# SUDAN & NUBIA

The Sudan Archaeological Research Society

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Egypt
RED SEA
ASWAN
1st cataract
Wadi el- Allaqi
Qasr Ibrim
Gebel Adda
WADI HALFA
2nd cataract
Wadi Gabgaba
Amara West
Sai
Sesebi
3rd cataract
Tombos
Kerma/Dokki Gel
ABU HAMED
Nile
Kawa
Sudan
KAREIMA
4th cataract
5th cataract
Jebel Barkal
Dangeil
Gala
Abu Ahmed
ED-DEBBA
ATBARA
Akad
Wadi Howar
Meroe
Atbara
el-Misaktab
Shuhada
Wadi el- Melik
Wadi Muqaddam
6th cataract
OMDURMAN
KHARTOUM
KASSALA
Eritrea
Blue Nile
Ancient sites
MODERN TOWNS
WAD MEDANI
GEDAREF
White Nile
KOSTI
Jebel
Moya
SENNAR
N
Ethiopia
0
250 km

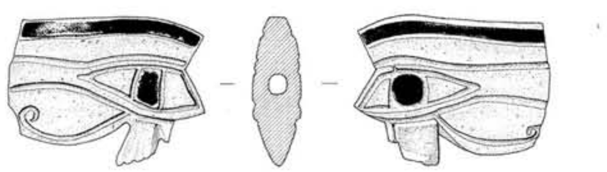
# SUDAN & NUBIA

The Sudan Archaeological Research Society — Bulletin No. 13 — 2009

Contents

Reports





*Front cover:* The head of a Kushite king, excavated in 2008, from the Amun temple at Dangeil. It has been tentatively identified as Aspelta (593-568 BC) based upon comparisons with statues of this king discovered at Jebel Barkal and Dokki Gel-Kerma. (Photo © J. R. Anderson, Berber-Abidiya Archaeological Project).

# Petrography of Pottery from Meroe, Sudan

*Robert B. J. Mason and Krzysztof Grzymski*

The typology of Nubian pottery has been dominated by W. Y. Adams' seminal work which, however, was based mainly on finds from Lower Nubia (Adams 1986). In practical terms, it meant that excavators of sites in Central Sudan opted to develop their own ceramic typologies rather than try to adhere to Adams' system. Thus, the pottery found at Meroe by the Calgary - Khartoum expedition was divided into eight "types" based on unaided observation of the ceramic paste and forming technique, coupled with decorative technique in order to create subdivisions (Shinnie and Bradley 1980, 152).

In order to facilitate comparison between the pottery from the Calgary - Khartoum excavations and ceramics found by the Meroe Expedition, a joint project of the University of Khartoum and the Royal Ontario Museum, directed by Ali Osman and K. Grzymski, we opted to maintain Shinnie's typology, albeit with some modifications (Grzymski 2003, 56). Moreover, comparisons were made with pottery classifications developed at Musawwarat es-Sufra (Edwards 1999; Seiler 1999). Since the appearance of *Meroe Reports I* more ceramic material from domestic context was found at sites near Meroe, such as Hamadab, Muweis, el-Hassa and Dangeil, each project presumably using its own pottery classification scheme. In order to make meaningful comparisons between pottery found at Meroe and that from other sites, we must feel confident that our classification system is a valid one. Since at Meroe we continue using Shinnie's typology we face a perceived challenge to consistently apply the typology, and a desire to understand what the typology actually means with regard to raw materials. This has led to the present study, based on the model developed elsewhere for medieval pottery from the Islamic world (Mason 2004). Such an approach begins with the application of petrographic analysis to determine centres of production and continues with analysis of the technology by several means, followed by a synthesis of analytical and typological data to create chronologically, technically, and geographically defined types, which are readily identifiable in the field. The present paper represents a first attempt at exploring the petrographic variability of the Meroe pottery, using the methodology of the ROM petrography laboratory (Mason 2004, 6-16).

## Petrographic analysis

The technique of petrographic analysis should be generally known to readers of this bulletin, as it has been applied to Sudanese pottery frequently before, in, for example, the extensive work by Laurence Smith (1991a; 1991b; 1995; 1996; 1997) and other work by Daskiewicz and Schneider (2001) and the Southampton laboratory (in Thomas 2008). A challenge with regard to petrographic analysis is the lack of a standardised methodology and descriptions across the discipline (for the methodology of the ROM laboratory, see Mason 2004, 6-16).

