

CHARLES BONNET

KERMA

1979-1980

SOUDAN



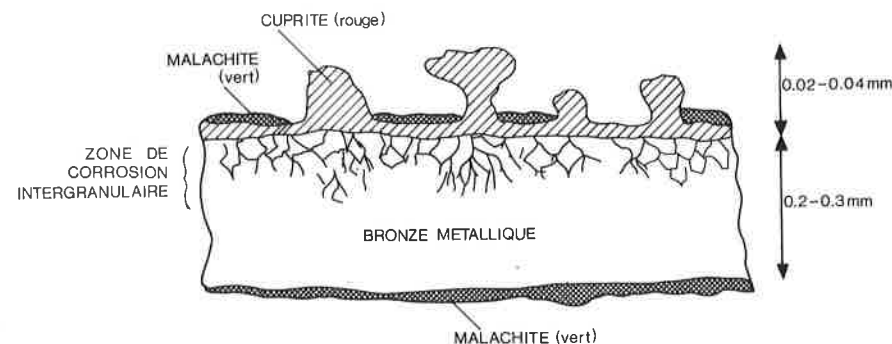


Fig.1 COUPE TRANSVERSALE À TRAVERS LE FRAGMENT EN BRONZE

Fig. 1. Coupe transversale à travers le fragment en bronze.

d'un revêtement de pigments appliqué artificiellement (ocre?) ou d'une corrosion naturelle? L'analyse du côté rouge du fragment en bronze et du prélèvement rouge effectué au Soudan montrent la présence des éléments constituant de l'alliage du bronze et en plus, environ 1-2% de fer. Cette faible teneur en fer en surface provient de la contamination de la terre. Il ne s'agit donc pas d'un revêtement de pigments d'ocres. L'analyse d'un petit grain de rouge par diffraction de rayons X² donne un diagramme qui correspond exactement au cuprite (oxyde de cuivre, Cu₂O).

Pour savoir si le cuprite a été appliqué en tant que pigment sur le bronze, nous avons effectué une coupe transversale en enrobant un petit fragment dans une résine synthétique. L'observation au microscope à la lumière polarisée montre sur le côté rouge une couche importante d'oxyde de cuivre (cuprite). Les grains de cuprite ont formé des petits «cham-pignons», donnant une structure granuleuse à la surface du bronze (fig. 1). Tous les grains

sont liés à la couche de corrosion qui se trouve en contact direct avec la partie métallique. Dans cette dernière, nous observons une zone de corrosion intergranulaire qui confirme que de ce côté, le bronze a subi une corrosion importante. Il est intéressant de noter que directement sous les gros grains de cuprite, la corrosion intergranulaire est plus prononcée. C'est à ces endroits que le cuivre a été dissous de l'alliage cuivre-étain et redéposé sur la surface sous forme d'oxyde de cuivre. Ces observations nous permettent de dire qu'il s'agit d'une corrosion et non d'une application de pigments sur la surface du bronze.

Sur les lions en feuille de bronze, on observe du côté rouge, une bande de 1-2 mm qui suit exactement les contours du lion. Cette bande est lisse et ne contient pas de grains rouges. Nous pensons que ces surfaces ont été protégées de la corrosion par la présence de bois, d'étoffe ou de cuir et également de la terre puisqu'elles ne contiennent que très peu de grains de quartz.

¹ J. C. RUSS, *Energy dispersion X-ray analysis*. American Society for Testing Materials, Philadelphia, 1971, pp. 154-180.

² L. V. AZAROFF et M. J. BUERGER, *The powder method*, London, 1958.

Archaeological Expedition at Kerma, Sudan Preliminary Report of the 1978-1979 and 1979-1980 Seasons

by Charles BONNET

Translation from the french by Harry BLACKMER

Dedicated to the Sheikh El Zubeir Hamad El Malik

During the last two seasons of excavation of the Archaeological Expedition of the University of Geneva in the Sudan, we have continued our study of the ancient site of Kerma in the Northern Province of the Sudan¹. For almost five months, we have collected important documentation concerning dwelling places as well as cemeteries. We once again wish to thank the Department of Antiquities of the Sudan, headed by Sayed Nigm Ed Din Mohammed Sherif, for all the help given to our undertaking. We are also grateful to the individuals and organizations who helped finance our expedition². The support of the University of Geneva's Commission has been also of great value³.

We have attempted to link some rescue work with a research project that would provide a better understanding of the history of the site. The modern city continues to grow and endangered ancient vestiges were pointed out to us all over the city. Numerous archaeological sites will soon be rendered inaccessible by urbanization and damaged by the foundations of new houses. The areas of cultivation also continue to expand and we have been forced to work on the eastern cemetery where the neighboring desert is already partially under irrigation. Some tombs have been disturbed and pottery appeared at ground level. We thus began our work on the edges of the immense cemetery on a surface that had been damaged by tractors and truck tracks. Fortunately, the ancient town is protected by an enclosure which allows us to program a longer term study of this area.

We worked from December 5, 1978 to February 3, 1979 and from December 10, 1979

to February 25, 1980. Our two Sudanese «raïs» from Tabo, Gad Abdallah and Saleh Melieh, directed a group of 30 to 45 workers. Sayed Khidir Adam Eisa, Assistant Director of the Department of Antiquities, joined us and helped in the general organization of our work. The helpful cooperation of all members of the Expedition aided our efforts. Miss B. Privati classified and made the preliminary examination of all objects and ceramics. She also helped in the architectural surveys and the drawings of the tombs. The Institute for the Conservation of Monuments of the Federal Polytechnical School in Zurich sent us Mr. A. Hidber to study the best means of safeguarding the western deffufa, a solid mass of sun-dried mud-bricks. Mr. Hidber also aided us in the survey and the reconstruction of this monument and of some of the dwellings. Mrs. M. Ferrière-Willis was responsible for the preparation of the surveys of the houses and their internal arrangements as well as the recording of some structural features of the deffufa. Mr. C. Simon made anthropological studies of skeletal remains at Kerma and the excavation of some of the tombs. Mr. L. Chaix, an archaeozoologist was given the task of studying the remains of animal bones found in the city and in the cemeteries. The photographic work was done by Mr. J.-B. Sevette who with the help of Miss A. Hurlimann managed the housekeeping of the Expedition.

The City

The clearance of large surfaces of land complete the information already obtained from the study of the city. New houses were found

in the southern quarter and around the deffufa. More than a hundred meters west of this monument, situated in the center of the town, we found the remains of houses on each side of a small street. Thus, the city must have spread out fairly far towards the Nile.

Only the uppermost layers of soil were removed because in many places the mud-bricks were visible before digging. It seemed preferable to proceed by careful cleaning which from the very beginning indicated a complex chronological sequence. Thus we realized that there were levels from four or five principal periods of occupation very close to the surface (from 0.05 m to 0.30 m) and that in the course of centuries the inhabitants had often modified the orientation of the walls and the organization of the rooms. Even today, we are still surprised to see how quickly the layout of certain modern houses can be changed by the addition of new annexes, the collapse of badly supported walls or by the acquisition of neighboring lots of land and the displacement of fences. Stratigraphic analyses constituted our first job in order to attribute the archaeological materials to the various cultural horizons. Limited excavations near the deffufa disclosed well conserved traces of the development of the city. In houses 5, 6 and 8 it was possible to link our stratigraphic studies with an analysis of the masonry of the deffufa and its additions.

Contrary to what we observed on the surface for some later walls which belong to the classic Kerma period ⁴ houses 5, 6 and 8 predate the foundations of the deffufa which are laid in a trench filled with greyish-yellow sand ⁵. It is important to remember that this lower part of the deffufa belongs to a phase in the alterations of an earlier edifice and that this complex is older than the actual construction which is preserved to a height of 17.30 m ⁶. Certain houses were probably levelled down earlier during the works which gradually altered the monument. In many places the trench of the foundation of the deffufa helps to easily trace the levels previous to these works.

The spoil left by G.-A. Reisner had to be partially removed since it was piled in an area where classic Kerma structures covered

significant remains of several earlier periods. Elsewhere in the city, recent levels have disappeared by erosion. After the removal of the spoil originally left to the north of house 5 and near the eastern additions of the deffufa, we were able to see the subsoil up to nearly three meters in depth; the natural soil was not reached but traces of a large wall were mapped out. It was most probably a large building and the layers of ash and charcoal bear testimony to its violent destruction. At the same partially cleared location, flimsy shelters were subsequently built. The holes of the posts of these shelters go through the ashes so as to be more firmly driven into the hardened clay of the destroyed building. These holes, with a maximum diameter of 0.15 m, are identical to those left by the poles of present day houses. When a house owner does not have the means to build in mudbrick, he is obliged to make do with a shelter made of wooden poles, covered and walled by reeds, straw and palm branches. The general orientation of these post-holes and of the few hearths we discovered do not facilitate the reconstruction of the habitation and one can assume that the thickness and the position of the poles could vary and that they were often replaced. However, it is possible to observe rows of post-holes doubtless belonging to partitions.

