



HAL
open science

The Roman baths at Karnak, between river and temple. Architectural study and urban context

Mansour Boraik, Salah Al-Masekh, Thibaud Fournet, Pauline Piraud-Fournet

► **To cite this version:**

Mansour Boraik, Salah Al-Masekh, Thibaud Fournet, Pauline Piraud-Fournet. The Roman baths at Karnak, between river and temple. Architectural study and urban context. Collective Baths in Egypt 2. New Discoveries and perspectives, B. REDON (éd.), Le Caire, 2017, p. 215-261, 2017. <halshs-01698115>

HAL Id: halshs-01698115

<https://shs.hal.science/halshs-01698115v1>

Submitted on 5 Dec 2019

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



HAL Authorization

Collective Baths in Egypt 2

New Discoveries and Perspectives

βαλανεία ■ THERMAE ■ حمامات

Edited by

Bérangère Redon



Institut français d'archéologie orientale

Études urbaines 10 – 2017

Dans la même collection :

Marie-Françoise Boussac, Sylvie Denoix, Thibaud Fournet et Bérangère Redon (éds.), *25 siècles de bain collectif en Orient. Proche-Orient, Égypte et péninsule Arabique*, 2014.

Julien Loiseau, *Reconstruire la Maison du sultan* (2 vol.), 2010.

Marie-Françoise Boussac, Thibaud Fournet et Bérangère Redon, *Le bain collectif en Égypte*, 2009.

István Ormos, *Max Herz Pasha*, (2 vol.), 2009.

Mercedes Volait (éd.), *Le Caire – Alexandrie. Architectures européennes, 1850-1950*, 2004.

Sylvie Denoix, Jean-Charles Depaule, Michel Tuchscherer, *Le Khan al-Khalili et ses environs, un centre commercial et artisanal au Caire du XIII^e au XX^e siècle* (2 vol.), 1999.

Sylvie Denoix, *Décrire Le Caire. Fustāt-Miṣr d'après Ibn Duqmāq et Maqrīzī*, 1992.

Nelly Hanna, *Habiter au Caire aux XVII^e et XVIII^e siècles*, 1992.

Collectif, *L'habitat traditionnel dans les pays musulmans autour de la Méditerranée* (3 vol.), 1988-1990-1991.

© INSTITUT FRANÇAIS D'ARCHÉOLOGIE ORIENTALE, LE CAIRE, 2017

ISBN 978-2-7247-0696-3

ISSN 1110-2497

Mise en page: Christine Mina

Couverture: Ismail Seddiq, d'après Th. Fournet



Tous droits de traduction, d'adaptation et de reproduction par tous procédés, réservés pour tous pays. Toute reproduction ou représentation intégrale ou partielle, par quelque procédé que ce soit, des pages publiées dans le présent ouvrage, faite sans l'autorisation de l'éditeur, est illicite et constitue une contrefaçon. Seules sont autorisées, d'une part, les reproductions strictement réservées à l'usage privé du copiste et non destinées à une utilisation collective et, d'autre part, les courtes citations justifiées par le caractère scientifique ou d'information de l'œuvre dans laquelle elles sont incorporées (art. L. 122-4, L. 122-5 et L. 335-2 du code de la propriété intellectuelle).

Sommaire

Bérangère Redon	
Introduction. Rediscovering the Bathing Heritage of Egypt.....	1
I. PTOLEMAIC PERIOD	
Jean-Pierre Brun, Thomas Faucher, Bérangère Redon	
An Early Ptolemaic Bath in the Fortress of Bi'r Samut (Eastern Desert)	13
Mohamed Abd el-Rafa Fadl, Wagdy Ibrahim Abd el-Nabi, Guy Lecuyot, Bérangère Redon	
A New Ptolemaic Bath Building at Buto/Tell el-Fara'in – A Preliminary Report	25
Mohamed Kenawi, Nunzia Larosa	
The <i>Tholos</i> Bath at Kom Wasit.....	41
Wolfgang Müller, Mariola Hepa	
Two Baths from Syene.....	51
Karol Myśliwiec	
Baths from the Ptolemaic Period in Athribis (Tell Atrib, Lower Egypt)	65
Aiman Ashmawy Ali	
The Lost Graeco-Roman Baths of the Eastern Delta.....	83
Thibaud Fournet, Bérangère Redon	
Bathing in the Shadow of the Pyramids: Greek Baths in Egypt, Back to an Original Bath Model	99
Anne-Marie Guimier-Sorbets, Bérangère Redon	
The Floors of the Ptolemaic Baths of Egypt: Between Technique and Aesthetics.....	139

II. ROMAN AND BYZANTINE PERIODS

Grażyna Bąkowska-Czerner, Rafał Czerner	
Roman Baths in Marina el-'Alamein	173
Paola Davoli	
A New Public Bath in Trimithis (Amheida, Dakhla Oasis).....	193
Mansour Boraik, Salah el-Masekh, Thibaud Fournet, Pauline Piraud-Fournet	
The Roman Baths at Karnak, Between River and Temples	
Architectural Study and Urban Context	221
Bérangère Redon	
The Missing Baths of the First and Second Centuries in Egypt:	
A Tentative Explanation.....	267
Thibaud Fournet, Bérangère Redon	
Romano-Byzantine Baths of Egypt:	
The Birth and Spread of a Little-Known Regional Model.....	279
Charlène Bouchaud, Bérangère Redon	
Heating the Baths During the Ptolemaic and Roman Periods in Egypt:	
Comparing the Archaeobotanical and Textual Data	323

III. MODERN PERIOD

Muhammad Husam al-Din Isma'îl, Michel Tuchscherer, Matthieu Vanpeene	
The Hammams of the Egyptian Provinces	
During the Modern and Contemporary Periods: an Inventory.....	353

IV. CATALOGUES OF THE BATHS OF EGYPT

Bérangère Redon	
Presentation and Principles of the Catalogues	385
Thibaud Fournet, Bérangère Redon	
I. Catalogue of the Greek <i>Tholos</i> Baths of Egypt	389
Thibaud Fournet, Bérangère Redon	
II. Catalogue of the Small Greek Baths of Egypt	437
Thibaud Fournet, Bérangère Redon, Matthieu Vanpeene	
III. Catalogue of the Roman and Byzantine Baths of Egypt	451
Michel Tuchscherer, Matthieu Vanpeene	
IV. Catalogue of the Egyptian Hammams Outside Alexandria and Cairo	525
Bibliography	541

Mansour BORAİK (SCA, Supervisor of Luxor Antiquities)
Salah EL-MASEKH (Site director of the Excavations)
Thibaud FOURNET (CNRS, IFPO Amman)
Pauline PIRAUD-FOURNET (IFPO Amman)*

The Roman Baths at Karnak, Between River and Temples

Architectural Study and Urban Context

IN 2006, on the occasion of a major planning and development project in the area between the first pylon of the great temple of Karnak and the banks of the Nile,¹ a team from the Ministry of State for Antiquities (MSA), led by Mansour Boraik, uncovered a *tholos* bath of the Hellenistic period.² To the surprise of the field director and his assistant, Salah el-Masekh, they then discovered in 2012, and only 40 m further north,³ a new bathing complex, twice as large as the first one (fig. 1). According to preliminary observations of the archaeological material, this building—typologically different from the previous one—has been dated to the Roman era. Extensive excavations carried out by the MSA brought to light the entire building. Thereafter, its architectural analysis was launched in July 2012, with the intervention of Thibaud Fournet, Pauline Piraud-Fournet, both from the Institut français du Proche-Orient (IFPO) in Amman, and the assistance of Matthieu Vanpeene, the support of IFAO, CFEETK and the *Balnéorient* programme.

The remains show much remodelling and successive developments that may have been motivated in part by the succession of various bathing practices. The architectural plan and the descriptions of the remains made in the field provide an overview of the structures as they are preserved today. A depiction of the various phases of transformations of the building is then proposed, which allows us to restore the functioning of the baths at each of the six major phases of evolution. Lastly, an analysis of the archaeological material is presented; it is still under study but an initial examination gives some indications as to the dating of some of these phases, ranging across a period from the 2nd to the 4th century AD.

* M. Boraik would like to thank the heads of the Ministry of State for Antiquities and Mr Ibrahim Soliman (Director of Karnak). Th. Fournet and P. Piraud-Fournet thank Bérangère Redon, who organised the architectural survey mission in July 2012, Matthieu Vanpeene (independent architect) for his contribution to the survey and the remains analysis, IFAO and CFEETK for their logistical help and support. All the authors are also grateful to Charlène Bouchaud (Muséum d'histoire naturelle, Paris), Thomas Faucher (CNRS, Orléans) and Marie-Dominique Nenna (CNRS, Lyon) who kindly shared their initial analyses of the artefacts discovered during the excavations. Finally, thanks are also due to Emmanuel Laroze (CNRS, Paris) and Gérard Charpentier (CNRS, Lyon) for their comments.

1. This project was launched in 2007 by the Luxor City Council and the Ministry of State for Antiquities (MSA). For a first presentation, see BORAİK, EL-MASEKH 2012; BORAİK 2013a and BORAİK 2013b.

2. BORAİK 2009; BORAİK, FAUCHER 2010; LAROZE, VALBELLE 2010, p. 28; BORAİK et al. 2013; BORAİK, NAGUIB 2013.

3. That is 150 m north of the main entrance to the sanctuary.

The discovery of the Roman baths at Karnak, in a region at the southernmost limits of the Empire, enriches the still limited corpus of baths dating back to the Roman period in Egypt.⁴ The baths in Karnak have a monumental and symmetrical plan, but much smaller dimensions than other buildings of the same type found elsewhere in the Empire. Their remains offer the possibility, with the *tholos* baths excavated further south, to highlight the evolution of the thermal model in Egypt over about seven centuries (3rd/2nd century BC to 4th century AD). Lastly, the discovery of these two collective facilities provides an opportunity to reconsider the occupation of the area located between the Nile and the first pylon of the temple of Karnak in Ptolemaic and Roman times. The size and organisation of the two bath buildings clearly point to a domestic and commercial context and more broadly to a real agglomeration, of which other structures have been brought to light by the excavations conducted in front of the first pylon since the 1930s.

DESCRIPTION OF THE REMAINS

The bath building covers an area of approximately 1440 m² (37 × 39 m, the bathing sector and its ancillary rooms occupying about 1200 m²). It is built almost entirely of fired and mud bricks (fig. 2), from the foundation to the vaults, some lying in their position of collapse when discovered.⁵ As it stands today, in its last state, the construction had a relatively symmetrical plan along a central east-west axis. The main entrance is to the east, leading to a central courtyard and a large room ending with an apse to the west (fig. 3). Probably accessed from a street parallel to the enclosure wall of the temple, the entrance leads to an area (A) composed of two courtyards (one with a portico, the other hypaethral), two cold pools and some additional rooms (cloakrooms, latrines). This cold area gave access to the heated section (B), located in the centre, consisting of three small rooms opening into three larger rooms. The western section (C) is devoted to the heating system, and the water devices (D) are grouped to the north (aqueduct, reservoirs, *sakieh*, elevated tank)⁶.

Sector A. Cold Rooms

Entrance of the Baths, Hall 1 and Court 2

The entrance of the baths, in the eastern facade of the building, is located 20 m west of the large enclosure of the Egyptian temple. At the centre of this facade, a door opened into a vestibule with portico (1) extended westward by a court (2).

4. Redon in this volume; Fournet, Redon in this volume (b) and Cat. III.

5. In the baths, stone is used only for some architectural elements: the eight columns still *in situ* in the court, two capitals, a basin found during the excavations and the support of another basin are of local sandstone. The remains of slabs of ornamental stones still adorn the walls of some basins. The paving of the rooms is mainly made of fired brick, sometimes in sandstone or limestone. The jambs and the lintel of the door of the baths are also made of sandstone.

6. Area (A): Rooms 1, 2, 7, 8, 9, 10, 16, 17, 18, 19, 27, 28, 29, 30, 35, 36, 37, 38 and 39. Area (B): Rooms 3, 4, 5, 11, 12, 22, 23, 25, 26, 31, 32 and 40. Area (C): Rooms 6, 13, 14, 33, 34, 44 and 45. Area (D): Rooms 38, 41, 42, 43, 47 and 48.

The two doorjambs and the outer lintel of the door were discovered, in their collapse position, in front of the central part of the eastern facade of the baths (fig. 4). The location of the door can be restored in the axis of the vestibule, in front of four narrow paving slabs marking the threshold limit. The first element of the door is a large jamb 2.67 m high by 0.65 m thick and 0.44 m wide; it was found slightly above the level of the pavement. It has a mortise for a lock. The second jamb was 0.54 m width, 0.71 m thick and 2.08 m high, but is now broken. Its face has a series of grooves, probably cut during votive rites.⁷ The lintel (fig. 5) measures 2.16 m long, 0.74 m high and 0.29 m thick. Its front face has a moulding strip (0.09 m high) and its underside has two incised lines perpendicular to the facade, 0.33 m from either end of the block. These lines mark the width of the passage under the lintel between the two jambs, which was therefore 1.51 m. The front face of the lintel is covered by a light whitewash. At both ends of its upper surface, two half dovetail mortises (0.035 m, flare at 0.05 m) for slate cramps are visible; its surface is pitted to receive mortar. The lateral joint is dressed to 0.05 m in width at the front and sides. The reverse of the lintel is not dressed, probably because it was hidden by an inner lintel that accommodated the wooden elements of the door. The threshold is the last stone element found complete and belonging to the door. Its upper side, where people walked, is the only face of this block that is dressed. It is very worn, polished and abraded (fig. 6). It is 0.42 m wide, 0.35 m thick and 1.52 m long. As we shall see, these architectural elements were re-used from an earlier building.

Room 1, of rectangular shape and inner surface area of 58 m², is divided into three sections by two rows of three columns. The north and south galleries, about 2 m wide, were certainly covered, making this room a porticoed entrance vestibule.⁸ The floor is made of large sandstone slabs; most are between 0.6 and 1.2 m wide or long. Their shape is irregular, rectangular or slightly trapezoidal, and they are joined together by a mortar. A gap in the pavement allowed us to measure the thickness of the slabs, ranging between 0.10 and 0.20 m, and to observe their foundation: they are built on a thick layer of earth (almost 0.15 m thick) resting on a layer of mortar mixed with pebbles, itself lying on brick fragments, probably remnants of earlier paving.

The elevation of the front wall of the building, the eastern wall of Vestibule 1, has almost entirely disappeared. Its limits are given by the end of the pavement and, in the north-east corner, by a row of six bricks still *in situ*. However, the foundations of this wall are preserved, consisting of several courses of bricks visible to 1.25 m depth (up to 2 m to the north). Four courses of fired bricks lie on a bed of brick fragments, itself placed on a layer of mud bricks, which seems to be the base of the foundations. In the southern part of the facade, the remains are more difficult to interpret. A deep excavation was conducted in the north-east corner, outside Room 1. There, a construction break in the wall is visible, between Room 1 and Room 27, to the north, which may correspond to different phases of the same period of construction rather than to different construction phases. To the north, the foundations of the eastern wall of Room 27 have three courses of mud bricks laid on their edge, and then a row of fired bricks and three others laid flat. The north wall of Room 1 stands 0.45 m

7. Many such striations carved by the faithful are attested on the jambs of the doors of most shrines, for example, near the baths in the chapel of Achoris (LAUFFRAY 1995a, p. 136, figs. a, b, c). This practice is still alive in Egypt and other African countries, and the aim is to gather sandstone powder to make talismans and magical remedies (GAST 2003, p. 27).

8. The width of the central span (4.6 m) is, however, not large enough for us to definitely rule out the possibility that it was covered.

high. Its western corner is visible, but the other parts were removed by the later construction of a well. In the corner, a pillar (0.80 m wide and 0.25 m deep) is engaged in front of the last row of columns. It is built of fired bricks laid with mortar. In this wall, three stone blocks appear, embedded into the masonry. The southern wall of Room 1 has disappeared, but its limits are marked by the paving of the hall, and it appears to have been similar to the north wall. To the north, the eastern facade of the baths perhaps leans against the wall of an older building.

The six columns of the peristyle are now preserved only to the height of one drum. They were baseless and without moulding, placed on a square die with bevelled corners in their upper part (fig. 7). Five of them were found *in situ* when discovered, the sixth was placed back onto its die. The height of the preserved drums varies between 0.38 and 0.54 m and their diameter of 0.55 m is uniform. Many still have on their top faces the mouth and the cavity where the mortar was poured to affix the upper drum. Two capitals belonging to the baths were found (figs. 8–9). One was lying at the foot of the columns on the stone floor, the other, identical, was re-used in modern buildings that reoccupied the site.⁹ In fact, they are only the upper parts of two, extremely pared-down Corinthian capitals, of the so-called Nabataean style (see below on the architectural elements). Their shape fits a square of 0.88 m wide and a rectangle of 0.21 m tall. They have no pattern or decoration, with four prominent and smooth corner horns, and a very prominent axial rectangular button on all four sides. The six drums and two capitals found on the site were covered with a white painted plaster with traces of red and yellow colour.

