

Desert and the Nile.
Prehistory of the Nile Basin and the Sahara.
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What Do We See When We See a Decoration? An Overview on the Pottery from Sai Island and Esh Shaheinab

“I have been fortunate to live an interesting life, go to strange places, do interesting work, and learn about the past.” (Wendorf 2008: 339)

Dedication

Fred Wendorf was severely wounded to his arm in Italy, our country, during World War II in a fight against the Nazi regime and the fascist oppression. We take the opportunity of this book in his honour to express our everlasting gratitude to all young people like him, who fought to liberate our country from dictatorships. The first author of this paper met him the first time in 1988, at the Dymaczewo Conference, one of the numerous that she attended in the following years. She always keeps a vivid memory of Fred's remarkable stories and admirable actions on the battlefields in Italy. The second author of this paper regrets she never had the honour to meet him, but still had the privilege to take part in a Poznań conference in 2011 and appreciate the magic atmosphere of these meetings.

Introduction

This paper presents an overview on the ceramic productions of prehistoric (Khartoum Variant, Abkan, and Pre-Kerma), Pharaonic, and ethnographic assemblages from Sai Island, in northern Sudan, dating from the eighth millennium BC until the present, and prehistoric (Early Khartoum, Neolithic, and Late Neolithic) assemblages from Esh Shaheinab, 50 km north of Omdurman, in central Sudan (Fig. 1, left). The paper discusses the first criteria used to classify Nubian and Sudanese pottery, which were mostly based on visual observations of surface decorations, and extends its analysis to broader considerations of the entire *chaînes opératoires* by comparing five temporally different productions (Mesolithic, Neolithic, Late Neolithic, Pharaonic, and ethnographic) from two culturally and geographically distinct areas, northern Sudan and central Sudan.

In agreement that pottery manufactures are indicative markers of cultural identities (e.g., Rice 1996; Gosselain 2000; Roux 2013), Sudanese ceramics have provided effective means to observe the evolution with continuities and discontinuities in pottery making traditions and to discern distinct cultural orbits and their social networks and boundaries (e.g., Caneva and Marks 1990; Welsby 1997; Garcea 1998; 2006a; 2006b; Gatto 2002a; 2006; Keding 2006; Lange and Nordström 2006; Garcea and Hildebrand 2009; Jesse 2010; Winchell 2013; D'Ercole *et al.* 2015; 2017a).

Pottery making in Sudan was initiated by hunting-fishing-gathering groups with a precocious production, although not the earliest on the African continent (see below). The earliest dates of Sudanese pottery have been recently obtained from an excavation in the Amara West district, just north of Sai Island, and are from about 8600 BC (Garcea *et al.* 2016). This age is almost contemporary to the earliest dates of pottery found at Sorourab 2 in central Sudan, which average around 8700 BC (Hakem and Khabir 1989). This pottery is slightly younger than the oldest African ceramics, which notably have been dated from the end of the tenth millennium BC at Ounjougou, in Mali (Huysecom *et al.* 2009), from the early ninth millennium BC at Adrar Bous and Tagalagal, in the Nigerien Sahara (Roset 1982; 1987), and from the late tenth/early ninth millennium BC at Bir Kiseiba, in the Egyptian Western Desert (Connor 1984).

Due to a lower energy of the water flow in the middle Nile River, small islands formed between the cataracts of the river, one of them being Sai Island, which lies in a gold-rich area between the Second and the Third Cataract (Fig. 1, left). This island had a central strategic role from early prehistory until Ottoman times, thanks to its protected position, and was constantly related to Lower Nubia

in Egypt and the Levant to the north, the Sahara to the west, and East Africa to the south-east (Geus 1998; 2004; Budka 2011; 2015; Garcea 2012).

Macroscopic, stylistic and archaeometric analyses of the ceramic assemblages from Sai Island were undertaken on both prehistoric (Garcea and Hildebrand 2009; D’Ercole 2015; D’Ercole *et al.* 2017a; 2017b) and New Kingdom productions (Budka 2011; 2014; 2015; D’Ercole *et al.* 2017a). For comparison, additional analysis was made on modern ceramics from a currently active pottery workshop in the nearby village of Abri (D’Ercole *et al.* 2017b).