After troubled times, new houses were set up in the center of the city. Several foundation walls were apparent in the stratigraphic studies or in the pits that remained after the excavations of 1916. Once again, one finds levels of destruction with layers of ash and charcoal. The settlement which followed this new period of disturbances is also characterized by more modest dwelling of which numerous post-holes still exist. The earliest work on the building of the deffufa probably started at a time when the city was practically in total ruin. As G.-A. Reisner already observed, the foundations of the eastern additions were laid on a thick level of ash ⁷.

These remarks partially explain why it is so difficult to excavate the villages of the various periods of the Kerma culture. Without wedging-stones, it is almost impossible, in a sandy terrain, to spot out the little post-holes. The

slower and more minute methods of digging must be employed, particularly as the materials used to build these shelters leave no trace after a fire or after being attacked by termites.

It is evident that the city's organization was often changed and that the orientation of streets and the arrangement of lots were often modified during periods of trouble. The study of architectural remains in the center of the town is particularly interesting due to alternating periods of reorganization and war. During the former, well constructed walls and edifices were built while during the latter period, the houses were of poorer quality.

Different periods of occupation in houses 6 and 8 were established when the lower levels were cleared. The oldest group of walls, built at an angle to the later ones, defined relatively small rooms with narrow walls reinforced by irregularly placed buttresses. We noticed that several alternations had taken place. One of the houses was furnished with two large circular store-rooms in an enclosure built for that purpose. These rooms, carefully plastered on the exterior as well as the interior with hardened clay, are raised slightly above ground level. Other installations were found: small walls enclosing hearths, washing area and a structure made of mud-bricks. We also found a small sandstone base, probably for a beam.

Although we have not reached the lowest levels of soil and have confirmation of the existence of older levels through a few large hearths, we can propose a provisional date of these structures. The pottery and the few objects we found date from the end of the ancient Kerma period or the beginning of middle Kerma (about 2000 B.C.) ⁸. Later remains, contemporary with house 5 and with the last two rooms which constitute the final reorganization of house 6, belong to middle Kerma. During an ultimate stage, this quarter was abandoned so as to enlarge the original edifice situated under the deffufa. By using the C¹⁴ method we arrive at a later date (about 1500 B.C., \pm 80 years ⁹, corresponding to the last decades of the classic Kerma period). This one sample, however, is obviously not enough to be decisive.

To the south of these houses the soil is very eroded and there are no remaining wall foundations. We were able to study a series of store-rooms found in the substructures. These stores are often rather deep (up to 1.60 m) and more or less aligned on a north-south axis. Some still conserve the interior plastering; one of the inhabitants working on the finishing touches, stood on the wet clay and left his foot mark in the soil. The diameters of these circular store-rooms vary according to their depths (from 0.40 m to 1.80 m). A large amount of cow and goat bones were mixed in the soil deposits as well as many potsherds dating from ancient Kerma but including some from middle Kerma.

This group of storehouses was bounded on the east and south by small streets which were laid out after the first periods of occupation. A large circular enclosure was doubtless reserved for animals. We think it is a yard but nothing remains of the house to which it was attached and which was probably placed above the already filled-in store-rooms.

The remains to the south are better conserved. One of the rooms of house 9 is almost square and its walls are thicker than those of other rooms found in this area. A second room, enlarging the house towards the west, is rather narrow due to its location between the street and a neighboring house. The building is constructed on older foundations and its orientation is the same as other walls discovered on the south side. House 9 was abandoned when the owners completely reconstructed this area by building a very large new house (house 10).

House 10 was no doubt built during one of the periods of middle Kerma that permitted the town to develop under the best conditions and allowed the inhabitants to build more spacious dwellings. This stage of construction seems contemporary with a group of buildings found in the lower levels of house 1. We thus have some features of the urban organization that developed after the construction of a rampart whose trenches are still recognizable. The plan of house 10 is rectangular and consists of an L shaped court with two rooms along its side. The enclosure and the walls of

the two rooms are supported by buttresses. However, only the walls of these rooms support a roof made of beams and palm branches. On the outside, two large buttresses are placed along the west wall and most probably mark the position of the doors. The entrance to a small additional room to the south of the house was placed on the same side as the main door in front of which there was a circular annexe destined for small domestic animals.

There was a courtyard during a very long period between houses 1 and 10. The little door formed by the two small walls which were perpendicular to the enclosure allowed the domestic animals to go out beyond the ramparts. Because the wall enclosing this space was sinuous, it was more resistant. The restorations of this wall and the remains of ashes are evidence that the south-east of the courtyard was used as a dump. Due to the changes in levels, the small walls were constantly rebuilt and the fences were shifted. There are many contemporary as well as ancient examples of this occurrence¹⁰.

Furthermore, we would like to point out that after the destruction of house 10, other habitations were built to the north along the street and to the south (house 11) on an esplanade gained after the abandonment of one of the fortification systems. Perhaps some large areas within the walls were necessary to keep in the cattle in case of conflict. Animal husbandry was certainly very important during the whole cultural evolution of Kush and the long rounded enclosures covering vast areas seem to have provided a passage for the animals.

After changes in the enclosure wall of the city and the filling up of the trenches, this quarter grew towards the south. The first foundations of houses 7 and 12 are in bad condition but one can assume that these houses abutted against the new fortifications. The building of modern irrigation canals makes the study of the unfired brick masonry in the southern part of the site impossible because flooding has transformed the bricks into an indefinable mass. In spite of this difficulty, enormous efforts were made for the protection of the city and the defense system was

complex and of imposing proportions. These transformations probably occurred during the classic Kerma period and lasted until the time of the Egyptian colonization.

An almost square area of excavation of about 40 m by 40 m gave us a preliminary picture of the *western part* of Kerma. We were immediately able to see that the houses were well arranged, their architecture perfectly adapted to the practical and climatic needs. This type of construction has influenced the people of the region as one finds the same characteristics in modern constructions. It is too early for us to compare the two parts of the city that we have explored although sherds of the middle Kerma period have been found in the houses of both quarters. This period, however, lasted for several centuries and we are not yet in a position to refine the chronology.

The remains that we studied in the western quarter form a slight mound and often several layers of the walls are preserved. We are thus able to discover many important details of their construction and the collected archaeological material can be connected to the different levels of occupation of each house. Between the 2nd and 4th centuries A.D. a Meroitic cemetery spread out over the abandoned parts of the town. The tombs are very deeply dug and thanks to these graves we noticed traces of habitation 1.50 m below the uncovered walls. Thus our excavation represents only a short period of the lengthy occupation of this quarter. Furthermore, it is likely that more recent dwellings have disappeared because of erosion.

During the last season, we concentrated on four groups of buildings and a large courtyard. A street running north-south divides the area and seems to end towards the north where its width becomes only 1.50 m. The function of building 16 is not clear. It is a very massive structure with thick walls (0.45 m – 0.80 m) whose square layout is completed by a rectangular room to the east. Two large buttresses strengthen the southern wall. The square layout could form the base of a terrace or a room used for public purposes, but, due to the absence of a comparable structure, we must

await further excavation to support our interpretation.

House 14 has undergone numerous changes. The track that was built a few years ago over its site makes any reconstruction impossible. Only three sides of the north room were found. This room, built over the circular foundations of store-rooms, is of the same period as houses 13 and 15. The room was finally destroyed to make way for an additional enclosure to house 15.

From the street one entered a courtyard through a monumental door built between two rounded brickworks. This enclosed area, probably used by house 13 and perhaps house 16, is arranged in such a way that it most likely enclosed domestic animals. The walls of a four sided construction in the center are so thin that its height surely could not have been more than 1 m. It was doubtless a secondary enclosure used as a chicken coop or to keep ewes about to bear. One still sees this type of enclosure in farms today. Two annexes and two granaries have been helpful in reconstructing some daily life features. The numerous granaries and millstones prove that this pastoral population dedicated a great part of its life to agriculture. We have also found, a few hundred meters from the walls of the town, hoof prints of oxen left in the clay, most probably after flooding. Traces of flimsily built enclosures allow us to reconstruct the limits of a zone where there is evidence of the treading of hoofs which indicate where these animals were kept a part of the day and night. As there are very few traces of goat and sheep hoof prints, it would seem that the inhabitants preferred to herd them into the courtyards of the houses.

House 13 is built on an older construction with almost identical general dimensions. However, the orientation of the walls as well as the disposition of the rooms differ slightly. Thus, two rooms of the first house were placed on the east and west sides of an open space. The reason for the change in the orientation of the walls was probably to allow for a small street which runs along the eastern face of the house. The construction technique of the two houses is fairly similar, with narrow walls

reinforced by brickwork of greater or lesser thickness. A coating of clay plaster, perhaps painted, gives a well finished look to the masonry.

The study of the final state of house 13 enabled us to reconstruct its general layout and elevation. The entrance door from the street was placed near the middle of the eastern wall of the enclosure. This door is conspicuous because of its pilasters whose slight projection shows up in the foundations. Today, entrances to houses are still built in this way; relief decoration with geometric patterns are often found on the pilasters and the archway above.