The geology of Nubia is underlaid by the African shield, primarily comprising of Precambrian metamorphics and intrusive basement rocks, with large areas overlaid by Nubian sandstone and the Nile runs through the region (Figure 1). The Nile alluvium would be an obvious source of clay for ceramic production and this is dominated by inclusions produced from weathering of the basaltic Ethiopian highlands. Primary clays would also be generated by the various lithologies of the shield, while the Nubian sandstone areas would appear not to be obvious sources of clay, although deposits of kaolinitic clay have been found in the area, in strata within the sandstone (Robertson 1992). This initial study aims to explore the petrographic variability of the pottery from Meroe. Samples were chosen to represent the range of Shinnie's typology (see Table 1) and to cover the available chronological range of production. Hence samples were chosen for their typologically diagnostic properties, and many of them have been previously published (see Table 1). Meroe Expedition excavations (Grzymski 2003; 2005; Grzymski and Grzym-

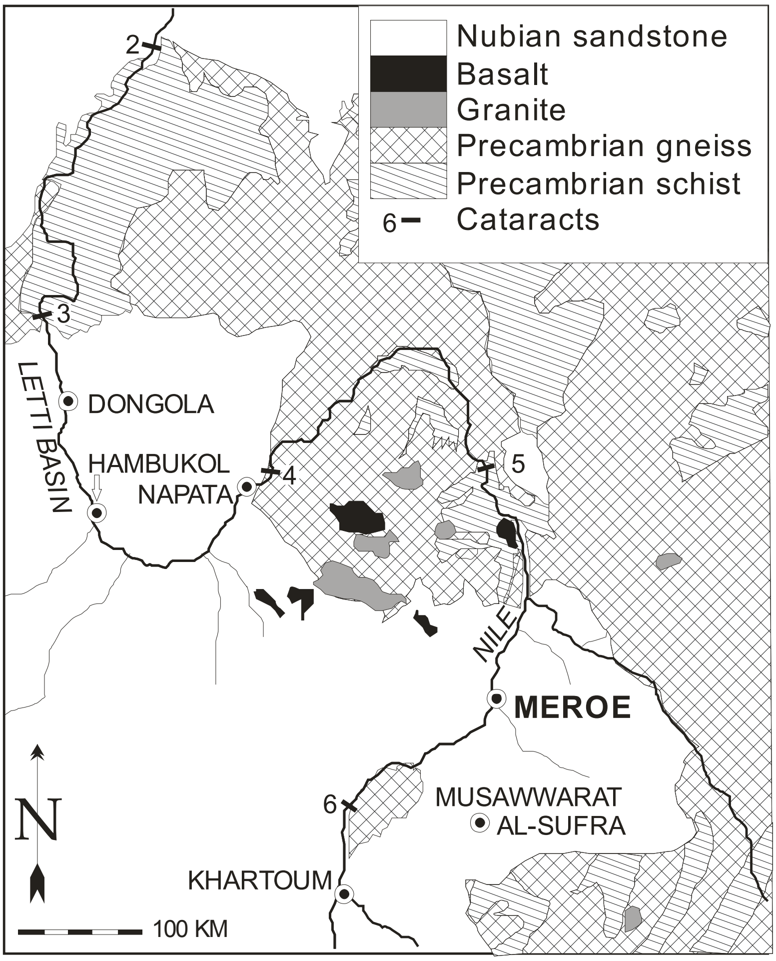



*Figure 1. Geological sketch map of Nubia.*

ska 2008) were undertaken at the Amun Temple, in a Late Meroitic domestic complex M 712 (dated to *c.* AD 100-350) and at site M 750, a Late Meroitic palace (*c.* AD 100-200) with an earlier Napatan period building beneath it (*c.* 900-600 BC). The Late Meroitic sample also contained several imported and/or unusual sherds found at M 712. Additionally, three samples of Early Napatan pottery, similar to that found in M 750S, but discovered in the Letti Basin (Upper Nubia) were included for comparison, and were used as a standard of comparison with earlier work on the pottery from this region (Mason 1987; 2001). No kiln-furniture, wasters or other evidence of production were included, as none were available, and so it is conceivable that the pottery is not local. The convention in naming petrographically-defined fabric groups, or petrofabrics, is to put parentheses around their names, if it is just a name (e.g., "Meroe Nile" Petrofabric) but not to use them when their attribution is reliably supported through analysis of kiln furniture, wasters, or local raw materials (e.g., Meroe Nile Petrofabric).

