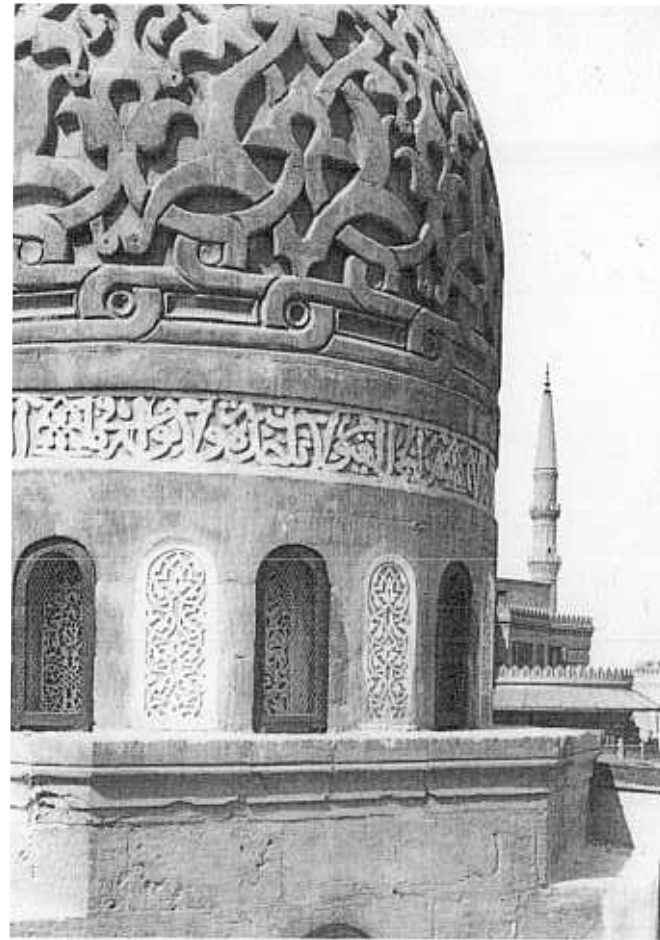


## Collaboration in Cairo: the conservation of the Madrasa el Gawhariya

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FIG. 1. Part of the dome after restoration.

<sup>1</sup> See *Monumentum* (1984) Special WHC Issue, 92ff.

In the name of Allah, the Compassionate, the Merciful. Blessed be He who has placed in the Heaven mansions of stars and has placed therein a great lamp and a moon giving light. And He it is who has appointed night and day in succession for him who desires to remember or desires thankfulness. The faithful subjects of the Compassionate are they who walk upon the Earth modestly and when the foolish ones address them answer: Peace. [Inscription from the drum of the dome of Madrasa el Gawhariya]

Although a poor country, Egypt is blessed with a great number of buildings and items of cultural value. Until now, lucrative tourism has been able to finance the preservation of the Pharaonic monuments, but the majority of the buildings from the Islamic era in Cairo are today in a state of severe decay or simply buried in dust and debris because of lack of money and expertise to bring them back to their former beauty and grandeur.<sup>1</sup> Without an extraordinary effort, these buildings will be nothing but past history to the next generation, yet they possess a special significance to the population compared to the Pharaonic monuments, simply because Islam is as strong among the Egyptians today as when the buildings were erected. The following account describes one of these Islamic monuments and its conservation.

The Madrasa el Gawhariya is situated in a corner of present-day Cairo in the heart of the medieval bazaars and connected directly to the walls of the famous university and mosque of Al Azhar, which was founded in 972 (Fig. 2). It may be only a small item among the thousand or so recorded

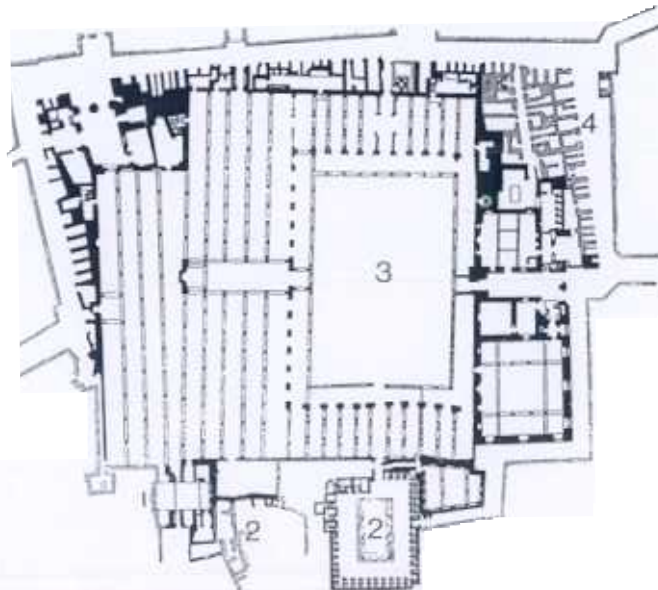


FIG. 2. Plan of the Al Azhar Mosque. 1. Madrasa el Gawhariya. 2. Buildings now demolished. 3. The open courtyard of the Al Azhar. 4. Bazaars.

and listed in the report prepared by Unesco after the international conference on saving ancient Cairo; but it represents all the other beautiful buildings still waiting to be restored, as well as three years of intensive work.

The conservation of this small building is the result of an experiment that involved experts and students from the Royal Academy of Fine Arts, the School of Architecture and the School of Conservation in Copenhagen, and postgraduates from the Egyptian Antiquities Organization in Cairo. The work was executed by local Egyptian craftsmen and workers in collaboration with Danish and Egyptian participants, thus giving the Danish-Egyptian project a broader aspect. It became a combined education/research/service exercise. The first step was made back in 1972, when the Royal Danish Academy was requested by the Ministry of Cultural Affairs to make suggestions for projects which could be executed within the framework of the Danish-Egyptian Cultural Agreement made in the previous year. A group of people with experience of different works in the Near East was attached to the Department of Restoration at the Architectural School, and it was therefore agreed that this expertise should be offered for saving valuable Islamic monuments in Egypt. In 1974 the first small group of students and teachers went to Cairo to discuss the details of this co-operation with the Director of the Egyptian Antiquities Organization and to consider buildings in need of restoration.

Among the numerous more or less ruined buildings two were chosen because of their obvious beauty, easy access, and the general character of the problems they represented. Priority was given to a small religious building dating from c1440—the Madrasa el Gawhariya (Figs 3, 4). This was selected because of its small size, which offered the possibility of finishing the work within the two years on which our offer was based. After the proposal had been accepted officially, a group consisting of twelve students and teachers started to photograph and make measured drawings in February 1975. The author joined the group as project leader on 1 March at the invitation of Prof. Vilhelm Wohlert, the Director of the Department of Restoration in Copenhagen, who was the head of a co-ordination group consisting of architect Hans Munk Hansen and conservator Steen Bjørnhof.<sup>2</sup> However, it was only at the end of November 1979, after long negotiations, that the starting signal was given by the Egyptian authorities; and on 1 January 1980 we began work. There were a few problems at first; for example, it took three weeks to get our equipment through the customs. Again, the agreement itself was not signed until 13 February, and we had to find a way of releasing the money available for the project from the account held by the National Bank of Egypt.<sup>3</sup>

The original plan was that the students should be sent to Cairo in four groups, each of three to five members and staying for four months; but in

<sup>2</sup> See *Monumentum* (1983), vol. 26, no. 4, 237ff.

