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Title: **The Mosque Building in Old Dongola. Conservation and revitalization project**

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Journal: *Polish Archaeology in the Mediterranean* 22 *(Research 2010)*

Year: 2013

Pages: 248–272

ISSN 1234–5415 (Print), ISSN 2083–537X (Online)

Publisher: Polish Centre of Mediterranean Archaeology, University of Warsaw (PCMA UW), Wydawnictwa Uniwersytetu Warszawskiego (WUW)

www.pcma.uw.edu.pl – www.wuw.pl

Abstract: The article is a concise presentation of the scientific results of a project sponsored by the Polish Aid government program in two parts: firstly, insight into the history of the oldest surviving mosque in Sudan and archaeological and architectural research carried out to date, and secondly, a review of building conservation issues concerning the architecture and wall paintings preserved from before it was turned into a mosque. The presented program of conservation and restoration works is planned for the fall of 2013.

Keywords: Dongola, Mosque/Throne Hall, architectural/wall painting conservation/restoration

THE MOSQUE BUILDING IN DONGOLA

CONSERVATION AND REVITALIZATION PROJECT

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Abstract: The article is a concise presentation of the scientific results of a project sponsored by the Polish Aid government program in two parts: firstly, insight into the history of the oldest surviving mosque in Sudan and archaeological and architectural research carried out to date, and secondly, a review of building conservation issues concerning the architecture and wall paintings preserved from before it was turned into a mosque. The presented program of conservation and restoration works is planned for the fall of 2013.

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The Mosque in Dongola can be seen from afar, especially from the Nile. It stands 12 m high on a rocky outcrop rising steeply from the desert at the edge of an extensive plateau, which extends east and south of the citadel and which is occupied by the ruins of the medieval town. The massive silhouette of this building recalls at first glance Pharaonic structures and seems more like a defensive building [***Figs 1, 3***]. Travelers have long described this large rectangular structure, 28 m by 18 m, as the only building in Dongola to have remained in use, even if with short breaks, from the times of Middle Makuria in the mid 9th century until recently (Żurawski 2001).

The building is perhaps the most important, symbolic edifice in the medieval history of Sudan. For over 450 years it served as a throne hall for the Makurian kings, then in 1317 it was transformed into a mosque. Nowadays it is known as the oldest preserved mosque in Sudan [see ***Fig. 1***, inset]. Although the building is well-preserved, it now requires substantial conservation works, the challenge being to preserve its structure, while making its antiquity significant again to the modern community through a restored functionality. Its historic value and splendor makes it also a welcome tourist attraction in Dongola with visitors

Fig. 1. The Mosque of Dongola, view from the river; inset, map from an official Sudanese school atlas (2006) illustrated with a view of the Mosque (Photo W. Godlewski)

Team

Dates of work: 1 June–31 December 2008

Director: Dr. Artur Obłuski, archaeologist (independent researcher)
NCAM representative: Iglal el-Malik (Director, Conservation Department)
Experts:
Archaeologist: Prof. Włodzimierz Godlewski (Institute of Archaeology, University of Warsaw)
Architects: Prof. Stanisław Medeksza (Wrocław Technical University);
Dr. Wojciech Kołątaj, *emeritus* (PCMA UW)
Conservator: Cristobal Calaforra-Rzepka (freelance)

The project "Support for the National Corporation for Antiquities and Museums and local community of el-Ghadar, Northern Province, Sudan" was implemented within the framework of the "Polish Aid" program of the Polish Ministry of Foreign Affairs. A key objective was to prepare Sudanese administration staff to initiate and implement independently projects for the reconstruction, conservation, restoration and revitalization of historical monuments, the monuments on the UNESCO World Cultural Heritage list in particular. Following 45 years of cooperation in the region, the PCMA willingly undertook to participate in the program, developing a community project around the site of Dongola, the ancient capital of the Nubian kingdom of Makuria.

The first stage of the "Polish Aid" program called for training altogether 23 employees of the NCAM, as well as the Ministry of Culture, Youth and Sport, the administration of South Sudan and academic centers like Khartoum University and Shendi University. Three one-day intensive training sessions gave participants an overview of the history of Sudan in the medieval period, as well as an understanding of the history of architecture in Sudan, and the practical aspects of preservation and restoration of buildings and wall paintings in the specific climatic conditions of this part of Africa. The PCMA's community project in Dongola commenced with an on-site study tour that prepared the ground for developing a conceptual plan for the conservation and revitalization of the oldest preserved mosque in Sudan.

Acknowledgments

I would like to express my sincere thanks to Hassan Hussein Idris, Director of the National Corporation for Antiquities and Museums (NCAM) and Iglal el-Malik, Director of the NCAM Conservation Department for their support in the course of the project.

being able to see the mosque in the central room on the first floor, which they can access from a monumental staircase that preserves on its walls murals from the time of the Makurian kings. From the windows they can admire a magnificent vista of the ruins of the ancient capital of Makuria — now excavated by Polish archaeologists — set against the backdrop of a remarkable desert on one hand and the majestic waters of the Nile on the other.

In turn, the well preserved ground floor of the building is a textbook example of Nubian building technique and construction skills of the 9th century. Once restored, it will provide an excellent venue for an educational display documenting the history of Dongola from its founding at the end of the 5th century as the capital city of the most powerful kingdom in medieval Africa until its abandonment in the beginning of the 20th century [see ***Fig. 15***].

STATE OF ON-SITE RESEARCH

Travelers and researchers visited the site repeatedly in the 19th and at the beginning of the 20th century, leaving the following descriptions and documentation:

1) December 29, 1820, George Waddington and Barnard Hanbury (1822: 212–213)
2) January 31, 1821, Frederic Cailliaud, description of the building and drawing (1826: 20–21, Pl. I) [***Fig. 3***]
3) September 26, 1821, Louis Linant de Bellefonds (1958: 33)
4) April 1833, George Alexander Hoskins (1835: 171)
5) 1851, Pierre Trémaux (1862: 361–362)
6) June 10, 1844, Richard Lepsius, first record and documentation of the foundation stela of the Mosque from AD 1317 (1913: V 250, VI Pl. 100) [***Fig. 2***]
7) February 1904, John Winter Crowfoot (1927: 144)
8) September 1906, William H. McLean and W.R.G. Bond; documentation plans of both floors of the building, two cross-sections, all four facades and three sketches of columns and painting in the central room on the first floor.
   At this time a new entrance to the eastern part of the ground floor was opened through a hole in the north wall of the staircase in the western part of the ground floor (documentation in the archive of the Griffith Institute, Ashmolean Museum, Oxford; see also note by J.W. Crowfoot on the Mosque Building in the same archive)

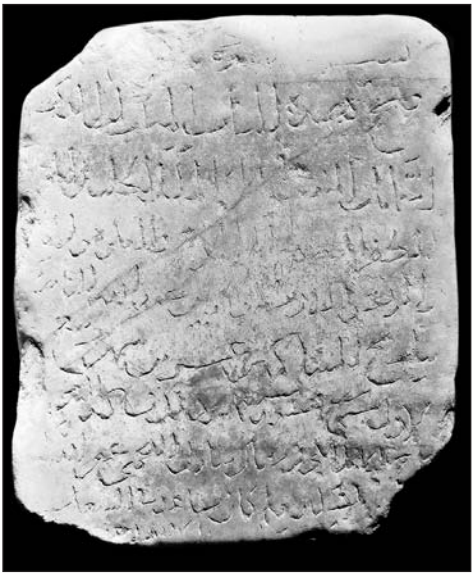

Fig. 2. Foundation stela of the Mosque, AD 1317 (Photo W. Godlewski)

9) January 7, 1910, George Somers Clarke (1912: 43–44)
10) 1970–1983, documentation and excavation inside the building by a team from the Polish Centre of Mediterranean Archaeology of the University of Warsaw. New documentation plans of the ground and first floors, as well as cross-sections were prepared [*Fig. 4*] and the original building plan reconstructed, determining also building chronology. A new interpretation of the building as a royal palace with throne hall on the first floor was proposed (Godlewski 1982). Analysis of wall structure, window openings, entrances, vaults, and ceilings permitted a provisional reconstruction of the original appearance of the building, prior to its destruction in the 13th century and its transformation into a mosque in 1317 (Godlewski, Medeksza 1987). Studies of the wall paintings on the staircase and in the central room on the first floor gave an idea of their iconography and chronology.