## "Meroe Kaolinitic" Petrofabric

Four samples are of white-bodied ware with abundant quartz (Colour plate XL, Table 2), which strongly resembles kaolinitic ceramics that have been previously defined from the Yemen (Mason and Keall 1988) and Turkey (Mason and Mundell-Mango 1995). The area of Meroe is geologically dominated by outcrops of Nubian sandstone (Figure 1), which is not a likely material to produce kaolinitic clay of this type, but Robertson (1992) reports finding a kaolinitic deposit in the vicinity of Meroe, while 'white' clays from two locations in the hills to the east of the North Cemetery, and from one location near the Sun Temple were investigated by Smith (1996 26-28). Such clays would presumably have been deposited from erosion of the Precambrian Shield to the east. This deposit has not been examined by the present authors.

The petrofabric is defined by inclusions of a very well-sorted sub-angular silt, mean grainsize being about 0.03mm and comprising 20-22% quartz, mostly with straight extinction, 1-2% each, of muscovite and opaques, trace to 1% untwined (probably potassic) feldspar, with traces of plagioclase, amphibole and clinopyroxene (percentages refer to the total body). Sample #25 seems a little coarser and mineralogically more diverse than the other two (in the data table, it is hidden by the quantity of "tr" or trace for all of them, which mainly in this group can be as little as a single grain, but in #25 is distinctly higher, but not enough to reach 1%), or be defined as a separate group at this stage. Sample #25 was included as a possible import, as the red slip was very well-developed and was originally identified as Eastern Red Slip, or Sigillata ware (Grzymski 2003, 70 P.92), but it is certainly either local, or from a production centre with a similar kaolinitic clay source in the region. In subsequent re-examination, it could be seen that the gloss on #25 was due to burnishing the slip, whereas on Eastern Sigillata examples (e.g., Grzymski 2003, 70 P.91) the gloss is imparted naturally by the quality of the slip.

These petrofabric groups appear to represent most of the "F" group samples selected, according to the Shinnie typology.

This differs from results for Meroitic white wares, reported in the Fourth Cataract region by Thomas (2008), which are said to contain basaltic rock fragments, but which seems similar to an analysis of finewares by Smith (1995), although perhaps on a superficial level.

## "Meroe Nile" Petrofabric

A Nile Alluvium petrofabric has been previously defined using the ROM methodology by analysis of pottery from the Dongola area (Mason 1987), Fustat in Egypt (Mason and Keall 1990; Mason 2004) and Hambukol (Mason 2001).

The Nile alluvium petrofabric, as found in this pottery, is defined by inclusions of a moderately-sorted subrounded/subangular silt, of mean grainsize of about 0.02mm, comprising 4-6% of mostly undulose quartz, 1-3% each of plagioclase, clinopyroxene (probably augite), opaques, and phytoliths, trace to 1% biotite, green pleochroic amphiboles and basalt rock fragments, with up to trace amounts of epidote, muscovite, and carbonate (Colour plate XLI). Generally these inclusions appear to be distinct from samples from earlier studies of Nile alluvium (see above) and the three samples from the Letti Basin included in this study, in that they have a higher content of minerals derived from the basalts of the Ethiopian highlands and a lower content of quartz and other minerals obtained from the African shield rocks. This also means it will be possible to distinguish between typologically similar wares, as selected in this study, from the two regions. The phytoliths are not strong geographical indicators, but they are characteristic of pottery made from Nile alluvium, nonetheless. These inclusions may perhaps derive from a phytolith-rich plant that is specifically abundant in the Nile, perhaps papyrus?

This petrofabric group seems to represent most of the "C" group samples selected, according to the Shinnie typology.