<sup>3</sup> The money originated from a Danish Government loan given to Egypt at the start of the 1970s, now being used to cover our expenses, lodging and allowances.



FIG. 3. The Mosque of Al Azhar. In the foreground is the restored Madrasa el Gawhariya and the restored open space which, until a few years ago, was filled with buildings.

the event several found the stay so interesting after the first difficult weeks of acclimatization that they continued for another period, in some cases up to eleven months. This provided better continuity, and their advice was valuable to the new students in helping them to become accustomed to the hectic life of Cairo, its burning heat, its penetrating cold winds, and its myriads of people.

#### The historical background

When the Mosque of Al Azhar was built in 972, the area outside the north wall was an open space, a *harām*, which was used during Friday prayers and gave access to the main entrance of the mosque. Soon, however, buildings of various kinds started to fill the area, so that by about 1300 the whole had been built up. It is not known exactly when the small *madrasa*

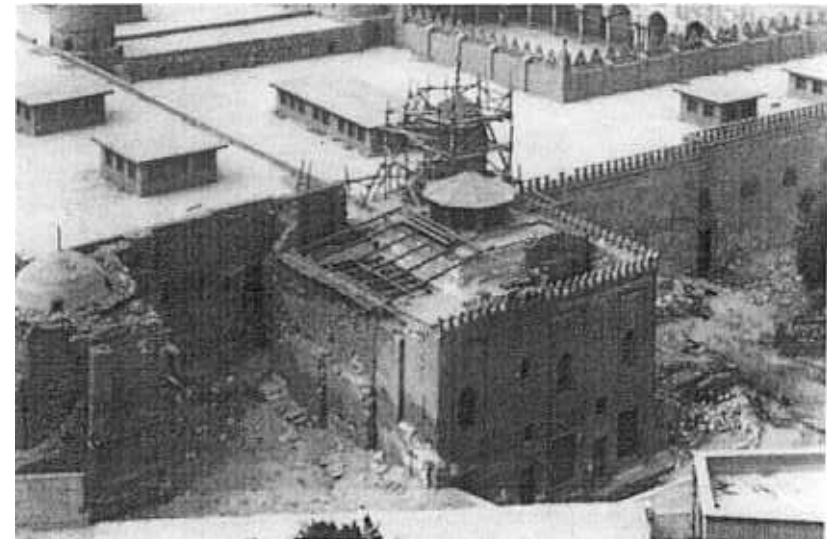


FIG. 4. The Madrasa before work started. Notice the raised level around the building.

was erected, but it is generally thought it was finished around 1440, the year in which its founder died. It was squeezed in on a piece of land which the founder succeeded in buying after a long battle with the leaders of the Al Azhar Mosque, and so it was in effect a work of infill built between two existing houses to the west and east. It was given two entrances, one from a narrow lane to the north and another from a small square behind the *qibla*-wall of Al Azhar to the south.<sup>4</sup>

The founder, Gawhar al Qanqubay, was a Mameluke prince.<sup>5</sup> During the reign of Sultan Barsbay he occupied the posts of *al Khaṣṣandaria*, supervisor of the Sultan's treasuries, and *al Zaman Dar*, the one in charge of the women's affairs. Thus he was an influential man, and that might explain how he could succeed in purchasing the small but prestigious site. Sultans and other officials with rank and influence tried to earn themselves a more exalted life after death by founding *madrasas* or theological colleges, and very often they were buried in a mausoleum within the complex. Consequently Cairo is well supplied with *madrasas*, that of Gawhar al Qanqubay being the third to be built and attached to the most important building in Cairo at that time.

#### The Madrasa el Gawhariya

The plan followed the traditional form, i.e. a cruciform with an almost

<sup>4</sup> The *madrasa* dates from that part of the Mameluke period which is generally regarded as the peak of its architectural achievement, its most beautiful representative being the Madrasa and Mausoleum of Sultan Qait Bay, built c.1470 and situated in the northern cemeteries of Cairo.

<sup>5</sup> The Mamelukes took control of Egypt by force in 1250, being originally slaves brought to fight in the army of the Sultans. Their two dynasties ruled Egypt and the neighbouring countries until 1517, when the Ottoman Turks conquered the country.

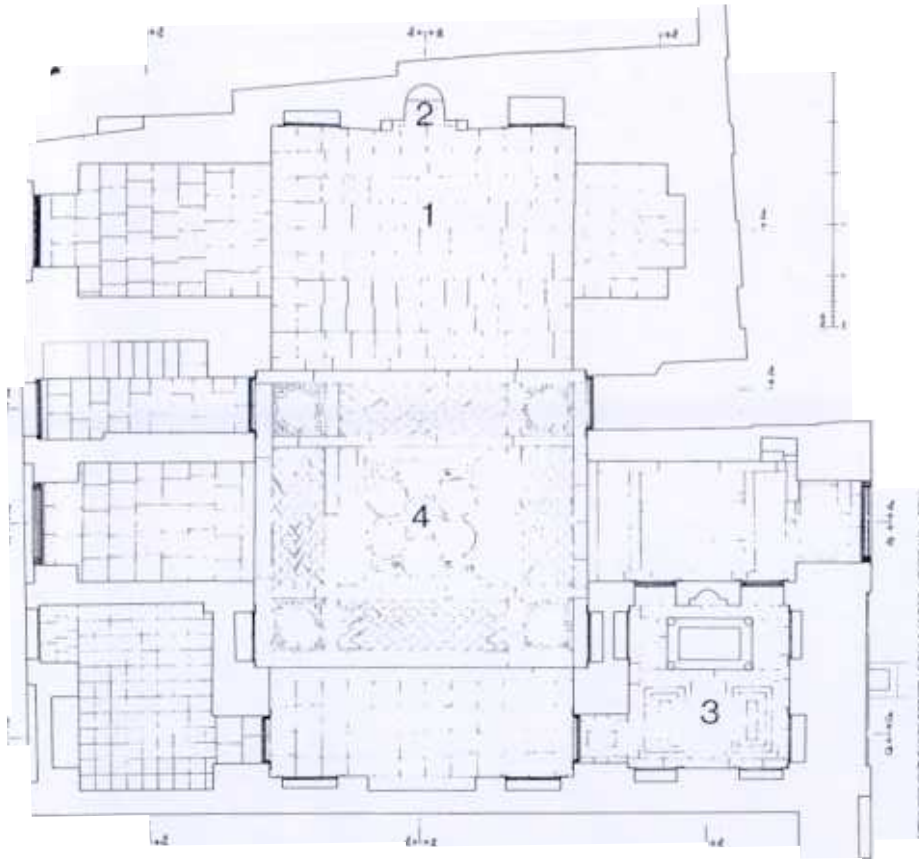


FIG. 5. Plan of the Madrasa. 1. The *qibla-ivan*. 2. The *mihrab*. 3. The mausoleum. 4. The courtyard.

square courtyard and four *iwans* or grand entrances (Fig. 5), but the Z-shaped site resulted in a number of adjustments being made. It has long been discussed whether Islamic buildings were designed or whether they resulted from traditional ability and experience in putting together more or less standard architectural elements. In this case, because of the skill with which the adjustments to the standard plan were made to conform to the difficult site, there seems little doubt that it was a carefully considered individual design.