Room 2, accessed from Vestibule 1, is an elongated rectangular space measuring 85 m². Its large width and the absence of intermediate support suggest that it was not covered, making it a courtyard. A sewer, whose orientation is approximately north/south, is visible in a gap of the floor. It was taken out of service by the last pavement and its vaulted cover has disappeared; it was therefore in use in an earlier phase of the room. Its width is 0.51 m and (preserved) depth 0.65 m. The sewer had a mortar floor and its walls and roof are made of fired bricks. The walls are of irregular alternating stretchers and headers. The floor has a slight slope southward. To the south, the sewer is connected to another branch coming from the west. Another sewer going eastward is covered with slabs; one, in the southwest corner of Courtyard 2, is pierced with three holes: it is a floor drain positioned at the lowest point of the pavement. The floor of Hall 1 and Court 2 has undergone some repairs with limestone slabs and bricks. The current level of the slabs is not regular, in particular in Room 2. In Room 1, the subsidence of the slabs and columns is more pronounced, as a result perhaps of the fall of the vestibule roof during its destruction. Similarly, the two columns to the west are less embedded in the ground than the other four.¹⁰

The western wall of Room 2, which corresponds to the eastern facade of the “thermal section”, is preserved throughout its length (19 m) and its width is 1.20 m.¹¹ The paving of Courtyard 1 was made after the construction of this wall. Its structural form seems to prevail in most of the building: the wall, still standing at points up to 0.87 m high, was built in its lower part with several courses

9. This capital is currently kept in a store that holds all the blocks from the bath area.

10. This may suggest that the two columns are set upon on the razed wall, which was the eastern limit of the first bath building: see Construction Phase 1, *infra*, p. 228.

11. The thickness of the walls of the different parts of Sector A varies between 0.45 m and 0.90 m. Therefore, this wall stands out by its great thickness, which recalls the structures of Sector B.

of fired bricks bound with mortar. Its elevation was coated with paint, placed on a layer of mortar 0.02 to 0.04 m thick. The construction system of the lower part of the structure is interrupted at irregular heights and is topped by a magma of tamped mud, broken bricks, mortar, plastered fragments with traces of paint (now called *mouna*), which was covered with mortar and plaster (fig. 10). The association of these two different construction techniques can certainly be explained by the constraints imposed on the walls: foundations and lower parts of the walls were directly exposed to water and high temperatures and thus had to be built in regular courses of resistant bricks, while their less exposed elevations were built in *mouna* made of mud and reused materials. The coating of the wall bears traces of a painted decoration consisting of a register of white paint at the bottom and another of red paint from about 0.70 m above the ground. A black line separates the two registers. The lower strip still has droplets of red paint on a white background (splashes or deliberate decoration?).

The western wall of Room 2 has five engaged pillars on its eastern facade, built at the same time as the wall; they are between 0.50 and 0.53 m wide and from 0.24 to 0.30 m thick. Their regular position (average spacing: 2.9 m) does not match the range and position of the columns and walls of Room 1, located in front of them. They probably belong to an earlier stage of the baths, before the construction of Room 1. The wall has four doorways in the centre of each of the four spans separated by pillars. They are respectively, from south to north, 0.84 m, 0.75 m, 0.84 m and 0.75 m wide. In the final stage of the baths, the two centre doorways were blocked and the coating that covers the facade was redone. While the second door from the south was blocked, an outlet channel (0.16 × 0.11 m) was set in the floor, coming from Room 3 through the blocking.

A rectangular swimming pool (30), of 18 m² (3.6 × 5 m), is located in the north-west corner of Courtyard 2, adjacent to the northern pillar of the western facade. The facade of the pool shows traces of the same painted plaster as in Room 2, but this time the red paint starts lower, at 0.43 m above the ground. This difference in height may be explained by the sharp slope of the court's floor from the north to the drainage outlet located in the south-west corner. At one point, the red paint is reduced to a band of 0.07 m and painting continues over unidentifiable (geometric?) painted patterns. The pool is very damaged (its north-west corner is destroyed), but its construction mode is still visible at the south-east: it consists of the two already described techniques (fired bricks in the lower part, and *mouna* above the water level of the pool). The pool is 1.20 m deep in the south-west and 1.25 m in the north-east, where the plughole is situated (0.10 m in diameter). It was accessed from the south through a wide bay equipped with a bench, reached by a step on the north-west corner of the Court 2. From this bench a three-step staircase led down into the pool in its south-west corner. On the other three sides, the pool had a peripheral bench limited by a chamfer. Above it, no traces of paint are preserved on the walls. The floor of the basin consists of pebbles bedded into the mortar. A small wall of one brick thick, uncoated, using four different modules, divides the pool into two parts. This late construction remains unexplained so far.

Another swimming pool (10), symmetrical to Pool 30, is located in the south-west corner of Courtyard 2. The white coating that covers its facade is well preserved, as well as a skirting board of 0.07 m thick and 0.20 m high, also coated. This plinth continues but it is hidden below the floor of Room 9 located to the south. The rectangular Pool 10 covers an area of 19 m² (4 × 4.8 m); it is better preserved than the northern one. Its depth, under the peripheral bench and in front of

the three steps occupying the north-east corner of the basin, is 1.15 m and 1.25 m at its deepest, in the south-east corner, where the drain is located. As in the north, the basin was accessed through a bay that occupies its entire width. It was equipped with a front bench 0.38 m high, reached by a step 0.20 m high. The other three sides have a bench of 0.40 m high. The front seat was covered with three stone slabs; one is still *in situ*. The floor of the basin is made of the same mortar with pebbles as in Pool 30, with a repair in the south-west corner still showing traces of smoothing with fingers. In the south-east corner, the plughole is made of a ceramic pipe of 0.10 m diameter. The walls are preserved to about 0.30 m height above the bench and have white painted plaster decorated with black vertical lines alternately placed every 0.30 m and 0.40 m, clearly imitating panels of orthostatic masonry (fig. 11). To the south, the central part of the bench is interrupted by a structure with a semi-circular coated niche,¹² which was later blocked up, raised and coated again. The structure and the blocking of the niche are built with courses of fired bricks and mortar, while the western part of the basin and its south-east corner are built in *mouna*. The imprint of a ceramic pipe supplying the basin is visible in the mortar of the niche. While Court 2 was likely not covered, the two pools were probably indoor and opened onto the court via an arch.

Service Rooms, Cloakrooms, Latrines

The eastern section of the baths (front door, peristyle Hall 1 and Court 2) is flanked by two sets of annexes: cloakrooms, latrines, open spaces and probably service or care rooms. Both sets are accessed from the court by two corridors (29 and 9); they share the same floor of fired bricks arranged in chevrons with the neighbouring rooms.

The Cloakrooms 28 and 08

The south-western part of Room 28 was destroyed by a later well. This room and its southern counterpart (08), both almost square, cover an area of 22 m² (4.5 × 4.9 m). They are accessed on their west side, fully opened, by a portico consisting of a column on the front associated with the two north and south wall heads forming pilasters at their ends. The column (diameter 0.55 m) is built with triangular fired bricks covered with red painted plaster, and placed on a die of about 0.15 m high and 0.64 m square, painted white. A bench (0.30 m high) in Room 28 has been fitted against its northern and eastern walls at a second stage, since one can see traces of a red coating on the walls, where the seat once was. The construction of the current floor is contemporary with the construction of these benches, or later. On the wall, above the north bench, black lines are used to imitate panels of orthostatic masonry, similar to those adorning Pool 10. In Room 8, less well preserved, remains of a bench are visible to the east. These benches (and niches that may have existed above) suggest that the two rooms were used as changing rooms. The western facade, wide open, might probably have been closed by fabric suspended between the walls and the central column. The function of the next Room 36 (to the north), and Rooms 16 and 17 (to the south) is unknown. Room 15, which

12. No trace of such niche is visible in Pool 30.

is fitted with a bench in its southern part, may also be a cloakroom. Corridor 35 is accessed from Corridor 29; a pivot-stone might indicate that a door closed this passage. Corridor 35 led to the hypothetical Terrace 27, equivalent to Terrace 7 located to the north.

Terraces or Porticoes 27 and 7

Located at the eastern end and flanking the entrance, Rooms 27 and 7 are both long spaces (8.6 m long × 2.3 m deep) that could be interpreted as terraces. The south wall of the southern Terrace 7 forms a pillar suggesting that these two rooms were equipped with a portico opened onto the street. To the north, the circulation level of Room 27 is higher than in other rooms, suggesting that the terraces were slightly overhanging the street. This higher level necessitated a sloping floor in Corridor 35 that leads to Terrace 27 (a stone threshold is still preserved between the two rooms). Corridor 35 opens onto Room 27 and northern Latrines 39, through a small Room 37, equipped with a bench. The passage that connects Terrace 37 to Latrines 39 runs above a slab placed over the channel that flushes them. The complex located south of the Court 2 is much less well preserved and its facilities are more difficult to interpret. Nevertheless Room 18 is probably another collective latrine.

Latrines 39 and 18

Latrines 39 are rectangular in shape and measure 30 m² (4.4 × 6.7 m). A wide (0.45 m) and deep sewer channel runs along its four inside walls (fig. 12); it was once topped by benches or seats, supported by beams whose recesses are still visible in the north and west walls of the room. A shallow channel, still preserved, ran in front of the seats and allowed users to draw clean water to wash. The deep sewer received wastewater from Pool 30 and perhaps also from the “thermal section” of the building. After flushing the latrines, water was evacuated to the west. The peripheral bench probably measures 17.5 linear metres along the four sides of the room, which could accommodate between 20 and 30 people. The southern part of the latrines was destroyed by a later well. What may be latrines (18) to the south had apparently similar dimensions and equipment. Their remains are poorly preserved, and only the southern part of the peripheral deep sewer is identifiable. The arrangement of these latrines, with long sides oriented north/south, is different from Latrines 39, oriented east/west.

Room 38

Room 38 is probably a service room. It contains many constructions that are still difficult to interpret, such as a thick wall north of Pool 30 that possibly belonged to a first stage of the baths. To the east lies the sewer conducting the entire baths' wastewater to latrines further north; this may indicate that the sewer and latrines were built more recently. A well built in modern times makes it difficult to describe and interpret this still partially excavated space.

Sector B. The Thermal Section

The thermal section differs from other sections through the technical characteristics of its constituent rooms (fig. 13). It covers an area of about 350 m² and is organized symmetrically along an east-west axis, slightly offset from the axis of Court 1. In the final stage of the baths, the easier one to understand, Court 1 led to five hypocausted rooms (11, 3, 12, 4, 32) and a sixth without hypocaust (31). The walls of this section are on average 1.15 m thick, much thicker than in Sector A. Rooms 11 and 31 were entered through two doors south and north of the western wall of Court 2. Most often, the walls that separate the heated rooms are preserved only at the level of their foundations and hypocausts. In the best cases, they stand c. 30 cm above the level of circulation. Rooms 11, 3, 12, 4 and 32 still have their hypocaust pillars, made of rectangular or square bricks. The ruined walls do not reveal the position of the doors leading from one room to another, but it seems appropriate to place them directly above the passageways connecting the hypocausts. The hot air circulated through the regular grid of square and rectangular pillars (*pilae*) supporting arches. These pillars are between 0.30 and 0.45 m on one side and are arranged in east/west lines separated by 0.45 m; their distances vary between 0.65 m and 1 m in a north-south direction. The hot air warmed the hollow floor (*suspensura*) supported by the arches and then escaped through the chimneys built inside the walls, apparently without tubing, at least in the last stage of the baths. The bottom of the hypocaust consists of brick paving and the *suspensura* (total thickness: c. 0.35 cm), supported by the pillars and arches, was built with *bipedales*,¹³ then a layer of mortar and lastly a probable stone paving.

An aqueduct, visible in several places, seems to circle the thermal section from outside; it supplied the boilers, different tubs, basins and pools with cold water (fig. 14). The wastewater of these facilities was used to clean the floors of the rooms. The remains of ruined vaults in brick are preserved inside the rooms of the thermal section (fig. 15). They provide information on the roof architecture of this section.¹⁴

Rooms 11 (south) and 31 (north) measure just over 12 m² (4.5 × 2.8 m). Room 3 is larger and occupies almost 20 m² (5 × 3.9 m). A *bipedales* is still visible *in situ* in this room as well as mortar bearing the footprint of the stone slabs of the, probably looted, flooring. In its final state, Room 3 was only partially heated. A gap in the floor shows that the eastern half of the hypocausts was no longer used and is filled with discarded fragments of bricks and mortar, on which the current pavement lies. In the centre of the eastern wall of Room 3 is a chimney connected to the hypocausts, even after their partial abandon.

A door, now blocked, can be seen in the centre of the west wall of Room 31. It led to Room 32 located further west. A gutter was pierced through the blocked-up doorway to evacuate wastewater from 32 to 31. To the south a door opens onto Room 3. Room 11 is poorly preserved but a chimney is still visible in its eastern wall. Part of this room and its neighbours 3 and 12 appear to

13. Two-foot-square tiles.

14. The remains *in situ* need to be checked more precisely to understand the construction system used for the lateral walls of the thermal part that received the haunches of the brick vaults. They may have been built of fired bricks rather than *mouna*.

have been disturbed by a large pit, which perhaps corresponds to old excavations for recovering material, or to a failed attempt to dig a well. However a probable access can be restored from Room 11 to Rooms 3 and 12, even if the doorways are not preserved.¹⁵

The large heated Rooms 12, 4 and 32 measure approximately 48 m², including the pools to the north and south and the apse in the central Room 4. The latter is shifted 1.12 m to the west compared to 12 and 32. These large rooms are all equipped with pools of different sizes. Room 12 has a protruding plunge Pool 21, located in a deep semi-circular apse of 2.80 m, in its south wall. It is accessed by steps and provided with a peripheral bench. The trace of a single bathtub, partially dismantled, is also visible in the south-west corner of the room. Two other small tubs, 22 (0.86 × 1.64 m) and 23 (1.50 × 1.20 m), built on the floor of the room, occupy its western end (fig. 16).

Room 4 has an axial apse to the west (width 3.80 m, depth 2.40 m), which occupies the entire width of the room. It hosted a basin (*labrum*) whose pedestal is preserved, placed on a base using a “bundled papyrus stalks” column drum (figs. 17–18). A sandstone basin was discovered (fig. 19) in the stoke room located just west and below, but it does not seem to fit on the pedestal.¹⁶ The basin of this *labrum* has disappeared, as well as its water supply (the level of the aqueduct that runs along the west side of the baths is too low to supply the *labrum* with water by gravity¹⁷). Finally, the small individual Bathtub 24 (0.70 × 1.60 m) occupies the south-west corner of the room.

Room 32 has a semi-circular apse (2.50 m width and depth) to the west and off-centre to the room, in which is built Pool 26, very similar to Pool 21 in Room 12. Here also an individual bathtub, 25 (0.95 × 2 m), is built in the south-west corner of the room. Individual bathtubs are all placed on the *suspensura*, unlike Pools 21 and 26, whose floor is about at the same level as the bottom floor of the hypocausts. Room 32 still has considerable fragments of its ruined vault on the floor of its collapsed hypocausts. It consists of several superimposed arches of fired bricks set on edge. The walls of this room were coated with white plaster and the floor was made of limestone slabs.

Heating Rooms and Stoke Room

To the west of the thermal section are three furnaces used to heat the baths. The furnaces located north (33) and south (13), fitted with a boiler whose base is partially preserved, are built at the eastern end of two oblong service Rooms 34 and 14 of approximately 12 m². The location of the boilers is marked by the remains of fired brick structures, which probably supported the metal boilers. The furnaces had three or four vertical chimneys formed (or rather dug *a posteriori*) in the thickness of the wall (figs. 20–21). The circular furnace located under the boilers opened onto three horizontal wide heat ducts, north-east, east and south-east, which joined the hypocausts of Rooms 12, 4 and 32. The central furnace was accessed by a small Room 6 of 13.50 m². Rooms 34, 6 and 14 were covered by a fired brick vault, topped with a terrace. The terrace of Room 6 is still in

15. When these rooms were surveyed, they were not totally excavated. Description and analysis need to be completed.

16. It could have been placed in the service rooms of the heated part or belong to other buildings to the west.

17. Some hypotheses can be proposed to address this issue: a supply conduit whose remains have disappeared (a metal pipe for example) may have been hung on the facade, above the current conservation level. Supply may also have been manual, inside the room, or rather from the outside service terrace above Room 6.

place, but that of Room 34 is ruined, lying on the floor. The western facades of these chambers were completely open (fig. 22). The excavations ended there in a high berm, and while the other sides of the baths seem to be surrounded by a residential area, it is not known what their environment to the west once was. A segment of aqueduct is preserved, though ruined, north-west of Boiler 13. It passed in front of the north-west chimney and was certainly connected to the aqueduct running along the facade. It was probably formerly located at the start of the vault and on the upper part of the boiler (which was completely destroyed during the recovery of its metal components). This canalisation might have supplied the boiler from the north and gives an indication of its maximum filling level. Another pipe, probably in metal, came from the boilers to supply the hot pools, but has now disappeared. The walls of Service Rooms 14, 6 and 34 show remodelling and repairs. They will be described in detail in the second part.