## "Meroe K-N Mix" Petrofabric

Clay mixing seems common along the Nile, having been noted at Fustat (Mason and Keall 1990) and Hambukol (Mason 2001). That this is a mix of clays is evidenced, not only by a more diverse mineralogy, which could be a natural mix of resources (indeed, it would appear that the Nile alluvium itself, further downstream, exhibits evidence of this mineralogical diversification), but also, more clearly, by inclusions of clay nodules (Colour plate XLII). These are the argillaceous inclusions in the data table, being characterised as clay nodules by their structure and indistinct grain boundaries. There are two types of clay nodules, one essentially identical in texture to the kaolinitic clay, the second essentially identical in texture to the Nile alluvium. Further evidence that both clays are available in the same location includes a red Nile clay slip, on a pale-bodied mixed petrofabric (Colour plate XLIII) and a white clay slip, on a dark, mixed petrofabric (Colour plate XLIV).

A mineralogical diversity, greater than the sum of its two components, with minerals, such as colourless amphiboles being present in the "K-N Mix" Petrofabric (Colour plate XLV), but not in either of what are considered its constituent clay sources indicates that there may be a more complicated story than that the kaolinitic petrofabric was mixed with the Nile petrofabric, both described above. An explanation may be found in the clay nodules of one typologically unusual sample (#19) that has clay kaolinitic-like nodules, but with a more diverse mineralogy than that typically seen in the other. There may in fact be more than one source of kaolinitic clay and the diversity which we observe in this pottery in this case reflects production in more than one centre. There are two possible sub-groups within this group, one with about 10-15% quartz; and the other with about 5-6% quartz, but there are no distinctions with the other minerals, which comprise 1-4% opaques; 1-2% plagioclase; trace to 2% untwined feldspar; up to 2% each of amphibole, including pleochroic and colourless varieties, clinopyroxenes; up to 1% each of microcline, biotite and muscovite; while other inclusions such as the clay nodules, phytoliths, etc, are very uneven in their abundance (see data table). Grain size and other textural attributes vary between those of the two main clay sources.

The "K-N Mix" Petrofabric is found in a variety of the Shinnie types selected for analysis, but it includes most of the "B" type group, which tends to be of the lower quartz-content sub-group, while the higher, quartz, possible sub-group tends to be of the "F" type series.

## "Imports"

A number of samples were chosen because they were thought to be "exotic", while two, which were considered possibly local, were deemed sufficiently different as to be incompatible with local production. Sample #25 was found to be compatible with local production and is described above. The remainder are single examples and will be more fully reported after further analysis in future publications, but it is thought worth reporting that two black sherds, samples #11 and # 12, previously published as local (P.75 and P.72 respectively; in Grzymski 2003, 66, 68) are not. Sample #11 includes fragments of siltstones, micritic carbonates and a higher abundance of epidote than any of the local petrofabrics; while #12 contains a sand of a granitic origin. Typologically, they are more likely to come from the south, and perhaps originating in the region of the Sixth Cataract. Sample #18 (P. 139 in Grzymski 2003, 67) contains a well-sorted sand, perhaps a beach sand, with various volcanic rocks (felsic and intermediate mineralogy predominant) with silty shale inclusions and unsurpisingly is an amphora, probably imported from a Mediterranean island. Samples 11 and 12 are included in Table 1, as they are typologically relatively local, but none of these "exotic" wares are in table 2, which is a presentation of data from wares considered to be local.

## Conclusion

This paper is intended as a first characterisation of the pottery that might reasonably be thought to be locally produced in the Meroe region. For the pottery considered to be local, it is clear that the petrofabric groupings reflect the Shinnie typology more in concept than in reality. There do indeed seem to be different bodies, but they do not correlate precisely with the Shinnie designations, although there is indeed some correlation. Whether this is due to problems with the system of typology, or in the assignation of specific samples to the typology is not necessarily pertinent. Continued work on Meroitic pottery at the ROM facility will be aimed at exploring the relationship between the typology and the petrography of the pottery; and eventually developing reliable macroscopic descriptions of the petrofabrics, which will allow ceramicists to assign ceramics to the petrographic groups with thin-sectioning; or in determining more precise typological attributes which can be consistently linked to petrographic groups.