In order to make the courtyard a fair size, the *qibla-ivan* and the opposite west *ivan* were made less deep than usual, whereas the north and

south were made deeper. Traditionally the mausoleum of the founder is situated close to the *qibla-ivan* and with openings to the street, but as the *qibla-wall* was built against neighbouring houses another solution had to be found. The mausoleum was therefore placed in the south-west corner with two barred windows to the south *ivan*. Here there was a direct connection to the main praying hall of Al Azhar through another barred window. In order to give the public a chance to have a glimpse of the mausoleum from outside, an opening was made in the east wall of the south *ivan* towards the main entrance. At the same time the entrance was given a funnel-shaped form, which can still be seen inside the praying hall of the mosque.<sup>6</sup>

In a cruciform *madrasa*, the *qibla-ivan* and that opposite are normally the same width as the courtyard, while the side *iwans* are narrower. This leaves space for four corridors, one on each side of the two *iwans*. In this *madrasa*, there are only two, both used as entrances. The corridor that should have existed in the south-west corner was used for the mausoleum, and the north-west was reduced to a small closed room inside the structure of the neighbouring house around which the *madrasa* was built. Until a few years ago, when this house was demolished, the two buildings were in close contact; and from the first floor of the house two barred windows offered a view of the courtyard of the *madrasa*.

Not only had the plan to be altered, but also the traditional

<sup>6</sup> In 1751 this praying hall was enlarged, when the small square in front of the main entrance of the *madrasa* was swallowed up by the new structure.



FIG. 6



FIG. 7.

FIGS 6; 7. The north *ivan* before and after restoration.

<sup>7</sup> Gypsum windows were normally cut in an intricate manner at an angle, so that light from windows in tall narrow rooms, such as the mausoleum, would be visible when one was close underneath the window. A special arrangement to bring as much light as possible into the obscure interior of the mausoleum was found in the south *iwān* where there was a double set of windows. In this case, those towards the *iwān* were cut horizontally, and transparent white glass was set in. The windows in the mausoleum itself were cut in the traditional way, sloping and with coloured glass. Thus light from the south *iwān*, which had openings to the street, could penetrate into the mausoleum.

arrangement of the openings in the walls had to be adapted. Normally, Islamic buildings are filled with light reflected from the outside walls and ground, streaming in through openings with iron or bronze grilles, while high above the light is filtered through coloured glass. In this case, however, as only small parts of the outer walls were exposed, windows were not possible and cast gypsum panels were put in instead (Fig. 20). These were carved with intricate, overlapping arabesques and painted in bright colours interplaying with those of the windows. Very clear traces of gold leaf were found on the original panels in the *qibla*-wall, which must have added a striking brilliance to those far up in the dim light.<sup>7</sup>

The courtyard, the natural centre of the complex, is covered with a wooden ceiling, in which is a lantern in the form of an octagonal pavilion with a pyramidal roof and wooden windows with grilles (Figs 8, 9). Originally the courtyard was open and the walls crowned with a crenellation. The ceiling and lantern were added later, the present one, we believe, was renewed about a hundred years ago when the *madrasa* underwent a major alteration to make it a part of the Al Azhar library. The walls surrounding the courtyard may be regarded as 'inner' facades; they follow the general pattern of Islamic buildings, opening up inwards

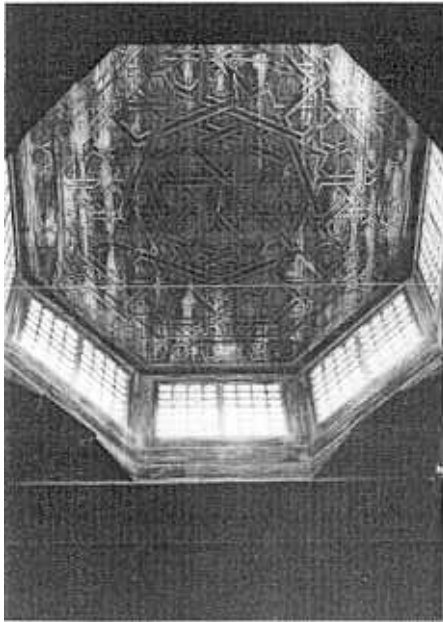


FIG. 8.

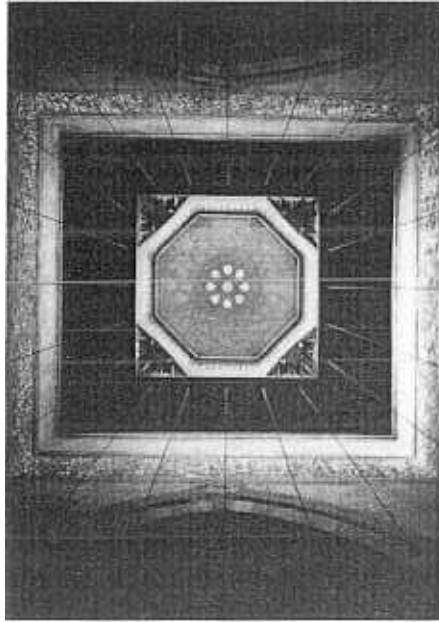


FIG. 9

FIGS 8, 9. The lantern before and after restoration.

and showing a relatively closed and shuttered facade to the world. The whole composition of the courtyard is held together by a broad band of Koranic inscription, which runs around the entire space (Fig. 24). Traditionally and for practical reasons the *qibla-iwān* is the largest of the four; and all are normally covered with wooden ceilings.<sup>8</sup> In this *madrasa*, it is the most beautifully decorated element and it creates an axial system of its own in conjunction with the two side *iwāns*. The *mihrab* is decorated with polychrome marble, the lower part being of plain rectangular black and white panels. Two red columns flank it, and further up the pattern becomes more intricate with arabesques, inlaid like jig-saw puzzles, carved and painted. A band of blue-glazed dwarf columns makes the transition between the lower and upper panels. The whole composition is centred on the top of the *mihrab*, where zig-zagging black and white rays hold the many parts together visually (Figs 18, 19). On the adjoining walls of the *qibla* complex and its side *iwāns*, evidence showed that these too had been decorated with marble panels.

