The Palace of Muweis and the Early Meroitic Levels: The Contribution of Technological Analysis to the Architectural Study

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Introduction[1]

The palace building

The major discovery of the first excavation season of the Louvre Museum in Muweis (*fig*. 1), in 2007, was that of a Meroitic palace in the southern part of the site.[2] The large ruin had already been identified in 1969 and protected thereafter, but it remained of an undefined nature due to the lack of excavations.

The survey performed by A. Sokari and P. Lenoble pointed out in 2003[3] that here lay an important structure, as shown by the dense cover of red bricks, the presence of small black ferricrete sandstone slabs and white lime plaster fragments. Thanks to the potsherds collected on the surface and those coming from ditches recently dug into the mound, they proposed to date the monument to the Classical or Late Meroitic period. During the surface clearings performed by the present mission in January 2007, mud-brick walls 1.5 to 1.7 m large (four bricks of 340 × 370 mm) soon began to appear. The strategy adopted then and later consisted in following the walls both on the top and at the foot of the 4 m high mound.

1 The present writer would like to thank the editorial committee of the Dotawo review, namely Vincent W.J. van Gerven Oei, Giovanni Ruffini and Robin Seignobos, who took in hand the publication of this paper. Without their help, this text would never have been published.

2 Baud, "The Meroitic Royal City of Muweis," pp. 52–53.

3 Lenoble & Sokari, "A Forgotten Meroitic Agglomeration in the Region of Meroe," p. 59, pl. 28.

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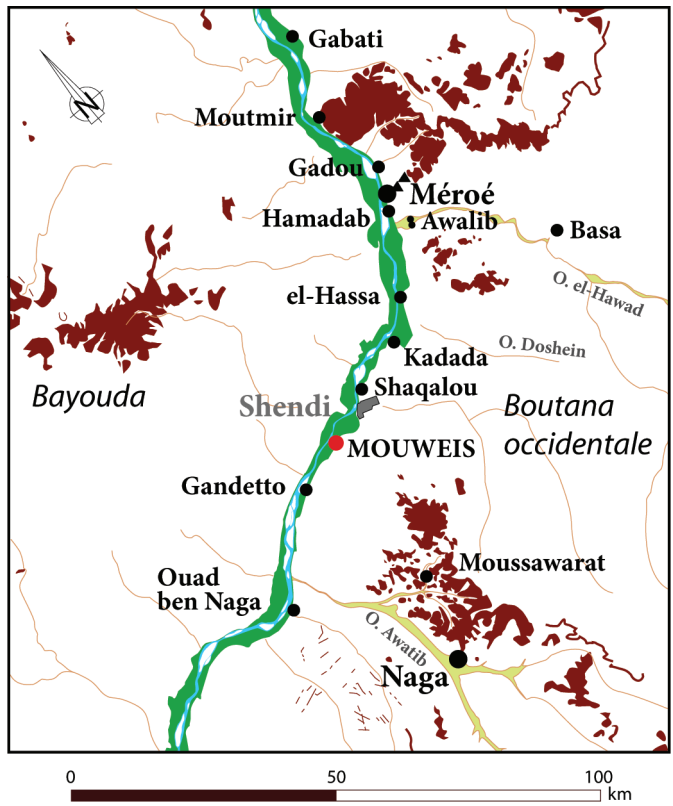

Fig. 1. General map of the Meroe region. © Marc Maillot.

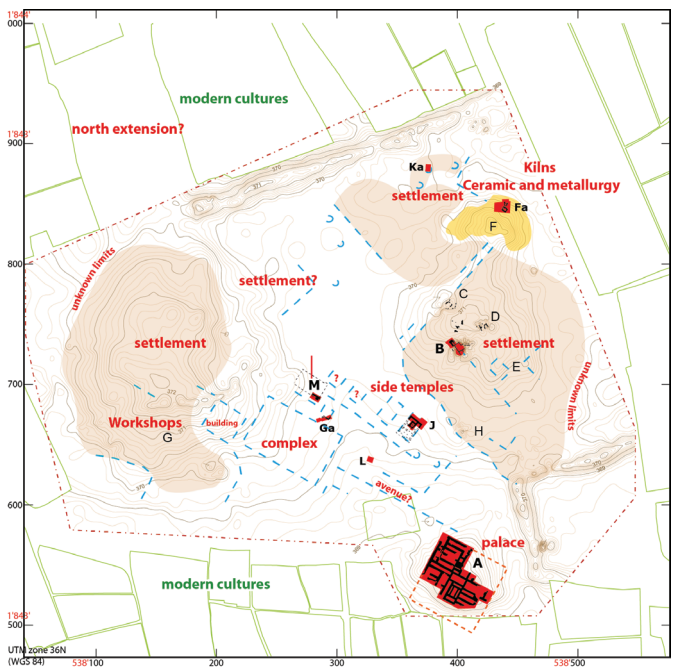

Fig. 2. General map of the Muweis site. © 2009 Louvre–Mission archéologique de Mouweis–Michel Baud.

