is true for the period under study and may be even earlier and later.

The main variation lies in their number of tiers (single or double) and the proportions of the openings. The number of tiers did not seem to be influenced by the coverage as much as by the scale of the *sahn*. For example from the open type, the smaller mosques like Jawhar al-Lala (Cat. 4) and Taghri Bardi (Cat. 6), contained single tiers. The larger ones like Barsbay (Cat. 2) and Qadi 'Abd al-Basit (Cat. 1) have a double tier. The same happens to be the case for the roofed ones. The larger scaled Qaytbay N. C. (Cat. 9) and Qijmas al-Ishaqi (Cat. 12) have double while the smaller Azbak al-Yusufi (Cat. 13) have a single tier.

These openings are always filled with a grill that sometimes has shutters on the inside when accessible from upper stories. Some cases still have their upper floors existing or the remains of the structure marking the wall. In all those cases the windows sills are so high that the grill was not expected to function as a balustrade. Accordingly this would leave the grill with only one purpose; to prevent birds. This is useful for roofless court mosques but should be irrelevant if used in a roofed one.

⁷³O'Kane, "Domestic and Religious Architecture", 6.

The roof and its lantern might have been expected to take over the function of preventing bird passage. This would in turn release those windows from the obligation of being filled with grills and make them more flexible. This does not seem to have happened. Furthermore in both roofed and unroofed *sahns* those windows were treated in the same way, regardless of them being openings to rooms behind or to other spaces that were sometimes unroofed as well as the *sahn*. This feature could be explained in terms of the demand for preserving the symmetry of the fenestration, a feature that never seems to have been sacrificed. Nevertheless there could be other explanations.

The walls in which these types of windows are fitted have a unique feature compared to other interior partitions in the mosques. The windows are opened within recesses. Each recess is usually crowned either with a few tiers of *muqarnas* or a pointed blind arch with a sunburst motif. It is clear that this style became more dominant in the later period even prior to the roofing of the *sahn*. Examples of the ones with *muqarnas* are Qadi 'Abd al-Basit and Barsbay, while all the rest, whether roofed or not, contain a sunrise motif crowning the recess.⁷⁴

The reason behind the change in style of that recess is not the real issue for the time being. What stands out clearly is the fact that both types of solutions are of exterior spirit. This language of decoration does not have roots anywhere in interiors of mosques except in the *sahn*. Consequently it is

⁷⁴ Only example with no recess is Jawhar al-Lala

to be expected when used with the unroofed *sahn* when it was the light well with its exterior environment. However this raises the question of the continuation of this application later when the *sahn* lost the characteristics of an exterior.

Finally one last element of fenestration in the *sahn* is worth considering. This is the lantern in the wooden roof covering the *sahns* and acting as a skylight. All the present roofing is a result of recent restoration. This is clearly due to the low durability of wood as a material particularly when exposed to direct sunlight and other damaging weather conditions.

The Comite reports do not mention any archaeological evidence for the *sahn* roofing that survived prior to the restoration. Furthermore they do not give any information or criteria on which the model for such restoration was based. Their reports give the impression that they were personally fond of the idea of roofing the *sahn* to preserve the whole monument regardless of the originality of it. Accordingly in a lot of cases mosques were just roofed whenever the span of the *sahn* allowed that.

At Qaytbay N. C. (879/1474) (Cat. 9) the present octagonal lantern is fitted on a similarly shaped opening that takes 40-50 % of the total roof area. The earliest available documentation representing the shape of this lantern dates back to the 19th century in the form of two paintings by Pascal Coste. One of them is an interior view (Pl. 13), the other a section through the *sahn* (Pl. 16).

The lantern represented in these paintings is octagonal but is different from the one the Comite installed. The lantern in the painting is of greater scale compared to the *sahn*. In addition it is not with a flat top like that of the Comite, but is pyramidal.

Although those paintings by Coste are the earliest available documents they were still made over three hundred years after the date of the mosque's foundation. This puts the originality of this form of lantern in the range of doubt. In addition to this is the question of the reliability of Coste's painting itself as historical evidence. Therefore there is a problem on two levels; the originality of the form (whether or not it is a later restoration) and if that is assumed, the reliability of the painter needs to be proved.

The question of the reliability of the painter can be answered on the basis of the paintings themselves. One of the paintings is a section, which is in fact quite accurate, as it can be compared with the proportions of the existing monument. In fact it is obvious that the drawing has proportions and details. Hence that will make the expectation that the artist's imagination was set free almost negligible.

Another aspect supporting the reliability of the artist is the availability of other models that have the same lantern type. These are sections made in the *qa'as* of some houses by the same painter (Pl. 17). The fact that they are not religious buildings suggests the common use of such a form of lantern at that time.

For the time being no solid evidence is available to determine the original form of the lantern. If this could be solved, it would be on the basis of more detailed comparative analysis dealing with the whole *sahn*'s architecture and the way it functioned. Therefore this issue will be dealt with later in a more comprehensive context.

iii-The Anti-Qibla Iwan :

A more noticeable change took place in the fenestration of the anti-qibla *iwan*. This *iwan* shows most flexibility to adaptation in fenestration in comparison to all other spaces in the mosques under study. For example the qibla *iwan* shows development in the void percentage but the style of fenestration is preserved. This is hardly the case in the anti-qibla *iwan*.

As argued earlier, the dependence of the anti-qibla *iwan* in the case of roofless *sahns* on any other space for the provision of light other than the *sahn* itself was shown to be nil. Studying their plans and void areas in the walls of the examples that contain fenestration confirmed this.

The case of Qadi 'Abd al-Basit (823/1420) (Cat. 1) was considered. The presence of the corridor behind the wall explained the reason for such fenestration. A closer look at the style of openings and their fillings can affirm this suggestion.

On the ground level, in the middle of the anti-qibla wall, facing the

sahn (the main wall) is a door crowned with a tri-lobed arch recess. This door is flanked by two recesses. At a much higher level are three pointed arched windows in vertical alignment with the door and the two recesses.⁷⁵ The two side walls contain three tiers of quite large pointed arch windows. The lowest of these openings is on a level not higher than 30 cm from the floor. This is the only instance of an opening at such a low level with an arched profile in all the examples under study.

Although the two side walls open onto different types of spaces their openings are symmetrical in shape and alignment. That on the east opens onto the street while the western one opens onto the corridor right before the entrance to the *sahn*. Why are those sets of windows on the side symmetrical? Does one serve a particular function while the other just mirrors it to maintain the symmetry? Or are they both made in a way that suites their function?

Before going into detail about this one remark has to be made. The vertical alignment of these sets is not centered in the walls but rather shifted toward the inside of the *iwan* (further from the *sahn*). This feature, although unique to this mosque, does not make one side more privileged than the other. The eastern wall's thickness narrows towards that direction because the street and qibla alignments are different. This ensures better window light and ventilation and presents less structural risk as the volume subtracted from the

⁷⁵The upper level of windows, that are even present in the main wall, might indicate the presence of several stories of this corridor. This requires further site investigation if it is to be affirmed.

solid is smaller. At the same time, it is beneficial for the opposite western wall since it shifts the light closer to the corner (behind the *iwan*) where no openings could be made. This spot is even more in need of light for it is a point at which a person changes direction in the corridor.

Although both areas do benefit from this shift, the last one is likely to have been more important. This is probably due to the presence of the unroofed *sahn* that would reduce the need to obtain light from any other direction.

Janibek (830/1426-27) (Cat. 3) is another example that contains fenestration in the anti-qibla *iwan*. Here it is another type of exception since it is the only one in the sample where the anti-qibla wall shares part of the street façade. In this case the anti-qibla wall contains more fenestration than the qibla. It adopts the same composition of the qibla walls of the time with the exception that it has no oculus.

In turn this is strong evidence that the qibla wall's fenestration is determined by the fenestration of the street façade and is applied to any wall that takes this position in the building. The rarity of such a case during that period is the real reason why one might believe the opposite. That would leave the oculus and the mihrab as the only features that are exclusive to the qibla wall at this stage. It is interesting here to compare this with 'Abd al-Basit that was discussed earlier. Although the compositions of both anti-qiblas are quite similar they are very different in their total area which is indicative of

the different functions they represent. The fenestration of Janibek is modeled for the *iwān* to communicate with the street and hence it is in proportion to the scale of it. On the other hand, it is obvious that the windows of 'Abd al-Basit are modeled according to the scale of the rooms that existed behind the wall before. Consequently they are of much smaller scale.

Qadi Yahya (848/1444) (Cat. 7) presents another type of fenestration. There is only the typical upper tier of three pointed arched windows while the lower part of the anti-qibla wall is left solid. Here this composition is very indicative of the function. The anti-qibla wall overlooks an English court (sunken court) that is clearly made to serve the function of providing light and ventilation to the ablution area below (Fig 25). This is the first time for such a feature to appear. The same applies for the composition of the fenestration that directly reflects its function in that case. As agreed earlier this tier of windows seems to be mainly for communication. In the case of Qadi Yahya there is no benefit from such a feature in that case and in turn their absence is further proof that they were used for that reason only.

The presence of the upper tier of windows in the case of Qadi Yahya (Pl. 18) raises a question in the light of the belief that it was originally an open *sahn* madrasa. Why should there be windows filled with stucco inlaid with glass (that would only supply little lighting and no ventilation) in that *iwān* that is already lighted and ventilated by the *sahn*. The only answer here is that it is a first attempt to articulate the anti-qibla *iwān*. Later on we notice the

increasing urge to articulate this wall in both open and roofed examples.

This feature does not take long to become very popular; and is more apparent and emphasized at the madrasa of Sultan Inal (855-60/1451-56) (Cat. 8) in his complex in the northern cemetery. Here the anti-qibla wall contains the lower tier that is absent in Qadi Yahya although it is still not part of the street façade. That tier was mainly employed in the earlier cases for street communication and was particularly evident in the case of Janibek whose composition is very similar to Inal's.

Nevertheless at Inal, unlike Janibek, the windows did not overlook the main street. Then the only other functions that could be attributed to those windows are light and ventilation. The desire to increase the supply light and ventilation in Inal could be regarded as further proof of the originality of that madrasa being with a roofed *sahn*. Further evidence of this is seen in two photos from the Creswell album that show the top of the *sahn*'s walls with the remains of a construction line that probably marks the installation level of the roof (Pl. 19 and Pl. 20).

The anti-qibla *iwan* of the roofed *sahn* mosques presents a new formula of fenestration. It is more related to the interior than to exterior factors like the ones studied above. In Qaytbay N. C. (879/1474) (Cat. 9) an oculus appears in the main wall of the *iwan* for the first time. Moreover the overall composition of the qibla wall fenestration start to be mirrored in the main wall of the anti-

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qibla *iwan*. Here this could be regarded as a continuation of the increasing urge to articulate the anti-qibla wall.

From the interior point of view the uniqueness of the qibla wall becomes reduced. The upper and lower tiers of windows of the qibla and their filling material are echoed in the same way on the anti-qibla wall.

With that taking place the only unique feature exclusive to the qibla wall, by that time, is the mihrab itself. In the anti-qibla wall of Qaytbay N. C. it becomes substituted with an opening of the same profile like those flanking the mihrab. This intention is highlighted by the fact that in most cases the number of those openings is kept odd so that there is always a central one. The only exception is Azbak (900/1495) (Cat. 13), but that is a special case that will be discussed below.

Although Qaytbay N. C. seems to be modeled on Sultan Inal its anti-qibla wall express a more obvious mirroring of the qibla wall due to its oculus. Other features of similarity between those two mosques is the presence of very wide *sidillas* in which openings are made in the same way. A much later example is a copy of Sultan Inal's main anti-qibla wall, namely Qijmas (885-86/1480-81) (Cat. 12), where there is no oculus topping the central lower opening. Later in Qaytbay Q. K. (880/1475) (Cat. 10) and in Azbak (900/1495) (Cat. 13) the oculus appears again in the same place. Nevertheless the context in which it is put undergoes some modification.

In the case of Qaytbay Q. K. (Cat. 10), for the first time in the anti-qibla *iwān*, the area above the central lower opening is recessed. A level is created on top of this opening due to the recessing. At that level, the wall is bordered by a wooden balustrade. The area created there gives the impression of a balcony or *dikka*.⁷⁶ The means by which this *dikka* would be accessed is not known but probably a ladder was used. Here in the wall at the back of this *dikka* the oculus is opened.

The originality of the *dikka* is always subject to doubt due to their impermanence. They could easily be attributed to later periods. However, in the example of Qaytbay Q. K., it is built-in, and therefore its originality is certain. More could be concluded from this. The built-in one of Qaytbay Q. K. indicates the consolidation of this feature's presence and its related functions in the anti-qibla *iwān*. This means that the anti-qibla *iwān* by the time of Qaytbay was for sure providing the function of prayer more frequently; an activity that was more attributed to the qibla *iwān*. This further indicates the rising power of the anti-qibla *iwān* to rival the qibla one. In addition, it is indicative of the increasing integration of the madrasa plan giving way to a more universal space with a multiplicity of function and flexibility of usage.

The *dikka* in Abu Bakr Muzhir (Pl. 27) was built-in like most examples of the Qaytbay period. However it is protruding on several *muqarnas* tiers and does not contain an oculus. Instead it was installed in front of one of the

⁷⁶There is evidence from the Pascal Coste painting (Pl. 13) of the interior view of Qaytbay

pointed arched windows of the upper tier. The way it was installed reflects that it was not well thought of. The *muqarnas* starts at quite a low level that it conceals part of the top of the pointed arched opening below it.

The same feature with the oculus is found later in Azbak (900/1495) (Cat. 13). The difference here is that the recess goes down to the ground level. Another minor difference is that it is topped by an arch instead of the flat lintel in Qaytbay Q. K. This makes the *dikka* even more recognizable, and with the addition of the oculus inside it competes more with the qibla wall. It is worth mentioning here that the depth of this recess is made greater in the case of Azbak. That made it possible to increase the perimeter of the wall; an issue discussed earlier in the spatial study. This advantage was taken of by the architect in that he added two windows on the ground level in the side walls of the recess, allowing for more light and ventilation to be supplied from the court behind.

Conclusion:

The study of solid to void percentages had indicated the general increase in fenestration of the roofed examples. The increase in this value could be directly attributed to the intention to increase light supply because the it mainly took place in walls opening onto exteriors.

N. C. that it had a *dikka* in this *iwān*.

The rare incidents when the lower tier of windows opened in the qibla wall was absent do not exist in the roofed examples. This earlier feature is only found in the cases in which the qibla wall was not part of the street façade. Consequently, It could be concluded that the original function of the lower tier of windows was mainly for communication. However if this was optional in the unroofed examples, it was no longer the case for the roofed ones since these windows supplied lighting as well.

In the *sahn* the void percentage in the walls opening onto the two main *iwans* undergoes reduction in the roofed examples. This was possibly a direct result of the *iwans* became self sufficient of light after the modification of their form and fenestration. On the other hand, no noticeable change took place in the void percentage of the walls containing the lateral *iwans*.

The anti-qibla *iwān* shows greater tendency to increase fenestration. The case when it was completely devoid of fenestration that is occasionally seen earlier does not exist in the roofed examples. In fact, it has been proved that when fenestration happened to appear in the early example it was for reasons other than the supply of light.

The composition of fenestration of the qibla wall was retained in all the examples under study. Nevertheless the case of a double set of windows flanking the mihrab that was optional in the early example became standardized in the roofed ones.

The composition of the fenestration of the *sahn* is completely retained with no exception to allow comparison between the roofed and unroofed examples. This feature demands a closer look.

In the early cruciform type of madrasas the area between the four *iwans* was used to accommodate the rooms of the students or other facilities. One of the main reasons behind its suitability was that it gave the rooms the chance of benefiting from opening onto the *sahn*. This provided the room with light, ventilation and even communication.

Gradually the madrasa started losing the feature of student accommodation among other features found in the earliest ones.⁷⁷ Through this gradual process the number of rooms started being reduced. Cells flanking the arches of the main *iwans* were the first to be disappear, allowing more width for the *iwan* opening; those flanking the lateral *iwans* were only reduced in numbers.

The fenestration of these cells had its echo in the *sahn*. However later in some examples even when cells no longer exist the openings are still there. Moreover the grill and the wall treatment were sustained regardless of whether the *sahn* was roofed and its environment internalized.

Although these windows lost their original function they continued to exist. This existence was not only on the level of the mere opening but the whole language and motif that framed them. Perhaps they symbolized

⁷⁷Behrens-Abouseif, D., "The Change in Function", 88-91.

something beyond their basic function. Referring back to their original function it seems that they were still present to give an impression of it. In other words by that time these windows were only expressive of the madrasa space. This is not the first time that one sees a functional element turning into a symbol even though it was no longer in use. A very similar case to that of the minaret in the 20th century religious architecture for instance.

The anti-qibla *iwan* contains more variety of fenestration both in the roofed examples and whenever openings are present in the earlier ones. Nevertheless a tendency to articulate the anti-qibla wall (by means of fenestration) is traceable in early examples under study. In the later stages when the roof was introduced this tendency became more obvious. The articulation of the anti-qibla *iwan* in the roofed examples went as far as mirroring the qibla wall.

The *dikka* was another feature transferred from the qibla to the anti-qibla *iwan*. *Dikkas* were first seen in the qibla *iwans* during the Circassian period. Their location suited their context since they served a purpose related to prayer.⁷⁸ Examples of these are in the madrasas of Barquq (786-88/1384-86) (Pl. 21) and 'Abd al-Ghani al-Fakhri (821/1418) (Pl. 22). However with time *dikkas* were shifted to the anti-qibla *iwan*. This is apparent from the period of Barsbay onwards, examples being Qadi 'Abd al-Basit (823/1420)

⁷⁸It is important here to understand how the *dikka* was used. A person (*muballigh*) stood on top of it during the prayer so that he can view the movements of the *imam*. Accordingly he called out loud to announce the change of prayer positions for people standing at the back

(Pl. 23), Barsbay (829/1425) (Pl. 24), Kafur al-Zimam (829/1425) (Pl. 25) and Jawhar al-Lala (833/1430) (Pl. 26).

In the roofed examples became a standard feature of the anti-qibla iwan as they became a part of the anti-qibla wall, built-in like a balcony. The transfer of this feature, that is mainly provided for the function of prayer to the anti-qibla is indicative of the growing urge to expand the flexibility of function of the whole madrasa space. This issue will be highlighted later when a full picture will be perceived of the way the madrasa functioned during the period under study.

rows and unable to see or hear the *imam*. This is the main reason why the *dikka* was located at the end of the prayer *iwan* when it first appeared.

Chapter IV

Functional Versus Ideological Expression; the Interaction Between Architecture, Decoration and Inscriptions of the *Sahn*

As madrasas came to be roofed the *sahn* was the area in the mosque that underwent the principle changes. With the roofing of the *sahn*, the change in lighting intensity and quality impacted upon both the whole space and the way in which the space was perceived by the beholder. Therefore the interactions between the architecture, decorative scheme and inscriptions of the *sahn* is the next subject of study. Only this will yield clearer perspective of the way it developed given the well-integrated style of architecture of the period under study.

The Architecture

Architecture has taken the lion's share of the research so far. Consequently it will not be stressed in this section, and certain points only will be highlighted in order to characterize the background against which the development of decoration and inscriptions may be evaluated.

Earlier in this study, changes in the proportions of the *sahn* were traced and it was suggested that once the *sahn* came to be roofed, its height increased relative to its area. This kind of modification (increase in height relative to the area) had a direct impact on the beholder evoking an effect of verticality and

directing the eye upwards towards the sky. The effect of verticality finds its climax in the lantern, with its conical shape and obvious center.

This modification increased monumentality and emphasized the grandeur of the space are beyond doubt. In other words the potential of the *sahn* to dominate the whole space was thus revived under a new concept.⁷⁹ This is not to say that the *sahn* did not maintain a character earlier, rather that when it (in the roofed type) was released from the pure function of a light shaft it played a greater role in the language of the space. In the open type the *sahn* contained certain expression in most of which was functional.

In general, the *sahn*'s architecture and fenestration expressed the functionality and structural language of the madrasa. The *iwan* as a form on its own was never as expressive of the madrasa as it was when attached to a *sahn* with windows of student cells opening onto it. As argued earlier, this combination of spaces and their fenestration was maintained regardless of the change in function of the madrasa and whether it was roofed or not.

Another retained feature that was pointed out earlier in the chapter on fenestration was the *iwan* opening in the form of an arch. It was also suggested that the shape of the arch can connote either function or ideology or both at the same time.

⁷⁹As mentioned earlier the domination of the *sahn* by means of the greater area was one feature that characterized the four-*iwan* madrasas of the Bahri period. In the Circassian period this domination was revived but took new dimensions.

The arch could be considered an expression of function if looked at from the madrasa's spatial expression. In early madrasas vaulted *iwans* were widely used for a long period. Later flat roofs for *iwans* became standard. As a result of the earlier structural solution the *iwān* opening had to be that of an arch echoing the profile of the vault. However when the roofing of the *iwans* became flat, this was not reflected in their openings. They still used arches rather than *kurdis* even though the later were easier to execute. This contradiction could only be explained in the light of the above. Probably arches were retained because they expressed a feature of the madrasa. After such a long period of application, the arch had become indicative of the madrasa's function and form.

Another reason for the almost exclusive use of an arch could be symbolic. All arches of *iwans* originally seem to have carried a lamp hanging down from their apex. The evidence for this is strong. Several paintings by Coste (Pl. 13), Roberts (Pl. 28) and d'Avennes (Pl. 29) show this feature. A ring is found in the apex of the arch of the unrestored mosque of Azdumur (beginning of 10th/16th century) (Pl. 30) that could have no other function but to carry the chain of a lamp. Finally several photos by Creswell show it (Pl. 18, Pl. 22, Pl. 26, Pl. 31 and Pl. 32). This evidence supports the common use of a popular tradition.

The niche or arch with a hanging lamp was very common in Islamic art, mainly in mihrab decoration. This motif was not alien to Egypt and examples

of it date back to the Fatimid period and may be earlier (Pl. 33 b and c).⁸⁰ Art historians have advanced different interpretations of this motif.⁸¹ However, no one has denied that it has a symbolic value, most have agreed that it was a light theme. The arch of the *iwān* with the lamp hanging does resemble this motif and could be considered a variation on it. This might present another possibility behind the unrivaled existence of the arch. Such an icon is appropriate to the religious environment of the mosque/madrassa.

One last point needs to be made before moving on to studying the decoration of the *sahn*. This is a modification that, although not made in the *sahn*, impacts upon it. This was the widening of the two main *iwāns*, qibla and anti-qibla. This research has demonstrated that this was of direct benefit to the lighting of the interior. However from the spatial point of view it has further additional impacts, particularly as viewed from the *sahn*.

Earlier the *iwāns* were equal in width to the *sahn* or slightly less wide. Accordingly the limits of the space of those *iwāns* were conceivable from the *sahn* because the entirety of the side walls of the *iwān* could be seen.

As the *iwāns*' width increased, this effect was partially lost. In the case of the roofed examples it was completely lost as the side walls became totally invisible even from a narrow angle. A visual effect of dynamism and continuity was accordingly created. This effect compensated for the possible loss of monumentality and grandeur resulting from the shrinkage in the total

⁸⁰Fehrevari, G., "Tomb Stone", 245.

mosque area. In addition it eliminated any claustrophobic feeling that might result owing to the roofing of the *sahn*.

The Decorative Scheme

As discussed earlier, the main elements of fenestration continue to exist even after the *sahn* was roofed. It is apparent that the divisions (made by bands framing the openings) of the solid areas containing such openings were also maintained. This gives the impression that the general layout of the decoration was hardly affected at all. However a clear tendency to increase the intensity of decoration and to add polychrome is quite noticeable.

Thus we may note that intensive decoration is no longer exclusive to the qibla *iwan*. In fact the concentration of decoration was shifted more towards the center of the whole space. This is supported by the fact that even the anti-qibla *iwan* started to acquire the fenestration style and decoration once unique to the qibla *iwan*. In a way this, together with the overall increased decoration, revived the centrality of the *sahn* by reestablishing a balance around it.

The tendency to increase the *sahn*'s decoration at the expense of the qibla *iwan*'s uniqueness finds roots even prior to the roofing. As early as Jawhar al-Lala (833/1430) (Cat. 4), marble paneling extends beyond the qibla area to encircle the walls of the *sahn* as well, for the first time in the sample under study. This feature at first quite rare, appears more frequently later and

⁸¹ For a summary of the different opinions on this subject see Flood, "Light in Stone".

for quite a long time. For example it was present in Inal (855-60/1451-56) (Cat. 8), Abu Bakr Muzhir (884/1479-80) (Cat. 11) and Qijmas al-Ishaqi (885-86/1480-81).

Stone carving is another feature that starts to be fashionable from Qaytbay Q.K (880/1475) (Pl. 34). It first appears in that particular mosque filling the spandrels of the arches, framed by a band of carved stone. The use of division by a stone band is earlier and is present in most of the cases under study; nevertheless it is only from the time of Qaytbay Q. K. that the areas enclosed by the bands are filled in with arabesque decoration.

A point worth noting here is the intensive use of arabesques rather than geometric patterns for this stone carving.⁸² The greater complication of executing arabesque elements compared with that of geometric ones raises the question of the reason behind their selection for such areas. This might be more understood later when more research can be done on the whole decorative scheme of the *sahn*. However, despite the challenge and difficulty of carving arabesques, their use is intensified in the later example of Azbak (900/4195) (Pl. 35). Here almost the whole wall surface area of the madrasa, not just of the *sahn* ones is mainly treated with arabesque carving.

⁸² Although geometric design is still present in this madrasa the area it occupies in the total decoration is much smaller than that taken by the arabesque. The geometric pattern is used only on the white bands of the *mushahhar* lining the *iwan* arches' profile.

Another interesting feature is the introduction of polychrome finishing to the *sahn*.⁸³ Previously this type of finishing was found mainly in the qibla *iwan*, occasionally in the other *iwans*. This polychrome finishing was achieved using paints and gilding. The low durability of such materials might explain the reason for their introduction to the *sahn* only after the roofing. The poor resistance of such materials to harsh weather conditions such as direct sunlight, rain and wind may explain why they were not in use with unroofed *sahns*.

Consideration of the stone carving mentioned above may add to the above reason. Unlike painting and gilding, stone carving is durable enough to withstand such weather conditions. This is obvious since of the exterior decoration of Cairene domes is of stone carving. If the intention to increase the *sahn* decoration existed earlier (as in Jawhar al-Lala's marble paneling), why wasn't stone carving introduced as well? This might only be answered in the light of more understanding of the roofed *sahn* environment.

In the diffused light of the covered *sahn* the colorful and shiny surfaces acted as focal points. They would help reflect the light dispersed by the lantern and give a greater spectrum of colors, an effect that could never be achieved with direct lighting. The new central positioning of the source of the *sahn's* lighting shows the suitability of such materials for it. The lantern would ensure the supply of homogeneous lighting with fewer harsh shadows and

⁸³ The originality of the use of polychrome and gilding is assured in the case of Qaytbay N.

create a state of visual comfort, unlike the *iwans* that were lighted from the walls by windows some of which supplied direct lighting.

With reference to the subject of this research, the blind keel arch with a sunburst motif (that crowns the window above the doors flanking the lateral *iwans*) poses a question. This is the case due to its possible connotation of a light theme very similar (or may be the same) to that of the niche with the hanging lamp. Such an element is not unique to the roofed examples but predates the roofing.

Among all the cases under study there are only two instances where it is not present. In the early examples of Qadi 'Abd al-Basit (823/1420) (Cat. 1) and Barsbay (829/1425) (Cat. 2) it is substituted by *muqarnas* at the top of the wall crowning the recess containing all the openings. However the keel-arch with sunburst motif replaces the *muqarnas* in all the later examples whether in roofed or unroofed *sahns*. The only exception to this is Jawhar al-Lala (Cat. 4) with no recess of any kind.

As early as the Fatimid period it is found flanking gates of mosques (Pl. 36), the bases of minarets (Pl. 37) and on the walls of the *sahns* (Pl. 38). It continues to exist later in the Ayyubid period and could be seen in the *madrasa* of al-Salih Najm al-Din Ayyub (641-48/1243-50) (Pl. 39) again flanking the gate and filling the base of the minaret. During the period of study this motif was very popular on the sides of the octagonal bases of minarets (Pl. 40). It

C. as its *waqfiyya* indicates this.

also appears in the same context towards the end of the Bahri period (Pl. 41) (however not as common as it became in the Circassian period). Four of those eight sides usually have very small stone-carved balconies (much smaller than human scale). These "balconies" were probably used to carry lamps at night as there could be no other logical function for them.

Several common factors link the areas where this motif appears. One is the fact that it is never out of the range of visibility. Second, and more interesting, is the fact that it is always found in areas that are well lit at night. Third, and this is more concerned with the period of study, the motif only appeared on areas with a celestial connection. It appears on the minaret - that is, the part that penetrates the sky - and in the *sahn* where the sky is projected into the space of the madrasa.

The main entrance was the focus of the facade with the highest level of lighting. The minaret was a landmark and a light source that served as a guide on dark nights. This is clear from one of its Arabic names, *manara*, meaning place of light. One is led to the conclusion that this motif was meant to be seen clearly and under particular conditions.

It is possible that the motif was intended to create a certain effect at night, as seen in the way it is treated in the minarets, with dwarf balconies big enough only to accommodate a lamp. The balcony is always at the base of the blind arch. The lighting direction would be going upwards from the balcony towards the tympanum, with the sunburst motif creating a mystical effect.

Lighting from this direction would cast shadows from the ribs radiating out of the center of the tympanum of the blind arch. This would highlight those ribs and their center point. On the other hand it would leave the arch profile with no shadows. Nevertheless the fact that the light is captured only in the recessed area succeeds in emphasizing the profile of sunburst motif.

Owing to the difference in light levels, the profile of the arch would be clearly defined (Pl. 42 shows this effect at night). Pl. 42 shows how the recess no longer appears to be of material but rather of light, the source of which is not seen but its center is faked by the radial ribbing of its tympanum. The theme seems to have been very expressive; it may possibly have been a symbol of Divine presence. Its location at the base of minarets would give the illusion that the minaret was floating on eight niches of light in surrounding darkness

This effect could be borrowed from and influenced by the Quran, verse 24:35 containing the description of God:

"الله نور السماوات و الأرض مثل نوره كمشكاة فيها مصباح المصباح في زجاجة الزجاجة كأنها كوكب دري يوقد من شجرة مباركة زيتونة لا

شرقية و لا غربية يكاد زيتها يضيء ولو لم تمسسه نار نور على نور يهدي الله لنوره من يشاء و يضرب الله الأمثال للناس و الله بكل شيء عليم"

"God is the light of heavens and earth; His light is like a niche in which there is a lamp; the lamp is in a glass and the glass is like shining star⁸⁴; it is lit from a blessed tree, an olive tree, neither an eastern nor a western one, its oil almost shines alone even if no fire touches it; light upon light, God leads to His light

whom He wills and God creates allegories for man, and God knows all things.”

If the verse evokes any picture in the mind of a Muslim it will no doubt be very close to that motif under such lighting effects. The niche capturing the light, the source that is not seen but whose effects are seen in the radiating lines, and the absence of any shadow that would identify the direction of light as being from east or west, all contribute to a masterly pictorialization of the verse.

Let us look now at the same motif found in the *sahn* appearing in two pairs, each flanking the two arches of the lateral *iwans*. There is a high possibility of having a light source at a level beneath those four blind arches (with sunburst motif). Two means can project lighting towards them in the same manner as on the minaret. One is the window, opened below the recesses' tympanum in all the cases. The second is the presence of the lamp hanging from the apex of the arch discussed earlier.⁸⁵

Here we shall return to a point discussed earlier. This is the common theme shared by a niche (or blind arch) with a radial design (sunburst or its variation) in its tympanum and an arch with a hanging lamp.⁸⁶ In my opinion the hanging lamp and the sunburst motif are repetitions of the same theme (or

⁸⁴For a more detailed study of the meaning of the word "*kawkab durri*" see Flood, "Light in Stone", 331-335.

⁸⁵Note that in all the cases shown in Pl. 13, Pl. 18, Pl. 22, Pl. 29 and Pl. 32, the lamp level is lower the level of the blind arches with sunburst motif.

⁸⁶Flood, "Light in Stone", 335-338.

a variation on it), just as the mihrab profile is repeated by the openings flanking it. I suggest here that in both cases – both in the mihrab and in the sunburst motif - the same rhythm is sounded through different instruments. It could be seen as an attempt to manifest one of the laws of creation, variety within unity.

This parallelism in theme between the two forms is further emphasized by their occurrence in the same number, eight. There are eight sunburst motifs on the base of minarets, while there are only four inside the *sahn*. Nevertheless, if we consider the arch with the hanging lamp to be a variation on the same theme, then four more are added to the recesses in the *sahn*, making eight altogether.

Does the number eight have any connotations in the Quran? In fact it is mentioned once in connection with the throne of God: eight is the number of angels that carry the throne as mentioned in verse 57:17. Several scholars have argued about the ideological connotation to the archangelic sphere presented by the number eight.⁸⁷ This supports the interpretation of this theme as a symbol of Divine presence and explains its appearance on architectural forms with celestial connection.

⁸⁷Nasr, S. H., "The Principle of Unity", 40-41; Haider, S. G., "Islam, Cosmology", 75.

The Inscriptions:

The study of inscriptions poses a further question about the role of the *sahn* after it was roofed. In most of the cases under study, both roofed and unroofed, the inscriptions of the *sahn* are readable from the normal viewing distance. However even when this was not the case (like the most of the ones in the *iwans*), an inscription may still have carried some special connotations. For instance, an inscription can act as a talisman (*hijab*) protecting the place or evoking a certain manifestation of God in it.⁸⁸

Certain verses from the Quran are often recited to answer certain needs or to serve a certain occasion. An example of this is *sura* 113 which can be recited to protect one from the evil eye; *ayat al-kursi* (2 : 255) as a general protection; *surat yasin* (36) for the dead and *surat al-rahman* (55) against the jinn. It seems that there is a tradition in the selection of specific verses that would call for the presence of a certain aspect of Divine power. Accordingly if the verses were to function as talismans, they would have to be selected carefully with this in mind.

In the early period, before the roofing of the *sahn*, one style of verse seems to have been the most commonly used. The selection was limited to inscriptions containing at least one or a combination of the following:

- The domination of God over the heavens and earth.

⁸⁸ Worth pointing out here is that amulets do not have to be read to be expected to function, since people wear them hidden most of the time.

- How God looks upon the faithful and guides them to his path (including the path of light).
- How God misleads the unbelievers and directs them away from His path into darkness.

This can be supported by the study of some examples of that period. In Qadi 'Abd al-Basit (823/1420) (Cat. 1) the verse 2:255-257 is used. The first part is the well-known *ayat al-kursi*, a manifestation of God's domination. Then the two following verses are added, the second of which is incomplete:

لا إكراه في الدين قد تبين الرشد من الغي فمن يكفر بالطاغوت و يؤمن بالله فقد استمسك بالعروة الوثقى لا انفصام لها و الله سميع عليم (256)

الله ولي الذين آمنوا يخرجهم من الظلمات إلى النور ...

"Let there be no compulsion in religion : Truth stands out clear from Error : whoever rejects Evil and believes in God hath grasped the most trustworthy hand-hold, that never breaks. And God heareth and knoweth all things. (256) God is the Protector of those who have faith : from the depth of darkness He will lead them forth into light...."

The verse is suddenly truncated at the word *al-nur* (light). According to the rhythm and spacing of the words in the inscription one might expect the verse to end earlier; as it is the words of the last portion of the verse are squeezed together. This gives the impression that it was very important to read as far as this point in the verse at the end of the inscription.

The selection of verses in the *sahn* of Qadi 'Abd al-Basit combines the themes mentioned above, including the deliverance of the faithful from

darkness into light (even if this last had to be squeezed in). The last section makes one wonder about its impact on the beholder (given that the inscription here is clearly readable). He had already been delivered from actual darkness into light, as he passed into the *sahn*.

From the street he entered a dark lobby. At that particular spot the beholder possibly experiences a momentary blinding as a result of the sudden changes in lighting.⁸⁹ Consequently his awareness of the darkness is stimulated. The long dark corridor that follows bends and changes direction and gives him enough time for his eye to adapt to the dark.⁹⁰ After this he is struck again by the direct lighting of the court, to which his sensitivity is increased by his eyes adapting to the darkness of the corridor.

The spiritual value present in the verse is thus physically enacted by the person entering the mosque to pray. This last part of the verse (that was squeezed in) can be considered as a reminder of this physical experience, given that it is inscribed in a spot directly facing the *sahn*'s entrance.

In Taghri Bardi (844/1440) (Cat. 6) the verses are used, though this time they are complete. The complete verse 257 is as follows:

الله ولي الذين آمنوا يخرجهم من الظلمات إلى النور و الذين كفروا أولياؤهم الطاغوت يخرجوهم من النور إلى الظلمات أولئك اصحاب النار

هم فيها خالدون (257)

⁸⁹The first person who suggested to me a possible hidden intention behind creating this light contrast between the dark corridor and the *sahn* was Dr. Khaled Deemer on a field trip early in 1994.

⁹⁰ It takes about 35 seconds to reach the *sahn* in most cases under study while it requires 30 seconds for the eye to adapt to sudden light changes. For detailed information about visual adaptation see Hart, W., *Adler's Physiology of The Eye*, 389.

“God is the Protector of those who have faith : from the depth of darkness He will lead them forth into light. Of those Who reject faith the patrons are the Evil Ones : from light they will lead them forth into the depths of darkness. They will be the Companions of the fire, to dwell therein (for ever). (257)”

The rest of the verse underlines the values of the first part by the comparison between the believers and the unbelievers' path and end.

In Barsbay (829/1425) (Cat. 2) a verse from another *sura* is selected, but one which still contains most of the themes found in the verses selected in that period. The passage is from *surat al-nur* 24:36-42.

في بيوت أذن الله أن ترفع ويذكر فيها اسمه و يسبح له فيها بالغدو و الآصال (36) رجال لا تلهيهم تجارة و لا بيع عن ذكر الله و إقام الصلاة و
إيتاء الزكاة يخافون يوماً تتقلب فيه الأبصار (37) ليحزيهم الله أحسن ما عملوا و يزيدهم من فضله و الله يرزق من يشاء بغير حساب (38) و الذين كفروا
أعماهم كسراب بقيعة يحسبه الظمآن ماءً حتى إذا جاءه لم يجده شيئاً و وجد الله عنده فوفاه حسابه و الله سريع الحساب (39) أو كظلمات في بحر لجي يغشاه
موج من فوقه موج من فوقه سحاب ظلمات بعضها فوق بعض إذا أخرج يده لم يكد يراها و من لم يجعل الله له نوراً فما له من نور (40) ألم ترى أن الله يسبح
له من في السماوات و الأرض و الطير صافات كل قد علم صلاته و تسبيحه و الله عليم بما يفعلون (41) و لله ملك السماوات و الأرض و إلى الله المصير (42)

“(Lit is such a Light) in houses, which God hath permitted to be raised (to honour; for the celebration, In them, of His name : in them is He glorified in the mornings and in the evenings, (again and again), (36) By men whom neither traffic nor merchandise can divert from the Remembrance of God, nor from regular Prayer, nor from the practice of regular Charity : their (only) fear is for the Day when hearts and eyes will be transformed (in a world wholly new), (37) That God may reward them according to the best of their deds, and

add even more for them out of His Grace : for God doth provide for those whom He will, without measure. (38) But the Unbelievers, -- their deeds are like a mirage in sandy deserts, which the man parched with thirst mistakes for water; until when he comes up to it, he finds it to be nothing : but he finds God (ever) with him, and God will pay him his account : and God is swift in taking account. (39) Or (the Unbelievers' stake) is like the depths of darkness in a vast deep ocean, overwhelmed with billow topped by billow, topped by (dark) clouds : depths of darkness, one above the another : if a man stretches out his hand he can hardly see it ! For any who God giveth not light, there is no light ! (40) Seest thou not that it is God Whose praises all beings in heavens and on earth do celebrate, and the birds (of the air) with wings outspread? Each knows its own (mode of) prayer and praise. And God knows well all that they do. (41) Yea, to God belongs the dominion of the heavens and the earth ; and to God is the final goal (of all). (42)"

These verses fall within the same category of themes, though with a different organization. They contain the affirmation of God's domination, the light of God that is only given to those he selects, and the darkened faith of the unbelievers. The only thing added here is the subject of religious practices, presented by the verse 24:37-38 which appears most often in qibla *iwans* of that period.

The inclusion of this *aya* here might be for several reasons. In the first place, the large scale of the *sahn* might call for a long inscription. A related

reason is that most of the perimeter in the qibla *iwan* was occupied by an extract of the *waqfiyya*. Although there was little space available in the qibla *iwan* (the common place for this inscription during that time), there was plenty of it in the *sahn*.

Further more, the content of verse 24:37 is a subject of the Divine Light and is therefore related to the general theme of light and darkness comparison. The verse follows the famous Light verse and together with the following one (24:38) describes the places and their people in which Divine light would be present. The attribution of this verse to prayer halls might be considered for the sake of its mention of prayer as a practice. Such interpretation would overlook the main theme of the verse (Divine Light) and go for one cause of its presence, given that it is not the only one the *aya* mentions.

What is quite unique here is the inclusion of 24:41. The *aya* comments on the fact that everything in the heavens and on earth praises God, and it particularly mentions the praise and prayer of birds as something known only by God. This is the first time that we see a selection of a verse that summons to contemplation in the period under study.

A major activity of Sufism is contemplation, for example, in the practice of *khulwa*. The fact that Barsbay was not just a sultan who patronized Sufism but was a Sufi himself may indicate a possible influence behind this new choice. Furthermore the *waqfiyya* of his madrasa informs us that it was

designated for Sufi students.⁹¹ These two facts might indicate the beginning of Sufi influence in madrasas.

In the later period, the theme of contemplation became more common in the selection of inscriptions in madrasas, and is not far from being related to the increasing popularity of Sufism.⁹² As mentioned above, Sufi practices were introduced in the majority of religious buildings during the late Circassian period.⁹³

The later roofed buildings show a further trend in the selection of the verses circling their *sahns*. It is apparent that it was not only quantity and quality of the lighting that affected the decoration alone. The inscriptions had their share in the influence too. This would suggest that the inscription program was planned as part of the whole construction program.

In the *sahn* of the mosque of Qatybay Q.K.(880/1475) (Cat. 10) the verses 3: 190-192 are used:

إن في خلق السماوات والأرض واختلاف الليل والنهار آيات لآولي الألباب (190) الذين يذكرون الله قياماً وقعوداً وعلى جنوبهم ويتفكرون في خلق السماوات والأرض ربنا ما خلقت هذا باطلاً سبحانه فمنا عذاب النار (191) ربنا إنك من تدخل النار فقد أخزيته وما للظالمين من أنصار (192)

“Behold ! In the creation of the heavens and the earth, and the alternation of Night and Day, __ there are indeed Signs for men of understanding, __ (190) Men who celebrate the praises of God, standing,

⁹¹Behrens-Abouseif, “Change in Function”, 86.

⁹²Fernandes, *Evolution of the Khanqah*, 213-218

sitting, and lying down on their sides, and contemplate the (wonders of) creation in the heavens and the earth, (with the thought) : "our Lord ! not for naught hast Thou created (all) this ! Glory to Thee ! Give us salvation from the Penalty of the Fire. (191) "Our Lord ! any whom Thou dost admit to the Fire, truly Thou coverest with shame, and never will wrong-doers find any helpers ! (192)"

The contents of these verses present a new perspective that particularly suits the new environment of the *sahn* and the whole mosque. It is a step beyond the level of contemplation found in that of Barsbay, where that is limited to the praise of God performed by all beings in their own languages. It is a more direct instruction to contemplate the creation of the heavens and earth that changes in the alteration of day and night. Furthermore the verses continue by linking the remembrance of God with contemplation of the heavens and earth. This again could be identified with Sufi practices such as *dhikr*.

The content of these verses gives rise to other levels of thought. They stimulate both the act of contemplation and the act of invocation. The earlier approach was that of revelation and direct destiny in which the human being has no role. The later examples call upon the human senses to wonder at the effects of God's creation and hence feel his presence.

⁹³Fernandez y Espinosa, *Visual Composition*, 207, 213, 215, 220-221 and Behrens-Abuseif, D., "Change in Function", 88.

Azbak al-Yusufi (900/1495) (Cat. 13) has the same verse as that of Qaytbay Q. K. but continues as far as verse 3:194. The extra two verses here are basically a continuation of the invocation. The theme is confirmed rather than added to.

In Azbak there is another band of inscription above this one. It contains the verses 67:1-9.