However, it was found that all this marble decoration was a later addition, although from the Mameluke period. Most likely it was decided to put it up soon after the opening of the *madrasa*, when more money was available. That can only be speculation, but when the marble covering was removed during the restoration of the *mihrab*, the original finish was

<sup>8</sup> In contrast to the earlier practice in the Mameluke period, in which the arch to the *iwāns* continued as a pointed vault in the entire depth of the niche (thus giving the impression of the *iwāns* being extensions of the central courtyard), the wooden ceilings make the *iwāns* appear to be more or less separate rooms. The ceilings give the impression of being lids lowered into a shaft of stone walling.

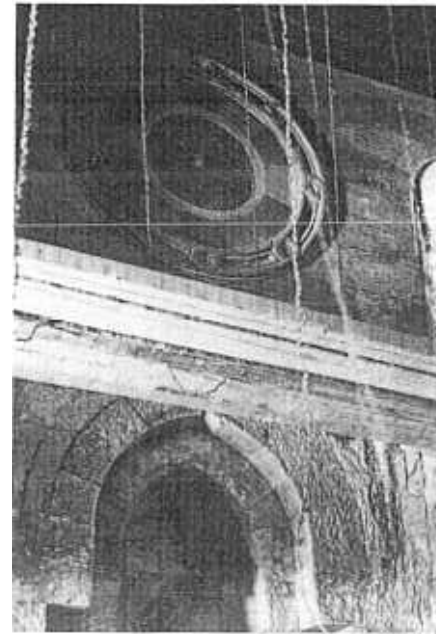
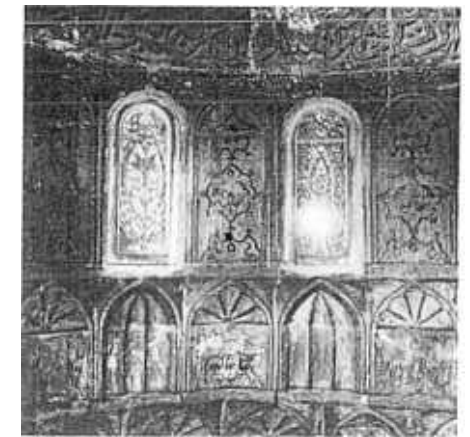
FIG. 10. (left) The original *mihrab* found during the restoration of the marble facing.

FIG. 11. (below) The transitional octagon and gypsum windows of the dome.



found underneath (Fig. 10). It was in fact a structural part of the *qibla*-wall itself and made of the same limestone, the outer edges being lined with yellow stones, like those of the walls and arches of the courtyard (Fig. 7). The top of the original *mihrab* had the same zig-zag pattern as the marble decoration, but in yellow and white. As we began to make these discoveries, we began to appreciate the interior's harmony and unity.

In the *qibla-ivan* the ceiling appears to be supported on complicated *muqarnas* vaults in the corners, and the impression of unity is emphasized by a large coved cornice. The space between the beams is divided into squares, thus eliminating the obvious direction of the beams themselves. Details, gilded and brightly coloured, would have sparkled originally with a dazzling richness; and all the ceilings (but especially that in the south-east *ivan* off the *qibla*), would have seemed like fireworks of gold and colour. The floors too were decorated, those in the central courtyard and the south *ivan* being covered with marble. The same material was used in the mausoleum, and the central part in front of the founder's cenotaph took the form of a prayer-rug.

The mausoleum itself differs from the rest of the *madrasa*. Almost a regular square, tall and narrow (its height being five times its width), it is covered by a stone dome. By using *muqarnas* vaults, the transition from



FIG. 12. (left) A detail of the decoration of the dome.

FIG. 13. (below) The dome and lantern seen from the roof of the Al Azhar Mosque after restoration.



the square of the room to the circle of the dome's base is effected by means of an octagon (Fig. 11). The dome rests on a drum, which is perforated by openings and niches, sixteen in all, every second being a gypsum window with coloured glass through which the light is filtered. A second layer of light enters through eight windows in the transitional octagon. The resultant feeling of weightlessness is further reinforced by the decoration of the dome itself, in which a painted green network on a white stucco ground creates a *treillage*-like effect (Fig. 12). A marble cenotaph on the floor in front of a *mihrab* indicates the spot underneath which the founder is buried, the grave itself being in a vaulted tomb under the mausoleum. From outside, the dome rises above the roofs of Al Azhar (Figs 1, 13), strangely different in form from the rounded *muqarnas*-vaults of the interior with its sharp prismatic appearance. The surface is carved with two interwoven arabesque motifs, which produce a changing effect of light and shadow during the blazing Cairo days.

When the *madrasa* was erected, only two small narrow sections of the outer facades were visible. Today, because of demolition of the surrounding buildings, these facades are completely exposed. The north-west corner, which was earlier part of the neighbouring house, was reconstructed only twenty years ago with a set of windows and a door competing strongly with the original ones and made in order to create a symmetry the facade never had. Excavations in front of the entrance door, where traditionally there would have been a staircase, revealed that it was so in our case. We can therefore imagine that there was a high symmetrical facade with a central entrance, plain and simple in character, reached by eight steps.<sup>9</sup> At each side of the entrance is a vertical niche, each framing two sets of windows. The lower have iron grilles and may be closed with wooden shutters that open inwards. The upper are gypsum windows with coloured glass. The main entrance of the *madrasa*, however, must have been in the south facade behind Al Azhar, as the very simple north entrance could not have been anything but a secondary one. The facades have been colourwashed in horizontal red and white stripes following the stone courses, in accordance with a later custom (Figs 14, 15). The last time when this was done was when the Suez Canal was opened in 1869; all the other official buildings in Cairo were similarly decorated to celebrate the event.

#### The restoration

When we started the work, general neglect and time had conspired to ruin the small but beautiful building. The dome showed severe cracks and several stones had disappeared completely. The beautiful ceiling over the *qibla-ivan* had collapsed, the big beams broken under the weight of walls from the neighbouring building, which had been extended over the roof of the *madrasa* (Fig. 16). The central part of the ceiling in the north *ivan*

<sup>9</sup> The entrance is slightly off centre in a way very characteristic of the Islamic disregard of strict symmetry.



FIG. 14. The north-east facade before restoration; a drawing by the author.

had disappeared, as in the south *iwan* where a boarded ceiling had been put up. The infrequent but heavy winter rain had penetrated everywhere, dissolving and loosening the ground of the decorations. The gypsum panels had been covered with lime-wash, and were often cracked. Of the original windows, only one remained in the mausoleum; and the only other old window was a Turkish one found behind a brick wall.