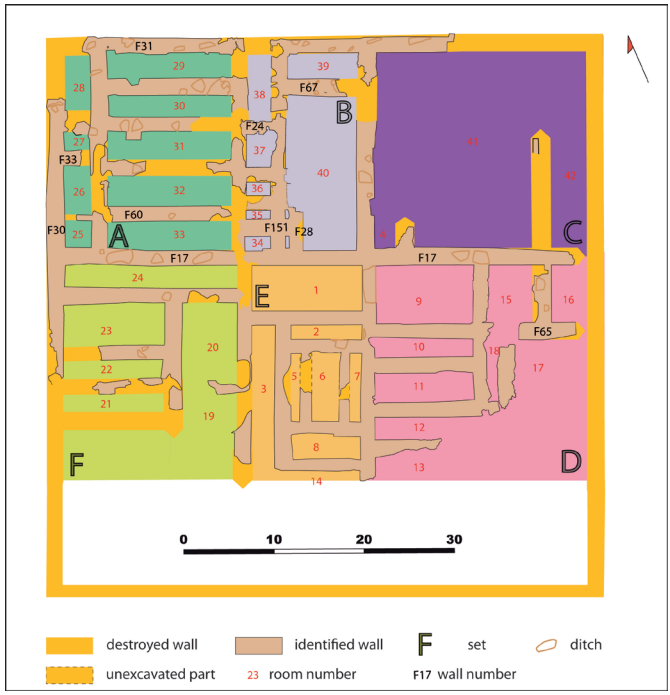

Fig. 3. Plan of the Muweis palace. © 2011 Louvre–Mission archéologique de Mouweis–Marc Maillot.

The *kom* is situated next to the southern limit of the archaeological site (*fig.* 2), at the margin of the monumental area located on a large central strip inside the city. It is delimited on its south and west sides by fields and on the north and east sides by a small recently dug canal, which separates the *kom* from the rest of the city. The shape of the mound covering the ruin is due to natural topography, human activity and erosion; its flat surroundings are often used as a path by local farmers or shepherds and their cattle. The south part of the structure has now been completely destroyed by land reclamation and some of the building material is dispersed in the fields, such as foundation stone slabs.[4]

The partial plan (*fig.* 3), which displays long corridors, very elongated rooms (11 to 14 m) and larger rooms in the central part of the building, is strikingly reminiscent of the palace basement at Wad Ben Naga,[5] hence the proposed identification for the Muweis structure. Moreover, the core rooms are distributed the very same way and generally possess similar proportions, even though their size is

4 Maillot, "The Palace of Muweis in the Shendi Reach: A Comparative Approach," p. 783.
5 Vercoutter, "Un palais des 'candaces,' contemporain d'Auguste," pp. 277–78, and Vrtal, "The Palace of Queen Amanishakheto," pp. 164–77.

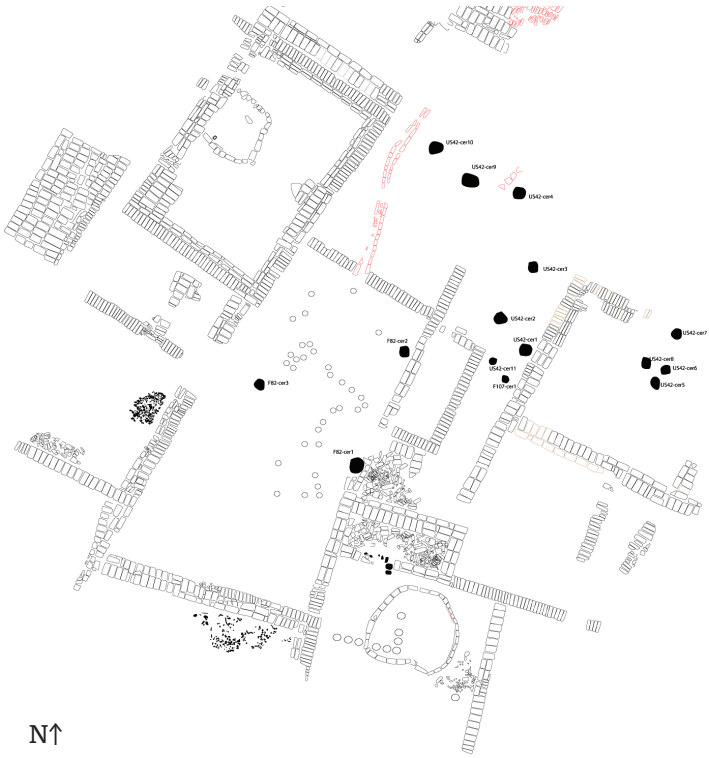

Fig. 4. Plan of the early Meroitic occupation (palace plan, set C). Scale 1/175 © 2010 – Louvre–Mission archéologique de Mouweis-Marc Maillot.

about 10% smaller than at Wad Ben Naga.[6] The similarities in plan could not however be verified in the southern part of the building, which had been completely destroyed. The comparison with Wad Ben Naga also allows us to infer that the two palaces were of equal dimensions, namely 60 m a side. To the present east–west length must be added on the east side a supplementary row of rooms now almost entirely vanished, nearly 10 m wide, i.e., pointing to an original length of 60–61 m.[7] Knowing the predilection of the Meroites for royal buildings of great dimensions (40 to 65 m a side) and of square plan,[8] the structure of Muweis must have had sides of equal length. We can, therefore, estimate the missing portion of the southern part as being between 10 to 20m since its actual north-south dimensions are reduced to between 40.7 m and 49.2 m.

6 For preliminary comments on this structure and its comparison with the palace of Wad ben Naga, see Baud, "Premières données sur le palais royal de Mouweis," pp. 339–57.
7 Ibid. p. 340.
8 Maillot, "Les palais de Méroé, relais du pouvoir," pp. 66–71.