Fig. 1. Map of the Nile Valley with Sai Island, Esh Shaheinab and the other sites mentioned in the text (modified after D’Ercole *et al.* 2017b, Fig. 1)

In central Sudan, the pottery sample comes from Esh Shaheinab (Fig. 1, left), which is the well-known site excavated by Arkell (1953) in the 1950s and re-excavated by Haaland (1982) in the late 1970s. This site gave the name to the 'Shaheinab Neolithic', although the excavations also yielded Early Khartoum and Late Neolithic occupations and provided considerable quantities of pottery, which EAAG restudied at the National Museum in Khartoum in 2001. While petrographic, mineralogical, and chemical analyses of the ceramic assemblage from this site are still under way, the available data regard macroscopic observations on pastes, vessel shapes, surface treatments, and decorations (Garcea 2006a; 2006b). Additionally, functional data from absorbed organic residues, in particular lipids, in the vessels, using chemical and isotopic techniques on a sample from both Sai Island and Shaheinab are currently in progress.

1. What do we see when we see a decoration?

Saharan and Sudanese decorated pottery drew the attention of scholars of all times to such an extent that decorations have been among the priority objectives in typological classifications especially concerning prehistoric pottery, which usually occurs in fragmented sherds and, therefore, vessel shapes or rim diameters can be rarely detected. Several past studies elaborated typologies of decorative styles, motifs, or design structures from both the Sahara (e.g., Camps Fabrer 1966; Bailloud 1969) and the Sudan (e.g., Nordström 1972; Hays 1976; Mohammed Ali 1982; Chłodnicki 1984).

The first development of these traditional typologies of the 1960s and 1970s evolved into a hierarchical system of classification of decorated pottery, starting from decorative techniques (rocker impressions, alternatively pivoting stamp, simple impression, incision) and proceeding to higher levels that consider decorative implements, and then, progressively, elements, motifs, and structures (Caneva 1983; 1988; 1995; Caneva and Marks 1990; Caneva *et al.* 1993). This system resulted to be open and flexible (Garcea 1998; 2005, see also Gatto 2002b) and could be successfully applied to other contexts than the Sudanese one, namely the Libyan Sahara (Caneva 1987; Garcea and Sebastiani 1998; Garcea 2001a), the Nigerien Sahara (Garcea 2008; 2013), and the Atlantic Sahara (Commelin *et al.* 1992).

A further methodological elaboration implied that the hierarchical system of classification of decorations was to be conceived as a component of the steps undertaken in the entire production sequences, where decorations are an integral

part of the finishing process within the *chaîne opératoire* and all the other manufacturing steps are equally important and functional to detect and define social identities, regional boundaries, and cultural processes (Garcea 2001b).

The pottery productions that we studied from Sai Island cover a very long chronological framework, spanning from about 7600 BC to the present and including the foraging culture associated with the Khartoum Variant period (7600-4800 BC), the earliest pastoral culture, locally called Abkan (5500-3700 BC), the emerging complex societies of the Pre-Kerma period (3600-2500 BC), the 18th Egyptian New Kingdom (1539-1077 BC), and a presently active workshop in the village of Abri, just north-east of Sai Island (Fig. 1, right.). The studies of these ceramic assemblages included observations on fabrics, surface treatments, and decorations by mineralogical (X-ray powder diffraction analysis: XRPD), petrographic (SEM observations, and thin sections with a polarized light microscope: OM), and chemical analyses (trace elements by X-ray fluorescence: XRF, and Instrumental Neutron Activation Analysis: INAA) (Garcea and Hildebrand 2009; Garcea 2012; D'Ercole 2015; D'Ercole *et al.* 2015; 2017a; 2017b).