- تبارك الذي بيده الملك و هو على كل شيء قدير (1) الذي خلق الموت و الحياة ليلوكم أيكم أحسن عملاً و هو العزيز الغفور (2) الذي خلق سبع سماوات طباقاً ما ترى في خلق الرحمن من تفاوت فارجع البصر هل ترى من فطور (3) ثم ارجع البصر كرتين ينقلب إليك البصر خاسئاً و هو حسير (4) و لقد زينا السماء الدنيا بمصابيح و جعلناها رجوماً للشياطين و اعتدنا لهم عذاب السعير (5) و للذين كفروا برجم عذاب جهنم و بس المصير (6) إذا ألقوا فيها سمعوا لها شهيقاً و هي تفور (7) تكاد تميز من الغيظ كلما ألقى فيها فوج سألهم خزنتها ألم يأتكم نذير (8) قالوا بلى قد جاءنا نذير فكذبنا و قلنا ما نزل الله من شيء إن أنتم إلا في ضلال كبير (9)

“Blessed be He in Whose hands is Dominion ; and He over all things hath Power ; __ (1) He Who created Death and Life, that He may try which of you is best in deed : and He is the Exalted in might, Oft-Forgiving ; __ (2) He Who created the seven heavens one above another : no want of proportion wilt thou see in the Creation of (God) Most Gracious. So turn thy vision again : seest thou any flaw ? (3) Again turn thy vision a second time : (thy) vision will come back to thee dull and discomfited, in a state worn out. (4) And We have (form the old), adorned the lowest heaven with Lamps, and We have made

such (Lamps) (as) missiles to drive away the Evil Ones, and have prepared for them the Penalty of the Blazing Fire. (5) For those who reject their Lord (and Cherisher) is the Penalty of Hell : and evil is (such) destination. (6) When they are cast therein, they will hear the (terrible) drawing in of its breath even as it blazes forth, (7) almost bursting with fury : every time a Group is cast therein, Its Keepers will ask, "Did no Warner come to you?" (8) They will say : "Yes indeed ; a Warner did come to us, but we rejected him and said, "God never sent down any (Message) : ye are in nothing but an egregious delusion !" (9)

The content of these verses matches that of the ones below it. Again it presents the creation of God and challenges those who view it to find any flaw in it.

It is worth comparing the contents of the upper and lower verses in the *sahn* of Azbak. The upper passage speaks of the miracles of God's creation on the level of the skies and how he protected it from devils by shooting stars. The lower passage speaks of the heavens and earth together, as well as other earthly phenomena which are clearly witnessed by man; the tone is more advising and encouraging. The connection is quite clear between the levels of the inscription on the wall and the level of their content.

The other two roofed examples, Qaytbay N. C. (Cat. 9) and Qijmas al-Ishaqi (Cat. 12), both have *ayat al-kursi* which is too common to have a

specific symbolic value. This verse is quite popular on domes. It could simply be related to the addition of the lantern and its resemblance to a dome.

Reference must be made here to a point raised earlier in this chapter, which is the appearance of intensive arabesque decoration in the *sahns* of Qaytbay Q. K. and Azbak al-Yusufi. According to the analysis made above on the inscriptions, these two examples were related in their inscription program. The common features these two examples exhibit may help answer the question raised earlier of the sudden appearance of intensive arabesques in them, a feature that has no precedent in that manner.

It could be suggested that it is the relation between the content of the *ayas* and the meaning the arabesques evoke that relates them. Both *ayas* summons contemplation through invocation or praise (*tasbih* or *dhikr*), an act of repetition and multiplication. The nature of the arabesque is quite expressive of such religious practices. The leaves and entwining stems of the arabesque give the impression of unlimited growth and self-multiplication.

There is nothing more expressive of the growing spiritual energy by means of continuous repetitions of rhythmical intervals, in both acts like *tasbih* and *dhikr*, as the arabesques. Consequently it is valid to conclude that this was the reason for the appearance of the arabesque with the type of inscriptions discussed above. Furthermore this confirms the suggestion, constantly mentioned through this research; in the architecture of this period there is always a mutual relation between the part and the whole.

Conclusion

Shortly before the introduction of roofing to the *sahn* the four-*iwan* plan had already reached its optimum refinement. As noted in this research, new the Circassians rarely introduced new elements to the four-*iwan* plan but tended to develop and refine it. They seem to have been concerned with refining the enormous architectural library they inherited from the Bahris, who extensively incorporated foreign elements over a period of almost 150 years. The continuous urge to innovate had left the architectural heritage with more vocabulary but less individuality.

The Circassians did not waste as much time chasing new elements, as did the Bahris. Instead, a process of selection and elimination was undertaken to purify and select whatever was suitable for a particular formula. Some elements were adopted and refined, others were neglected.

It is plain that the Circassians were more comprehensive in their approach than the Bahris. More time seems to have been invested in thought starting from the whole and going down to the minute details. Noteworthy is the time taken to reach this individuality. It seems that the Circassians handled the process so efficiently that maturity of the four-*iwan* plan was achieved as early as the period of Barsbay.

The Circassian approach with its search for individuality makes it easier to classify its different stages and trace their development. Moreover, of all

the Islamic dynasties of Egypt, the Circassians are those who presented a taste that may best be classified as Egyptian. This is highlighted increasingly during the late Circassian period by the frequent inclusion of decorative elements borrowed from ancient Egyptian art. Examples of this were found in several carpets from the Qaytbay period.⁹⁴ In addition, ornament from the same origin appears for the first time in the mosque of Abu Bakr Muzhir (884/1479-80), and was continued later.⁹⁵

By the mid-Circassian period, as mentioned above, the four-*iwan* madrasa was already saturated with refinement and maturity. That left the Qaytbay period with a great challenge. It could be suggested that it might have seemed like there was nothing more to be added to the architectural heritage. Even the idea of the roofed *sahn* was most likely not new, given the great probability of original roofing for the mosque of sultan Inal (855-60/1451-56).

In fact the idea of roofing the *sahn* may already have been introduced by the Bahris. If it is assumed that the roofing of Almalik al-Jukandar (719/1319) was original, the roofed *sahn* of Inal would be nothing more than a revival of a Bahri tradition.

Nevertheless, the Circassian approach could be credited for introducing the roofing on a much greater scale, a process that was riskier given the greater

⁹⁴ Kuhnel, E., *Cairene Rugs*, 6.

⁹⁵ Devonshire, R. L., *Some Cairo Mosques*, 86.

depths to be lighted.⁹⁶ This was unlike the case of Almalik al-Jukandar from the Bahri period.

Dealing with roofing on a larger scale was therefore a new challenge. For the first time light planning was introduced to cope with the criticality of roofing the main light shaft on such a large scale. Earlier, in the open *sahn* case, this was never a problem since the *sahn* always provided surplus light.

I believe that Inal was an initial experiment on the basis of which the Qaytbay period architect embarked on the task of refining it. The structural challenges and the main lighting adaptations was overcome in the case of Inal. Reducing the thickness of the qibla wall, increasing its fenestration and aligning both its sides to ensure more homogenous lighting raises a structural risk.

During that time the shorter span of the qibla *iwan* was perpendicular to the qibla wall. As a result the qibla wall bore the load of the roof with the opposite wall due to the position of the ceiling's beams at right angles to it. This added to the importance of the strength of such a wall and amplified the risk of increasing its fenestration. Such an obstacle was handled safely in the case of Inal and the experiment seemed to have been successful. However, we find little evidence of thought invested on the relation of the detail with the whole.

⁹⁶By this I mean the scale of the whole building not that of the *sahn*.

The Inal experiment gave the chance for the Qaytaby architects to study the impact of the new space and its light effects in real life. The result of this careful study was the madrasa of Qaytbay N. C. (877-79/1472-74). In my opinion this building sets the classical model of the roofed type of madrasa.

The formula of the roofed type of madrasa as presented by Qaytbay N. C. has been studied earlier on several levels: the development of the space, the fenestration, the decoration and the inscriptions.

The spatial development of the roofed type is traceable on several levels. There was an obvious expansion in the width and reduction in the depth of the qibla and anti-qibla *iwans*, and an increase in the total perimeter of their walls opening onto exteriors. At the same time, height was increased relative to the area of the *iwans* and *sahns*, and became independent of the size of the madrasa. The thickness of walls containing fenestration that supplied light was reduced, and their internal and external faces became aligned. As an overall result of this development, the plan takes the I-shaped form mentioned earlier which finds its origins in the Bahri period.

The fenestration was developed to optimize the lighting benefit from the modifications carried out on the spatial level. The increase in wall areas opening onto the exterior was accompanied by an increase in the areas of their fenestration. Most probably this was intentional, and served to increase the light supply through means other than the *sahn*. A strong reason supports this suggestion. Increasing fenestration would increase the structural risk in such

retaining walls. Given that the walls' thickness already underwent reduction and their heights were increased makes it more critical to open in them and therefore would not be done unless highly demanded. It is unquestionable that the overall increase in fenestration was mainly to increase light supply, and not for other functions like communication. The main reason behind this is the fact that the qibla wall remained to be the only one opening onto the main street. In the roofed type other walls however were opened onto backyards and courts.

The *sahn*'s inscriptions and decorative scheme were also part of the new formula. This study has identified a new type of content for the inscriptions circling the top of the *sahn*'s walls. All these inscriptions belonged to the cosmological type of verses. In cases including arabesques in the decorative scheme, the inscription also evoked contemplation.

The decoration of the roofed type contains modification only on the level of materials and details; the divisions of the decorative scheme was left untouched. This is probably due to the fact that the form and composition of fenestration they surrounded were retained. Polychrome and gilding was introduced to the *sahn*, while in some cases (as mentioned above) stone carving, mainly of arabesques, filled the spandrels of the *iwan* arches.

The maintenance of the original style of fenestration for these walls is no doubt the result of their symbolic value. The fenestration of the *sahn* and

its *iwan* arches were retained because they became part of the spatial expression of the madrasa by that time.

Another point in support of the unrivaled use of the arch as an *iwan* opening is its relation with the theme of the verse of Light (24:35). A variation of this theme, which is the blind niche with sunburst motif, appears in the decorative scheme of the *sahn*. This is indicative that the arch itself could have a symbolic meaning in addition to expressing a function.

The architect of Qaytbay shows an awareness of the impact of changes in the light upon the space. The result of this awareness was a synthesized development of architecture, decoration and inscriptions, unified functionally and thematically by means of the integral element, light.

The study pointed out a connection between the *iwan* arches (with the hanging lamp), the four sunburst motifs of the *sahn*, and their relation by number to those found on the bases of minarets. In addition, their possible connotation of Divine presence (due to their number)⁹⁷ is further confirmed by their appearance in areas with the celestial connections: the *sahn* and the minaret. These two relations contribute to confirm the well-integrated approach to architecture and its decoration of the Circassian period.

The inscriptions also play a part in the overall integration of space during the period of study. They tend to match the new environment and their

⁹⁷ The connection between the number in which this motif occurs, which is eight, and the number of angels carrying the throne was pointed out earlier.

reselection to suit the roofed type is beyond doubt. They are related to the architecture and its lighting as well as the decoration of the *sahn*.

The most commonly selected inscription on the *sahn* in the period prior to its roofing was an early attempt to play with light to convey a symbolic and spiritual message. It was demonstrated that the delivery of the faithful from darkness into light by God (found in 2: 256-57) usually recorded on the *sahn* was symbolically experienced by the beholder on his way in. The architect used the contrast between the dark corridor and the intensely lighted *sahn* to convey this message. The careful study of such an experience to optimize its impact on the beholder indicates the presence of a very mature approach to it.⁹⁸

When the roof was introduced, the sharp light contrast between its space and the corridor leading to it was lost, together with the role of verse 2:256-57 that goes with it. Consequently the replacement of this inscription reflects the awareness of its role and the importance of the selection of inscriptions in relation to the whole context. In addition the selection of the new type matches the new lighting environment with its exhortation to contemplate the majesty of God and His creation. This characteristic is emphasized in the decoration that appears in the later examples of Qaytbay Q. K. and Azbak al-Yusufi. The arabesques employed in those two examples promote the act of contemplation through their constant rhythm. The

repetitions and endless process of self-multiplication of these arabesques resemble the act of invocation (*tasbih*). This act is part of the religious rituals and its echo is found in the content of the inscription circling the *sahn*.

More stress on the spatial continuity is noticeable in the development of the anti-qibla wall. This was clear from the way it mirrored that of the qibla. In fact this feeling of unobstructed space was a side effect of roofing the *sahn*. In the case of the open *sahn*, the division of space about the *sahn* is more felt. This was mainly due to the great difference of light intensity between the *sahn* and the two main *iwans*, an impact that was highly reduced with the reduction of the illumination level of the *sahn*. This resulted in a homogenous distribution of light all through the space of the madrasa.

Spatial continuity is further emphasized by the expansion of the qibla wall beyond the angle of vision. This dynamic effect reduces the sense of enclosure and conveys a feeling of openness. A similar impact was created by the increased verticality of the walls and the absence of harsh shadows resulting from direct lighting. The whole feeling is finally echoed in the decoration that by means of polychrome and gilding introduced under such diffused lighting reflected and refracted a wide spectrum of light. This decorative scheme in addition to arabesques (when applied later) divide the solid areas and reduce their visual weight.

⁹⁸ This particular feature of the earlier open *sahn* example indicates that the seed of playing with light was already planted as early as the first third of the Circassian period.

In the light of the above it is valid to suggest that the light planning was the most effective development in the four-*iwan* plan of that time. A full picture of the space and its impact on the beholder seemed to have been predetermined by the architect. Accordingly, the architecture, inscriptions, decoration and above all the light (under which all the elements are to be viewed) underwent fusion.

The more focused classification of the Circassian period's work makes it easier to picture and relate their architecture with their history and collective ethos. What I called revival of the four-*iwan* plan during the first half of that period is a typical example of this. The way the four-*iwan* plan was revived by the Circassians is very indicative of the way the mosque functioned during that period. The domination of the street façade by means of the qibla wall and its widening (that was part of this revival) gives rise to valid reasons behind their coexistence.

The increasing occurrence of the qibla walls dominating the street façade was pointed out earlier in this research. Together with the increased share of this wall itself in the length of street façade, is a further indication of the growing demand for its function. Communication with the public could be the only possible reason behind this; such as Quran reciting, incense and providing light for the street at night.⁹⁹ Consequently, the increasing

⁹⁹ Fernandez y Espinosa., *Visual Composition*, 210, 222-223.

occurrence of such a feature is direct indication for the increasing demand for public communication.

The link between the revival of the four-*iwan* plan and the unrivaled popularity of qibla wall domination could then be explained by the parallelism of the benefits behind their existence. The first allowed more sections of the society to be involved in the activities of the madrasas while the latter addresses more of the public. In other words, such revival of form came along with the aim of expanding the facilities of the mosques making them less specialized and more multiple.

Looking at the political and religious environment during the late Circassian period might help explain why did the madrasa develop in that way. The will of the Circassians to communicate directly with the masses was pointed out earlier. It seems that they modified the political approach to address the community. The historical study of that period reflects the intention of the rulers to be directly influential on the street man. There is an increase in quantity and quality of religious parades and festivals. At the same time less attention was given to investing in dogmatic religious institutions. By this I don't mean the number of such institutions but the way they functioned according to their endowment deeds. This can directly reflect the Circassians' aim to diminish the role of the '*ulama* in the society and direct there investment towards the final target (which is the masses) without an intermediary.

Madrasas were still built at a high rate but the assigning of education of any type underwent reduction as the *waqfiyyas* indicate. However most *waqfiyyas* include the provision of Sufi performances in the madrasas of that period. This reflects that the rulers were becoming aware of easier means to manipulate the masses without the burden of worrying about the power of a well-educated religious elite that can rival them.

Doris Abouseif concludes that the rulers of the late Circassian period were no longer in control of all aspects of religious life.¹⁰⁰ Her point will remain only true on the part and not the whole. According to the outcome of this research it is clear that the Circassians willingly lost control over the *'ulama* who were no longer a threat to them after they were able to reach the masses directly. In other words it was the diminishing role of the *'ulama* that lead to their negligence by the rulers and not vice versa.

In the light of understanding the social environment during the Circassian period it is easy to imagine how the mosque was functioning. The four-*iwan* plan as a space alone facilitated the multiplicity of functions provided by the structure. By this I mean that it could be indicative of the will to provide teaching of the four *madhabs* (rites) of Sunni Islam. This was not a rule but still it could be expected when the four *iwans* were provided.¹⁰¹

¹⁰⁰ Behrens-Abouseif, D., "Change in Function", 92.

¹⁰¹ The fact several *waqfiyyas* (of four-*iwan* madrasas) do not assign money for teaching during the later period is not enough evidence that teaching did not take place even in the madrasa itself. In addition teaching by that time was more associated with individuals and

Accordingly, such a madrasa addressed more sections of the society than other types of *iwan* ones.

From this point is valid to argue that the madrasa of the late Circassian period was functioning more like a community hall for each district.¹⁰²

Consequently the so-called revival of the four-*iwan* plan was not a revival of function but rather of form. This type of *iwan* probably increased the potential of the madrasa to offer multiple functions at the same and different times. As has been argued earlier the gradual transfer of the *dikka* to the anti-qibla wall reflect the growing flexibility of a function like praying all over the mosque.

The overall development in function and form of the four-*iwan* madrasa and its roofing made the *sahn* the climax of the whole space. Fernandez insists on making the qibla *iwan* the visual focus and center of the mosque. If that could be assumed for the open type it is far from valid for the roofed one in the light of this research. I would not hesitate to consider the *sahn* the center of the space at least for the roofed type.

It was pointed out earlier how some of those mosques held Sufi practices as recorded in their endowment deeds.¹⁰³ I would be tempted to suggest that area with the highest potential to accommodate Sufi performances is no doubt the *sahn*. Practically, the potential of the *sahn* space to host this

could then take place anywhere is enough proof. On this issue see Behrens-Abouseif, D., "Change in Function", 92.

¹⁰² A study of the relation between the madrasas built during that period and the selection of their sites within the topography of the city of Cairo could be the subject of further research.

function is enhanced by the use of lantern. Fernandez relates these performances to the qibla *iwan* but does not give evidence to support her opinion.¹⁰⁴

On the other hand Doris Abouseif mentions (based on an account of Ibn Batuta) that the *qubba* space was preferred for both ceremonials and Sufi performances.¹⁰⁵ The only space that somehow resembles the *qubba* space is the roofed *sahn*. Consequently I would not hesitate to relate any Sufi performances or other types of ceremonials to the *sahn*.

Earlier in this research the original lantern was proved to be more likely the one drawn by P. Coste. The acoustical suitability of such a form of roof was further proof that the *sahn* was tailored to accommodate Sufi activities, given the musical and vocal performance required in it.

The description of the ceremonial tent erected in the Citadel for religious celebration was presented earlier. The chronicles inform us that different kinds of performances took place in that tent on the night of celebration, one of which was the Sufi. The deliberate choice of such form of enclosure given the flexibility of tailoring a tent indicates the preference for it to accommodate ceremonies. The four *iwans* opening onto a central domed area was probably the spatial form most suitable for such a ceremony.

¹⁰³ Fernandez y Espinosa, *Visual Composition*, 215 and Behrens-Abouseif, D., "Change in Function", 88.

¹⁰⁴ Fernandez y Espinosa, *Visual Composition*, 220.

¹⁰⁵ Behrens-Abouseif, D., "The *Qubba*", 1-2.

Imagining how the space looked like, there would be no better place to accommodate the performances than the central space under the dome. This will insure that the audience in all the four *iwans* opening onto the domed area would have an unobstructed view. The case would never be the same if the performances took place in one of the *iwans*. This confirms that the *sahn* would be the logical choice if performances would take place in the madrasa, given its resemblance to the domed area of the tent with its central position.

The fact that the ceremonial tent was made a four-*iwān* enclosure explain the evolution of this form with time. It could be concluded that this type of space was no longer expressive of the function of teaching as it was of a multipurpose hall. This is further evidence to support the suggestion made earlier of the new role of the madrasa during the period of study.

It was pointed out earlier that the covered type branched out from the open one to form a new generation. The fact that it did not completely replace the open type further proves that it was looked at individually. In fact, the two types co-existed and exchanged popularity through the period of Qaytbay and later.

The period that followed the reign of Qaytbay was not as fruitful. The deterioration in the economic situation was probably the main reason behind this. Nevertheless, within those few examples we find the open, the roofed and a third one that I would classify as hybrid. A closer look at some post-

Qaytbay examples might help give some idea of the path of development of the four-*iwan* plan madrasa.

A typical example of the open type post-Qaytbay is that of Qanibay al-Sayfi (911/1506) (Fig. 27). From the plan and on the basis of this research it is clear that it does not belong to the roofed type. In the plan it is clear how there is no fenestration in the qibla wall as in many early open *sahn* examples.

The typical example of the roofed type is that of Qurqumas. Applying the method followed in this research, it is beyond doubt that it belongs to the roofed formula. The I-shaped plan, the form of the qibla wall with its intensive fenestration and the small area of the *sahn* all contribute to classify it as roofed (Fig. 28). Quite noticeable is that the features of the roofed class present in it are even more obvious.

The madrasa was restored as open by the Polish-Egyptian Group of Restoration of Islamic Monuments in Cairo. However, this does not seem to have been done properly. More evidence for this suggestion is a published drawing by the Polish-Egyptian group presenting the proposed preservation.¹⁰⁶ The drawing shows an isometric of the building where the *sahn*'s corners are chamfered with a roof, a treatment that is never done except to carry a lantern (Fig 29). Another is an aerial picture taken of the complex in 1976 that again shows the *sahn* (Pl. 42). In that picture and at that very early stage of the

¹⁰⁶ Neiduziak, I., "Polish-Egyptian Restoration", 48.

restoration there is no presence of a trace of crenellation or any marks of a balustrade lining the *sahn* in case it was open.¹⁰⁷

Finally, on the basis of the above evidence and my own analysis, I held a personal meeting with Dr. Jerzy Kania the head of the Polish-Egyptian group. Dr. Kania kindly informed me that prior to the restoration they found remains of revetments at the top of the walls of the *sahn*. These revetments, he added, were probably to support a roof and outline the octagonal shape of the lantern given that they left marks of fixation in the wall at an angle.¹⁰⁸ Based on this observation Dr. Kania explained to me why they initially proposed to roof the *sahn* (the isometric presents) and that they declined this proposal later on for budget reasons.

I checked in the Creswell album to find one photo that might be relevant (Pl. 43 and Pl. 44). They both show the upper corners of the *sahn* with no remains of a proper finish. In particular Pl. 43 shows the remains of a construction line that might indicate the installation level of a lost roof.

To me this experience was some validation for the basis and outcome of this research. It dictates the importance of basing the decision of roofing a *sahn* or not for restoration initially on the analysis of the architecture and fenestration. Further support to this is the fact that the originality of the roofing will always remain subject to doubt even if remains of revetments

¹⁰⁷ Ibid. 48.

could be found in the walls of the *sahn*. This is simply because the roof could have been added at a later period and does not have to date back to the original state of a given madrasa.

Finally we come to the case of al-Ghuri (909-10/1504-5). This mosque presents a unique example of its type. It is what could not be fully classified neither under the open nor under the roofed type of the four-*iwan* madrasas. It combines features from both formulas. It reintroduces the *sidillas* and deep qibla *iwan* from the open type (Fig. 15).¹⁰⁹ On the other hand it contained the small *sahn*, alignment of both face of qibla wall and intensive fenestration all of which are indicative of the roofed type.

As a result I am tempted to classify it under what I would call the hybrid type. I would further suggest that this madrasa used temporary roofing of the *sahn*. This finds proof in an aerial photo of the *sahn* from the Creswell album (Pl. 46). The photo shows the presence of a wooden balustrade that was probably used to carry a light-weight cover. Unfortunately, it is the only existing example of such class and probably the only one designed in that way.

Probably the example of al-Ghuri mentioned earlier, was expected to be the start of a new line had the Mamluk era not come to its end in 1516. The Ottoman conquest that ended the rule of the Mamluk Empire brought about the

¹⁰⁸ He informed as well that there were pre-restoration photos that show this but which he has no access to at that moment and promised to give me a copy of it. Nevertheless the time did not allow me to add such proof to this research.

¹⁰⁹ More evidence on the absence of a complete roof is found in the painting of David Roberts (Pl. 28). The painting shows that the *sahn* was open to the sky but had a kind of *cavetto* around its top.

death of a whole architectural heritage. This lost tradition contained the building experience was culminating over a period of at least 250 years. This process was further catalyzed by the transfer of the Mamluk royal atelier to Istanbul in the year following the conquest.¹¹⁰ The departure of expertise with their families marked the transfer of the Mamluk art and architectural heritage to the Ottomans.¹¹¹

No one has dedicated a study to trace the Mamluk influence in Ottoman architecture until now.¹¹² However, I would not hesitate to suggest the transfer of the experience of light planning as a main influence, because well-planned lighting became one of the unique features of Ottoman architecture later on.¹¹³

With this I come to the final stage of this research. To end with, it is very important not to forget acknowledging the person without whom the validity of this research would have undergone a lot of doubt. By this I specifically mean the architect himself.

Among all the other considerations included and involved in the building program light will remain the architect's exclusive tool. All other factors influencing the design process are subject to interference. They could be all open to direct influence from political, social, economic and functional

¹¹⁰ Ibn Iyas, *Bada'i al-zuhur*, 3: 116-117.

¹¹¹ Ibn Iyas mentions that these craftsmen were sent to build a madrasa like that of al-Ghuri in Istanbul, see *ibid.*, 3: 119.

¹¹² Although it was mentioned, see Goodwin, G., *A History of Ottoman*, 312.

¹¹³ Goodwin, G., *Sinan*, 66-82

obligations. Nevertheless, the light planning remains to be the last and final implementation that is completely in the hands of the architect.

It forms the space in his thought under which all other considerations are subject to integration. Yet, it could not be easily captured for discussion in the stages prior to execution but rather resided in the architect mind. This is the main reason why it could be the component with the least direct interference. Consequently, it is more valid to rely on it to trace the secret elements that influenced the architect and formed his vision at any given time.

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Endowment deeds (*Waqfiyya*):

- حجة وقف السلطان لأشرف قايتباي ، ١٤٧٤/٨٧٩ ، وزارة الأوقاف ، ٨٨٨.
- حجة وقف جوهر اللالا ، ١٦١٢ . (مخطوطة بكتبة الكتب النادرة بالجامعة الإسلامية)

Catalogue 1

Index. 60 - Qadi 'Abd al-Basit (823 H / 1420 A. D.)

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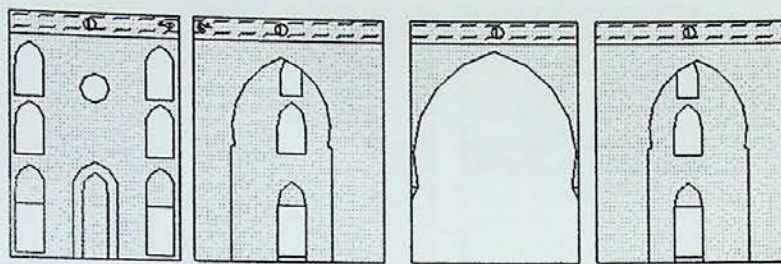
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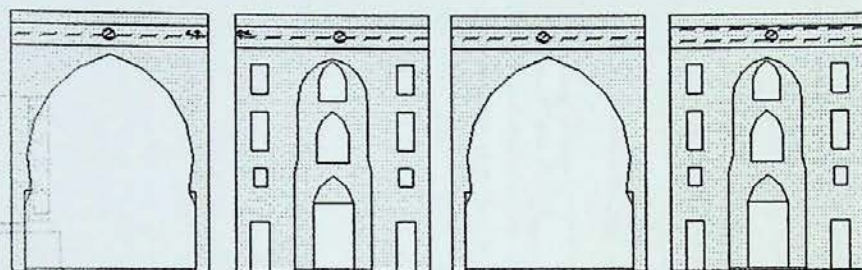
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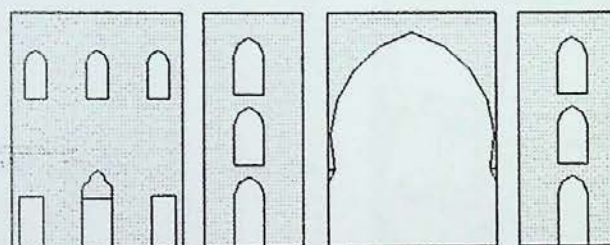
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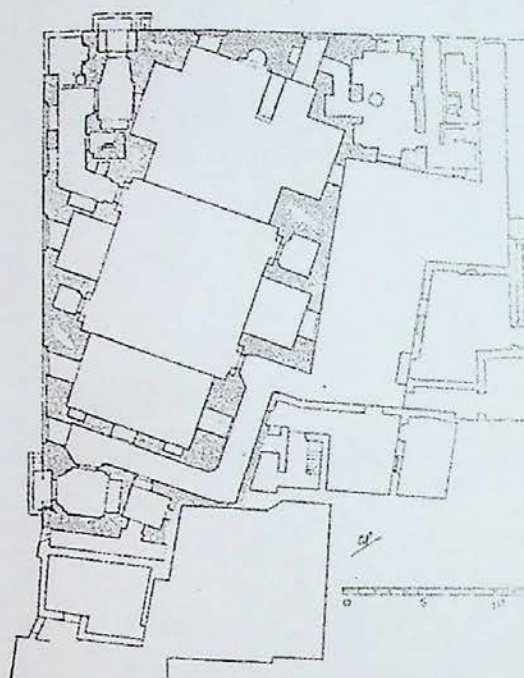
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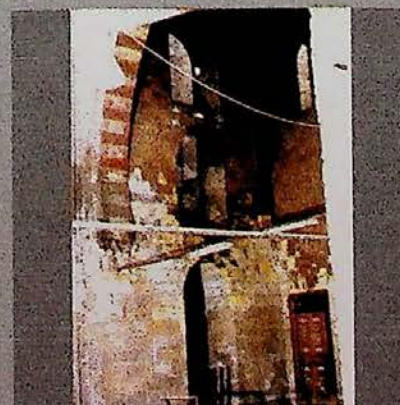
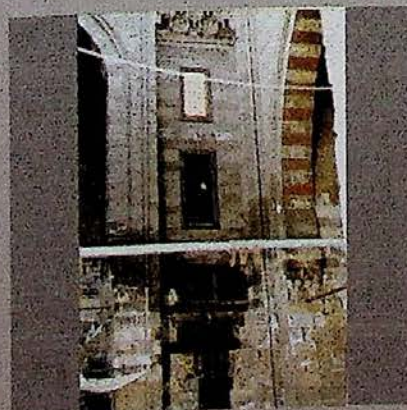
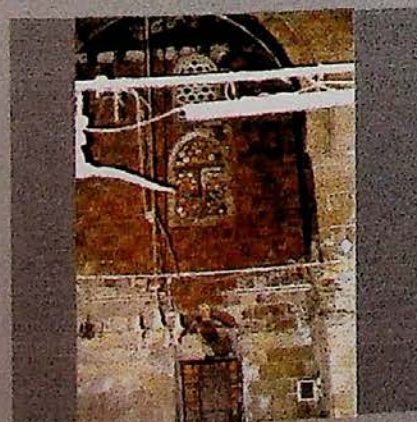
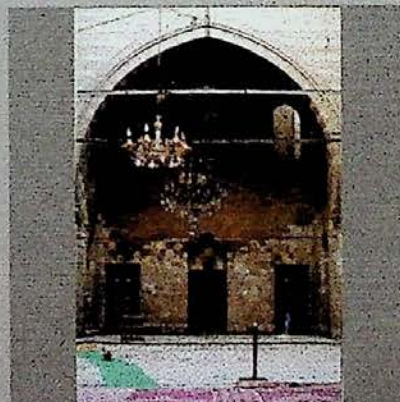
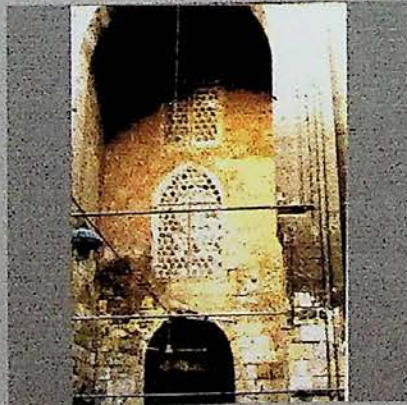
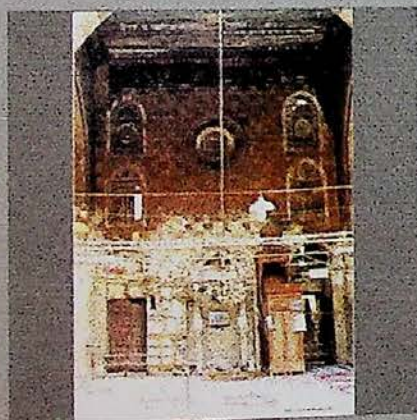
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Anti-Qibla Iwan (Scale 1:400)



Plan (Scale 1 : 500)



Index.175 - Barsbay (829 H / 1425 A.D.)

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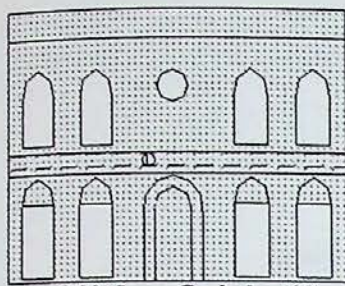
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- (3) 2 : 255

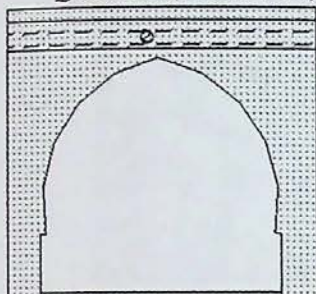
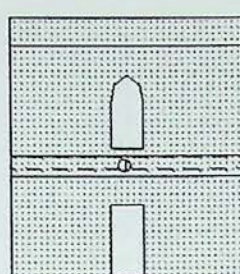
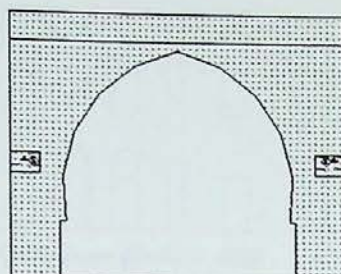
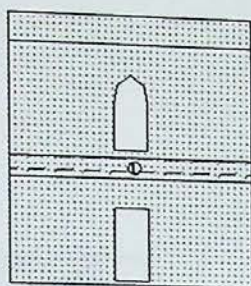
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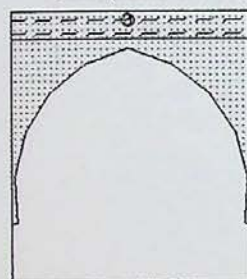
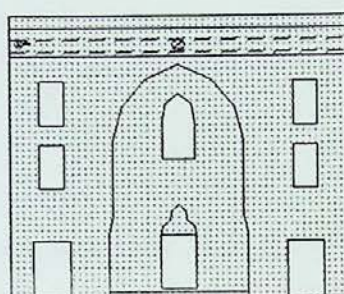
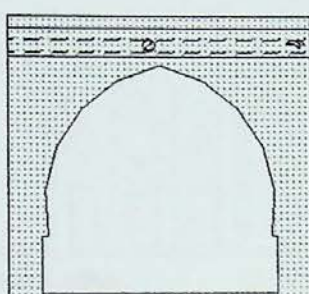
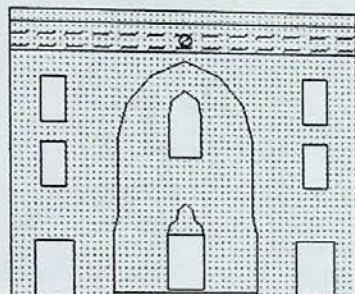
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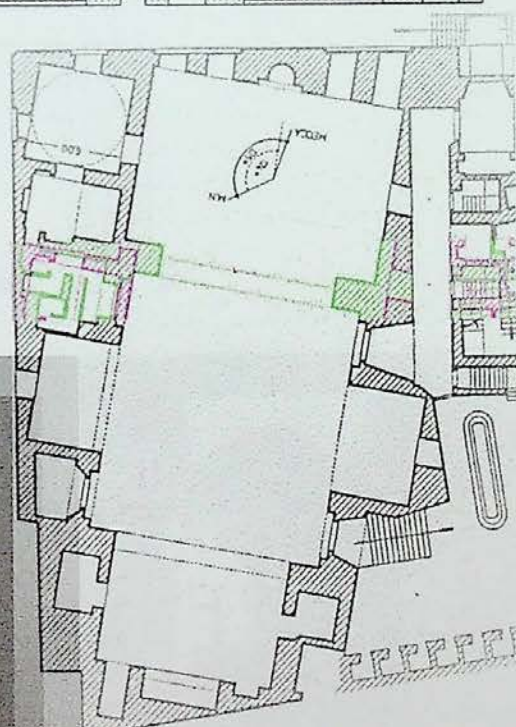
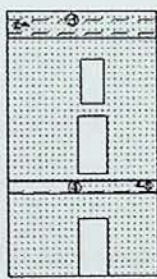
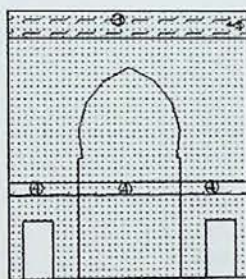
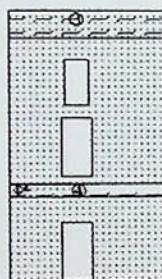
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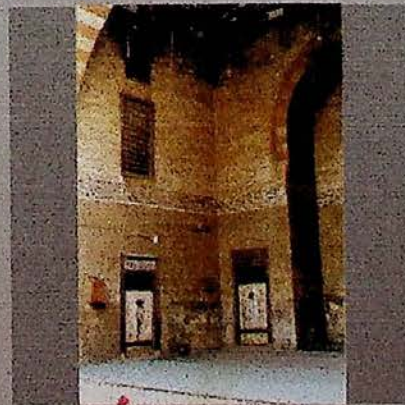
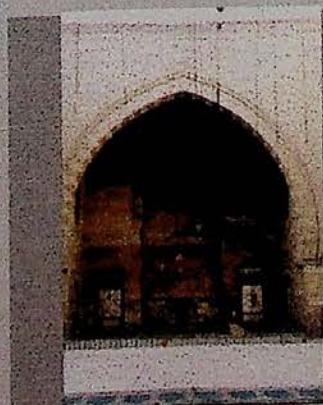
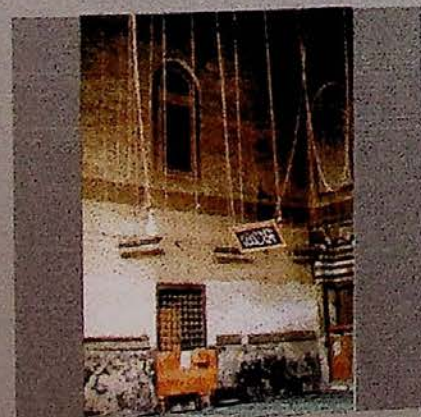
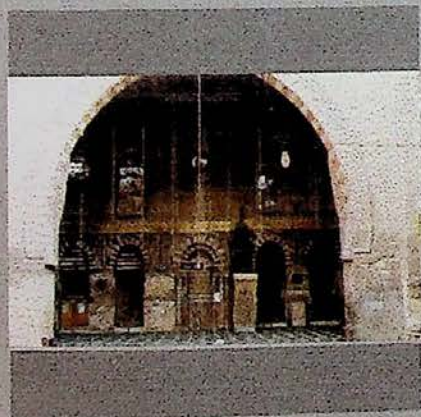
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Anti-Qibla Iwan (Scale 1:400)



Plan (Scale 1 : 500)



Catalogue 3

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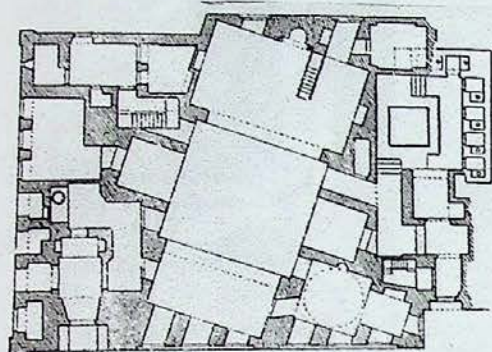
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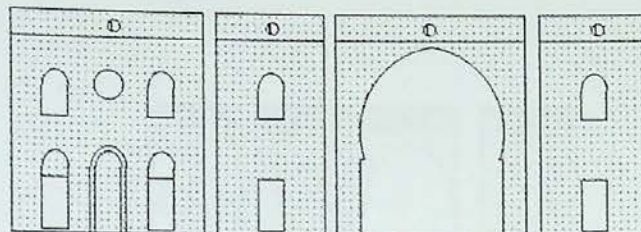
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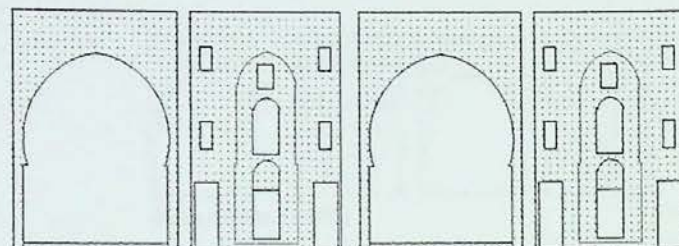
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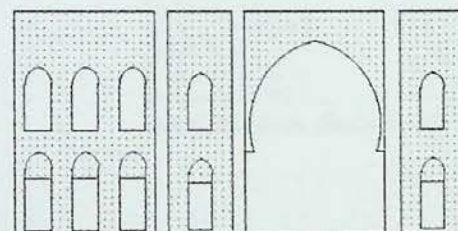
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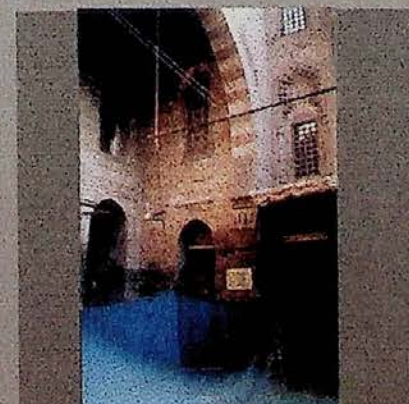
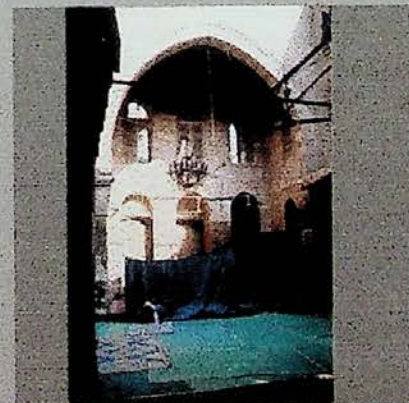
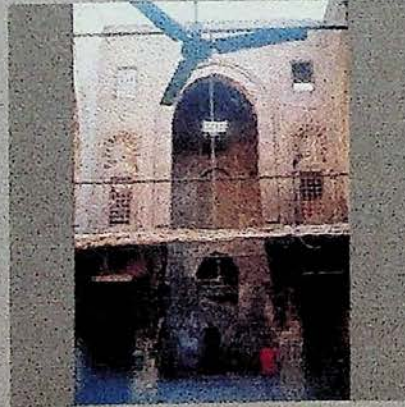
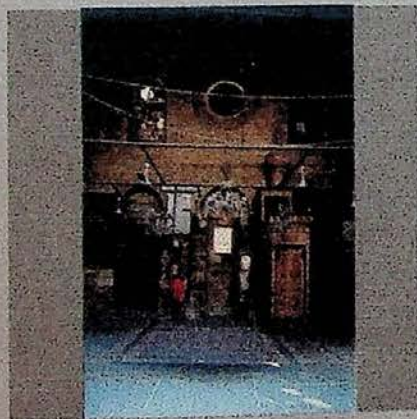
Qibla Iwan (Scale 1 : 400)



Sahn (Scale 1 : 400)



Anti-Qibla Iwan (Scale 1 : 400)



Catalogue 4

Index.134 - Jawhar al-Lala (833 H / 1430 A. D.)