The Early Meroitic Settlement

Due to the very poor condition of the palace's north-east part (*fig.* 4), successive surface clearings in this spot have revealed much of the early Meroitic remains predating the palace foundation. They were known since the 2008 season, but their excavation was limited to a few sondages in the central rooms of the palace, where they were trenched down to virgin soil by the foundation of the monumental building. The remains preserved belong to the Early Meroitic period, as indicated by the ceramic material.[9]

They reflect a complex occupation, showing a development proceeded by successive additions, the oldest western building being still in use when the subsequent eastern extensions were built. Four phases are identified; however, the available data, mostly obtained during the 2010 season in Muweis is still under study. In the excavated area, a central open area seems to be at the heart of this domestic settlement which consists mainly of small rooms or units, showing features such as pits, some shallow and filled with ash and brick waste, all associated with a whitewashed clay floor. This central area, probably a workshop, also contained sixteen painted craters turned upside down and reused as braziers, arranged in shallow pits dug into the virgin soil.

After this brief introduction to the Muweis palatial sector, this article will seek to demonstrate how the technological analysis of materials and construction techniques has complemented the architectural study, both on major and secondary points. To do this, short descriptions will be dedicated to mud brick, fired brick and stone, drawing on examples from the palatial area of the site. Finally, three architectural features will be evaluated as examples of the *know-hows and techniques* used in this palatial area. This will demonstrate how the study of materials and techniques can provide an understanding of elements of a monumental building.

Mud brick

Meroitic builders had to deal with the available and best adapted resources for their various needs. In some cases, trends and choices in earth types can be observed according to their position in the final construction. Mud brick matrix differences are attested in the Muweis palace, especially between the basement infrastructure and its elevation. One can observe that the lowest bricks are of a dark grey colour, with few inclusions, while those in the upper courses whiten very slightly, the inclusions becoming bigger.[10]

9 Maillot, *Palais et grandes demeures du royaume de Méroé,* pp. 363–65.

10 The phenomenon is also common in Egypt: Boak, *Soknopaiou Nesos,* pp. 10–13, figs. 8–12, pl. iii, iv, ,v and xi; Davoli, *L'archeologia urbana nel Fayyum,* pp. 47–48.

Unless it corresponds only to a change of material during the construction program and/or to a natural erosion phenomenon (the difference is too uniform on the bricks to suggest the latter), this material selection was presumably based on their intrinsic characteristics, and their use in a specific position in the construction to meet specific architectural needs.[11] The use of sand could also be a possibility, mixed with the mud matrix. It would have resulted in an increase of the inclusions' density and size, especially if it came from non-agricultural soil.[12] The first bricks may have offered better load bearing properties than the latter ones for foundations that supported the construction weight.[13] The standard module for the bricks in the Muweis palace, like that for the early Meroitic occupation, is standardised at 35 × 18 × 8 cm.

Reused earth could also be an additional resource of raw material for making bricks. Like the *sebbakhin* pits, extracting from ancient mounds the material needed for house construction, it is quite common in ancient urban sites such as Muweis to recover materials from earlier occupation phases.[14] This phenomenon induces the presence of specific traces. Indeed, if natural earth is reusable at will, the anthropic material density increases to the detriment of the natural density. It could be eroded ceramic sherds,[15] small charcoal or mud brick fragments or fragments of stone masonry. Such inclusions can also fill the purpose of degreasers, modifying the mud plasticity and allowing a better drying process, by avoiding deformation and cracks.

Further and systematic analyses would be required to confirm the presence of reused earth, but the phenomenon is particularly visible in the early Meroitic occupation beneath the Muweis palace (*fig.* 5). In this case, several bricks have a high density of small anthropic material (and probably an addition of ash in the clay), conferring a whitish-gray color, highly recognizable relative to the greenish mud bricks coming from the palace. This distinction in the brick matrix could also mean a more "industrial" production of the palace bricks, more fragile than the ones coming from the early

11 Baud, "Premières données sur le palais royal de Mouweis," p. 353 and n. 27.
12 Hintze, "Diskussionsbeitrag zum Thema 'Meroitische Architektur,'" p. 336; Grimal, "Travaux de l'Institut Français d'Archéologie Orientale en 1995–1996: § 11 Tebtynis," pp. 530–31; Rondot, *Tebtynis II*, p. 61 and 66.
13 The technique is not unusual in casemate buildings: Hartung & Ballet, "Tell el-Fara'in - Bouto," pp. 211–16.
14 Valbelle, *Tell el-Herr*, p. 26; Grimal, "Travaux de l'Institut Français d'Archéologie Orientale en 1993–1994: § 10 Tebtynis," p. 412; Wolf, "The Meroitic Urban Town of Hamadab in 2010," pp. 719–739.
15 For example in sector Ka in Muweis, ceramic sherds are used to prepare another occupation floor in an ordinary house: Muweis ncam Report 2009, §7.

Fig. 5. Muweis Palace, set E, wall F17 (background), bricks more clayish than the early Meroitic ones (forefront, white/gray), trenched by the palace wall. © 2009 Louvre–Mission archéologique de Mouweis–Marc Maillot.

Meroitic occupation. Indeed, the palace courses required regular mortar fillings to fill the gaps between brick courses.[16]

However, in some particular cases, these mortar fillings are deliberately avoided. Indeed, most of the time, the lowest course of a palace dividing wall is composed of a foundation course in mud brick positioned on edge.[17] These bricks on edge, whether or not placed on a pre-leveling course, have sometimes been laid dry, without interstitial mortar, perhaps to avoid a too rigid foundation course in order to allow slight brick movements.[18] This technique is most probably due to the masonry heaviness and/or in case of small earthquakes. It can also be more simply the result of cheapness or construction speed, but the critical position of these bricks, close to the palace central lightwell, and in the lowest wall courses rather indicates a conscious selection of the building method.