Because of humidity and rising water level, the marble floors were loose and damaged by salt, which had also crystallized high on the walls, causing the marble panels of the *mibrab* to become loose and pushing them 4 cm out of vertical. The only thing that had miraculously escaped all disasters was the most precious of the ceilings, the small stalactite-ceiling next to the *qibla-iwan*. During the first, rather depressing inspection of the building, as we walked among the piles of dust and debris,<sup>10</sup> the survival of this small ceiling gave us a glimpse of what the building had been and might be. The first essential, in order to secure the *madrassa* a future, was to solve the problem of water from above and from below.

The original roof of the *qibla-iwan* was supported directly on the

<sup>10</sup> The debris had reached a level 4 m above the the present street, and 6 m above the 1440s level of Cairo.

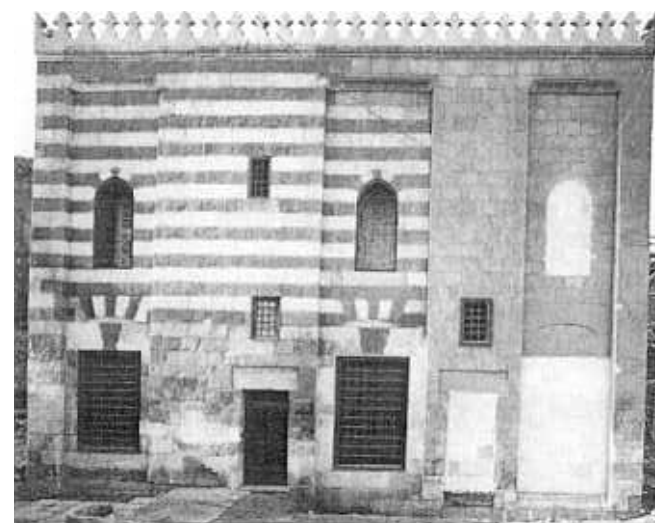


FIG. 15. A part of the north-east facade after restoration.

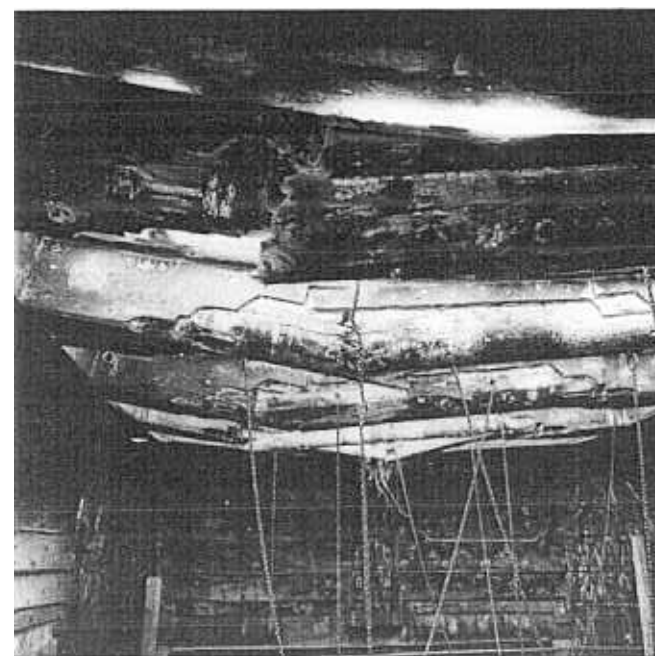


FIG. 16. The broken beams of the ceiling over the *qibla-iwan*. Note the original copper chains for the oil lamps which had disappeared.

decorated ceiling beams. In order to secure the latter, which were broken, it was necessary to support them and build a new independent roof. This extra layer of beams created a problem. It was not possible to use the same construction as originally,<sup>11</sup> because the total thickness would have been too great, and as it was necessary to protect the layer of bitumen from the sun's heat, polystyrene was used as insulation under the traditional finish of stone flags laid in sand and lime mortar.<sup>12</sup> During the clearing and excavation of the roofs many original parts were discovered, the most important being the two centre panels from the south *iwān*. These had been used in a later reconstruction of the roof, and were found broken into pieces under about seven cubic metres of debris. All the painted decoration had gone, but the carved swirls of flowers clearly showed the design. They have been collected and put up again in their original positions.

The relatively new covering of the courtyard, including the lantern, was the subject of much discussion. We believed that it had been put up in 1883, when the *madrassa* was turned into a part of the Al Azhar library, but we had no direct proof until we found one of the original crenellations built into the base of the roof. This was proof that the courtyard had been open; but should it be restored to its original form? Though not the best representative of its kind, the roof and its lantern was regarded as a valuable protection against the fierce climate; and as the building was to be used as a school after its restoration, we decided to leave this later roof, restoring it and covering it with lead according to the traditional Egyptian method.

The dome showed evidence of cracking and weathering of the stone. There was discussion about how to reinforce it and Dr Bernard Feilden (then Director of ICCROM), being in Cairo at the time, suggested the use of stainless steel rods laid in the bottom of the joints before sealing them with mortar. However, this turned out not to be necessary, as the thrust calculations showed that the dome was stable and secure. The cracks were of an old date. We discovered that the use of gypsum in the mortar had resulted in a bone-hard consistency when mixed with slaked lime in the proportion 1:1. The presence of the lime made it possible to work up the mortar again after the gypsum had hardened, thus extending the use of the mortar in the cracks and joints of the dome. The mortar expanded slightly due to the gypsum, and so closed the joints completely. Both the joints and the cracks were then sealed with a mortar incorporating crushed limestone and sand, so being given the same rate of expansion as the limestone of the dome. Finally it was washed with limewater for a week in order to harden and stabilize the surface.

The other main problem was the rising water level, linked with the salts that were destroying the building. This is a problem all over Cairo, and its cause has not yet been determined. However, we know that it is not a new problem; Herodotus referred to it almost 2500 years ago when

he wrote that 'salt is eating away even the pyramids'. Many different methods have been tried to stop rising damp within walls and other structures.<sup>13</sup> We considered such solutions as resin products injected into the walls, or the insertion of steel sheets as damp courses; but none was considered safe or suitable in this instance. The walls of the *madrassa* are constructed of faced rubble, consisting of stones of all sizes laid in lime-gypsum mortar. It was thought that if resin were injected the liquid could not be expected to penetrate evenly and completely, and one unfilled cavity would be enough for the humidity to continue. Similarly, with such a construction steel sheets could not be consistently forced through.

Therefore it was decided to drain the building outside and inside, and to lead away as much water as possible from the walls, taking precaution against further decay of the marble floors by laying a drained underfloor in mixed mortar and then replacing the damaged slabs. When necessary, damaged wall stones were replaced also.<sup>14</sup> The humidity itself had no damaging effect on the structure of the building, and the problem might therefore be regarded as of a cosmetic nature only.

