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SOUDAN



Archaeological excavations at Kerma (Sudan)

Par Charles BONNET

*Preliminary report
on the 1991-1992 and 1992-1993 seasons*
Translated by Annie Grant

The two most recent excavation campaigns undertaken by the University of Geneva Mission to the Sudan at the site of Kerma (Northern Province) took place in favourable conditions. Each year, we continue to be surprised by the diversity and richness of the information uncovered from this exceptional collection of archaeological remains. Our discoveries also provide confirmation of the benefits of a long term research project, which has allowed us to deepen and extend our knowledge of this vast site¹.

Professor Ahmed M. Ali Haken, Director General of Antiquities and the National Museums, has continued to give his support to the members of the Mission and has left no stone unturned in order to facilitate the work of our campaigns. He was supported in this by the Inspectors of the Sudanese Antiquities Service, especially Salah El-Din Mohamed Ahmed, who took an active role in our excavations. His work on the Napatan buildings and a pottery workshop at Kerma have recently been published².

Finance for the two expeditions was provided by means of a grant from the Swiss National Fund for Scientific Research and a private donation. We should like to record our gratitude to our colleagues in Berne and to Professor Michel Valloggia and the members of the Excavations Commission of the University of Geneva who supported and subsidised the scientific work.

During these campaigns, much progress was made towards understanding the urban development of the 2nd millennium. The discovery of a palace occupied by the last kings of Kerma offered new insights into the evolution of the sovereigns' residence. A large roundhouse in the centre of a royal residential quarter was eventually replaced by a mud brick palace. A major site of the quarter to the south-west of the centre of the town was an important building of a rather different character.

Even more surprising was the discovery of a collection of buildings and a secondary necropolis outside the main walls. These may have served as a religious centre that was particularly associated with services for the remembrance of dead kings. The full extent of this agglomeration remains to be discovered.

Several kilometres from the town, we continued our work in the eastern necropolis, where excavations of tumuli of the Classic Kerma period complemented our knowledge of the more ancient tombs excavated in previous seasons.

The excavations took place between 7 December 1991 and 2 February 1992, and between 12 December 1992 and 5 February 1993. Fifty to 120 workmen were most proficiently directed by the raïs of Tabo, Gad Abdallah and Saleh Melieh. A far reaching programme was set up to restore and protect the site of the ancient town. One aim was to avoid the destruction of those remains of the palace and its stores preserved on only one or two foundations. As the boundary surrounding the archaeological zone had been badly damaged, it was decided to replace it with a wall, and the first segment of 300 metres was completed.

Consistent quality and effective collaboration was demonstrated by the members of the Mission. Béatrice Privati has now worked in the Sudan for twenty years, and her experience in the study of the material remains and the documentation of the tombs and monuments is essential to us. Thomas Kohler worked in the ancient town and carried out several architectural surveys. Marion Berti was responsible for administration and she also undertook restoration of some of the finds and participated in the graphic documentation of the site. Daniel Berti took photographs and worked on the excavations, and Louis Chaix and Christian Simon studied the animal and human remains respectively. The collaboration of Brigitte Gratien was of great value to us, particularly for the comparative work that she contributed.

We also undertook some survey work in collaboration with the director of the French Section of the Directorate of Sudanese Antiquities, Jacques Reinold. This gave us the opportunity to examine two other sites of the 2nd millennium, one in the eastern desert and the other in the mountains of the Red Sea.

The ancient town

The plan of the ancient town of Kerma is gradually being revealed. We know of four major access routes, all more or less organised in relation to the Deffufa, the main temple, and the enclosed religious quarter which surrounded it. The layout of these approaches, wide bands of land devoid of any buildings running to the centre of the town, recalls the schematised design of the town illustrated on the Egyptian hieroglyph *nḥwt*. The western entrance was the most used, as the Nile ran beside it, and nearby the numerous activities associated with the movement of merchandise took place (fig. 1).

At its beginning, this approach took the form of a trench of 5 to 7 metres in depth, flanked on either side by bastions designed for surveillance. One of these that was partially preserved had stone foundations that formed a massive rectangle. Behind, casemates opened into the defensive wall and there was also a well for the soldiers on look-out. Near its end, the large ditch turned to the south and became narrower and more shallow. The route brought visitors up to the town, just in front of a sort of monumental entrance formed by two round bastions on opposite sides, and towers. The foundations of the better preserved of these demonstrated that it had been rebuilt many times. A final rectangular bastion blocked the route³. Skirting the bastion to the left, the road emerged close to the entrance of the great roundhouse, and in front of a warehouse that was associated with it (fig. 3).

This general layout has led us to propose that the roundhouse, which was rebuilt several times and surrounded by smaller huts, was used as an audience chamber, and thus these buildings formed the earliest royal residence. This hypothesis is supported by the discovery nearby of a palace, perhaps built after the roundhouse had been abandoned.

Over the course of several years, many specialists have studied the palace in Egypt and the Sudan⁴. It is known that from the period of the New Kingdom, some palaces were built in front of the main temple of the town, perpendicular to the axis of the sanctuaries and generally on the right as one left them. They seem to be centres of government that established a connection between the town and the god on which the town depended. In some way, the palace played the role of intermediary between the inhabitants and their administration and the Universe, as has been suggested by D. O'Connor⁵.

The topography of Kerma illustrates a similar conception. While the lateral entrance to the Deffufa differs from the usual orientation, the axis of the temple is north-south and the southern entrance to the religious quarter gives the same orientation to the passage for processions. Moreover, there is the possibility that in front of this

entrance and beneath the spoil of Reisner's excavations lie the remains of a courtyard. The very large upturned stone found about 25 metres to the south of the entrance could be part of the remains of such a structure. The route along the north side of the palace, the passage behind the great roundhouse and the southern road into the town all lead to this area.

On leaving the religious quarter it is possible by turning at right angles to return to the quarter of the royal residence, the seat of power of the town. For several centuries, the great roundhouse played a powerful role. Nearby, a warehouse with five stores succeeded an earlier building of the same function, attesting to the economic role played by this residence, which was situated with an access directly to the Nile. As the ditch gradually became filled with the town's rubbish, a new urban area was regained from the defence system and the defensive walls were moved to the west.

The new area was rapidly used for the construction of a palace. Its foundations were dug into earth that was full of material from the Classic Kerma period, around 1600 BC. The plan of the palace was in three distinct parts: to the east were the royal apartments, in the centre the throne room surrounded by administrative buildings and to the west, the food stores. An enclosure wall of fired brick, along a road, surrounded the southern part of the parcel of land.

A corridor could be traced to the north, which, after turning at a right-hand corner, ended at a door that opened into an interior courtyard (fig. 4). Three rooms and a veranda comprised the dwellings built during the first phase of the site. Within the courtyard a silo and other small structures indicated its use as a meeting place. A second, rounded courtyard lay behind, increasing the available space. One presumes that there had been a second service door to the south.