In the Muweis palace, walls are based on a foundation course composed of bricks on their edge,[19] as in common Meroitic housing,[20] but on some occasions the bricks are laid flat or askew. This alternation is certainly meant to catch up with uneven line courses. Indeed, the palace builders did not bother to fully level the early Meroitic occupation before inserting the palace foundation.[21] To compensate,

16 Maillot, "The palace of Muweis in the Shendi Reach: A Comparative Approach," p. 785.
17 Jacquet, "Remarques sur l'architecture domestique à l'époque méroïtique," p. 122; Husson, *Oikia*, p. 89.
18 Hadji-Minaglou, "La mise en œuvre de la brique à Tebtynis," p. 120.
19 Maillot, "The palace of Muweis in the Shendi Reach: A Comparative Approach," p. 787.
20 Shinnie & Bradley, *The capital of Kush I*, p. 25.
21 Baud, "Premières données sur le palais royal de Mouweis," p. 354.

Fig. 6. Muweis Palace, set E, foundation foot of wall F10, room 3, close to the central lightwell. © 2008 Louvre–Mission archéologique de Mouweis–Marc Maillot.

Fig. 7. Early Meroitic settlement, set C, water pipe in fired bricks F91. © 2010 Louvre–Mission archéologique de Mouweis–Marc Maillot.

some walls, especially those surrounding the central lightwell, have a foundation foot, although this method is only little used (*fig.* 6).[22]

Fired Brick

Fired brick has specific properties and destinations. It is above all a strong marker of late antique building, especially from the second half of the first century AD,[23] where it appears regularly in foundations and floors.[24] Due to its resistance in wet environments, fired brick is a favored material in spaces with direct contact with water and hydraulic facilities (such as in Muweis with the early Meroitic water pipe F91 established in two parallel lines of baked bricks[25]) (*fig.* 7). The properties of fired brick also make it a useful element of non-hydraulic architecture as it provides such a good compromise in place of stone.[26] Its superior resistance to compression and friction explains its use for the parts of the construction subjected to pressure and erosion.[27] Baked brick is also utilized in the lower parts of walls and foundations to strengthen the construction.[28] Its refractory qualities and heat resistance also make it very advantageous for the construction of installations such as kilns or domestic cooking places.[29]

In the palace of Muweis, a substantial part of the foundation courses is in red brick set on their sides.[30] In some areas, these foundation courses appear to be specific points of reinforcement, to support the second floor. Thus, several wall sections have this type of foundation, which does not appear uniformly in the palace. These spots are usually close to the external walls, indicating the same function of additional support for larger rooms or requiring reinforcement.[31]

22 Ibid., fig.9.
23 Spencer, *Brick Architecture in Ancient Egypt,* pp. 140–41, and Goyon & Golvin, *La construction pharaonique,* p. 135.
24 Sordi, "Djebel Barkal: New Excavation in B2200," pp. 181–86 and figs. 2–4; Ciampini, Bakowska & Czerner, "Meroitic Kingship and Water: The Case of Napata (B2200)," pp. 695–702.
25 Muweis NCAM Report 2010, pp. 7–8.
26 Adams, "Meroitic Architecture," pp. 275–76.
27 Baud, "Premières données sur le palais royal de Mouweis," p. 353. Note its regular use for the foundations of the pillars in M998 central court in Meroe: Török, *Meroe City,* p. 228 and for the door jambs of Meroe house B: Ibid., pp. 55–57. Also in place of mud brick laid on a foundation layer in coarse blocks of sandstone in Saqadi, due to climatic conditions or simply because of the prestigious nature of fired brick: Crawford & Addison, *Abu Geili, Saqadi and Dar el-Mek,* pp. 137–38. Finally one can mention the use of broken red bricks in front of the external base of mud brick walls in Hamadab, to prevent erosion: Wolf, "Hamadab – Fouille d'un site urbain méroïtique, campagnes 2001–2003," p. 258.
28 Garstang, "Third Interim Report on the Excavation at Meroe in Ethiopia," p. 76, and Török, *Meroe City,* p. 53.
29 Welsby, "Excavations at Kawa, 2009–10," p. 50 and pl.5; Muweis NCAM report 2011, pp. 17–18.
30 Maillot, "The Palace of Muweis in the Shendi Reach: A Case Study," p. 6.
31 Maillot, "The Palace of Muweis in the Shendi Reach: A Comparative Approach," p. 787.

However, what is of particular interest here is that these foundations could be found inside the palace, as the red brick wall F24, indicating the use of this foundation system to reinforce some crucial spots. Wall F24 (1.5 × 2.5 m) consists of four courses of mud bricks in foundation alternately arranged in a header/stretcher pattern, topped with three layers of red bricks. The entire wall, whose foundations are dug into the virgin soil, rests on a 20 cm thick layer of red bricks broken into small fragments. The wall F24 also contained fired bricks broken in half and reused in the brick-laying. It probably corresponds to a retaining wall for a large open space on the first floor, an assumption that tends to be confirmed by other sondages within this part of the palace.[32]

Stone

It is clear that environmental conditions have played a key role in the use of stone on the scale of a city such as Muweis. However, identifications remained focused on a single stone type with remarkable characteristics and distinguishable from other resources used, namely sandstone.