The site of Esh Shaheinab is mostly known for its Neolithic evidence, which has been dated between about 4580-4460 BC and 4500-4380 BC (Haaland 1982; 1987). However, Early Khartoum pottery was also recovered in undisturbed layers below the Neolithic occupation, as well as in some mixed surface material. Furthermore, some Late Neolithic pottery was also found at the site (Arkell 1953; Garcea 2006a; 2006b).

In addition to macroscopic examinations, petrographic, mineralogical, chemical, and functional (organic residues) analyses have been able to: (a) provide a diachronically extensive perspective on the very long tradition of pottery production in Nubia, (b) cross-check and validate or discard the results from single analyses, (c) delineate cultural and technological processes, and (d) demarcate social identities and regional boundaries, in northern and central Sudan.

2. Khartoum Variant and Early Khartoum pottery

The earliest pottery at Sai Island is associated with the Khartoum Variant cultural complex (Shiner 1968b) for its presumed similarities with the Khartoum 'Mesolithic', although it later appeared to have more affinities with the Nabta-Kiseiba area, in the Egyptian Western Desert, than the Khartoum province (Gatto 2002b; Jesse 2002; Garcea and Hildebrand 2009).

One of the Khartoum Variant sites on the eastern side of Sai Island, 8-B-10C, was extensively excavated beneath gravel bars lying on the early Holocene fluvial terrace (Fig. 1, right). The excavation covered an area of 105 m² and revealed two upper levels with a complex settlement organisation, indicating a substantially permanent occupation. Level 1 yielded hut floors, post holes, rubbish pits and hearths and was dated between about 5050 and 4800 BC. Level 2 revealed another architectural complex with post holes, suggesting an earlier phase of occupation with a similar hut system and a permanent use of the site, dating between 7600 and 7200 BC (Garcea *et al.* 2016).

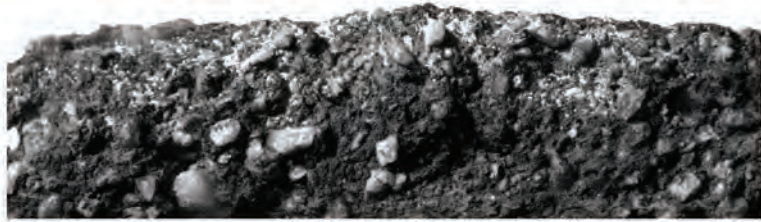
The spatial distribution of the artefacts from Level 1 was plotted in relation with the architectural features of this level and the pottery appeared to be concentrated outside the hut floors, on the eastern side of the excavated site, in different places than the lithic débitage and tools, which are more frequent between the huts (Garcea 2012).

The pottery from this site was coarse-grained with poorly sorted inclusions and locally made with residual clay sediments originated from weathered metamorphic rocks of the still outcropping Precambrian Basement Complex (Table 1, Fig. 2: a). Tempering materials mainly comprised quartz, K-feldspar, and biotite mica (Fabric QKfs) (Table 1, Fig. 3: a). Chemical analyses indicated an assemblage rich in Potassium oxide (K₂O), rubidium (Rb), and yttrium (Y), which appeared to be clearly distinct from the later assemblages. The high frequencies of K₂O and Rb, in particular, are related to the importance of K-feldspar (D'Ercole *et al.* 2017b). Furthermore, Instrumental Neutron Activation Analysis (INAA) showed a progressive increase of elements, such as Scandium (Sc), Chromium (Cr), and Iron (Fe), which are related to the heavy minerals included as detrital components of Nile alluvia and were less frequent in the Khartoum Variant productions also due to the presence of large grains of quartz and feldspar from residual clay sediments in these ceramics (D'Ercole *et al.* 2017a).