Elevated Tank and Cistern

A thick brick structure, 41 (3.50 × 3.80 m), leans on the north wall of Room 32 (thickness: 1.45 m). It is associated with a deep Cistern 42. Structure 41 has in its lower part a vaulted room of 5 m² (2.10 × 2.35 m), coated and accessed through a door at the bottom of Tank 42 (fig. 23). This structure is probably the bottom of a now disappeared water tower used to supply the aqueduct that runs along the front of the boiler rooms in the west, but also the one that seems to continue north and east, to Latrines 39 and, beyond, to cold Pool 30. A siphon is still visible in its place, 1.20 m east of the water tower. A large channel supplied the rectangular Tank 42 from the west and an oblong depression is recessed in the floor of the tank. These facilities are probably related to the operation of a *sakieh* for raising the water from Cistern 42 to a water tower, 41.

A second tank, 43, circular, is located west of 41 and 42. It shows signs of repairs: there are several inflows and outflows at different heights on its circular wall, and the pipes heading northwards are blocked. Here again, an oblong depression was dug at the bottom of the tank. As will be seen, it could be again a well for a *sakieh*. Tank 43 was completely filled with ash when discovered. It was most likely abandoned before the baths and served in its final state as an ash dump for the heating area of the baths.

Other Devices

North of Tanks 42 and 43 is a manhole for a sewer, draining the wastewater of Latrines 39 westward. Another sewer, parallel to it, was found south of the south-west service Room 14, in the small Courtyard 45. This long channel, covered by bricks laid diagonally each against the other, corresponds to the end of the sewer coming from Court 2 and running all along the south exterior wall of the heated Rooms 11 and 12. These drains lead wastewater westwards, probably to the Nile.

The excavations of the south-western and north-eastern limits of the baths unearthed two residential areas built of mud brick, containing several *tannur*-s (domestic ovens), stone elements for kitchens and lots of ceramics (*dolia*, lamps, culinary vessels etc.). A survey conducted directly south

of Room 18 revealed also, almost 2 m below the Roman bath, a small private Hellenistic bathroom, consisting of two rooms, one (49) with two adjoining hip-bathtubs, the other (50) fitted with an individual bathtub (fig. 24).

PHASES OF CONSTRUCTION

The detailed architectural survey of the baths allows us to identify the different construction methods employed, using fired bricks and mud bricks for masonry and arches as well as stone architectural elements.¹⁸ But, above all, it has also highlighted numerous transformations, more or less important, carried out on the building. The in-depth examination of three sectors in particular helps to distinguish clear chronological sequences: the south-east sector (Rooms and Basins 11, 20 and 21, and peripheral areas), the west/north-west sector (boiler rooms, hot pools and hydraulic devices) and the central and north sections (distribution rooms and articulation between the heated and cold areas). The evolutionary pattern established on the basis of the examination of these three sectors points to six main stages of construction and transformation of the Karnak baths, detailed below.

Construction Phase 0

[Grey in fig. 25]

The southern section of the baths (Latrines 18) is built about 2 m above the remains of two rooms (49 and 50) in which one can easily recognise a small Hellenistic bathroom. The north wall of Room 49 serves as the foundation of the south wall of Room 18, which presents a different technique in its construction. Further east, south-east of Room 17, a wall with a white plastered niche, certainly also belongs to this earlier construction. West and north-west of the baths, two elements seem also to be associated to an earlier phase: north-west, an L-shaped brick wall, of which two courses are visible under Tank 41, follows a different orientation from the bath. It probably belongs to a building destroyed by its construction. South-west, in the service room or Court 45, a second structure, oriented close to the first wall but probably belonging to another building, was also uncovered under the circulation level of the baths.

The remains from before the baths existence are too rare for the prior organisation of the area to be reconstructed. The discovery of the bathroom (49 and 50), however, indicates that the area was inhabited and that the remains of domestic constructions were sufficiently visible to be used as foundations for the baths. The sector would have normally been levelled and slightly elevated for the construction of the Roman baths, but the construction of the half-buried service areas and stoke room, to the west and north-west, forced the builders to dig into the existing levels, and thus to expose the previous structures and walls. From a chronological point of view, the bathroom clearly belongs to the Hellenistic period, but it is impossible to give a more precise date for the other elements.

18. These materials are the same as those used in general in domestic architecture at Karnak, as mentioned in papyri and described by LAUFFRAY 1995b.

Construction Phase 1

[Red in fig. 25, proposed reconstruction fig. 26.1]

Several walls and constructions about the south-east corner of Room 11, on the south side of Rooms 11 and 12 to the south, on the north side of Room 32 and on the facade of Room 31. Thus all the imposing masonry of the thermal section (Rooms 3, 4, 11, 12, 31 and 32) belongs to the initial nucleus from which the baths were developed. It leads us to restore, for the hot rooms, a perfectly symmetrical layout in the first phase.

South of Room 11, the masonry of this first phase is readable only in its southern aspect, which is slightly protruding (0.15 m). A curved canalisation is preserved in the heart of the masonry, in the corner, but we lose it to the north. In the south, it flows into a larger sewer that runs through the wall from north to south. These two canalisations located below the circulation level of the room may have originally been intended for the drainage of Room 11. The curved part probably collected the wastewater of a device (basin or sink) placed somewhere further north that was subsequently destroyed. The water flowed further south in a sewer. The one currently visible is a more recent device (Construction Phase 5, see below), but an older one must exist, probably leading westward, along the initial south facade.

The northern exterior wall of 31–32 has a widely recessed ledge of 0.35 m in its elevation, creating a protruding base that may have accommodated an aqueduct in a first state. Room 32 is very incomplete on the plan because of a large portion of the roof vault collapsed in its middle. However, its original inner elevation is preserved in its lower part. In the western section of the baths and in the furnace rooms, it is difficult to distinguish what could belong to the first phase, as the changes and additions were numerous. The oldest part—but it is impossible to say whether it belongs to Phase 1 or 2—is a small portion of the masonry in the middle of the exterior western wall. Its presence points to the absence of an axial furnace in the original plan. Beyond this observation, it is impossible to restore the western facade of the original building, as all the western rooms belong to a later construction phase (Phase 4, see below). In the heated rooms, the lower parts of the walls had chimneys in their thickness, which show the presence of a hypocaust device from Phase 1 in Rooms 3, 4, 12 and 32. However, apart from these chimneys, only the irregular presence of some circular bricks re-used in the masonry recall a more conventional hypocaust device, with the classic small round pillars, unlike the current one, with large rectangular pillars and arches. Apart from this, it is tempting to place Well 43 in Phase 1. It has an oblong depression (not drawn) built into its floor, characteristic of the drawing pits found with *sakieh* devices.¹⁹

The western wall of Court 2 can also be assigned to the first stage of the building. It shares, with rooms located further west, a symmetrical composition on the same axis. The distance between the pillars decorating the facade is quite regular (2.90 m), except for the deformations due to plaster repairs. In front of it, in Court 2, the wide sewer rendered out of service by the pavement of Phase 2 (see below) may also be associated with the first phase of construction. It drained the water coming from the hot rooms, through its western branch, and also water coming from a basin that will have existed to the north, since the floor of the sewer slopes south. One is then tempted also to connect Latrines 18 to Phase 1, which could have been flushed by this sewer from the north.

19. These devices are often mentioned in the papyri: REDON 2012a, p. 59. See their functioning in MÉNASSA, LAFERRIÈRE 1974.

Gathering all these data, it seems that the first baths building—whose remains are mainly preserved in the central section—followed a clearly symmetrical plan. It is not possible to restore the details of its organisation, but Room 4, with its axial position to the west of the building, could be the *caldarium*. In this case, at the location of the current Apse 5 and its furnace, a collective hot immersion pool (*solium*) possibly existed initially. We can then restore a symmetrical double-ring type building as in fig. 26.1. The entrance was from the *frigidarium*, 2, leading to the two *tepidaria*, 31 (north) and 11 (south), and the two hot rooms, 32 and 12, probably used as *destrictarium*/*laconicum*. Both circuits joined in the *caldarium* (4) and shared an axial exit *tepidarium* (3).

Frigidarium 2 was probably covered in this initial phase, as evidenced by the remains of pillars in its facade. Another similar wall must have existed in front of the latter, also comprising pillars at the same interval. The spacing of the pillars gives indication on the coverage, maybe a terrace (beams and joists carrying mats and earth for insulation), or more likely consisting of a series of parallel arches connected by joists (and then having a greater span). To the west, the heating system should consist of two furnaces associated with boilers inserted between the three hot rooms, a layout that will be reproduced and improved in subsequent phases. The central Hall 4, an axial *caldarium*, was certainly heated by the two furnaces. The small basin built in part into the south wall of Room 12 might also belong to this phase, but we cannot prove it.²⁰ If this basin belongs to Phase 1, it is likely that another one sat in the north-west corner of Room 32. These areas were not fully excavated during the survey of 2012 and their excavation will hopefully complete the description of the first building and check our assumptions. The alleged presence of Latrines 18 in the south and of a cold plunge pool north of Room 2, whose possible existence is only indicated by the abandoned oblique sewer in the court, allow us to restore a very hypothetical initial cold section, east of the heated section. However, the evidence is scarce and nothing proves that the cold section was also organised symmetrically.²¹ Nor is there much evidence to help us restore the initial extension of the baths to the east (were they preceded by a court?) nor to suggest that the street that runs alongside the baths already existed at that time.

Construction Phase 2

[Yellow in fig. 25, proposed reconstruction fig. 26.2]

During the Construction Phase 2, the cold sector seems to have been completely reorganised in order to give to the entire thermal building a perfectly symmetrical and monumental appearance. The construction of most of the annex cold rooms can be attributed to this Phase 2: the porticoed entrance Hall 1, Cloakrooms 8 and 28, Terraces 7 and 27, Latrines 39 etc. The coherent plan presented by the ensemble, except for a few construction breaks, which could correspond to different phases of the same construction (Rooms 7 and 27, for example, that may have abutted Vestibule 1), indicate that it was built at one go.

20. It could also have been built later; certainly before Phase 4, because the hypocausts are rebuilt, partly where the basin used to be.

21. If the organisation of the cold sector was asymmetrical (which can be indicated by our hypothesis of a latrine south and a basin north), it would be original and previously unseen. Many “semi-symmetrical” baths exist, but the cold sector still remains perfectly symmetrical, while the hot part is not (THÉBERT 2003, p. 319).

The remains show the installation of a cold plunge Pool 10 against the outer south-east corner of Room 11. This pool was accessed from the old cold room, now Court 2. Originally, effluent water from Pool 10 ran south-east, down into a sewer whose north/south part is preserved. Another sewer, which drained the runoff from Court 2, was probably built at the same time as the pool and joined the evacuation of the latter. The orientation of the subsequently blocked north/south sewer suggests that it ended in Latrine 18, receiving the water of the cold pool and the court. Another east-west sewer segment is visible to the west, south of Room 20, and its installation seems to be older than the amenities that surround it. It initially came from the south, possibly from Latrines 18. It may belong to Phase 2 or the previous one and is part of the same sewage system, downstream latrines this time. Both sewers (from and to the latrines) crossed an east-west wall evidently built at the same time. The north face of the wall, only visible, has some traces of white plaster just above the floor level, which suggests that a corridor would have existed between Pool 10 and Latrines 18 above the sewers. A section of masonry is preserved to the west, south of Pool 21; its conservation level and its location possibly related this section to the same wall.

In the western and north-western sections of the baths, the construction of Tank 41 (abutting the north side of the first building outside Room 32) can possibly be associated with Phase 2, since it seems to be set between Phase 1 and Phases 3 and 4 (see below). In front of Tank 41 to the north, the lower part of 42 is contemporary to the installation of Tank 41. The oblong depression recessed in the floor of Tank 42 corresponds to the installation of a *sakieh*; as a consequence the one associated with Well 43 in the first phase became obsolete. The massive underground Tank 41 could serve as a base for an elevated storage tank supplied by the new *sakieh* associated with 42. The water came into the lower Tank 42 by a wide coated pipe from the west, visible for several metres, possibly connected to the old Tank 43, which, if it was still in use, perhaps acted then as a settling pond. Once the water was lifted, it could supply the neighbouring pipes, be stored in the water tower, or be distributed by gravity throughout the building.

The axis of symmetry of Phase 2 does not match exactly with the original axis of the building: the offset is about 0.40 m. It was probably not visible to the bathers, and seems to support our hypothesis concerning the complete restructuring of the cold section between Phases 1 and 2. But in the new projection, while the cold sector is reorganised under a strict symmetry, the two cold plunge pools appear quite different from each other: Pool 10, for example, is significantly larger than Pool 30. It is thus possible that Pool 30, although abutting the facade of Phase 1, is older than Pool 10. The abandoned sewer of Room 2 could be linked with it, possibly joining Latrine 18 in a first phase (see above), and subsequently adjusted to the new plan of Phase 2. In a desire to restore a symmetrical layout to the building, this new projection gave the same equipment to the north and south rooms: therefore, each had a cold pool flushing the latrines that were associated with it.

To sum up, Construction Phase 2 aimed to give monumentality to the thermal building henceforth organised on a strictly symmetrical plan. The old cold room (currently Court 2) is destroyed and its equipment (maybe the Pool 30 and the Latrines 18) is incorporated into the new building and their counterparts (Pool 10 and Latrines 39) are built to achieve the symmetry required by the new programme. The installation of new hydraulic equipment (41–42) likely improves the supply of the new facilities and increases their performance. Entrance Halls 1 and 2 are now open areas, and only porticoes provided some shade to the bathers. The paving stone that covers the floor of

the court seems to exclude any hypothesis of gymnastic activities. The two cold pools were covered, but open by large arches onto Court 2. Cloakrooms 8 and 28 housed the people who undressed before starting their bathing circuit. The door that closed the access between Corridors 29 and 35 in the north possibly isolated Latrines 39. Thus, Terrace 27 was perhaps a direct access from the street to the latrines, making them public latrines.²² No transformation could be identified in the hot rooms at this time, probably because the potential changes were masked by later modifications. It seems that, following the new symmetrical plan and the so-called “imperial” model, the double ring circuit of the original building, sharing on the same axis the *Caldarium* 4 and the exit *Tepidarium* 3, is maintained in the second phase.

Construction Phase 3

[Blue in fig. 25, proposed reconstruction fig. 26.3]

The remains that can be attributed to a Construction Phase 3 are scarce. South of Room 11 and west of Pool 10, the small Pool 20 was added. Reached by two steps added in the south wall of Room 11, its evacuation was to the east, joining a north/south sewer connected with the east/west sewer described along with Pool 10 (see above). The cover of this east-west sewer rests upon the base of Pool 20 and is built into the west wall of Pool 10. This indicates that Pool 20 was built after Pool 10. This sewer also drained the wastewater coming from Room 1 through two pipes built in Phase 1.

Meanwhile, the small Room 40 was built, almost vis-à-vis Pool 20, north of Room 32, abutting the existing facade. To the west, it is also resting against Tank 41, confirming that the construction of the latter is older. Room 40, preserved only in its western part (its eastern limit was disturbed by a later pit), was accessed from Room 32, through a door of which only the base of a jamb is visible. This small room was completely plastered and displays a curved junction of walls and floor in its northwest corner²³ (the other corners are not preserved). This curvature indicates that water was used extensively in the room. The level of circulation and the door leading to it are not consistent with a basin, and indicates more probably a shower installation. It is tempting to postulate that this room and the southern one (20) were built at the same time, symmetrically with respect to the axis of the building, and that Pool 20 was flanked to the west with a similar small room to 40, opening onto Room 12, while Room 40 was equipped to the east by a pool similar to 20, accessed from Room 31. These two rooms, if they existed, subsequently disappeared, the southern one been replaced by Pool 21 (during Phase 4, see below), the northern one destroyed by the pit. This hypothesis would explain the presence of a small sewer segment extending from the assumed location of the north pool and leading water to the Latrines 39. It does not explain, however, the presence of very disturbed brick structures at the bottom of the pit. The excavations in this sector were too limited in 2012 to verify the hypothesis.

22. In this case, Room 36 could have hosted the ticket office, if it was not a service or storage room.

23. This is a coating placed at the base of the walls, forming a quarter circle to prevent water infiltration.

Construction Phase 3 only led to limited improvements, with the construction of two small square immersion basins north and south of Rooms 11 and 31 (entry *tepidaria*), and of two small rooms, maybe for ablutions (showers?) north and south of the hot Rooms 12 and 32. The construction breaks that separate structures belonging to Phase 3 and Phase 2 could possibly be the traces of different stages of a single project.