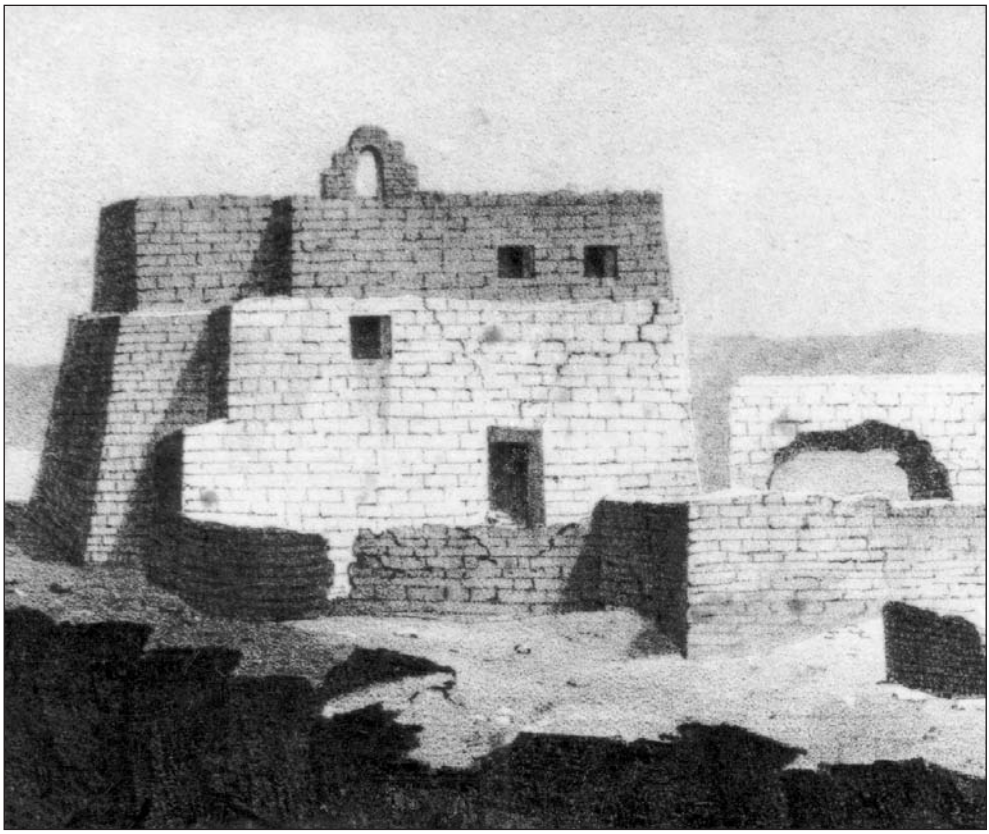

Fig. 3. The Mosque Building in 1821, view from the west, from the site of the abandoned citadel (After Cailliaud 1826: Pl. I)

HISTORICAL–ARCHAEOLOGICAL DESCRIPTION

The current state of preservation of the building is the result of transformations undergone in the course of slightly over a millennium: apparent destruction of the original structure, the resultant introduction of protective measures, change of function and adaptation of the interior to new demands, insufficient maintenance over the years and numerous provisional repairs which proved not entirely effective in protecting the interior from rain and diverse biological factors (termites, bats) affecting the wooden structural elements.

The devastation, especially of the south wall, is attributed to the wars between Makuria and Mamluk Egypt at the end of the 13th century. The vaults in the southern quarter of the ground floor (rooms 3, 4, 1, 10) also suffered, as did the northwestern corner. The south wall was later rebuilt and the damaged vaults replaced with wooden ceilings, but the northwestern corner was not restored. The entire building was reinforced at this time with a slope wall rising to the height of the ground-floor vaults, that is, approximately 6.50 m. This completely modified the original outline of the building. Parts of the external walls of the first floor were also rebuilt, closing off the original open porticoes. The building was given its flat roof, still in place today [***Fig. 5***].

The transformation of the building into a mosque in 1317 necessitated a series of adaptations, not only on the first floor, but also on the ground floor, which was partly filled (1.50 m above the original walking level). The interior window openings of the ground floor in room 3 were converted into entrances [see ***Fig. 4***, bottom], whereas

Table 1. Stages of construction, reconstruction and protection of the Mosque

Antiquity	
First half of 9th century	Construction of the throne hall of Makurian kings in the reign of king Georgios I (835–887)
11th–12th century	Alteration of painted decoration on the walls of the staircase and in the central room on the first floor
End of 13th century	Destruction of the building
Turn of 13th century	Rebuilding of the edifice
AD 1317	Transformation of the central room on the first floor into a mosque (foundation stele, see ***Fig. 2***)
Modernity	
Second half of 18th century	Restoration of the building by Sheikh Sati Hamid Sawar el Dahab (according to local tradition)
1907–1908	Restoration of the building by Ahmed Helmi, *naib* of the *mamur* of Debba (foundation inscription, see ***Fig. 8***)
1927	Repair of the roof by the province authorities
1939, 1944, 1945, 1946, 1955	Roof repairs by the Antiquities Service (institutional reports)
1969	Shutting down the mosque, enabling archaeological exploration