Assembling walls with stones, slabs or sandstone blocks is a common method,[33] but usually restricted to basement and foundation areas.[34] The technical implementation remains fairly simple and served primarily to provide a solid foundation for buildings[35] (to raise the structure vertically as much as possible[36]) and to reduce the impact of water and erosion[37] on the lowest courses of mud brick walls.[38]

A wall of very coarse and irregular stones coated with mud[39] may adjoin a dry brick-laying.[40] The stones used are long and flat slabs with smooth faces.[41] This type of protection is common in the case of vaulted basements[42] supporting significant elevations of one or

32 Maillot, "The Palace of Muweis in the Shendi Reach: A Case Study," p. 4 and fig. 4.
33 Woolley, *Karanòg: The Town*, pl.12; Frend, "The Podium Site at Qasr Ibrîm," pl. xiii; Plumley & Adams, "Qasr Ibrim, 1972," pl. xliii-2; Adams, "Meroitic Architecture: An Analytical Survey and Bibliography," p. 275.
34 Gelin, *Histoire et urbanisme d'une ville à travers son architecture de brique crue*, p. 513; Gratien, "Gism el-Arba Habitat 2. Campagne 2005–2006," pp. 21–37.
35 Macadam, *The Temples of Kawa II*, p. 85.
36 Maillot, "The Palace of Muweis in the Shendi Reach: A Case Study," p. 12.
37 Gelin, *Histoire et urbanisme d'une ville à travers son architecture de brique crue*, p. 512.
38 Bradley, "Comments on Meroitic Architecture," p. 286; Hintze, "Diskussionsbeitrag zum Thema Meroitische Architektur," pp. 335–36; Fitzenreiter, *Musawwarat es Sufra II*, pp. 34–35.
39 Husselman, *Karanis*, p. 35.
40 Jacquet, "Remarques sur l'architecture domestique à l'époque méroïtique," p. 122.
41 Dunham, *El Kurru*, p. 124; Adams, "Meroitic Architecture. An Analytical Survey and Bibliography," p. 274.
42 Husselman, *Karanis*, p. 67.

more floors.[43] The method is particularly widespread in Lower Nubia, and appears to be frequently applied in the X group period.[44]

The use of coarse stones (rubble) is also frequent for the core of access ramps and stairs, especially in Meroe.[45] Noteworthy here is the northern end of facade stair M950, built in sandstone.[46] The entire staircase was then redesigned to form a ramp, following a major status change of the building.[47] Also in Meroe, the use of stone rubble is attested in the erection of *podia* foundations, including M990.[48] This implementation circumscribed to foundations,[49] basements and certain isolated walls from ground floors is due to obvious reasons of weight.[50]

The use of stone also appears for wall protection.[51] In this context, the use of ferruginous sandstone is revealing. The latter is exploited during the Meroitic period in three main ways.[52] The first is in the form of coarse blocks for wall construction, hafirs, and filling. The second use is in slabs as in the pyramids of Meroe's northern necropolis, in the temple II of Mussawarat es-Sufra and in KC100 temple in Meroe.[53] It is also used as ashlar for altars, basins, and stairs, such as in Meroe M260.[54]

However, as observed in Meroe temple M282,[55] ferruginous sandstone is widespread when used in foundations, since it seems to be regularly found under mud brick walls.[56] In the Muweis palace, a part of the walls is built on dark ferruginous sandstone slabs.[57] With dimensions generally less than 20 cm in length, with very different forms, these slabs are thin, 2 to 3 cm, and derived from a natural cutting, as shown by their faces (*fig.* 8).[58] This material, together with a specific construction mode called "tabular" (*Plattenbauweise*[59]), corresponds to slabs carefully arranged in a way that limits the size of

43 Boak, *Soknopaiou Nesos*, p. 18.
44 Kromer, "Austrian Excavations in the District of Sayala, Lower Nubia," pp. 87–94; Adams, *Nubia: Corridor to Africa*, p. 400; Adams, "Meroitic Architecture: An Analytical Survey and Bibliography," p. 275.
45 Hinkel & Sievertsen, *Die Royal City von Meroe*, p. 101.
46 Adams, "Meroitic Architecture," p. 263; Török, *Meroe City*, pp. 207–11.
47 Maillot, *Palais et grandes demeures du royaume de Méroé*, p. 147.
48 Especially for M 97: Garstang, "Third Interim Report on the Excavation at Meroe in Ethiopia," p. 76, Török, *Meroe City*, p. 53.
49 Gratien, "Gism el-Arba Habitat 2. Campagne 2005–2006," pp. 21–37.
50 Gelin, *Histoire et urbanisme d'une ville à travers son architecture de brique crue*, p. 513.
51 Ibid., p. 571.
52 Bradley, "Comments on Meroitic Architecture," pp. 280–86.
53 Ibid., 285.
54 Török, *Meroe City*, pp. 116–123.
55 Shinnie & Anderson, *The Capital of Kush 2*, p. 46 and fig. 35.
56 Hintze, "Meroitic Chronology," p. 335; Bradley, "Comments on Meroitic Architecture," p. 285.
57 Maillot, "The Palace of Muweis in the Shendi Reach: A Case Study," p. 7 and fig. 5; Maillot, "The Palace of Muweis in the Shendi Reach: A Comparative Approach," p. 787.
58 Bradley, "Comments on Meroitic Architecture," p. 285–86.
59 Hintze, "Diskussionsbeitrag zum Thema 'Meroitische Architektur,'" pp. 335–36; Fitzenreiter, *Musawwarat es Sufra II*, pp. 34–35.

Fig. 8. Ferruginous sandstone slabs close to wall F65, set D. © 2011 Louvre–Mission archéologique de Mouweis–Marc Maillot.

the interstices which are filled with a clay mortar, of the same type as that used between the bricks. In some sections of foundation of the palace, up to twelve "courses" of these slabs have been laid.[60]

It is only in the south-east part of the palace that the ferruginous sandstone slabs were identified in foundations, this part being the most sensitive spot prone to water damage. The specificity of this sector tends to indicate a function of hydraulic protection to these slabs, especially for the mud brick foundation courses.[61] In the same area, the wall's lower part and some narrow spaces were also reinforced with broken fired bricks, a well-known phenomenon in Meroitic architecture.[62] These small red brick fragments, accumulating up to three to four heterogeneous courses, are adjacent to the ferruginous slabs and should also be considered as a part of a protection system against water.[63] These red bricks are sometimes mixed with vitrified fired bricks, an appropriate use for brick wasters.[64]

Building techniques helping architecture

Considering the very poor preservation of the Muweis palatial area, technological analysis helped our understanding of elements of the buildings. Here are three examples.