Construction Phase 4

[Green in fig. 25, proposed reconstruction fig. 26.4]

Unlike Phase 3, the bath building underwent significant changes during Phase 4, in particular in its heated section, both in its facilities (addition of hot pools) and in its circulation (duplication of circuits). During this phase the horseshoe Pool 21 is built south of Room 12, against the western wall of Pool 20. The east-west sewer, passing between Pools 10 and 20 and Latrines 18, is partially rebuilt or extended westward (a construction break shows that its reconstruction followed the installation of the foundations of Pool 21, which emptied into the sewer). The outer western and southern facades of the new pool are provided with a large corbelled cornice intended to carry a pipe for its supply. Further east, a low brick wall, added against the existing facade, carries the continuation of this aqueduct for the supply of Pools 20 and 10.

Other major improvements of this phase concern the western section of the baths. First, another horseshoe Pool 26 is built at the west end of Room 32, hiding the location of the original boundary of the room in the first three phases. The north wall of the pool is clearly lying on the south-west corner of 41 and its sewer goes north, then west, bypassing the well-*sakieh* 43.²⁴ The layout of Pool 26 (apse, bench, dimensions, construction technique) is similar to that of Pool 21, south of Room 12. The arrangement of Rooms 12 and 32 in the previous phases probably prevented these two pools being added symmetrically.

At the western end of Room 4, an Apse 5 equipped with a *labrum*, was built. Meanwhile, an axial furnace, without any boiler, was inserted into the masonry supporting Apse 5. This embedding is very clear in the lower facade of Room 5. Further south, the south-west corner of Room 12 seems to have been completely rebuilt, following a slightly different layout from that we presumed for Phase 1.²⁵ The probable aim of the remodelling of the western section was to improve the heating system. In addition to the new axial furnace, two impressive sets combining a furnace and a boiler were installed at each side of Apse 5, probably where the oldest furnaces used to be. The northern Furnace 33 is located between Apse 5 and Pool 26, while the installation of the southern one (13) required the construction of a wall to the south, to support the vault that must be imagined above the boiler.²⁶ These boilers occupy only the eastern part of the newly created stoke room. The oth-

24. The Well 43 is clearly anterior to Pool 26: the north wall of Pool 26 is slightly deviated to the south and the drain starting from the pool abuts the western wall of the well. Some access steps to the well were added in the elevation of the north wall of Pool 26 indicating that it was still in use during the construction Phase 4.

25. This shift is not yet explained, due to an incomplete excavation here, the lower parts of the building not being visible during the survey.

26. We consider that these changes, which are part of the reconstruction project of the heating system, belonged to the same phase with the construction of the two horseshoe shape pools. It is possible, however, that these two projects have been completed in two successive operations. Both north chimneys of Furnace 33 were carved *a posteriori* into the facade of Pool 26, not at the time of construction of the wall, as in the south. It may be necessary to restore a first stage in phase 4

er half was covered by a vault that provided, in front of the *praefurnium*, a service area for the staff, opening into the service court to the west of the building. The central furnace, embedded in an existing facade (built in Phase 1, see above), was also equipped with a vaulted Service Area 6, whose roof was supported by two added walls, perpendicular to the facade. It opened, like Rooms 34 and 14, into the service court located to the west.

A pipe is built along the western facade; it is similar to the canalisation built at the same time on the peripheral wall of Pool 21. Its circuit is visible from the Water Tower 41–42 to the southern Boiler 13. Just before the boiler a secondary branch supplied this boiler directly, while the main pipe was to join the south-east Pools 21, 20 and 10. Some of the visible changes in the superstructure of the *Sakieh* 42 are likely to be linked with the development of this water system.

The refurbishing of the boilers and the water system was simultaneous with the reconstruction of all the hypocausts of the hot rooms, which replaced the original installations. The new network of pillars was adapted to the new configuration of furnaces (including the new axial one) and to their multiple heat ducts. The ducts from the northern and southern furnaces are split into three branches, two for Rooms 12 and 32, and three for Room 4. The brick masonry built west of Room 4 in contact with Apse 5 keeps traces of this innovation, and re-uses in its foundation some elements belonging to the older phases. It is not possible so far to restore the original shape of the western end of Room 4 and to confirm the presence of a basin in the previous phases. In the south-west corner of Room 12, the pool, built into the south wall and belonging to an earlier phase, was destroyed by the installation of two pillars of the new hypocaust network. But the elevation of the basin could have subsisted in the form of a niche. During the survey, this area was still under excavation, and the description of the transformation of this corner has to be completed.

In the central and northern section of the baths, several changes appear to be related to this Phase 4. The two doors in the centre of the facade of the original building, between Court 2 and Room 3, are carefully blocked.²⁷ In addition, a doorway is opened between Rooms 3 and 31. The southern part of the western wall of Room 31 had to be cut to open this doorway, which shows that it was done at a later stage. Another doorway was also probably opened, for symmetry, between Rooms 11 and 3. The doorway connecting Rooms 31 and 32 is blocked,²⁸ and perhaps also the one that should have existed between Rooms 11 and 12. In Room 3, the eastern half of the hypocausts is abandoned and filled in, but a duct leading to the chimney built into the wall is arranged in the filling, in order to maintain the circulation of the hot air. The potential reasons for this transformation are numerous: it could be a repair after destruction, or a construction to support a basin or a pool. The hypothesis of heavy equipment installed in this location would also explain that the new doorways to the north and possibly to the south of Room 3 are shifted westward.

A reversal of the circuit in the heated section of the building explains the changes in the circulation and installation of the two Pools 21 and 26. Indeed, the double ring type is split into a double row type, the bather following the same route to and fro, retracing his steps, with two common rooms in

corresponding to the construction of the pools, and a second corresponding to the installation of the furnaces. It is also possible that the boilers operated from the beginning with only two chimneys and that the other chimneys were added during the next phase, when the boilers were raised to supply the new pools (see below, stage 5).

27. When the southern door is blocked, a drainage channel is arranged in the masonry from Room 3 to Court 2.

28. Here also a sewer for the wastewater is installed.

the axis. Half of the bathers follow the south circuit (*Tepidarium* 11, first and second hot Rooms 3 and 4, the last equipped with a *labrum* in its apse, and *Caldarium* 12, fitted with a hot plunge pool), the other half follows the north circuit, symmetrically arranged (31-3-4-32). The return was made via the same rooms the other way round. This assumption of a radical transformation of the bathers circuit explains the game observed in the blocked and pierced doorways, as well as the creation of the two hot Pools 26 and 21, aimed to provide Rooms 32 and 12 with the usual facilities of a *caldarium*.

This transformation, with minor changes, doubles the number of main hot rooms. Similarly, the double role of Rooms 11 and 31 (entry and exit at the same time) allows the insertion of Room 3 into the group of heated rooms. Thus, without extending the surface of the building, its capacity and likely profitability were increased. The result of this process is that the baths adopted its most monumental layout, of which a reconstituted perspective view is presented (fig. 28). The changes subsequently enacted in the building had a smaller impact on its overall organisation.

Construction Phase 5

[Purple in fig. 25, proposed reconstruction fig. 26.5]

The transformations of the building subsequent to Phase 4 are grouped into a single Phase 5. They may have occurred in several steps, but the state of preservation of the remains does not allow for any distinction.

During this phase, Pool 20, south of Room 11, was filled and turned into a small tiled room. The passage leading from Room 11 to the pool is turned into a doorway by installing two jambs, while a second is opened between the new Room 20 and Pool 21, adjacent to the west. Moreover, the aqueduct that ran along the south facade of the baths is raised (c. 0.15–0.20 m) and equipped with a siphon between Pools 10 and 20. This deviation, which allows the pipe to be lowered below the level of internal circulation, was probably needed to allow a passage between the baths and the southern sector (Rooms 19 and 18). This adjustment is certainly to be linked with the transformation of the old Pool 20 into a paved room. It is tempting to associate this new circulation with the redevelopment of Rooms 18 and 19. North of Room 19, two square pillars are built on a stone floor and a ceramic pipe, preserved over 2 m in length, was installed along the interior western wall of the room. The wall has vanished and only the remains of the pipe allow its location to be presumed. The altitude of the pipe indicates that it came from the canalisation along Pool 21. Thus, it was a supply of clean water, of which its southern destination remains unknown. Also, Latrines 18 were abandoned and covered with a baked brick floor probably during this reorganisation of the southern part of the baths. The floor also covers its northern, razed wall. The new Space 18 was enlarged and extended until Pool 10. A new sewer was installed at the outlet of Pool 10 and along its southern facade, connected directly west to the main east/west sewer, passing south of Rooms 20 and 21 and Service Rooms 13 and 14.

In the western sector of the baths, the most visible change is the installation of the small individual bathtubs, 22, 23, 24 and 25. They are all four built directly on the floor, above the *suspensura* and partly embedded in the wall of Rooms 12, 32 and 4. The Bathtubs 23 and 25 are built just in front of Boilers 13 and 33, only separated by a thin wall of brick that was probably integral to the furnace. The other two bathtubs, 22 and 24, slightly smaller, are not far from Boiler 13 and would also have benefitted directly from its heat.

The raising of the aqueduct that runs along the building on its western facade, which seems to be linked with the changes already identified in the south-east sector,²⁹ most likely belongs to Phase 5. This was probably connected with the construction of the new Bathtubs 22, 23, 24 and 25: the floor of the previous Basins 21 and 26 (and of the two cold plunge pools) is located at the same altitude as the hypocausts lower floor and their filling level corresponds approximately to the level of circulation on its upper floor. The new bathtubs, however, built above this level, need a higher supply. The boilers necessarily undergo transformations also, and they seem to have been raised in order to supply hot water, by gravity, to the new tubs. Moreover, it seems impossible that the construction of the Bathtubs 23 and 25, so close to Furnaces 13 and 33, did not lead to their refitting. It may be during this reconstruction that additional chimneys were added, carved into the south wall of Pool 26. This raising of the water supply network evidently also led to transformations in the technical area 41–42: for example, to the west of the Water Tower 41, a new arch is installed for carrying the new aqueduct. A little further on, in the fill of Room 34, the excavations unearthed a long, collapsed masonry element, with a broken segment of the aqueduct. Better preserved than elsewhere, it provides some information: the depth of the pipeline was about 0.20 m, and an edge in its upper part was to receive slabs to cover and protect the pipe. To the west of the pipe itself, a plastered flat surface corresponds to the extrados of the vault of Room 34, which was therefore a terrace. The Tank-*Sakieh* 43, already replaced by the 41–42 group, was perhaps at that time abandoned as a settling tank/cistern and used as an ash dump (see above).

Other changes are also visible in the heating system. The heating conduits connecting Boilers 13 and 33 to the hypocaust of Room 4 were carefully obstructed by brick masonry, as were the passages between the hypocaust of Room 4 and Rooms 12 and 32. After these transformations, Room 4 is thus heated by a single furnace, located on the symmetrical axis of the building, while Furnaces 13 and 33 are used respectively to heat Rooms 12 and 32. Therefore, the heating system, central so far, became adjustable: it was possible to heat a single room more intensely than another, or to heat only a small part of the building.

Unlike the previous Phase 4, when the changes led to the rebuilding of at least some vaults covering the building, the changes made during Phase 5 are unlikely to have caused significant structural works. Other constructions, however, must be linked with the raising and improvement of the boilers, for example, the addition of the two Service Rooms 14 and 34 against the west front of the baths. Their vaults are built in the so-called “Nubian” technique, unlike the more ancient vaults of the building that used the “barrel vault” technique.³⁰

Other remains, still being excavated during the architectural survey and only drawn schematically on the plan, can probably be attributed to Phase 5. Of particular note is an impressive curved wall, with fired bricks in its foundations and mud bricks in its elevation, located north of Room 44. It abuts the north-west corner of Pool 26, at the level of the peripheral aqueduct coming from the east. This location and its curved path might suggest that this wall was the substructure of another aqueduct, perhaps intended to supply other buildings further north and west. This adjunction, sharing the baths’ water system, seems however independent of the operations of the bath itself.

29. This transformation causes, for example, the blocking and raising of the niche of Pool 10.

30. On the two techniques, see AURENCHE 2004, p. 171, figs. 480–482 and p. 175, fig. 492.

The installation of a hypocaust in Room 11 can also possibly be attributed to Phase 5. During Construction Phases 1, 2 and 3, Room 11 and its counterpart 31 to the north do not appear to have been fitted with under-floor heating. The construction of the hypocaust is, moreover, slightly different from that of the hypocausts built in Phase 4: the side piers do not rest against the walls of Room 11, as they are in other heated rooms, but are slightly shifted.³¹ In the northern sector, against the north wall of Room 40, a siphon is visible in the aqueduct path. Its layout is similar to the southern one preserved in the line of the aqueduct, probably designed to give access from the bathing circuit to Room 19. Only the start of the northern siphon is preserved and its position is not symmetrical with the southern one. Its construction could also be explained by the opening of a doorway, which led from a service area to the bathing circuit. A wall north of Room 32 may, by default, also be attributed to Phase 5: it may be the last remnant of a structure that would have replaced the pool of Phase 3 restored at the same location. Finally, Room 31, symmetrical with Room 11, is not provided with a hypocaust. This shows that at the time of Phase 5 there was no longer an insistence on symmetry, as already illustrated by the construction of Bathtubs 22, 23, 24 and 25 and the opening of a doorway to the south.

The architectural changes of Phase 5 probably went along with changes in bathing practices. The addition of the small Bathtubs 22, 23, 24 and 25 probably corresponds to a new desire for individual hot baths, promoting privacy and hygiene, rather than collective practices. The opening of a door to the south and the redevelopment of Areas 18 and 19 might be considered as a partition of the baths into two independent retrograde circuits. In this case, the largest (north) was organised around Halls 1 and 2 and Rooms 31, 3, 4 and 32: the second one, simpler, to the south, comprising Rooms 18–19, 20, 11 and 12. Several arguments strengthen the hypothesis and are illustrated in fig. 26: for example, the construction of two small basins in Room 12, against only one in Rooms 4 and 32, the changes in the hypocaust connections to give independent heating possibilities to the main hot rooms, and finally the construction of a heated floor in Room 11. If such a partition in two independent circuits had existed, it implies that the door connecting Court 2 and Room 11 must have been blocked, and that the door leading from Room 11 to Room 12 was re-opened at the same time. However, even if worth considering, this hypothesis of a double circuit (one for men, one for women?) is hardly demonstrable and the abandonment of Latrines 18 in the southern part would be difficult to explain in that case.

Construction Phase 6

[After the baths? brown in fig. 25]

Several elements uncovered during the excavations of the baths were constructed after the abandonment of its bathing function. The first two elements are a mud brick wall raised east-west on the baked-brick floor of Room 18 (backfilled latrines), in the alignment of the two pillars of Room 19, and a small rectangular pit constructed against the south wall of the baths, blocking the pipe located west of Room 19, which dates back to the previous phase.

31. Another reading of these remains is possible. The two rooms could have been equipped with hypocausts in previous phases and the hypocaust of Room 31 backfilled in Phases 4 or 5. However, there is no chimney, even blocked, in Room 31 and thus makes the assumption is less probable.

Many structures abutting the south-west and north-east of the baths and containing numerous traces of domestic installations are located on a roughly equivalent circulation level as the baths. Unfortunately, their stratigraphic relationships cannot be established and their organisation is far from being clear. They can probably be identified with houses built at the same time as the baths, but also after the end of the thermal function of the building. For example, south of Pool 22, a large *dolium* was installed above a ruined wall of baked brick that belonged to the baths. It is clear, in this case, that the house to which this *dolium* belongs was built at a time when at least this part of the baths was no longer in use. To the east, a mud-brick structure is visible, against the main facade of the baths, south of the entrance. It was set up in the street that runs along the *temenos* wall of the temple. In the absence of excavations, the time of its construction cannot be specified, but we can assume that these were shops encroaching on the street.

Some structures of medieval and modern times are still visible today in the midst of the baths remains,³² in particular, three circular wells³³ drilled through Rooms 16, 28 and 38. They were dug during the reoccupation of the sector by a residential area, probably long after the abandonment of the baths. The bricks used to build the wells are similar to the ones of the baths, showing that the construction materials of these late buildings were re-used. The two large pits identified between Rooms 38 and 40 and between Rooms 4 and 11 may be aborted attempts at well drilling, or excavations to recover building materials.

ARCHAEOLOGICAL MATERIALS AND DATING

The salvage excavations of the building did not manage to establish an overall stratigraphy of the area, but the archaeological material has been carefully registered. It is sometimes possible to date some of this, in particular the coins and a bundle of bracelets, which help to estimate the occupation and abandonment periods of the baths. The study of the pottery is under the responsibility of Mohamed Naguib (MSA). It is still on-going and has not been used in this article. Lastly, the study of archaeobotanical material has identified the fuel used for heating the building.³⁴

Coins

The coins found during the excavations of the baths were restored by Mahmud Samir Hussein Ibrahim and Ashraf Mostafa Ali Sayed (MSA) and partly studied by Thomas Faucher in 2012. If one considers only the coins discovered in the basins of the thermal rooms and in the tanks located to the north, it appears that the oldest dates back to the 1st–2nd centuries AD and the latest to the first half of the 4th century. The study is very preliminary and incomplete, since all of the coins have not yet been restored and read. Nevertheless, of the 34 pieces studied, 27 were struck between the last quarter of the 3rd century and the years 335–337 AD. 12 of them were discovered in Basin 21 and can be dated to the reign of Diocletian. None of the restored and examined coins was struck after 335–337.