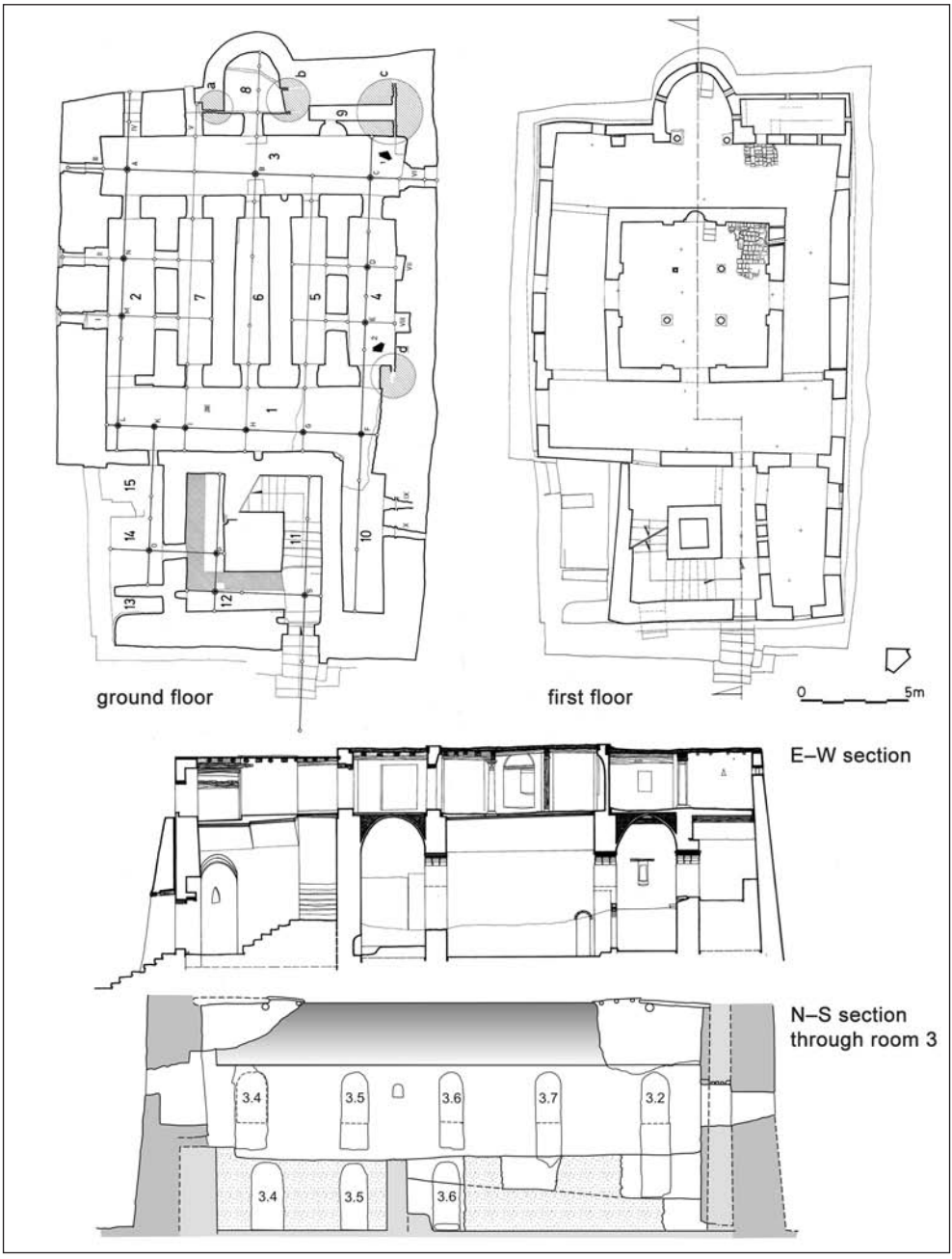

Fig. 4. The Mosque Building (archival documentation, 1980)
(P.M. Gartkiewicz, B. Kubicz; S. Medeksza; W. Godlewski, S. Maślak; PCMA Archives)

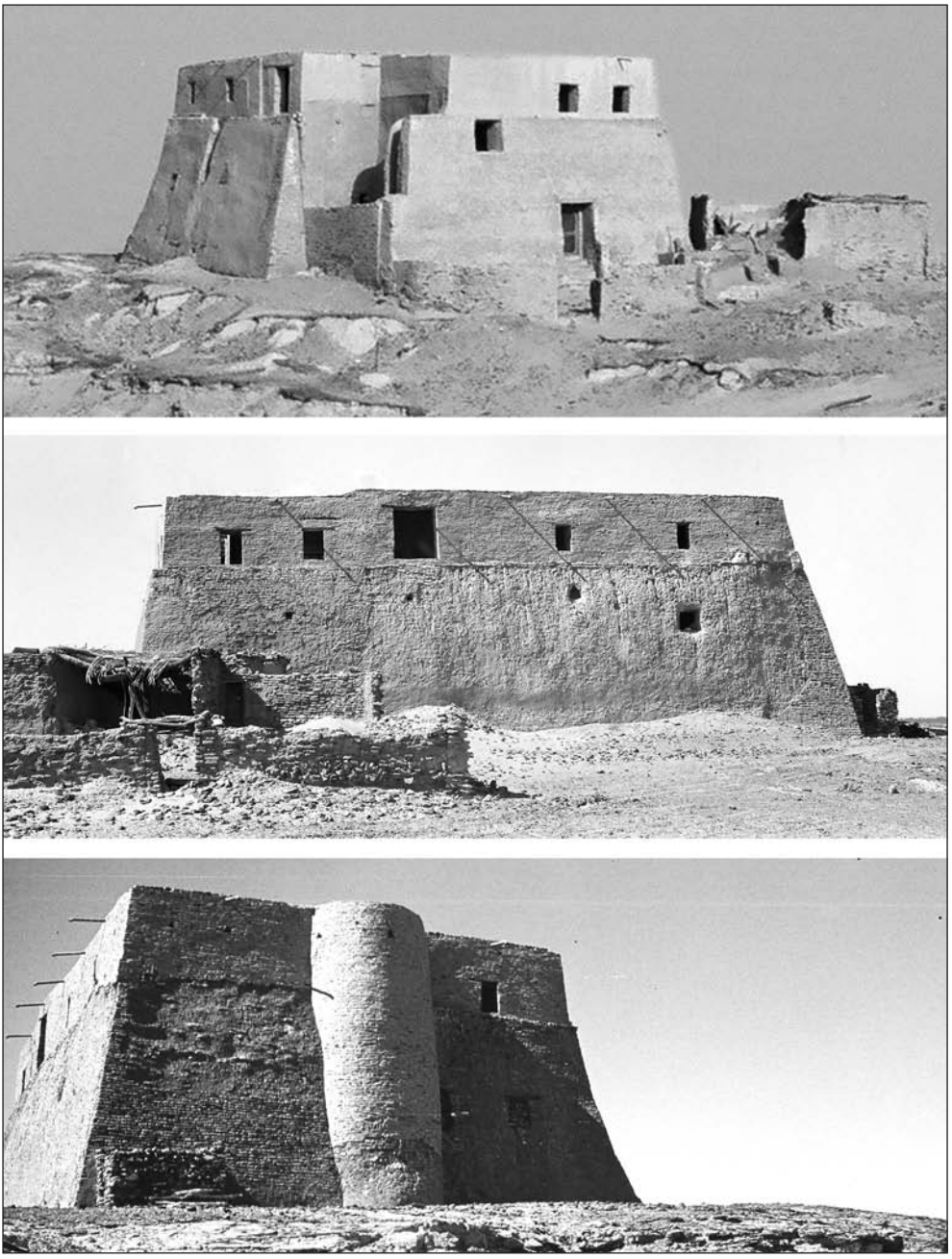

Fig. 5. Mosque Building, views from the west (top), south (center) and east (bottom) (Photos W. Godlewski)