The entrance opens into a court surrounded by two rooms with annexes. The door to the north room has been restored by a threshold that extends into the interior of the room by means of a step. A row of small slabs used as bases for posts is placed along the axis of the room. The wooden and palm frond roof was covered by clay plastering whose weight, as is the case in present day houses, could often be a problem. The bases of the supports partially protected the wood against termites.

The roof of the slightly narrower southern room was not constructed in the same way. A step, in this case placed outside the door, is located in the north-east angle. On the southern wall, we found traces of red ochre¹¹ which decorated a limited part of this wall. Has this thin layer of paint something to do with a niche or altar for household worship¹² or is it simply decoration?

In the courtyard, two large buttresses leaning against one of the walls of the northern rooms were also used as protection for the domestic water supply. We discovered here the sherds of a large jar, doubtlessly used for water. A light-weight ceiling, most probably supported by the buttresses kept the water cool. Once again, present day practices help us with our reconstruction. A hippopotamus tooth was found alongside the jar. Its ivory was most probably used for the manufacture of various artifacts. It is likely however, that a part of the animal was cut up and eaten on the spot. At the same level in the courtyard we found abandoned bone fragments of this animal's front hoofs.

A shelter, opening on to the courtyard, occupied the north west corner of the dwelling. This was the kitchen where only traces of different hearths and half of a fired-clay oven remain. This oven was used to bake bread and was altered at the time of the construction of the house. Probably there were other arrangements in the courtyard as shown by the remains of flat stones and post holes.

Numerous furnishings give an indication of the various inhabitants of house 13. Some terra cotta female figures, animal models and containers have turned up during the dig. These objects, that one finds occasionally associated with funerary offerings¹³, in this case seem to be connected with a popular cult as they are found in large numbers in the city. Made of ordinary hardened clay, these figurines were perhaps magical, bringing fertility or well-being to the household. They are occasionally marked by traces of a red ochre coating. It is rare to find them in good condition as they are usually broken.

As G.-A. Reisner pointed out, the use of seals was widespread at Kerma¹⁴. They have various forms and their impressions are usually found on the lumps of clay which served as jar stoppers. The stopper was of wood (or other material), tied by a string; the whole object was covered by a bit of clay which bore the imprint of the seal. Only one such piece of clay came out of house 13 and it was sealed three times with an oval amulet, probably a scarab.

The end of a stone (schist?) bracelet resembles some ivory specimens found in tombs of the classic Kerma period¹⁵. A rather large and thin sandstone spindle-whirl was also found. Sherds of ceramics are clearly of the middle Kerma period; the bowls are red on the outside with the rim and the interior black. They are polished and the rim is often decorated with lozenges and triangles. Very bulging vases are made of a coarser paste with incised triangular patterns under the neck. Several fragments of large crudely made jars of beige fabric were also found.

Some fragments of ostrich egg shell were used to make beads, some of which were lost in the courtyard. The large transparent rock-crystal found there was also used to make

beads. Ground red and yellow ochre were used to paint hides and everyday household objects. Perhaps the colour red had religious or magical significance for we found it in tombs, on statuettes and on one of the walls of the deffufa. Two ochre fragments with holes were perhaps worn by an inhabitant for easier use. One side of these objects was very worn and their resemblance to graphite beads found in the tombs could indicate that they were used for marking purposes.

Although bread was the basic foodstuff, a large amount of meat was eaten. The systematic collection of bones indicates that the inhabitants ate almost exclusively beef and goat meat and some fish.

To complete these few remarks on the excavation of a middle period Kerma dwelling, it might be useful to describe another house of a different architecture. However, the two buildings located in the same quarter, are of the same period, and their owner must have belonged to the same social class.

House 15 must have been destined for occupation by a greater number of people. For one thing, its size (14 m by 15 m) is slightly larger than the neighboring house; furthermore, the builder has diminished the size of the courtyard so as to provide for three more rooms. The layout also includes a sort of vestibule which cuts off the entrance, situated in the south west corner. The central space was partially covered by a lean-to roof; a small circular base and traces of a post-hole indicate the position of thin stakes. One can assume that towards the south side, there was a yard for animals as the wall that borders the street continues in that direction. We found important traces of yellow and red ochre painting in the interior of the room on the north side. The plaster coating which had fallen on the ground covered a surface of about a square meter.

What particularly differentiates house 15 from the other constructions is the thickness of its walls (0.40 m to 0.50 m). These walls would indicate a heavy roof which had no other support. In addition, the rooms are vast and the walls are higher than those of neighboring houses.

These preliminary observations on the urban architecture of the city of Kerma enables us to describe a still unknown type of dwelling. The detailed arrangement of these houses is quite different from those that have been studied in Egypt. A comparison with the almost contemporary open town of Mirgissa¹⁶ is significant. The climate and way of life around the fortress dictate a rather modest type of building. Also organized in units more or less separate from each other, the houses and their annexes have much smaller rooms. This town, however, is built according to patterns fairly similar to those used at Kerma. On the other hand, the houses in the interior of the fortresses of "Batn El-Hagar" have nothing in common with the architecture of Nubia. It is even more difficult to assess the relations between Kerma and more distant towns. Furthermore, it is surprising that during four seasons of work in the city we have found very few objects imported from Egypt.

The western Deffufa and its additions

During these last two seasons, we have systematically analyzed the masonry of the western deffufa. We have extended our work to include the brickwork additions leaning against the eastern side of the deffufa as well as the room with columns installed within one of these additions. Although these structures have already been studied by G.-A. Reisner, it seemed indispensable to continue clearance as well as detailed recording of some of their architectural features. Thus, on a scale of 1:20, we drew the stairways, the monumental door to the west, the interior corridor running down the middle of the monument, the adjoining room with columns as well as the general layout of the brickwork masses.

The photographs published by G.-A. Reisner and his successors show that the outline of the edifice has hardly changed; the architectural remains are identical to those observed in the 19th century. To resume their study, we have cleared the floors and the steps. Beneath them, we found the layers of aban-

donment or destruction still in place. Through a deep hole dug by treasure hunters, we were able to uncover in room A¹⁷ different types of brickwork which form the foundations of the stairway at the time that the construction was abandoned. Several building phases have appeared in the eastern additions so that we now have new documentation which bears evidence of the complex evolution of the structure. The laying down of cross sections and surveying permitted us to correct various hypotheses so contradictory that they falsified any reconstruction of the edifice¹⁸.

We have already submitted our observations regarding the original plan of the deffufa and have suggested that this monument was of the same type as the funerary chapel K 11 of the eastern cemetery. The southern entrance, opposite a rounded bastion, a sort of solid apse, marked the principal axis of the building which probably contained one or two narrow rooms in its central part. This plan, modified by the addition of annexes at the four exterior corners, was abandoned after long occupancy of the edifice, partially painted in red. The older masonry was then razed down to about 2.5 m above ground-level, and a new architectural conception seemed to have prevailed¹⁹. An immense brickwork mass was built with a small chamber and a narrow corridor placed in its center. So as to reach these rooms, a wide stairway was built on the western side. Thus a door of large proportions was backed against the lateral wall. It is located between the main part of the edifice and a sort of elevated pylon. The stairway cuts deeply into these two brickwork masses. The general aspect of the whole structure is reminiscent of an Egyptian temple.

The builder probably intended to make the entrance monumental. A flight of four steps gives access to a four sided terrace (9 m by 7.85 m) on which was placed the entrance door to the deffufa. Two large walls supported on each side the framework of the roof. After a landing and another flight of steps one reached the main part of the building which was strengthened by a timber framework of which numerous traces were found. The monument came to a violent end by fire and

the combustion of the beams reddened the brick surface. The imprints of the wooden trunks, sunk into the brickwork, remained after the disappearance of the wood. The walls of the stairway were reinforced by a series of horizontal beams which helped hold together the unfired brick masonry. Another landing marked the passage into the building and finally after eleven steps one arrived in a room situated about 7 m above the outside ground level. The stairs were covered by a light ceiling supported by rounded beams. Their location was indicated by holes situated almost 4 m above the steps.

The room located on the axis of the deffufa seemed to have had two functions: one of a ceremonial nature in relation to the central hall and to a stone base found there, and the other as a passage leading towards the top of the monument. The large circular stone, held to be the base of a column, could not be replaced in the center of the room. Indeed, we found the original floor level still preserved and there is no imprint of a circular base in the center. This white stone, although it had been moved, seems to be very near its original position. We also know that the roofing over this area was flimsy and that a column placed here at the end of the stairs would serve no purpose. In addition, there are green tracings on the stone due to vitrification which, according to a common practice in Kerma, gave certain objects the appearance of faience. We must, therefore, consider another use for this stone. Was it perhaps used as an altar on which animals were sacrificed? The study of successive floor levels has shown that sheep and goats have been kept several times in this room and that such was the case even before the last fire of the deffufa.

A stairway led to the upper terrace of the monument; as it is narrower, we must assume that certain ceremonies ended at the intermediate levels, in the central room. This stairway could be closed off as we found the remains of a wooden door before the first step. There were traces of the threshold after it burnt. In the rectangular hollow that shows its position and on one of its edges, we uncovered the stakes which doubtless formed its frame.