32. The baths were covered by the Naj' al-Hassana district when excavations began. It included, in particular, a *marabout* shrine of local importance, which was removed before the architectural survey.

33. Ext. diam.: 1.60 m to 1.75 m, int. diam.: 0.70 m to 1 m.

34. See Bouchaud, Redon in this volume.

Glass Bracelets

Several black glass bracelets were found in one of the pipes of the baths (fig. 29). According to Marie-Dominique Nenna, who has only seen pictures of these objects, they belong to an identifiable group of pinch decorated bracelets that dates back to the second half of the 4th century and the 5th century AD.³⁵

Taking these artefacts into account, while aware of the weakness of any analysis in the absence of the examination of the other material, we can nevertheless assume that the baths could have been built during the Early Empire and abandoned around the mid-4th century AD or even in the second part of that century (the coins may have circulated for years after they were struck).

Architectural Elements

Similar columns to those discovered in the court of the Karnak baths (consisting of non-moulded drums sitting on a stone base) are to be found in the *apodyterium* of the southern bath of Tebtynis in the Fayoum, dated to the late 1st century BC or early 1st century AD.³⁶ The two capitals found in the Karnak baths belong to the category of so-called Nabataean capitals³⁷ that have been discovered in a wide area ranging from Cyprus to Egypt through Arabia, and in particular in Nabatene (Jordan and southern Syria). The closest Egyptian parallel was found in another site of Upper Egypt, Kom Ombo.³⁸ It is described by Françoise Laroche-Traunecker as an “unfinished Corinthian” capital rather than a real “Nabataean” one. Some capitals discovered at Dush (Kharga oasis), whose form seems to have been simplified, received a painted and not a carved decoration, like those of Karnak,³⁹ which were stuccoed and painted red. Their simple shape could be an aesthetic choice, or may be explained as expedient measures imposed at the end of construction phases, as proposed by Françoise Laroche-Traunecker.⁴⁰ It is not possible to date precisely their manufacture, but the Karnak capitals may be dated to the Ptolemaic period or the beginning of the Roman period, given the parallels mentioned above.

This comparison does not allow a dating of the earlier states of the Karnak baths, as these columns may probably have been reused architectural elements from another previous building. In fact, several architectural elements of the baths (Construction Phases 2 and 3) appear to belong to one or more older buildings. For example, one of the jambs of the main door of the baths has votive vertical stripes, which could be remains of a previous cultic vocation. In the final phase of the baths, these ridges were covered with plaster, but we cannot say whether they are attached to votive practices related to the baths in its previous phases or to an older monument. In Apse 5,

35. The black glass appears earlier in well dated Western contexts of the late 3rd century AD (M.-D. Nenna).

36. HADJI-MINAGLOU 2009, p. 182 and 187, fig. 2 and p. 188, fig. 5.

37. LAROCHE-TRAUNECKER 2000.

38. LAROCHE-TRAUNECKER 2000.

39. To be more precise, the lower part of the Karnak capitals have disappeared (on purpose? from the beginning?) and this description concerns only their upper part.

40. The joint work of J.-Cl. Bessac and A. Raboteau on Cyprus is consistent with this hypothesis (BESSAC, RABOTEAU 2002).

located at the western end of Room 4, the support of the *labrum* lies on a base formed by a drum of a composed papyriform column that belonged to a Pharaonic monument, buried in the floor of the apse. Only its protruding surface was visible; it had a decorative function.

CONCLUSIONS

Typological and Chronological Study of the Roman Baths of Karnak

As mentioned, the artefacts found in the baths allow the different construction phases of the baths to be placed in a period ranging from the beginning of the Roman period (1st–2nd century AD) to the mid-4th century. Unfortunately, however, these dates are too imprecise and based on very few elements. Comparative work at the regional level may yet improved our periodisation. At the same time, comparisons are useful to better understand the place of the Karnak baths in the Egyptian and Mediterranean baths corpus.

The history of bathing architecture and its evolution in Roman times has been well studied in North Africa⁴¹ and is the subject of current extensive work in the Middle East.⁴² In Egypt, very few buildings dating from this period have been discovered and the history of their typology and of thermal practices is still difficult.⁴³ Despite the absence of clear stratigraphic data, the Karnak baths are, for the imperial Roman period, one of the best-documented Egyptian buildings, and their discovery offers the possibility to follow the evolution of a thermal building for about three centuries, a period for which, until then, little or nothing could be written about Egyptian baths.

One of the important features of the Karnak building, during its first three phases, is its imperial type, characterised by a symmetrical plan, the duplication of some rooms and a double-ring circulation, symmetrical along a central axis. This architectural type has been identified all around the Empire, though it remains exceptional in the Roman baths corpus, which consists mainly of smaller buildings. For Yvon Thébert,⁴⁴ this type, which was initially reserved for Rome and the largest cities of the Empire, allows, together with other monuments, for the identification of prosperous cities enjoying an important political or administrative role in their region.

In Egypt, the only other thermal building certainly following an imperial plan is found in Alexandria, at Kom el-Dikka. Built in an urban context (in the centre of the city), the baths date back to the second half of the 4th century AD and underwent significant changes until the second half of the 6th century.⁴⁵ The monumental scale of these large baths, which occupy nearly 6000 m², is not found in the baths of Karnak, which cover only 1200 m², and the imperial baths of Alexandria are rather linked with the great baths of the Middle East (Syria, Palestine and Arabia).

41. THÉBERT 2003.

42. Thanks, in particular, to the studies conducted in the frame of the *Balnéorient* project, between 2006 and 2010 (see BOUSSAC et al. 2014a). Concerning the great baths of Roman and Byzantine times in the eastern Mediterranean, see FOURNET 2012.

43. See Redon in this volume. Apart from the numerous Greek type baths, the other antique baths of Egypt belong mainly to the Byzantine period (see Fournet, Redon in this volume [b]).

44. THÉBERT 2003, pp. 287–318.

45. KOŁATAJ 1992.

In this region, the imperial type of baths were progressively introduced, mainly in the second half of the 3rd century, and became ever more monumental in the heart of the Byzantine period (5th and 6th century AD).⁴⁶

From a chronological point of view, the baths of Karnak, which are earlier than the Middle Eastern imperial baths, may be more comparable to the imperial baths of Africa,⁴⁷ assigned to the second half of the 2nd century until the second half of the 3rd century. Most of the 14 buildings of this type known in North Africa date back to the reigns of Commodus and the Severi, between 180 and 235 AD. Unlike in the Middle East, no known African building of this type was built after the Severan era. In the centuries that followed, the locals just took care and maintained the baths heritage they already had.

The similarity of the baths at Karnak with the African group is also clear in the dimensions of these imperial type buildings (fig. 30). Except for the gigantic Carthage baths, approximately 18000 m², the surface covered by the imperial baths of Africa ranges between 1500 and 6000 m². They are generally smaller than the Middle Eastern examples,⁴⁸ occupying an average of 6400 m², or the Asia Minor ones, with an average of 7700 m² for the thermal section, to which were added extensive *palaestrae*.⁴⁹ The Karnak baths, which cover an area of only 1200 m², are even smaller than the smallest African baths;⁵⁰ they are, in fact, the smallest imperial baths known so far throughout the Roman world. According to Y. Thébert, the construction of public baths of imperial type but of reduced dimensions in North Africa is explained by the prosperity of local small towns, which allowed their elites to fund prestigious buildings inspired by the most monumental models of the major cities.⁵¹ The dimensions of the monuments were adapted to their means, which logically led to the construction of “monumental small baths”, their monumentality being recognized through the organisation of their plan rather than through the scale of the building. The construction and shape of the Roman baths of Karnak could be the result of a similar process.

Thus, the imperial plan of the Karnak baths seems to have benefited from experiments conducted in other provinces, especially in Africa. They constitute an adaptation, at a very small scale, of a model already mastered elsewhere. Considering the corpus of the imperial baths in North Africa (most of which date to the late 2nd–early 3rd century) and in Syria (mostly of the 3rd century), it seems impossible to place the Karnak building’s construction, located on the fringes of the Empire, before the end of the 2nd century, or even at the beginning of the 3rd century. Its construction in the southern part of Egypt implies first the adoption and spread of the imperial type elsewhere in Egypt, in particular in its four cities (Alexandria, Naukratis, Ptolemais and Antinoopolis) and in the nome metropolises. No such baths (except the baths in Antinoopolis) have been discovered so far, but papyri during the 2nd century AD begin to mention a new type of baths (the “*thermae*”) that could correspond to this architecture.⁵² Some of them mention the intervention of an emperor in

46. FOURNET 2012.

47. THÉBERT 2003, p. 303.

48. FOURNET 2012.

49. NIELSEN 1990, followed by THÉBERT 2003, pp. 305–308.

50. The three smaller baths studied by Y. Thébert (2003) covers an area of 1200 to 1300 m² (Capitol *thermae* at Cuicul), 1650 m² (“Great *thermae*” of el-Knissia) and 1750 m² (Lycian baths of Thugga).

51. THÉBERT 2003, pp. 287–318.

52. Redon in this volume; REDON 2012b for an inventory of baths mentioned in the textual documentation.

the construction of *thermae*; others underline the public nature of these large urban baths from the second half of the 2nd century onward, shortly after Hadrian's visit to Egypt or even a little later in the 3rd century, at a time when cities took on a more monumental appearance. The Antinoopolis baths are known from both texts and archaeology. Their remains, identified and schematically drawn in the *Description of Egypt* (fig. 30), and their surface (c. 4600 m²) are consistent with a monumental building of the imperial type, comparable to the monumental examples of North Africa or Middle East. Given the chronology above, the construction of these baths must have occurred between the second half of the 2nd century and the beginning of the 3rd century, if not before, considering the special role of the city in Egypt and its direct links with Rome. A papyrus⁵³ evokes the renovation, in 263, of a coffered ceiling in a colonnaded hall, suggesting here a bath already in used, probably for decades. Thus, the discovery of the Karnak baths should not give the impression that they were an isolated and unique building. On the contrary, it confirms the dissemination in Egypt of elaborated bathing types, even in remote areas.⁵⁴

The transformations of the Karnak baths in the later phases (4 and 5) find parallels in other provinces and even in Egypt. The modifications of circulation observed in Phase 4, for example, is found *mutatis mutandis* in the Middle Eastern baths, where it has been possible to demonstrate a duplication of circuits and the advent, ultimately, of a model outfitted with two *caldaria* (Bosra, Philippopolis).⁵⁵ In Syria, this phenomenon is observed from the second half of the 3rd century AD, which may be a chronological indication for the date of Phase 4 at Karnak. We have seen that the success of the building and the increasing number of visits were probably the cause of this new layout (double row-type vs. double ring-type), taking advantage of a finite space by a reorganisation of the circulation inside a building that probably could not be enlarged, constrained as it was by its environment.

Phase 5, characterized by the presence of individual bathtubs, also finds parallels in several other bath buildings. In the Middle East, the construction of facilities offering more privacy, and the related evolution of thermal practices, are traditionally attached to the Byzantine period (from the 4th century onward).⁵⁶ However, baths with small individual basins coexisted in the Middle East with the great public imperial baths⁵⁷ so this new trend was not exclusive. At Karnak, individual tubs coexisted with collective plunge pools in the same building and their construction seems to occur before the mid-4th century, when the building was likely abandoned. The Karanis baths, dating approximately to the same period (4th–5th century),⁵⁸ were equipped with similar bathtubs, as well as a heating system with boilers that is very similar to what is observed in the last phase of the building at Karnak. From a technical perspective, the last state of the baths at Karnak is also comparable to the baths at the Kom el-Dikka in Alexandria, with its hypocaust system using large rectangular pillars, arches and chimneys, its boilers and some very characteristic features like the “high-flame furnace” described by W. Kołataj.⁵⁹ In this building, as in Karnak, the plunge pools

53. *P. Köln* I, 52.

54. An important clue for the construction of the baths may be the presence, almost uninterrupted, of the Roman army in Thebes during the Roman period.

55. FOURNET 2012.

56. CHARPENTIER 1995; NIELSEN 1990; YEGÜL 1992; GINOUVÈS 1955.

57. FOURNET 2012.

58. CASTEL 2009.

59. KOŁATAJ 1992, pp. 176–178.

remain and the construction of additional individual tubs is clearly intended to offer an alternative to the mingling of the collective pools and to provide more comfort and warmth (the choice of temperature and the water renewal were easier in individual bathtubs).

The initial heating system at Karnak disappeared during the many transformations of the building (especially during Phase 4), but it was most likely standard in form, with circular pillars to support the hypocausts (some of them have been found, re-used in later masonry). This was replaced by arches and pillars, as at Alexandria, a characteristic of the baths built in the Byzantine era. However, one feature of these Byzantine Egyptian baths, which is not found in the baths of Karnak, is the presence of boilers inserted in the heart of the hot sectors associated with furnaces located half a level lower than the bottom level of the hypocausts. They were accessed by corridors and underground service rooms, which were located under the rooms open to bathers.⁶⁰ For these technical aspects, the baths of Karnak in their last phases (as well as those of Karanis and Alexandria) seem to illustrate an intermediate stage between two models, one coming from the western Mediterranean and directly linked with Roman techniques elaborated during the Early Empire, the other purely local and characteristic of the Egyptian baths erected during the Byzantine era (5th–7th century).

It has already been established (Y. Thébert *contra* I. Nielsen) that climatic constraints, often used to explain possible regional peculiarities, had no influence on the thermal architecture.⁶¹ This fact is clearly displayed at Karnak: the circuit and facilities offered to the bathers are exactly the same as in the baths of other Roman provinces at the same time. The size and efficiency of the heating system used here shows that the Upper Egyptian climate (extremely hot) had no influence on the initial model.

A Residential Area West of the First Pylon

The examination of the Roman baths of Karnak is a great opportunity to bring together the scattered data from excavations carried out previously in the area located west of the first pylon and the enclosure wall of the temple. We will try in the following lines to propose a reconstruction of the history of the urban area that seems to develop mainly during the Ptolemaic and Roman periods.⁶² The existence of a settlement, at the foot of the monumental pylon giving access to the temple of Amun-Re, has repeatedly been mentioned from as early as the 1930s by Henri Chevrier, then in the 1970s by Jean Lauffray, who deplored the low interest of the scholars in the Graeco-Roman remains at Karnak.⁶³ The recent discovery of two public bathing buildings, one Ptolemaic, the other Roman, gives a new dimension to this neighbourhood and its organisation needs to be reconsidered (fig. 1).

60. Fournet and Redon in this volume (b).

61. THÉBERT 2003, pp. 316–317.

62. Recent works in this area, often salvage excavations, are listed in reports and articles published by the CFEETK. See, most recently, ARNAUDIÈS, LAROZE 2007 and LAROZE, VALBELLE 2010. Reconstructing the history of archaeological research in front of the first pylon was carried out in parallel with our work by REDON, FAUCHER 2015 (focusing on the many bath buildings found in the area and its Ptolemaic occupation). We thank E. Laroze and B. Redon for bringing these articles to our attention.

63. CHEVRIER 1939; LAUFFRAY 1971b, p. 571.

The excavations carried out in recent years by archaeologists of the MSA in front of the first pylon were designed, among other things, to understand the history and function of the embankment and ramp built in front of the temple and along the river Nile.⁶⁴ Core drillings from around and in front of the sanctuary of Karnak have highlighted the gradual shift of the riverbank and the appearance, as a consequence, of new building land and cultivated fields in front of the sanctuary.⁶⁵ During the Ptolemaic period, the temple of Karnak seems to have been an almost permanent construction site. The numerous works aimed, among other things, at the embellishment and restoration of the existing religious buildings.⁶⁶ The dynamism of the sanctuary and the shift of the Nile bank to the west certainly explain the development, near its main access to the west, of an area for domestic and commercial purpose. Its existence was probably related to the operation of the sanctuary and its function as a pilgrimage centre. The occupation period of the Ptolemaic baths unearthed in 2006 ranges between the late 3rd–early 2nd century BC and the third quarter of the 2nd century BC.⁶⁷ Access to the baths was from the east, probably from a street passing between the baths and the western wall of the temple, but as the neighbourhood has not been fully excavated and published, it is not possible to say more about the organisation of the district in which they were inserted. However, the excavations have brought to light a number of relatively luxurious domestic buildings⁶⁸ equipped with private bathrooms, such as those found south of the Roman baths, but also around the old Achoris chapel, south of the *dromos*, in front of the first pylon.⁶⁹ This chapel, which served as a resting place for the sacred boat of Amun, seems to have functioned in the early Ptolemaic era, before being abandoned by the end of the Ptolemaic period. The abandonment/reorganisation of the surrounding area at the beginning of the Roman era could be the result of the reorganisation of the ritual, even if the many revolts in the late Ptolemaic period may also have had some influence on the history of the settlement.⁷⁰

64. BORAİK et al. 2010; CHARLOUX, MENSAN 2012, p. 49.

65. GRAHAM, BUNBURY 2005; HILLIER et al. 2007; BUNBURY et al. 2008 quoted in CHARLOUX, MENSAN 2012, p. 49. It is therefore not possible to place, as previously (AUFRÈRE, GOLVIN, GOYON 1991), a basin in front of the embankment, but rather the Nile itself (CHARLOUX, MENSAN 2012, p. 48). See also BORAİK et al. 2010; GRAHAM 2010.