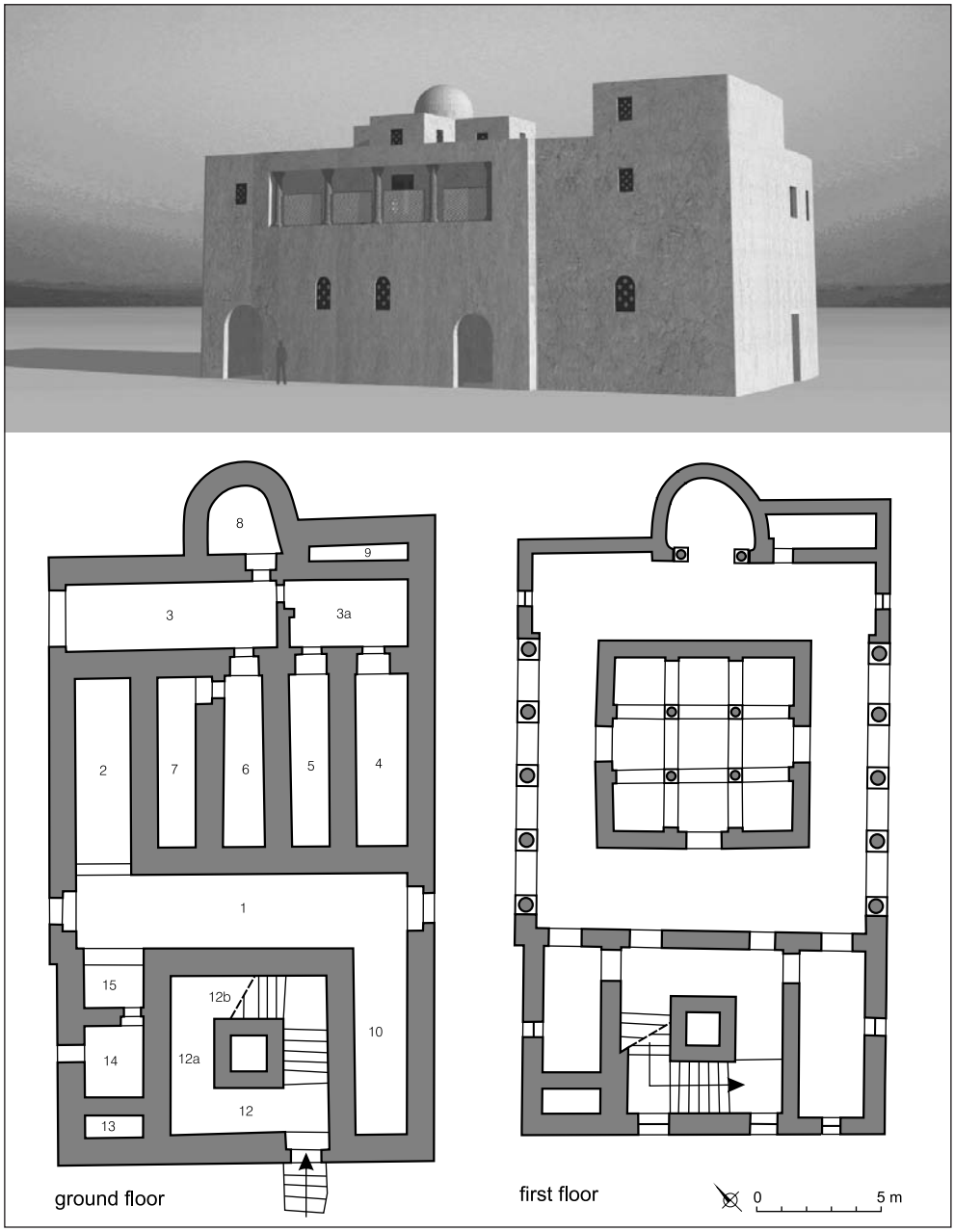

Fig. 6. Mosque Building: original plans of the ground and first floors; top, reconstruction of the original appearance of the building, view from the northwest (Reconstruction W. Godlewski, D. Zielińska; drawing W. Godlewski, S. Maślak)

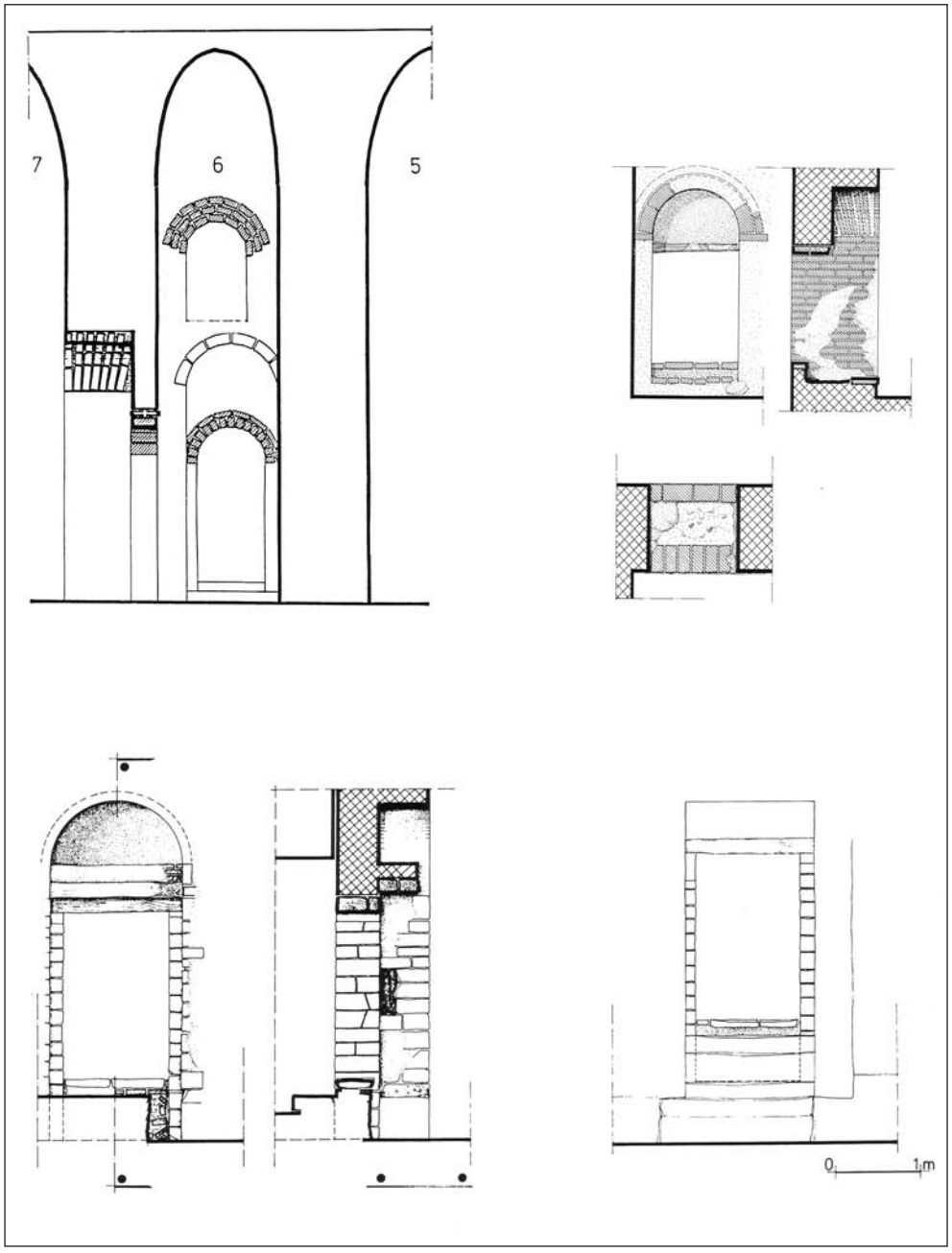

Fig. 7. The Mosque: top left, section through room 6 on the ground floor; top right, window in the western facade; bottom, western entrance (Archival documentation S. Medeksza)

the original entrances to the building from the north and south were built up.

Insufficient protection of the interior against water penetration, as well as termites and bats, started to ruin the painted plasterwork in the central room on the first floor and on the staircase, as well as the wooden architectural elements. Multiple vault and roof repairs, necessitated by the condition of the structure, obscured the original appearance. New beams were substituted for decayed old ones — in the central room on the first floor only the beams in the western corner were preserved. Devastation and the resulting alterations of the outer slope wall are presently difficult to read and need to be studied in order to determine the reasons for the slope of the walls. Bulging plaster may be the result of stratification of the joints between the original vertical walls and the slope walls.

THRONE HALL

Research carried out since 1971, after the mosque was closed, has contributed to a partial reconstruction of the original plan of the ground and first floors, and has identified the function of this structure. Building materials included mud brick (35 x 18 x 8 cm), red brick (32 x 16 x 7 cm) and occasionally blocks of sandstone reinforcing corners [***Fig. 9***] and entrance reinforcement. Outer and inner walls were equally massive, reaching a thickness of about 1.10 m, and were founded either directly on the rocky ground or on ruins of older structures. Red brick was used for the wall facing on the outside and for window and door arches, in keeping with the principles of Meroitic building tradition which called for more durable material to be used in such spots.

The original building consisted of a ground floor that was cut off from the rest of the premises and an upper floor reached by a monumental staircase, which also presumably led to a roof terrace [***Fig. 6***, bottom]. Circulation on the ground floor was ensured by long passages. Two independent sets of chambers were accessed from these passages. The rooms in the center were reached from the northern passage through an entrance from the north, while the other small units on this floor from a southern corridor were entered from the opposite ends. All the rooms were narrow, from 1.60 to 3 m, and very high, up to 6.50 m, with barrel vaulting [***Fig. 9,*** top left]. The interior was lighted through several round-arch windows. The extraordinary height of the ground floor is understood when one considers that it was the upper floor that was the important part of the building and the objective was to raise it as much as possible above the ground.

This upper floor was reached by a monumental staircase entered from the west, which was the approach from the city and river. Official delegations and processions proceeding to the hall on the upper floor and the roof terrace could have followed no other way. The reveals in the entrance were built of sandstone blocks. The jambs and the construction of the transom and relieving arch have survived. The original entrance was 2.75 m high and 1.25 m wide [***Fig. 7***, bottom].