Many precautions were taken to secure the *mibrab*. An enormous amount of salt had crystallized on the inner surfaces of the walls as high as five metres up because of the rubbish and debris piled against the backside of the *qibla* wall (Fig. 17). This had destroyed the marble and loosened the whole of the panelling. To stop the humidity in that part of the building, and before attempting to conserve the *mibrab*, it was necessary to remove about 800 m<sup>3</sup> of rubble from the demolished houses behind the *qibla*-wall. This was treated as an archaeological excavation, and the material was carried away in baskets. In order to stop humidity further damaging the

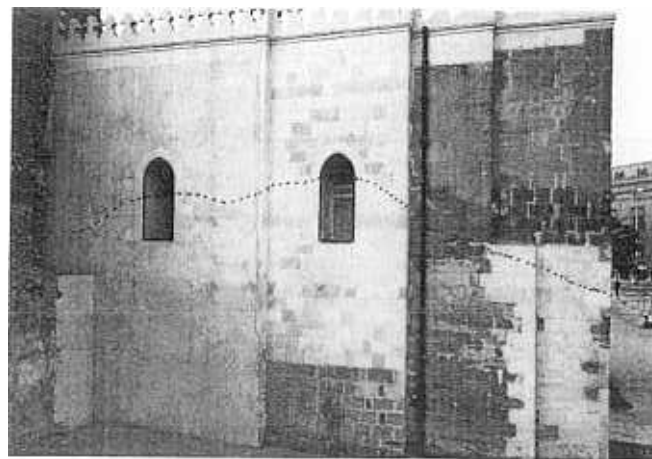


FIG. 17. The *qibla*-wall after restoration. The two original panels have been opened up, and two of the four new gypsum windows have been inserted. The dotted line indicates the level of the debris piled against the wall.

<sup>11</sup> Originally the roof construction was made of many layers of lime mortar and clay, the former being water-repellant and the latter being both an insulation against the effect of the sun and (to some extent) water-absorbent.

<sup>12</sup> One of the cardinal points in the restoration work was not to use cement, but to employ lime mortar throughout. Only in cases where extra strength was required, such as in foundations and under floors, were different kinds of mixed lime and cement mortar used.

<sup>13</sup> SPARE (The Society for the Preservation of the Architectural Resources of Egypt) Newsletter no. 9 (April 1984) claims that surveys have shown that the recent dramatic rise in groundwater since 1965 has been caused by a trebled population, a supply system that leaks 30 litres per capita per day before water even reaches taps, and a surcharged sewerage system. A current three-billion-dollar proposal to remedy the situation excludes the historic zone from any direct benefit, and there is some apprehension that such drying out as may occur as an indirect benefit could lead to building collapses.

<sup>14</sup> When replacing such stones, it is of course very important that they are laid on their quarry bed, i.e. horizontally. If they are laid with the bed vertically, the salt (in Egypt omnipresent in the limestone) will cause the stones to shale.

*mihrab*, a layer of lead was inserted under the marble panelling; this was possible because only one-third of the thickness of the *qibla*-wall remained after the demolition of the neighbouring building. The entire marble facing had to be numbered and taken down in order to clean the walls, and it was later replaced (Figs 18, 19).

The ceilings presented more complex problems. The decoration had survived in very different states; in parts it was completely washed away, in parts it was found with astonishingly fresh colours. There is a beautiful interplay of flowers and gilding, designed to produce a rich and sparkling impression when viewed from below; and all the Koran cartouches are set in moulded, gilded frames. The question was to what extent the missing parts should be restored. It was thought desirable to reinstate, so far as possible, the full intended richness of the original ceiling decoration, since this was an integral part of the whole design. But it would have to be based on certain evidence, and executed by simple methods within the programme and principles laid down for the work as a whole. Finally it was decided to complete the floral decoration where it was repetitive in character. The new decorative motifs differ in technique, and slightly in

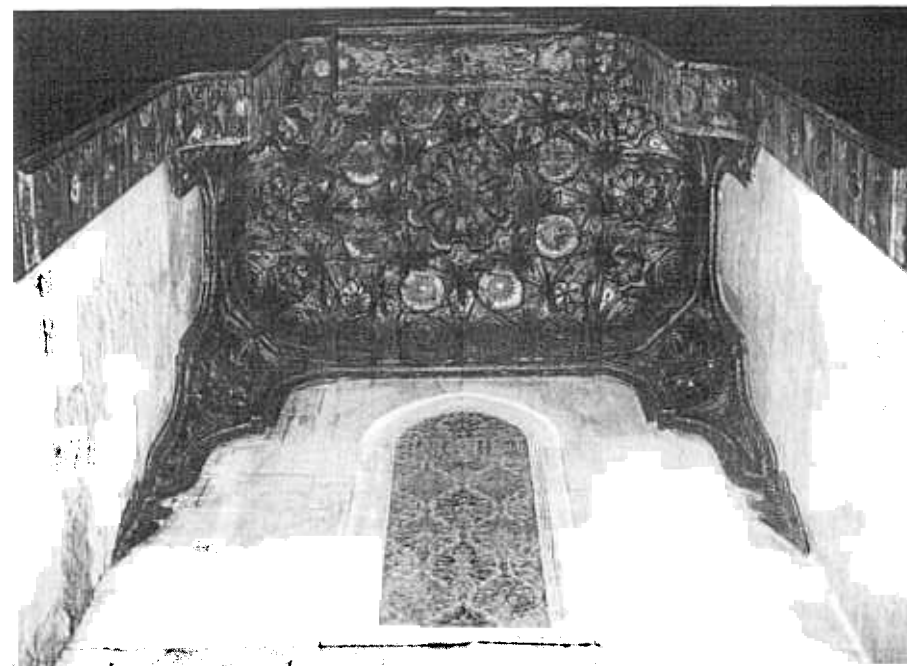


FIG. 18.



FIG. 19.

FIGS 18, 19. The central part of the *mihrab* before and after restoration

FIG. 20. The stalactite ceiling and the original panel from the *qibla*-wall after restoration.

colour, from the originals; but nevertheless they unify the ceilings. The cartouches were not touched; but in all the ceilings the missing gilded parts were regilded to give them a sparkling effect close to the original (Fig. 20).

As a result of the demolition of the buildings west of the *madrasa*, the two openings which were originally gypsum panels were now empty holes; and so the design of two new windows became a necessity. This offered the chance of giving the interior some of the brilliance that had been denied to it because of the restrictions imposed by the surrounding houses (but which surely would have been desired if possible). At the same time it was decided to open up the *qibla*-wall by replacing the original panels with windows (Figs. 22, 23). In the small *iwan* with the stalactite ceiling to the south of the *mihrab*, the situation was reversed. Here the window, in fact a bad copy of an Ottoman window, had been blocked because of the extension of the Al Azhar mosque; this was removed and the first panel from the *qibla*-wall was substituted. The latter revealed no traces of paint, since the surface had been scraped during one of the two earlier alterations in an attempt to remove a layer of red wash;

FIG. 21. The author at work on the restoration of the Koranic inscription in the courtyard. It was treated like the outside decoration of the dome, the missing parts being remodelled in a lime-gypsum-sand mortar.



but there was sufficient evidence on the matching panel for the other to be painted and gilded according to the original scheme.