The entrance to the central corridor in the room is indicated by a recess in the brickwork. This corridor is cut seven meters from the room by a vertical wall which has been altered by treasure hunters. Its width of 0.50 m hardly permits frequent comings and goings of a large number of people. Its height of 3.50 m is well proven by the remains of plastering and especially of an unusual ceiling. Contrary to the stairway whose ceiling is very simple and light, the masonry at the top of the corridor's walls carries the imprints of joined beams. Placed perpendicularly to the passage, these beams, very close to each other (0.20 m – 0.30 m), support a layer of unfired bricks at least four meters thick. On the north side, an overhanging part of this masonry is still preserved. Consequently, the corridor, situated in the center of this large brickwork mass, is very important and must be directly related to the function of the deffufa itself.

A flight of 19 steps gave access to another landing six meters above the room. Then, after a 90° angle, the stairs ended on the top terrace. A few bricks of a large wall are still in place to the south of the last steps. This structure possibly belonged to the base of a roofing system. There is nothing to prove that the stairs extended towards the north as G.-A. Reisner assumed; on the contrary, a room had probably been intended on the other side, above the end of the central corridor. The very regular level of destruction of the main part of the building makes us think that its height was not much greater than what is actually conserved.

The construction of the enlarged foundations of the deffufa dates from a relatively recent period if one can rely on one C¹⁴ test. The dating, from the beginning of the New Kingdom, is partially confirmed by another sample of burnt wood taken from the threshold of the middle room which was certainly built much later. The fire which finally destroyed the whole building could be dated to about 1380 B.C. (with a margin of error of ± 80 years)²⁰. Under the ground level of the corridor, we found a large number of sherds of a type which relates them to the 18th dynasty.

The totality of our observations points to the importance of the central corridor. This passage focuses on the middle of the monument from all sides as well as in height. The care with which it was roofed, its orientation towards the north where the apse of the primitive building was originally located would seem to prove that all these aspects were necessary for the requirements of religious ceremonies. The corridor is also present in chapel K 11. Likewise, we found an entrance to a corridor in the eastern deffufa but it did not give access to the top part of the walls as G.-A. Reisner has suggested for K 11. The corridor could then represent a sort of sanctuary where sacred objects were placed. The modifications that appear in the masonry show that there was an older corridor at the same place, slightly longer and terminating under the end of the higher staircase.

Using the information at our disposal, we made a scale model of the deffufa so as to be able to study its reconstruction. Little by little the general outline of a building began to emerge with battered walls and a front higher than the rest. Certainly its side entrance and the absence of rooms in the interior make it different from known unfired brick constructions. However, we must emphasize some real parallels with an Egyptian temple and admit that a kind of copy was made in the town of Kerma. Until the time of the Egyptian conquest, the inhabitants wished to safeguard their place of worship, and, even later, the solid brickwork was preserved even though enormous fortifications were destroyed.

The eastern annexes and additions to the deffufa

Several brick structures were added to the eastern side of the deffufa. The most important seems to have been constructed to shelter two square store-rooms and two rooms open to the south. This complex had already been excavated before 1916. However, we have to modify and add to the initial ideas presented. The largest room is rectangular; its ceiling was originally supported by a row of six wooden columns whose stone bases remain *in situ*. The floor, laid on two layers of mud

bricks, was of clay painted with several coatings of red ochre. This decoration is also present on the base of the walls. Subsequently, the roof was modified as 16 stakes became necessary to hold up the timber framework. The bottom ends of the trunks are still preserved in holes which traverse the earlier floor. In a final phase, the eastern side was hidden by a wall which replaced the row of stakes, probably so as to strengthen the support system of the ceiling or of an upper storey. An idea of the height of this room (3.80 m) is given by a hole left after the disintegration of a beam sunk into the western side wall. The fire that destroyed the deffufa did not spare this room nor the adjoining installations. Later on, erosion caused more damage and the south east angle of this mass has deteriorated. Such conditions allowed us to undertake some test digging under the structure already studied.

The two southern rooms are oriented in the same way as other religious buildings at Kerma. The red painted floor, the dimensions of the main room as well as the quality of its arrangement indicate that it was doubtless a chapel. Several ceramic containers made of good quality paste located in small hollows dug in the floor could represent offering remains. We can assume that the deffufa was surrounded by a complex of contemporary buildings some of which were used for religious purposes.

To the north a second smaller and badly conserved structure was built against the deffufa. All remains of the internal layout, possibly with rooms have disappeared. The foundations of a third structure trace the outlines of a wall of more than 3.60 m thick. This construction, to the east of the deffufa's additions is perhaps a segment of a large enclosure wall. There was a passage between the wall and the mass of the annexes. Its axis is continued by a street that has been cleared in the southern quarter. Perhaps there was a gate at the other end but the numerous layers of masonry there make it complicated to come to any certain interpretation. We observed that the foundations of the wall are large blocks of stone built in the same way as the southern

fortifications. The wall itself is built with unfired bricks.

Below this architectural complex which belongs to the last stages of development of the city, we found traces of another group of buildings. The removal of the floor of the large chapel has revealed the lower part of the walls and the occupation level of an earlier room. Clay plastering covers the walls and the floor and contains a red and yellow ochre wash still brightly colored. Curiously, the floor level does not seem to have been trod on, and in certain places one has the impression that the plastering has just been laid on.

Although this room is smaller, there is a clear indication that its use remained the same because in the subsequent room one finds the same red decoration²¹. Probably this was and remained a place of worship during the whole classic Kerma period in spite of important changes.

The first room is adjoined to several elongated rooms, perhaps used as store-rooms. The construction is carefully done; the walls are thick and were all built at the same time. The two doors were placed in such a way that one went in and out in an east-west direction. Our work must continue in order to complete the plan of these buildings which will have to be compared to the structures uncovered by G. A. Reisner to the west of the deffufa. Indeed, there are numerous similarities between these constructions that form a separate quarter in the center of the old town.

We must remember that other older archaeological levels have been partially excavated to the east of the deffufa. Walls and post-holes that are connected with habitations appear more or less everywhere, but the debris of preceding excavations complicates our work. So as to be able to continue our study, it will be necessary to determine whether the original building to the north ending with the unusual apse, replaces a temple or a chapel which was located in the middle of the town already at the time of the middle Kerma period.

The eastern cemetery

The excavations made by G.-A. Reisner in the eastern cemetery had decisively proved the

importance of the Kerma civilization²². The American archaeologist however, did not understand that the discovery of so many remarkable objects demonstrated the merits of a people that he mistakenly judged by the criteria found in pharaonic texts, which draw the picture of an underdeveloped kingdom, incapable of organizing a lasting and effective political centralization. Thus, he thought that the enormous tombs of this cemetery could only be those of Egyptian governors on Nubian territory. It is only recently, by comparing what has been found in other cemeteries, that such an assumption has been totally refuted²³. Today, the most likely assumption is that the largest tombs form the royal cemetery of Kush.

The tombs located in the desert are marked by rings of black stones that cover large tumuli made of clay and sand. The impressiveness of the site is heightened by the somber mass of a large funerary chapel, whose elevation is preserved at one end of the cemetery. This construction of unfired bricks, the eastern deffufa, is near a large tumulus of about 100 m in diameter. Another chapel of the same proportions, K 11, has survived to the height of 2 m. It is also located in the southern part of the cemetery where the tombs of the classic Kerma period are situated and belong to the last phases of development before the funeral area was abandoned.

Contrary to what G.-A. Reisner thought, the older tombs are to the north and one can follow the chronological sequence of the different Kerma cultures by working north to south. The cemetery spreads out over more than a kilometer and a half with a width of about 600 m. Taking into account that the amount of land devoted to agriculture is constantly expanding, almost a third of the cemetery has been altered in the last 65 years, and so as to shed light on the many archaeological problems found here, we decided to dig in the north and center of the site. The southern end was extensively studied during the work of 1913 to 1916. Only a small surface of 30 m square, where we found 34 tombs, was uncovered during the last two seasons. Further to the north, some test diggings were

necessary after the passage of a tractor and 8 tombs were thus studied. In this sector our observations will have to be completed by further work during the coming years.

The whole of the cemetery has been systematically pillaged and in places the ground is very disturbed. In the central zone of the cemetery where we dug, the superstructures of the tombs are levelled down as originally they were 0.50 to 2 m in height. The small slabs of hard stone that covered them are scattered over the ground. Depressions in the ground still show where plunderers have dug. The cattle skulls deposited to the south of the tumuli mark the largest burials. The graves are usually circular (1 m to 6 m in diameter), but there are certain exceptions of half circular graves for subsidiary burials which are joined to more important tombs, to which it is necessary to add one single rectangular grave. Their depth varies according to soil erosion (0.50 m to 2 m). There were no funeral chambers in wood or unbaked brick; the body and funeral offerings were protected only by oxhides before the graves were filled in with earth.