The western facade of the staircase had two large rectangular windows opening onto the city and lighting the interior [***Fig. 7,*** top right]. The walls of the staircase were decorated with murals on two successive coatings of plaster [***Fig. 10***]. Probes

Fig. 8. Stele commemorating the renovation of the Mosque in 1907 and a stone plate with the names of workers (Photos Z. Doliński)

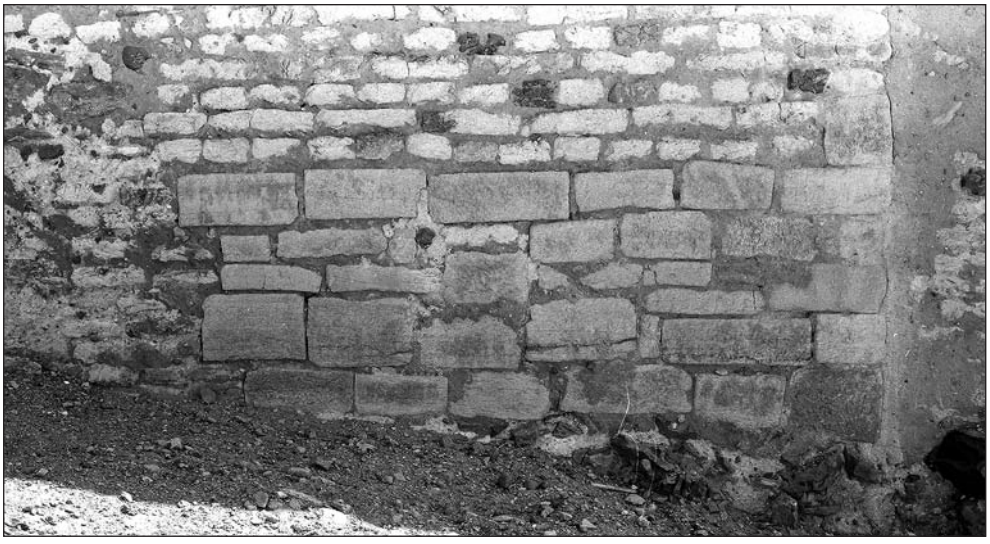

Fig. 9. Stone blocks reinforcing the northwestern corner of the Mosque Building (Photo W. Jerke)

on a small-scale on the second and third landing of the staircase permitted the nature of these murals to be identified. In both cases, the frescoes on the second coating of plaster featured warrior saints. The one on the second landing of the staircase was a standing saint holding a spear in his raised right hand. Traces of yellow wings with red peacock feathers on both sides of the head suggested an identification with the Archangel Michael. Assuming the interpretation is correct, these painting traces should be linked rather with the first layer of plaster on this wall and treated as older than the standing figure, which is dated to the 11th–12th centuries. Earlier representations of standing figures were positioned higher up on the walls, about 0.60 m above the head of the later warrior saint. Identifying the older representation is not possible because of the condition of the painting and the limited extent of the conservation work done at the time. The mural observed on the second landing featured a warrior saint on horseback. It, too, was painted over an older painting of a warrior saint, depicted most probably in standing position. Again, the condition of the earlier painting precludes its full interpretation.

Fig. 10. Mural of a warrior saint on the south wall of the staircase (Photo W. Godlewski)

The first floor of the building was strictly symmetrical in design [***Fig. 6***, bottom]. The central and most important hall is a virtual square (7 m by 6.90 m) and is surrounded by a corridor running around it. One entrance led straight from the staircase, two others from opposite sides of the surrounding corridor, from the north and south. Four granite columns and corresponding pilasters in the walls supported a wooden coffered ceiling [***Fig. 11***]. Several ceiling beams of this construction have been preserved in original position in the southwestern quarter of the hall and one beam in the northwestern quarter. It is very likely that the roof was of cruciform shape with higher ceilings in the central sections on all sides and a small dome rising in the center (see reconstruction in ***Fig. 6***, top). The interior would have been well-lit through windows positioned in the raised cruciform part of the room [***Fig. 6***, top]. The walls of the central room were finely plastered and covered with paintings. On the walls of the northwestern corner section, at a height of 2.60 m above the present pavement, just below the wooden ceiling, a frieze was identified, apparently crowning the compositions below. Painted on the first layer of plaster, it should be considered part of the original decor. Study of the paintings below the frieze, as much as could be carried out without precipitating special conservation procedures, permitted two standing figures to be identified. Based on a drawing made by William McLean in 1906 (now held in the Griffith Institute in Oxford), the mural on the west wall could be interpreted as a king with protecting saint. A large cross with a bust of Christ and cherubims was painted on the adjacent north wall.

The north and south corridors may have originally featured columnar porticoes, resembling in this the recently uncovered Upper Church in Banganarti or the Desert

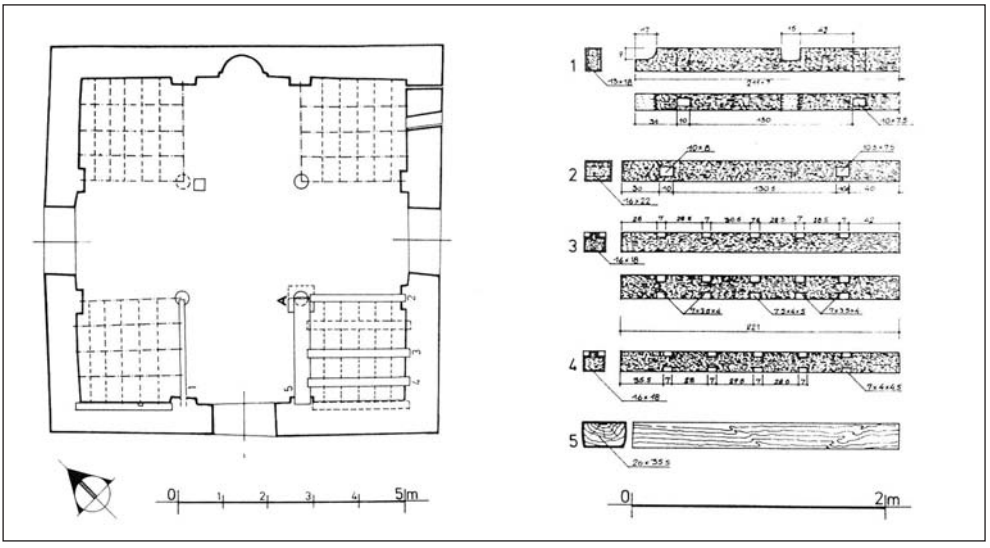

Fig. 11. Ceiling of the central room on the first floor (Archival documentation S. Medeksza)

Church in Adindan. The presence of such porticoes in the building at Dongola is strongly suggested by a red-brick facing on the outside of the mud-brick walls forming the square hall. In the local building tradition, red-brick facing was commonly used for external walls. Moreover, even in its present shape the corridor around this central room, has windows in the north and south wings and there are large openings at the opposite ends of the western wing. The use of columns in porticoes in the 9th century is confirmed by other Dongolan foundations of the time, e.g., the Cruciform Church and Church D, where columns appeared both as structural supports and in porticoes (Godlewski 2006).

A large and deep apse opened of the middle of the eastern wing of the corridor. It was built atop a semicircular tower projecting from the eastern facade. Two granite columns flanked the apse entrance in the manner of triumphal arches in the apses of early basilical churches. A room of unknown function opened on the southern side of the apse, in the southeastern corner of the building.

Filling the space on either side of the staircase were two rectangular rooms with windows and wooden ceilings. They were accessible from the long platform at the top of the steps and from the western wing of the corridor. A narrow compartment, now partly destroyed, was separated from the northern of these two rooms, at its western end. This installation recalls the narrow rooms recognized as toilet depositories in houses in Dongola, as well as in Building I on the Dongolan Citadel. A similar function of these compartments, or at least the one next to the stairs on the first floor of the Mosque building, is very likely. The room siding the apse may have served some liturgical function, perhaps as a small sacristy.

The staircase proceeded to give access to the next level, which was most probably a terrace roof above the western part of the building, to the west of the raised part of the roof above the central hall. The exit from the staircase was presumably roofed and there was a balustrade running around the terrace. It is also likely that the toilet in the northwestern corner of the building was roofed and accessible from this level. Thus, the superstructure on the roof would have measured 5 m by 9 m. Its existence is further confirmed by some kind of roof construction documented on F. Cailliaud's drawing of the building made in 1821 [see ***Fig. 3***].