60 Baud, "Premières données sur le palais royal de Mouweis," p. 353.
61 Ibid., p. 354.
62 Shinnie & Anderson, *The Capital of Kush 2*, pp. 45–46, fig. 35.
63 Maillot, "The Palace of Muweis in the Shendi Reach: A Comparative Approach," pp. 787–88.
64 Bradley, "Comments on Meroitic Architecture," pp. 285–86; Hintze, "Diskussionsbeitrag zum Thema 'Meroitische Architektur,'" pp. 335–36; Fitzenreiter, *Musawwarat es Sufra II*, pp. 34–35.

The palace vaulted casemates

Technological analysis of brick masonry in Muweis allowed restoring the presence of vaulted casemates, while the conservation state of the building made any identification of the method impossible. One observes a wall thickness of 138 cm minimum to 185 cm maximum.[65] The contrast is striking compared with similar Egyptian structures,[66] whose casemates are filled with rubble, and where the thickness of the outer masonry varies between 300 and 350 cm (a necessary thickness to withstand the lateral pressures). Considering the reduced thickness of the Meroitic masonry, this is an argument in favor of empty casemates in a probably vaulted basement.[67]

The particular use of red brick in the palace of Muweis is also significant. Masonry is mostly in mud brick for the substructure, with notable exceptions being walls F17 and F24.[68] Some sections of wall F17 have a core in fired brick, with a facing in mud brick. This is quite unusual in Meroitic monumental architecture, except if one considers in this case a *point d'appui* (bearing point) in the lower parts of this dividing wall, ensuring a greater stability. This *point d'appui* might support a vault rib, designed to cover the surrounding rooms.[69]

Knowing the important role played by wall F17 in the general organization of the building,[70] it is likely that other bearing points are present along the wall (observations were only possible in parts where the wall was already damaged), to develop the vault covering over a large part of the basement. To this can be added the discovery in the demolition layers of thin red bricks marked with deep fingerprints, designed to facilitate the mortar grip for the brick vault. The process is well known both in Egypt and Sudan, and on various sites.[71]

The central lightwell

Some Meroitic palaces have, in their basement, rooms too large to be only simple casemates (exceeding 3.5 m). The design of these

65 Baud, "Premières données sur le palais royal de Mouweis," p. 347.
66 Leclère, *Les villes de Basse Égypte au Ier millénaire av. J.-C,* p. 631.
67 It is interesting to observe that in the case of casemate structures, the various Egyptian *thesauroi* present, in addition to storage units, empty rooms covered by vaults whose internal wall thickness does not exceed 1.10 m: Tassinari, *Il thesauros di Bakchias,* p. 50.
68 Baud, "Premières données sur le palais royal de Mouweis," p. 353.
69 Maillot, "The Palace of Muweis in the Shendi Reach: A case study," p. 7.
70 Maillot, "The Palace of Muweis in the Shendi Reach: A comparative approach," pp. 783–84 and fig.1.
71 Woolley, *Karanòg: The Town,* pp. 11–25; Jacquet, "Remarques sur l'architecture domestique à l'époque méroïtique," p. 122; Bradley, "Meroitic Chronology," pp. 197–200; Bonnet & Ahmed, "Excavations at Dokki Gel (Kerma)," pp. 252–53; Fitzenreiter, *Musawwarat es Sufra II,* pp. 153–56; Gelin, *Histoire et urbanisme d'une ville à travers son architecture de brique crue,* p. 546; Baud, "Premières données sur le palais royal de Mouweis," p. 344.

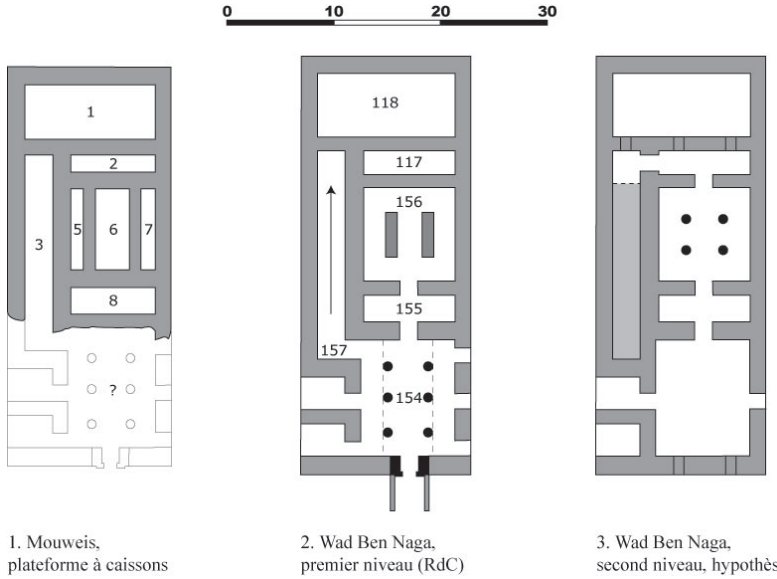

Fig. 9. Central space, Muweis (1/left), Wad ben Naga (118/middle) and Wad ben Naga, central core, second floor (right, hypothesis). © 2011 Louvre–Mission archéologique de Mouweis–Michel Baud.