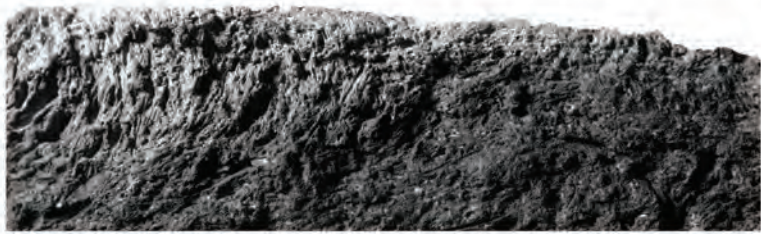
Surface decorations are frequent and are made with the rocker technique, producing typical dotted wavy line motifs and packed zigzags while firing techniques are very basic, consisting simply in the use of bonfires or pit fires (Garcea 2012; D'Ercole 2015) (Table 2, Fig. 4: a-d). In spite of the great attention paid to decorations of the Khartoum Variant pottery, raw materials derived from opportunistic collections of clayey sediments, resulting in poorly sorted grain sizes in the pastes with no intentional addition of tempering materials, except for sand, which was naturally present in the residual clay deposits.

Table 1. Comparative outline of the techniques of raw material procurement and preparation in the different periods at Sai Island

Period	Site	Raw material procurement	Preparation
Khartoum Variant (7600-4800 BC)	8-B-10C	Mainly Fabric QKfs: residual clay (Precambrian Basement Complex suite) K-feldspar, metamorphic rocks, coarse Qtz rich-specimens + biotite and Fabric Q: Qtz-rich- specimens	No intention- ally added tempers
Abkan (5500-3700 BC)	8-B-76	Mainly Fabric QPl: secondary, alluvial sediment (Nile clay) Plagioclase, fine Qtz-rich-spe- cimens + volcanic rocks, heavy minerals and micritic calcite aggregates	Organic tempers (charcoal, wood ash)
Pre-Kerma (3600-2500 BC)	8-B-52A 8-B-10A		Organic tempers (herbivore dung and vegetal fibres)
New Kingdom (1539-1077 BC)	SAV 1		Organic tempers (her- bivore dung and vegetal fibres: chaff, grains, glu- mes, seeds)
Modern	Abri workshop		Organic tempers (herbivore dung)



a



b

1 cm

Fig.2. Sherd sections. a: Coarse-grained Khartoum Variant sherd with abundant angular inclusions of quartz and K-feldspar; b: Pre-Kerma sherd tempered with abundant organic material (Photos: R. Ceccacci)