Inscriptions Key:

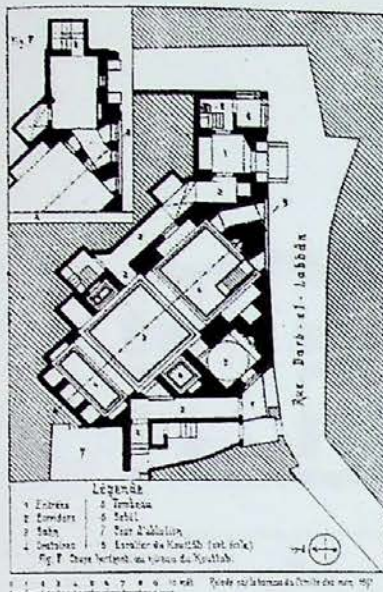
(1) 24 : 36 - 38

(2) _____

Area/Sheet/Position: Darb al-Labana / II / 8G

Type: Madrasa, 4 Iwan, Roofed Sahn

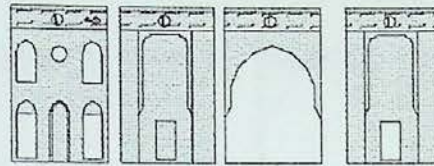
Notes:



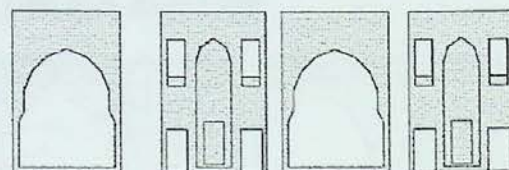
Plan (Scale 1:500)



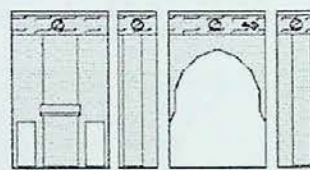
Section (Scale 1:400)



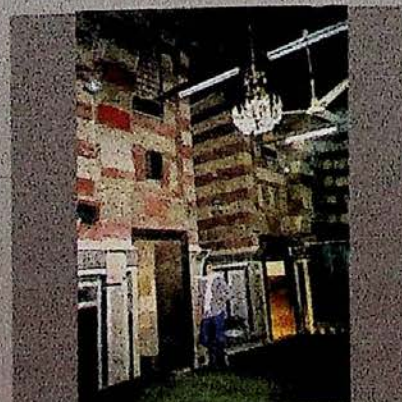
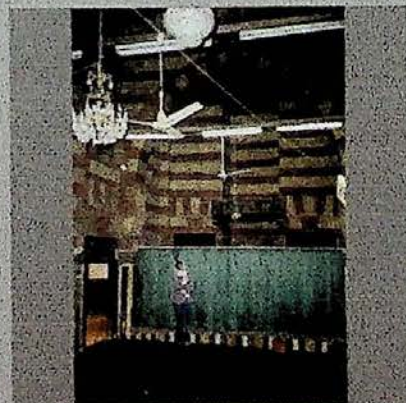
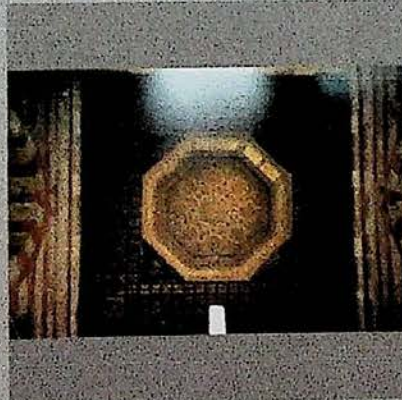
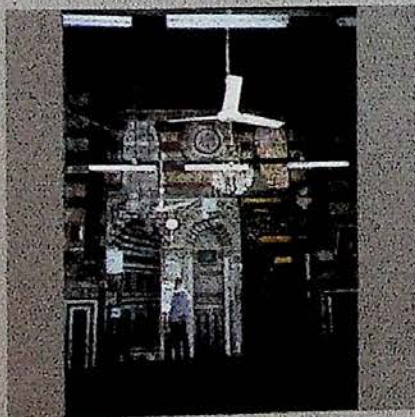
Qibla Iwan (Scale 1 : 400)



Sahn (Scale 1 : 400)



Anti-Qibla Iwan (Scale 1:400)



Catalogue 5

Index. 97 - al-Jawhariyya (844 H / (Before 1440 A. D.)

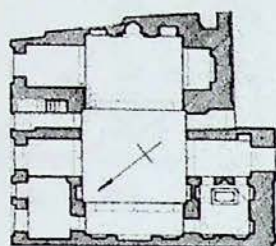
Inscriptions' Key:

- (1) _____
(2) _____

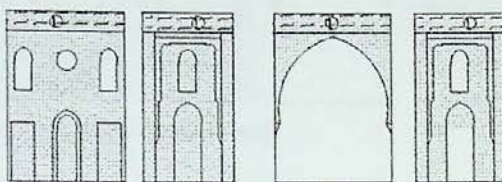
Area/Sheet/Position: al-Azhar mosque / I / 5H

Type: Madrasa, 4 Iwan, Roofed Sahn

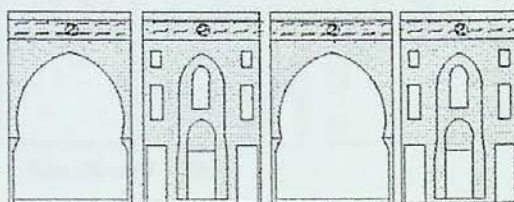
Notes:



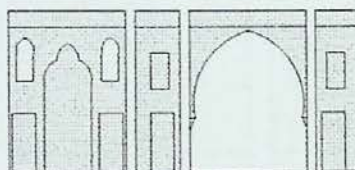
Plan (Scale 1:500)



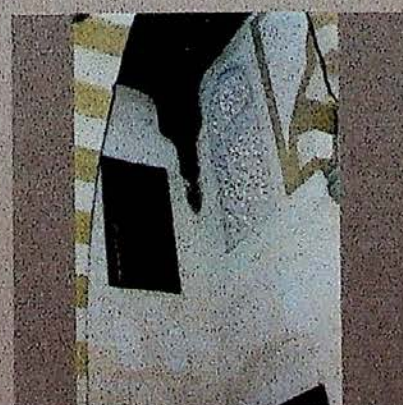
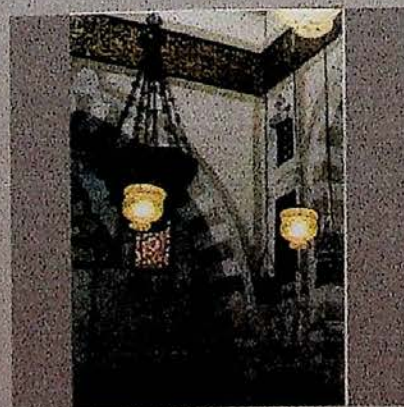
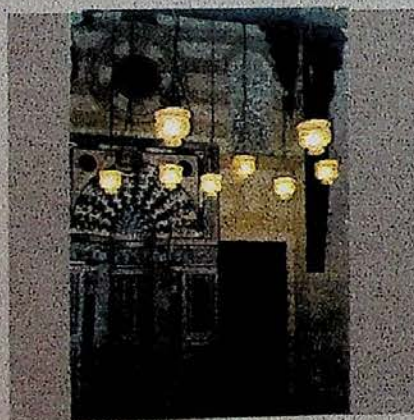
Qibla Iwan (Scale 1:400)



Sahn (Scale 1:400)



Anti-Qibla Iwan (Scale 1:400)



Catalogue 6

Index. 209 - Taghri Bardi (844 H / 1440 A. D.)

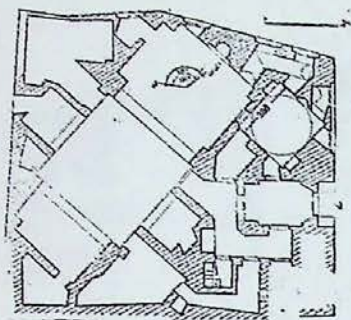
Inscriptions Key:

- (1) _____
(2) 2 : 256-7, Found...Jumada 1/ 844 H

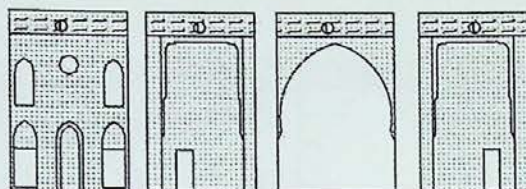
Area/Sheet/Position: Saliba / II / 8F

Type: Madrasa, 4 Iwan, Open Sahn

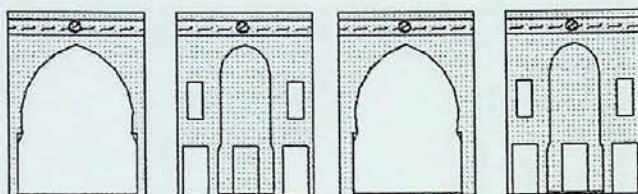
Notes:



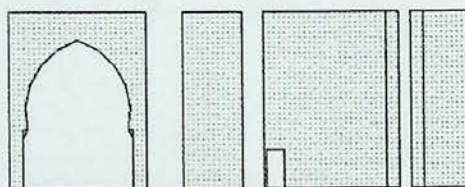
Plan (1:500)



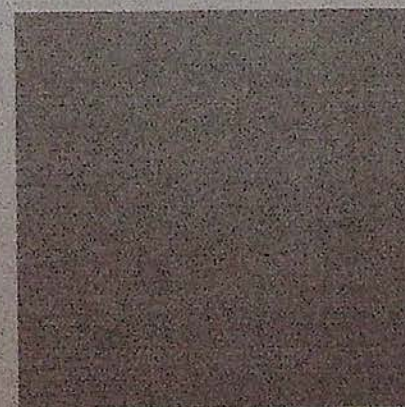
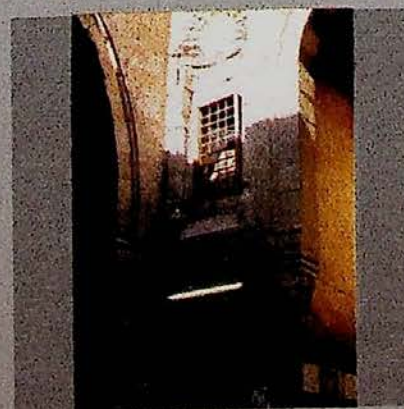
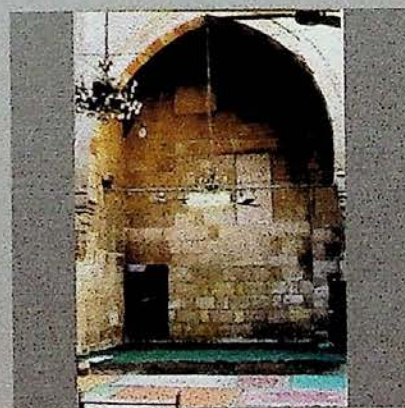
Qibla Iwan (Scale 1 : 400)



Sahn (Scale 1 : 400)



Anti-Qibla Iwan (1:400)



Catalogue 7

Index. 182 - al-Qadi Yahya Zayn al-Din (848 H / 1444 A. D.)

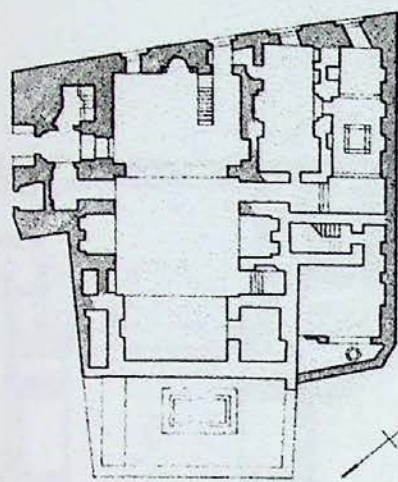
Inscriptions' Key:

- (1) _____
(2) _____

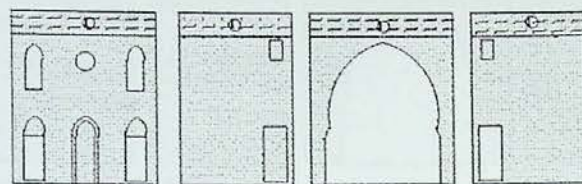
Area/Sheet/Position: Bayn al-Nahdayn / I / 4F

Type: Madrasa, 4 Iwan, Roofed Sahn

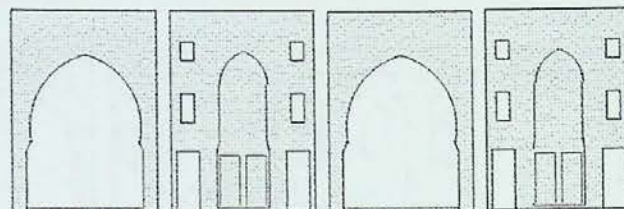
Notes:



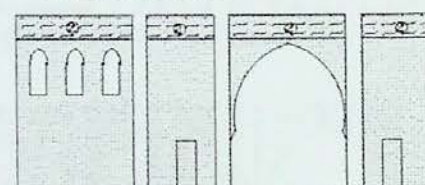
Plan (Scale 1:500)



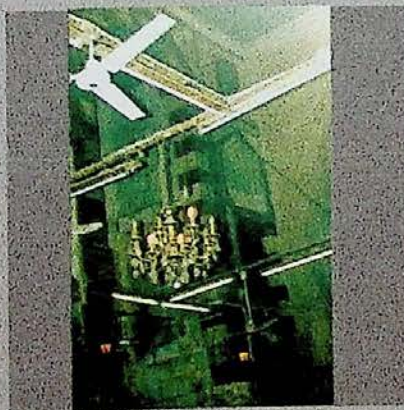
Qibla Iwan (Scale 1:400)



Sahn (Scale 1:400)



Anti-Qibla Iwan (Scale 1:400)



Catalogue 8

Index. 158 - Inal (855-60 H / 1451-56 A. D.)

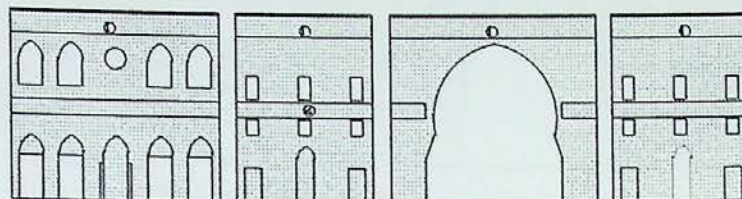
Inscriptions' Key:

- (1) _____
 (2) 48 : 1-11
 (3) _____, Found.
 (4) _____

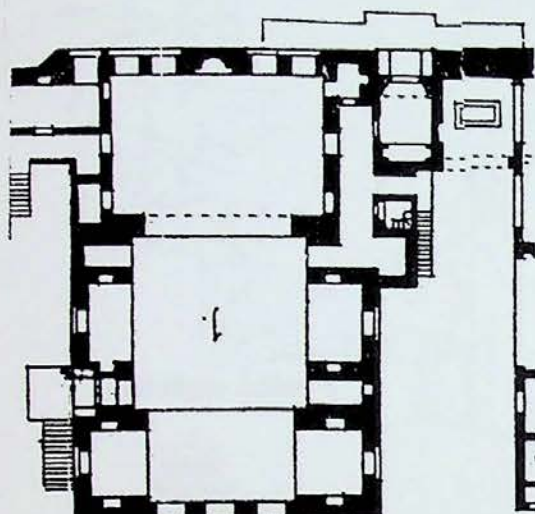
Area/Sheet/Position: N. Cemetery / I / 3L

Type: Funerary Complex, 4 Iwan, Unrestored

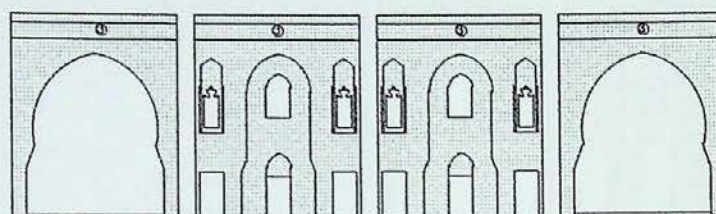
Notes:



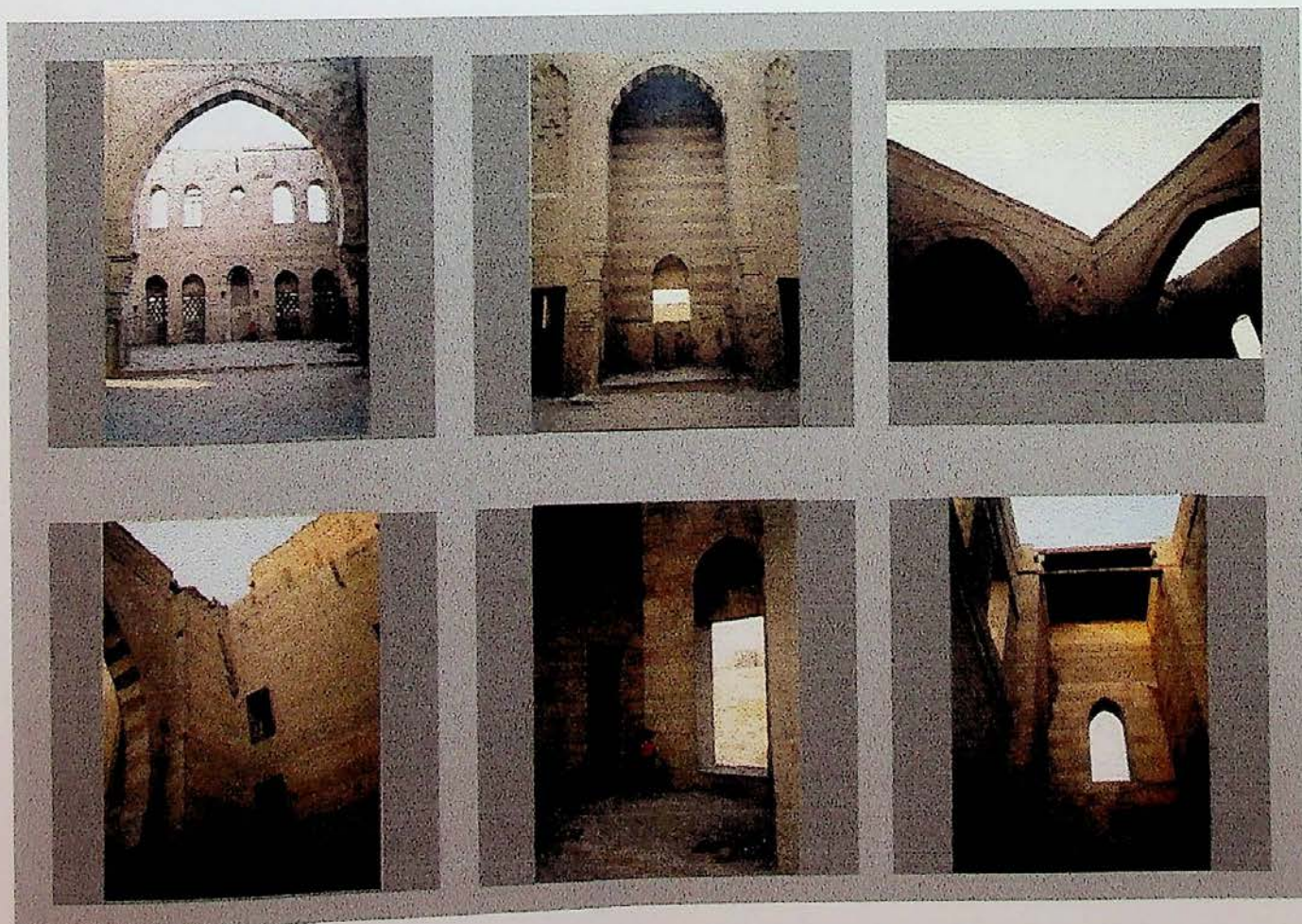
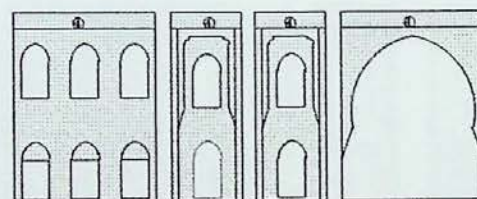
Qibla Iwan (Scale 1 : 400)



Plan (Scale 1 : 500)



Sahn (Scale 1 : 400)



Catalogue 9

Index.99 - Qaytbay N. C. (877-79 H / 1472-74 A. D.)

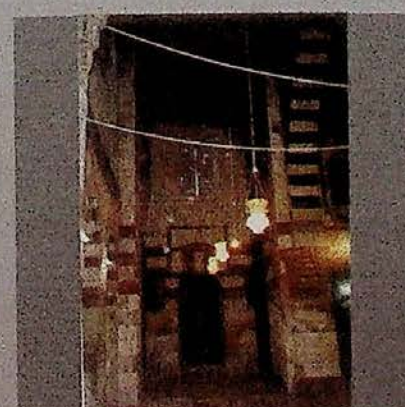
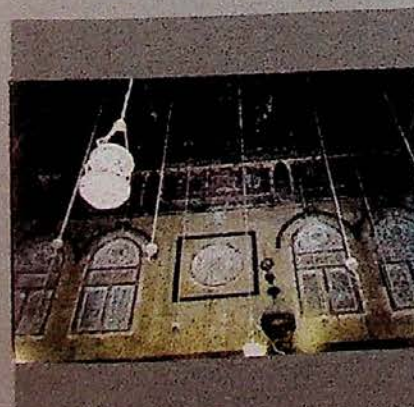
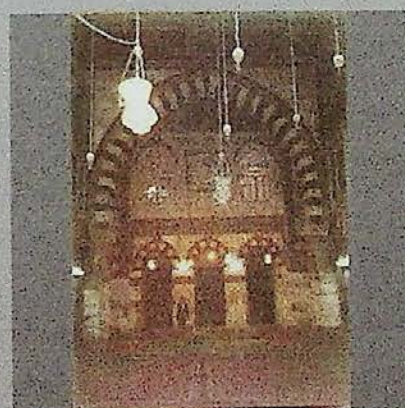
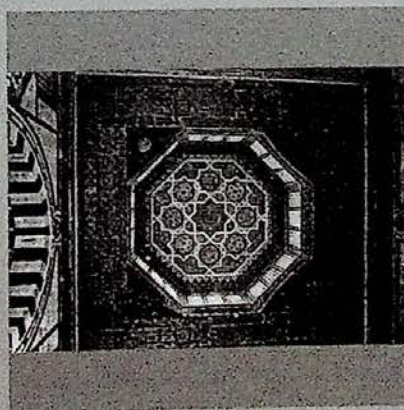
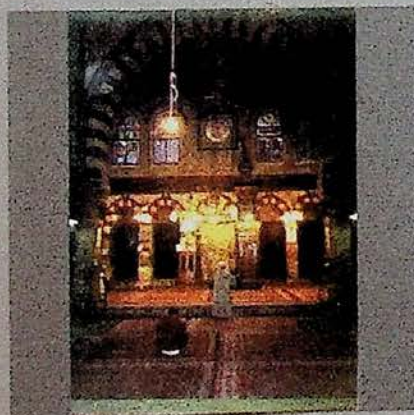
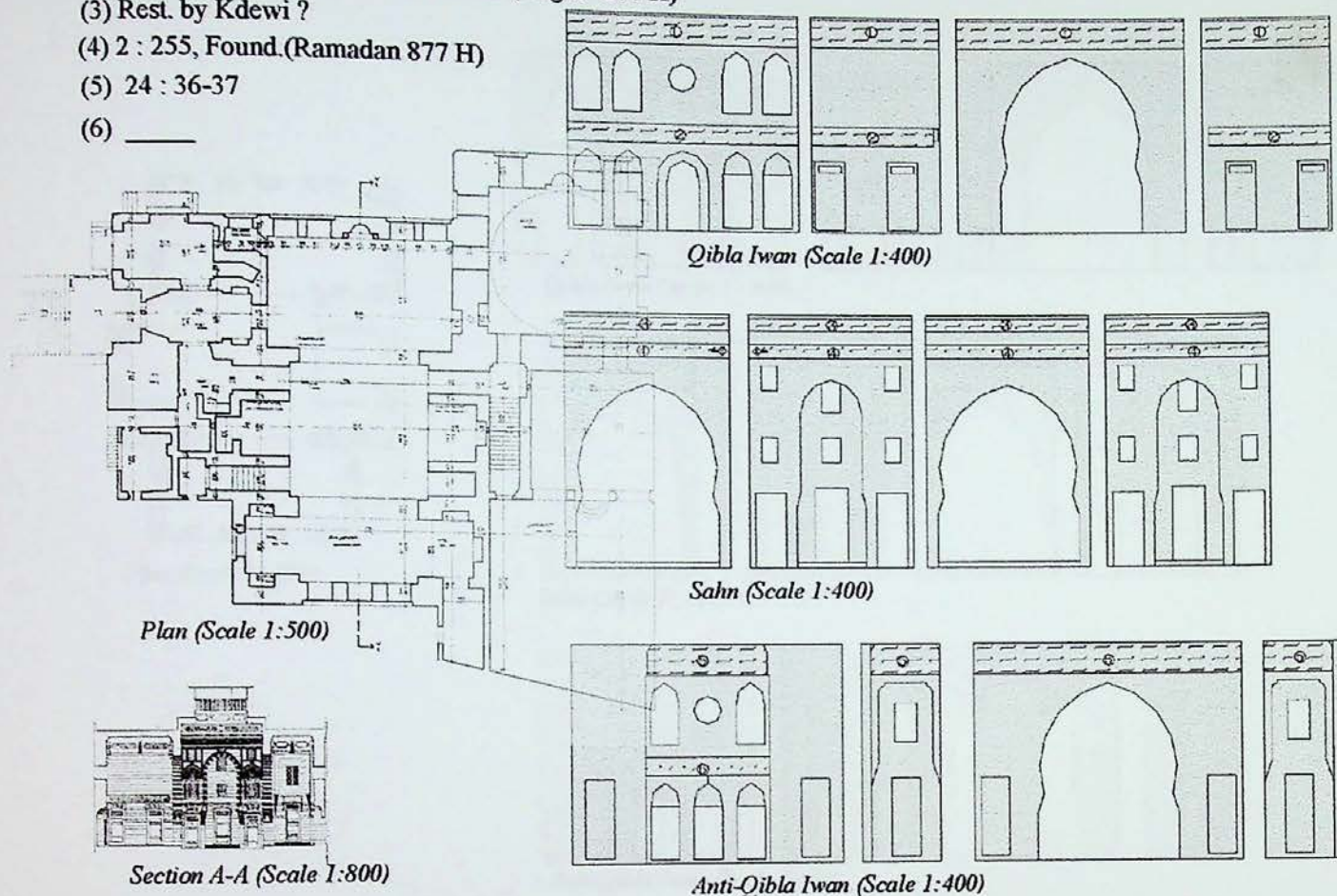
Inscriptions Key:

- (1) _____
- (2) Found. (Sultan) , 48 : 1-4, Found. (Ragab 877 H)
- (3) Rest. by Kdewi ?
- (4) 2 : 255, Found. (Ramadan 877 H)
- (5) 24 : 36-37
- (6) _____

Area/Sheet/Position: N. Cemetery / I / 5K

Type: Funerary Complex, 4 Iwan, Roofed Sahn

Notes:



Catalogue 10

Index.223 - Qaytbay Q. K. (880 H / 1475 A. D.)

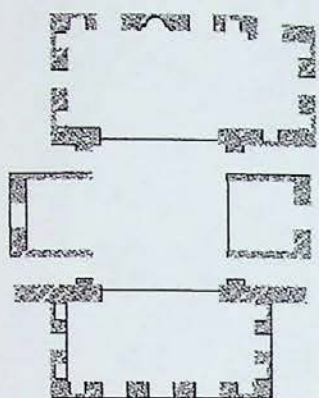
Inscriptions Key:

(1) 3 : 190-192

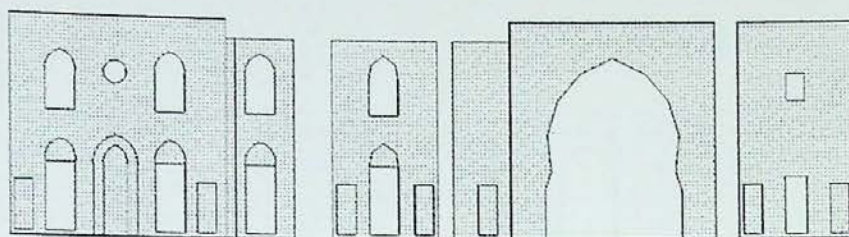
Area/Sheet/Position: Qal'at al-Kabsh / II / 8E

Type: Madrasa , 4 Iwan, Roofed Sahn

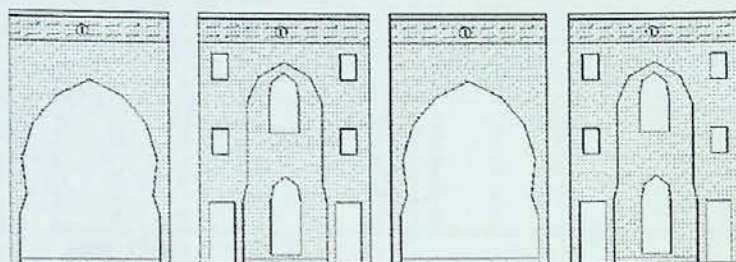
Notes:



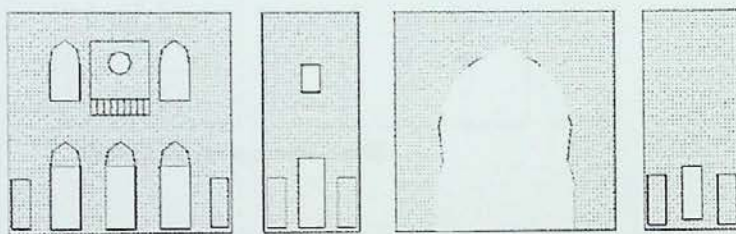
Plan (Scale 1 : 500)



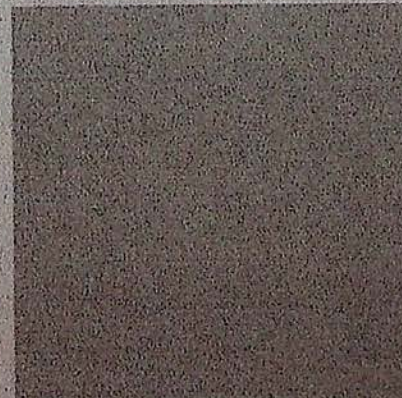
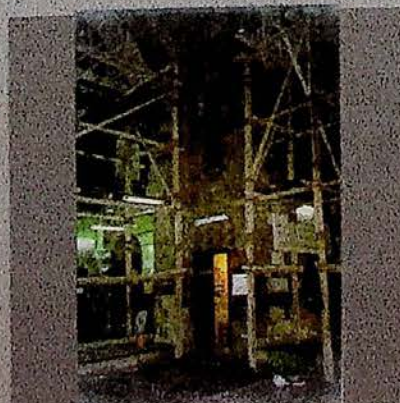
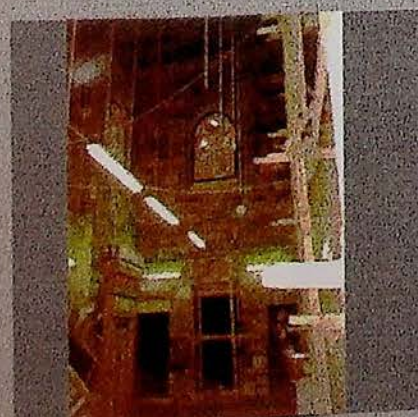
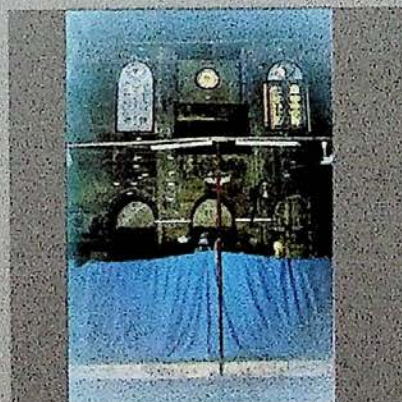
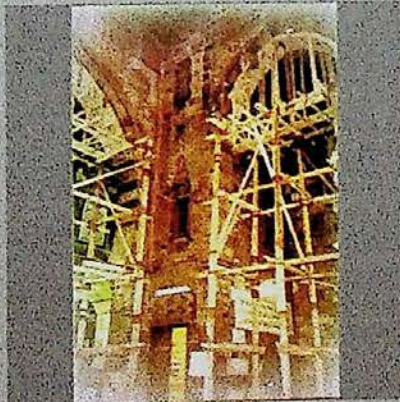
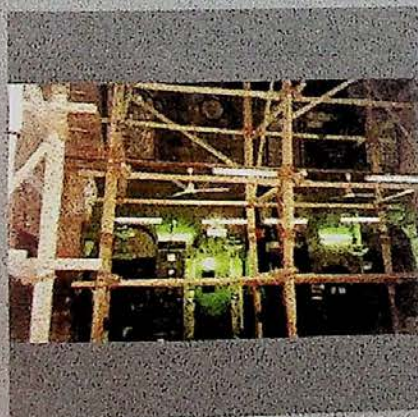
Qibla Iwan (Scale 1 : 400)



Sahn (Scale 1 : 400)



Anti-Qibla Iwan (Scale 1:400)



Catalogue 11

Index 49 - Abu Bakr Muzhir (884 H / 1479-80 A. D.)

Inscriptions' Key:

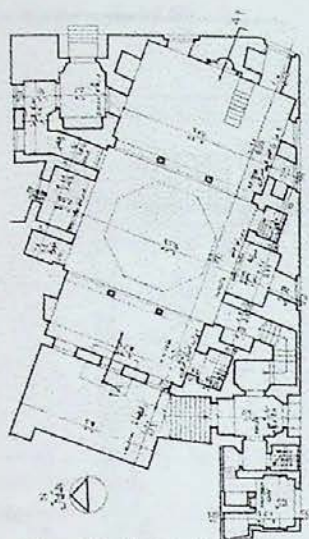
(1) _____

(2) _____

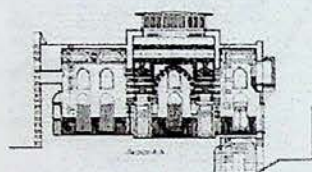
Area/Sheet/Location: West of Gamaliyya / I / 3H

Type: Madrasa, 4 Iwan, Roofed Sahn

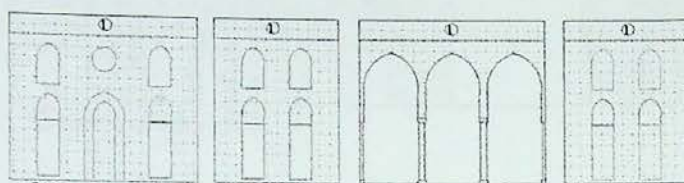
Notes:



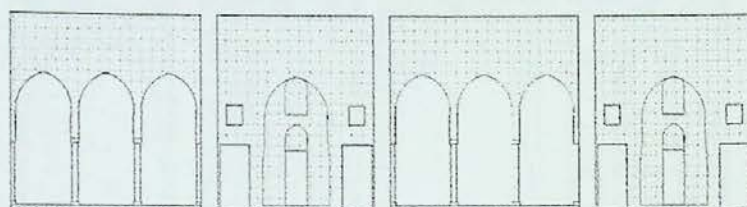
Plan (Scale 1 : 500)



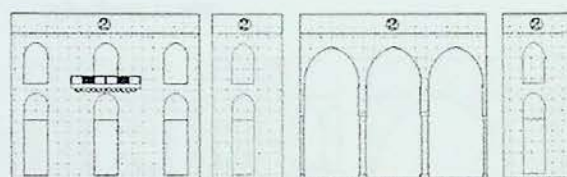
Section A-A (1:800)



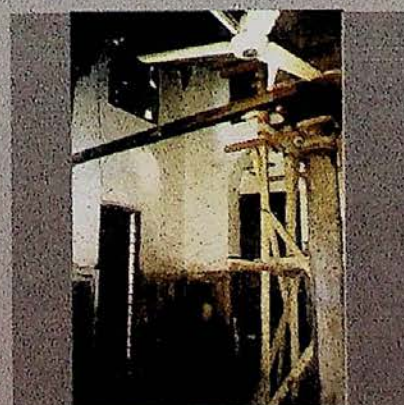
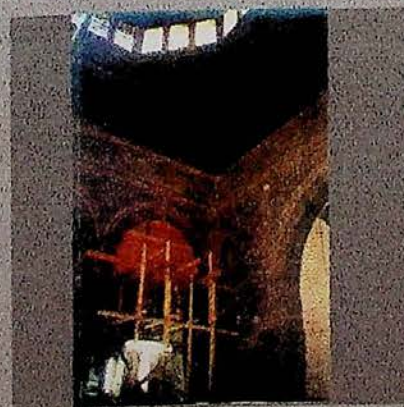
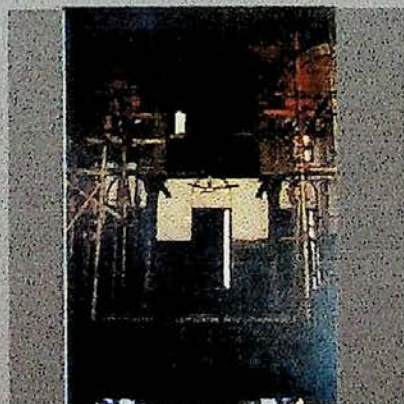
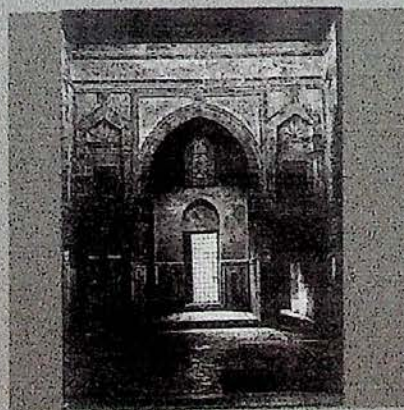
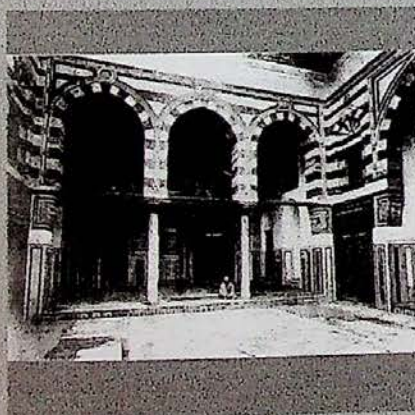
Qibla Iwan (Scale 1 : 400)



Sahn (Scale 1 : 400)



Anti-Qibla Iwan (Scale 1:400)



Catalogue 12

Index.114 - Qijmas al-Ishaqi (885-86 H / 1480-81 A. D.)

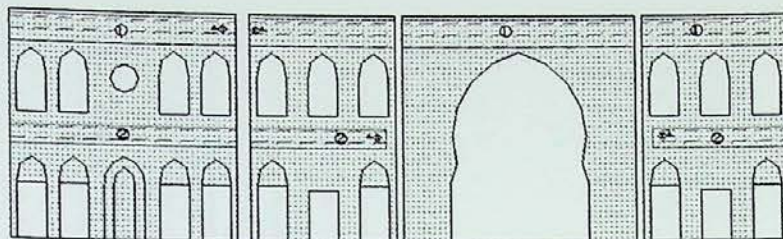
Inscriptions Key:

- (1) II : 255, Foundation.
- (2) IX : 18-22
- (3) XLVIII : 1-5
- (4) Foundation
- (5) XXIV : 36-37 ??

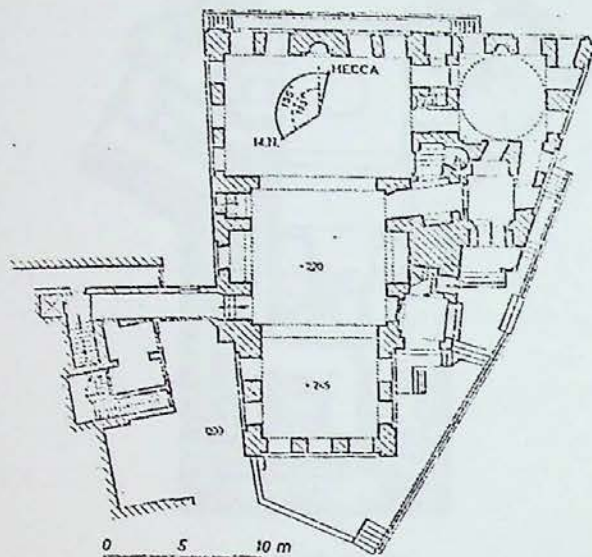
Area/Sheet/Position: South of Bab Zuwayla / I / 8G

Type: Madrasa, 4 Iwan, Roofed Sahn

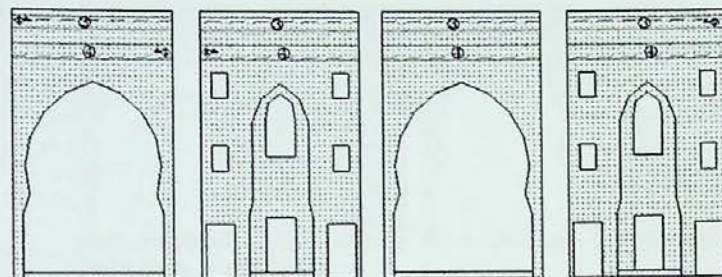
Notes:



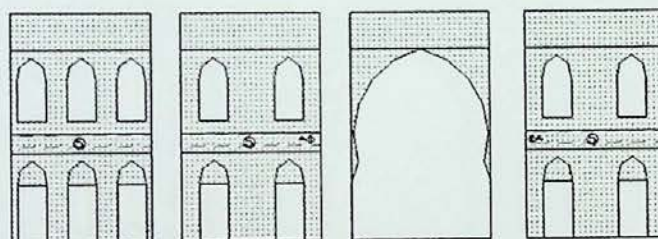
Qibla Iwan (Scale 1: 400)



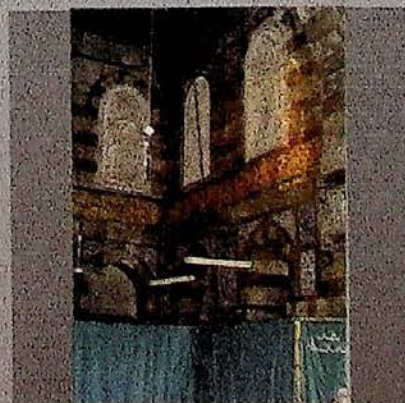
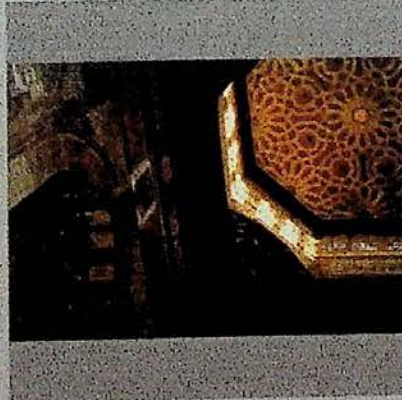
Plan (1:500)



Sahn (Scale 1: 400)



Anti-Qibla Iwan (1:400)



Catalogue 13

Index.211 - Azbak al-Yusufi (900 H / 1494-95 A. D.)