The throne room of the interior courtyard was approached through a vestibule flanked on both sides by small rooms perhaps in part used as archives⁶. Within the vestibule was a shallow well containing more than 5000 small clay rollers used for sealing objects, messages or the doors of the room. By analogy with the funerary chapel K XI, where seal imprints were found in front of the door⁷, we assume that access was regularly prevented in this manner, although such a quantity of seals must reflect the amount of traffic in goods (fig. 5).

In its proportions, the throne room is comparable with the rooms of the two large funerary chapels of the necropolis. The three powerful pillars which supported the roof suggest a height of about 5 metres. In fact, it is a double room: the way in to the first room was at the side through two separate entrances, while in the second room the king would be installed on a plinth approached by a ramp or a staircase. From this position, only half of the main room can be viewed, as the three pillars

obstruct the axial view and the eastern side. The first room, with its rounded bench was thus placed in direct relation to the throne. There was a second plinth in the other half of the principle room, perhaps for the use of a different category of visitors (fig. 6).

Two silos of approximately 7 metres in diameter could have stored nearly 30 tonnes of cereals, and the sector with which they were associated could have been used to pen domestic animals. The rounded front to the west seems to have been designed in order to allow the traffic into the town to be observed and the palace to be guarded (fig. 7-8). Warehouses were associated with this residence of the last kings of Kerma as with the great roundhouse. They were built in a vast rectangular area to the southwest. The majority of the area was occupied by insubstantial buildings, but ten aligned store houses demonstrated the function of the area (fig. 9). Once again the economic function of the residential institution can be demonstrated, and one is struck by this example of the adaptation of an Egyptian model to the realities of Nubian life. The siting of the palace, the entrance corridor and the layout of the throne room can be paralleled by some of the rare examples known from the New Kingdom. However, the general proportions and the character of the architectural tradition are in distinct contrast with the Egyptian examples. The desire to use rounded spaces and the irregularity of the walls are particularly significant.

Following the investigation of this east-west area we turned our attention towards the southern areas. The remains of a large house (M122) were uncovered close to the centre. It lay near house 21, which was probably the residence of someone of importance, and formed part of the same series of buildings; we were able to trace the development of these over a long period. Initially, at the beginning of the Middle Kerma period, there were two distinct houses (M126 – M127). They had a different orientation from those of the quarters previously studied and were part of an urbanised zone that ran along a ditch over 120 metres long. This ditch was lengthened following successive periods of expansion of the town towards the Nile.

The plots of these ancient buildings were then united for house 122, which was placed within a rectangular enclosure 26 metres by 17 metres. The accommodation comprised two buildings and a porch, and to the east an elongated parcel of land (c 30 metres by 9 metres) was probably used for worship and as a meeting place. Blocks of badly eroded masonry marked the site, which had a courtyard entered from the south. The entrance to the two sectors of the residence was protected by a curved wall. To the north were the enclosures and circular bases of several cereal silos.

House 122 was altered again in the Classic Kerma period. Thicker walls were built over the remains of some

of the earlier buildings and a new block was constructed to the south. A large chapel was constructed in place of several parts of the earlier building.

At the edge of the neighbouring quarter was a group of three houses (M128, M129, M130), built up against each other. Traces of earlier constructions were also found here, but a full investigation was not completed and numerous structures still remain to be studied. However, erosion had destroyed the surface layers and the only Kerma Classic remains were an insubstantial circular enclosure, which no doubt was used for small livestock (fig. 10).

Beside the palace warehouse, five habitations (M116 – M117, M118, M120, M121) formed a separate enclosed quarter. The walls of several houses had fallen down suddenly, preserving the complete form of some of the pilasters. It was thus possible to measure the original height of the walls as 3 metres. This small group of buildings lasted for a fairly long time during the Classic Kerma period, but one house (M119) was rebuilt at the end of this period.

Surface cleaning in the old town rarely reveals objects of particular interest. However, following the 1992 rains the ground was somewhat eroded and while carrying out a survey, Louis Chaix discovered about thirty fragments of an ostrich egg that had an incised decoration. They were spread over several square metres within house 27, close to the rounded wall that enclosed the northern courtyard, and were associated with pottery of the Middle Kerma period. It was possible to partly reconstruct the egg, as the fragments represented approximately one third of the total surface area of the egg. The hole through which the egg had been emptied was 5 millimetres in diameter and had been carefully pierced (fig. 11).

The scene, whose engraving is irregular, is arranged around a central personage framed by two festoons of oval motifs. The stern and rudder of a ship with two persons holding hands form one group. The loincloth of one of the figures is particularly well executed. On the other side, three other figures, one with dressed hair, form a second group. Two giraffes, a crocodile and an ox complete the decoration. This find is particularly interesting as representations of figures are very rare in the Kerma cultures. Only two other eggs have been found with figures, one in the ancient town in 1985⁸ and the other found by G. A. Reisner near the eastern Deffufa⁹.

Two other objects merit discussion, both probably contemporary with the palace, as they were found with ceramic material of the Final Classic period. They are a rock crystal and gold pendant found within a room of the residence, and the bust of a fired clay statuette, with certain details of the clothing painted on. This was found abandoned in a ditch to the west of the palace (fig. 12-13).

The ditches

In order to complete the plan of the limits of the town, we followed the southern ditches. Here, better than in other places, it was possible to observe the build up of superimposed layers of spoil and the surface layers which were marked by several spreads of earth hardened by water. The slope of the Middle Kerma ditches examined near house 122 seemed relatively steep, while the long segment of the Classic Kerma ditch at the extremity of the site had a gentle slope. Some traces of earthen blocks could not be interpreted as the collapsed masonry was of the same compact form as the foundations of the fortification system.

At least three principle levels were discovered, but the bottom of the ditches, 5 to 7 metres deep, have not yet been reached. It seemed more important to mark the beginning of the break in the slope. In addition, the remains of several tombs dug into the fill of the ditches at the end of the Kerma period were partially cleaned, although not systematically excavated.

The fortifications turned towards the south after 120 metres of a more or less rectilinear path, and it is probable that they were avoiding an area that had previously been built up within the suburban zone. Close to the limits of the site, the ditch turned again in an easterly direction, perhaps in order to rejoin the axis of the southern entrance to the town.

A group of small buildings had all been constructed at the same time over a second filled-in ditch. They were close to house 122, and probably had a military purpose, perhaps as casemates for one of the latest walls of the town. Several querns were found within the floors of the buildings.

A secondary centre

At the beginning of our campaigns, we had noticed a mound to the south-west of the ancient town, covered by a type of stone not found elsewhere on the site. Beads from the grave goods of several tombs and scattered human remains indicated that a cemetery had been established here, outside the town. The mound could have been the tomb of an eminent person but this hypothesis was shown to be unfounded. These remains were under threat from cultivation, and so an initial cleaning was undertaken, which revealed foundations and low walls of a very interesting monumental complex, with two distinct parts, possibly surrounded by a wall and ditches. On one side, a group of buildings spread out towards the west, where cultivation had destroyed a large area of the remains. On the side towards the ancient town there was an enclosed group of chapels and their dependencies (fig. 2).