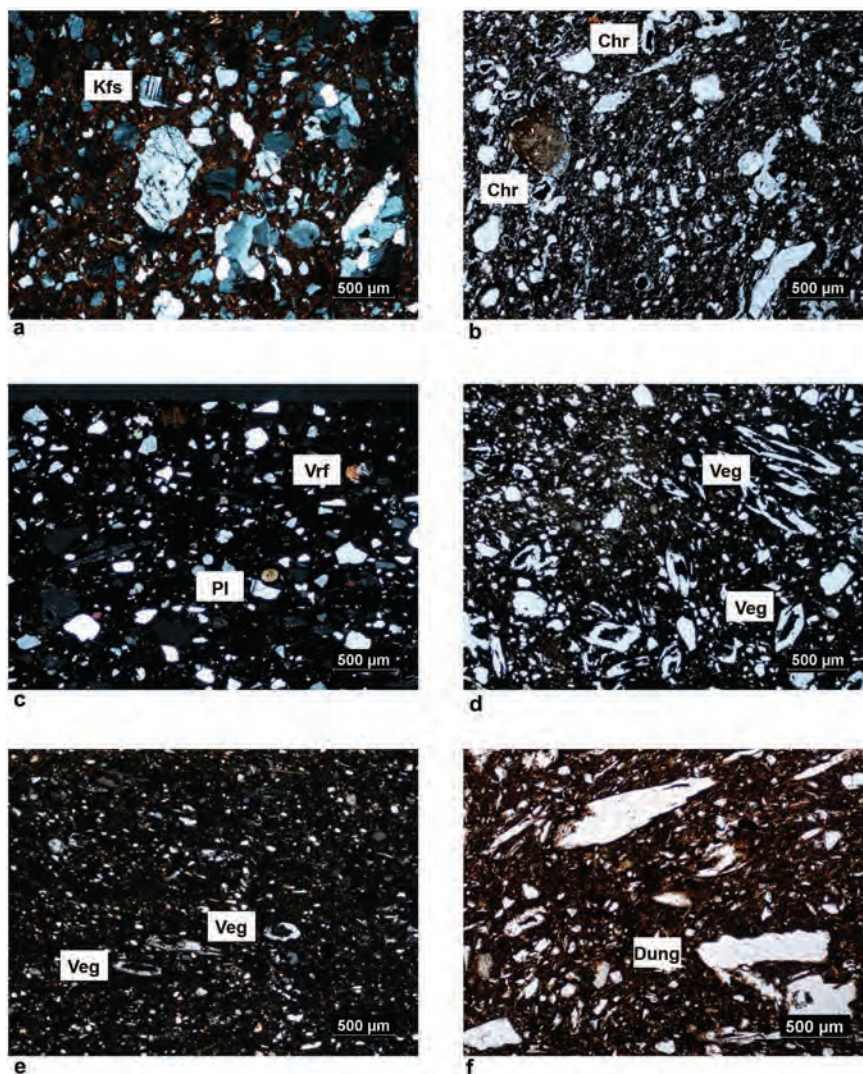


Fig. 3. Microphotographs of thin sections. a: Khartoum Variant pottery rich in K-feldspar (Kfs), quartz and biotite mica; b: Abkan pottery tempered with small charcoal particles (Chr); c: Pre-Kerma pottery from Site 8-B-10A with abundant quartz, plagioclase (Pl) and volcanic rock fragments (Vrf); d: Pre-Kerma pottery from Site 8-B-52A tempered with abundant organic plant remains (Veg); e: New Kingdom 'Nubian style' pottery with very fine quartz inclusions and organic plant remains (Veg); f: Modern pottery from Abri tempered with herbivore dung that was totally burnt. Photos a and c are in cross-polarised light; photos b, d-f are in plane-polarised light (Photos: G. Eramo and G. D'Ercole)

Table 2. Comparative outline of the techniques of production, finishing, and use in the different periods at Sai Island

Period	Site	Production	Finishing	Use
Khartoum Variant (7600-4800 BC)	8-B-10C	Coiling technique; open bowls and jars; wall thicknesses from 6 to 10 mm; plain or smoothed surfaces; rocker stamping (zigzags and DWL); milled and notched rims	Bonfire in oxidizing atmosphere	Food preparation, storage
Abkan (5500-3700 BC)	8-B-76	Coiling technique; globular bowls and straight walled jars; wall thicknesses from 3 to 8 mm; smoothed, rare burnished surfaces; undecorated, black-topped vessels; milled and notched rims	Bonfire in short oxidizing atmosphere	Food preparation, consumption, transport
Pre-Kerma (3600-2500 BC)	8-B-52A	Coiling technique; large storage saucer-shaped and ovoid jars, open bowls; wall thicknesses from 4 to > 10 mm; burnished and polished surfaces; rocker and alternately pivoting stamping		Storage
	8-B-10A	Coiling technique; bowls, open vessels; wall thicknesses from 4 to 8 mm; burnished and polished surfaces; impressed and incised decorations		

Period	Site	Production	Finishing	Use
New Kingdom (c. 1539-1077 BC)	SAV 1	Coiling technique; large storage jars, cooking pots, cups and beakers; burnished and polished surfaces; geometric and rocker-stamped decorations, mat/basket impressions	Bonfire	Storage, food pre- paration, consump- tion
Modern	Abri work- shop	Slow wheel and coiling technique; storage jars, plates, bowls, incense burners; undecorated, incised wavy line decorations	Kiln and bonfire	Storage of water, food pre- paration, ritual and orna- mental function

Khartoum Variant pottery is spread over a wide area, extending north to Nabta and Kiseiba, Wadi el Akhdar, Great Sand Sea, Abu Tartur, Abu Ballas, and Dakhla Oasis, and south to El Barga near Kerma (Garcea and Hildebrand 2009). At this time, human groups were mainly semi-sedentary, but their influence expanded over a culturally uniform area, although they did not probably compete for external resources and therefore did not need to establish strong social relations with other groups in the central and upper Nile Valley, or the Western Desert. The uniform culture shared a rather conservative system of generalised features in common, that was based on practically permanent exploitation of water and food resources. It suggested that large cultural units were related within a social loose network and successfully persisted over the onset of the harsher climatic conditions that occurred towards the middle Holocene, in association with the dry and cold 8.2 BP (ca. 6300 BC) event.