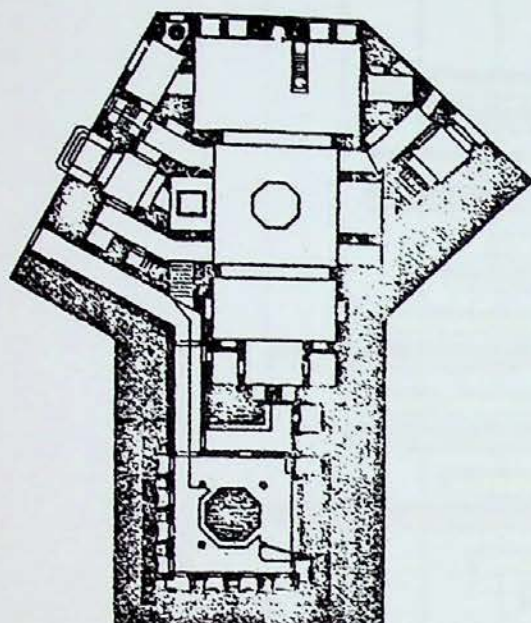
Inscriptions Key:

- (1) _____
- (2) 3 : 190-194
- (3) 67 : 1-9
- (4) _____

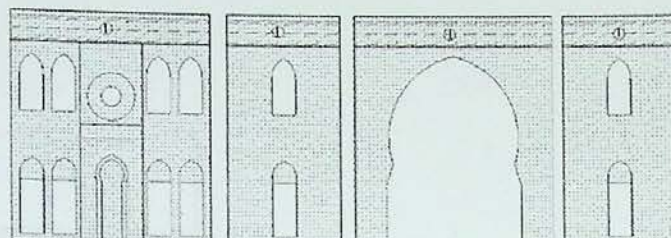
Area/Sheet/Position: North of Saliba / II / 8E

Type: Madrasa, 4 Iwan, Roofed Sahn

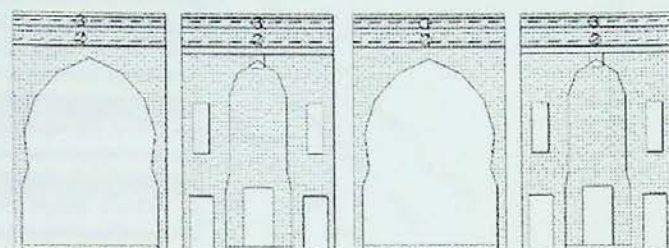
Notes:



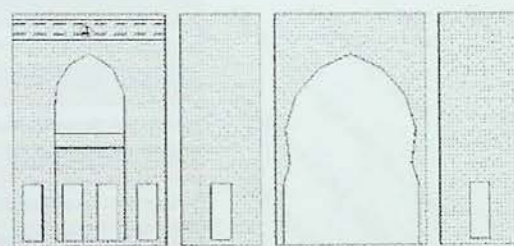
Plan (Scale 1:500)



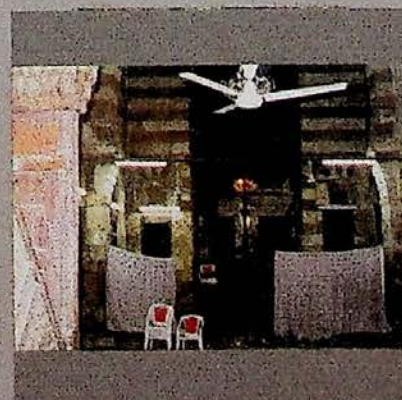
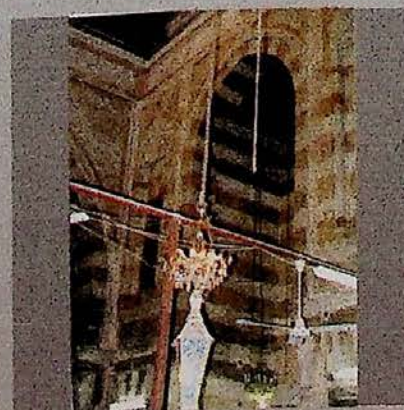
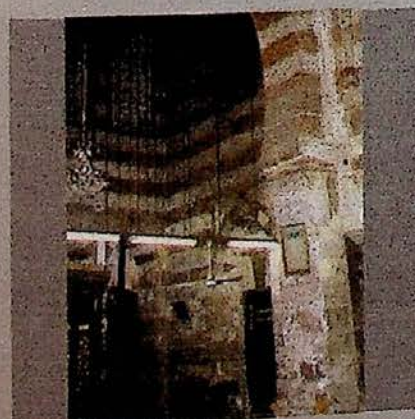
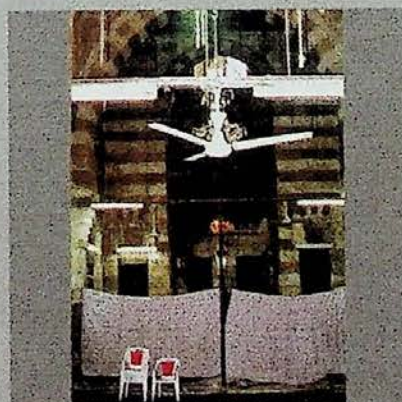
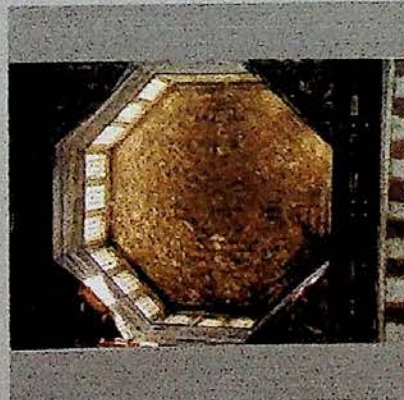
Qibla Iwan (Scale 1: 400)



Sahn (Scale 1: 400)



Anti-Qibla Iwan (Scale 1:400)



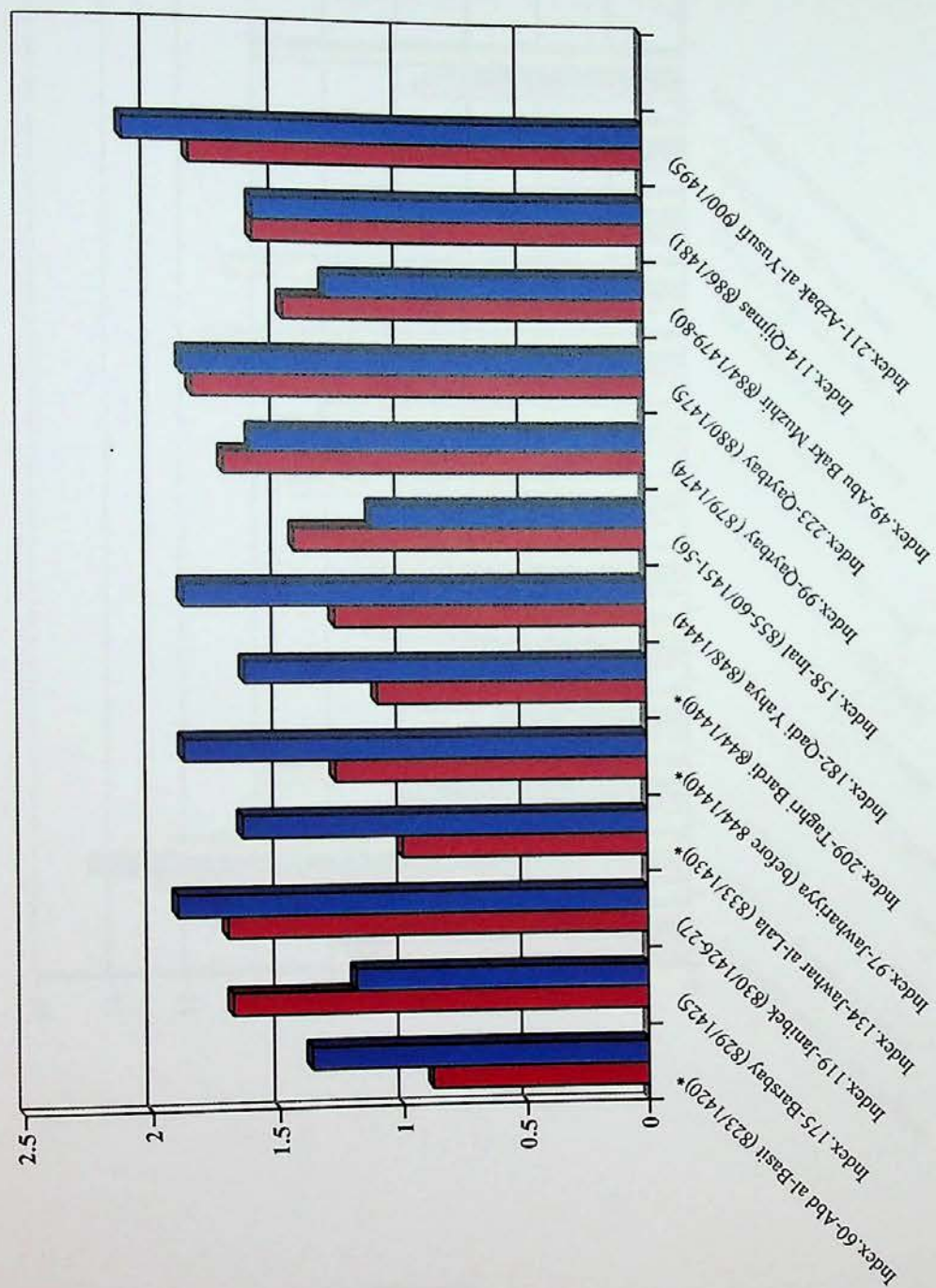


Chart 2.2 The ratios between dimensions of the qibla iwan. The asterisk (*) indicates the presence of *sidillas*. Their dimensions were excluded.

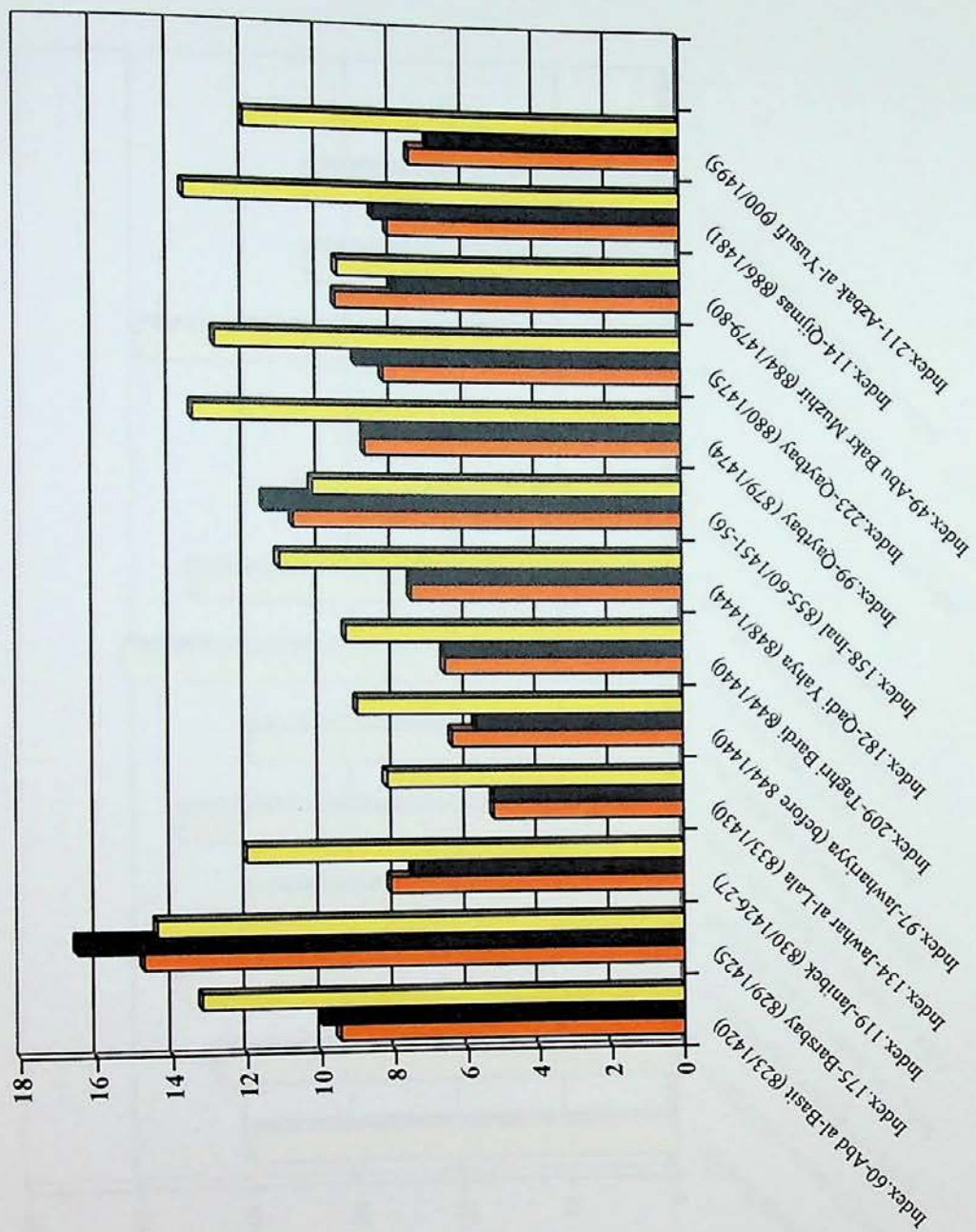


Chart 2.3 The dimensions of the sahn.

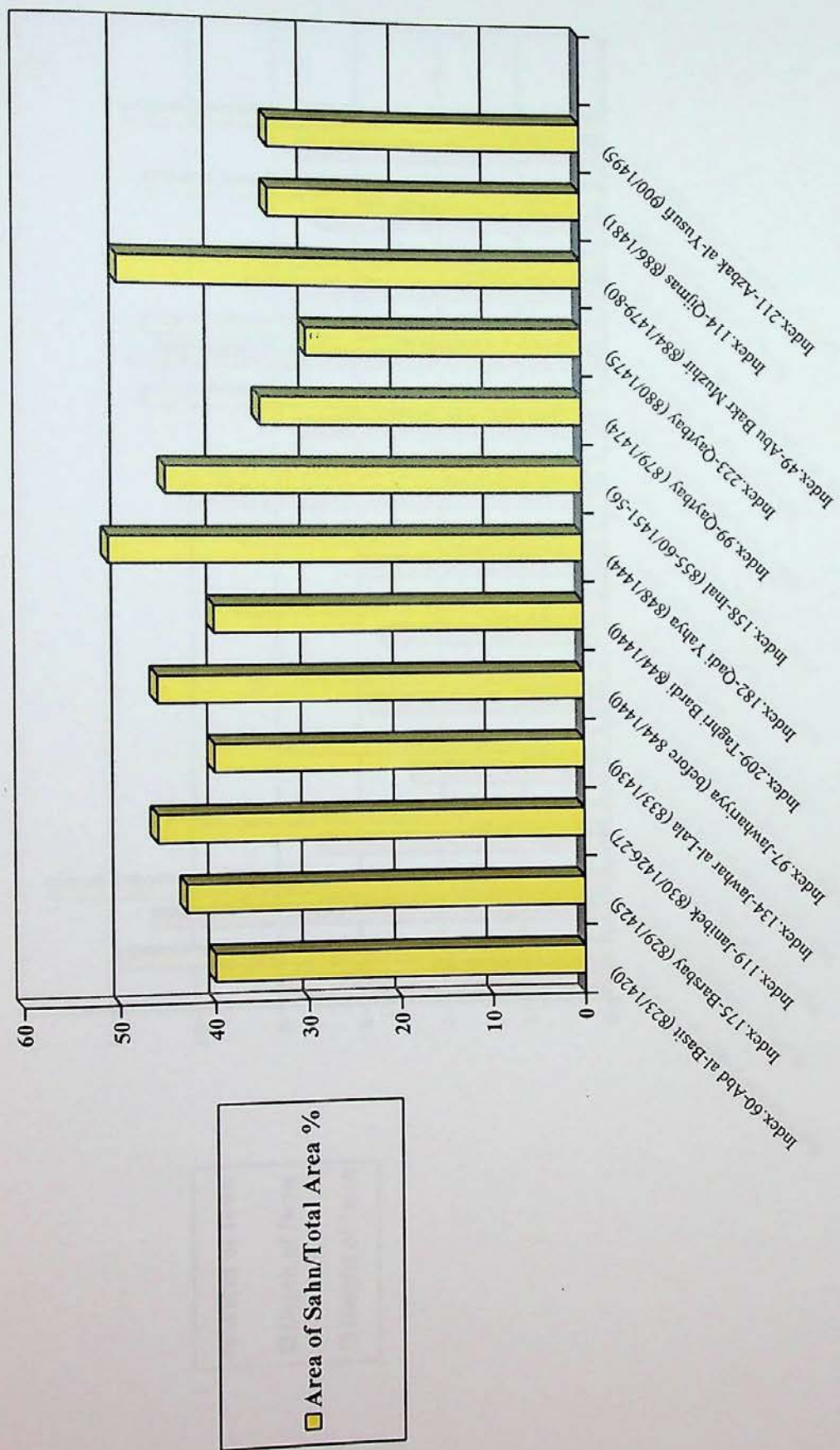


Chart 2.4 The area occupied by the sahn as a percentage of the total Area of the mosque (4 iwans + sahn)

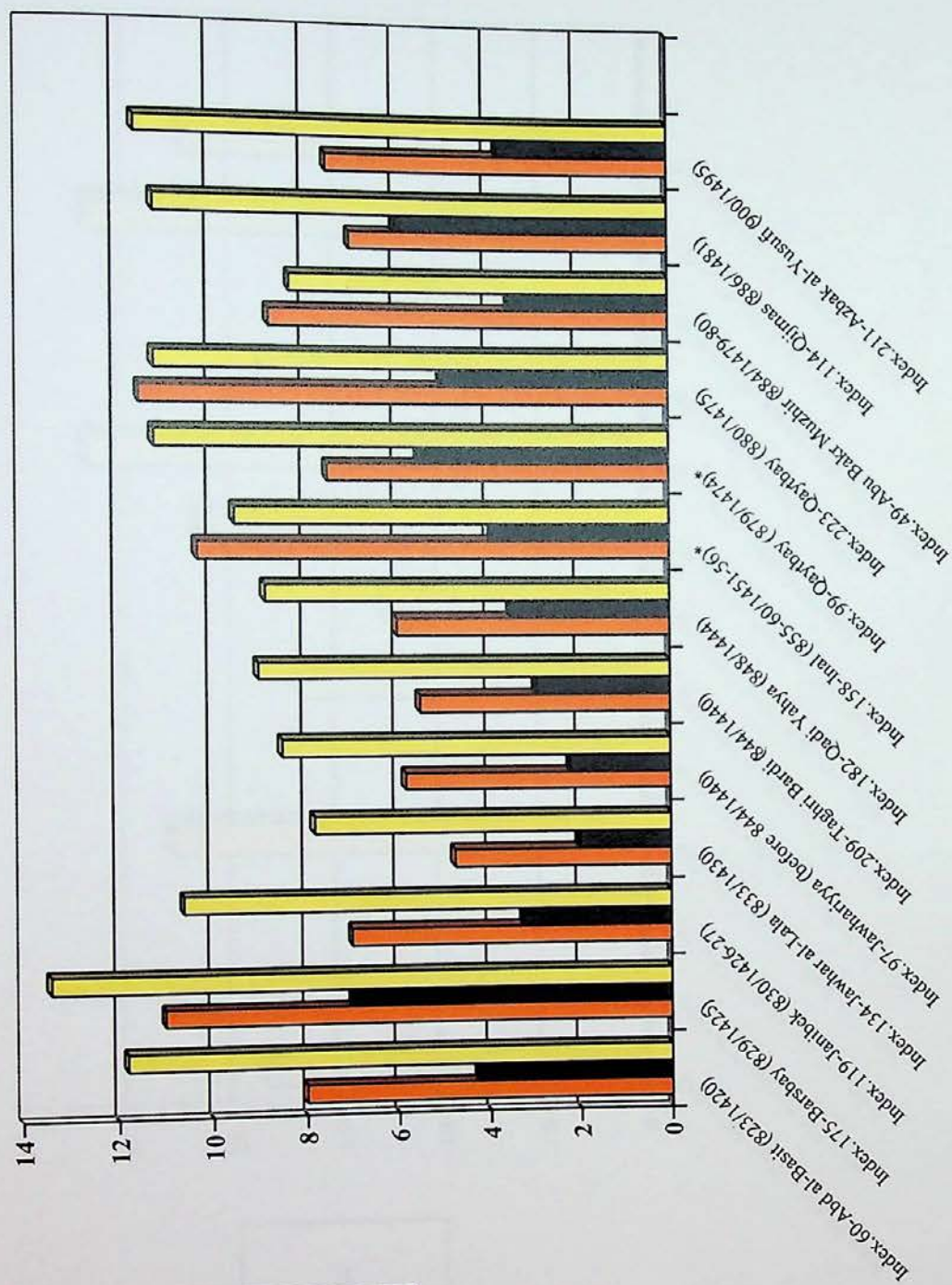


Chart 2.5 The dimensions of the anti-qibla *Iwan*.
The asterisk (*) indicates the presence of *sidillas*. Their dimensions were excluded.

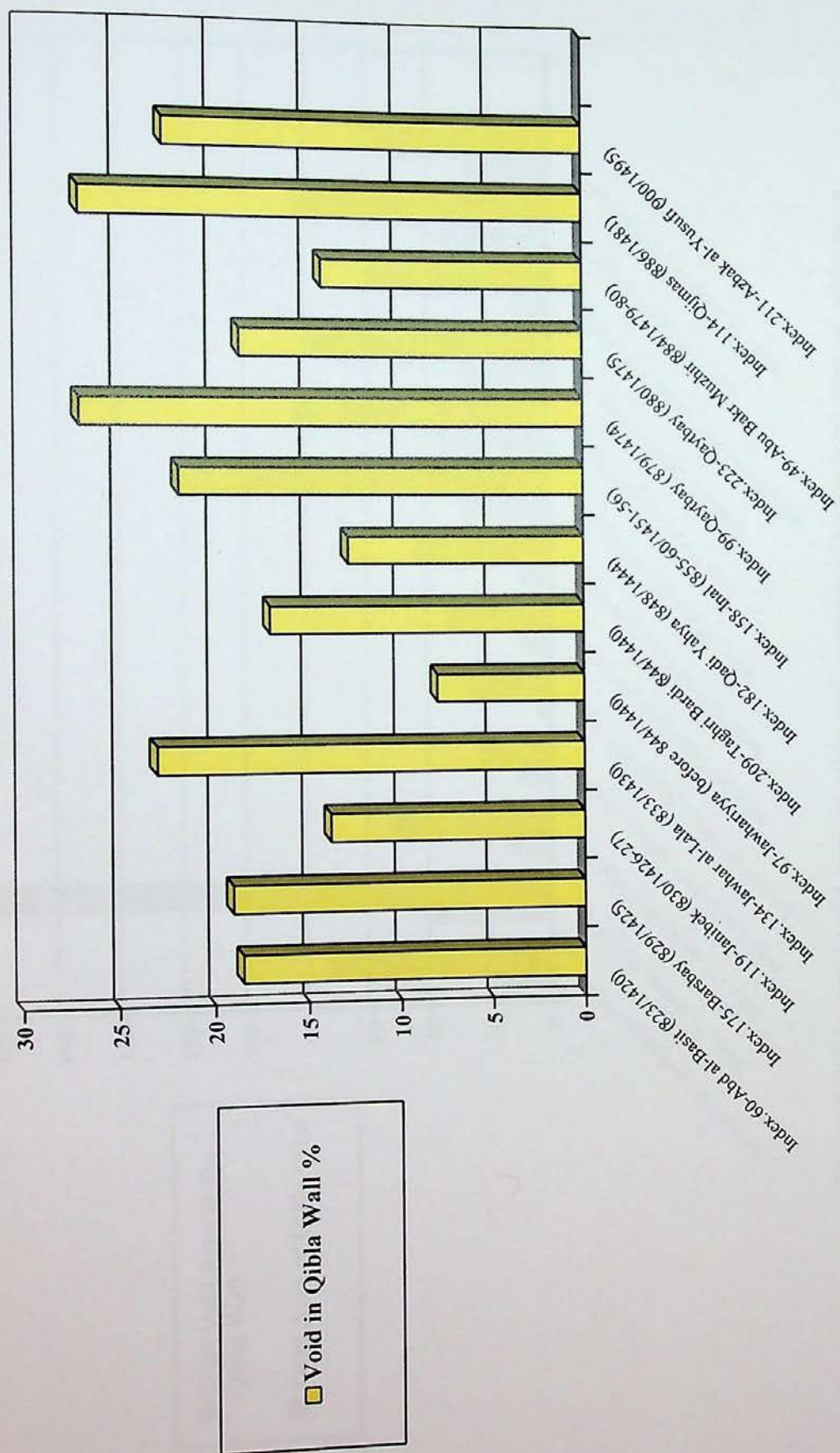


Chart 3.1 The void as a percentage of the total area of the qibla wall.

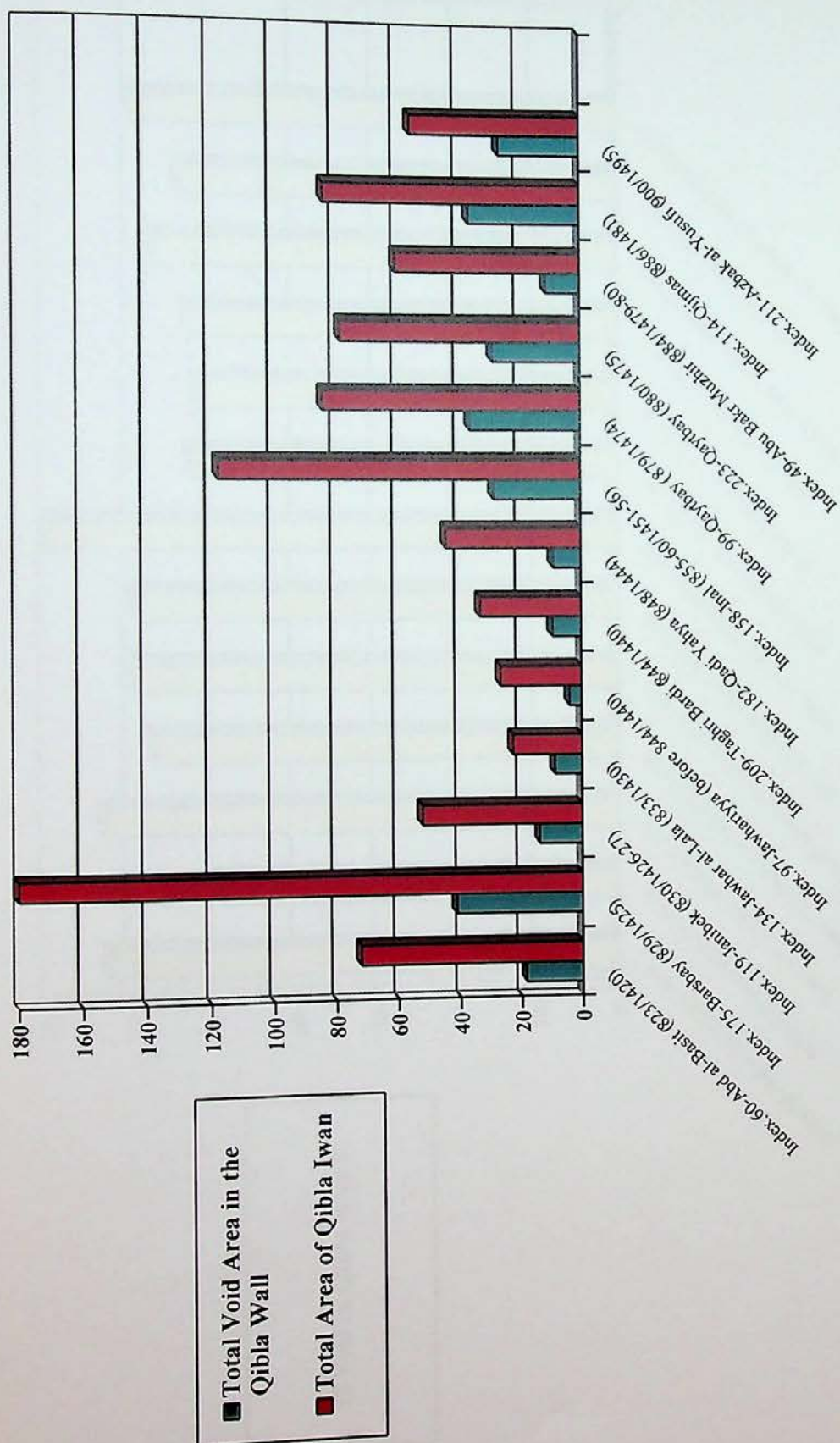


Chart 3.2 The total void area in qibla wall compared to the total area of qibla iwan.

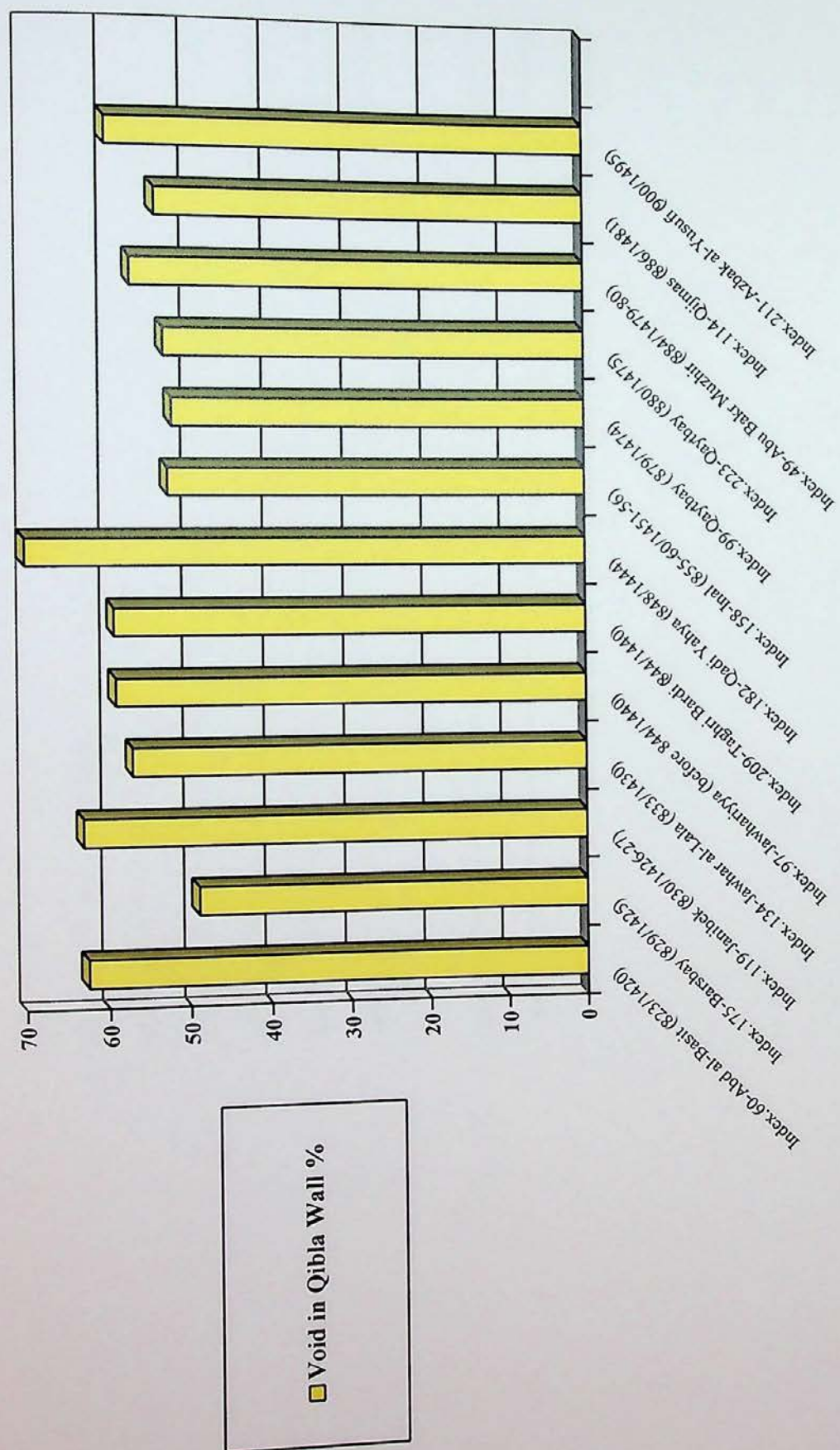


Chart 3.3 The void as a percentage of the total area of the *sahn* wall containing the main arches.

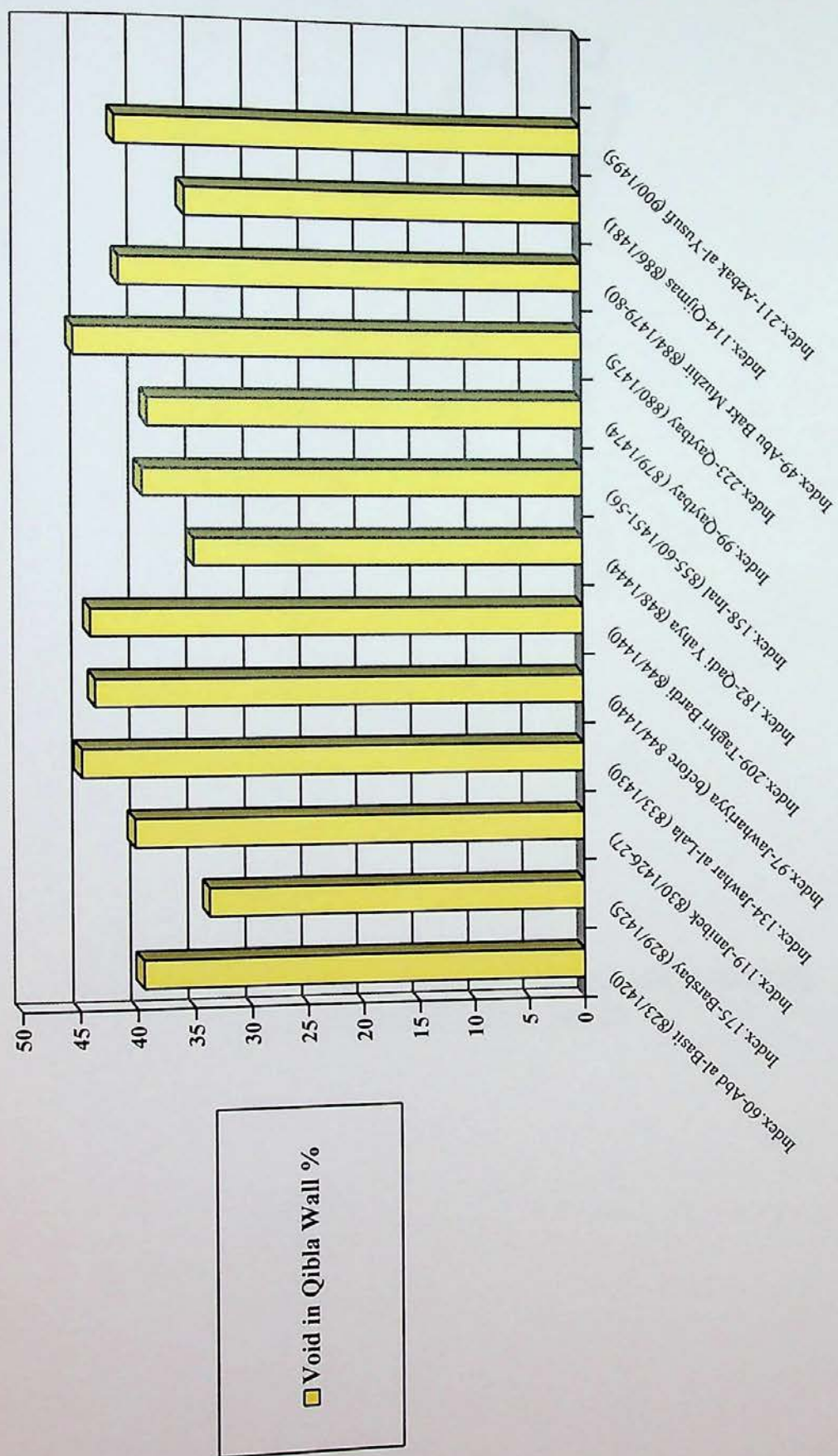
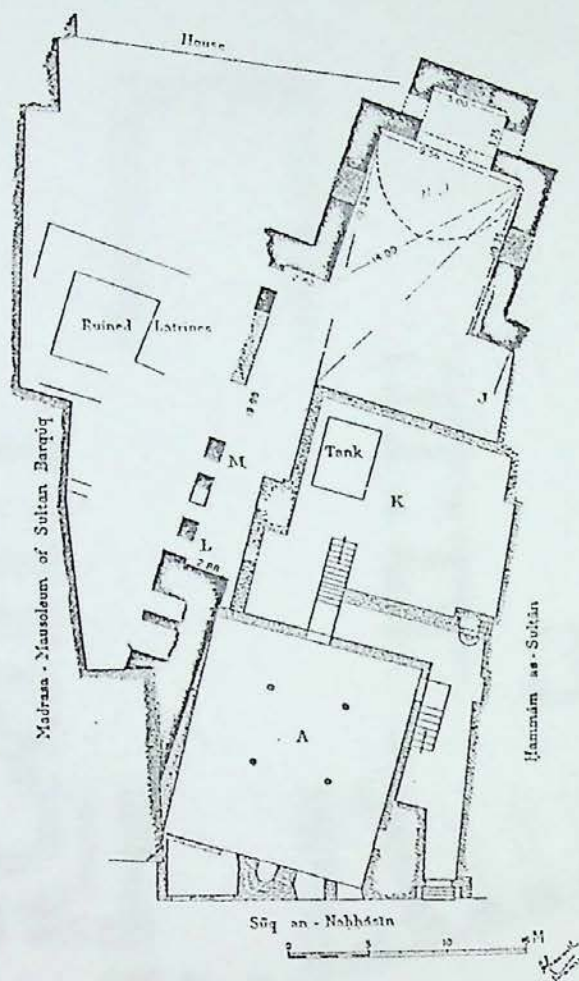


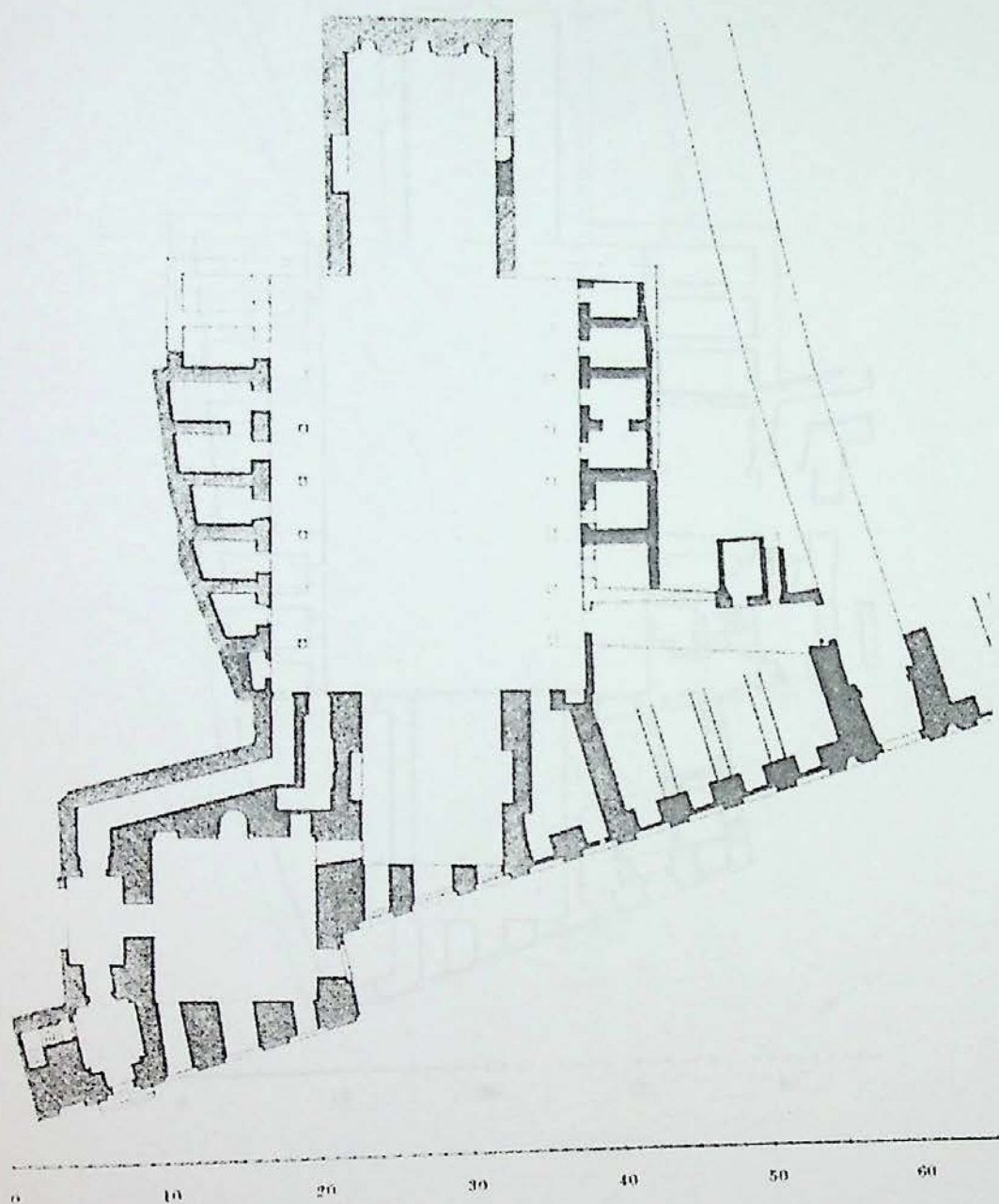
Chart 3.4 The void as a percentage of the total area of the *sahn* wall containing the lateral *iwans*.