In the first sector, the excavations have only just begun, but we can suggest that building EII, orientated to the north, and rebuilt at least once, was a cult building. On the west, it was joined to two annexes, and on the other side there were the remains of a more ancient single-roomed building. Other buildings, bordering onto a road had been almost completely destroyed by cultivation. The group of chapels is separated from this sector by two rounded enclosure walls on either side of a street. This layout forms a monumental entrance that was probably closed by a door and gave access to the religious quarter. More than 65 metres to the east, the main axis runs up to a narrow opening, flanked by large blocks of masonry. Ditches with a gently sloping bank of bricks complete the construction (fig. 14).

The varied plans of the chapels can be related to the different phases of their construction. As a general rule, the early buildings are rectangular, with a single room. Sometimes they have a row of wooden columns to support the roof. They are always orientated towards the north, and usually have a door to the south; traces of door sills also show them to have had side openings. Although the archaeological investigation is not yet complete, it is already possible to demonstrate a continuity of occupation and a desire to be able to worship simultaneously in several buildings. Thus some of the chapels were reconstructed and enlarged several times, while others seem to have been abandoned after a while, or maintained in their original state.

Cult buildings of more or less square shape, with a courtyard to the south are well known at Kerma. In the religious quarter near the Deffufa and in the necropolis there are examples with walls of various thicknesses which vary in size from 3 to 12 metres square. The number of such chapels increases from the Middle Kerma period onwards¹⁰.

There was a diversification apparent in the evolution of the architecture, but three buildings (EI, EIII, EVII) were identically planned and indicate that a tripartite building was established on the remains of a square chapel. The principle room has a row of wooden columns, and access was from two elongated annexes through doors to the north. In some, the annexes were partitioned (fig. 15).

In front of the entrance, in the southern courtyard, columns formed a kind of peristyle, or, more simply, a covered alley. The wooden columns were placed on flat stones which were surrounded by a base, sometimes of large diameter, and made of a mixture of mud brick and stones mortared with hardened silt. It is likely that when these column bases were destroyed by the digging of the later graves, the mound became covered with broken stones. Curiously, several columns were very close to the walls, so that it was impractical to walk behind them. In one case (EI), segments of perpendicular wall in the side walls helped to support the roof. The courtyard was

closed alongside the road, where the doors were located. Paving in one courtyard (E VIII) could only have been observed once; bricks set on edge were laid in line with the axis of the side door to another chapel to the east (E VIII).

The three main sanctuaries thus described had been completely renewed but with almost exactly the plan of the second stage of building. All occupation levels had traces of fire and hearths that were visible on the ground or in the spoil. It is clear that fire accompanied offerings and ceremonies, and the monuments were burnt at least twice.

The buildings with double rooms are more difficult to interpret. They seem connected with cult activities since, like the other buildings, they are placed along the main road and have similarly spacious courtyards (EV, EVI, EIX). Some had been built on the foundations of earlier buildings.

The southern sector was occupied by a number of buildings placed in a more dispersed manner, and may have been the dependencies of the religious buildings. Houses, workshops and service buildings were all identified. Surface finds were different from the objects usually found in the ancient town, and further excavations will complement these first discoveries.

This extra-mural religious centre was abandoned during the Classic Kerma period, when a necropolis replaced the chapels. This necropolis had been badly plundered and we were only able to recover disturbed human remains. Not a single grave remained intact, but the cemetery was dated to the end of the Kerma period by sherds of pottery.

A preliminary analysis of some other tombs was made, but they were not fully excavated. They were typologically very interesting as they were from the transition period at the beginning of the New Kingdom. In fact, the fragmentary potsherds which were found in considerable quantity were still of the Classic Kerma horizon, but several thrown pottery vessels of an Egyptian style attested to new influences. The tombs themselves were orientated east-west and were accessed by means of a stair to the east. There were traces of the door that closed the chamber where the corpse was placed, on his back with his head to the east.

This secondary centre and the necropolis that marked the final phases of the Nubian culture revived our researches. The religious centre could have been an adaptation by the Kerma population of a funerary cult known from Egypt. No doubt they wished to preserve the memory of their kings. The Middle Kerma chapels found in the necropolis, except for the eastern Deffufa and K XI, were only maintained during a fairly brief period¹¹. Perhaps an organisation that depended directly on the kings was progressively imposed. The example of the funerary institutions of oasis governors in Egypt provides a preliminary basis for reflection¹².

At Kerma, the chapels were built over by the late necropolis which extended to include a royal tomb¹³. This could be seen as a continuation of this funerary tradition. Further clarification of these observations requires investigation of a larger area in order to understand the nature of its relationship with the ancient town.

The eastern necropolis

Twenty-six tombs of the Classic Kerma period were excavated during the last two seasons. The investigation of the necropolis has been carried out over several years and nearly a thousand years of its development can now be traced. In a new sector of the Classic Kerma period (CE19) an extraordinary increase in the number of human sacrifices raises again the issue of demographic evolution. The discovery of the remains of twelve individuals in a single tomb necessitates some reflection on the possible consequences of this excess, which was probably one of the factors in the fall of the kingdom.

A detailed study of the superstructures has brought us new information on the funerary ceremonies. Two chapels were again discovered to the north-west of the tumuli (CE 159-181). In one, the threshold of the door bore the fused elements of the four planks that formed it. The facade of the rectangular monument with a single room was slightly at a slant, and its floor was covered with a red-ochre wash. A bronze toilet instrument, with the functions of razor, tweezers and pin, was found in a small cavity in one of the corners, and there were also fragments of a necklace or bracelet of faïence beads, and several upturned beakers on the floor¹⁴.

Cross-checking the structural details of these two tumuli has provided a relative chronology. The ground for the second tumulus (CE 156) was prepared over the site of the levelled chapel of the first (CE 181) (fig. 16). The second tomb was dug deeper and so the superstructure was well preserved (fig. 17). It was thus possible to examine a large section of the surrounding circle of black stones, and of the almost flat top of the tumulus, which was covered with white quartz pebbles (fig. 18). To the east of the tumulus was a circular baked clay plaque, perhaps representing a snake game, with the spiral turned to the ground. Similar plaques found near another tumulus (CE 175) were placed in the same way (fig. 19). To the south of the tumulus were thirty-five buchrania, placed in small hollows facing the grave. Behind them were six libation jars that were upturned and covered with earth. A small grinder used to crush ochre had been abandoned there, perhaps after it had been used in the preparation of the white and yellow washes that were painted in bands and points on the libation vessels.

All the important tombs have been badly plundered, and thus the numbers of individuals within the graves, and of the sheep or goats placed beside the corpse, can only be estimated. Pottery fragments and bones from food deposits demonstrate the importance of offerings at this period. Any other grave goods have completely disappeared. The feet of the funerary bed were generally steadied by being placed in two depressions, and in one of them the base of a leg in the form of a cattle hoof was preserved.