66. THIERS 2010, p. 373.

67. BORAİK et al. 2013.

68. The Ptolemaic houses excavated in the area are mainly located south of the *dromos* and were discovered by J. Lauffray (LAUFFRAY 1995a, p. 78). We are indebted to E. Laroze and B. Redon for the information that C. Grataloup and S. Abd el-Radi excavated domestic structures dated to the end of Ptolemaic–beginning of the Roman period, in 1990, against the western face of the *temenos* wall, where it forms an angle to the north of the pylon (GRIMAL, LARCHÉ 1993, p. XII). For a reassessment of the archaeological and architectural finds made in the whole western exterior area of Karnak, see REDON, FAUCHER forthcoming.

69. About the baths, see now REDON, FAUCHER 2015, pp. 128–130, who list four bathrooms in the area. Besides the bathrooms with two hip-bathtubs and an individual immersion tub discovered near the Roman baths (see above), another bathroom with two bathtubs was found in 1938–1939 in a Ptolemaic or Roman house, south-west of the first pylon (CHEVRIER 1939, p. 556, pl. XCV). An interesting parallel to these Ptolemaic private baths has been found recently in Luxor (KOŚCIUK 2011).

70. REDON 2009, pp. 435–436. The occupation of this area and the changes it has undergone were also obviously related to the vicissitudes of the Nile and silt deposits (LAROZE, VALBELLE 2010, p. 27).

The district regained vitality in Roman times as evidenced by several discoveries.⁷¹ With regard to the sanctuary, it seems that the sacred precincts already contained so many temples and altars that the contribution of the Roman emperors to its development was modest.⁷² However, a small temple was partially cleared by H. Chevrier in the 1930s, in front of the first pylon. Measuring 14 m by 8.60 m, it can be identified as a shrine, opening to the north, preceded by a Corinthian portico. It is built of bricks and paved with sandstone. This small temple was dedicated to the imperial cult, 14 pedestals, bearing inscriptions and statues of Roman emperors, line up along its inside walls.⁷³ J. Lauffray has also unearthed in the *dromos* area an archaeological layer containing Roman shards, coins, several ex-votos dated to the first half of the 1st century, the cover of a Roman cistern and the remains of a pavement including a reused fragment of a granite stele bearing a decree from the Ptolemaic period. Furthermore, the settlement located south of the *dromos* and surrounding the Achoris chapel (itself re-used as stable and cellar) was apparently rebuilt and occupied in the early imperial period, as well as other structures built above the embankment.⁷⁴

The remains of a large sandstone stele erected by Domitian at the end of the 1st century were unearthed in front of the entrance of the sanctuary.⁷⁵ This stele refers to the fees paid by traders, potters and wine merchants, and scholars have proposed situating the original location of the stele in front of the first pylon. This document is one of the arguments used by scholars to identify the area with a market place that might have given its name to the whole area. Indeed, many ostraca found in Thebes (but unfortunately whose precise origins are unknown) since the 19th century refer to an area named “the Agoras” in Roman Thebes. The recent discovery of three ostraca bearing this name precisely north of the *dromos*, not far from the Ptolemaic *tholos*-baths, reinforces the hypothesis.⁷⁶

All these transformations and renovations, which seem to continue from the 1st to 3rd century at least, were clearly accompanied by the development of a residential neighbourhood.⁷⁷ To that phase, we can now add the construction of the Roman baths, around the late 2nd or early 3rd century AD, erected in the northern part of the area, which was already occupied, at least in part, during the Ptolemaic period, as evidenced by the remains exposed under the baths. The domestic remains uncovered in the periphery, north-east and south-west, were also partly pre-existing, which would explain the presence of 1st and 2nd centuries material discovered when clearing the baths and its surrounds.

71. The CFEETK team excavated Roman levels in 1970–1971 near the first pylon (LAUFFRAY 1971b, p. 558; BLYTH 2006; REDON, FAUCHER 2015). Roman structures were also unearthed north of the first pylon (GRIMAL, LARCHÉ 1993, p. XII) and more recently during the dig of a modern foundation trench south of the *dromos* (LAROZE, VALBELLE 2010, pp. 26–27).

72. According to BLYTH 2006, p. 233, the Romans focused on the restoration of existing temples, in particular those of Opet and Khonsu.

73. LAUFFRAY 1971b, p. 558.

74. LAUFFRAY 1995a, p. 65 with a reassessment of the chronology in REDON, FAUCHER 2015, p. 27.

75. It was discovered in Byzantine levels (probably 4th century AD) covering the Roman floor (note of G. Wagner in LAUFFRAY 1971a, pp. 142–144, note 3).

76. The ostraca were found by Salah el-Masekh. They were firstly read by B. Redon and are under publication by P. Heilporn. We thank B. Redon for this information. For the other ostraca mentioning the neighbourhood “Agorai” and for the various hypotheses on its location, see PALME 1989; BLYTH 2006, p. 233 and HEILPORN 2009, p. 68–69.

77. LAUFFRAY 1980, p. 4; LAUFFRAY 1995a, p. 65 and 68.

The *tholos* baths had been abandoned for several centuries when the Roman baths were built, 40 m to the north. But bathing practices were still alive in Thebes as evidenced by many ostraca mentioning baths in the city⁷⁸ and in particular in the “Agorai” district (the ostraca date to the late 1st and 2nd century AD).⁷⁹ Eight others refer to a tax levelled mainly in the 140s AD and called “tax for the baths of the metropolis”, probably intended to fund the construction of large baths at Thebes.⁸⁰ It is not impossible to hypothesise that the tax could have been used to pay, a few years later, for the construction of the Roman baths discovered in front of the first pylon. This assumption, however, is hampered by the architectural type of the monument, probably unknown in the region before the end of the 2nd century. The building to which these documents refer is probably to be sought elsewhere, unless it has been destroyed and replaced by an imperial type building.

The location of this building, 150 m north of the monumental entrance to the sanctuary, could be explained by hygienic concerns: the drainage of wastewater into the Nile via two sewers was better made downstream from the sanctuary, away from its monumental access and residential areas. The construction, in the Ptolemaic period, of the *tholos* baths in the same area was maybe led by identical concerns. The probable north-south street, to the east of the baths, was to continue south, parallel to the *temenos* until the *dromos*. This proximity of the baths and the temple entrance may suggest an association between the two complexes: the former being used for ablutions by pilgrims going to the latter.⁸¹ This hypothesis is also valid for the Ptolemaic baths, even closer to the temple.⁸² In any case, the baths relied, from an economic point of view, on the attendance level of the sanctuary.⁸³ The adoption of the “imperial” type for the Roman baths attests the ambition of their builders and perhaps indicates that it was open not only to the residents of the town, but also to visitors and pilgrims, providing a service worthy of the important place they visited.

At the end of the Roman period, the temple complex of Karnak was progressively abandoned in favour of Luxor temple, and the process was accelerated by the desecration measures of Constantius II in 356 AD, and the edict of Theodosius in 380.⁸⁴ The period of abandonment of the Roman baths, approximately in the middle of the 4th century, corresponds well to this period of decline, which also sees the abandonment of the settlement located around the chapel of Achoris.⁸⁵ Without the income of the pilgrims, the baths, and no doubt a large part of the town to which they belonged, quickly collapsed. The Christianisation of the sanctuary, a few decades later, is marked by the erection,

78. See Redon in this volume.

79. HEILPORN 2009, pp. 87–90; BLOUIN 2014, no. 30.

80. HEILPORN 2009, p. 247 about *O.Stras.* II, 852, l. 1. K. Blouin thinks that, in fact, this *merismos* is another denomination of the *balaneutikon*, the common Roman tax on baths (BLOUIN 2014, no. 30).

81. H. Chevrier discovered, at the foot of the pylon, some ex-votos engraved in several blocks belonging to a cornice. They show representations of feet and names inscribed in Greek that might belong to pilgrims (CHEVRIER 1939, p. 556).

82. Other reasons may explain the construction of the baths in the area, in particular a military presence: see REDON 2009, pp. 435–436.

83. Other examples of baths associated with early Roman period sanctuaries exist, especially in the Middle East (Jordan and Syria). See, among other examples, Dharih (DURAND 2015), Sleim (FOURNET 2010) and Sia' (BUTLER 1919, p. 399, plan p. 364). Other parallels, dating from the Byzantine era, associate baths and monasteries or pilgrimage churches (GATIER 2009).

84. BLYTH 2006, p. 234 and, before, TRAUNECKER, GOLVIN 1984, p. 29.

85. LAUFFRAY 1995a, p. 68.

inside the ancient sacred enclosure, of three churches and a convent.⁸⁶ These constructions suggest the existence of a sizeable Christian community. A small village, whose occupation is dated to the 5th century, was discovered in the northern part of the sanctuary, near the temple of Ptah.⁸⁷ At that time, the baths and the residential area situated between the Nile and the monumental temple complex had already been abandoned for decades.

86. COQUIN 1972; RASSART-DEBERGH 2007. Cl. Traunecker and J.-Cl. Golvin (1984, p. 32) insist on the lateness of the Christian occupation inside the temple; for example, the Akhmenu is not converted into a church before the first half of the 6th century AD.

87. DAVID 2013.

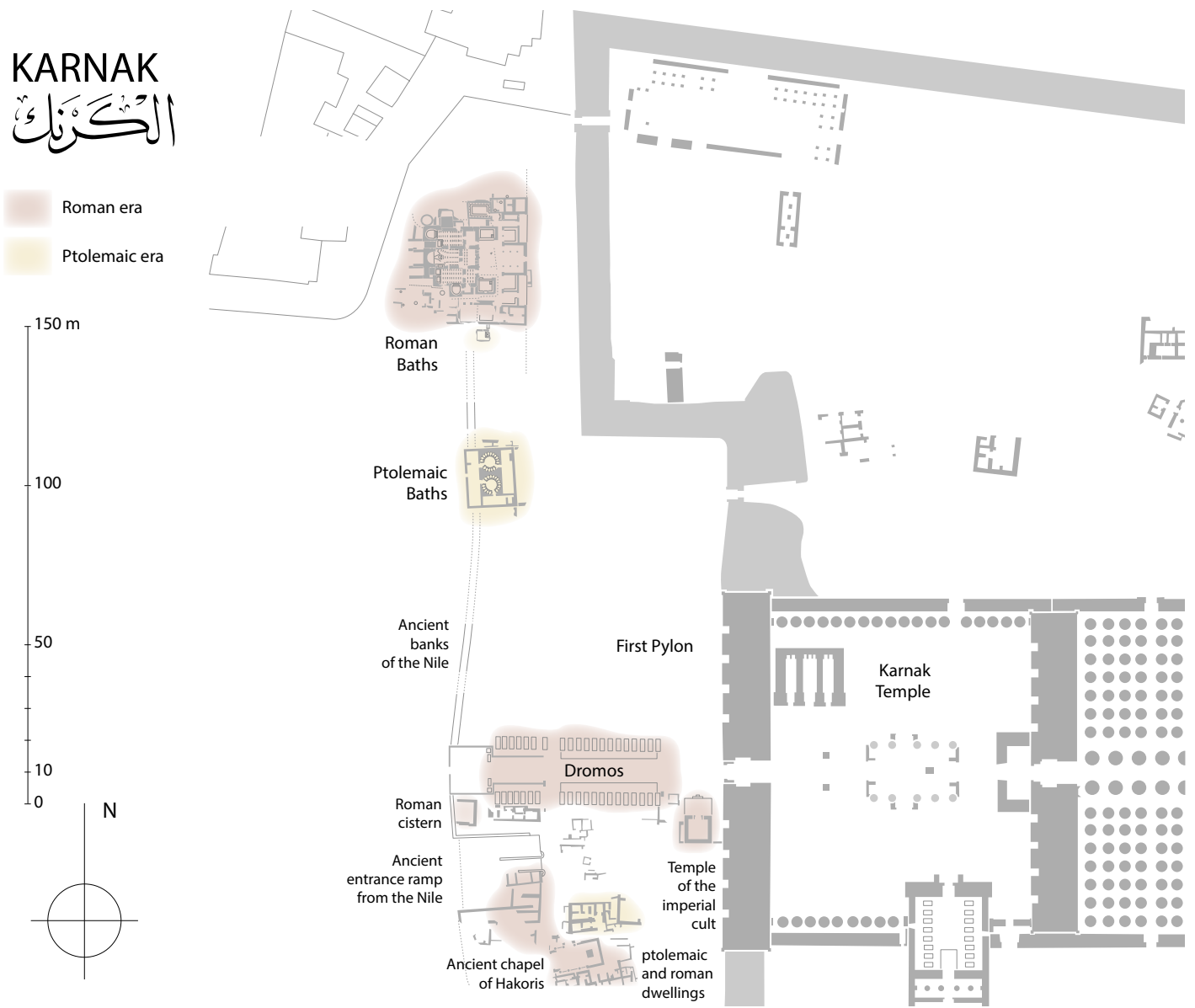
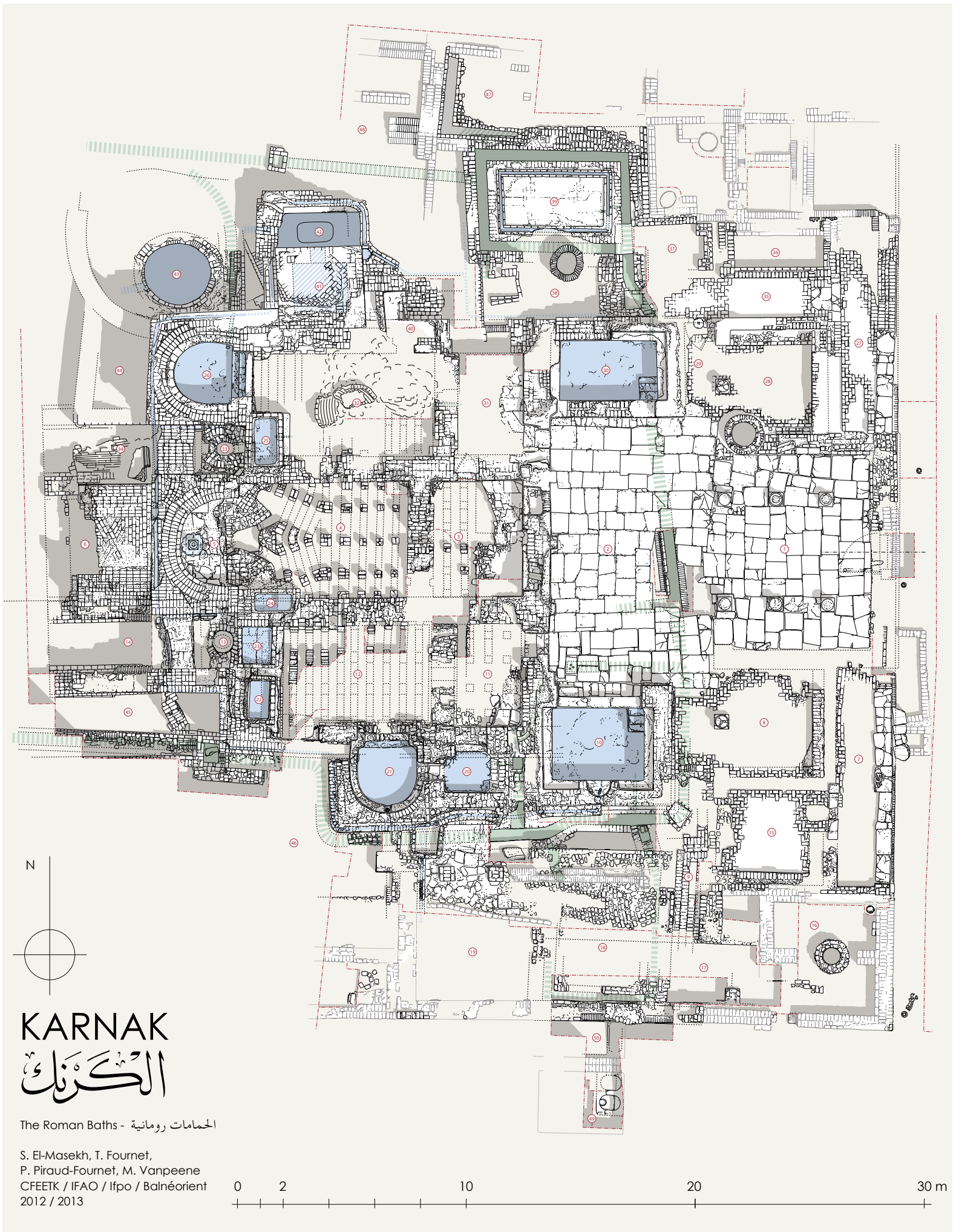


Fig. 1. Map showing the constructions discovered in front of the first pylon of the Karnak temple (© P. Piraud-Fournet 2014, background map CFEEKK).