## Acknowledgements

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*Table 1. Sample typology and provenance.*

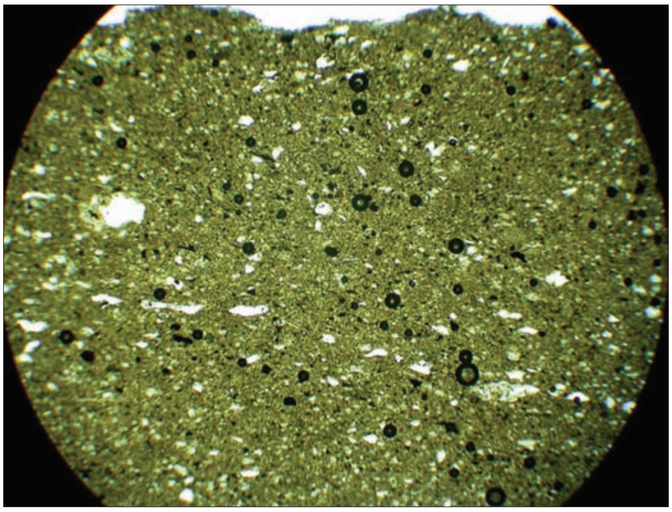
| # | Type | Find-spot | Period | Pot # | Const | Munsell | Decoration | Sand |
|---|---|---|---|---|---|---|---|---|
| 1 | Fa | M712(39) | Meroitic | | wheel | 5YR 6/4 core, 5YR 7/4 margin | plain | VF/F |
| 2 | Fa | M712(74) | Meroitic | P.31 | wheel | 10R 6/4 | white slip, red slip-paint rim band on ext | F |
| 3 | Fa | M712(14) | Meroitic | | wheel | 10R 6/3 ext margin, 10R 8/2 int margin | plain | F |
| 4 | Fc | M712(4) | Meroitic | P.146 | wheel | 5YR 6/4 core, 5YR 7/4 margins | red slip, 50% burnished ext, 25% burnished interior | C/M |
| | Fd | M712(38) | Meroitic | | wheel | 5YR 7/4 | red slip int & ext, burnished ext | F |
| 6 | Ca | M750(31) | Napatan | | hand | 2.5YR 1.5/0 core, 5YR 5/8 margins | red slip rim band int & ext | C/M |
| 7 | Cb | M750(31) | Napatan | | wheel | 5YR 5/3 core, 5YR 5/5 margins | slip ext, partial int | C/M |
| 8 | Cc | M750(31) | Napatan | | wheel | 2.5YR 5/2 core, 2.5YR 5/8 margins | plain | C/M |
| 9 | Cd | M750(31) | Napatan | | wheel? | 5YR 6/6 | red slip-paint rim band int | M |
| | Cd | M750(31) | Napatan | | wheel | 2.5YR 5/8 core, 5YR 5/8 margins | red slip ext & rim band on int, 10% burnish | C/M |
| 11 | ? | M712(55) | Meroitic | P.75 | wheel | 7.5YR 4/0 | slip? & burnished | M |
| 12 | J/K | M712(6) | Meroitic | P.72 | hand | 7.5YR 3/0 | burnished & impressed (rouletted?) | C/M |
| 13 | Be | M750(62) | Early Meroitic | | wheel? | 5YR 2.5/1 core, 5YR 5/8 margins | white slip, red slip-paint | M |
| 14 | Bb | M750(24) | Early Meroitic | | hand | 7.5YR 3/0 core, 5YR 5/8 margins | red slip? Burnished | C/M |
| | Ba | M750(31) | Napatan | P.172 | wheel | 7.5YR 5/6 | plain | M |
| 16 | H? | M712(3) | Meroitic | P.89 | hand | 7.5YR 6/6 | plain | C/M |
| 19 | ? | M712(1) | Meroitic? | | hand | 7.5YR 2/0 | incised decoration | M |
| | ? | M712(2)-(3) | Neolithic? | | hand | 5YR 3/1 core, 5YR 4/2 ext margin | burnished & impressed (rouletted?) | C/M |
| 21 | Ce | Shinnie exc. | Meroitic | 985.213.2 | wheel | 7.5YR 6/6 | white slip brushed on | C/M |
| 22 | Fc | Letti site 204 | Napatan | | wheel | 2.5YR 3/2 core, 5YR 5/8 margins | red slip ext & int | M/F |
| 23 | ? | Letti site 204 | Napatan | | hand | 10YR 3/1 core, 7.5YR 5/6 margins | basket-impressed | C/M |
| 24 | ? | Letti site 204 | Napatan | | wheel | 5YR 4/2 core, 5YR 5/6 ext margin | white slip-wash | F |
| | ? | M712(39) | Meroitic | P.92 | wheel | 5YR 6/8 | red slip & burnished ext. | VF/F |