Some of the more modest graves were also excavated, and these had fewer deposits within them. A series of tombs contained cattle horns, sometimes placed in relation to the position of the corpse (fig. 20). In one tomb (CE 174) there was a fibre sack containing a wooden seal, two pairs of sandals, two bone points, a palate for grinding red ochre and several fragments of ochre and pieces of galena, wrapped in leather. In these smaller tombs, it was unusual to find any trace of a bed. However, two well-preserved examples were found, with their frames made of interlaced leather thongs (fig. 21).

Kôm of the Bodegas or Douki Gel

A trench was dug in a large site under the protection of the Antiquities Service. This site, known as Kôm of the Bodegas (from the heaps of conical bread moulds¹⁵) is also called by the local inhabitants Douki Gel. The excavation took place within an area threatened by the destruction of the protecting fence. This site is one kilometre to the north of the ancient town.

Salah El-Din Mohamed Ahmed was in charge of the work on the foundations of an enormous monument with very thick walls. The main structure of a building more than 40 meters long had been preceded by a somewhat enigmatic circular structure with a diameter of 20 metres. It is thought that this was a residential or administrative building, part of a religious complex that included the remains of a large temple, chapels and the bakeries for bread offerings.

Several years ago we discovered fragments of a New Kingdom stele on the surface of this site. However, most of the surface material suggests much later occupation, in the 25th Dynasty and the Napatan and Meroitic periods. Recent work has recovered Kerman pottery from the surface layers, but the structures must be contemporary with the Napatan period, as the major part of the ceramic material recovered was dated to this period.

The Meroitic Cemetery

A detailed study was made of two Meroitic graves which were uncovered during the excavations of the ditch in front of the palace. Several other graves were found to the west of the site, but it was decided not to excavate these tombs, which extended over an area 2 kilometres long. Once again, we found jars in situ dating to the end of the first century BC or the first century AD. Bracelets or necklaces of beads were also found.

¹ Ch. BONNET, *Les fouilles archéologiques de Kerma (Soudan), Rapports préliminaires sur les campagnes de 1977-78; 1978-79 et 1979-80; 1980-81 et 1981-82; 1982-83 et 1983-84; 1984-85 et 1985-86; 1986-87 et 1987-88; 1988-89/1989-90 et 1990-91*, in: *Genava*, n.s., t. XXVI, 1978, pp.107-127; t. XXVIII, 1980, pp. 31-62; t. XXX, 1982, pp. 29-53; t. XXXII, 1984, pp. 5-20; t. XXXIV, 1986, pp. 5-20; t. XXXVI, 1988, pp. 5-20; t. XXXIX, 1991, pp. 5-20; *Kerma, royaume de Nubie*, Geneva, 1990; *Kerma ou la naissance d'une organisation urbaine en Afrique*, in: *ORIGINI, Preistoria e Protostoria delle Civiltà Antiche*, XIV, 1988-1989, pp. 525-537; *Upper Nubia from 3000 to 1000 BC*, in: *Egypt and Africa. Nubia from Pre-history to Islam*, edited by W. V. Davies, British Museum Press, London, 1991, pp. 112-117; *The University of Geneva Archaeological Mission to Kerma: Preliminary Report Following the 1990-92 Campaign*, in: *Nyame Akuma*, 36, déc. 1991, pp. 24-25; *Entre l'Égypte des pharaons et l'Afrique noire. Le royaume de Kerma*, in: *HISTORIA*, May-June 1992, 17, pp. 45-51; *Excavations at the Nubian royal town of Kerma: 1975-91*, in: *Antiquity*, vol. 66, 252, Sept. 1992, pp. 611-625; *De Arslantepe à Kerma: Contribution à l'étude du développement architectural et de l'administration*, in: *ORIGINI, Preistoria e Protostoria delle Civiltà Antiche*, XV, 1990-1991, pp. 337-347.

² Salah El-Din MOHAMED AHMED, *L'agglomération napatéenne de Kerma. Enquête archéologique et ethnographique en milieu urbain*, Editions ERC, Paris, 1992.

³ This type of doorway has been seen in many African towns, for example, at Kano, Nigeria: S. DENYER, *African Traditional Architecture*, London, 1978, pp. 175-176.

⁴ D. O'CONNOR, *City and Palace in New Kingdom Egypt*, in: *Cahiers de Recherches de l'Institut de Papyrologie et d'Égyptologie de Lille*, 11, 1989, pp. 73-87; T. KENDALL, *The Napatan Palace at Gebel Barkal, A First Look at B 1200*, in: *Egypt and Africa, opus cit.*, pp. 302-313; P. LACOVARA, *Deir el-Ballas and New Kingdom Royal*

Cities, in: *International Symposium "House and Palace in Ancient Egypt"*, April 8-11, 1992, Cairo (in press); L. TOROK, *Ambulatory Kingship and Settlement History*, in: *Études nubiennes, Conférence de Genève*, vol. 1, Geneva 1992, pp. 111-126.

⁵ D. O'CONNOR, *opus cit.*, pp. 81-82.

⁶ B. GRATIEN, *Les résidences*, in: *Les Égyptiens en Nubie, Politique et Administration aux 3^e and 4^e millénaires B.C.* Thesis manuscript for the Doctorat d'État presented on 19 November, 1990 at the Sorbonne, p. 624; W. B. EMERY, H.S. SMITH and A. MILLARD, *The Fortress of Buben, The Archaeological Report*, London, 1979, p. 51, Pl. 16.

⁷ G. A. REISNER, *Excavations at Kerma, Part II*, in: *Harvard African Studies*, vol. V, pp. 265-266.

⁸ Ch. BONNET, *Les Fouilles archéologiques, op. cit.*, *Genava*, t. XXXIV, 1986, p. 8, fig. 10.

⁹ P. LACOVARA, *Œuf d'autruche*, in: *Kerma, Royaume de Nubie, op. cit.*, p. 165, n° 76.

¹⁰ Ch. BONNET, *Les sanctuaires*, in: *Kerma, Royaume de Nubie, op. cit.*, pp. 53-67.