Different interpretations of the original building have been put forward over the years: church, monastery and even royal castle. The unnaturally high ground floor, the monumental staircase leading to the first floor and terrace, and the upper-floor layout with central square hall, as well as the murals identified on the walls of the staircase and central room, suggest instead that the building was of an official and non-residential nature. It may well have been intended as an awe-inspiring throne hall for official royal audiences and other ceremonies. The Bulgarian tsars had similar audience halls at Plisca and Preslav, imitating in this the monumental audience halls of the Byzantine emperors in Constantinople (Godlewski 1982).

MOSQUE

In 1317 the first floor space of the reconstructed building was transformed into a mosque with a *mihrab* in the east wall and a *mimbar* set to the south of it [***Fig. 13***]. The foundation inscription in Arabic was

located on the northern side of the *mihrab* in a pilaster, where it can be seen even now. The walls of the central room were covered with new white plaster and the flat ceiling of the room was reconstructed.

External porticoes in both the south and north facades were replaced with walls containing wide openings in the western corridor (room 20), giving a panorama of the city and the surroundings. The room in the southeastern corner, next to the apse, was rebuilt and adapted to the demands of the new function of the building; similarly, the room in the southern quarter of the staircase was adapted. The destroyed

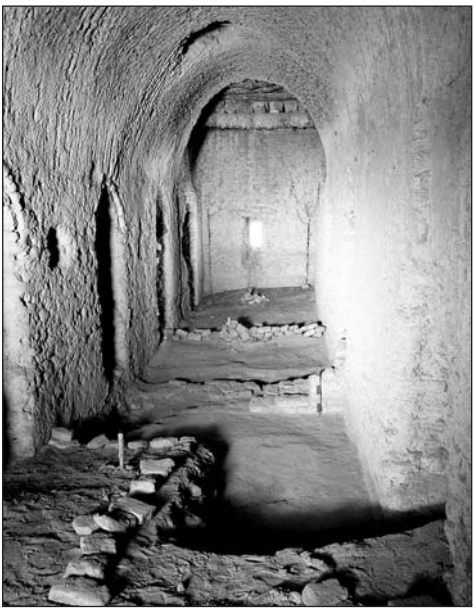

Fig. 12. Mosque, room 3 after rebuilding of the ground floor in 1974 (Photo W. Jerke)

Fig. 13. Mosque: central room with mihrab on the first floor (Photo W. Jerke)

northwestern corner was excluded from the developed space of the upper floor. The staircase walls were covered with white plaster, which concealed the earlier paintings.

The ground floor premises in the eastern quarter were partly filled to approximately 1.50 m above the original pavement; internal window openings were converted into entrances [*Fig. 12*]. Thus internal communication was provided, but it is not entirely clear for what purpose. Similarly, it is not evident how the ground floor rooms were entered in the period following the closure of the northern entrance arcade to room 3. Perhaps for a period of time in the 17th–19th centuries the ground floor remained utterly inaccessible. The current entrance from the staircase (room 12) through the destroyed rooms 14 and 15 in the southwestern quarter was not opened until 1906.

The history of renovations closes with an extensive program implemented in the times of Sheikh Sati Hamid Sawar el Dahab in the second half of the 18th century, after which the building was renovated again in 1907/1908. This event was commemorated by two inscriptions preserved in the pavement of the southeastern part of the mosque. The efforts of the Sudan Antiquities Service and Museums were recorded in appropriate reports in 1939, 1940, 1944, 1945, 1955 and later.

CONSERVATION ASSUMPTIONS

The current project is intended to prepare the grounds for an adaptation of the building that will meet all the requirements of conservation of historical heritage, while making the structure significant again for the local Dongolan community. Growing tourist interest in the site of Dongola and a rising local pride in the town's and region's history have created the proper circumstances for a meaningful restoration and adaptation of the structure [*Fig. 15*].

The so-called Mosque Building, which dominates the ruins of the city around the citadel, was preserved in a form suggesting its original appearance. It had been built with the same kind of local building materials as the surrounding housing, defensive and church architecture — primary dried brick with baked brick for structural elements and architectural decor. The ceilings as well as window and door lintels were of wood, mainly palm, the sills and thresholds being of local limestone. The facades and interior wall surfaces were rendered with lime plaster produced from ground local limestone, desert sand and water.

A guiding principle of the proposed conservation is the preservation of the body of the Mosque building and all the elements of the interior decoration wherever possible. This refers to the former throne hall turned mosque in particular. The appearance of the building is distorted by medieval buttresses structurally reinforcing the outer facades. It means that the walls are unsound, but proper conservation procedures will be selected once the walls have been exposed and examined. The necessity to reconstruct, overbuild, or even partially demolish these walls will not become apparent until construction/conservation works are commenced.

Another conservation problem is the exchange of roofs and construction of

a new roof above the staircase. Anchoring the roof construction in external and internal structural walls requires coordination with building works conducted in the body of the building. The final decision as to the works can be made after conducting the exposure and a thorough assessment of the durability of the uppermost part of all the structural walls.

The state of preservation of the ground floor interiors indicates the necessity for cleaning, reconstruction and strengthening of the vaults, and a reconstruction of windows and doors leading to individual rooms. The possibility of recreating the main entrances to the building on the ground floor will have to be assessed.

The damages to the ceiling and the upper flooring imply the necessity for dismantling and assessing the stability of the structural arrangement of the interface of the ground floor vault and first

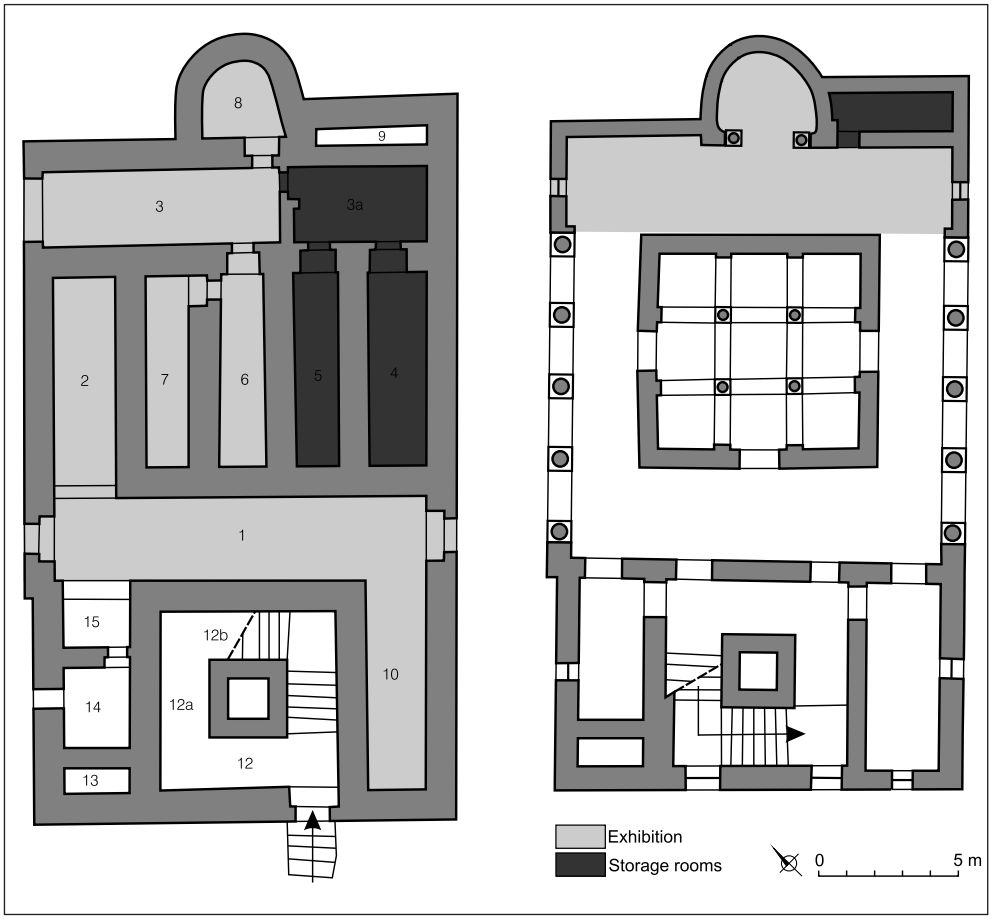

Fig. 15. The Mosque, concept of interior adaptation, ground floor and first floor (Design W. Kołątaj, S. Medeksza)

floor flooring. A separation of the vault construction from the ceiling between the ground and the first floors may be imperative.