The deceased rested on the bed which had been his during his life-time. We identified traces of repair which prove that some of these furnishings had been in use for a long time. The beds were always turned in an east-west direction and made of a wooden frame resting upon four square supports. The frame was strung with rawhide thongs in lattice-form and animal skins. We often found traces of a foot-board; the wood-work, attached to the bed by pegs, is almost identical to the classic Kerma examples made one or two centuries later. Other furnishings were spread out around the bed. The wood has been preserved in the form of a brownish mass which has different consistency and color than the rest of the filling. Consequently, tables, a stool and pink or white painted boxes were discovered after very careful clearing.

The skeletons are much disturbed. The dead must have worn very precious jewelry or weapons for the bones seemed to have been displaced shortly after burial. However, certain limbs are still connected and the position of the body can be determined in most of the

tombs. The majority of the bodies are in a contracted or flexed position with the head towards the east and the face turned north. The ornaments are composed of faïence, bone or ostrich egg shell beads. Two ivory bracelets were hidden at the bottom of one of the graves. Bronze rivets were often found on the pelvises of the skeletons; they fastened the ivory handles of knives or daggers whose bronze blades have disappeared. A purse furnished some common objects like bone points, a graphite bead²⁴, fragments of ostrich egg shell, polishers and scrapers, a palette for grinding red ochre and a fruit.

Accompanying a double interment we found between the burial bed and the side of the pit the skeletons of two young adolescents. We were unable to identify their sex but the anthropological analysis permits us to estimate their ages to be between 12-14 years. Both were adorned with identical long bone-bead necklaces. Fragments of cloth and black marks (from leather?) indicate that the body of one of the individuals was enclosed in a sack. We are certain that the two adolescents were sacrificed at the time of the funeral, a practice which was to increase during the coming centuries²⁵.

Animal sacrifices, mostly goats, were very frequent. Cattle skulls show, however, that bovines were also killed during ceremonies. Live goats and sheep, often not yet fully matured were put into leather or cloth bags (see the archaeozoology study made by Louis Chaix). These animals were placed south and west of the funeral bed; one animal still wore a finely braided leather collar²⁶. The bag was almost always marked with red ochre powder. We also found the skeletal remains of a dog placed on the western side. Pieces of goat meat were disposed near the corpse. In one grave, we counted up to 18 joints of meat also wrapped up in bags.

Ceramic containers occupied the north side of the grave as well as the two ends of the bed especially near the head of the deceased. The various types of pottery cannot be discussed here; there were jars, bowls, spherical pots. Geometric figures, mostly triangles and lozenges, were incised into the pottery and

filled with red ochre to emphasize the design. The analysis of the remains preserved in these recipients indicates foodstuff offerings as well as a mixture of waxes, resins or rosin, probably used for the treatment of hides or the caulking of boats²⁷. Near the pottery, we found fairly thin circular clay models of bread.

The excavated tombs are generally characteristic of Middle Kerma and contemporary with the tombs unearthed by G.-A. Reisner in the M cemetery²⁸. There are numerous resemblances to several tombs of the Sai necropolis²⁹ which permit us to emphasize the cultural unity of a large geographic area. The charcoal found in the filling of one of the tombs, gave us the opportunity to date the funeral ceremonies (or perhaps the date of pillage) with the C¹⁴ method. A probable date of 1750 B.C. (± 80 years)³⁰ matches the chronological evidence furnished by the comparison of funerary customs and furnishing.

The excavated area to the north of the necropolis belongs to the old Kerma era (between 2500 and 2000 B.C.). We unearthed circular or oval pits which contained bodies resting on cowhide. We found the remains of a wooden frame or bed in only one grave. The discovery of a sacrificed lamb is exceptional for most of the tombs were empty of offerings. The clothes of the deceased were prepared with well-tanned hides sewn together with surprising finess. A few beads made of bones were still sewn on to a piece of loin-cloth. The vestiges of rarely visible superstructures as well as the furnishings should help us understand the origins of the Kerma population. Perhaps we will be able to conclude that quite a few Nubian funerary customs already existed at a very early date.

The Western Necropolis

The excavations in the courtyard of the girls' elementary school have been finished. We completed our research on this terrain which is delimited by the school's buildings and fence³¹. The site has suffered considerable ancient or more recent damage and it is certain that some tombs have disappeared. The digging undertaken at about 100 m to the south,

permits us to grasp the immensity of the Meroitic cemetery which extends north and towards the south beyond the school. Further proof can be found in the ancient city where the tombs, belonging mostly to the 3rd and 4th centuries A.D., considerably extend the boundaries of the Meroitic cemetery excavated by G.-A. Reisner³².

The Cemetery of the New Kingdom

Four graves of the New Kingdom have been preserved very near ground level. They are oriented in an east-west direction (the head lies towards the west) with the bodies in a contracted position. Around two skeletons, we found some fairly thick grey traces which are the remains of organic matter. The bodies were perhaps enveloped in bags or wrapped up in matting. Some mud bricks, belonging to dismantled vaults, surround the burial. These poor tombs were devoid of furnishings.

The Southern Meroitic Cemetery

In the courtyard of the school, other burials and their offerings complete the already existing information collected during the first two periods of excavation. The painted jars and the tin-plated bronze bowls that were used as lids, are similar to the previously found recipients and as such, illustrate the coherence of this part of the cemetery. These objects were certainly manufactured by the same artisans³². For this reason, we believe that these tombs were constructed during a relatively short span of time even though several vaults were used more than once.

With the exception of a few scattered bricks abandoned on eroded soil, there are no traces of the superstructures of the tombs. We nevertheless, have some idea of their structure from the graffiti found on jars, which bare traces of long use. The designs, incised into the jars after they were baked, could signify a second use for funerary purposes. One of the jars seems to have been decorated in two steps: the first drawing represents the oblong form of a grave whose depth is indicated by small lines around the "pit". Subsequently, this oval

was covered over by the drawing of a pyramid³⁴, flanked by an enclosure with an entrance where one can see an offering table. The lines of the second drawing are clearly superimposed on those of the first.

The jewels that were found in an intact tomb (T. 35) give an idea of the finery worn by a Meroitic woman of Kerma, before the Roman era. She wore two golden earrings formed by a wire thickened at the bottom and decorated by a ball. Each strand of her three-strand necklace, had different beads which were either made of grey and yellow glass or faience. Her bracelets were made of carnelian and glass beads disposed around a scarab and a big diamond-shaped bead with facets. This custom of wearing one or several scarab bracelets was verified in some other burials. These objects are often much older and do not help us to situate the dates of the inhumations. In fact, even today, one can see women who use these ancient amulets as good luck charms. Some of the bracelets' glass beads, fashioned with great care, contained underglaze gold leaf in order to enhance their brilliance. Two bronze rings were also worn on the 4th and 5th toe of the right foot. On the site adjoining Tabo, in graves dating from after the Meroitic era, we found similar rings made of iron or bronze, worn on one of the toes³⁵. The sepulchre which we discovered near a descending passage leading to another vault, has remained intact in spite of extensive pillaging of the main tomb. Near the head of the corpse, we found a bronze bowl with an engraved line on the rim.

On the terrain of a house in construction (I), we cleared a new surface of the Meroitic cemetery. The 27 tombs we unearthed near the girls' school complex, did not furnish material as rich as the one found in the courtyard of the school. Practically all of these graves were without furnishings and the skeletal remains were in a very mediocre condition. This is a very poor area of the cemetery where burials rarely included sarcophagi. We found the skeletons almost near ground level, the vaults had thus been destroyed. We think that the house represents the eastern limits of the necropolis where most of the

women were buried (see the anthropological text of Christian Simon). In one of the tombs (T. 45) a woman had been adorned with two heavy rings worn over the calf of the legs. The position so high above the ankles is unusual³⁶. The two pieces of jewelry are decorated with delicate geometric engraving, similar to the designs discovered eight years ago by an inhabitant of the city³⁷.

The Northern Meroitic Cemetery

In the ruins of the western quarter of the ancient city, at about 200 m from the deffufa, several graves have been located. Systematic study of a few of them confirmed the interest of this area. Here again, the richness and variety of the furnishings have attracted thieves. However, some of the remaining elements prove that this cemetery is the extension of the funeral area excavated by G.-A. Reisner.

An immense subterranean room (T. 9) corresponds to the most important grave in this area. One has access to it by a large descending passage leading to a door. Its east-west orientation and eastern entrance are different from the other graves in the cemetery. In front of the wall screening the door to the entrance, we found pieces of a voluntarily broken amphora. After removal of the masonry which hid the door, other sherds were discovered in the filling of the doorway; they belonged to and completed the amphora. Consequently, we are certain that a ceremony with libations took place in front of the tomb, as has already been observed in certain descending passages of Tabo and Sedeinga³⁸ where broken recipients were also found.

The numerous inventoried objects in the ten excavated graves are contemporary with the end of the Roman era. The jewelry and pottery are better known but different from those identified in the courtyard of the school. We must still verify if the western necropolis extends from the south towards the north as the few landmarks seem to indicate. What appears certain, however, is the vastness of the area occupied by the tombs which proves extensive settlement during the whole Meroitic period.