Figure. 1



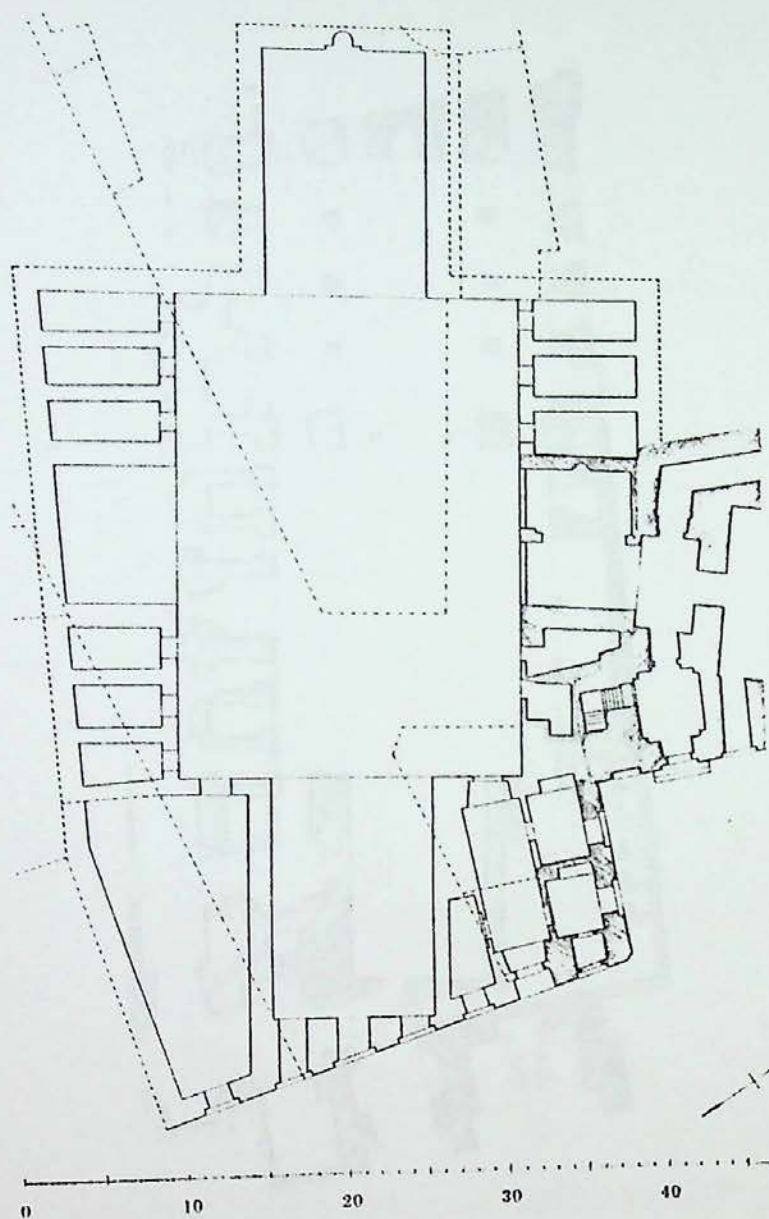
Plan of the madrasa of al-Kamiliyya (Index. 428, 622/1225)
(after Creswell, *MAE*, vol. 2)

Figure. 2



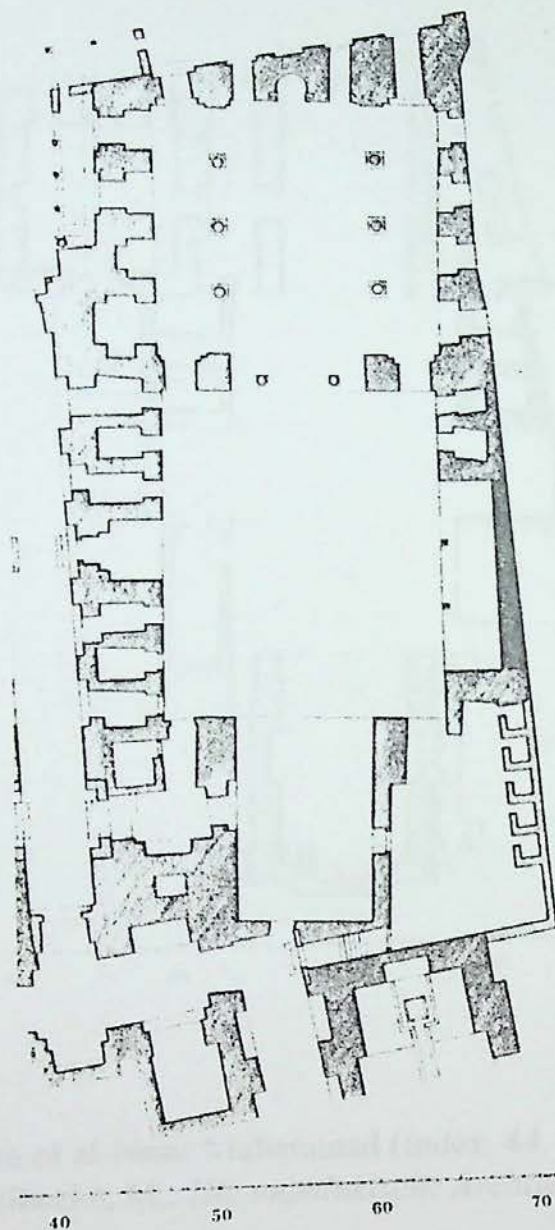
Plan of the madrasa of sultan al-Salih Najm al-Din Ayyub
(Index. 38, 641-48/1243-50)
(after Meinecke, M., *Die mamlukische Architektur*, 1: 10)

Figure. 3



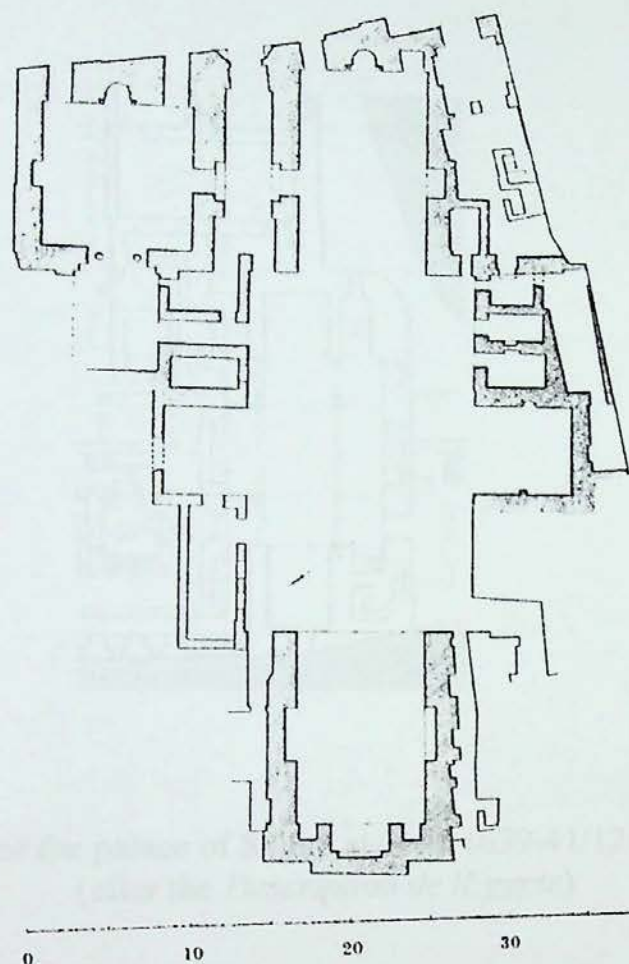
Reconstruction of the plan of the madrasa of al-Zahir Baybars
(Index. 37, 660-62/1262-63)
(after Meinecke, M., *Die mamlukische Architektur*, 1: 27)

Figure. 4



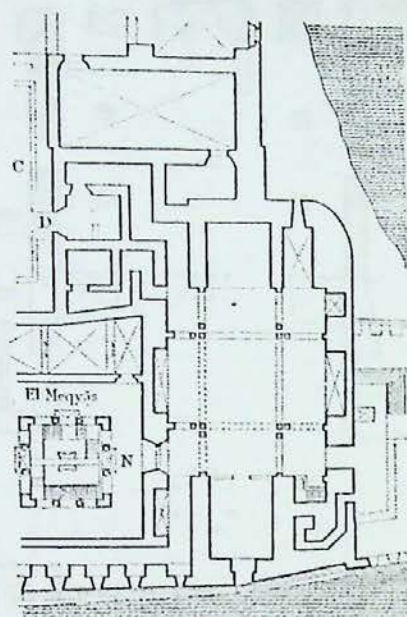
Plan of the madrasa of sultan Qalawun (Index. 43, 683-84/1284-85)
(after Meinecke, M., *Die mamlukische Architektur*, 1: 45)

Figure. 5



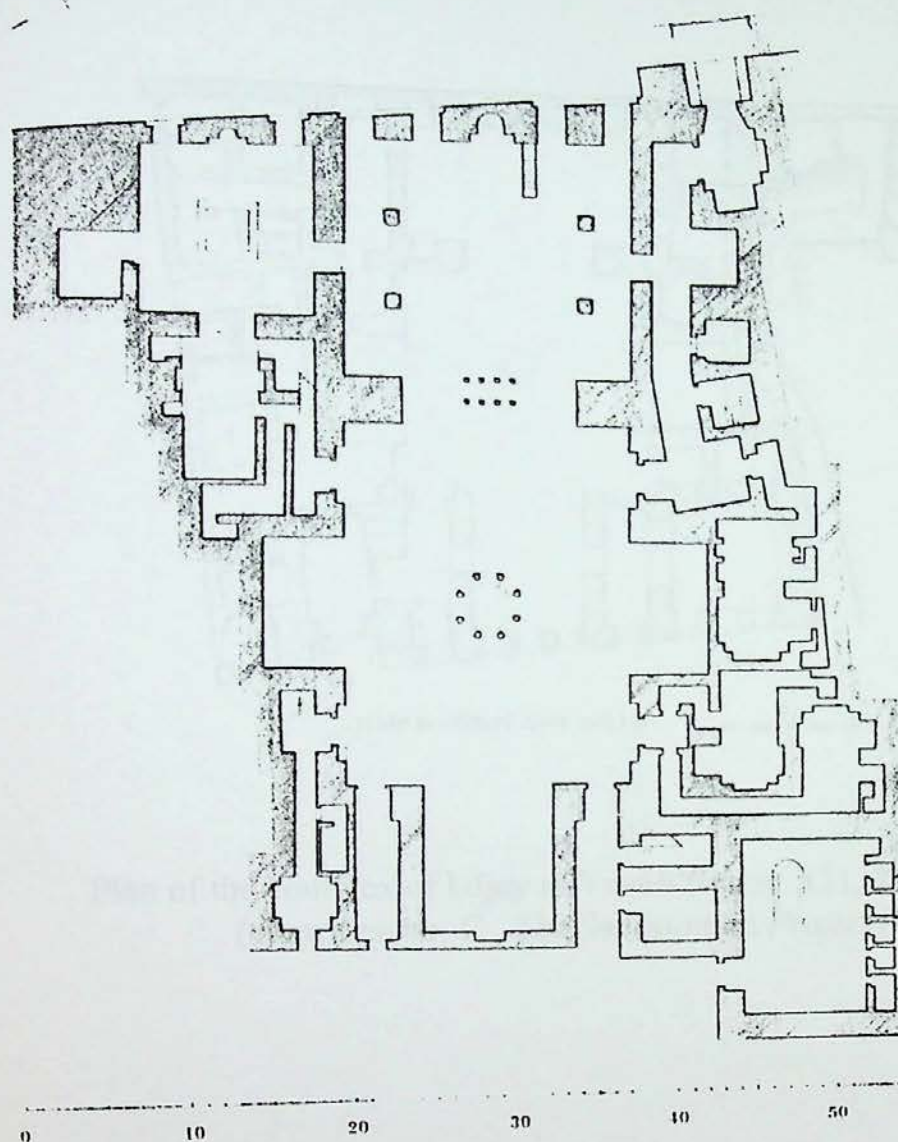
Plan of the madrasa of al-Nasir Muhammad (Index. 44, 695-703/1295-1304)
(after Meinecke, M., *Die mamlukische Architektur*, 1: 49)

Figure. 6



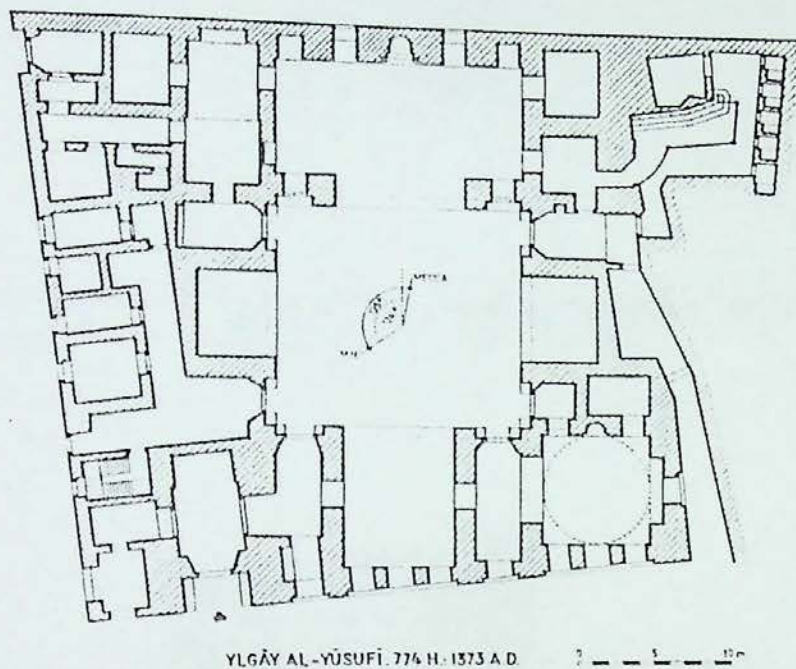
Plan of the palace of Sultan al-Salih (639-41/1243-44)
(after the *Description de l'Égypte*)

Figure. 7



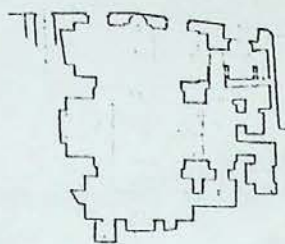
Plan of the madrasa of Sultan Barquq (Index. 187, 786-88/1384-86)
(after Meinecke, M., *Die mamlukische Architektur*, 1: 156)

Figure. 8

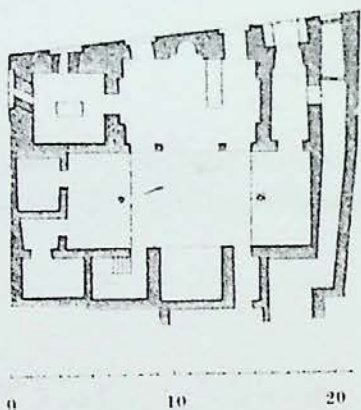


Plan of the complex of Uljay al-Yusufi (Index. 131, 774/1373)
(after Kessler, C., *The Smithsonian Project*)

Figure. 9

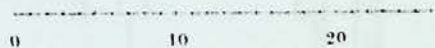
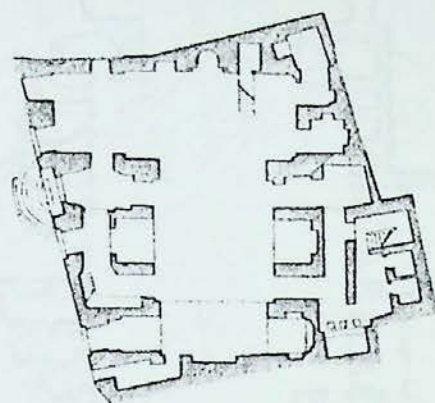


a. Plan of the madrasa of Almalik al-Jukandar (Index. 24, 719/1319)
(after Creswell, *MAE*, 2: 271)



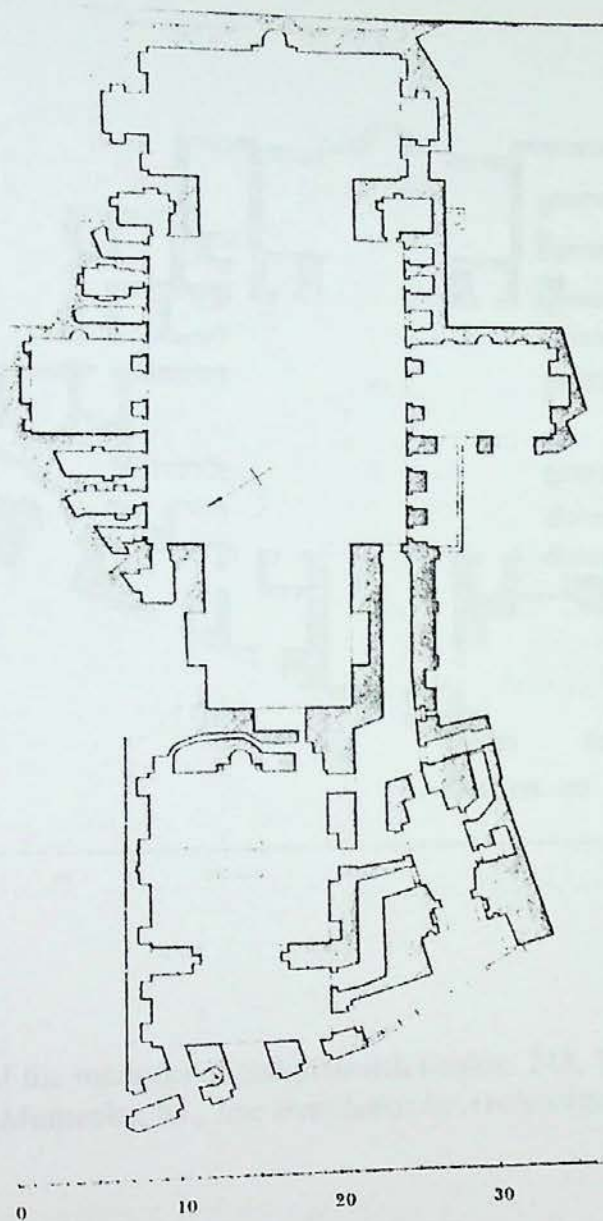
b. Plan of the madrasa of Ahmad al-Mihmandar (Index. 115, 725/1324-25)
(after Meinecke, M., *Die mamlukische Architektur*, 1: 64)

Figure. 10



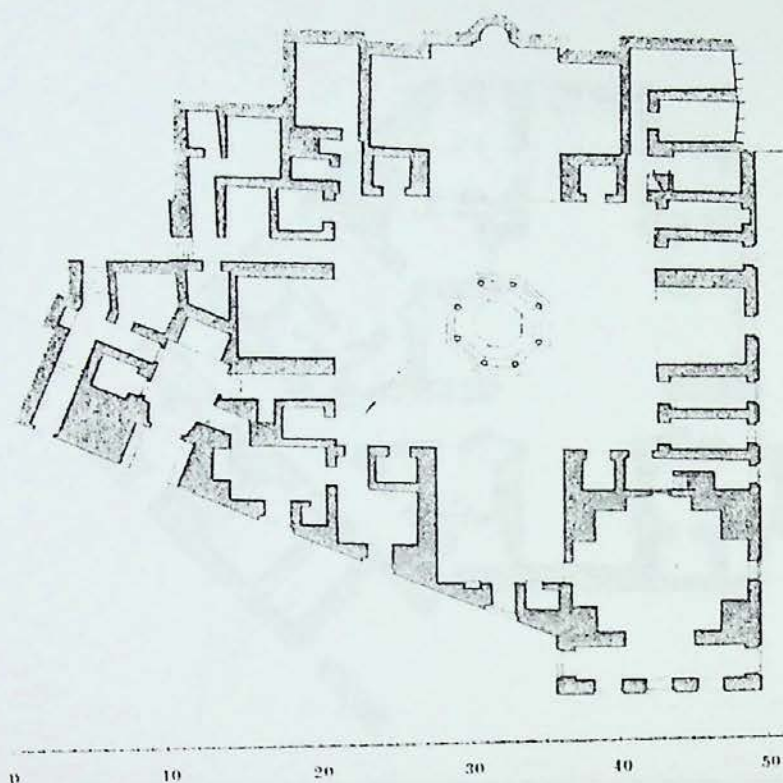
Plan of the madrasa of Mithqal al-Anuki (Index. 45, 763/1361-62)
(after Meinecke, M., *Die mamlukische Architektur*, 1: 124)

Figure. 11



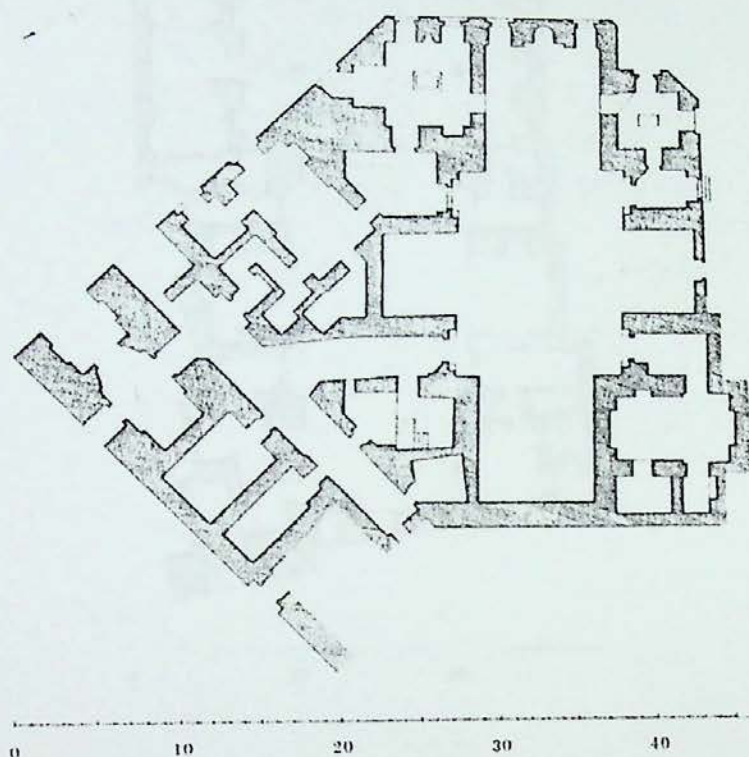
Plan of the *khanqah* of Baybars al-Jashankir (Index. 32, 706-09/1306-10)
(after Meinecke, M., *Die mamlukische Architektur*, 1: 66)

Figure. 12



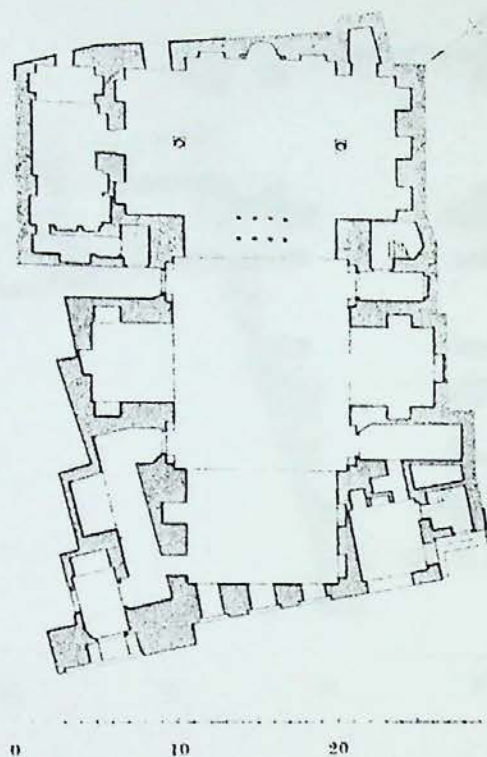
Plan of the madrasa of Sarghatmish (Index. 218, 757/1356)
(after Meinecke, M., *Die mamlukische Architektur*, 1: 126)

Figure. 13



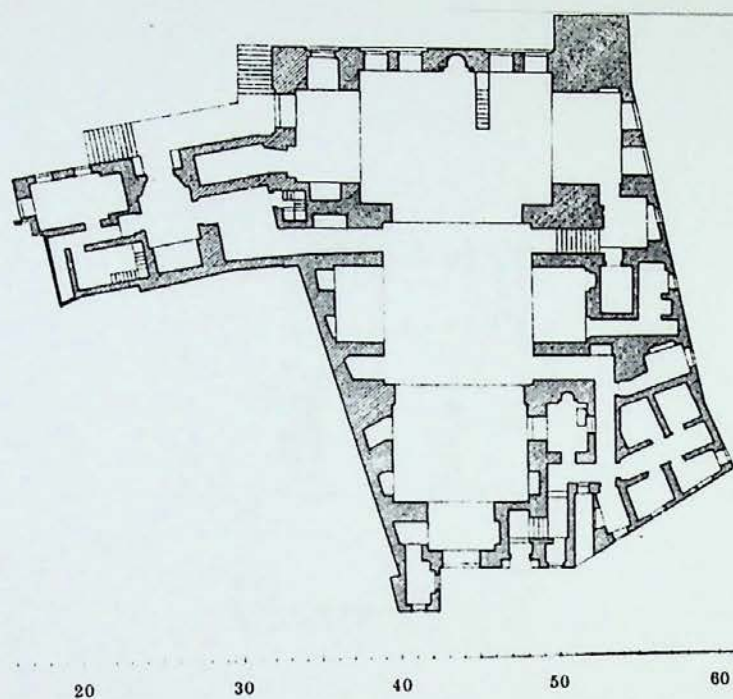
Plan of the madrasa of Umm al-Sultan Sha'ban (Index. 125, 770/1368-69)
(after Meinecke, M., *Die mamlukische Architektur*, 1: 124)

Figure. 14



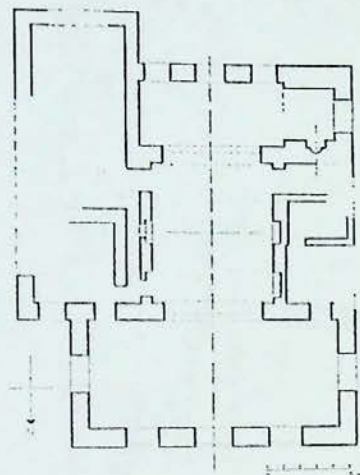
Plan of the madrasa of 'Abd al-Ghani al-Fakhri (Index. 184, 821/1418)
(after Meinecke, M., *Die mamlukische Architektur*, 1: 157)

Figure. 15



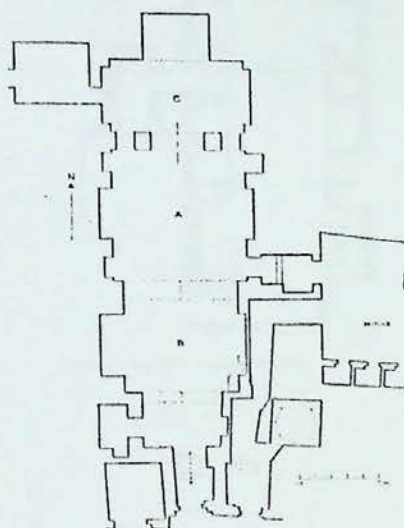
Plan of the madrasa of al-Ghuri (Index. 189, 909-10/1504-5)
(after Meinecke, M., *Die mamlukische Architektur*, 1: 167)

Figure. 16



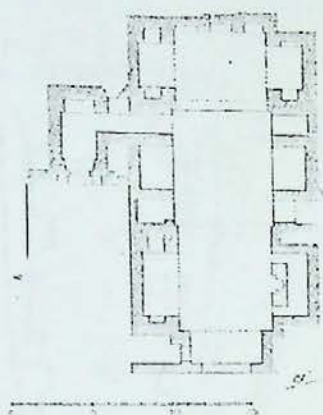
Plan of the *qa'a* of Alin Aq (Index. 249, 693/1293)
(after Lezine, A., "Les salles nobles", *Annales Islamologiques* 10, fig 10)

Figure. 17



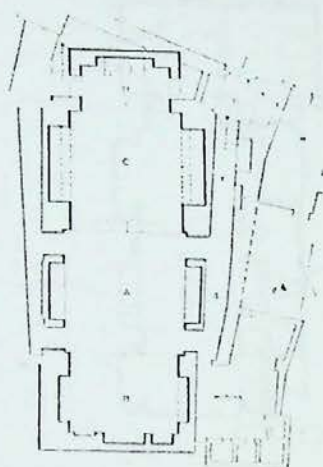
Plan of the *qa'a* (mosque) of Ahmad Kohya (Index. 521, 710/1310)
(after Lezine, A., "Les salles nobles", *Annales Islamologiques* 10, fig. 11)

Figure. 18



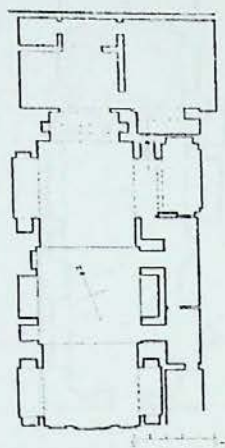
Plan of the *qa'a* (mosque) of Sharaf al-Din (Index. 176, 717-38/1317-37)
(after Comite)

Figure. 19



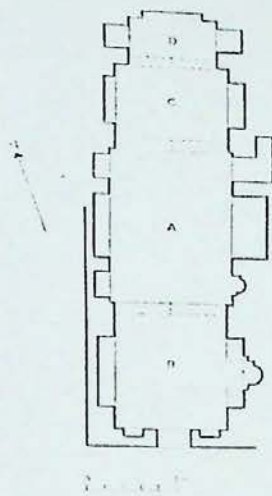
Plan of the *qa'a* (mosque) of Tashtumur (Index. 92, 735/1334)
(after Lezine, A., "Les salles nobles", *Annales Islamologiques* 10, fig 19)

Figure. 20



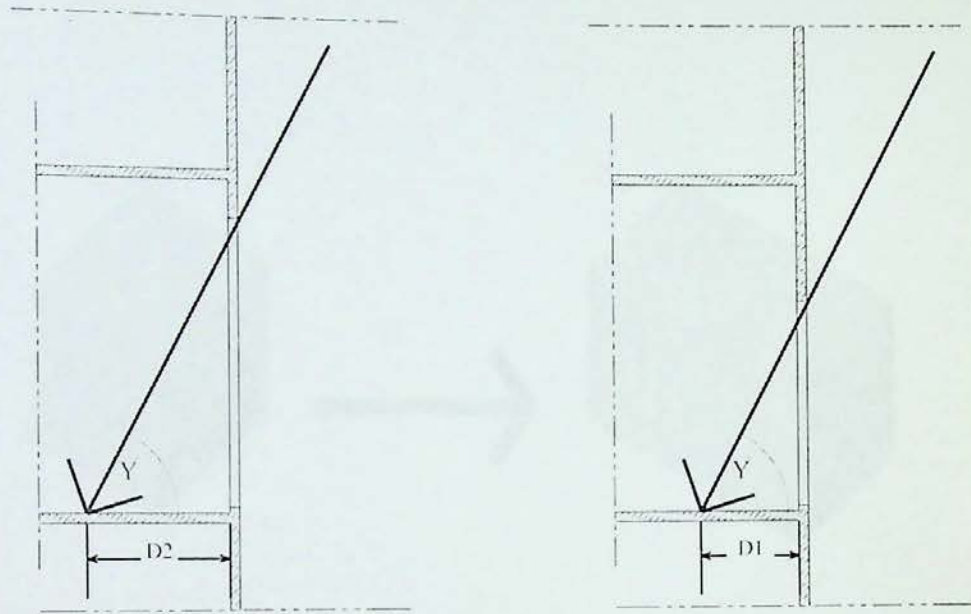
Plan of the *qa'a* (audience hall) of Muhib al-Din al-Muwaqi' (Index. 50, 751/1350)
(after Lezine, A., "Les salles nobles", *Annales Islamologiques* 10, fig 24)

Figure. 21



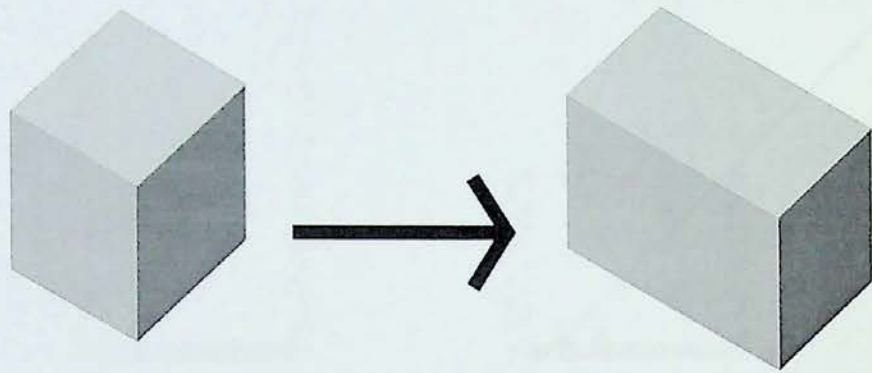
Plan of the *qa'a* (madrasa) of Ghannam (Index. 96, 774/1372-73)
(after Lezine, A., "Les salles nobles", *Annales Islamologiques* 10, fig 20)

Figure. 22



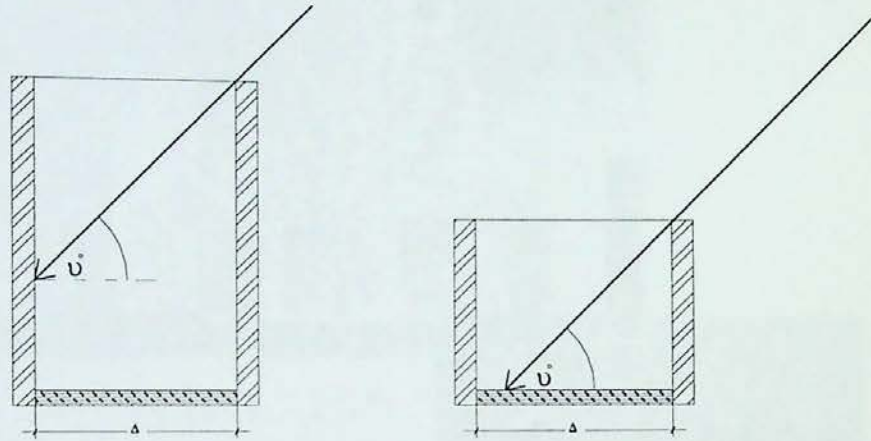
Drawing to demonstrate the result of increasing the height of openings

Figure. 23



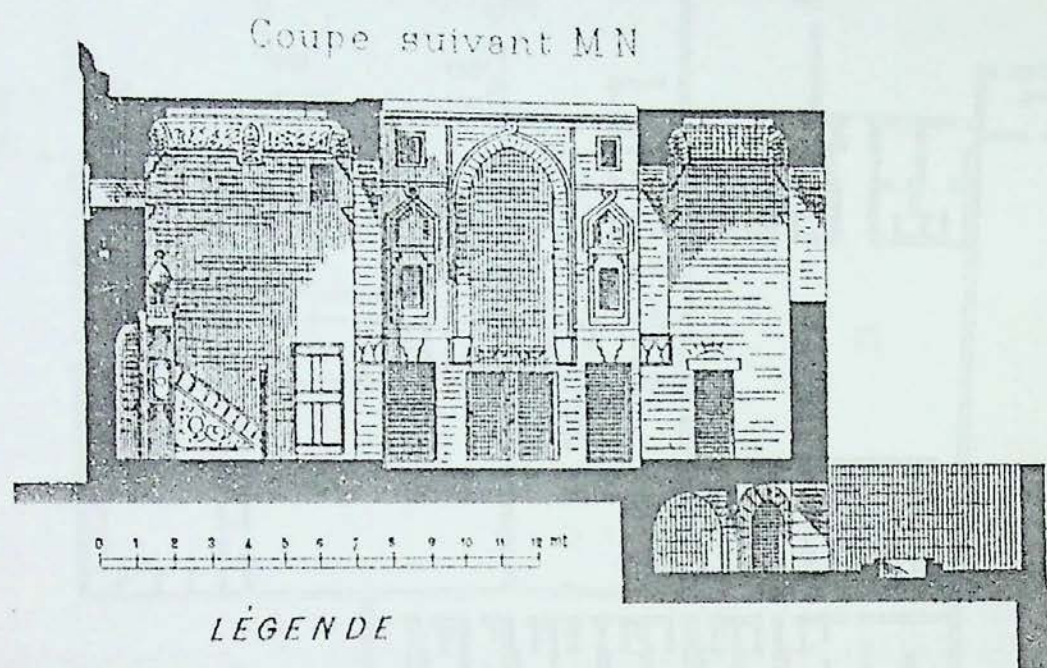
Drawing to demonstrate the form development of the qibla *iwan*.

Figure. 24



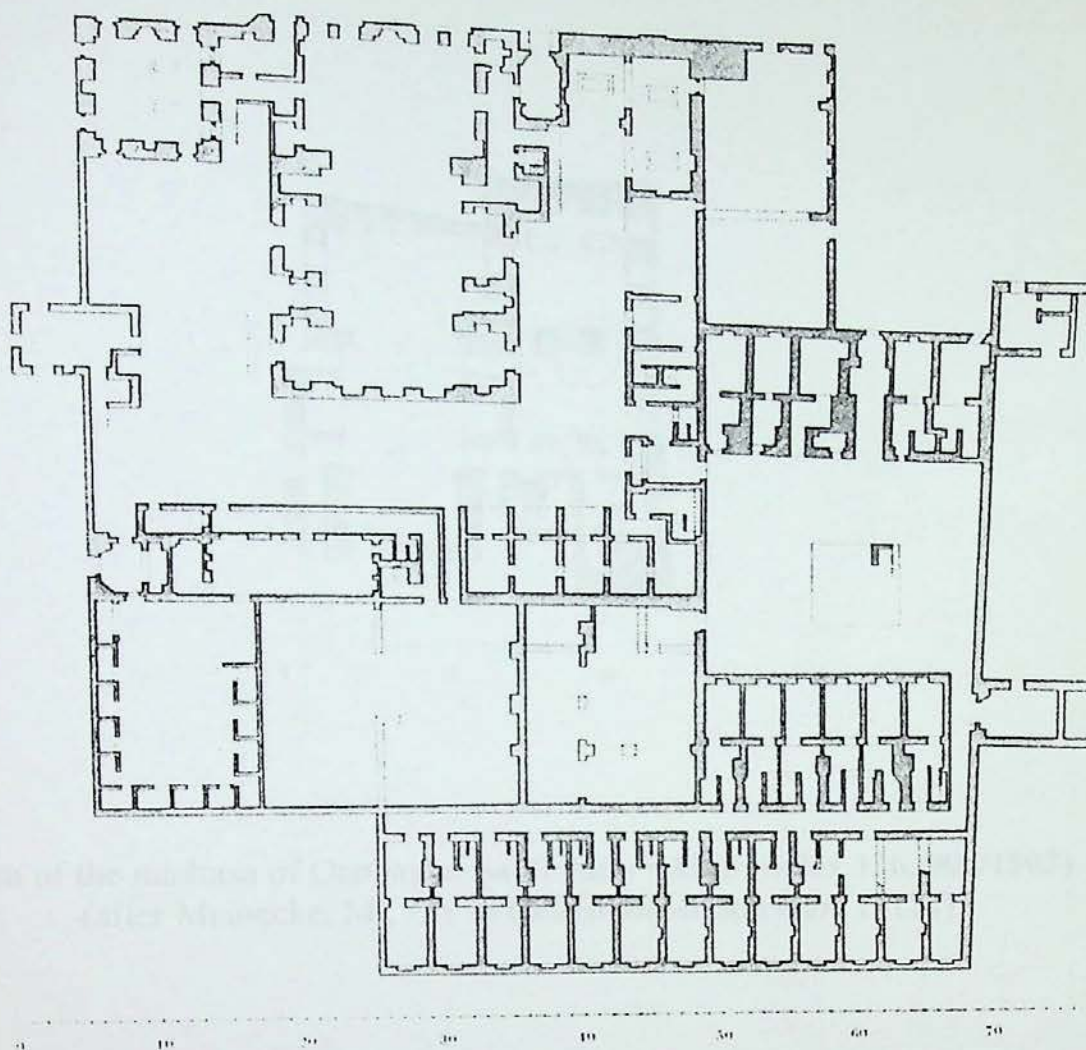
Drawing to demonstrate the effect of increasing the height of a light shaft on the efficiency of its lighting

Figure. 25



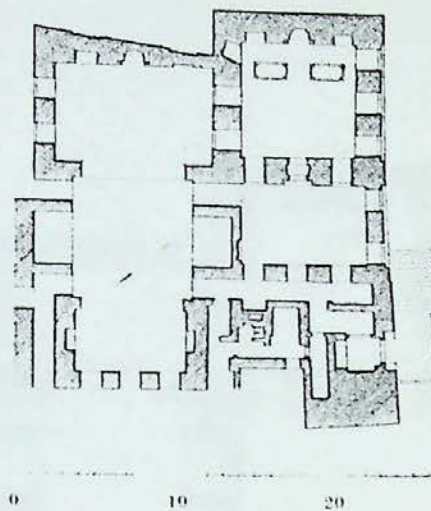
Longitudinal section through the madrasa of Qadi Yahya Zayn al-Din
(Index. 182, 848/1444)
(after Comite)

Figure. 26



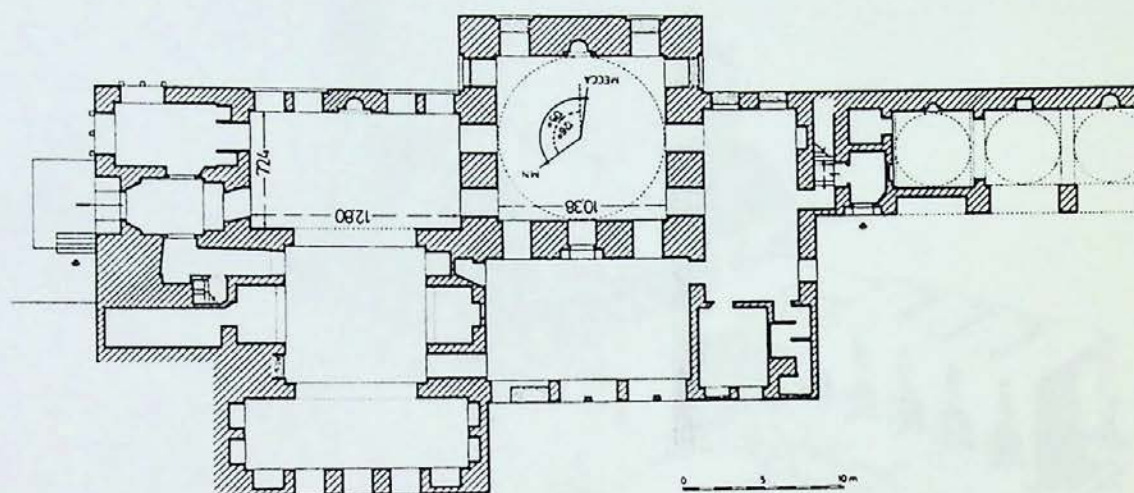
Plan of the madrasa of Sultan Inal (Index. 158, 855-60/1451-56)
(after Meinecke, M., *Die mamlukische Architektur*, vol. 1)

Figure. 27



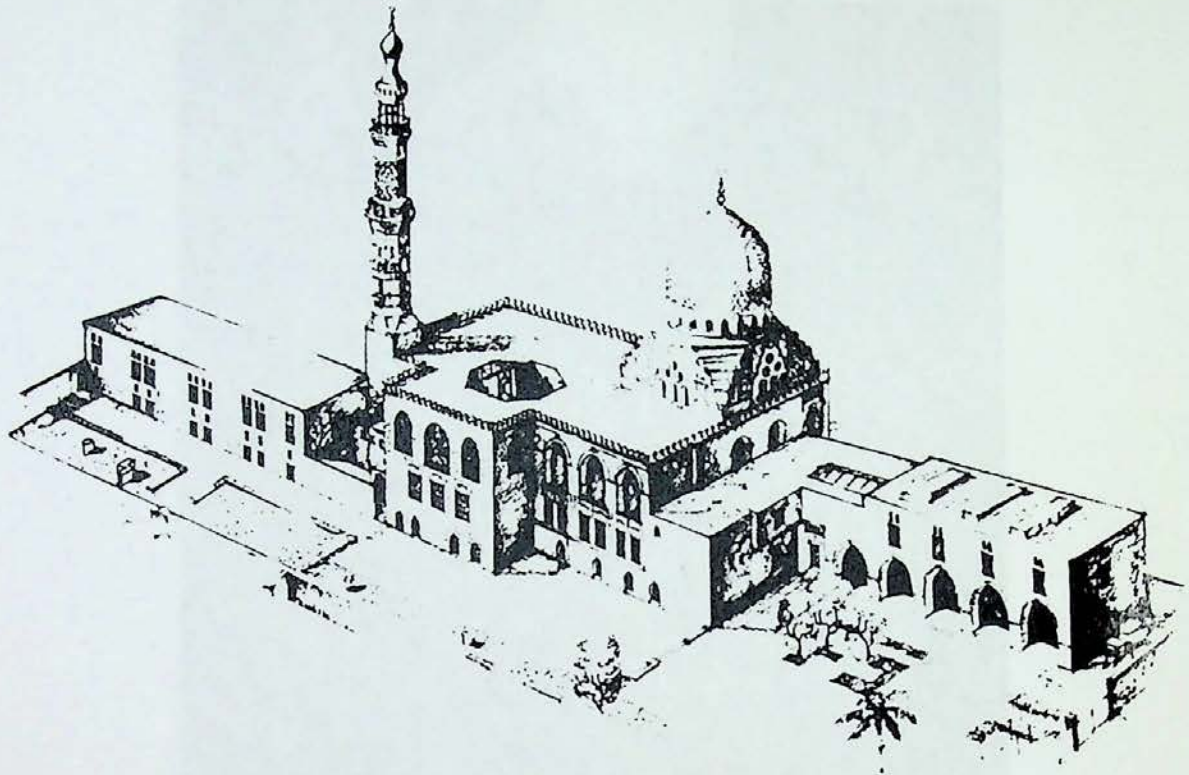
Plan of the madrasa of Qanbay al-Sayfi Amir Akhor (Index.136, 908/1503)
(after Meinecke, M., *Die mamlukische Architektur*, 1: 171)

Figure. 28



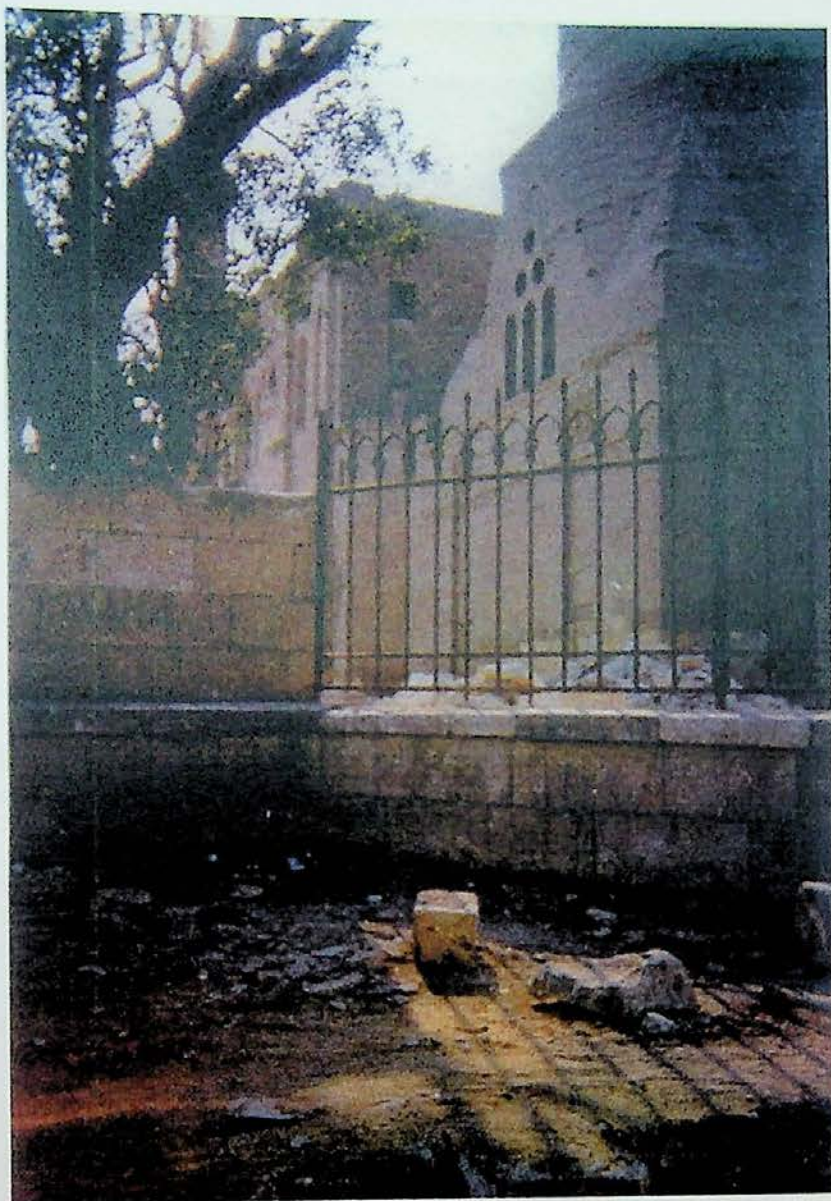
Plan of the complex of Amir Qurqumas (Index. 162, 911-13/1506-07)
(after Kessler, C., *The Smithsonian Project*)