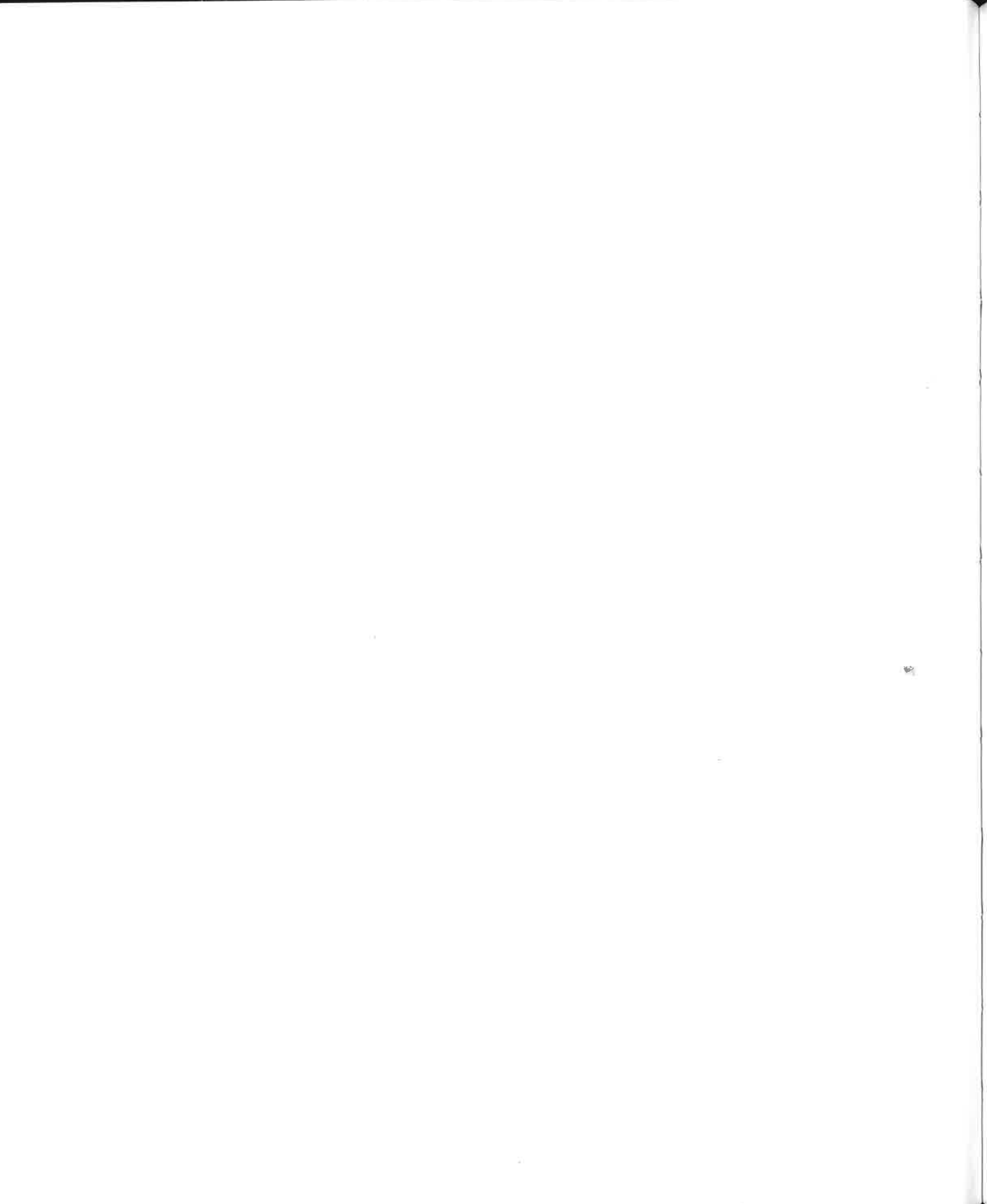
¹¹ G.A. REISNER, *op. cit.*, p. 61 ff.

¹² G. SOUKIASSIAN *et al.*, *La ville d'Ayn-Asil à Dakbla, Etat des recherches*, in: *Bulletin de l'Institut Français d'Archéologie Orientale*, 90, 1990, pp. 347-358; L. PANTALACCI, *Les chapelles des gouverneurs de l'oasis et leurs dépendances (fouilles de l'IFAO à Balat-Ayn Asil, 1985-9)*, in: *Bulletin de la Société Française d'Égyptologie*, 114, April, 1989, pp. 64-82.

¹³ Ch. BONNET, *Nouveaux travaux archéologiques à Kerma (1973-1975)*, in: *Études Nubiennes, Colloque de Cbantilly, 2-6 July 1975*, pp. 26-34.

¹⁴ G.A. REISNER, *op. cit.*, Part IV, pp. 184-185.

¹⁵ Ch. BONNET, *Remarques sur la ville de Kerma*, in: *Hommages à la mémoire de Serge Sauneron*, I, 1979, pp. 3-10.



Two reports on survey work in the eastern desert

By Charles BONNET and Jacques REINOLD

In memory of Gérard Vincent

A fortified site of the Classic Kerma Period

On 24 January, 1992, we found a fortified site 17 kilometres to the east of the ancient town of Kerma. It was probably a staging post on one of the routes across the eastern desert. The co-ordinates of its location are approximately 19°38'05" N and 30°33'45" E. The remains were found in a wadi surrounded by the plain. The limit of cultivation in the Kerma basin is today several hundreds of metres away. Towards the east are the first hills and the desert plateau (fig. 1).

Several monuments are surrounded by a powerful boundary wall. Built on sandstone blocks, approximately 2.5 metres thick, the wall itself was 1 to 1.5 metres thick. The enclosed area was oval in shape, 112 metres long and 84 metres wide. On the southern side, the door, with its eastern masonry block, is partly preserved. The facing stones were mortared with hardened silt. A transverse wall, as substantial as the main wall, may have been the boundary of an earlier fort, later enlarged by the addition of a semicircular area to the north. Another boundary, perpendicular to the transverse wall, cut the southern section in two. There were rectangular structures in a band of land against the wall on the desert side. Standing on their own near the centre are the remains of another building with walls more than 2 metres thick. The chamber itself was very small, and may have contained precious material (fig. 2).

The pottery remains were not very abundant, but all the sherds that were found were of the Classic Kerma period. Approximately 300 metres to the south-west was an apparently empty circular structure whose walls were over a metre thick. Potsherds dated this building to the same period as the fort.

This site, close to the capital, perhaps marks the route towards the gold mines of the mountains of the Red Sea. The transportation of metal must have been carried out under protection, as the defensive system of the town suggests that this was not a safe area. One would have to pass beyond this gateway into the desert to find similar forts, whose garrisons probably lived in huts made of wood and mud.

In the mountains of the Red Sea. The region of the gold mine of Ariab

At the invitation of Gérard Vincent, the deputy director of the Ariab Mining Company (AMC), we briefly moved site on 4 December 1992 to an archaeologically unknown area of the Red Sea mountains. The gold mine is at Has-sai, approximately 600 kilometres north-east of Khartoum, in a very broken landscape in which the large wadis have been exploited for pastoralism since antiquity. Even today, a nomadic, or partially sedentary population lives on the plains, where occasional trees mark the location of ground water. The many wells are meeting places for men and smaller livestock.

In our visit of a few hours we followed the Khor Ariab for a distance of 20 to 30 kilometres, passing the well that provides the water for the mine, close to the confluence with the Khor Eikidi.

We were struck by the number of circular structures, built in dry stone. Ranging in height from 0.5 to 2 metres, they were of different types of construction, and must have represented several periods of occupation. Pottery finds were very rare, and were only discovered on two occasions (fig. 3-4).

The structures are built on terraces close to the level of the wadis, on shelves in the slope of the mountains or at their summit. The silhouettes of those built on the high land stand out on the horizon and are visible from a great distance. Although they are generally in groups of between three and twelve, some of them stand alone.