Key: Type according to Shinnie. Pot # from Grzymski 2003, except #21 which is the ROM accession number. Const(ruction). Munsell determined by Mason by artificial light in examination of a cut section. Sand: predominant macroscopic inclusion grade visible with 10X magnification C(oarse) 0.5 - 1mm, M(edium) 0.25 - 0.5mm; F(ine) sand 0.1250.25; V(ery) F(ine) 0.0625 - 0.125mm (finer grades visible only in thin-section).

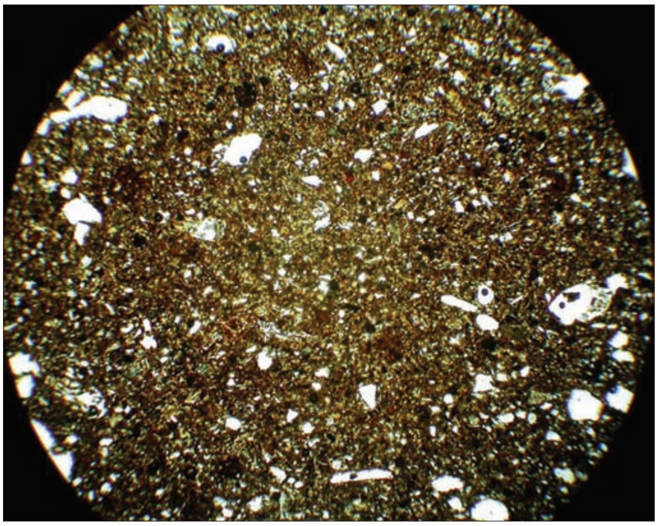
*Table 2. Petrographic data.*

| # | Petrofabric | QTZ | ext | PLG | MIC | FSP | AMP | CPX | BIO | MSC | CRB | OPQ | BST | ARG | VOID | PHY | MEAN | MAX | SRT | RND |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | |
| 1 | Kaolinitic | 20 | st | t | 0 | 1 | tr | tr | tr | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0.03 | 0.1 | w | sa |
| 3 | Kaolinitic | 22 | su | 0 | 0 | tr | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0.03 | 0.1 | w | sa |
| 25 | Kaolinitic | 20 | su | 0 | 0 | tr | tr | tr | tr | tr | 0 | 1 | 0 | 0 | 1 | 0 | 0.04 | 0.3a | w | sa |
| 2 | Mix | 15 | u/su | 1 | 1 | 1 | 1 | tr | 0 | 1 | 0 | 4 | 0 | 5 | 3 | 0 | 0.04 | 0.5a | m | sa/sr |
| 4 | Mix | 12 | u/su | 1 | 0 | 1 | 1 | 1 | 0 | tr | 0 | 2 | 0 | 4 | 2 | 2 | 0.04 | 0.8a | m | sa/sr |
| 5 | Mix | 21 | u/su | tr | 0 | 1 | 1 | 0 | 0 | 1 | tr | 2 | 0 | 0 | 1 | 0 | 0.03 | 0.6a | m | sa/sr |
| 6 | Mix | 13 | u/su | 1 | 1 | 1 | 2 | tr | 1 | 1 | tr | 2 | 0 | 1 | 5 | tr | 0.03 | 1.0a | m | sa/sr |
| 13 | Mix | 6 | u/su | 2 | tr | 1 | 2 | 2 | tr | tr | 0 | 2 | 1 | 0 | 5 | 3 | 0.02 | 1.1a | m | sa/sr |
| 14 | Mix | 5 | u/su | 2 | 1 | 2 | 1 | 1 | tr | tr | 0 | 2 | tr | 0 | 6 | 2 | 0.02 | 0.7a | m | sa/sr |
| 16 | Mix | 13 | u/su | 1 | 0 | tr | 2 | tr | 0 | 0 | 0 | 2 | 0 | 2 | 5 | 0 | 0.02 | 0.6a | m | sa/sr |
