Chapter 22

Islamic Stereotomy in Cairo

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ABSTRACT

A great number of mosques, madrassas and hospitals compete with the enormous mausolea of the two gigantic historical necropolis of Cairo. The extraordinary Cairene domes have been the subject of really interesting studies. From the early historiography investigations to the most recent contributions, some of them focused on finding an explanation to the stability of these constructions of extraordinary slenderness. However, the remarkable stereotomy of these constructions has only been mentioned in a few of these publications. The art of stonectcutting requires geometric knowledge which, although it starts with the professional practice at the workshop associated to the job, reaches extraordinary complexity and abstraction levels. In Islam, the passion for geometry finds in the masonry art a field where it can be developed without limits.

INTRODUCTION

From the Citadel, a profuse number of minarets and domes rise above the city of Cairo between the pollution and the suspended desert dust. The old Cairo possesses, undoubtedly, one of the most extraordinary skylines a city has ever created. Since it was founded by the Umayyads in the year 641, but particularly since the Fatimid caliphate (X-XII centuries), the city was filled with a great many extraordinary minarets and domes which compete with each other in attracting the attention of the stroller. This construction activity reaches its peak between the 13th and the 16th century, the glorious era of the Mamlukes, matching up partly with the Western Renaissance. At first they were masonry works, but later from the 8th century they began to be constructed of stone.

Initially, stone was used in fortifications. The Citadel’s extraordinary walls (1171-93) already show a deep knowledge of the art of building with this material. The perfection in the ashlars’ rigging as well as the accuracy in stonectcutting in the construction of domes and staircases let us affirm that knowledge of stereotomy was already present since those early times. In public buildings, from Fatimid era until far within the 13th century, only the exterior facades were built in stone; some buildings such as the Qalawun complex (1284-5) display extraordinary stone facades inspired in Western architecture. According to
Doris Beherens-Abouseif, a clear influence from Amiens or Palermo can be recognized. The first of the big mosques wholly built in stone was probably the Nasir Muhammad (1318-35) Mosque at the Citadel, constructed in stone in its whole. As far as domes are concerned, originally built in brick, they evolve towards construction in stone. Following the studies done by Kessler 1976 y Cipriani 2005, the use of stone to build Cairene domes takes place along the 14th century, that is the Mamluk era.

Besides, Mamluk domes show a completely different characteristic from that of Western domes, that is their decoration extends along their outside face, whereas in their inside they generally lack decoration. On the outer surface of these domes three types of decorative patterns have been identified. In the first place, decoration by concentric ribs came from the old brick domes, their construction in stone starts in the first half of the 14th century; later, in the second half of the same century, domes are garnished with a carved decoration in zigzag. Finally, in the 15th century, the domes’ outer surface is embellished with geometrical criss-crosses and, around the end of the century, this decorative pattern combines with vegetable motifs which probably attains the highest refinement and luxury in the Qaytbay Sultan’s mosque (1474) as the summit in Mamluk architecture.

In these domes, the stones were so large in size that the support of stereotomy for construction was necessary; also, the matching between the voussoirs and the decoration brings up interesting technical problems and that aspect has not received the attention it deserves,

Even today, a great number of mosques, madrassas and hospitals compete with the enormous mausolea of the two gigantic historical necropolis of Cairo. The extraordinary Cairene domes have been the subject of really interesting studies1. From the early historiography investigations to the most recent contributions, some of them focused on finding an explanation to the stability of these constructions of extraordinary slenderness2. However, the remarkable stereotomy of these constructions has only been mentioned in a few of these publications. The art of stoncutting requires geometric knowledge which, although it starts with the professional practice at the workshop associated to the job, reaches extraordinary complexity and abstraction levels. In Islam, the passion for geometry finds in the masonry art a field where it can be developed without limits.

Cairene domes can have different shapes. The system starts from a square ground plan which is made circular thanks to some muqarnas squinches, generally of extraordinary complexity. A slender cylindrical drum is placed on them and the dome is placed on top of it. The domes may in turn adopt various shapes, but in general they consist of three parts. The lower part, formed by a vertical stilt; the central part which is curved and with a pointed cross section, i.e. its tracing is made with its centers displaced from the vertical axis; and, finally, the top part, which is usually domed in the inside whereas the outside has a conical stone facade with the purpose of obtaining its characteristic pointed cross section. The system as a whole is extraordinarily slender; in other words, the relation between ground plan and height has no parallel in similar western structures. Another remarkable characteristic: the most important surface of the dome is the outer side, which contains the bulk of ornamentation; domes are usually plain and dark in their inside.

We know that, from the 8th century, many of these domes begin to be built of stone; they are single shelled, that is, the same stone goes from the inside to outside3. Their diameters are very variable, from 5m to about 15m, being these the largest ones; in all of them the stonework is extremely thin, about 5% of the diameter of the dome, as a rule. These dimensions fall, again, outside Western parameters4.

With the remarkable characteristics previously set out, the construction of these stone domes is a huge challenge. We could divide these structures into two completely different groups: firstly, the domes built
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