The major differences between these structures lie in the care with which they have been constructed, and in their height. The rounded walls are sometimes very regular and the upper platform is made of flat slabs. Vertical stela are arranged all round them as a facing. In the centre the pit, usually square, is made of substantial elongated blocks (0.8 to 1 metre). Some of the pits had partly caved into the sand of their filling or were covered with stones. No traces of bones were found on the surface, even if these pits seem to have been visited.

From what is known of the superstructures of the C-Group tombs, for example those at Aniba, or by analogy with similar discoveries made in the eastern

desert of Northern Sudan, one would expect that these buildings had been constructed to protect tombs.

A few sherds from a cemetery, situated at approximately 35°33'15" E and 18°44'40" N (AMS no. NE-36-H/11-B-1), appeared to be of the 2nd or 1st millennium BC, a date confirmed by the character of the tombs. A low tumulus surrounded by a ring of irregular stones, provided information on the diversity of tomb superstructures.

The modern cemeteries and those of the recent past demonstrated a continuity in the burial traditions. One finds oval or rectangular tombs covered by slabs, and around them are stele, lined up one against the next and arranged in a circle of 3 to 6 metres diameter. In two of them, a small rectangular niche, made from dressed stone, had been placed in the northeast of the circle.

Three kilometres up-stream from Bir Ajam, in the Khor Ariam, another very interesting site was located at approximately 35°35'50" E and 18°41'55" N (AMS no. NE-36-H/11-H-1). Our attention was attracted by an area of disturbed ground on a low terrace close to the wadi. Several hundreds of poorly fired clay figurines were spread over an area of only 5 metres square. Several other figurines were found 10 metres away. Almost all the figures were human in form and the majority were female, with only half a dozen animals found (fig. 5).

Since there were signs of disturbance it was decided to remove the figurines from the earth without excavation. A total of 700 were recovered, together with 69 potsherds.

The whole assemblage has been deposited at the Sudanese National Museum (fig. 6-7-8-9).

All the figures were in fragments, and they were probably broken deliberately during religious or magic rites. Similar, although not identical, objects found at Kerma may be related to them¹. Several hundreds of figurines were found in a mining context in Egypt at Gebeal Zeit, on the shore of the Red Sea. They had been abandoned in sanctuaries².

The pottery found with those from our site can be dated by their decoration to the 2nd millennium BC, and may suggest links with the Atbara basin and the Kassala region³.

We found no trace of a possible monument on the soil or the disturbed surface of the sandstone, but it seems certain that there were other figurines more deeply buried, perhaps within an enclosure or a structure. The circular superstructure of two tombs were found nearby.

The ancient habitations seem never to have been built on the slopes of the mountains or on terraces. Despite the rains, which can be plentiful, the small modern settlements of huts and tents (there was only one village of mud construction) were mostly built at the bottom of valleys.

In the mining camp were two querns that had been used for ore extraction. They had been found at a site not visited by us some 15 to 20 kilometres to the west. It seems certain that the whole region had been exploited during the Pharonic era and that the Nubian populations acted as intermediaries.

¹ N. FERRERO, *Figurines et modèles en terre mis au jour dans la ville de Kerma*, in: *Genava*, n.s., t. XXXII, 1984, pp. 21-25.

² G. CASTEL *et al.*, *Fouilles de Gebel Zeit (Mer Rouge), Première et deuxième campagnes (1982-1983)*, in: *Annales du Service des Antiquités de l'Égypte*, 70, 1984-1985, pp. 99-105.

³ R. FATTOVICH, K. SADR and S. VITAGLIANO, *Società e territorio nel Delta del Gash (Kassala, Sudan orientale) 3000 B.C. -300/400 A.D.*, in: *Africa*, XLIII, 3, pp. 1-60.

New seal impressions from Kerma: a glimpse of the Kush administration in the middle of the second millennium BC

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During the 1991-92 and 1992-93 excavation seasons, several seals and seal impressions were found, both within the ancient town, and in its ditches. These completed the collection that had already been discovered during the excavation of the residential building of Beit es-Shetan. Forty-five new impressions were found, adding to the thirteen previously published¹. Together with the seals, tablets and reserves of clay used for sealing, they demonstrate the existence of an administration at the capital of Kush that was already well developed during the Classic Kerma period.

Seal impressions from the town

Only two were found within a house (M 95, in the northern sector); the others were found in the more ancient layers of the Classic Kerma ditch fill to the north (5 examples) and to the east (13 examples) of the town, and in the ditch to the west of the town that pre-dated the building of the palace (3 examples) (figure 1, a-c). In addition, there were many fragments of plaques or of sealing clay, which are described below.

The seals had been affixed to many different kinds of object, although in most cases only the traces of the binding remained. Occasionally the seal had been applied to a wooden door frame or chest (4 times) or to a bolt: three of these were small (1 cm in diameter), but the fourth, 2 cm in diameter, could have been a door closure². Two other seals had been affixed to jars and two to basketwork. Thus they had been attached to the traditional objects, the door frames of buildings, chests, packages or baskets and pottery.

Unfortunately, since many were found in ditches, it was not possible to determine the function of the buildings in the town. The seal impressions, disposed of during periodic cleanings, must have come from nearby areas, perhaps from house 66, with its immense courtyard to the east, or from the area of the Deffufa, and of the royal roundhouse and its storehouses to the west. Reisner had previously discovered many impressions in the annexes of the religious sector³.

The motifs represented were frequently spirals (nos. 12, 19, 24), occasionally accompanied by hieroglyphic signs (nos. 20, 21), floral motifs (no. 8), prophylactic

signs (no. 397b, red crowns; no. 2, wedjat eyes and the symbol for gold; nos. 15 and 25, signs on the symbol *nb*; nos. 22 and 29, the symbol *nfr*) or again figures (no. 17) and heraldic animals, either in relief (no. 3, a falcon) or linear (no. 5, cobras). The impressions with a markedly geometric pattern are more instructive as they are comparable to the locally made clay scaraboids (nos. 10, 14, 18)⁴; one of these, no. V 14, seemingly affixed to a door bolt, has the impression of two different seals, demonstrating that control of the closing of the premises was in the hands of two different people (figure 1 b).

Several others bore titles (figure 1 c):

- *jdñw n jmy-r3 sd3wt Jji/////* (no. 6) Treasurer's representative⁵
- *jmy-r3 sd3wt n/////* (no. 1) treasurer⁶
- *jmy-r3 /////* (no. 397a) director...
- *šmsw b3yt ///* (no. 9), elder of the portal⁷.

These seals are those of the important officials that are frequently connected with the fortresses of the second cataract or Nubia⁸. With the exception of seals no. 3 and 17, which are in relief, and seem rather later, they belong to types that are known from the end of the XIIth and XIIIth dynasties, proof of close contact with the north from this period onwards.