Figure. 29



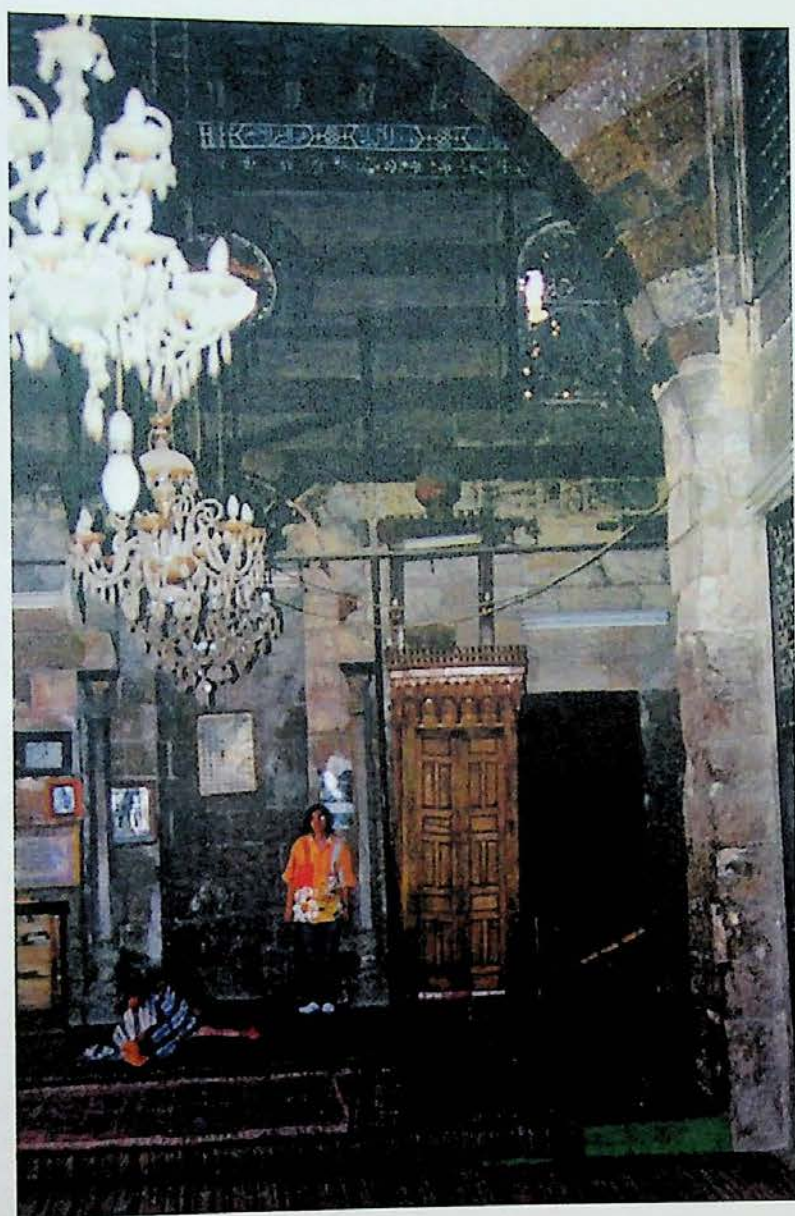
Isometric drawing of the complex of Qurqumas
(Index. 162, 911-13/1506-7)
(after Nieduziak, I., "Polish-Egyptian Restoration", Fig. 2)

Plate. 1



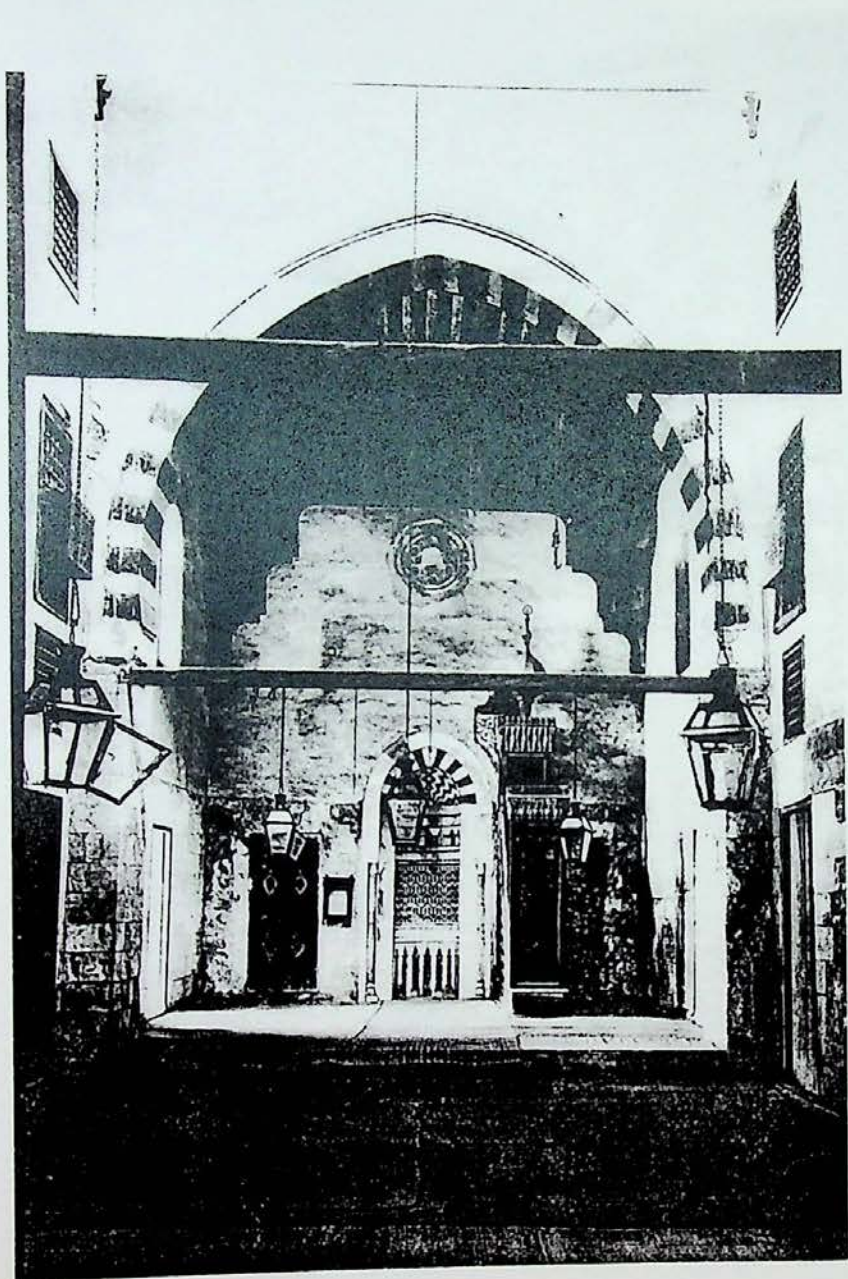
Exterior view of the side wall of qibla *iwan* of the madrasa of sultan Inal
(Index. 158, 855-60/1451-56)

Plate. 2



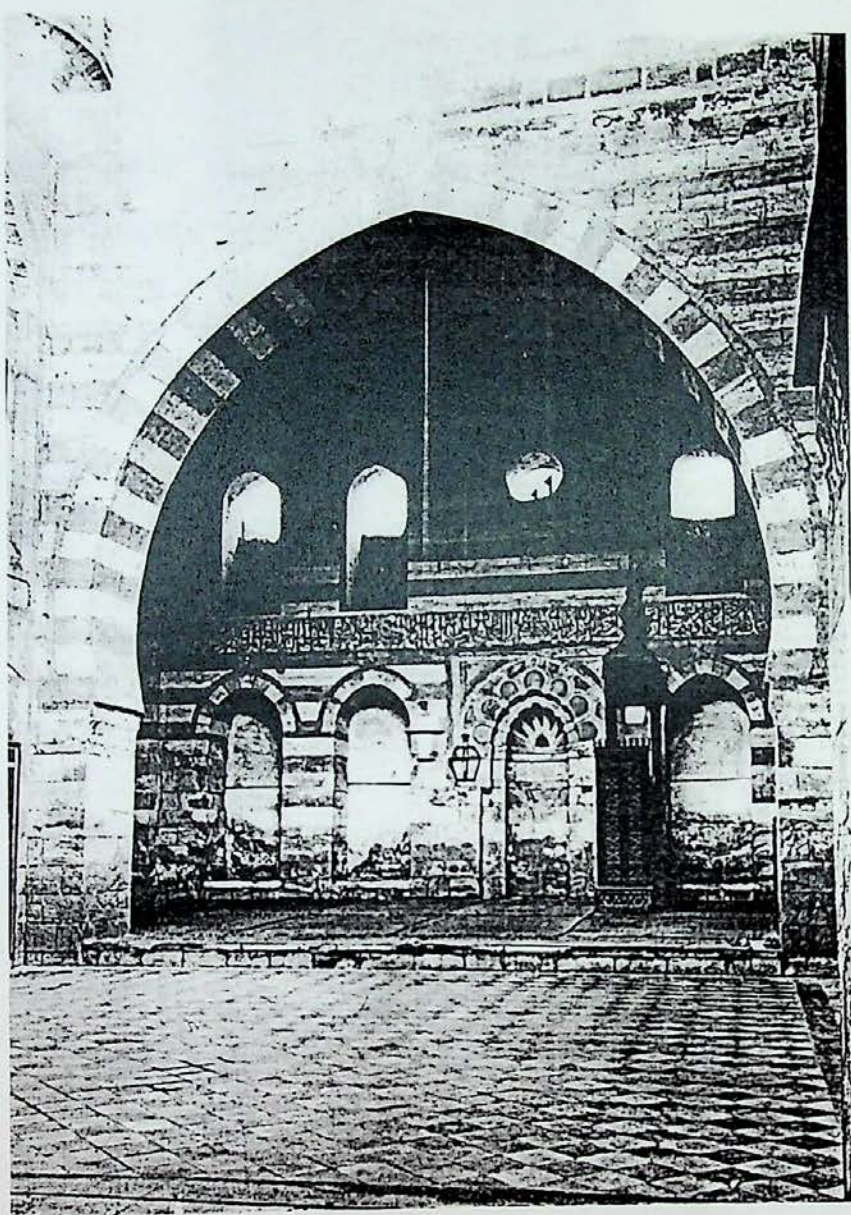
View of the qibla *iwan* of the mosque of Inal al-Atabki
(Index. 118, 794-95/1392-93)

Plate. 3



View of the qibla *iwan* of the mosque of Mahmud al-Kurdi
(Index. 117, 797/1395)
(Creswell Photo Collection, A23, 63C)

Plate. 4

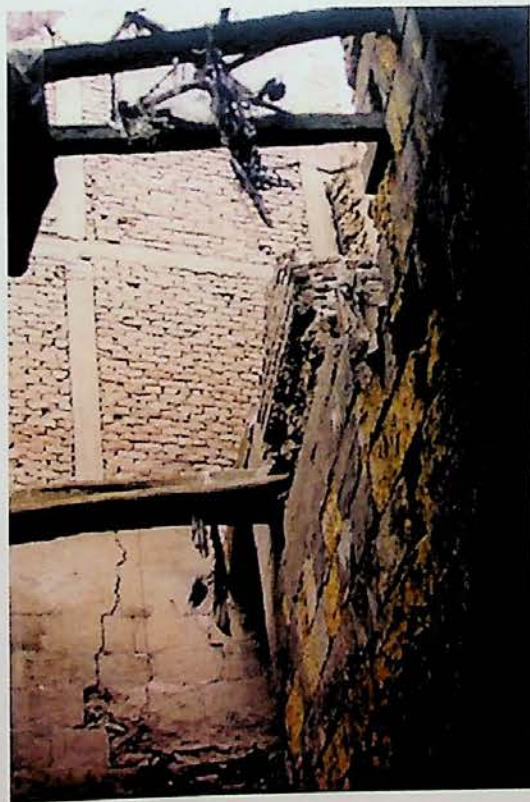


View of the qibla *iwan* of the mosque of Qaytbay at al-Roda
(Index. 519, 886-96/1481-90)
(Creswell Photo Collection, A25, 84C)

Plate. 5

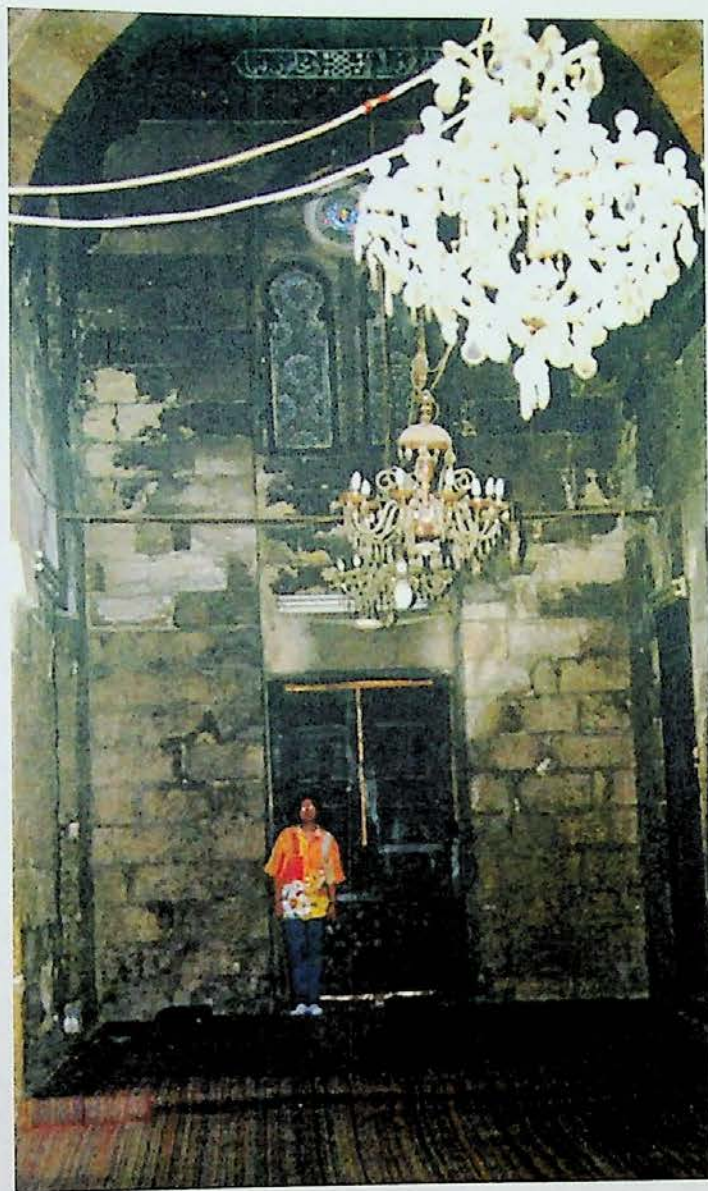


One. Interior view of the entrance the passage leading from the eastern entrance of the madrasa of 'Abd al-Basit (Index. 60, 823/1420).

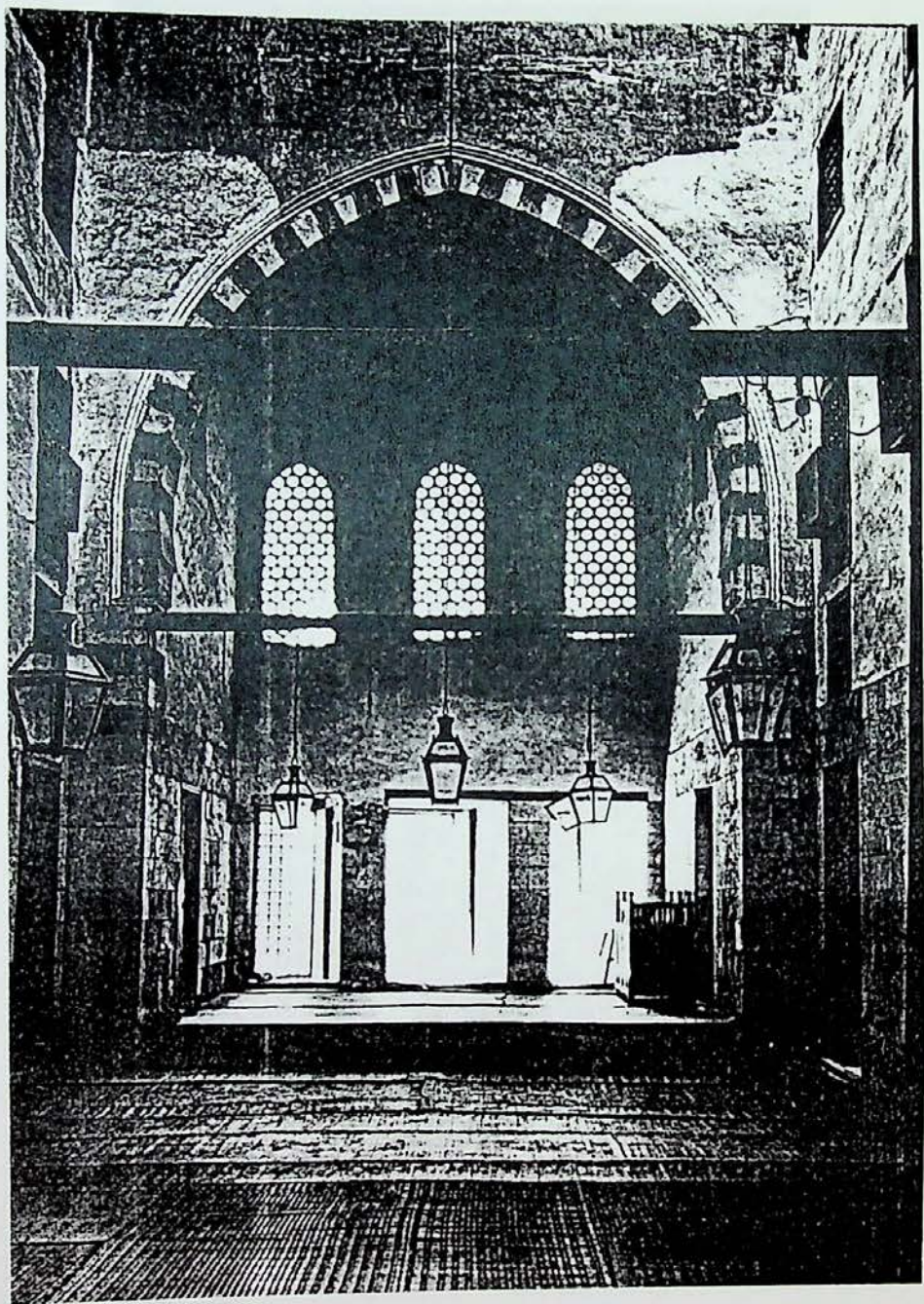


b. View of the remains of the corridor's roof behind the anti-qibal *iwan* of the madrasa of 'Abd al-Basit (Index. 60, 823/1420).

Plate. 6

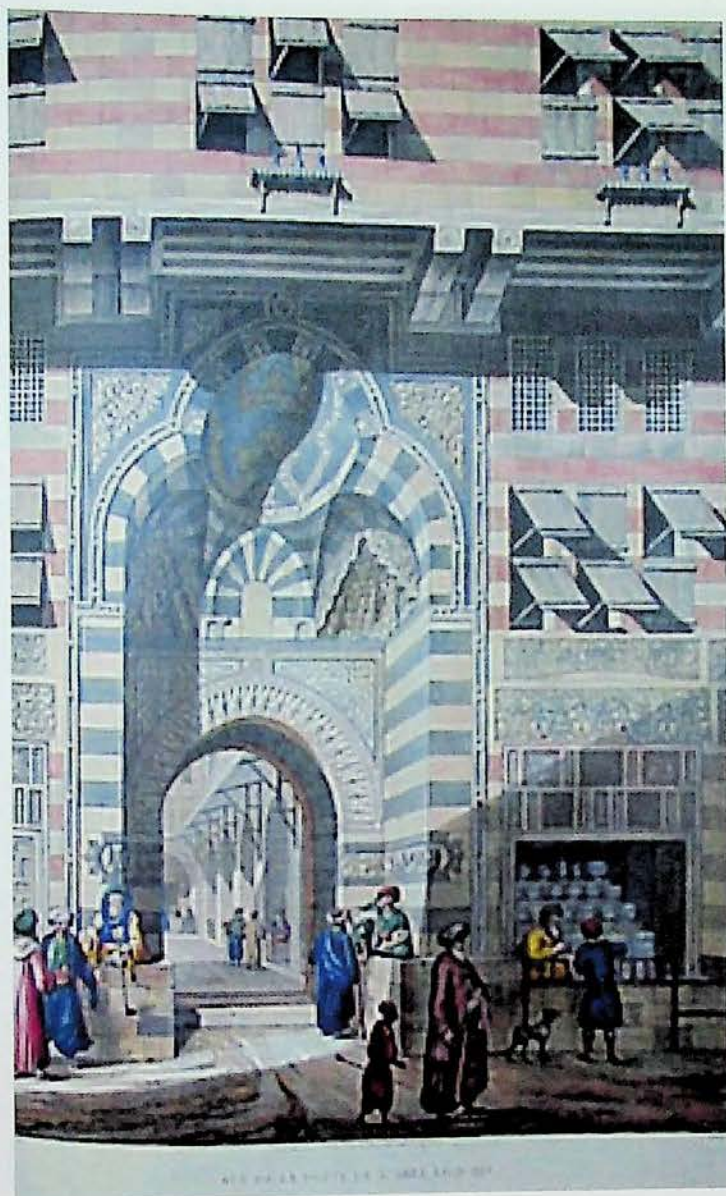


View of the anti-qibla *iwan* of the mosque of Inal al-Atabki
(Index. 118, 794-95/1392-93)



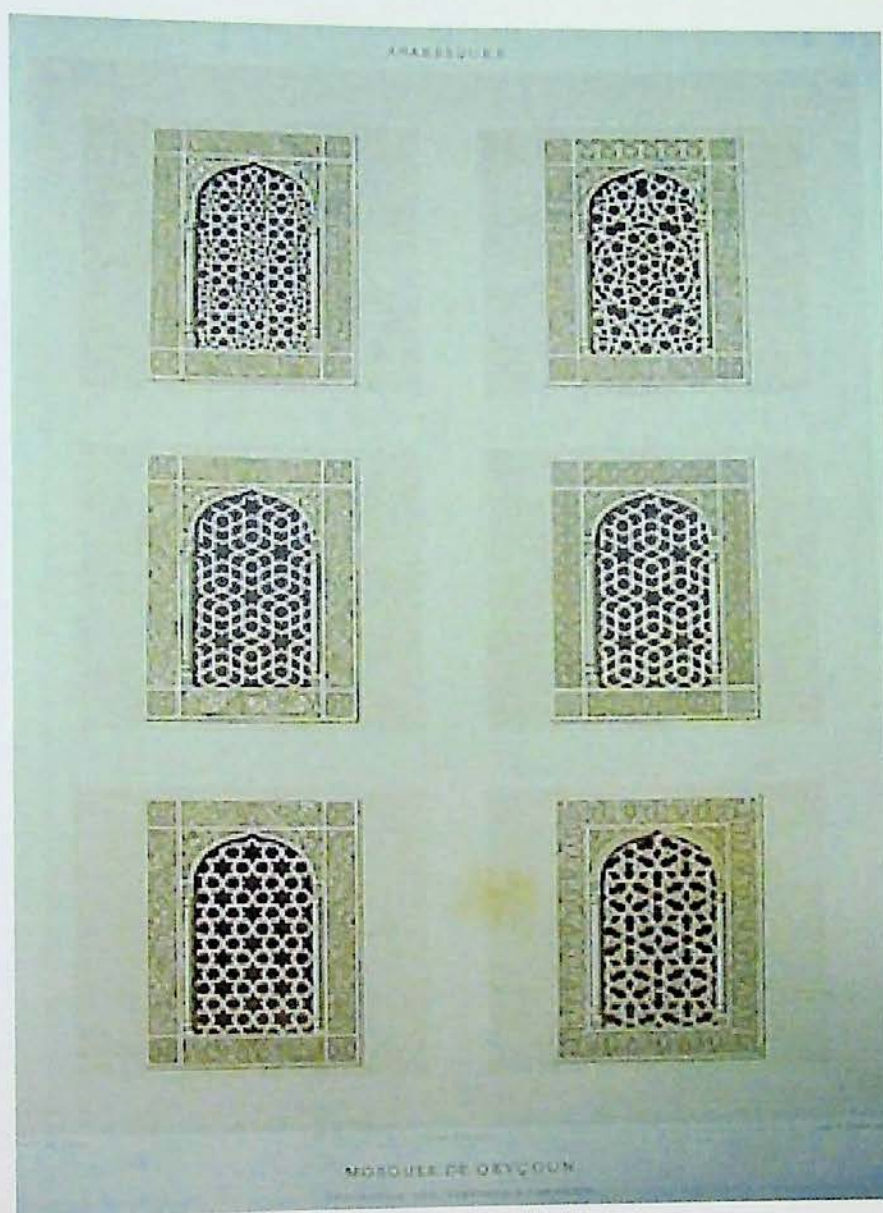
View of the anti-qibla *iwan* of the mosque of Mahmud al-Kurdi
(Index. 117, 797/1395)
(Creswell Photo Collection, A23, 64C)

Plate. 8



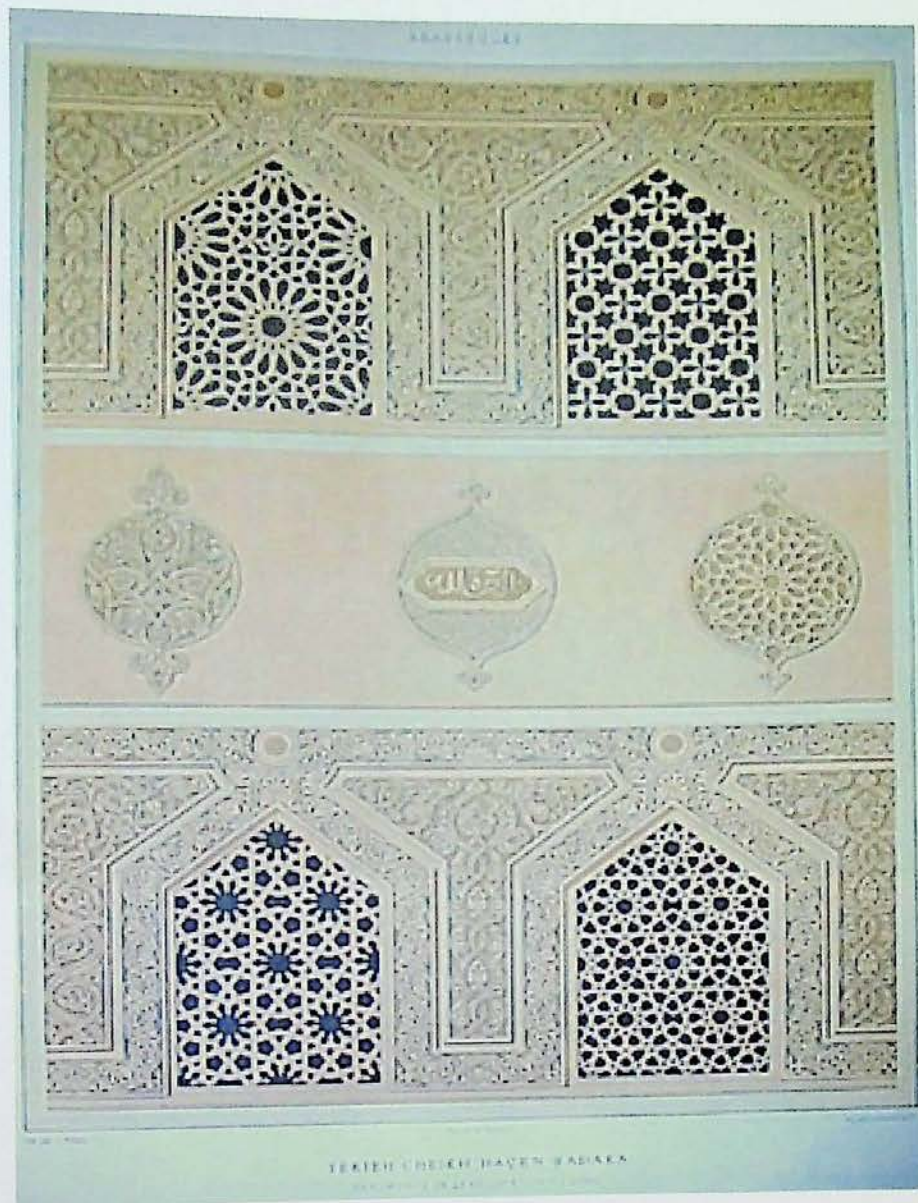
Building facades
(after Pascal Coste)

Plate. 9



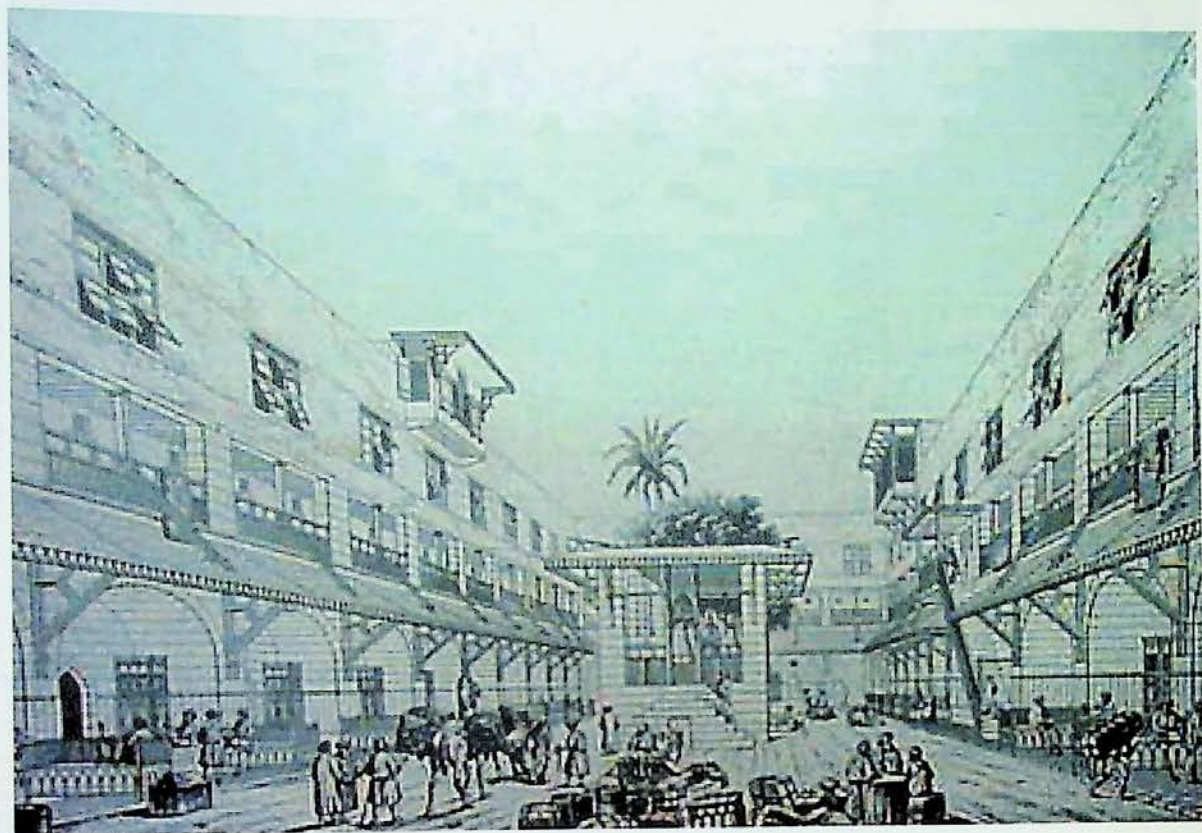
Details of stucco grills
(after Prisse d'Avennes)

Plate. 10



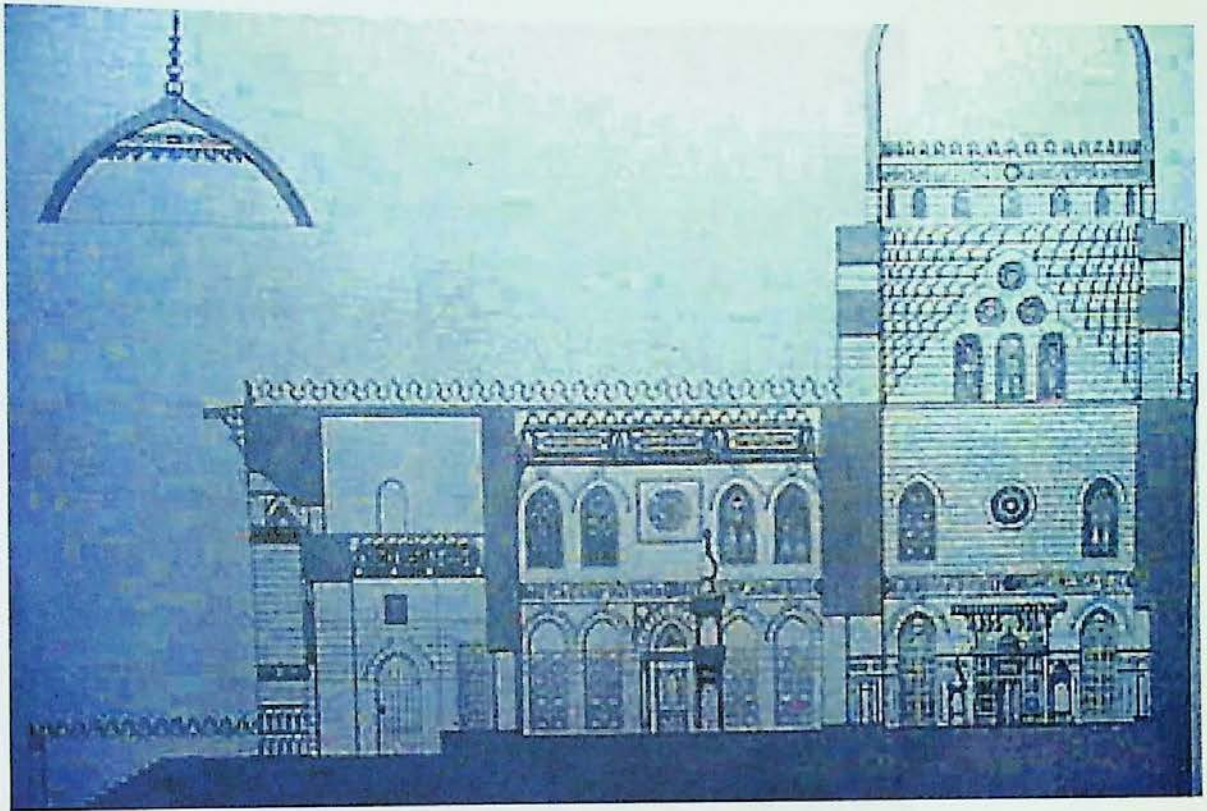
Details of stucco grills
(after Prisse d'Avennes)

Plate. 11



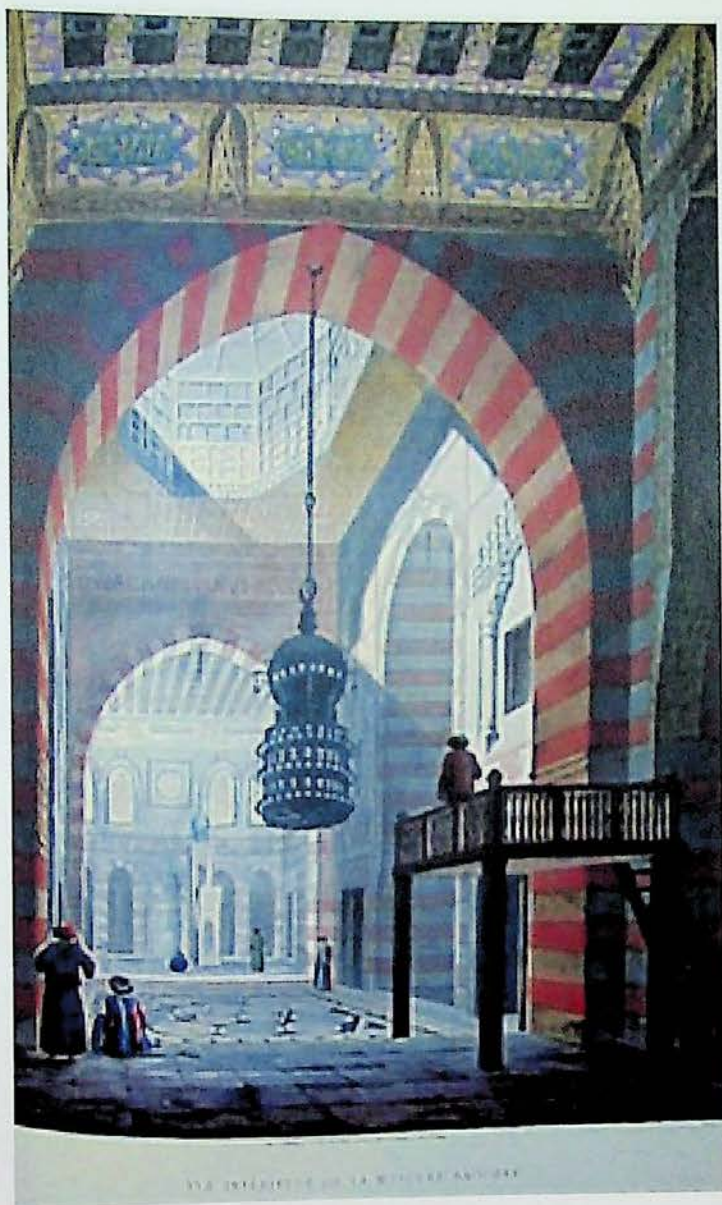
Building facades
(after Pascal Coste)

Plate. 12



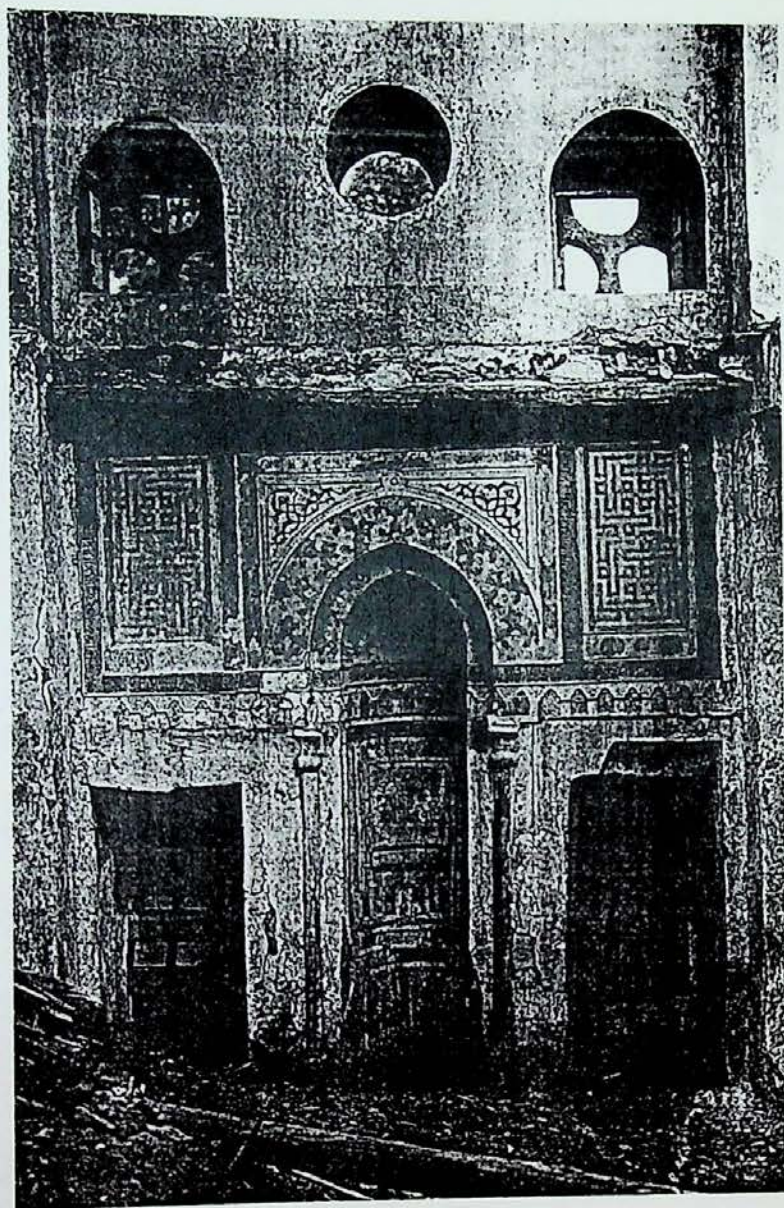
Section through the qibla *iwan* and the mausoleum of the madrasa of Qaytbay
N.C.
(after Pascal Coste)

Plate. 13



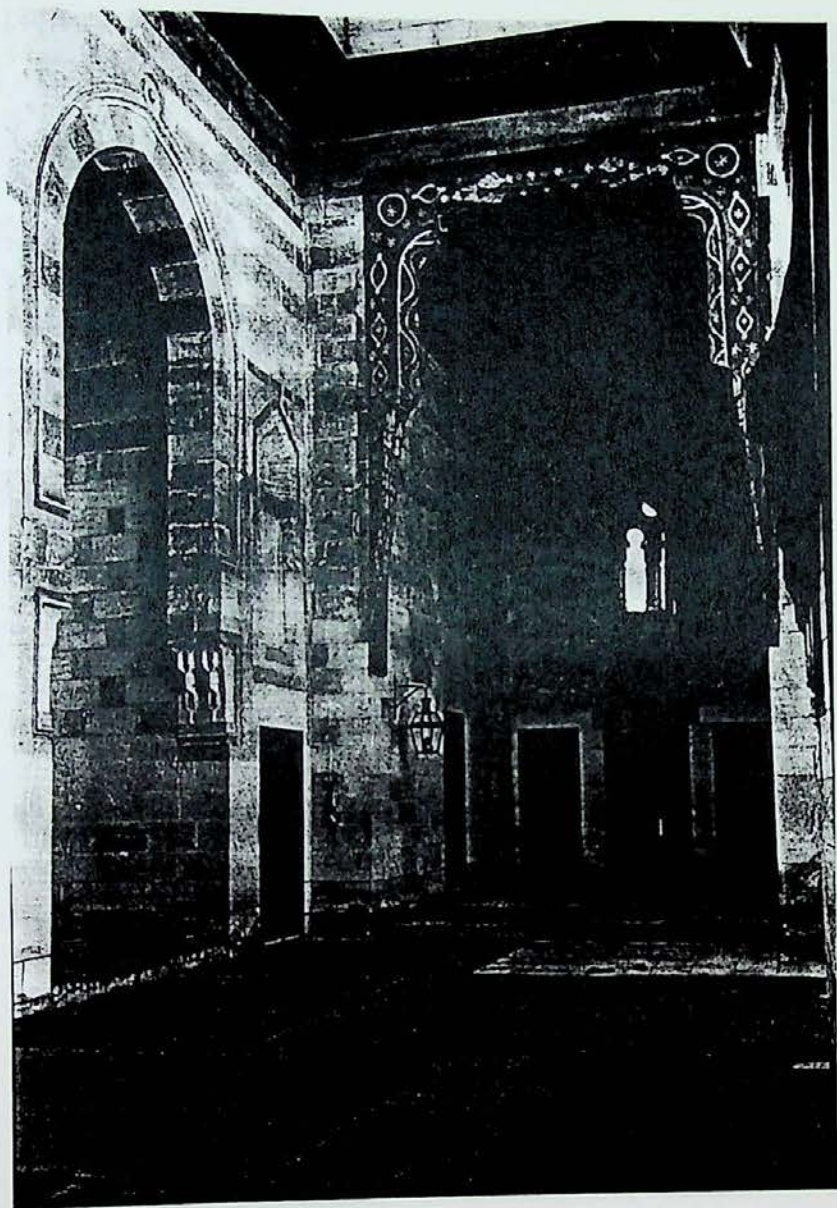
Interior view of the *sahn* of the madrasa of Qaytbay N.C.
(after Pascal Coste)