Conclusion

The University of Geneva's Mission should continue its work during the next few years. The first objectives have been largely reached but the Kerma site is very large and successive civilizations that inhabited the area create in-

numerable archaeological problems. We have made a scientific film about our excavations in the Sudan so as to increase public interest in such work. It will be presented as a co-production for the French-speaking Television Community³⁹. An Arabic version will permit the Sudanese to better understand a study that directly concerns their past.

¹ For the two latest expeditions, see:
C. BONNET, *Fouilles archéologiques à Kerma (Soudan), Rapport préliminaire de la campagne 1977-1978*, in Genava, n.s., t. XXVI, 1978, pp. 107-134; *La nécropole méroïtique de Kerma*, in *Actes du Congrès international des égyptologues, Groupe international d'études méroïtiques* (Grenoble, 10-15 sept. 1979), to be published; *La nécropole orientale de Kerma*, in *Actes du Colloque de la Société d'études nubiennes* (The Hague, 20-22 sept. 1979), to be published.

For earlier excavations, see:
J. LECLANT, *Fouilles et travaux en Egypte et au Soudan, 1972-1973; 1973-74; 1974-1975; 1975-1976*, in *Orientalia*, 43, 1974, p. 210; 44, 1975, p. 231-232; 45, 1976, p. 306-307; 46, 1977, p. 277-278. C. BONNET, *Nouveaux travaux archéologiques à Kerma (1973-1975)*, in *Etudes Nubiennes, Colloque de Chantilly, 2-6 juillet 1975*, Cairo, 1978, p. 25-34; *Remarques sur la ville de Kerma*, in *Hommages à la mémoire de Serge Sauneron*, I, Cairo, 1979, p. 3-10. C. BONNET and D. VALBELLE, *Un prêtre d'Amon de Phoubs enterré à Kerma*, in *Bulletin de l'Institut Français d'Archéologie*, Cairo, 1980, to be published.

² We wish particularly to thank Mr. H. Blackmer, the Swiss National Fund for Scientific Research, the Academic Society of Geneva as well as the Union Bank of Switzerland.

³ The Excavations' Commission for Sudan, presided by Prof. D. van Berchem, is formed by Professors J. Dörig, O. Reverdin and M.-R. Sauter.

⁴ *Kerma, Expedition 1977-1978* . . . , p. 113.

⁵ G.-A. REISNER, *Excavations at Kerma*, part I, Harvard African Studies, vol. V, Cambridge (Mass.), 1923, p. 22.

⁶ See below for the study of the phases of the monument's construction and its state of conservation.

⁷ G.-A. REISNER, *op. cit.*, p. 26, Plans IX and X.

⁸ For these periods, see:

B. GRATIEN, *Les cultures Kerma, Essai de classification*, Publications de l'Université de Lille III, 1978, p. 319-323; D. O'CONNOR, *Nubia before the New Kingdom*, in *Africa in Antiquity, The Art of Ancient Nubia and the Sudan, I, the Essays*, The Brooklyn Museum, New York, 1978, p. 48-49 fig. 25, and ST. WENIG, *The Chronology of Nubia and the Northern Sudan, in Africa in Antiquity* . . . , II, the Catalogue, p. 12 and following.

⁹ Analysis by Mrs. T. Riesen of the Physics Institute of the University of Bern (19.11.1979).

¹⁰ C. BONNET and D. VALBELLE, *Le village de Deir El-Medineh, Etude archéologique (continuation)*, in *Bulletin de l'Institut Français d'Archéologie Orientale*, vol. LXXVI, 1976, p. 320 and

J. D. S. PENDLEBURY, *The City of Akhenaten, part I*, 1923, p. 54 and Fig. XVI.

¹¹ For this substance and its derivatives, we have chosen to use the generally accepted term of «ochre». Concerning this subject, see:

P. CADENAT, *Notes de préhistoire tiarétienne II*, in *Libyca*, vol. XIX, 1971, p. 125.

¹² B. BRUYERE, *Rapport sur les fouilles de Deir El Medineh (1934-1935)*, in *Fouilles de l'Institut Français du Caire (FIFO)* vol. XVI, Cairo, 1939, p. 45 and following.

¹³ D. O'CONNOR, *op. cit.*, p. 53 and ST. WENIG, *op. cit.*, p. 29-30.

¹⁴ G.-A. REISNER, *Excavations at Kerma*, II, . . . p. 70 and following.

¹⁵ G.-A. REISNER, *op. cit.*, p. 255, No. 7, Fig. 53, 12-14. For the same type of example, see also H.-S. SMITH, *The Fortress of Buhen, The Inscriptions*, London, 1976, p. 28, 1478 and 1572, Fig. IX.

¹⁶ J. VERCOUTTER, *Excavations at Mirgissa-I (October-December 1962)* in *Kush*, vol. XII, 1964, pp. 57-58, for the layout of one of the houses, see Fig. XVII. The general plan of the open city of Mirgissa has been very kindly furnished by Mr. J. Vercoutter.

¹⁷ G.-A. REISNER, *Excavations at Kerma*, I . . . , p. 23 and following.

¹⁸ The deffufa has a maximum height of 17.30 m and not 19.30 m as indicated by G.-A. Reisner on his plans and in his notes. Therefore, the proposed reconstitution of the stairway has to be completely modified, G.-A. REISNER, *op. cit.*, p. 22, Fig. VIII and IX.

¹⁹ C. BONNET, *Fouilles archéologiques à Kerma* . . . , pp. 113-116.

²⁰ Analysis by Mrs. T. Riesen of the Physics Institute of the University of Bern.

²¹ This same red ochre decoration appears sometimes in civil Egyptian architecture and may perhaps be related to false doors or domestic altars especially as concerns the surface of the floor. For more information on this subject, see: B. BRUYERE, *FIFAO*, XVI, 1939, pp. 55 and 65.

²² G.-A. REISNER, *op. cit.* III, IV, V.

²³ H. JUNKER, *Bemerkungen zur Kerma-Kunst, Egypt Exploration Society, in Studies presented to F.-L. Griffith*, London, 1932, pp. 297-303; T. SAVE-SODERBERGH, *Ägypten und Nubien: Ein Beitrag zur Geschichte altägyptischer Aussenpolitik*, Lund, 1951; F. HINTZE, *Das Kerma-Problem, in Zeitschrift für ägyptische Sprache und Altertumskunde*, 91, 1964, pp. 79-86.

²⁴ Other similar galenite beads have been indicated; an

analysis (X-ray fluorescence) by J. Deferne and F. Schweizer showed that our sample is a piece of graphite. The wear which is visible on the three beads found in 1979-1980 as well as the black lines on certain jars seem to confirm their use for marking.

²⁵ G.-A. REISNER, *Excavations at Kerma, III* . . . , p. 69. For example, 322 skeletons found in a single tomb (DXB) which originally contained about 400.

²⁶ An identical necklace was discovered in Akasha: C. MAYSTRE, *Découvertes récentes (1969-1972) près d'Akasha*, in *Nubia, Récentes recherches, Colloque nubologique international de Varsovie, juin 1972*, Warsaw, 1975, p. 89.

²⁷ Analysis No. 9.754 of the Hygiene Institute of the Canton of Geneva, Cantonal Chemistry Laboratory directed by J. Vogel.

²⁸ See the layout of a tomb in this cemetery: D. O'CONNOR, *Nubia before the New Kingdom* . . . , p. 56, Fig. 32.

²⁹ B. GRATIEN, *Les cultures Kerma* . . . , pp. 160-181.

³⁰ Analysis by M^{me} T. Riesen of the Physics Institute of the University of Bern.

³¹ C. BONNET, *Fouilles archéologiques à Kerma* . . . , p. 116-126 and *La nécropole méroïtique de Kerma* . . .

³² G.-A. REISNER, *op. cit.*, II, pp. 41-57.

³³ These paint-decorated ceramics, originating most cer-

tainly from the same workshop, were signaled in Abri (North Province). F. Fernandez Gomez, who is director of the Spanish Mission, gave us documentation which indicated the presence of bronze bowls identical to those of Kerma.

³⁴ For the drawing of the plan and the elevation of a pyramid, see:

M. SCHIFF-GIORGINI, *Soleb II, Les nécropoles*, Florence, 1971, p. 183, T. 14/56, Fig. 316 and F. HINKEL, *Erstmalig Bauplan einer Pyramide gefunden*, in *Spectrum*, Akademie der Wissenschaften der DDR, 6, 1979, pp. 30-32.

³⁵ H. JACQUET-GORDON and C. BONNET, *Tombs of the Tangasi Culture at Tabo*, in *The Journal of the American Research Center in Egypt*, 9, 1971-1972, p. 81.

³⁶ For the position of these objects far above the ankles, see an identical case with iron rings in Soleb:

M. SCHIFF-GIORGINI, *Soleb II* . . . , p. 348, Fig. 682, p. 351, Fig. 690.

³⁷ These objects have been deposited at the Sudanese National Museum in Khartoum.

³⁸ M. SCHIFF-GIORGINI, *Sedeinga, 1964-1965*, in *Kush*, vol. XIV, 1966, p. 247, I.