The seal impressions from Beit es-Shetan

To be added to those already published are thirteen new seals from the sector of the Classic Kerma period where warehouses had been razed to the ground⁹. Most of these were in the category of figures and heraldic animals in relief (nos. 12 to 17) or of prophylactic seals (no. 18): in others, only the borders, spirals or the braids from administrative seals were preserved (nos. 9 and 10); some officials' seals complete this collection:

- *šmsw Y///* (no. 20)¹⁰
- *šmsw (?) ///* (no. 11, mounted on a ring)
- *jry///* (no. 19)
- illegible (no. 21).

They were affixed to the usual objects, bindings, wood and bolts. These new finds increase the range of what had previously been published, with the particular help provided by three administrative seals which confirm a date of the XIIIth Dynasty. However, the large number of relief seals indicate that the building had been in use in the Second Intermediate Period. Most of the impressions found in the town seem to be earlier than those from Beit es-Shetan, which can be compared with those found by Reisner in the annexes to the Deffufa.

However, the increase in the number of seals of different dates and styles, proves the existence of multiple institutions at Kerma, and of an administration that was in place at the end of the Middle Kingdom and lasted throughout the Classic Kerma period. These conclusions are corroborated by the discovery of fragments of tablets and many cylinders or tapered lumps of sealing clay in the town.

The sealing clay

Reisner discovered almost a hundred clay cylinders in K 1¹, and many others were found by the Mission of the University of Geneva, both in the annexes of the Deffufa¹² and in the ditches, and at Beit es-Shetan. Here, there were balls, cylinders and cones of various sizes, made, it seems, from levigated alluvium¹³. At the entrance to the throne room of the palace at Kerma, dated to the end of the Second Intermediate Period, Charles Bonnet discovered a cuboid receptacle, with sides of approximately 1 metre, whose upper part was filled with lumps of clay (figure 2). The excavation of a quarter of this receptacle demonstrated that it was filled with a heap of these objects, to a depth of 50 cm; the total number was estimated as 5,000. They were stacked one upon the other, and kept moist, since those that were in the lower layers had been deformed by the weight of those above; they were found within a very silty sediment¹⁴. Other identical receptacles were found in the religious quarter and in administrative buildings¹⁵. Experiments show that one lump of clay was sufficient to seal a chest or a door.

The presence of this number of seals ready for use at the entrance to a royal building, and almost certainly ready to be used to close official buildings and to seal dispatches and goods, confirms the existence of a class of officials within the capital of the Kingdom of Kush. The receptacle found in the palace may be interpreted as a distribution point for the whole sector, with the lumps of clay probably under the control of a state official, who supervised access to the goods stored in the nearby buildings. Beit es-Shetan and the town's temple, the Deffufa, must have used stores of identical material, distributed by other officials.

The tablets

If such was the importance of the seals, then registration of goods and accounting procedures were indispensable. There is as yet no proof of the existence of a local written script. However, it is likely that the inhabitants of Iam and of Kush knew the Egyptian language and could write hieroglyphics by the end of the Old Kingdom. It is remarkable that not one seal impression has been found on papyrus, in contrast to the forts of the second cataract; nor have any stele or ostraca been found. Did the people of Kerma use tablets? This could have been the case as several uninscribed fragments of such objects have been found in the northern ditches together with seal impressions¹⁶. The plaques were of clay, at first sight identical in composition to the clay lumps, and of oval form, on average 4 - 5 cm wide and 1.5 to 3 cm thick, but not covered with any kind of plaster. One had been inscribed with several parallel lines; its back was curved and smoothed with a knife (figure 1 d); others had incised lines or motifs in relief; the majority had been applied to objects made of wood or basket-work. Two found by Reisner had incised grills¹⁷.

The seals and scarabs

Scarabs in steatite or glazed clay are frequently found at Kerma. At least five were found in the town during the 1991-1993 seasons. They are engraved with prophylactic signs or spirals and date to the end of the Middle Kingdom or the Second Intermediate Period. One, decorated with the signs *nfr* and *nb*, had been executed very clumsily, and may have been made by a local craftsman. The fired clay scaraboids, of which Reisner had already found several examples¹⁸, are more remarkable and seem to have been made locally¹⁹. The underside is always engraved with geometric motifs or imitations of Egyptian symbols²⁰ (figure 1 e). They can be compared with the ivory seals with lines engraved on their bases, from the Classic Kerma period²¹. Of the same type as these scaraboids is a conical seal in fired clay which is decorated with a deeply incised grid (figure 1 f). In addition, an oval seal of wood, found in tomb 174 of the Classic Kerma necropolis, is sculpted in relief with two head to tail uraei (figure 1 g). The considerable number found in Nubia suggest that these seals are of local manufacture, and they should be compared with the stamps with geometric motifs in high relief, and in particular with stamp no. V 14, which was affixed to a large bolt, probably from the door of a building. These seals are thus those of local officials, in charge of the supervision of public buildings and the registration of the movement of commodities, and dependant on several departments, as

two different people were present for the sealing. A similar situation occurred at the fortresses of the second cataract, where side by side are seal impressions of a minor official and those of a person in charge, often a soldier²².

All these finds imply the existence in the capital of the kingdom of Kush, of a developed administration and institutions. Kerma is not an isolated case. R. Fattovich has recently discovered at Mahal Teglinos and Gebel Abu Gamal, in the Kassala region, clay seals affixed to leather sacks, tokens and fragmentary impressions dated to the 2nd and 3rd millennia BC²³. Charles Bonnet has also discovered baked clay seals, covered with unidentified signs, in the necropolis of Ancient Kerma²⁴.

From an early period, according to stratigraphic evidence, several institutions existed at Kerma, including the religious sector, the chapel sector and the palace and its warehouses. Another sector developed close to the Nile at Beit es-Shetan. The many finds of seals, impressions,

plaques and prepared clay found both in these sectors and in the nearby ditches are proof of the supervision of their activities and of the movement of goods. The local administration was thus complex, and probably copied from, or influenced by, the Egyptian model.

However, the administrative impressions of Egyptian type are identical to those found in the citadels of the second cataract (with the exception of the seals on papyrus and the seals of towns and institutions, unknown in Upper Nubia). The titles which appear at Kerma are those of high officials who were in contact with the Kush royalty. Whatever were the relationships with Egypt at the beginning of the XIIIth Dynasty, at the time of the building of the fortified barrier at the second cataract by the first of the Sesostris, from the end of the XIIIth Dynasty, or during the XIIIth, the contacts with Egypt multiplied and were integrated within a larger compass which covered north-east Africa.

¹ B. GRATIEN, "Empreintes de sceaux et administration à Kerma (Kerma classique)", in Ch. BONNET et al., "Kerma, 1988-1989, 1989-1990, 1990-1991", *Genava*, n.s., XXXIX, 1991, p. 21-24.

² If these dimensions are compared with those of the seals of the doors in the fortresses of the second cataract.

³ G.A. REISNER, *Excavations at Kerma*, Parts I-III, Cambridge, 1923, p. 38, pl. 2 and 3; parts IV-V, Cambridge, 1923, p. 70 ff.