It is indispensable to replace various elements of the ceiling above the central room; however, a guiding conservation principle is to preserve historically justified ceiling elements wherever possible. Replacement shall be considered solely in case of elements which undoubtedly were not introduced in the 20th century reconstructions or as protective means. At least a fragment of the coffer ceiling (in the southwestern corner) will have to be reconstructed. Construction of a flat ceiling is posited, independent of the ceiling, above the central room, thus achieving independent operation of the ceiling and roof structure and proper natural ventilation.

The murals discovered in the central room and on the staircase pose a special problem in terms of conservation and repair of the plaster, and subsequently, the conservation of the murals. Reconstruction of some of the murals appears to be inevitable. The decision to screen off paintings with Christian motifs will be made once it is clear that the local authorities wish to preserve the first mosque of the area rather than the original historical interior from the period of the Christian Makurian kings.

PROPOSED BUILDING CONSERVATION AND PROTECTION WORKS[1]

The conservation project will follow three principal stages preceded by a preliminary stage, which the Sudanese party can carry out under Polish supervision.

Preliminary stage

The first task is getting rid of the bats (either by smoking them out or driving them out with noise) and securing all of the openings, especially the currently roofless staircase, with a metal net protected against corrosion. The net should be set in a wooden framework installed on the inside of the openings and in the case of the staircase, the whole width of the corridor should be closed off with the angle steel reinforced with a diagonal, with two layers of net extended on it.

The historical doors should be protected with commonly available pentachlorophenolate or salt wood preservative, and the metal elements must be corrosion-proofed. New doors should be made to order, following the mission's design; they should be of impregnated wood, tightly fitted to the new wooden jambs and furnished with anti-burglary hinges and a key lock.

Bat excrement should subsequently be removed using professional means.

The ground inside the structure needs to be leveled in order to introduce scaffolding safely, so that the ceilings and window openings can be treated. Spraying the ground with water during this procedure will reduce the amount of disturbed dust and increase the cohesiveness of the ground layer. Platforms introduced inside the structure, made of metal or wooden boards, will serve communication purposes on the first floor. They should be set on stable structural supports, including special pads wherever the softness of the ground requires it.

Assessment of building structure indicated the generally poor condition of the

[1] The following is a summary description of the technical aspects of the architectural and building conception. A detailed description can be found in the unabridged report on file with the PCMA UW.

PROPOSED BUILDING CONSERVATION AND PROTECTION PROGRAM PRELIMINARY STAGE
Completing the roof above the stairs and closing off all openings with a net.
Installing new entrance doors with new keys.
Removing bat excrements.
Leveling earth on the ground floor.
Arranging communication pathways and walking platforms on the first floor and under the scaffold.
Opening the ceiling in room 2M01 by the south wall to allow for safe dismantling of the internal southern buttress on the ground floor in room 1M.01 and excavation under the south wall.
Cleaning the staircase and the area around the Mosque.
STAGE 1
Arranging the building site.
Walking level on the first floor (corridors, central room, and stair platform on the eastern side).
Protecting and cleaning ground-floor vaults.
Filling the interior windows on the ground floor.
Leveling earthwork on the ground floor.
STAGE 2
Wooden ceilings in the square room on the first floor; ceilings above the ground-floor vaults and roofing over the upper floor and staircase.
Exterior windows and entrances on the ground floor.
Outer walls.
STAGE 3 **(scope of work provisional pending results of previous stages)**
Installing electric wiring in the ground-floor rooms.
Developing the interior display of the structure and of the building technique.
Preparing an exhibition on the history and architecture of Dongola (5th–20th century)
Constructing an entrance onto the roof of the building.
Exhibiting staircase paintings.

south wall, which was apparently under the greatest stress. It is from this side that the structure was most easily accessible and the evidence of rebuilding and buttressing in the medieval period indicate that it had suffered substantially, especially in its middle section (collapsed vaults of rooms 4 and 10 and the northeastern sections of vaults in rooms 1 and 3). Upon restoration, they were replaced with wooden ceilings. As the vaults were built with no auxiliary structures, there must have been a wall or an arcade dividing rooms 1 and 10, serving as a support for the vault in room 10, as well as an abutment for the vault in room 1. The interior stone buttress supported the ceiling and probably reinforced the structure of the entire south wall of the building, which was likely to have cracked or was leaning in. Its presence does not permit archaeological examination of the southeastern part of the building and the alleged entrance

to this section of the ground-floorrooms. The disassembly is difficult and dangerous, and must be supervised by a qualified professional, especially as it will become clear in the process of the dismantling what the condition of the south wall is. If concerns about its structural cohesiveness are confirmed, the wall will have to be propped up. Protecting or reconstructing the wall shall be an option, provided it has been destroyed to a larger extent than assumed.

The necessity to dismantle the buttress closing off room 1 on the first floor from the south will require part of the ceiling in this unit to be disassembled. The task will be accomplished from the scaffolding. Some beams will require shoring from the bottom or underpinning from the scaffold. Similar treatment must be applied to particular ceiling areas. Small decrements in the vaults of rooms 2 and 3 also ought to be filled from above, using clay and dried brick.

In the meantime archaeological clearing of the fill inside and outside the staircase will take place and finds will be documented using standard professional procedures. A new access road on relatively firm ground will be cleared in order to be able to drive up with building materials.

Stage 1

Routine preparations will be made to arrange the building site (electricity, water, container for slaked lime, provisional storage space, concrete working floor approximately 3 m by 3 m in size, access road and a lift, either manual or mechanical depending on funds, for lifting building materials to higher levels).

A new roof covered with ceramic tiles needs to be introduced over the entire structure taking into account all factors involved, especially the amount of cleaning of the upper surface of the vaults and the vault spandrels so as to avoid impairment of their static balance. With regard to the ground floor, once the vaults have been cleaned of bat excrement and termite remains, the joints should be cleaned and filled with clay mortar resembling the original mortar in composition. The ground floor windows should be filled with original dried and burnt brick recovered from the excavation or produced to order in the required size. As a considerable amount of bricks is needed, the option of employing a local workshop to make the bricks to specifications seems the most expedient.

The entire ground floor will be excavated to prepare the ground-floor rooms to exhibition function and to arrange walkways for visitors.

Stage 2

The ceiling of the square room and the design of the lintel of the whole upper floor present a fundamental conservation problem. Regardless of the methods, materials and labor organization involved, it must be determined whether the preserved ceilings are to be conserved and protected with a new lintel, or filled with new material in particular areas, depending on the degree of recognition of their structure. Another option is to reconstruct the ceiling in the form presumed to have existed before the 14th century.

The square central room is divided into nine almost even square areas. In the corners of the central square there are stone columns on which the ceiling beams rest. The upper floor is about 3 m high compared to the 6.50 m height of the ground floor. The columns with their bases and

capitals are about 2.70 m high. Imposts about 13 cm high, made of hard wood, were inserted between the capitals and ceiling beams. The original coffer ceiling is partly preserved in the southern corner area (square). Its remains are also contained in the northwestern corner area. The rest of the ceiling has undergone multiple reconstructions; it was originally made in the 14th century from straight, roughly hewn logs and palm mats, as well as secondarily used beams, probably constituent elements of the earlier ceiling construction or of other objects. Upon reconstruction the northern column was replaced with a wooden pillar.