³⁹ This film is produced and directed by Pierre Barde for the Swiss Television.

A Preliminary Note on the Faunal Remains of Kerma (Sudan)

(Middle Kerma: 2000 - 1750 B.C.)

by Louis CHAIX *

During the 1979/80 expedition of the Mission of the University of Geneva to the Sudan (Bonnet, 1978), our research basically concerned two aspects:

- a preliminary study of the faunal remains collected during excavation of the quarters of the old town of Kerma and of the annexes and premises of the western deffufa.
- the excavation and study of the animals and animal offerings found in the sepulchres of the eastern necropolis.

a) *The Faunal Remains of The City and its various annexes*

The excavation of several houses permitted us to collect abundant osteological material, which has not yet been entirely identified. Differential conservation, and human inter-

ference, have meant that only the most resistant and compact bones are well preserved; the usable material consists essentially of carpal and tarsal bones, phalanxes and a few epiphyses of long bones.

Our first estimates indicate that the faunal remains are predominantly of domestic animals, particularly bovine. Several size groups of this family appear to be present, but definite attributions cannot yet be made, since precise measurements and external comparisons have not been completed. Among the thoracic vertebrae belonging to the genus *Bos*, we have never observed the bifurcation of the spine of the vertebra, characteristic of *Bos indicus*, the zebu (Clason, 1978). Apart from the bovidae, caprine animals were the most frequent livestock. The distinction between goats and sheep has not yet been made, but it seems that the goat played a relatively important role, as is still the case in the region today.

* Centre d'Archéozoologie, Museum d'Histoire Naturelle, Genève.

The donkey and the dog are among the species of which only a small number of remains were found. Fishing seems to have been practised, as witnessed by the finding of a few vertebrae and dorsal bones of a large fish, probably of the genus *Lates*.

Systematic digging in various sites has been started with the object of obtaining a significant sample of the ichthyofaunal and possibly the avifaunal remains (Desse, 1979).

The faunal remains discovered in a pit situated in the quarter to the south-east of the deffufa allow us to illustrate the distribution of species within a closed sample. Of the 771 bones discovered, 447 or 58 % have been identified. Oxen remains represent the largest part, 54 % of the total, followed by 45 % caprine animals (identified goat and sheep), and 0.6 % dog bones. Several reptile and rodent bones were also found, but it is not certain that these are contemporary with the other deposits.

The proportions of the different species found are similar for other pits within the town.

In the deffufa, an annexe, notable for its red-coloured floor, revealed numerous well-preserved bones. Among these were two bones of a young swine, probably a domestic pig. This is the first discovery of its type on a Kerma site.

As stated above, wild-life remains are very rare. Nevertheless, we did find two hippopotamus bones (an incisor and a proximal fragment of a radius) in a house of the western quarter. A piece of elephant tusk, fixed in a wall of the western quarters was also discovered.

Thus, as already mentioned, the state of bone preservation is mediocre. We observed, however, that most skeletal elements were present, with the exception of skulls and bovine ankle bones, which were probably set aside for funerary rituals (deposits of cattle skulls are found to the south of the tombs).

Several skeletal elements, essentially those with almost no nutritive value (oxen and caprine feet) were found still anatomically connected.

Furthermore, on several bones we observed traces attributable to human activity: throat-slitting, cutting up and carving.

b) *The Faunal Remains of the Eastern Necropolis*

The tombs excavated during this expedition furnished material essentially composed of the skeletons of animals which had been buried with the deceased, together with pieces of meat destined to accompany the dead to the beyond. The results presented here are only the beginning of a detailed study which is under way.

Among the animals found whole within the sepulchres of Middle Kerma, caprine animals are predominant, and among these, the sheep seems to be most common. These animals were most often sacrificed young, the majority before the age of two years. Our observations show that they were not killed by throat-slitting, but they were placed alive within the leather sacks in which they were found. This is shown by the fact that, in several cases, the hind legs of the animals had torn the lining of the bags, and by the often disorganized state of the skeleton.

In one tomb (No. 25), we found the remains of a small-sized dog, at the feet of the body. It also seems to have been placed in a sack. This is the first time that an animal of this type has been found in a Middle Kerma burial. A similar find in a later tomb at Kubban has been described (Firth, 1927).

The pieces of meat, which can be numerous—as many as 18 in tomb 12, for example—all show a similar carving technique. The following pieces (mostly caprine) were found:

- fore and middle segments of the spinal column. On the atlas we often observed transverse grooves on the ventral side, indicating that these sacrificial animals had had their throats slit.
- rib cages, which had been prepared by sectioning at the costal angle. The head parts of the costal bones were also found, still contiguous with the recesses in the vertebrae.
- shoulders and legs. These pieces showed that the limbs were sectioned at the carpus

and tarsus. We did not find any metacarpal or metatarsal bones, and it seems that these were kept for the preparation of awls, which were often made of bone.

This method of meat carving has been studied in detail using material from a similar cemetery, situated to the north of Kerma, on the island of Saï (Jourdan, 1980).

This note is only the introduction to a study which is to be continued, and which has the following objectives:

- a detailed description of, and the establishment of quantitative data for, the different species found on the Kerma site.
- an investigation of the animals of the ancient livestock, and a comparison with

the domestic animals of the present day. This aspect will be completed by a micro-morphological study of the tegumental material, which is well-preserved on this site.

- a study, using the technique of palynology, of the contents of the coprolitic material often found preserved, from which deductions can be made as to the ancient animal food-stuffs, and the palaeo-environment.

We believe that these studies will contribute to a better understanding of one aspect of the economy of the civilisation of Kerma, situated at the crossroads of Egyptian and African influences.

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Preliminary Anthropological Study

by Christian SIMON

During the expedition of 1979-80, three areas of the necropolis were excavated. The following is a brief description of the material found.

1) *The Western Cemetery*. The excavation was situated in the area of a house under construction (House No. 1), and concerned graves of the Meroitic period. The material comes from 27 graves. The skeletons were very badly preserved, since the necropolis is situated in an area where flooding by the Nile occurs.

Numerous observations and measurements were made in the site, where 32 skeletons were discovered.

The method of Acsádi and Nemeskéri (1970) was used for the determination of sex. Because of the fragmentary state of the skeletons, however, this proved to be rather difficult. We obtained 4 males, 14 females, 6 indeterminate and 8 non-adults.

The age at death was determined only for the non-adult subjects by examining the degree of synostosis of the proximal and distal epi-

physes of the long bones (Brothwell, 1972; McKern and Stewart, 1957), and the appearance of the teeth (Olivier, 1960).

We obtained: 1 subject of 1-4 years
2 subjects of 10-14 years
5 subjects of 15-19 years.

This area of the necropolis is characterised by a large proportion of female skeletons, while the few male skeletons were buried much more deeply. It is possible that this part of the cemetery was reserved for women, though we lack information to confirm this.

Morphology: The subjects we were able to measure were dolicho- to mesocephalic (long to medium skulls), with medium sized cranial vaults. The face is medium to long, with a definite prognathism, and a wide nose. The rest of the skeleton is slender, and of medium height (males 165 cm and females 156 cm). All these morphological characteristics tend to confirm the negroid appearance found in other Meroitic cemeteries (Chamla, 1967).

2) *The Cemetery of the City*. During excavation of the walls of the ancient city (western sector), a number of late Meroitic tombs were uncovered. All these tombs had been disturbed, and some of the bones were no longer in anatomical connection. A few of the 11 tombs excavated were completely empty. Twenty skeletons could be distinguished: 3 male, 6 female, 5 indeterminate, and 6 non-adult.

For the non-adults we found:

1 subject of less than 1 year
1 subject of 5-9 years
4 subjects of 15-19 years.

The morphology of the skeletons is practically the same as that found in the western cemetery.

3) *The Eastern Cemetery*. Two areas of this necropolis were excavated. Twenty-three tombs of Middle Kerma and 7 tombs of Ancient Kerma were discovered. All the tombs had been plundered, and the skeletons disturbed. In the Middle Kerma zone, the tombs generally contained a single body; the exceptions were two tombs which contained two

skeletons, one adult and one adolescent. The anthropological material was well-preserved. We were able to identify 19 subjects: 4 male, 3 female, 4 indeterminate and 8 non-adults. The non-adults had the following age ranges:

2 subjects of less than 13 years
2 subjects of 1-4 years
2 subjects of 10-14 years
2 subjects of 15-19 years

In the tombs containing two bodies, we found one adult male and an adolescent that we assume to have been sacrificed. The adolescent of tomb 11 was about 12 years old, while that of tomb 22 was 13-14 years. Unfortunately, because of their youth, it was not possible to determine the sex of these adolescents. This part of the necropolis contains a large proportion of child graves of all age classes.

The Ancient Kerma part of the cemetery is situated in a zone which has been disturbed by agriculture, and the tombs are generally very damaged. All the tombs contain a single body. We identified 8 subjects: 3 male, 2 female, 1 indeterminate, a child of 6 years, and an adolescent of 19-20 years. Despite the disturbance and damage, the anthropological material is well-preserved. On one of the female subjects (tomb 38), we found two types of hair; curly hair, similar to the present day Nubian hair, as well as short braids (Fig. 1) such as are characteristic of certain African hairstyles. A second young female (tomb 40) was naturally mummified (Fig. 2), with preserved skin and tissues. This is a very rare find, and it will be the object of a special study.