Fig. 10. Muweis palace, set B, wall F151 (top left) abutting on wall F17 (background). © 2011 Louvre–Mission archéologique de Mouweis–Marc Maillot.

rooms does not show the usual square plan[72] (one of the archetypes being M750[73]), but rather a rectangular room, too large to have been roofed.[74] This kind of room, well-known in Meroitic architecture,[75] is usually interpreted as a lightwell. In the palace category, the best examples are Wad Ben Naga and Muweis,[76] whose plans are extremely similar (*fig.* 9). Usually, the lightwell is associated with an entrance corridor flanking the lightwell in its south part, and opening onto a turn, in a sort of a reversed L shape.[77]

These open spaces, common in Nubian settlement architecture,[78] appear frequently in palatial and residential contexts.[79] It seems that, considering their regular presence in common housing, one can observe a local adaptation of a common architectural pattern in large complexes, localized in strategic areas of the Meroitic kingdom.[80] Indeed, one can find similar central spaces in Lower Nubia,[81] in Taifa,[82] and in Tila Island, situated 5 km from the Semna cataract, and where houses systematically present open rectangular central spaces.[83] Other examples are available in Ash-Shaukan[84] and Meili Island.[85] There is, of course, an important difference between a lightwell and a domestic open court. However, in common housing, the open court is above all a working space for domestic activities.[86] In most cases, the central lightwell is also used as a working space, whatever the building dimensions.[87] Furthermore, the distinction between building types is never made according to this criteria, but rather on the presence/absence of a corridor leading to the court.[88] Therefore, the central lightwell in large complexes may be a sort of monumentalization[89] of the central space, widespread in Nubian common housing.[90]

72 Ibid., p. 348.
73 Grzymski, "Excavations in Palace M 750S at Meroe," pp. 47–51.
74 Woolley, *Karanòg: The Town,* pp. 23–25; Ahmed, *Agglomération napatéenne de Kerma,* p. 97; Welsby, *The Kingdom of Kush,* pp. 102–103; Fitzenreiter, *Musawwarat es Sufra II,* pp. 34–35, 126–133,150 and fig.32; Hinkel & Sievertsen, *Die Royal City von Meroe,* p. 74.
75 Baud, "Premières données sur le palais royal de Mouweis," p. 345.
76 Ibid., p. 348.
77 Ibid., p. 345 and fig. 4.
78 Ahmed, *Agglomération napatéenne de Kerma,* p. 97.
79 Hinkel, "L'architecture méroïtique," p. 395.
80 Edwards, *The Archaeology of the Meroitic State,* pp. 22–26.
81 In Gaminarti: Ahmed, *Agglomération napatéenne de Kerma,* p. 97.
82 De Villard, *La Nubia Romana,* pp. 18–21 and fig. 23.
83 Edwards, *The Archaeology of the Meroitic State,* pp. 106–14.
84 Jacquet, "Remarques sur l'architecture domestique à l'époque méroïtique," pp. 121–31; Edwards, *The Archaeology of the Meroitic State,* pp. 62–69.
85 Adams, *The West Bank Survey from Faras to Gemai 2,* pp. 39–42.
86 Husson, *Oikia,* p. 51; Maillot, *Palais et grandes demeures du royaume de Méroé,* p. 408.
87 Woolley, *Karanòg: The Town,* pp. 23–25.
88 Fitzenreiter, *Musawwarat es Sufra II,* p. 132.
89 Maillot, "The Meroitic palace and Royal city," pp. 80–87.
90 Ahmed, *Agglomération napatéenne de Kerma,* pp. 96–97.

In any case, the choice of such a design cannot be a coincidence in palatial complexes,[91] and involves its implementation in the early stages of the building construction.[92] The case of Muweis is, as such, revealing.

One of the walls framing the central lightwell in the Muweis palace, wall F17, is the only internal wall going through the entire structure. It divides the whole building into two parts, north and south. It is a major dividing wall, and was built in the early stages of the building construction. Indeed, wall F17 has the deepest foundation trench compared to other core walls (alt. 369.32 m, between 27 and 35 cm deeper than surrounding core walls). The primacy of the wall during construction is also obvious through the adjacent walls, such as wall F151 (alt. 369.62 m; 30 cm higher than F17) or the reinforcement wall F28 (alt. 369.85 m; 53 cm higher than F17). Their junction with F17 is provided by large quantities of mortar,[93] and the foundation trenches of these secondary walls indicate that F17 is used as a spine wall on which are abutting all the side walls of the north part of the palace (*fig.* 10).

Furthermore, the various sondages in the angles of the lightwell show the presence of a foundation foot for wall F17, while some of the other framing walls present either a foundation foot, or a reinforced foundation consisting of a double row of mud bricks on their edge.[94] The fundamental role of this central room is clear, especially since these framing walls only possess a foundation foot near the lightwell, and adopt a standard foundation system out of the area of the central space. This lightwell is constructed without a leveling of the early Meroitic settlement; the palace walls cut through these earlier levels to a depth of one meter, to the virgin soil.

The palace entrances

The Muweis palace seems to have had an important entrance on its north side. Despite the poor state of preservation of the building on its northern side, some technological hints can still testify to its presence. The visible breach in the external north wall lies precisely in line with the group of rooms 34–38 and casemate dimensions in this area are diminishing in length from north to south[95] (34: 1.60 × 2.70 m ; 35: 1.10 × 2.70 m; 36: 1.40 × 2.70 m ; 37: 3.65 × 2.70 m; 38: 7.35 × 2.70 m).