Coherent execution of the third option, that is to say, a reconstruction of the historical form in new material, requires knowledge of construction and layout of the five central squares, knowledge which is lacking. So little is known about the lintels, that it is not clear whether there were wooden ceilings or horseshoe vaults of dried brick. Other questions which remain unanswered include: What was the height of the ceilings? Was there a spherical vault resting on the columns in the central area? What kind of architectural decoration had been applied? The preserved entrance arch in the western section suggests the lintels in the center to have been higher than those of the outermost areas. Thus, the preserved ceilings should be left in place and only reinforced structurally and chemically (selection of conserving and impregnating agents will depend on laboratory recommendations following analyses of fungi, mold and insects found in the object). Any interference with the original ceiling structure threatens its total destruction, including the demolition of its original elements. It is possible, however, to consider reconstructing a single, southwestern square of the ceiling in an attempt to restore its "coffer" arrangement.

The ceilings above the vaults may be constructed from various materials, such as wooden beams or, preferred, steel fittings, or a combination of both, taking into account the loads of stone-floor weight and the need to ensure stability of the vault arrangement on the ground floor. Regardless of the vault construction, building a ceiling above the vaults seems imperative. This requires incorporating lifting beams above the vaults, preferably steel beams with considerably smaller cross-section than wooden ones.

The roof above the building will be constructed successively. The part above the central room, which ought to be constructed separately, should be a structure independent of the preserved ceiling. It is advisable to leave an empty space of 0.10–0.20 m width (height) between these two constructions in order to allow for securing weaker ceiling elements to the roof structure and for potential repairs or replacements of the original ceiling above the central room.

The roofs above all the other rooms will make use of wooden beams or steel fittings, either welded or screwed together, supporting a wooden framework covered with sheet metal and furnished with appropriate and suitably concealed from view drainage systems.

Exterior windows and entrances on the ground floor need first to be located and studied in the course of the archeological clearing of the ground floor planned in the first stages of the project. On the grounds of forms already encountered in the object, burnt brick appears to have been introduced into their splays. Jambs and

doors should be made of properly impregnated wood; the same is recommended for window frames. There is no reason to replace them with steel elements.

The walls, especially the south wall, need to be examined for vertical delaminations, parallel and perpendicular to the external surface. The south wall will most likely be in need of injecting it with liquid clay enforced with vinyl acetate, or even partial demolition and subsequent reconstruction, especially in the sections containing entrances. The uppermost layers of bricks, serving as a sill for upper wall floors, should be laid with a mix of polyurethane or acrylic resin. The wall surface must be repaired wherever it has cracked or been washed out. Structurally damaged bricks need to be replaced. Exposed joints between the internal structure and the buttress must be inventoried and marked on the wall in a permanent, noninvasive manner.

WALL PAINTING CONSERVATION PROGRAM

The walls of the square room and the monumental staircase were decorated with paintings probably as early as the 9th century. Later restoration and transformation into a mosque led to the murals being covered with secondary coats of plaster. A study of the building's architecture in the 1990s resulted in the exposure of some of the paintings, although the chief purpose of research was different. The murals were preserved and covered for protection.

The historic building of the Mosque requires extensive research and state-of-the-art conservation to restore it to a state from the end of the 14th century as far as possible. The medieval architecture will benefit from the restoration of the original coloring of the elements and uncovering of the oldest polychromy.

The original beauty and harmony of the interior derived from a logical relation between the architecture, detail, coloring, and the motifs depicted. The whole of the edifice was remarkably charged with theological content, and as such reflected and documented the manner in which the world was viewed at the time.

Most of the paintings cannot be seen under secondary plaster, except for a fragment of a fresco on the second landing of the staircase representing a standing saint holding a spear. The traces of yellow color and peacock's feathers suggest the Archangel Michael. The painting on the western side of the square room features a standing person wearing a necklace. Depicted on the north wall is a cross with representations of apocalyptical figures. 90% of the composition remains under a coat of secondary plaster, which excludes correct identification of individual scenes and the decoration as a whole.

The brick walls of the Mosque were rendered with a ground layer of mud plaster with vegetable filler, covered with a coat of lime wash with dextrin (starch gum used as a substitute for gum Arabic) added, probably to enhance cohesiveness. This coat constituted a technological base, providing at the same time a bright background for the painting compositions. The paintings were made on a dry base. Casein as an adhesive cannot be excluded, although this has not been confirmed. Natural iron pigments, from light yellow

to dark brown, were used, as well as natural ultramarine (*lapis lazuli*) and copper-rust, which were sometimes whitened with kaolin. Bone white may have also been used. Painting technique varied depending on the effect desired. Human figures were painted with gentle *chiaroscuro* and emphasized contours. Dress was painted first with a local color, onto which a darker shade was applied to indicate the shape of the folds and other decorative elements. Aureoles and accessories, such as jewellery, were painted flat, with a distinct contour and no *chiaroscuro*.

Both the form and the technique of the paintings in the square room bring to mind Byzantine pictorial art, even though the material used was of local origin and the technology had to be adapted appropriately.

Plaster samples from the square room were analyzed to determine composition and painting technology. The stratigraphy of paint layers could be estimated only roughly due to 70% of the wall surface being secondarily plastered. Two paint strata were observed in stratigraphic sections, suggesting a multi-layer painting technology, although their identical composition indicated rather repainting within a single, chronologically homogenous composition. As all the sections display a similar structure, it is assumed the murals were created at about the same time. Most probably a single paint stratum was used. Once the entire painting stratum has been exposed, it will be possible to determine the stratigraphy and the percentage proportion of consecutive layers.

STATE OF PRESERVATION AND CAUSES OF DAMAGE

The state of preservation of the murals depends on their location inside the Mosque building. The paintings in the staircase formed one group. They included murals exposed in the 1990s; the surface of these paintings was consolidated, lined with facing and secondary plaster applied. The murals appear to be in stable condition, but a full assessment of their preservation will be possible only after their complete exposure. The fragment which has remained exposed (100x150 cm) exhibits numerous decrements of the paint stratum and the plaster; plaster layers are also evidently detached.

Paintings from the square room constituted the second group. The state of these murals was disastrous owing to rainwater penetrating through holes in the roof. The water had washed away the plaster and exposed the brick layer on about 40% of the composition. The rest of the paintings remains concealed under a coat of secondary plaster. The exposed fragments exhibit numerous decrements in both the plaster and the paint strata; cohesion of plaster layers is distorted and cracks are observable. The plaster filler previously introduced in the gaps was eaten by termites leaving voids that appear as decrements of the paint stratum. Areas where the paint stratum was exposed are subject to other problems, such as multiple stains left by bat excrements. Extensive discoloring distorts the legibility of the composition. Furthermore, the exposed parts are covered with a thin film of wind-drifted mud and sand. Part of the paint stratum is subject to exfoliation and powdering.

CONSERVATION RECOMMENDATIONS

The paintings are in need of immediate conservation. They should be studied to

identify the material and iconography. Due to the nature of the damages the work must be coordinated with construction works.

There are two fundamental issues to be decided: should the murals be exhibited inside the building and what should the ultimate function of the building be, mosque or museum? In the latter case, assuming exhibition of the murals, the paint stratum and plaster layers will have to be exposed, consolidated and prepared for exhibition. The roof will have to be sealed first in order to provide proper conditions for the treatment as well as protect the paintings against rainwater, dust and sand. The murals will have to be protected for the duration of building works, after which the gaps in the plaster will have to be filled and the murals prepared for exhibition.

The second option is for the building to continue to serve as a mosque. In this case the conservation procedure for the murals will be the same as in the first option, but the paintings will ultimately be screened off or covered with reversible plaster coating, the choice depending on the decision of Sudanese authorities and the local community. In both cases, the paintings need to be examined by specialists to consider proper lighting design and installations required for the functioning of the building.

The technology of conserving paintings on mud plaster has yet to be developed. Tests have been conducted with the use of the following materials: Remmers Antihygro, Remmers Steinfestiger KSE 300 E, Paraloid B-72, Primal AC-33, Glucel G. Determining proper material for consolidation of paint strata and plaster will be possible past their full binding; the degree of their reversibility will also then become apparent.

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POLISH CENTRE OF MEDITERRANEAN ARCHAEOLOGY
UNIVERSITY OF WARSAW

POLISH ARCHAEOLOGY IN THE MEDITERRANEAN

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RESEARCH 2010

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