| 19 | Mix | 8 | u/su | 1 | tr | 1 | 1 | 1 | tr | tr | 0 | na | tr | tr | 7 | 0 | 0.04 | 0.4a | m | sa/sr |
| 20 | Mix | 5 | u/su | 1 | tr | tr | tr | 0 | 1 | 0 | tr | na | 0 | 10 | 5 | tr | 0.05 | 0.7a | m | sa/sr |
| 7 | Nile | 6 | u/su | 2 | 0 | tr | tr | 2 | 1 | 0 | tr | 2 | 1 | 0 | 2 | 2 | 0.02 | 0.4a | m | sa/sr |
| 8 | Nile | 5 | u/su | 3 | 0 | tr | tr | 3 | 1 | 0 | 0 | 3 | tr | 0 | 2 | 2 | 0.02 | 0.4a | m | sa/sr |
| 9 | Nile | 4 | u/su | 2 | 0 | tr | 1 | 3 | tr | tr | tr | 3 | tr | 0 | 1 | 1 | 0.02 | 0.9a | m | sa/sr |
| 10 | Nile | 6 | u/su | 3 | 0 | tr | tr | 1 | tr | 0 | tr | 2 | tr | 0 | 4 | 2 | 0.02 | 0.7a | m | sa |
| 15 | Nile | 5 | u | 2 | 0 | tr | tr | 2 | 1 | 0 | 0 | 3 | tr | 0 | 4 | 3 | 0.02 | 1.1a | m | sa/sr |
| 21 | Nile | 10 | u | 1 | 0 | tr | 0 | tr | tr | 0 | 0 | 1 | 0 | 0 | 8 | tr | 0.05 | 0.6a | m | sa/sr |
| 22 | Nile-Letti | 9 | u/su | 3 | tr | 1 | tr | 2 | 3 | 1 | 0 | 2 | 1 | 0 | 5 | 1 | 0.05 | 0.3 | w | sa/sr |
| 23 | Nile-Letti | 12 | u/su | 2 | tr | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | tr | 0.04 | 0.6a | m | sa/sr |
| 24 | Nile-Letti | 9 | u/su | 3 | 0 | 1 | 1 | 2 | 3 | tr | 3 | 3 | 1 | 0 | 4 | 4 | 0.05 | 0.3a | w | sa/sr |

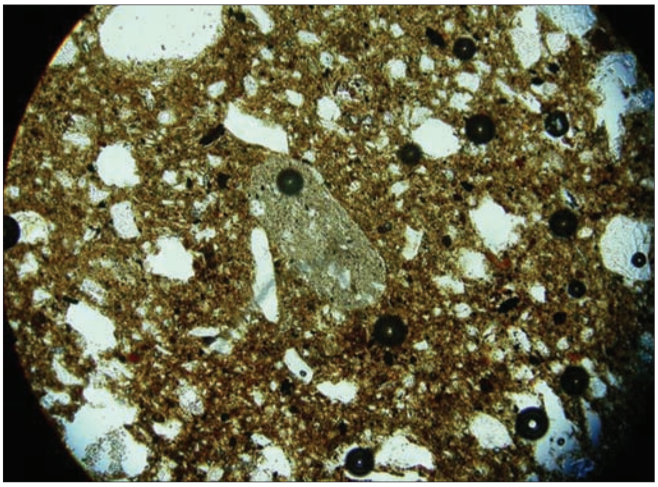
Key: Headings, # = sample number, QTZ = quartz, ext = quartz extinction (u = undulose, su = slightly undulose, st = straight); PLG = plagioclase, MIC = microcline, FSP = un-twinned feldspar (orthoclase?), AMP = amphibole group, CPX = clinopyroxene group, BIO = biotite, MSC = muscovite, CRB = carbonate group, OPQ = opaques, BST = basalt, ARG = argillaceous inclusions, VOID = void, PHY = phytoliths, MEAN grainsize, MAXimum grainsize ("a" refers to largest grains being aeolian), SRT = sortedness (w = well sorted, m = moderately sorted), RND = roundedness (sa = subangular, sr = subrounded).