Morphology: The subjects of the eastern necropolis are dolicho- to mesocephalic, with medium sized cranial vaults, a medium to long face and a moderate prognathism. The rest of the skeleton is relatively robust, and medium to tall in height (males 170 cm and females 160 cm). A larger number of skeletons will have to be examined in order to obtain a better picture of the morphology of the population of Kerma. However, at this stage of our knowledge, it seems that the morphology is rather similar to that of the present day population of the region.

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LEGENDS TO FIGURES

Fig. 1. Female hair and braids, Tomb 38 (scale 1:5). Photograph by J. G. Elia.

Fig. 2. Naturally mummified female left foot, Tomb 40 (scale 1:2). Photograph by J. G. Elia.

Some remarks concerning the bronze lions decorating a bed found at Kerma

by Charles BONNET and Siddig AMHED HAMAD

A new display by the National Museum of the Sudan of the bronze lions discovered in a tomb at Kerma (Northern province)¹ has prompted us to present some observations and the results of analyses carried out on these objects. The excavations organised on this ancient site have shown that red ochre was extensively used, and we have posed the question of whether these lions were originally painted. In fact, this hypothesis has not been confirmed, and we have shown that the different colours of the bronze are due to the position of the objects, which more or less favoured the corrosion of the metal. Nevertheless, the unique decoration formed by these lions merits special attention, and we thank Sayed Akasha M. Ali, Director of the National Museum, for having allowed us to carry out this study.

G.-A. Reisner states that these lions were inlaid in the wood of a board which bounded the bed vertically at the foot end. The outer surface of this footboard had four rows of four lions each. The lions in the centre faced each other, whilst those on the outside faced out, the tails of the animals being close together. In contrast, the inside surface had only two lions, both with heads facing to the left. The external surface was therefore the more highly decorated, as opposed to footboards decorated with ivory inlays. There were thus 18 lions in all. Their lengths varied from 13.3 to 15.5 cm and their heights from 6.2 to 6.8 cm, with a thickness of 0.5 cm, and they were

arranged on a panel measuring 72 cm by 40 to 50 cm² with a frame of about 2 cm in thickness.

This style of bed with a footboard seems to have appeared very early, since we have found beds with this element in tombs of Middle Kerma (about 2000-1750 B.C.). The tradition was thus continued up to the end of the Second Intermediate Period, the date of tomb K 334. It is the later examples known that are decorated with inlays; the earlier footboards were furnished simply with skins and thongs fitted into the frame. We know that these beds were used by their owners while alive, and that they accompanied the dead into the tomb. This is shown by the many repairs to these items of furniture³ and explains without doubt the bad state of preservation of several of the lions studied.

Fourteen of the bronze lions are preserved at the National Museum (one of these is in fragments); two others, also in the Sudan, are at the present time on display at the Ali Dinar Museum at El Fasher. Another of these objects is to be found in the collection of the School of Archaeology and Oriental Studies of the University of Liverpool (reference number SAOS 1566)⁴.

Almost all the lions were made on the same model. However it seems that the artisan cut out them freehand from a sheet of beaten bronze using a tool with a blade which was somewhat too long for this type of work (0.3 to 0.5 cm). In the majority of examples

the silhouette is definitely the representation of the same animal. We have, however, noted three exceptions. For these latter, the body is thinner, and the head a little lower, as if an attempt had been made to create a difference between the representation of a female and the more bulky form of a male.

During the cutting, the metal became slightly bent over at the edges, but the increased thickness did not affect its introduction into the wood. The difference in colour of the patina shows which part of the metal was protected by the wood and which was exposed to the air. Thus, one side and a border of 1 or 2 mm are less oxidised, whereas the exterior surface has lost the green colour characteristic of bronze and become deep ochrous red. This difference in colour is seen on all the lions, and was the source of our original belief that they had been painted.

¹ G.-A. REISNER, *Excavations at Kerma*, parts I-V, Harvard African Studies, Vol. V and VI, Cambridge (Mass.), 1923, Part III, pp. 170-171, tomb K 334, objects 1-14 and 42-45; Part V, pp. 176-177 and p. 204,6.

² The height of the footboard, as noted by Reisner (26 or 27 cm) corresponded to its state of preservation at the time of excavation (G.-A. REISNER, *op. cit.*, Part III, p. 171). A large part of the surface was occupied by the lions, and therefore the dimensions should be increased. For the reconstruction of the beds, see: G.-A. REISNER, *op. cit.*, Part III, pp. 208-227.

Examination of a fragment of a bronze foil lion

by François SCHWEIZER

A. Analysis of the bronze

The composition of the metallic bronze was determined by X-ray fluorescence spectrometry¹. A small area (about 4 mm²) was freed of its corrosion layer in order to eliminate changes in the composition of the alloy due to corrosion.

Results: Copper 92.3 - 94.6%
Tin 4 - 5%
Antimony 0.8 - 1.0%
Arsenic 0.5 - 0.7%
Iron about 0.1%

Thanks to the information kindly sent to us by Professor A. F. Shore of Liverpool, it can be stated that the lion in the collection of the School of Archaeology and Oriental Studies belongs to the group of animals whose silhouette probably corresponds to the representation of a male. The analyses carried out in Liverpool and in Geneva (see below) show that the corrosion of the bronze has varied according to the protection provided by the frame of the footboard, perhaps partly covered by skins or fabric.

The work which is continuing in the eastern necropolis of Kerma will help us to complete the picture of a Sudanese civilisation which is still not well understood. The study of the objects which are characteristic of the craftsmanship of this people is bringing to light a tradition which in many of its aspects can be distinguished from Egyptian influences.

³ C. BONNET, *La nécropole orientale de Kerma, Campagne 1978-1979*, in *Actes du Colloque de la Société d'Etudes Nubiennes de la Haye, 20-22 September 1979*, to appear.

⁴ This lion is noted in the catalogue of the exhibition *Africa in Antiquity*: s. WENIG, *The Catalogue, in Africa in Antiquity, The Art of Ancient Nubia and the Sudan, II*, The Brooklyn Museum, New York, 1978, p. 150, No. 52. See also for the acquisition of this object by the former Institute of Archaeology of Liverpool: *Annual Report, 1925 and Prospectus, 1925-26 of the Institute of Archaeology*, The University Press of Liverpool, XXII, p. 16.

The alloy is a bronze of the copper-tin type, which is very favourable for beating.

At the request of M. Ch. Bonnet, an analysis of a bronze foil in the form of a lion in the collection of the School of Archaeology and Oriental Studies of the University of Liverpool (object SAOS 1566) has been undertaken. This analysis, carried out by Professor C. F. Johnson of the Department of Experimental Physics, showed a tin content of about 12%. The minor elements were not determined. It is difficult to compare the two analyses, since

two different objects were used. Furthermore, the preparation of the surface plays an important role in X-ray fluorescence analysis, and we do not know whether Professor Johnson removed the corrosion layer in the same way as we did. In general, however, analysis of the surface of the corrosion layer of bronze shows a tin content higher than that of the metal.

B. Analysis of the surface of the bronze

The patina of the bronze lions has two very different aspects. One of their surfaces is red. Is this due to a coating of pigments applied artificially (ochre?) or to natural corrosion? Analysis of the red surface of the bronze fragment and of the red colouring obtained from the Sudan shows the presence of the constituent elements of the bronze alloy and, in addition, about 1-2% iron. This low iron content on the surface comes from contamination by soil. The red coating does not, therefore, appear to be due to a coating of ochre pigments. Analysis of a small particle of the red surface by X-ray diffraction² gave a pattern which corresponded exactly to that of cuprite (copper oxide, Cu₂O).

To investigate whether the cuprite was applied as a pigment to the bronze, we made a transverse section, after embedding as mall

fragment in a synthetic resin. Observed in the polarised light microscope, this section shows, on the red surface, a thick layer of copper oxide (cuprite). The grains of cuprite have formed small "mushrooms", producing a granular structure at the surface of the bronze (Fig. 1). All the grains are associated with the corrosion layer, which is in direct contact with the metal. Within the latter, we can distinguish a zone of intergranular corrosion, which confirms that this side of the bronze has been subject to considerable corrosion. Significantly, directly underneath the large grains of cuprite, the intergranular corrosion is more pronounced. It is from these areas that the copper has been dissolved from the copper-tin alloy and redeposited on the surface in the form of copper oxide. This observation allows us to conclude that the colouring of the bronze is due to corrosion and not due to the application of pigments to the surface.

On the bronze foil lions, a band of 1-2 mm, which follows exactly the outline of the lion, can be observed on the red surface. This band is smooth and does not contain red grains. We think that these areas were protected from corrosion by the presence of wood, fabric or leather covering, and protected also from the soil since they contain very few quartz grains.

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² L. V. AZAROFF and M. J. BUERGER, *The powder method*, London, 1958.