Preliminary isotopic data on organic residues showed that the samples from the Khartoum Variant site 8-B-10C appeared to be used to contain carcass fats of both wild ruminant and non-ruminant animals (Dunne personal information).

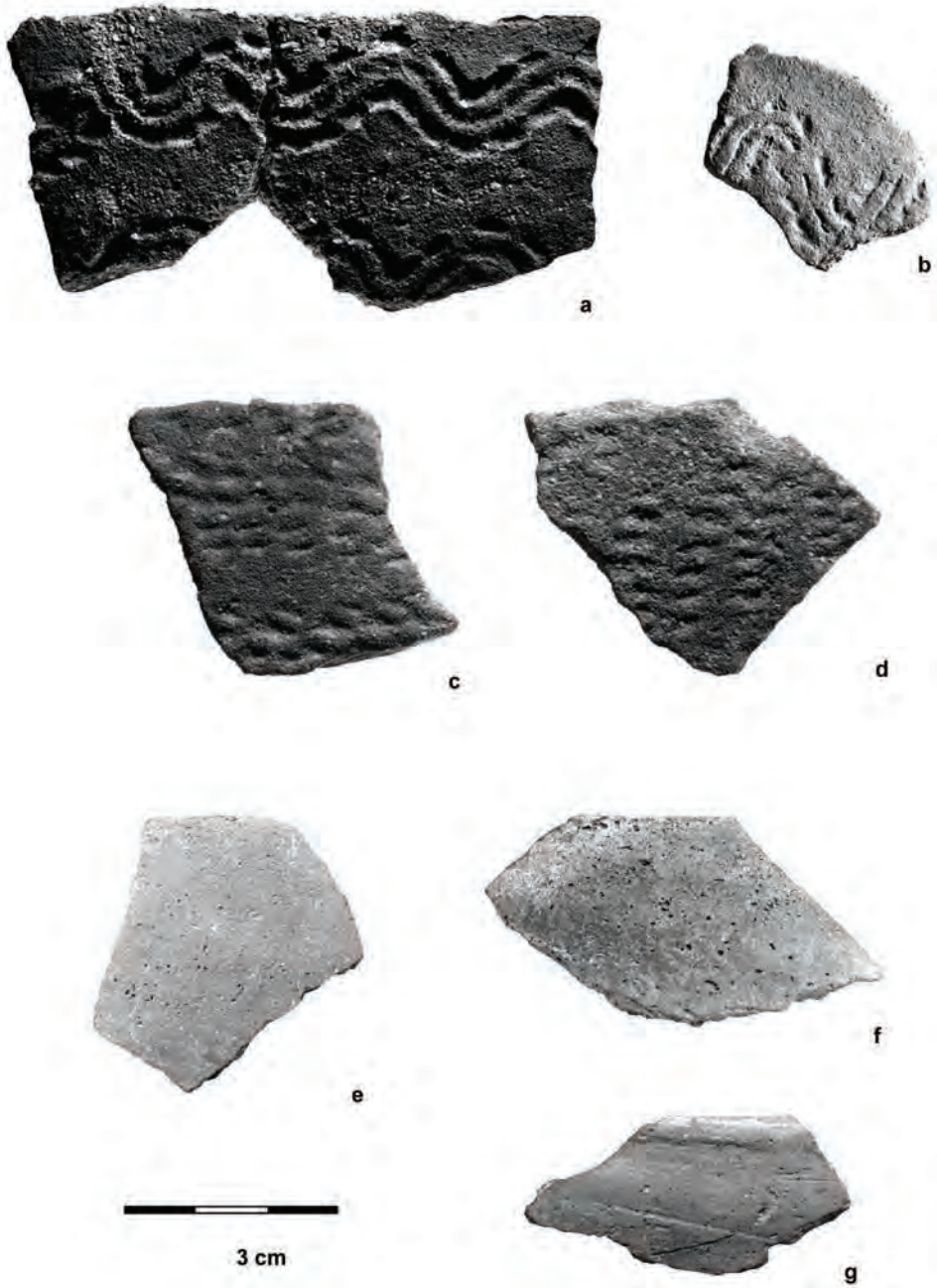


Fig. 4. Potsherds from Sai Island. a-d: Khartoum Variant; e-g: Abkan (Photos: R. Ceccacci)