Four new windows had to be designed, and we commissioned these from the Danish artist Niels Nedergaard and the Egyptian calligrapher Mustafa Ibn Rahim. The former had been living in the Islamic part of Cairo for five years, studying the decorative tradition which he tried to incorporate in new design concepts. He created four brilliantly effective windows, kaleidoscopic in their context, which are based on historical tradition although the colours are his own. The latter artist has been teaching traditional design at the Academy of Applied Art in Cairo for many years. The practice of inserting modern designs into an old monument had not previously been followed in Egypt, where replicas of old elements had been used normally. But as the former is widely done in Denmark and other Western countries, we felt it was important to introduce the concept and encourage it, since we believe a tradition is not living if it ceases to be developed and maintained continuously.

### Conclusion

The main aim of the treatment by the Egyptian-Danish team was to secure and preserve this small but precious architectural and historical

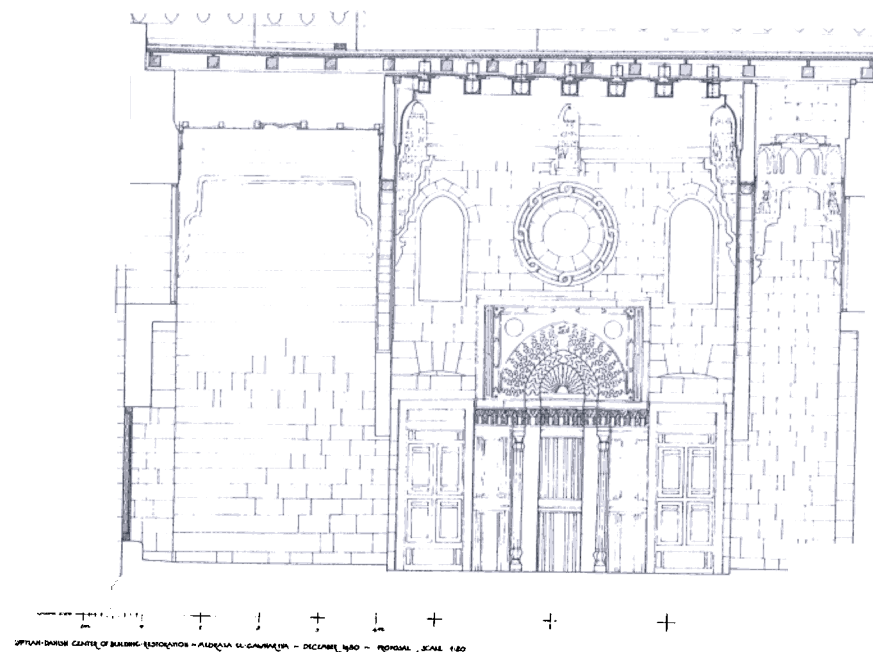
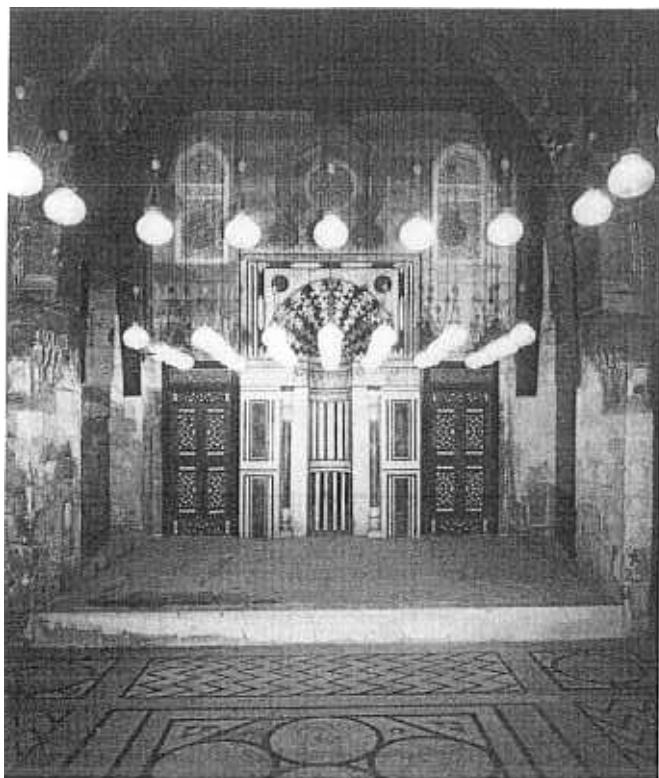


FIG. 22. A detail of the drawing made to show the proposal for the restored interior.

monument in a state as authentic as possible. Where it was technically and structurally sound, the original parts have been preserved—both from 1440 and from later works. Where new architectural elements have been introduced they have been added in accordance with tradition but in a manner not to be mistaken for original work.

The examples of problems and solutions referred to in this article are not untypical of those encountered by conservators all over the world, although each project inevitably possesses its own unique character. What is of special importance in this instance is the opportunity it offered for collaboration between experts, craftsmen and students from two countries with different cultural backgrounds and traditions. Nineteen Danish students (and the author, who was the project leader) worked with seven Egyptian post-graduates over a period of almost two and a half years, and I would like here to thank them all for their efforts and enthusiasm. The experience will certainly be of great value to them all in their future careers. Not only did they learn to face daily site problems and

FIG. 23. The Madrasa after restoration, showing also the lamps which have been added to improve the quality of lighting as this space will be used for teaching.



emergencies, and the reality of pragmatic and sometimes compromise decisions; they also came to appreciate the importance of building a self-maintenance element into monument conservation. The project was one that attracted considerable attention because of its unusual organizational features;<sup>15</sup> for instance, there were many official group visits from the American and Egyptian Universities of Cairo, and the Egyptian Television Service made a film about it during the course of the work. Such interest and publicity can only help in the enormous task of endeavouring to conserve the quality and character of old Cairo.<sup>16</sup>

<sup>15</sup> The cost of the project, planning and execution, was 176,000 Egyptian Pounds.

<sup>16</sup> Wohler, V., Hansen, H.M., Bjarnhof, S., *Restauring I Cairo*, Nytaar 1984.

## Résumé

Pays pauvre, l'Égypte est cependant riche d'un grand nombre de bâtiments et d'objets de valeur culturelle. Jusqu'à présent les ressources apportées par le tourisme ont suffi pour financer la sauvegarde des monu-

ments pharaoniques. Quant à la plus grande partie des monuments islamiques du Caire, ils sont aujourd'hui dans un état avancé de délabrement ou simplement ensevelis sous un amas de poussière et de débris car les

fonds et l'expertise qui leur permettraient de retrouver leur ancienne splendeur font totalement défaut. A moins d'un effort extraordinaire ces monuments n'existeront plus pour la prochaine génération. Et pourtant ils parlent davantage à la population que les monuments pharaoniques simplement du fait que l'Islam est aussi vivant en Égypte aujourd'hui que du temps de leur construction. Cet article décrit l'un de ces monuments et l'histoire de sa conservation.