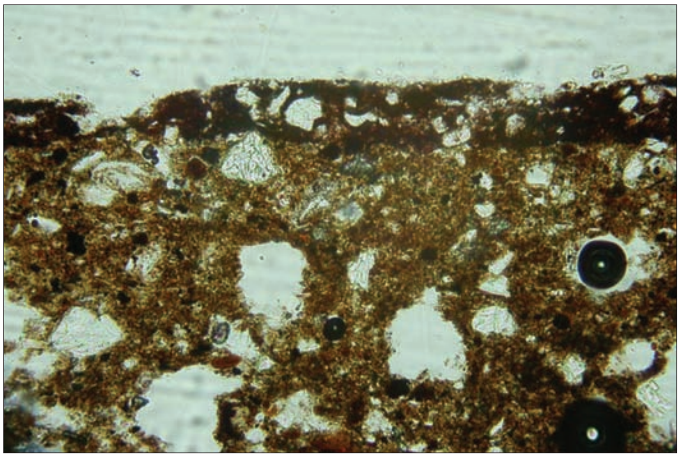
*Colour plate XL. "Meroe Kaolinitic" petrofabric (sample #1), plane-polarized light, field width 3mm.*



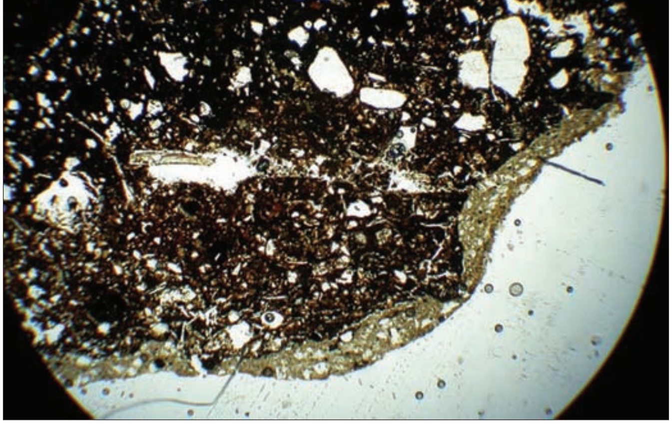
*Colour plate XLI. "Meroe Nile" petrofabric (sample #7), plane-polarized light, field width 3mm.*



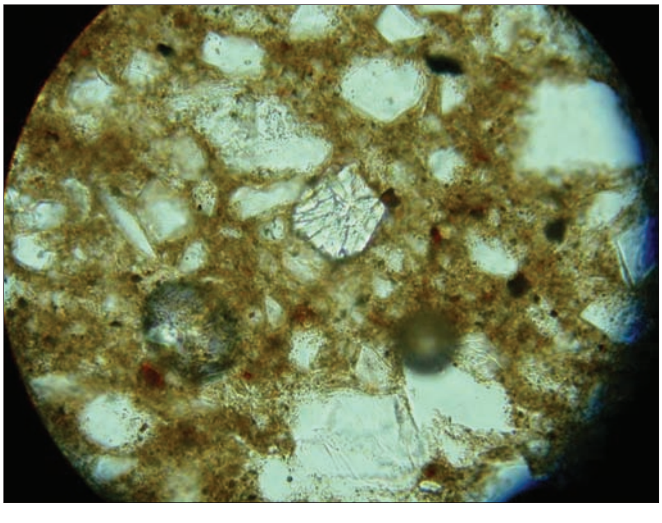
*Colour plate XLII. Kaolinitic clay nodule in "Kaolinitic-Nile mix" petrofabric (sample #4), plane-polarized light, field width 1mm.*



*Colour plate XLIII. Red-clay slip on "Kaolinitic-Nile mix" petrofabric (sample #4), plane-polarized light, field width 1mm.*



*Colour plate XLIV. "Kaolinitic-Nile mix" petrofabric with kaolinitic clay slip (sample #13 ), plane-polarized light, field width 3mm.*



*Colour plate XLV. "Kaolinitic-Nile mix" petrofabric (sample #5), plane-polarized light, field width 0.5 mm. with colourless amphibole (actinolite?) in the centre.*