⁴ Cf. below and B. GRATIEN, "Le pays de Kouch et l'Égypte: contacts, échanges, commerce", in Ch. BONNET, *Kerma, royaume de Nubie*, Genève 1990, p. 99.

⁵ This title appears only occasionally in Nubia and in a military campaign of the Middle Kingdom: in the first rank below the Treasurer, the possessor of this title could equally well be called governor (Cairo stèle CG 20086: *jb-j*; sent 'to open Kush'), director of great works or commercial expeditions to foreign countries or of mines; he frequently possessed a seal (G.T. MARTIN, *Egyptian administrative and private name seals*, Oxford, 1971, p. 178).

⁶ The treasurers and the directors of the bearers of seals are frequently mentioned in relation to Nubia: the statuette of Imeny and the statuette of *Ku* (Boston MEA 10.1191) in tumulus KIII at Kerma, the scarab of tumulus K XB at Kerma, eight imprints from Mirgissa, the double statuette of Kawa...

⁷ It seems that the bearers of this title, who have an ill-defined function, play a military or judiciary role (G. ANDREU, *Enquête sur la police de l'Égypte pharaonique. Étude de titres apparus avant la fin du Moyen Empire*, Doctoral thesis, Paris 1978, p. 40). It seems likely that he had an administrative role, given the large number of impressions found (10 at Mirgissa, 27 in G.T. MARTIN, *op. cit.*, p. 184); one of them, Mentuhotep, is the dedicator of a statuette in tumulus K XIV at Kerma (Kh. Mus. 1132).

⁸ B. GRATIEN, *Prosopographie des Nubiens et des Égyptiens en Nubie*, Lille, 1992 and *Les villes égyptiennes de Nubie*, in press.

⁹ In addition forty fragments of seal impressions without imprints were found during excavations of this sector, eleven of them fixed to wood, one to a chest shut with a bolt, six to the bolt alone (two of these measured 2 cm in diameter) and two to a binding.

¹⁰ The *šmsw* in Nubia appear to be members of an elite body, representatives of administrators of high rank, and are one of the categories of personnel most frequently represented; the imprints and rock inscriptions have only given us an abbreviated title, sugges-

ing the direction of expeditions and patrols, the command of certain fortresses, the survey of the Nile floods or the drafting of dispatches; at Uronarti, they seem to have been concerned with sealing the doors of granaries and the treasury (B. GRATIEN, *Les Égyptiens en Nubie. Politique et administration aux 3^e et 2^e mill. av. J.-C.*, Doctoral thesis, Paris IV-Sorbonne, 1990, p. 859 and ff.).

¹¹ G.A. REISNER, *op. cit.*, parts I-III, pl. 26, 2; parts IV-V, p. 47.

¹² Ch. BONNET, "Les fouilles archéologiques de Kerma (Soudan)", *Genava*, n.s., t. XXX, 1982, p. 6.

¹³ Paul de Paepe, of the Geological Laboratory of the University of Gand, has made a comparative analysis, shortly to be published, of the alluvium and the sealing clay from Kerma, and stamps from Kerma, Buhen and Egypt.

¹⁴ The average dimensions were 7.2 cm long and 3.5 cm in diameter, with the smallest and largest 5.8 cm x 2.8 and 8.7 x 3.4 respectively.

¹⁵ Charles BONNET, pers. comm.

¹⁶ Cf. the discovery of inscribed plaster tablets, dated to the end of the Old Kingdom, close to the governors' chapel at Ayn Asil (L. PANTALACCE, "Les chapelles des gouverneurs de l'oasis et leurs dépendances (fouilles de l'IFAO à Balat- Ayn Asil, 1985-9)", *BSFE* 114, 1989, p. 76).

¹⁷ G. A. REISNER, *op. cit.*, vol. I, pl. 26, 2; a third had signs that were not identifiable on the photograph.

¹⁸ For example, in Ch. BONNET, *op. cit.*, no. 253, p. 210.

¹⁹ B. GRATIEN, in Ch. BONNET, *ibid.*, p. 99.

²⁰ Ch. BONNET, *op. cit.*, no. 67 and 68, p. 163.

²¹ *Ibid.*, no. 296, p. 223; G.A. REISNER, *op. cit.*, vol. II, p. 72, 76-77.

²² For example, at Uronarti: G. A. REISNER, "Clay-sealings of Dynasty XIII from Uronarti Fort", *Kush* II, 1955, p. 29.

²³ R. FATTOVICH, "Evidence of possible administrative devices in the Gash Delta (Kassala), 3rd-2nd millennia B.C.", *Archéologie du Nil Moyen* 5, 1991, p. 65-78.

²⁴ Ch. BONNET, "Les fouilles archéologiques de Kerma (Soudan)", *Genava*, n.s., volume XXXIV, p. 172, no. 104. From very early on, there is evidence of control of access to cereals in Egypt, and at Abydos, in a storage zone, where seals of the First Intermediate Period were discovered (M.D. ADAMS, "Introductory report on 1991-92 fieldwork conducted at the Abydos settlement site", *ARCE Newsletter* 158/159, summer/fall 1992, p. 6).



Preliminary observations on the geomorphological context of the Nile alluvial plain above the third cataract, in relation to the archaeological sites

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A preliminary interpretation was made of the SPOT Panchromatic image 116-311, taken on 19 September 1986 and supplied by the University of Geneva Archaeological Mission to the Sudan. The aim was to recognise the possible presence of features attributable to river dynamics in the alluvial plain of the Nile. The study was made in preparation for the investigation of the geomorphological context of the archaeological sites of the Kerma Basin (particularly Kerma and Kadruka).

The stretch of the Nile between the town of Dongola and the narrow straits of the rocky barrier of the Jebel Ali Barsi and the Jebel Sadeik is very rich palaeohydrographically, and demonstrates the considerable variability in the activity of the river, and of its course, during the Holocene. This is particularly apparent in the alluviations of the Nile (the ancient, recent and present day sediments are shown on fig. 1), which form a vast plain, limited here and there by in situ rocks and aeolian deposits. At least four very wide and continuous river terraces could be distinguished: the oldest, numbered 1-1', is also the most distant; the most recent terrace (4-4')

borders the present day course of the river. These terraces bear witness both to phases of erosion and to phases of dispersal and deposit of the transported sediments, linked to changes in the hydraulic system of the Nile, and influenced by the climate and perhaps by neotectonic activity. On the shelf of each terrace are traces of ancient meanders and fossil river beds, which must have interacted with the pre- and proto-historic settlement pattern of the area. The traces are particularly abundant to the east of the river, close to Kerma and around Kadruka.

As a result of these preliminary observations, it seems to be advisable to develop in the near future a more detailed research programme, in close collaboration with the archaeologists, in order to attempt to reconstruct an evolutionary model of the Basin during the middle and late Holocene. This research would use in particular the documentation provided by the SOYOUZ satellite images with linear resolution of 2-3 metres, and an actual geomorphological and sedimentological survey. The results should then be looked at in relation to the typology and distribution of the known archaeological sites.