Fig. 2. General view, westward, of the Roman baths (© M. Vanpeene 2012).



KARNAK

الكرنك

الحمامات رومانية - الحمامات رومانية

S. El-Masekh, T. Fournet,
P. Piraud-Fournet, M. Vanpeene
CFEETK / IFAO / Ifpo / Balnéorient
2012 / 2013

0 2 10 20 30 m

Fig. 3. Roman Baths of Karnak, detailed drawing of the remains, 2012 (© Th. Fournet, S. el-Masekh, P. Piraud-Fournet and M. Vanpeene 2012).

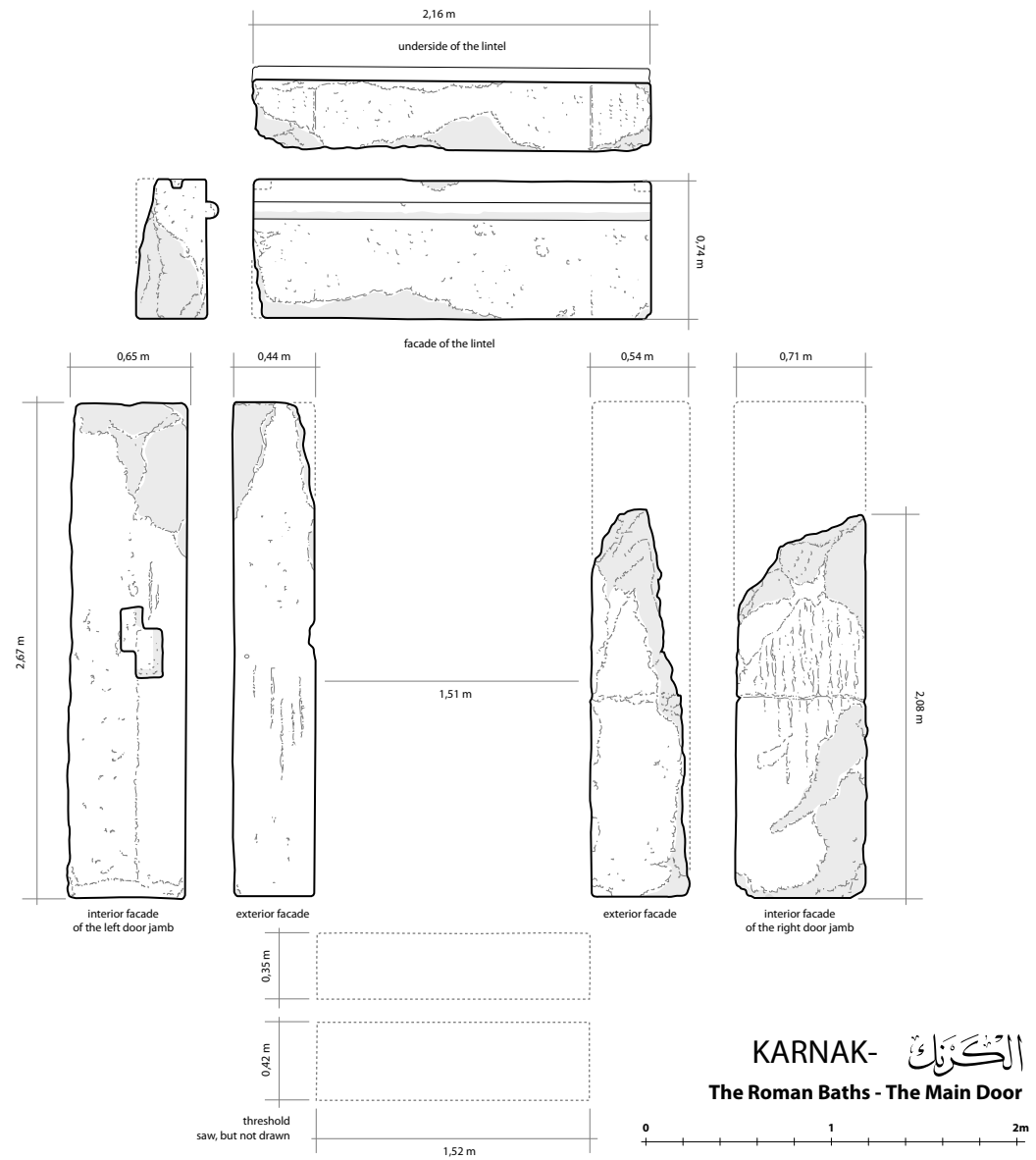


Fig. 4. Drawing of blocks belonging to the front doorway of the baths (© P. Piraud-Fournet 2012).



Fig. 5. Outer lintel of the front doorway of the baths (© P. Piraud, Fournet 2012).

KARNAK- الكرنك

The Roman Baths - Reconstruction of the Main Door
Second phase.

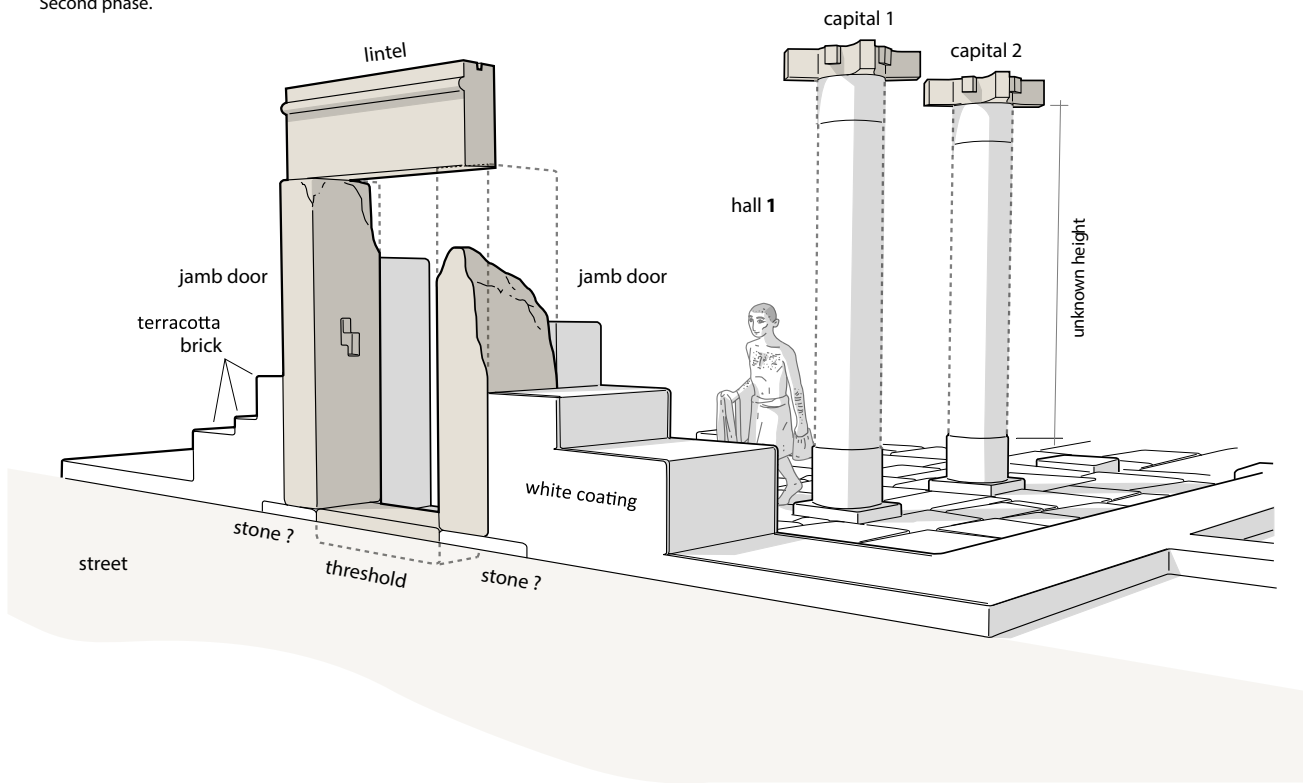


Fig. 6. Perspective reconstruction of the doorway (© P. Piraud-Fournet 2013).



Fig. 7. View, southward, of the columns of Room 1 (© P. Piraud-Fournet 2012).

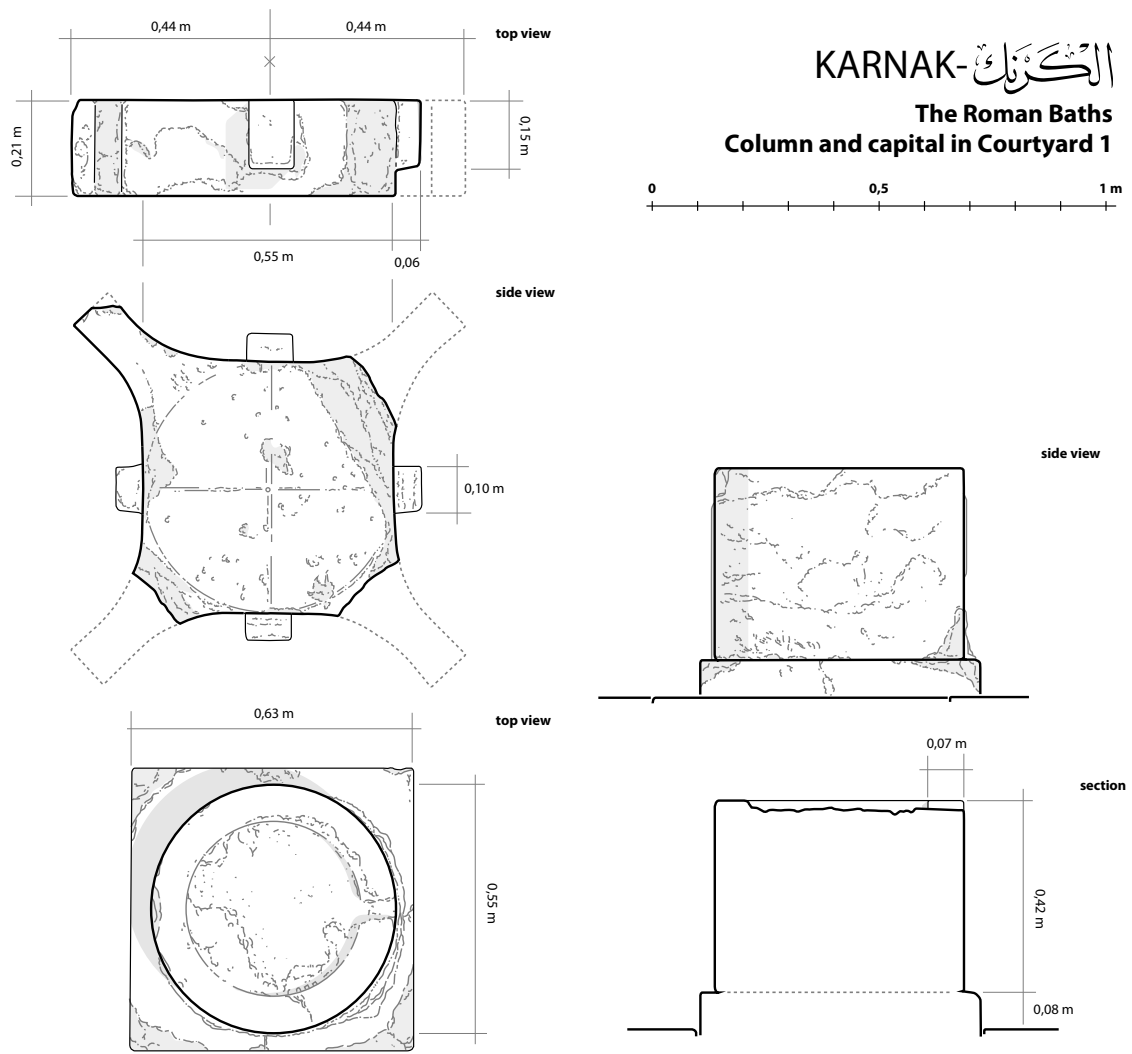


Fig. 8. Drawing of a die, a column drum and a capital (© P. Piraud-Fournet 2012).



Fig. 9. A capital (P. Piraud-Fournet 2012).



Fig. 10. View, westward, of the eastern facade of the thermal section (© Th. Fournet 2012).



Fig. 11. View, westward, of the painted inside wall of Pool 10 (© P. Piraud-Fournet 2012).



Fig. 12. Panorama of the latrines, southward (© Th. Fournet 2012).



Fig. 13. View, westward, of the heated rooms and their hypocausts (© Th. Fournet 2012).



Fig. 14. View, southward, of the western aqueduct (© P. Piraud-Fournet 2012).



Fig. 16. View, northward, of Basins 22 and 23 (© Th. Fournet 2012).



Fig. 15. View, north-westward, of the ruined vault of Room 32 (© Th. Fournet 2012).



Fig. 17. View, south-eastward, of Apse 5 and the base of the *labrum* (© P. Piraud-Fournet 2012).

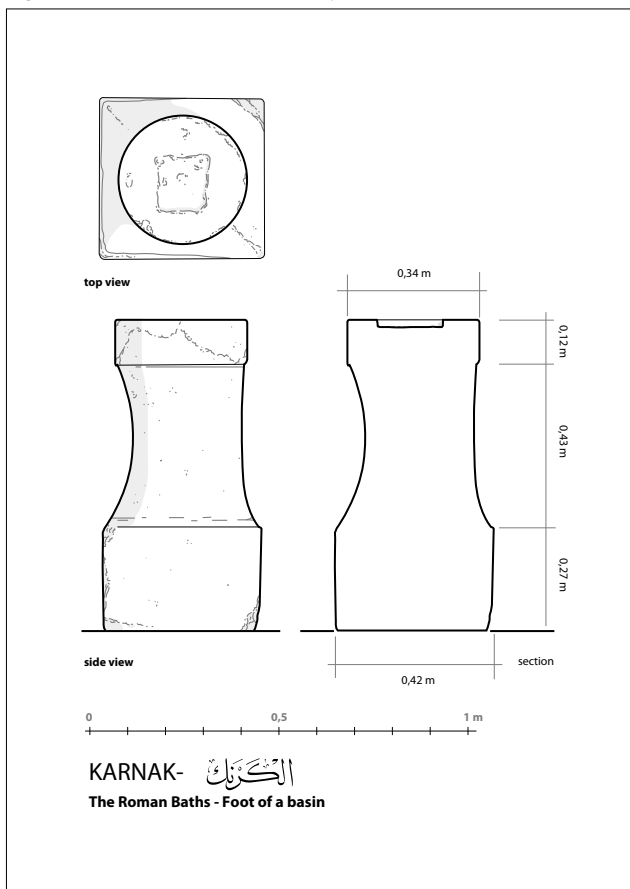


Fig. 18. Drawing of the base of the *labrum* (© P. Piraud-Fournet 2012).

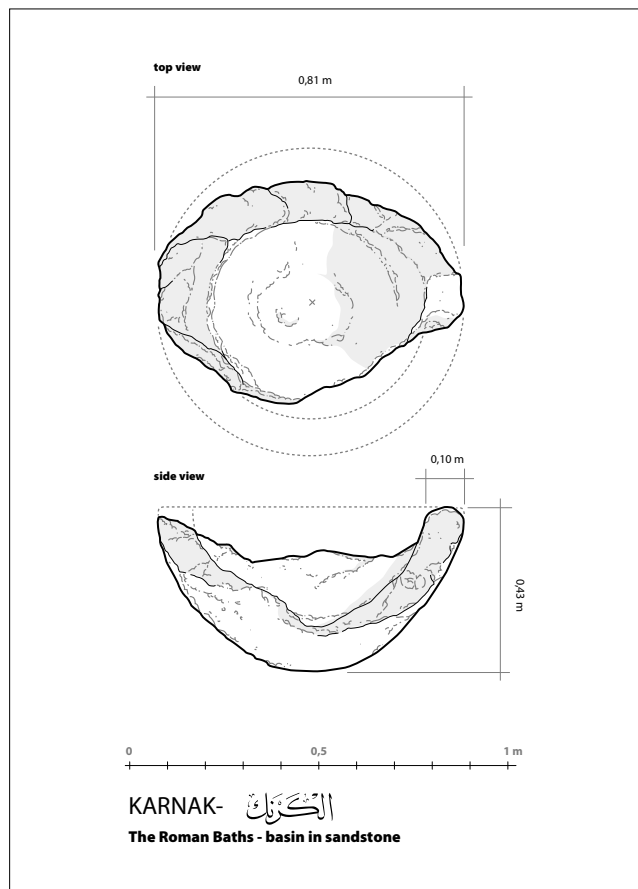


Fig. 19. Drawing of a basin (© P. Piraud-Fournet 2012).



Fig. 20. View, north-eastward, of the structures containing Boiler 33 (© Th. Fournet 2012).