These two features tend to confirm the hypothesis that a ramp supported by small casemates crossed the palace basement and al-

91 Hinkel, "L'architecture méroïtique," p. 395; Sewell, *The Formation of Roman Urbanism,* pp. 88–92.
92 Maillot, "The Palace of Muweis in the Shendi Reach: A Comparative Approach," p. 786.
93 Ibid., p. 785.
94 Maillot, *Palais et grandes demeures du royaume de Méroé,* p. 289.
95 Maillot, "The Palace of Muweis in the Shendi Reach: A Comparative Approach," p. 785.

lowed access from the outside directly to the upper floor.[96] The presence of the reinforcement wall F28 leaning against F17 may indicate that the ramp turned towards the east as it approached the central lightwell, thus fitting the pattern of the corridor/reversed L shape presented above. The thick mortar between the reinforcement wall F28 and F17 is also particularly important and ensures the connection between the two walls.[97] The foundation remains of the north exterior wall F31 (in red brick close to the breach located north of room 38) and its facing in red brick also confirm the presence of a ramp leading directly to a second level.

This highly disturbed area allowed us to observe the different processes used by builders to establish the north ramp. The systematic reinforcement of the foundations courses illustrates this phenomenon. The presence of red bricks at a very low level for wall F24 (alt. 370.08 m), – a unique feature throughout the palace at this level – can find an explanation here. The brick-laying of this wall is however problematic because it is partly composed of red bricks broken in half, implying a more opportunistic than deliberate construction technique. The builders may have been simply reusing some construction waste, for a wall invisible on living floors. However, the sporadic use of red brick in the basement, reserved for weak spots (angles, internal brick-laying of dividing walls, bearing points etc.) combined with the particular care given to wall F24's erection seems to go against such an interpretation. Indeed, this care is obvious considering on one hand the execution and on the other the amount of mortar used in wall F24. This amount is actually slightly above normal (average thickness of the mortar in wall F24 varies between 2.8 and 4 cm, while the overall thickness is between 1 and 2.5 cm). Furthermore, the sondage made along F24 also shows, like F28, a stronger foundation. It consists of four courses of mud bricks under a top course of red bricks. Only the first course is partially dug in the virgin soil. The entire foundation rests on a bed of small red brick fragments (between 2 and 5 cm), deeply dug into virgin soil (a layer with a thickness of 19 cm, a rare phenomenon in the area).

The top course of wall F151 and its height (alt. 370.43 m) in casemates 34 and 35 are also surprising, very well preserved and perfectly horizontal, which could indicate the start of red brick courses at this level (red bricks which were systematically removed soon after the abandonment of the palace[98]). In addition, the F151 brick-laying changes as we approach casemate 37 to form a herringbone

96 Ahmed, *Agglomération napatéenne de Kerma,* p. 100; Hinkel & Sievertsen, *Die Royal City von Meroe,* p. 68 and fig. IX.68.

97 Maillot, "The Palace of Muweis in the Shendi Reach: A Case Study," p. 5.

98 Maillot, "The Palace of Muweis in the Shendi Reach: A Comparative Approach," p. 786 and pl. 1.

pattern,[99] which is not the case elsewhere. Two supplementary features are indicative of the desire to strengthen the whole area to support heavy masonry on the upper level. It is, therefore, obvious that the Muweis palace must had entrances in the middle of each of its sides, as in Wad Ben Naga[100] and B1500.[101]

Conclusion

With these three examples, one can see how technological analysis provides answers to such crucial issues as the roofing mode of the basement, the primacy of the central space in the construction phases and the presence of monumental entrances to the cardinal points of the palace. The conservation state of the building cannot ensure a strictly architectural interpretation of the structure; it is therefore the study of materials and techniques that allows further interpretations. As one has seen above, further analysis is needed, whether with sedimentology or with geomorphology. But it still belongs to archeology to define in which areas these analyses are relevant and necessary, the proliferation of archaeometric data constituting in no way a guarantee of understanding.

99 This type of coursing is well documented: Sauvage, *La brique et sa mise en œuvre en Mésopotamie*, p. 60 and fig. 44.

100 Vercoutter, "Un palais des 'candaces,' contemporain d'Auguste," p. 281; Vrtal, "The Palace of Queen Amanishakheto," pp. 164–77.

101 Roccati, "Hellenism at Napata," p. 385; Roccati, "B2400: A New Page in Meroitic Architecture," pp. 295–96.

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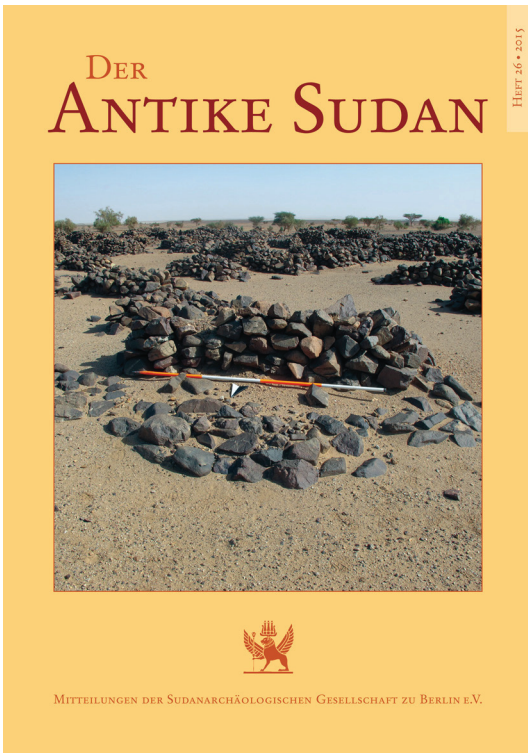

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