La Medersa el Gawhariya se trouve tout contre les murs de la célèbre université Al Azhar et date de 1440 environ. Son plan, en forme de croix, s'éloigne de la tradition du fait de difficultés inhérentes au site. Le bâtiment et sa décoration sont décrits en détail ainsi que le jeu voulu des couleurs et de la lumière internes caractéristiques du meilleur style mamelouk.

La conservation de ce monument est l'aboutissement d'une collaboration entre experts et étudiants de l'Académie royale des Beaux-Arts, l'École d'Architecture et de l'École de Conservation de Copenhague et de diplômés du Département des Antiquités de l'Égypte au Caire. Des artisans égyptiens furent dirigés par Danois et Égyptiens. Les travaux commencèrent le 1er janvier 1980 et durèrent presque trois ans. De nombreuses années de négligence avaient contribué au délabrement de ce ravissant petit monument. La coupole était profondément fissurée en plusieurs endroits et de nombreuses pierres avaient disparu; certains plafonds s'étaient effondrés; le revêtement de marbre du sol et d'une partie des murs avait été descellé par le dépôt de cristaux de sels dû à une humidité constante dont la trave s'élevait de plus en plus si bien que les murs n'étaient même plus verticaux.

La priorité fut la lutte contre l'eau, qu'elle vienne du haut ou du bas; l'auteur décrit les problèmes et les solutions qui y furent apportées. Il nous parle des dommages causés par le temps à la coupole et de la manière relativement simple choisie pour la réparer et la renforcer avec à la fin une semaine de lavage au lait de chaux. Conserver la décoration a posé de nombreux problèmes pratiques aussi bien que théoriques qui sont décrits en détail; mais, en résumé, il est dit que l'objectif essentiel de l'équipe égyptienne et danoise fut de sauvegarder le monument avec autant d'authenticité que possible. Là où son état le permettait l'ouvrage ancien—de 1440 ou plus tardif—a été sauvé. Les nouveaux éléments architecturaux qui ont été introduits ont respecté le style original mais ne prétendent pas à l'authenticité. Un élément moderne—des fenêtres neuves—a été inséré ce qui fut une innovation en Égypte où généralement on utilise des copies du modèles anciens.

Mais la signification particulière de ce projet de

conservation tient à la collaboration entre experts, artisans et étudiants de deux pays aux traditions culturelles totalement différentes. Non seulement les étudiants danois et les diplômés égyptiens eurent à faire face aux difficultés quotidiennes et aux urgences imposées par le site et donc à prendre des décisions souvent difficiles où le compromis jouait un rôle essentiel mais ils purent également apprécier l'importance d'inclure une maintenance automatique—sans intervention humaine—dans le processus de conservation.

## Resumen

A pesar de ser un país pobre, Egipto goza de gran número de edificios y elementos de valor cultural. Hasta el momento, los beneficios del turismo han podido financiar la conservación de los monumentos faraónicos, pero la mayoría de los edificios en El Cairo de la era islámica se encuentran en un estado semirruinoso o hasta enterrados en polvo y cascotes a causa de la falta de dinero y conocimientos técnicos para devolverles su antigua belleza y esplendor. Sin un esfuerzo extraordinario, estos edificios no serán sino historia para la próxima generación; con todo, tienen significado especial para la población en comparación con los monumentos faraónicos, sencillamente porque el Islam sigue tan importante entre los egipcios de hoy día como cuando se erigieron los edificios. El presente artículo describe uno de estos monumentos islámicos y su conservación.

Madrasa-el-Gawhariya se construyó inmediatamente junto al muro de la famosa universidad y mezquita de Al-Azhar, alrededor de 1440. De planta cruciforme, tuvo que adaptarse la forma tradicional a causa de las dificultades de su emplazamiento. El artículo describe el edificio y la decoración con todo detalle, llamando la atención especialmente a los efectos interiores de luz y color característicos de los edificios correspondientes a la cumbre del período mameluco.

Su conservación es el resultado de un experimento que juntó a expertos y estudiantes de la Academia Real de Bellas Artes, la Escuela d'Arquitectura y la Escuela de Conservación de Copenhague, y posgraduados de la Organización de Antigüedades Egipcias en El Cairo. El trabajo se llevó a cabo por obreros y artesanos egipcios en colaboración con participantes daneses y egipcios. Las obras empezaron el 1 de enero de 1980, y continuaron durante casi tres años. El tiempo y el abandono general se habían unido para arruinar el pequeño pero hermoso edificio. La cúpula mostraba grietas serias y algunas piedras habían desaparecido totalmente. Algunos de los techos se

habían hundido y, debido a la humedad y subida del nivel de agua, los suelos de mármol habían sido desunidos y dañados por sales que habían también cristalizado en las paredes, haciendo que parte del recubrimiento de mármol de las paredes se separara y quedase muy fea de vertical.

Lo más esencial era resolver el problema del agua desde arriba y desde abajo, lo cual comenta el autor, así como las obras de reparación efectuadas. Describe los ataques de la intemperie y el agrietamiento del tambor de la cúpula, y el modo relativamente simple en que fue reparado y reforzado, finalizando con una semana de lavados con agua de cal. La conservación de la decoración presentó problemas prácticos y filosóficos, que se describen en detalle; pero el conjunto de las obras se resume diciendo que el objeto principal del equipo egipciodanés fue asegurar y conservar el edificio en el mayor estado de autenticidad posible. En los sitios donde se hallaba en buenas condiciones técnicas y estructurales, se han mantenido los elementos originales, tanto de 1440 como de obras posteriores. Donde se han introducido elementos arquitectónicos nuevos, se han añadido de acuerdo

con la tradición, pero de modo que no se confundan con la obra original. Una decisión en particular, la de insertar diseño moderno (en este caso, ventanas nuevas) en un monumento antiguo, fue una innovación en Egipto, donde normalmente se utilizaban réplicas de elementos antiguos.

Sin embargo, lo que es especialmente importante en este proyecto de conservación es la oportunidad ofrecida de colaboración entre expertos, artesanos y estudiantes de dos países con culturas y tradiciones diferentes. Los estudiantes daneses y los posgraduados egipcios no sólo aprendieron a enfrentarse con problemas y emergencias del momento y la realidad de decisiones pragmáticas y a veces eclécticas, sino que también pudieron apreciar la importancia de introducir un elemento de automantenimiento en la conservación monumental.

*Credits:* Figs 1, 3, 9, 10, 12, 13, 15, 17, 19, by the author. 4, 8, 12, 16, 18, by Karin Lykke and Morten Jensen. 9, 20, 22 and 23 by Antonio Wohler. 11 by Benner Larsen.