Plate. 14



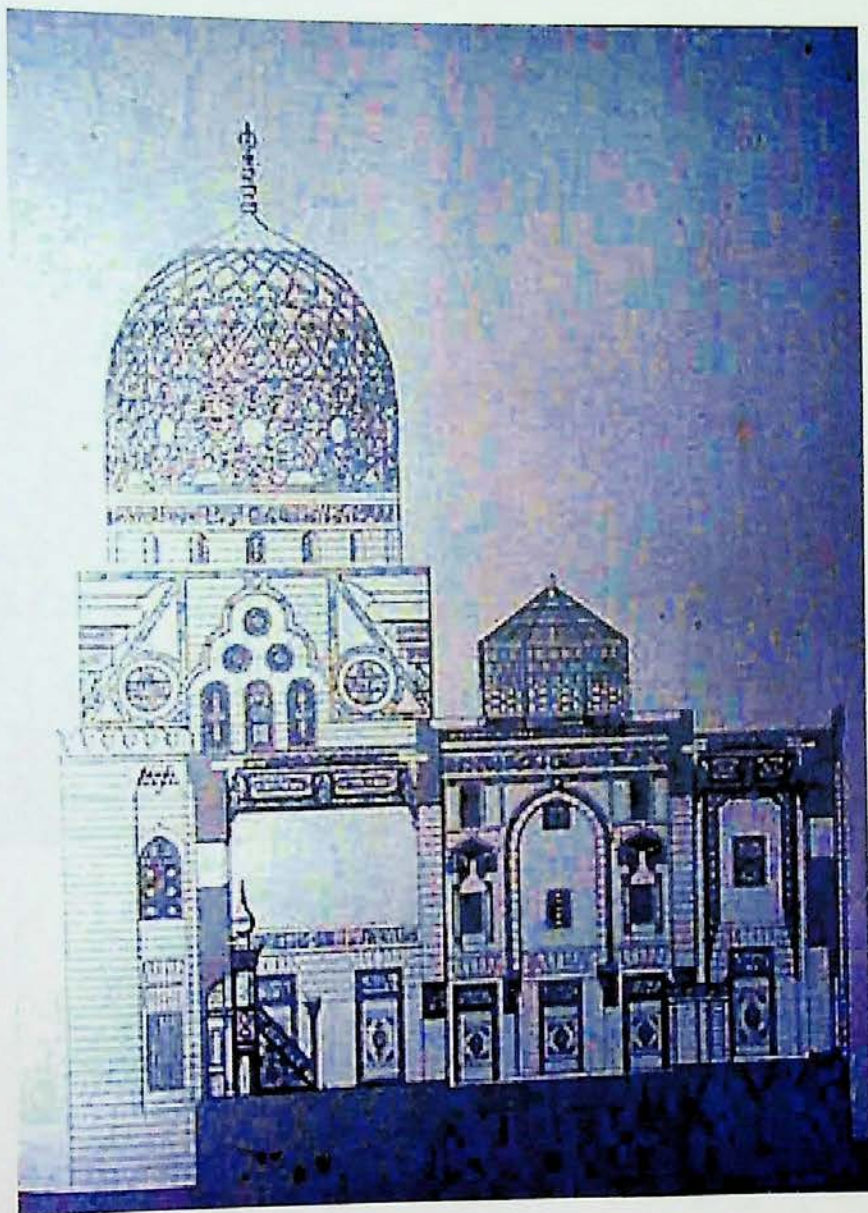
View of the qibla *iwan* of the mausoleum of Sa'd al-Din ibn Ghurab
(Index. 312, 803-8/1400-6)
(Creswell Photo Collection, A23, 74A)

Plate. 15



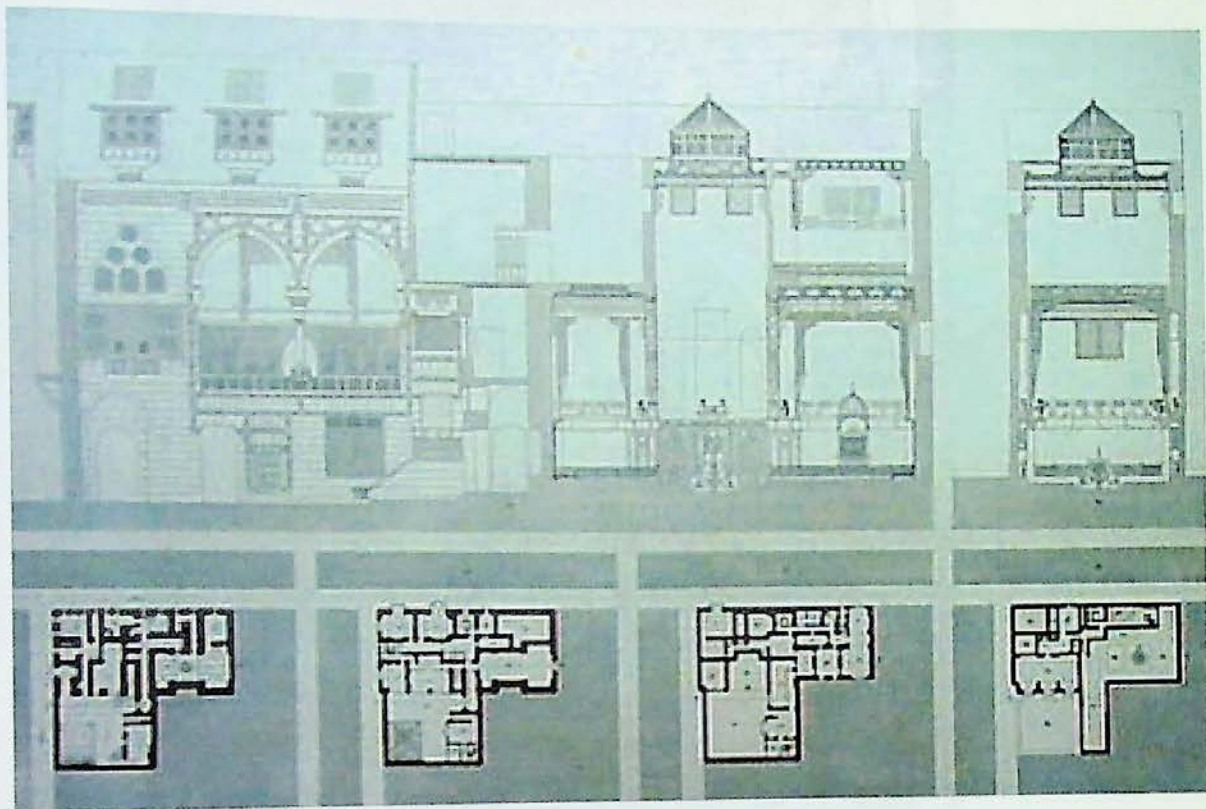
View of the anti-qibla *iwan* of the mosque of Qaraqoja al-Hasani
(Index. 206, 845/1441-42)
(Creswell Photo Collection, A24, 58D)

Plate. 16

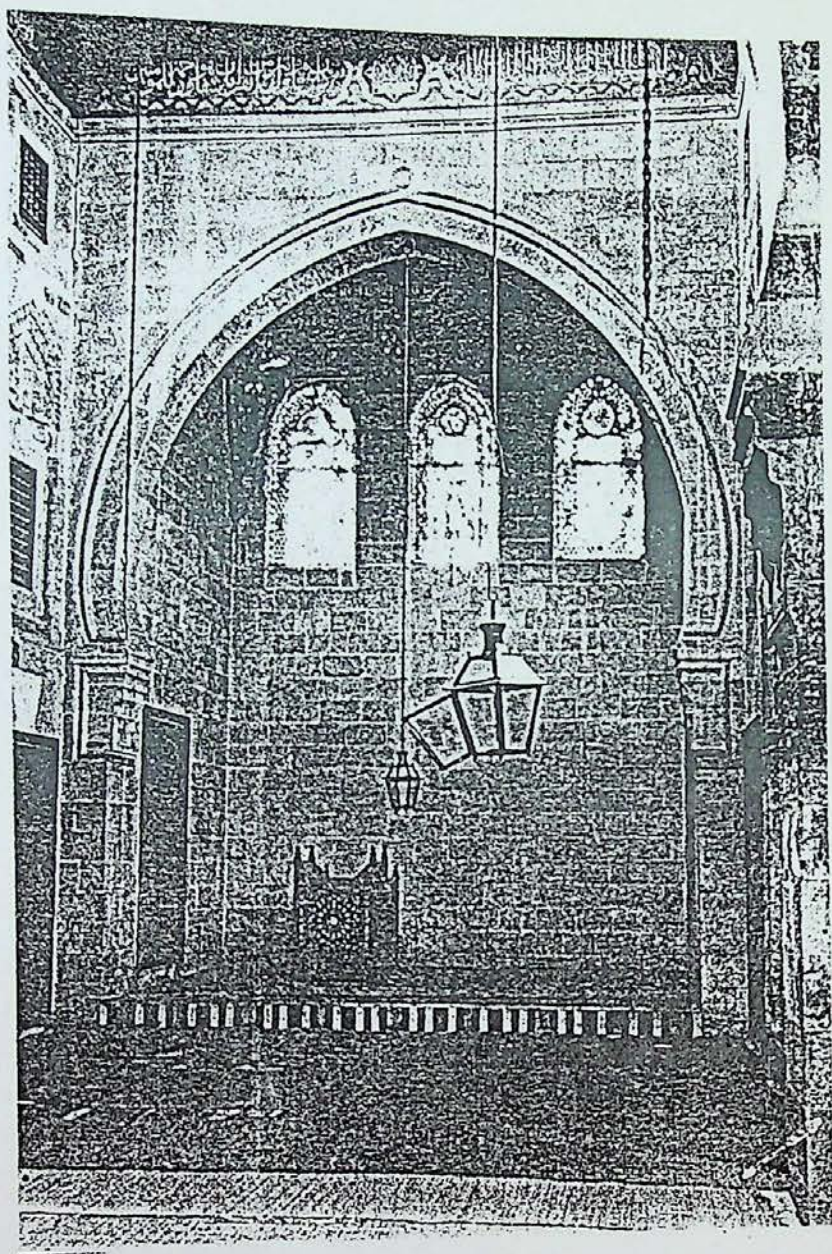


Longitudinal section through the main *iwans* and the *sahn* of the madrasa of
Qaytbay N.C.
(after Pascal Coste)

Plate. 17

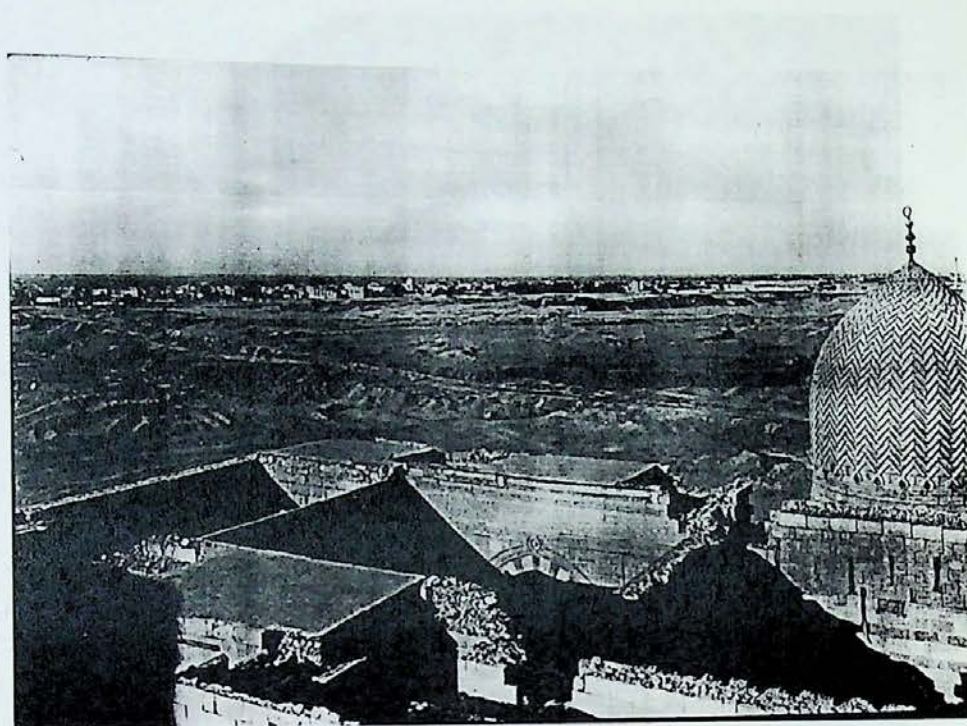


Plans, sections and elevation of houses
(after Pascal Coste)



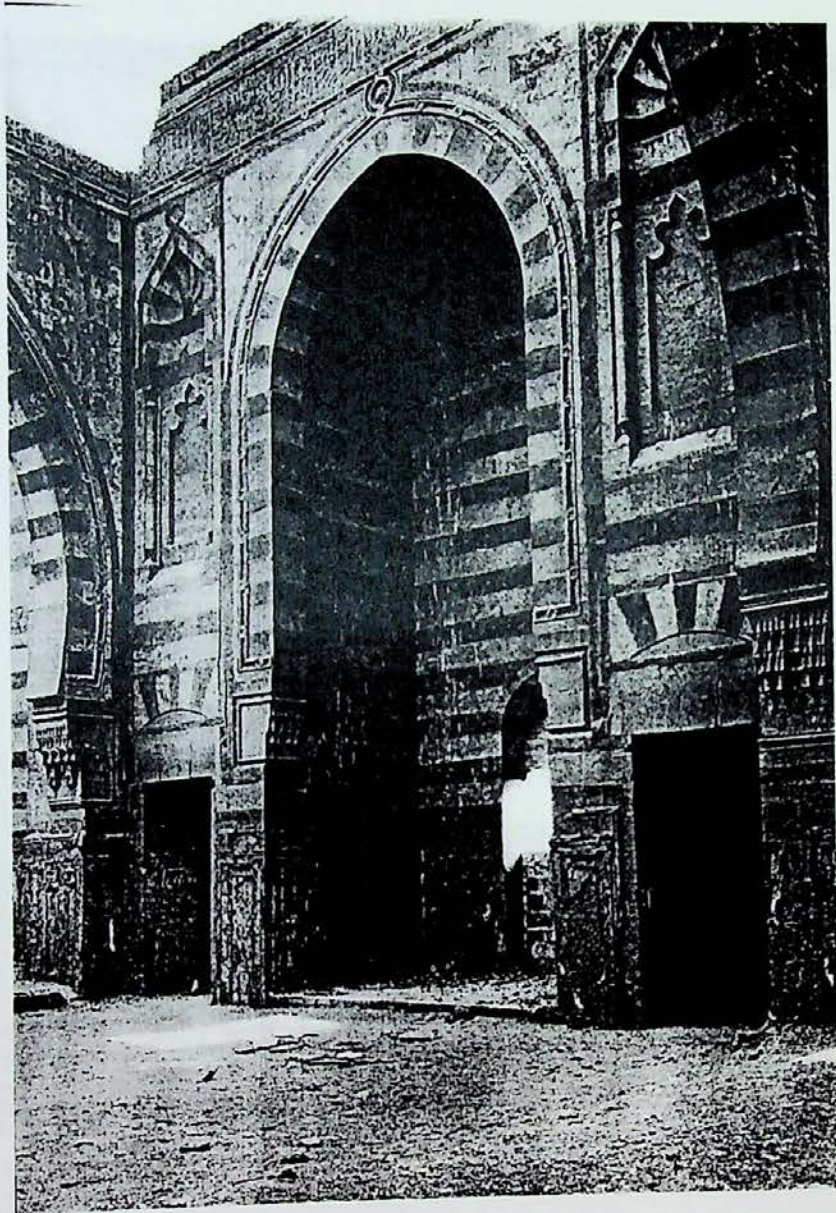
View of the anti-qibla *iwan* of the madrasa of Qadi Yahya Zayn al-Din
(Index. 182, 848/1444)
(Creswell Photo Collection, A24, 65B)

Plate. 19



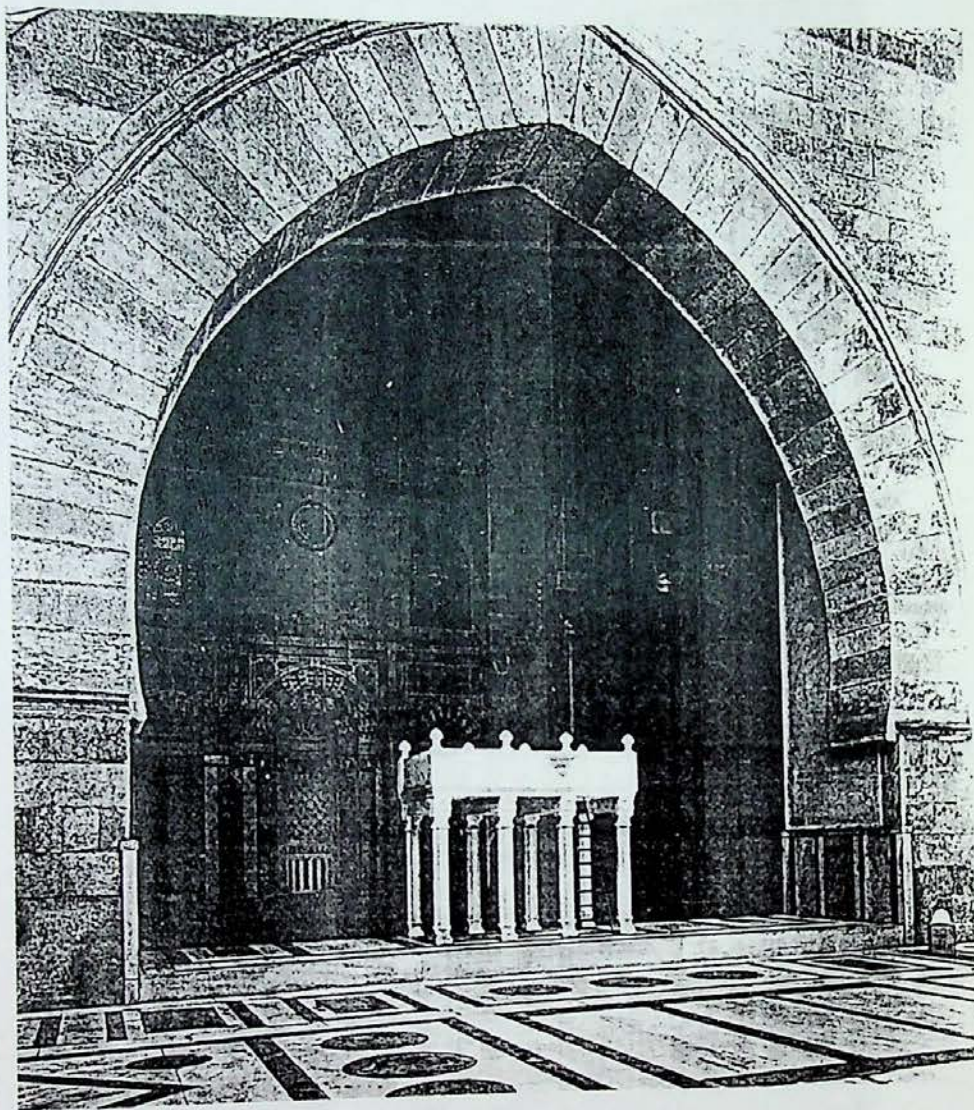
Aerial view of the madrasa of Sultan Inal
(Index. 158, 855-60/1451-56)
(Creswell Photo Collection, A24, 78E)

Plate. 20



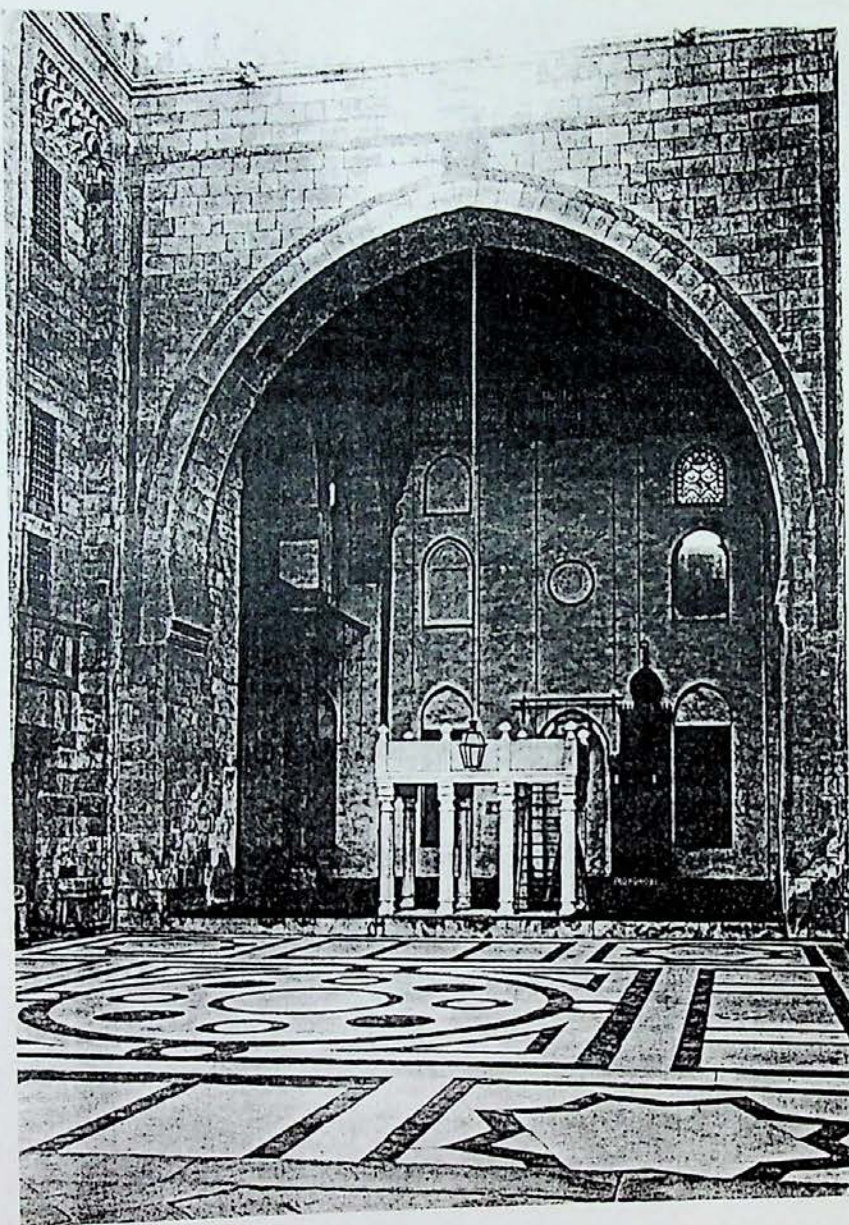
View of the lateral *iwans* of the mosque of Sultan Inal
(Index. 158, 855-60/1451-56)
(Creswell Photo Collection, A24, 77E)

Plate. 21



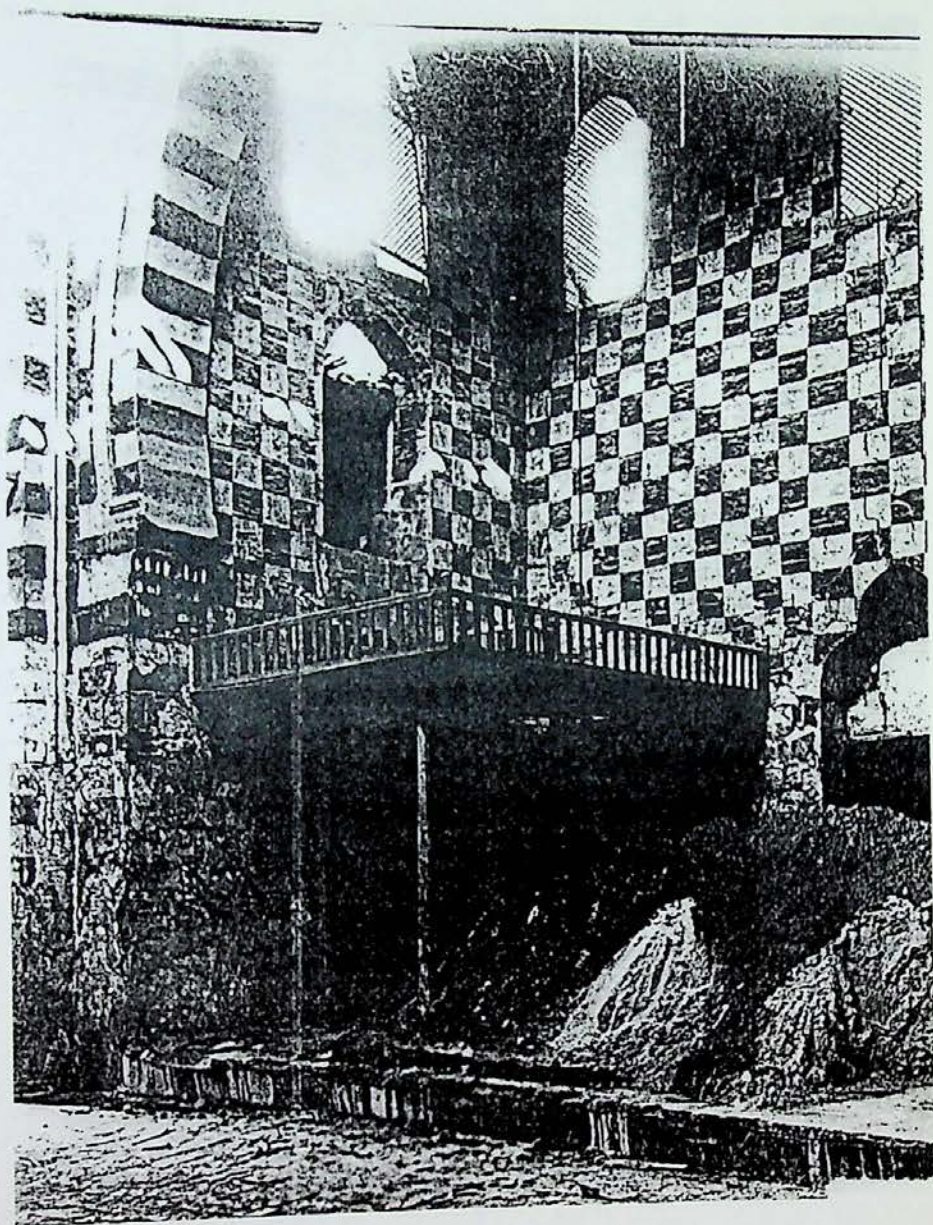
View of the qibla *iwan* of madrasa of Sultan Barquq
(Index. 187, 786-88/1384-86)
(Creswell Photo Collection, A23, 56B)

Plate. 22



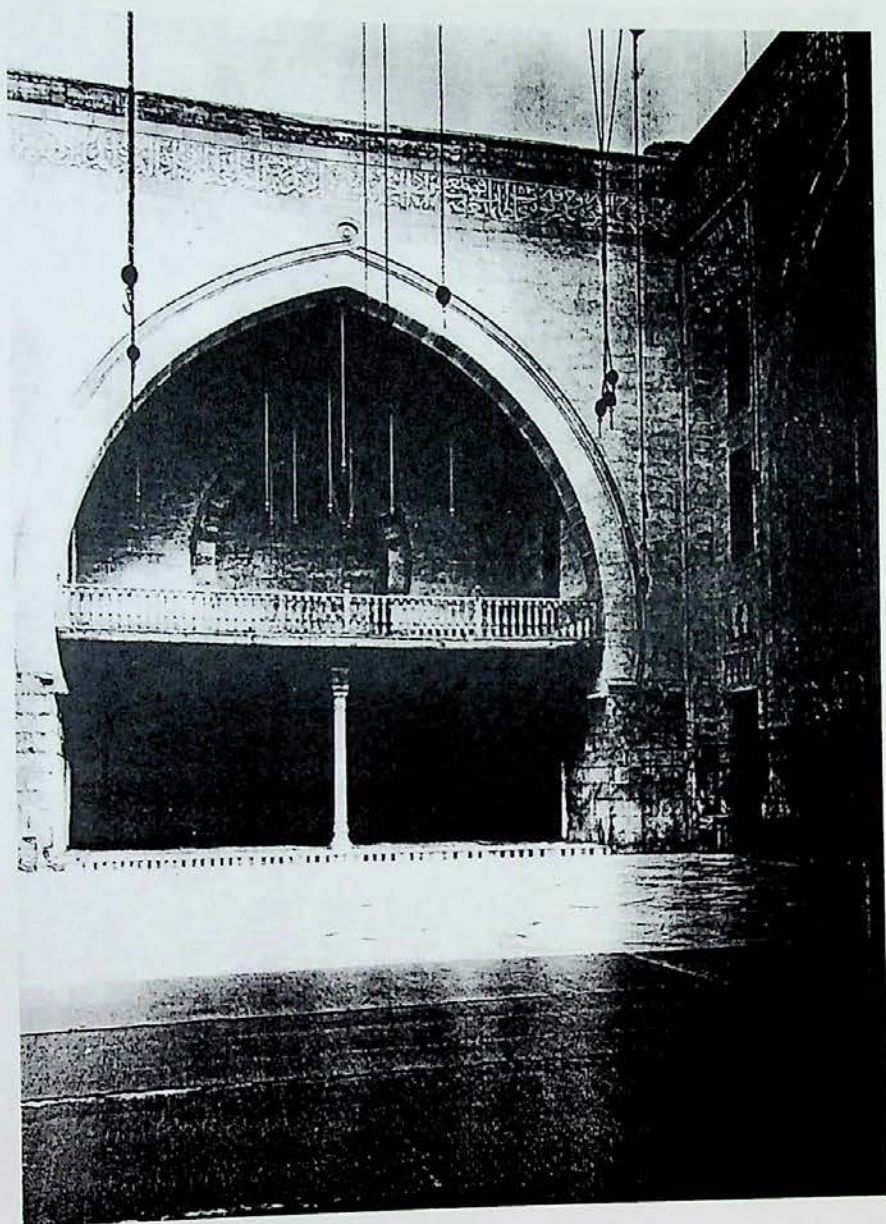
View of the qibla *iwan* of the mosque of 'Abd al-Ghani al-Fakhri
(Index. 184, 821/1418)
(Creswell Photo Collection, A24, 20A)

Plate. 23

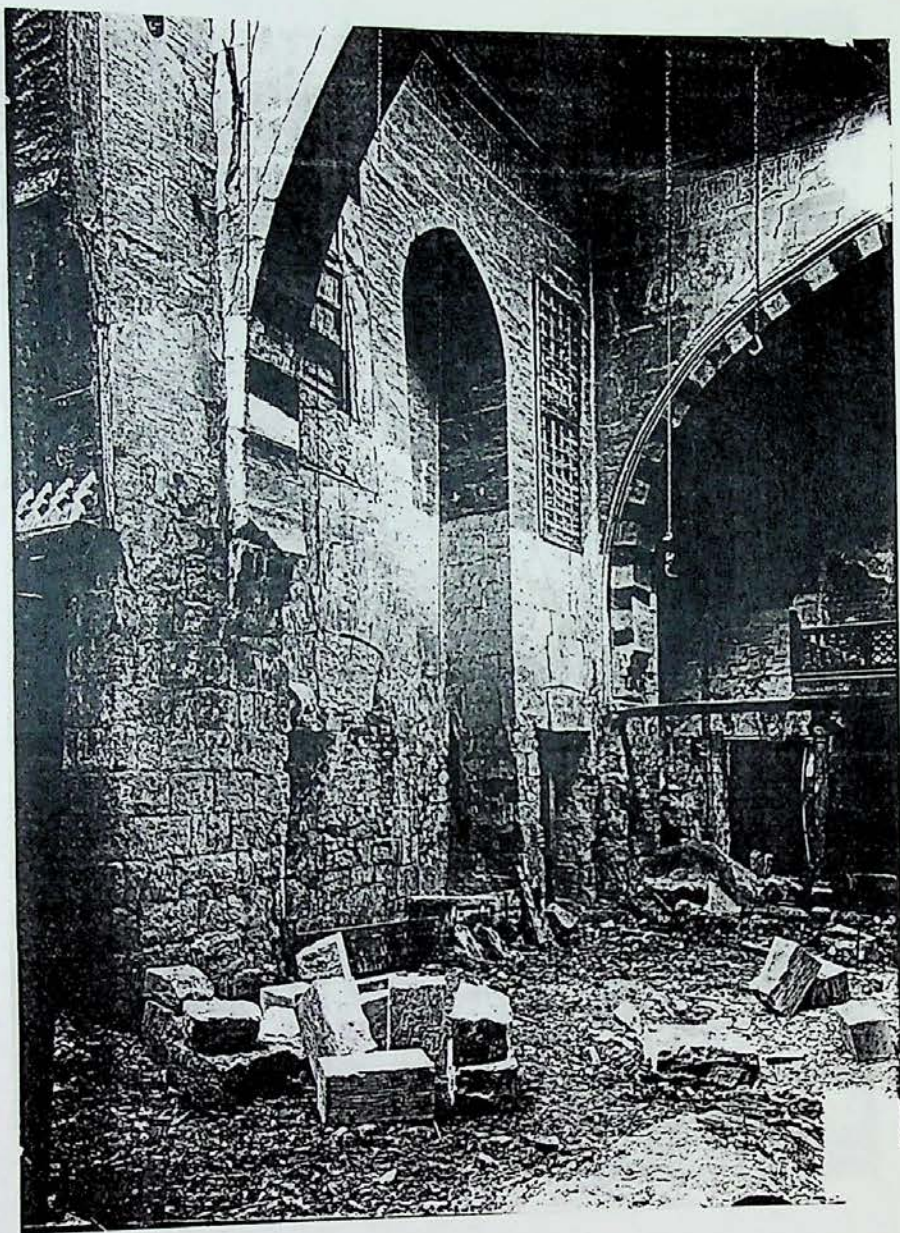


View of the anti-qibla *iwan* of the madrasa of Qadi 'Abd al-Basit
(Index. 60, 823/1420)
(Creswell Photo Collection, A24, 23A)

Plate. 24

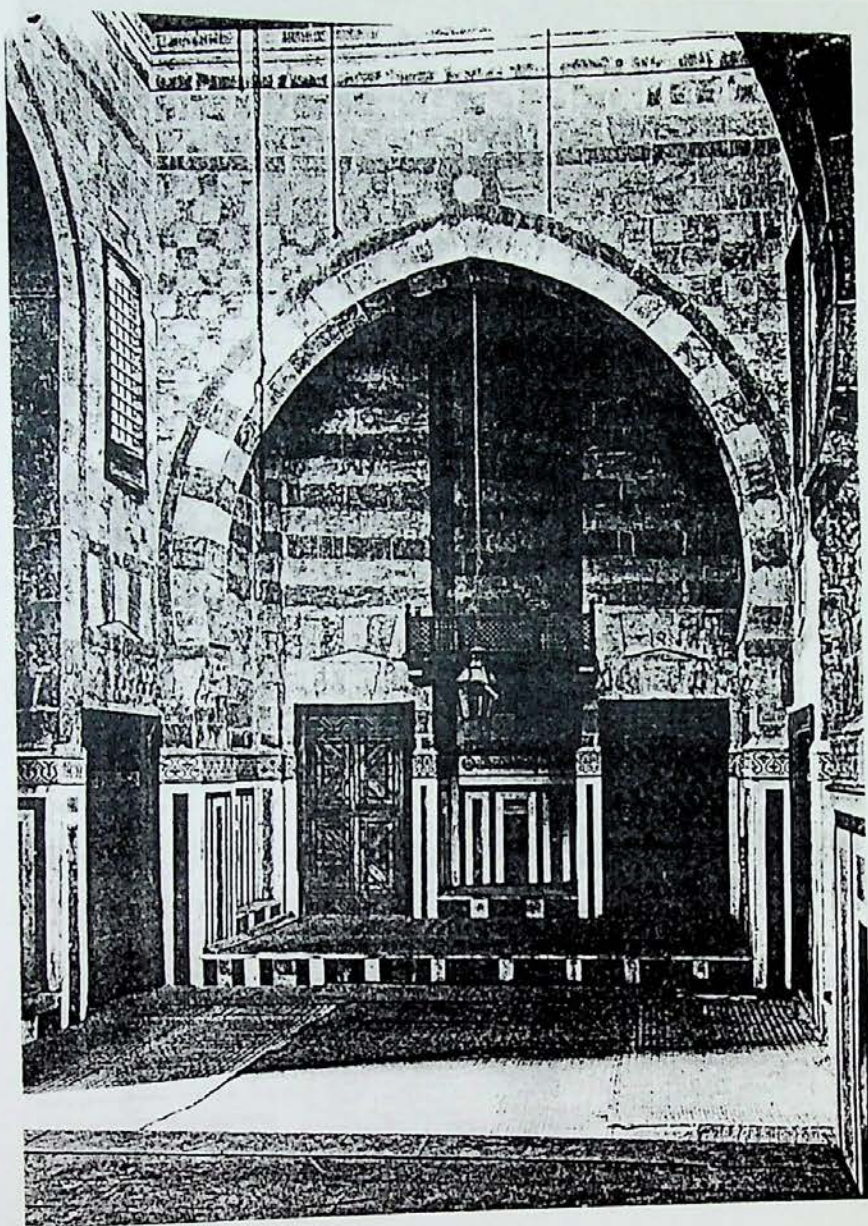


View of the anti-qibla *iwan* of the madrasa of Sultan Barsbay
(Index. 175, 829/1425)
(Creswell Photo Collection, A24, 30A)



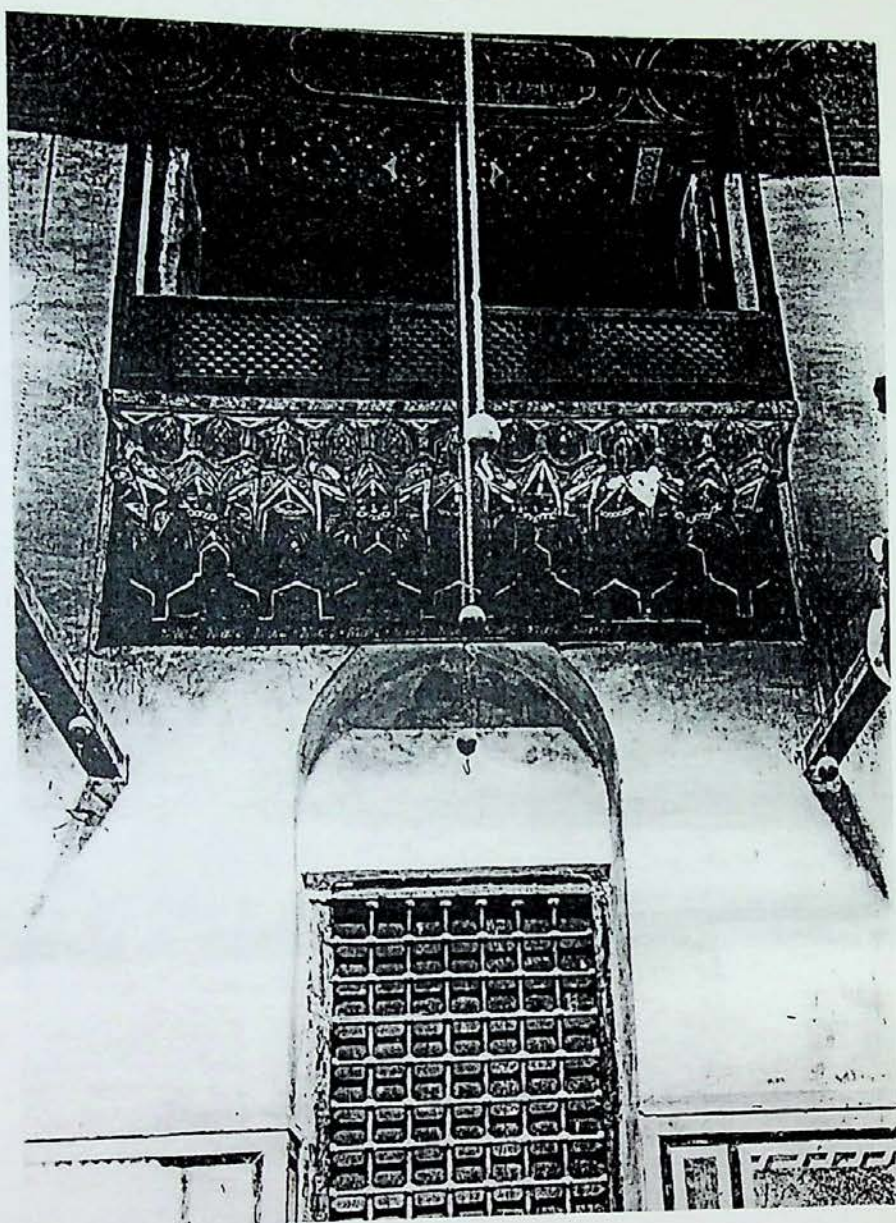
View of the anti-qibla *iwan* of the mosque of Kafur al-Zimam
(Index. 107, 829/1425)
(Creswell Photo Collection, A24, 36B)

Plate. 26



View of the anti-qibla *iwan* of the mosque of Jawhar al-Lala
(Index. 134, 833/1430)
(Creswell Photo Collection, A24, 42B)

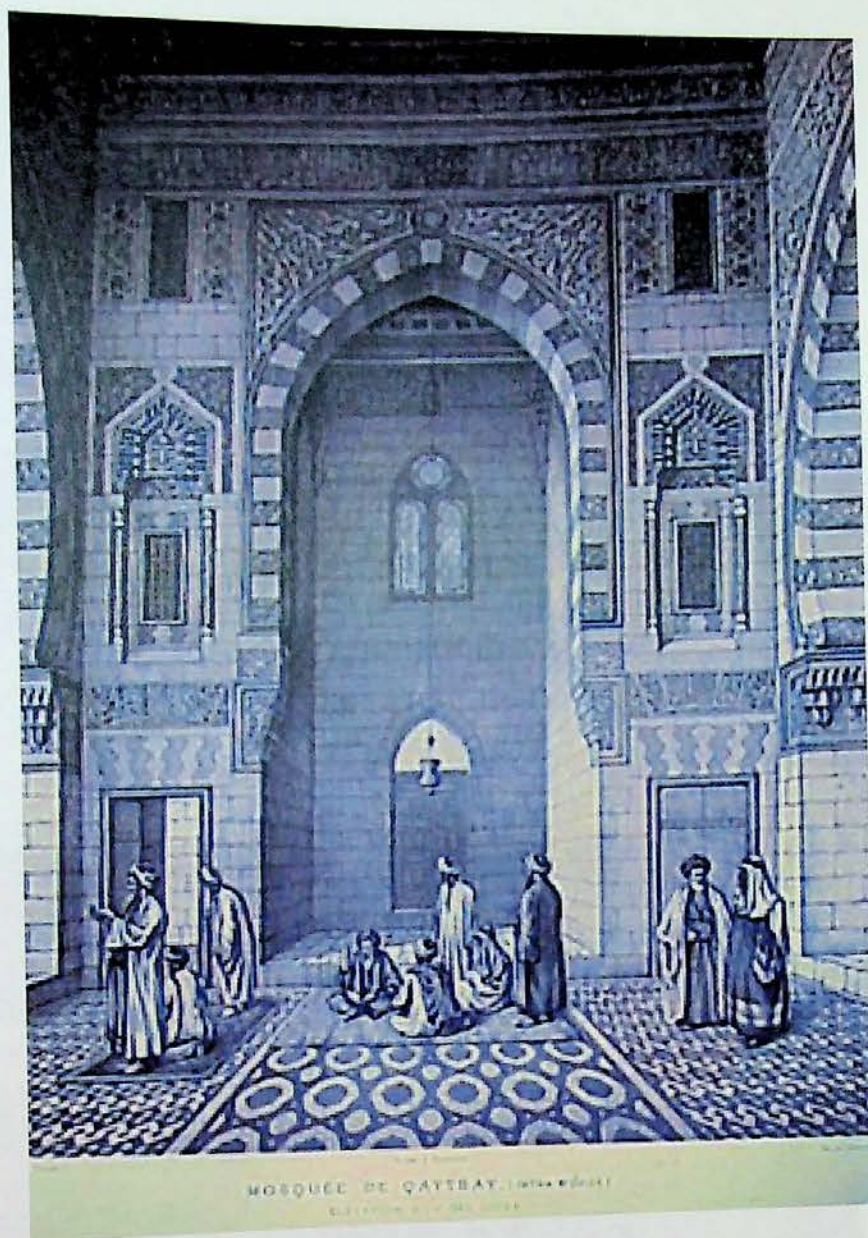
Plate. 27



View of the *dikka* of the madrasa of Abu Bakr Muzhir
(Index. 49, 884/1479-80)
(Creswell Photo Collection, A25, 54C)