Fig. 21. View, south-eastward, of structures containing Boiler 13 (© P. Piraud-Fournet 2012).



Fig. 22. View, north-eastward, of service rooms (© P. Piraud-Fournet 2012).



Fig. 23. View looking west of Tank 42 (© Th. Fournet 2012).



Fig. 24. View of the Ptolemaic bathtubs (Room 49) at the end of the excavations (© SCA, S. el-Masekh 2013), looking east.

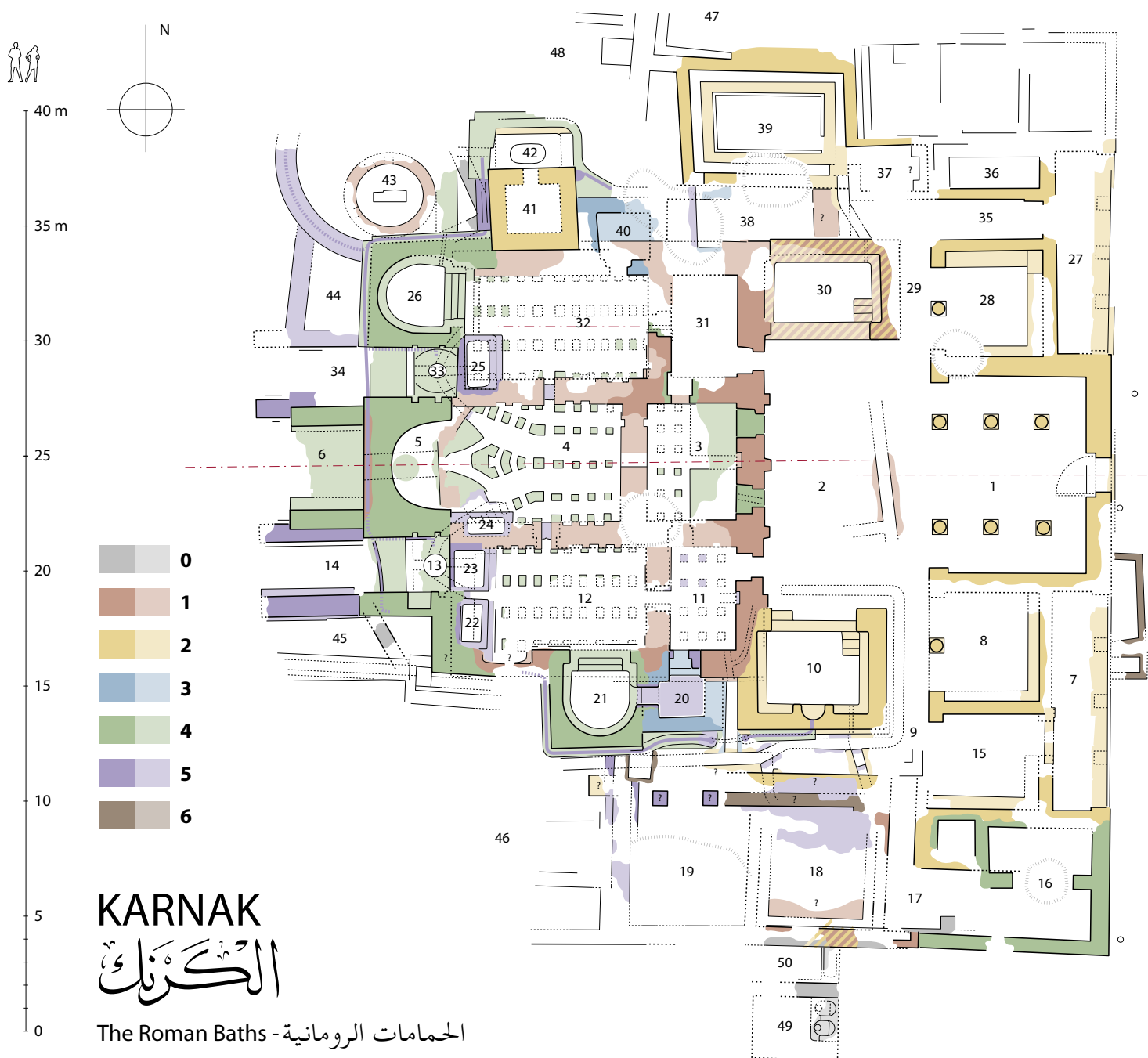


Fig. 25. Plan showing the different construction phases of the baths (© Th. Fournet 2014).

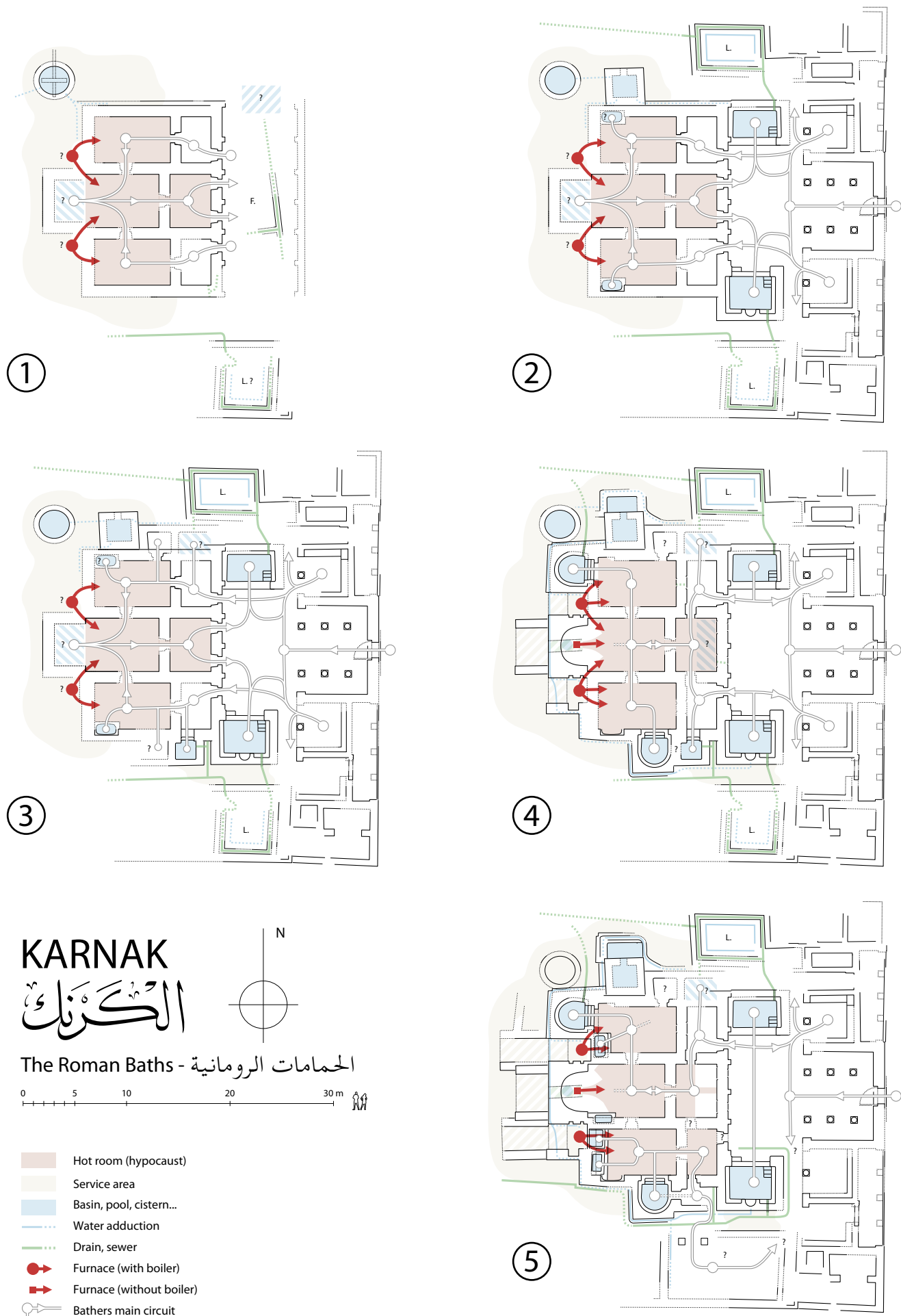


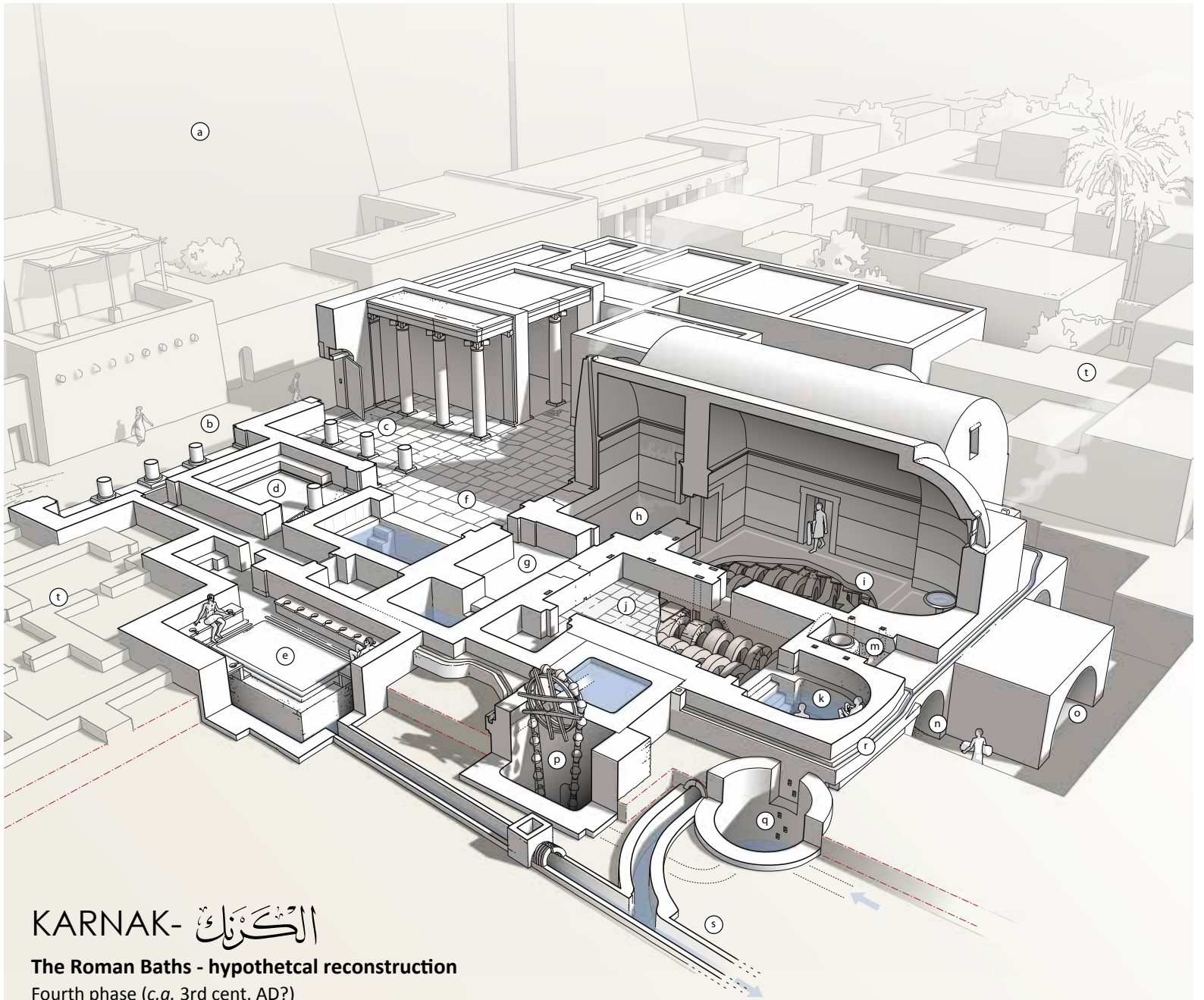
Fig. 26. Reconstruction plan of the baths, phase by phase (© Th. Fournet 2014).



Fig. 27. Panoramic view, southward, of the remains of the Karnak baths (© Th. Fournet 2014).



Fig. 29. View of the bracelets found in a pipe of the baths (© SCA 2012).



KARNAK- الكرنك

The Roman Baths - hypothetical reconstruction

Fourth phase (c.a. 3rd cent. AD?)

- | | | | |
|---|-------------------------------------|---|---------------------|
| a. Temenos wall of the Egyptian sanctuary | g. North <i>Tepidarium</i> | n. North furnace and stoker | s. North sewer |
| b. Roman street | h. First hot room | o. Central (axial) furnace chamber | t. Residential area |
| c. Baths entrance, columned vestibule | i. Second hot room (destrictarium?) | p. Sakieh and water tower | |
| d. Cloakroom | j. North <i>caldarium</i> | q. First abandoned sakieh, decantation basin? | |
| e. <i>Latrina</i> | k. North hot bath (<i>solium</i>) | r. Aqueduct (water distribution) | |
| f. <i>Frigidarium</i> / palestra | m. North boiler | | |

Fig. 28. Perspective drawing of the Karnak baths (Phase 4) (© Th. Fournet 2014).

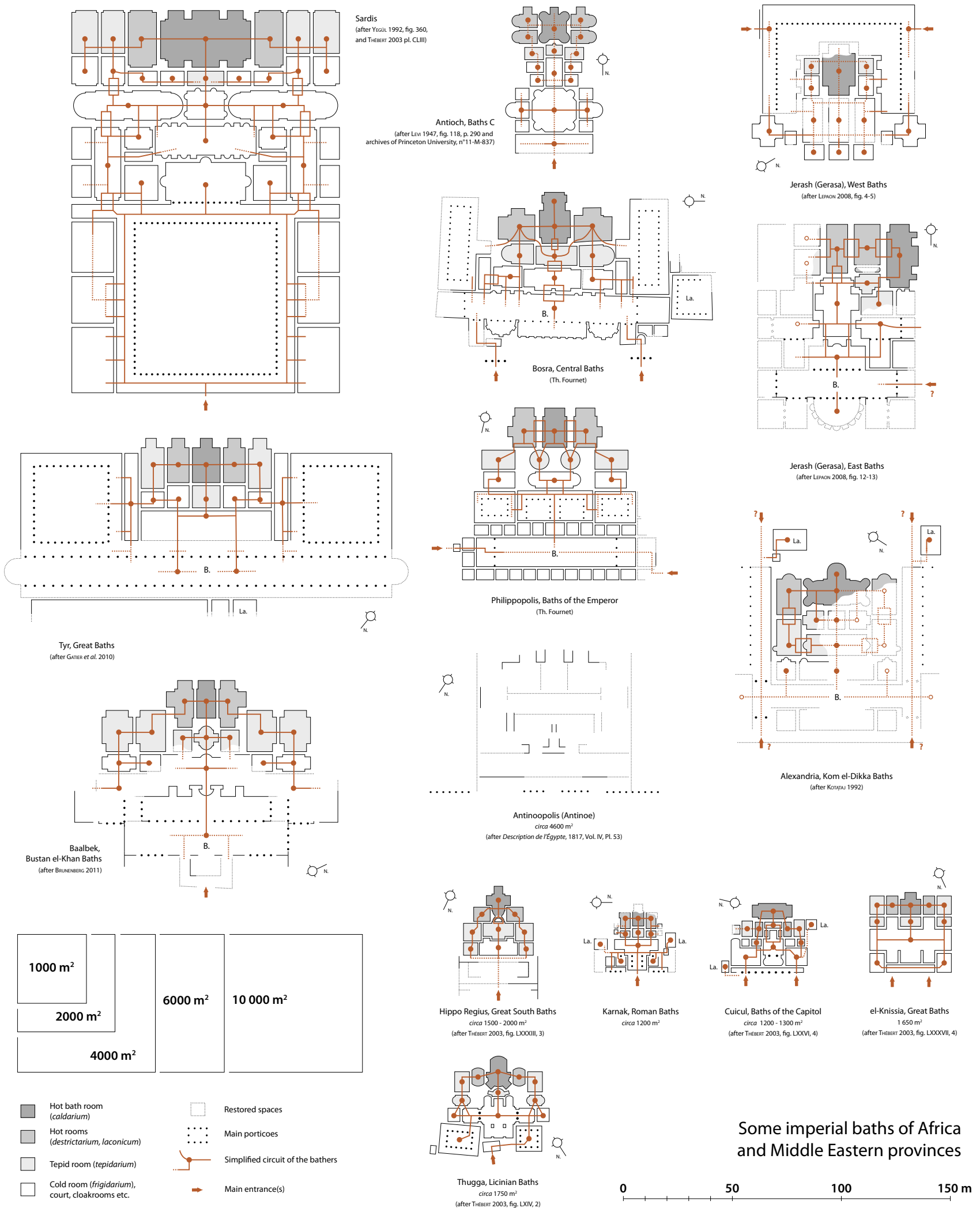


Fig. 30. Imperial baths of Africa and Middle East, typological plate (© Th. Fournet 2014).