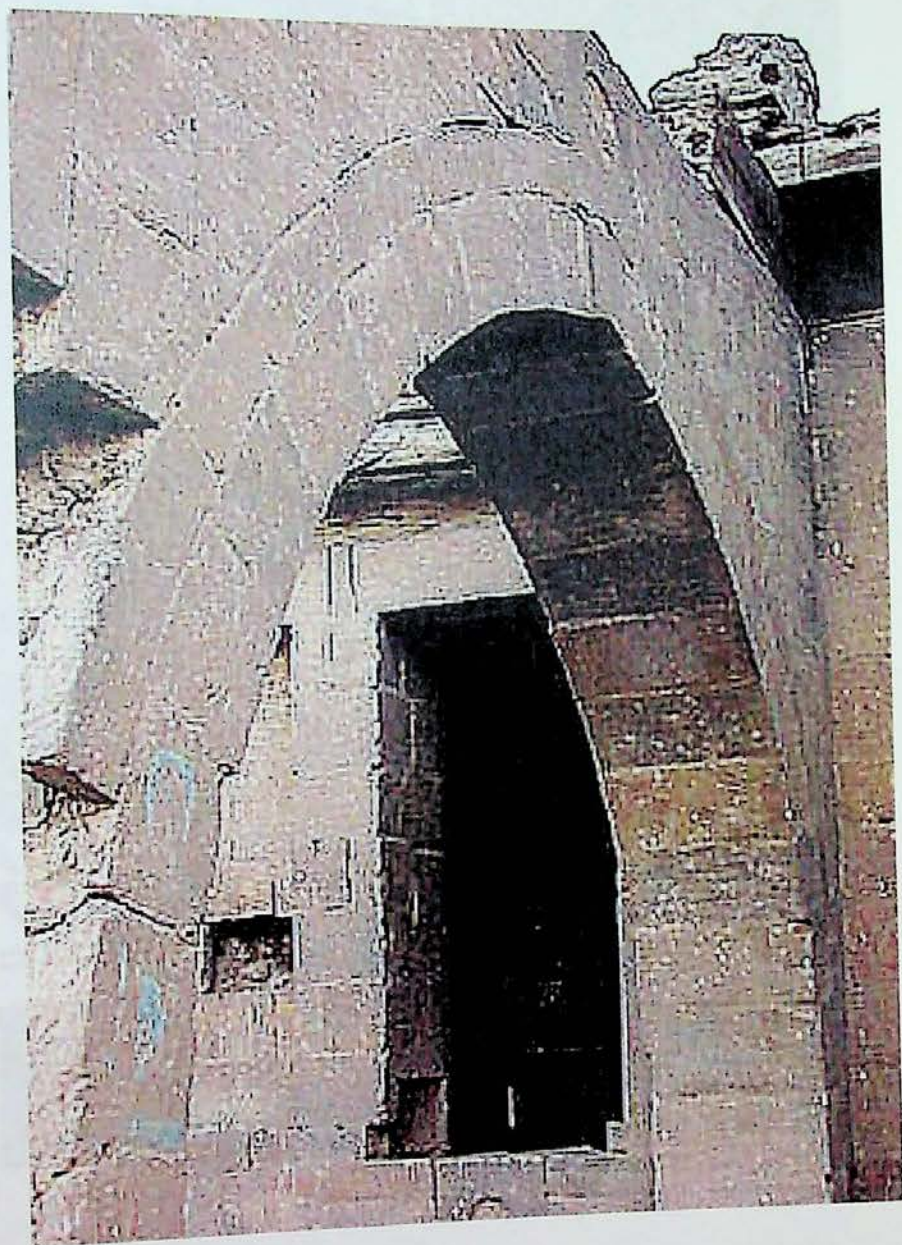


Interior view of the madrasa of al-Ghuri
(Index. 189, 909-10/1504-5)
(after David Roberts)



Interior view of the lateral *iwan* and the *sahn* of the madrasa of Qaytbay Q. K.
(after Prisse d'Avennes)

Plate. 30

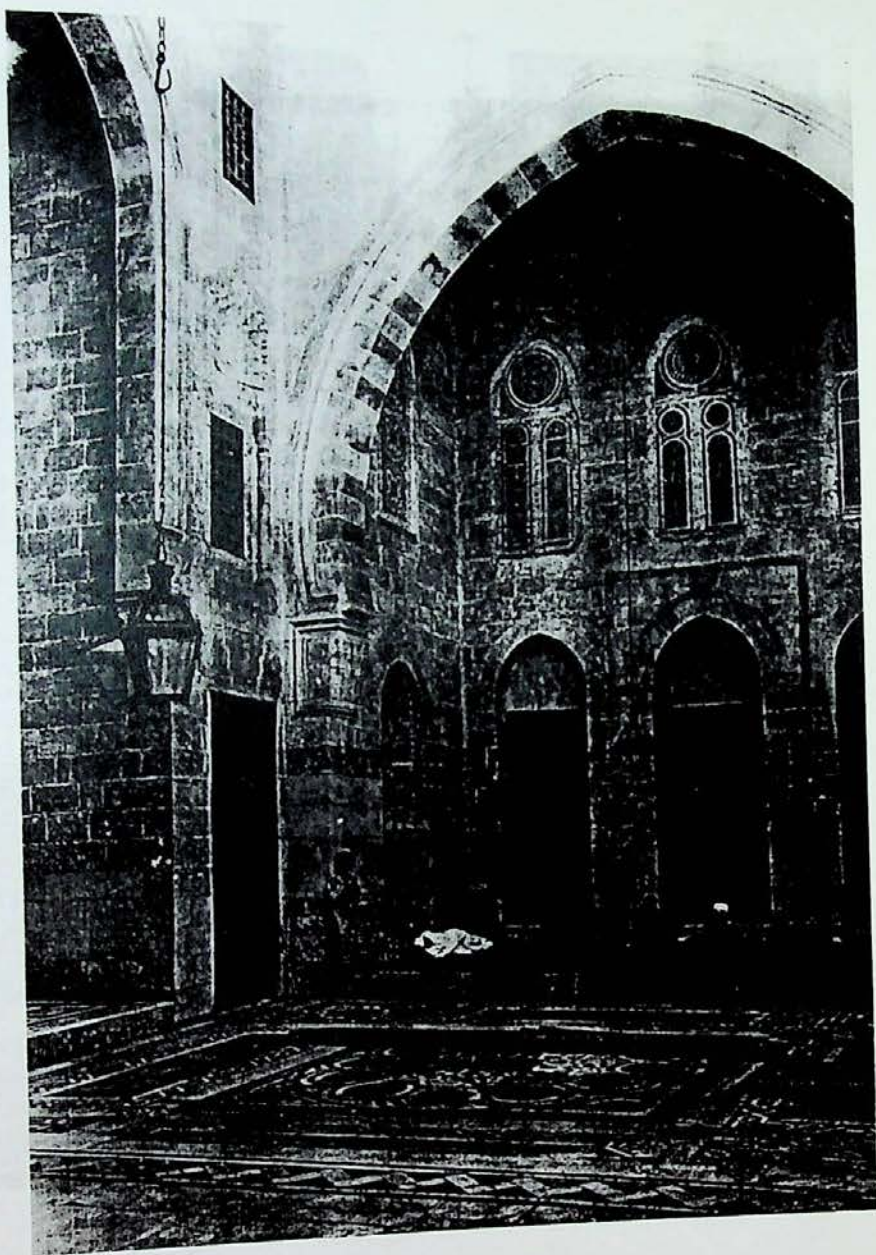


The apex of the arch of the west *iwan* of the mosque/mausoleum of Azdumur
(Index. 113, Beginning of 10th century / 16th century)

Plate. 31



View of the anti-qibla *iwan* of the mosque of 'Abd al-Ghani al-Fakhri
(Index. 184, 821/1418)
(Creswell Photo Collection, A24, 20B)



View of the anti-qibla *iwan* of the madrasa of Janibek
(Index. 119, 830/1426-27)
(Creswell Photo Collection, A24, 36D)



(a)



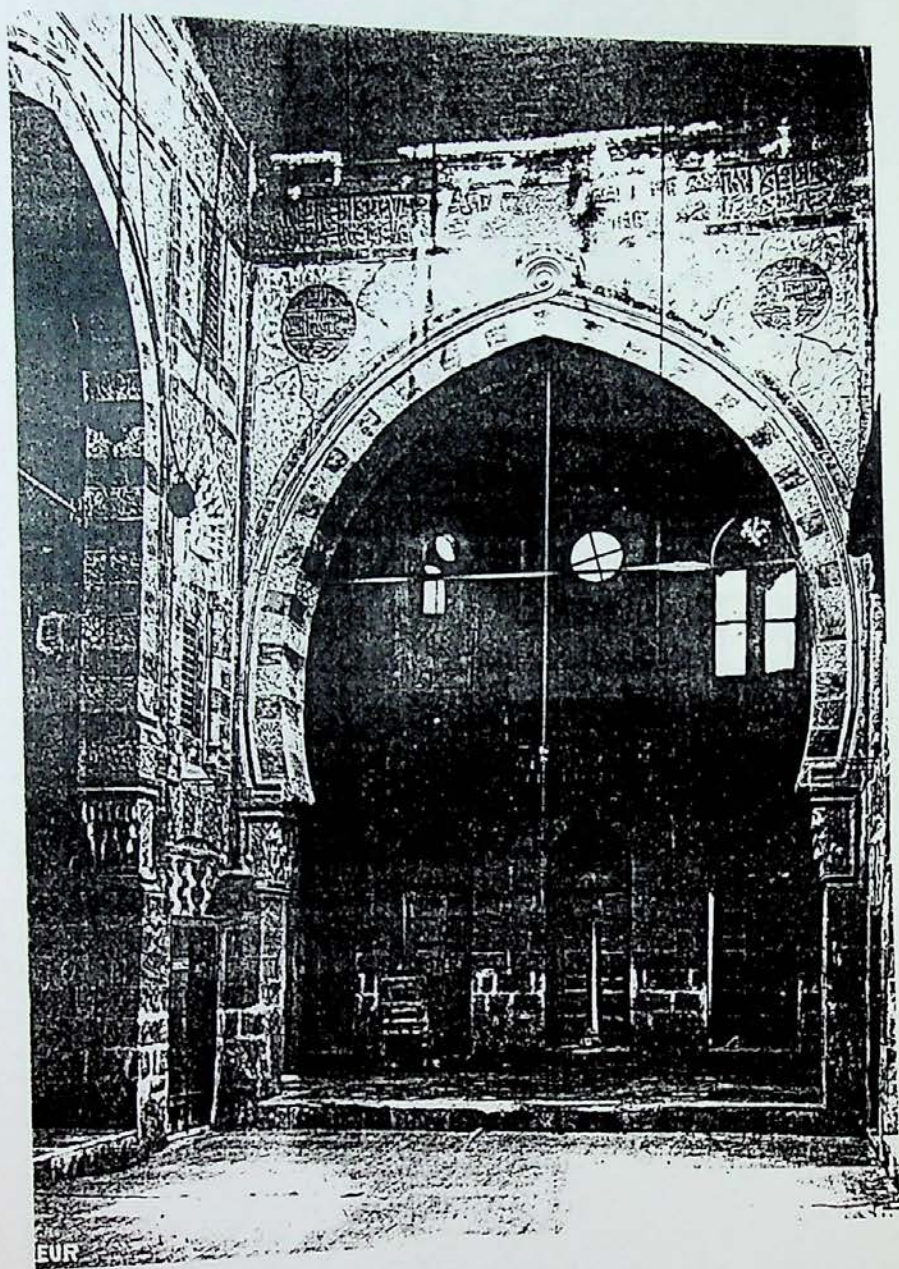
(b)



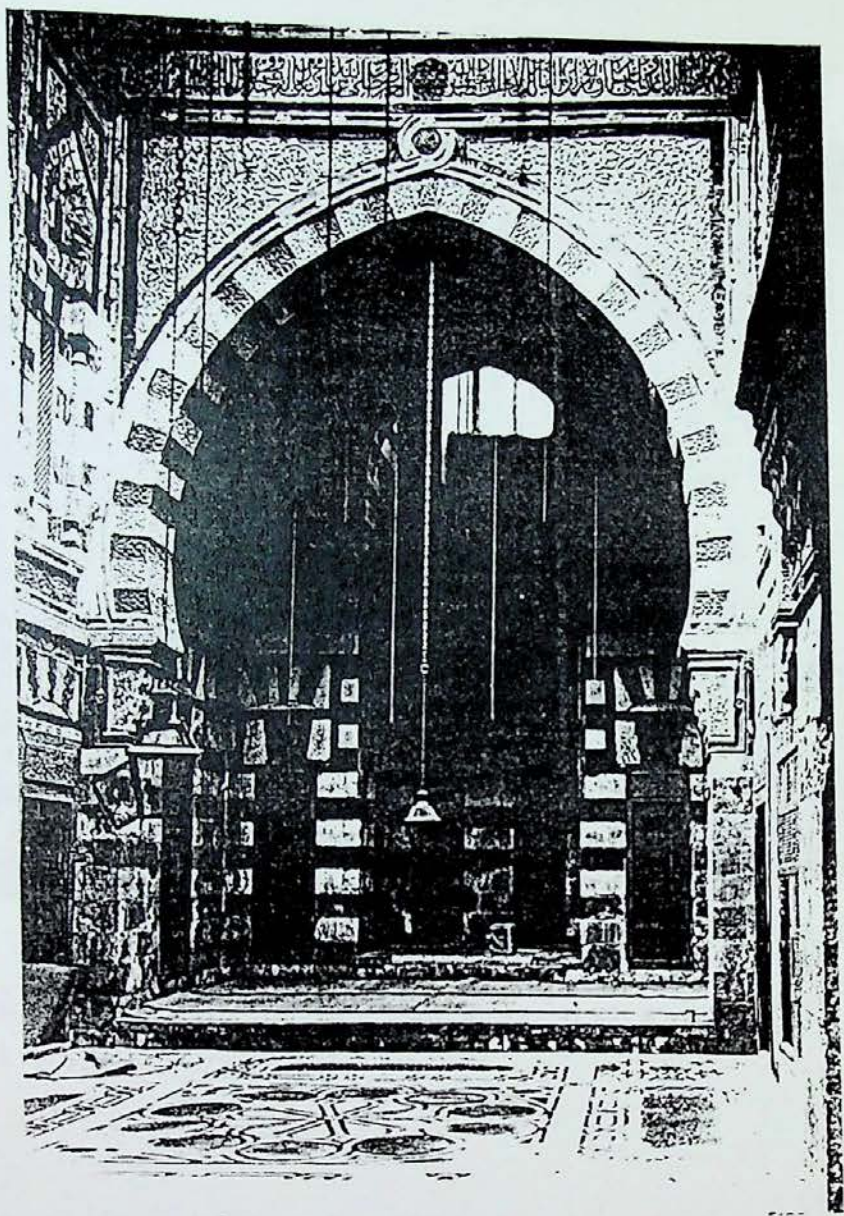
(c)

Sunburst motif early examples from tombstone mihrab and façade decorations

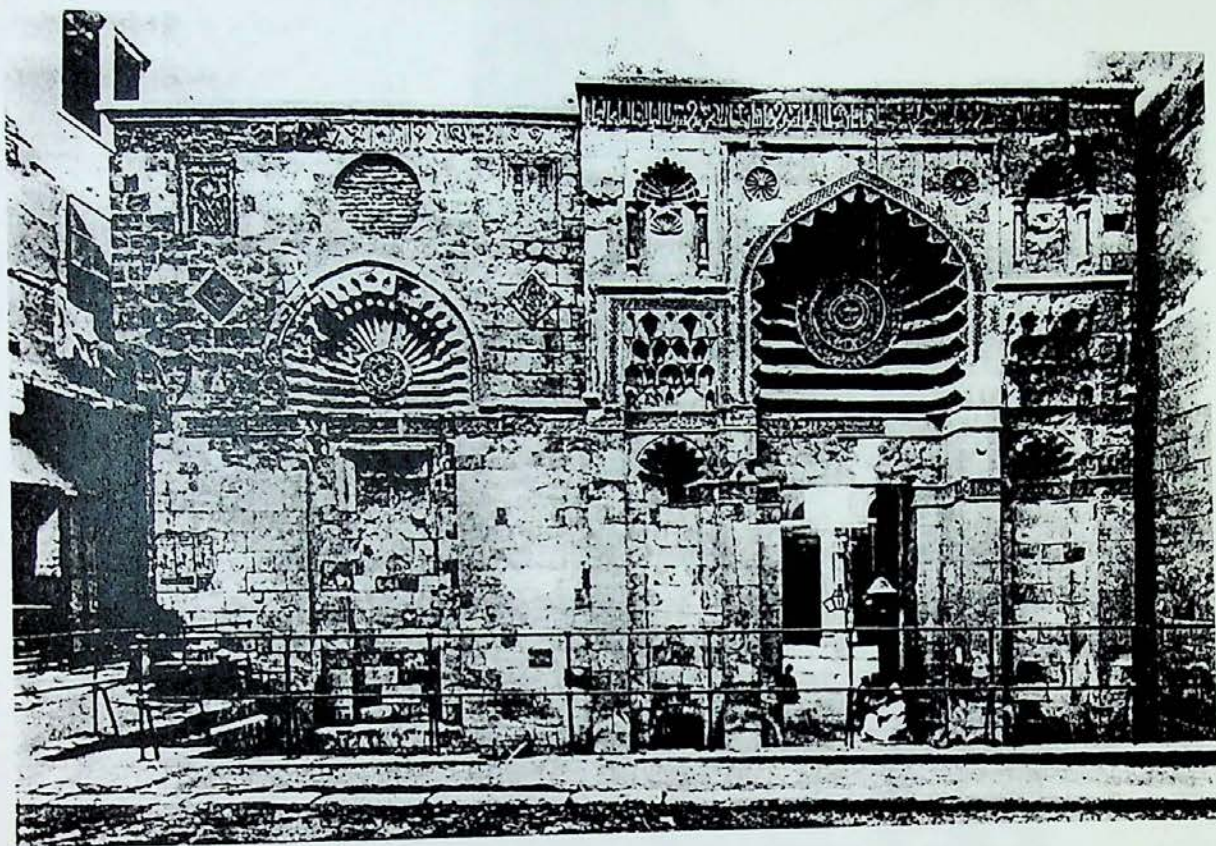
- (a) Tombstone from Iran (late 11th early 12th century A.D.) (Ater Upton J.)
- (b) Mihrab in the mosque of ibn Tulun (266/879) (Creswell Photographic Archive, Ashmolean Museum, 2847)
- (c) Stone grill on the façade of al-Aqmar mosque (519/1125) (Flood, F. B., "Light in Stone", Fig. 11)



View of the anti-qibla *iwan* and *sahn* of the mosque of Qaytbay Q. K.
(Index. 223, 880/1475)
(Creswell Photo Collection, A25, 36A)



View of the anti-qibla *iwan* and *sahn* of the mosque of Azbak al-Yusufi.
(Index. 211, 900/1495)
(Creswell Photo Collection, A25, 38C)

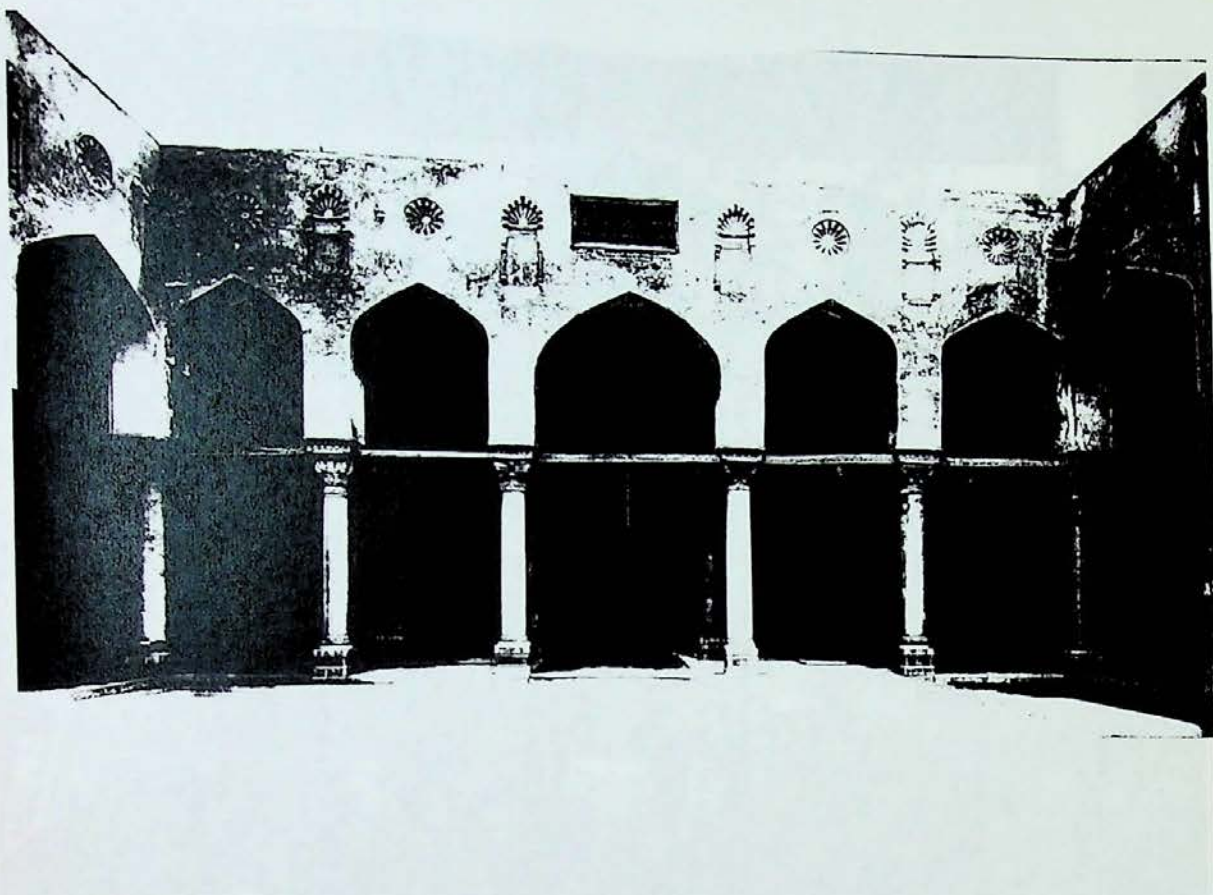


View of the entrance façade of the mosque of al-Aqmar
(Index. 33, 519/1125)
(after Creswell, *MAE*, 1: Pl. 82c)

Plate. 37

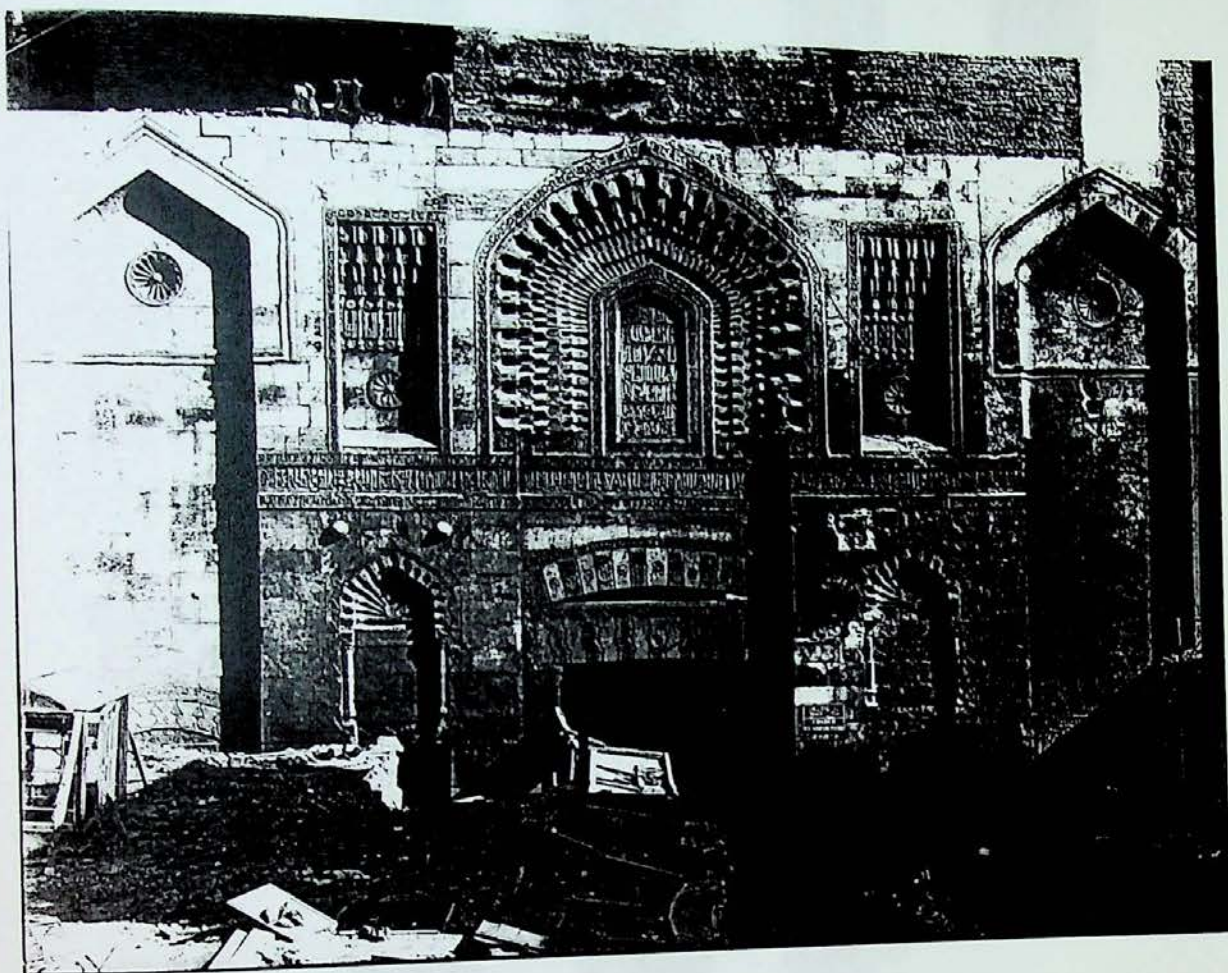


View of the base of the minaret of the *mashhad* of Sayyidna al-Husayn
(Index. 28, 549/1154)
(Creswell Photo Collection, A15, 10B)



View of the *sahn* of the mosque of al-Salih Tala'i.
(Index. 116, 555/1160)
(Creswell Photo Collection, A15, 22A)

Plate. 39



View of the entrance of the madrasa of al-Salih Najm al-Din Ayyub.
(Index. 38, 641-48/1243-50)
(Creswell Photo Collection, A18, 4A)



(a)



(b)



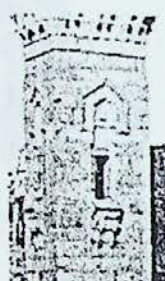
(c)



(d)



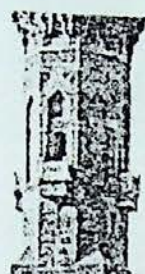
(e)



(f)



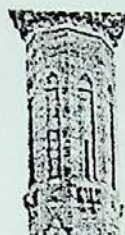
(g)



(h)



(i)



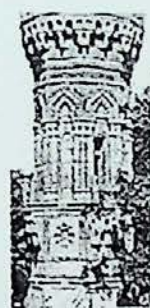
(j)



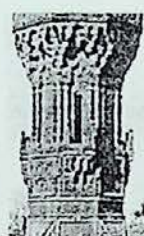
(k)



(l)



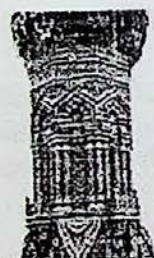
(m)



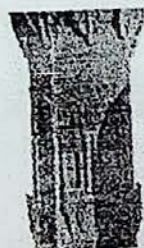
(n)



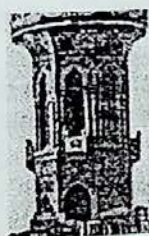
(o)



(p)



(q)



(r)



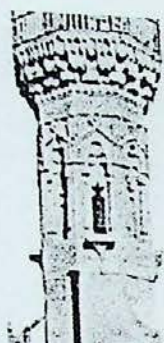
(s)

The bases of Circassian minarets (Creswell Photo Collection)

(a) al-Mu'ayyad (Ind. 190, 818-23/1418-20) (b) 'Abd al-Basit (Ind. 60, 823/1420) (c) Barsbay (Ind. 175, 812/1425) (d) Fayruz (Ind. 192, 830/1426-27) (e) Barsbay (Ind. 121, 835/1432) (f) Taghri Bardī (Ind. 209, 844/1440) (g) Qaraqoga al-Hasani (Ind. 206, 845/1441-2) (h) Qadi Yahya (Ind. 182, 848/1444) (i) Qadi Yahya (Ind. 344, 852/1448-49) (j) Gaqmaq (Ind. 217, 853/1449) (k) Muhammad Sa'id Gaqmaq (Ind. 180, 855/1451) (l) Inal (Ind. 158, 855-60/1451/56) (m) Bardbak (Ind. 25, about 865/1460) (n) Moghulbay Taz (Ind. 207, 871/1466) (o) Qaytbay (Ind. 99, 877-79/1472-74) (p) Ghanim al-Bahlawan (Ind. 129, 886-916/1478-1510) (q) Abu'l 'Ila (Ind. 340, about 890/1485) (r) Qaytbay (Ind. 519, 886-96/1481-90) (s) Azbak (Ind. 211, 900/1495)



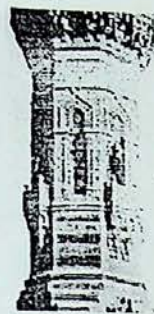
(a)



(b)



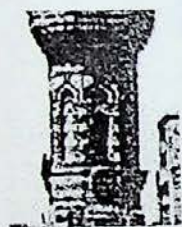
(c)



(d)



(e)

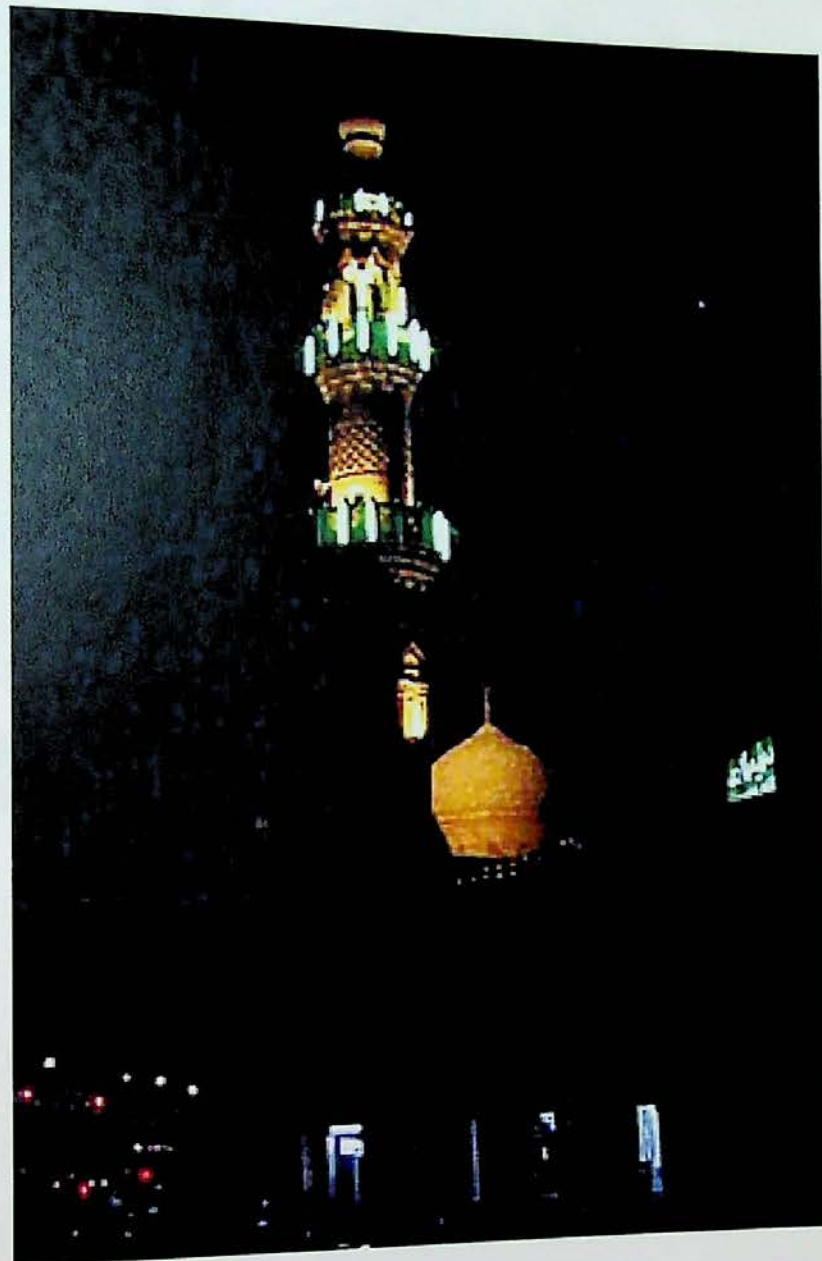


(f)

The bases of Bahri minarets (Creswell Photo Collection)

- (a) Minaret of the mosque of al-Hakim (al-Zahir Baybars' period) (b)
 (c) Minaret du sud (name given by Comite) (d) Tashtumur (Ind. 92, 735/1334)
 (e) Assanbugha (Ind. 185, 771/1370) (f) Ulgay al-Yusufi (Ind. 131, 774/1373)

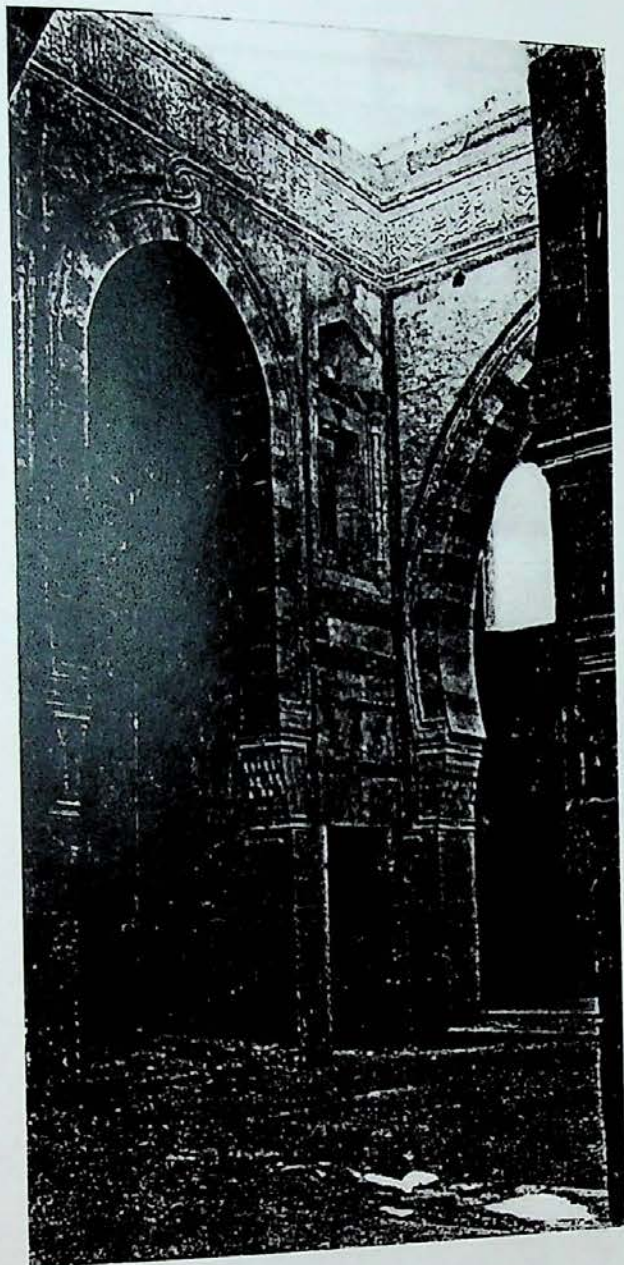
Plate. 42



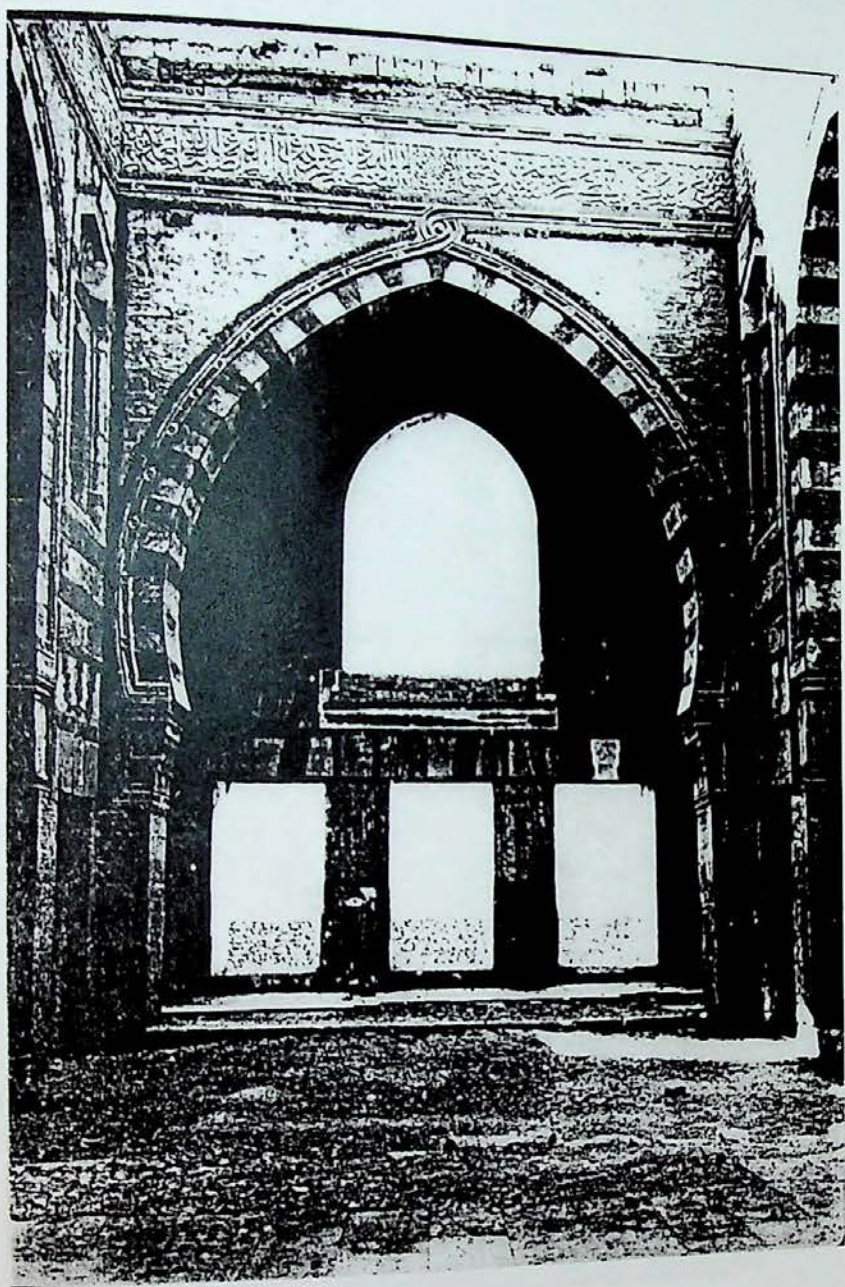
Night shot of minaret with one sunburst motif on its base lighted properly



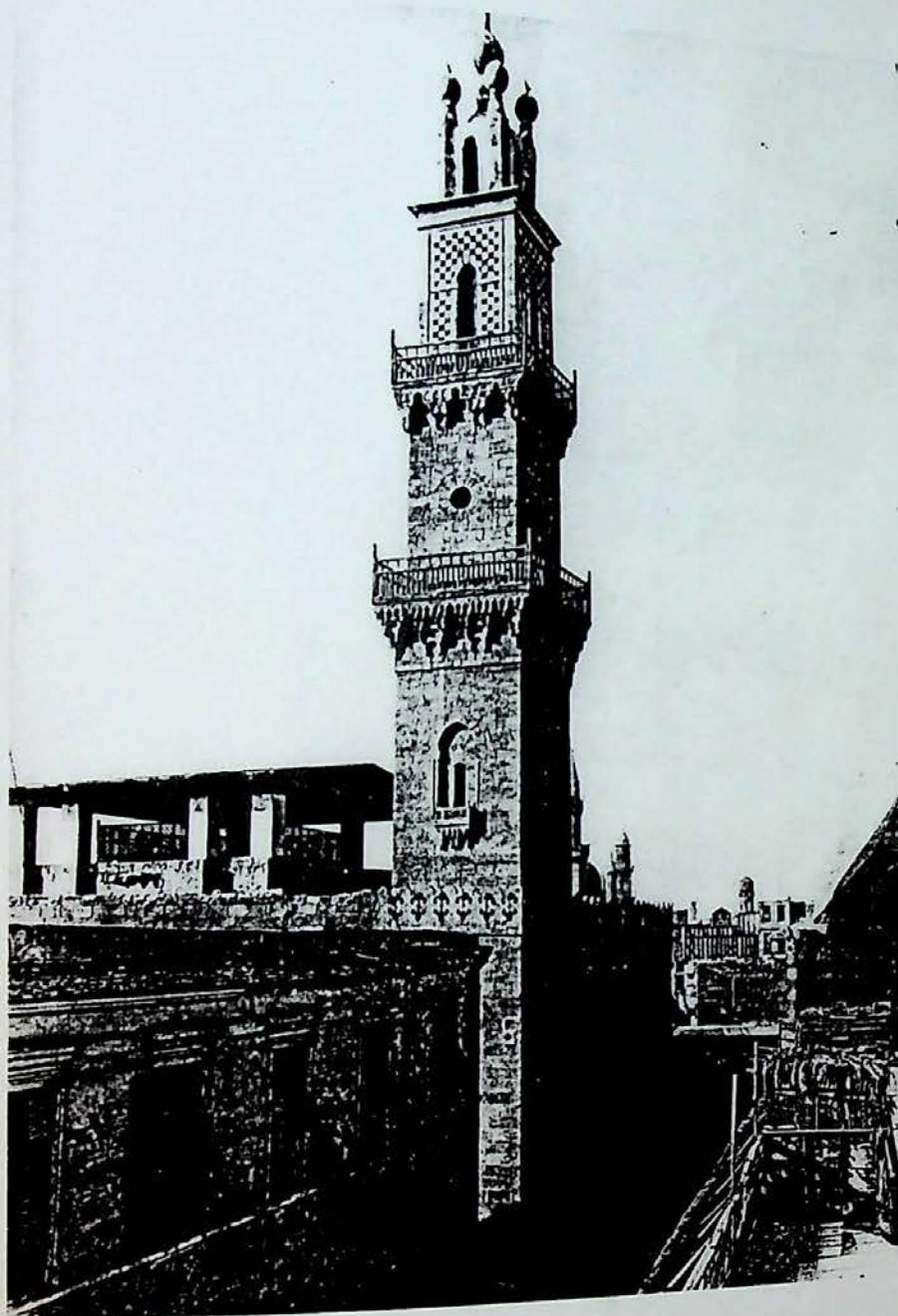
Aerial view of the complex of Qurqumas
(Index. 162, 911-13/1506-7)
(after Nieduziak, I., "Polish-Egyptian Restoration", Fig. 1)



View of the corner of *sahn* of the madrasa of Qurqumas
(Index. 162, 911-13/1506-7)
(Creswell Photographic Archive, Ashmolean Museum, 3946)



View of the anti-qibla *iwan* of the madrasa of Qurqumas
(Index. 162, 911-13/1506-7)
(Creswell Photographic Archive, Ashmolean Museum, 3947)



Exterior view of the *sahn* balustrade of the madrasa of Sultan al-Ghuri
(Index. 189, 909-10/1504-5)
(Creswell Photo Collection, __, __)