Moving south, to central Sudan, the Early Khartoum pottery from Shaheinab clearly resembles the ceramics from the site of Khartoum Hospital, the other well-known site excavated by Arkell (1949). This pottery was mostly medium-grained and contained frequent mineral inclusions (Table 3). The vessels were very thick, with a mode of 10 mm, and their surface decorations were technically similar to the Khartoum Variant ones, being made with the impression technique to make packed zigzags and dotted wavy lines (Fig. 5, Garcea 2006a; 2006b). At Shaheinab, decorations always covered the entire surface, which was not the case of the Khartoum Variant assemblage, and the motifs and decorative structures were different, particularly in the shape and composition of the dotted wavy lines.



Fig. 5. Early Khartoum potsherds from Esh-Shaheinab (Photo: R. Ceccacci)

Table 3. Comparative outline of the macroscopic technological features in the different periods at Esh Shaheinab

Period	Raw material procurement	Preparation	Production
Early Khartoum	Predominantly medium-grained clay texture	Tempering with occasional flat fibres	Coiling technique; wall thickness around 10 mm; rocker stamping (zigzags and DWL)
Neolithic (4600-4400 BC)	Predominantly fine clay texture	Tempering with common tubular fibres (dung)	Coiling technique; wall thickness around 5 mm; rocker (packed vees and dots), APS (paired lines and DWL) and simple stamping, incision
Late Neolithic	Exclusively fine clay texture	Tempering with frequent tubular fibres (dung)	Coiling technique; wall thickness around 5 mm; rocker (zigzags), APS (paired lines) and simple stamping, incision; undecorated

3. Abkan and Khartoum Neolithic pottery

The Abkan period derives its name from the type-site near Abka in the Second Cataract of the Nile (Shiner 1968a). With regard to the subsistence economy, this period is distinguished from the Khartoum Variant for the initial practise of animal husbandry.

Site 8-B-76 at Sai Island was selected for excavation. It is located on a south-west slope towards a currently inactive floodplain occupied by a modern village (Fig. 1, right). A 27 meter transect was laid out along the slope and consistent horizontal and vertical stratigraphies could be observed and were supported by a differentiated ceramic distribution. The ceramics on the surface showed that Khartoum Variant sherds predominated in the higher part of the slope, whereas Abkan sherds occurred at lower elevations, toward the current course of the Nile. Such

a lateral shift of the archaeological deposit suggested that the older settlement lied inland with respect to the present Nile, whereas the Abkan occupation followed the accretion of the island. The trench confirmed that the north-easternmost units uniquely contained Khartoum Variant ceramics, the south-westernmost unit exclusively included Abkan ceramics, while the central portion of the stratigraphic profile yielded a sequence of Khartoum Variant levels below Abkan ones. The Abkan complex was dated between around 5500 and 3700 BC (Garcea *et al.* 2016).

Mineralogical and petrographic analyses showed that the Abkan pottery was quite different from the Khartoum Variant one. Pastes were porous and brittle and included small mineral and organic tempers, particularly small particles of charcoal and wood ashes (D'Ercole *et al.* 2015) (Table 1, Fig. 3: b). Quartz prevailed in the pastes, whereas K-feldspar and mica were rare. The chemical composition indicated a prevalence of CaO, like in the following Pre-Kerma assemblage, suggesting a higher content of plagioclase (Table 1). Also rubidium (Rb) had lower values than in the Khartoum Variant. The shift in the use of raw materials that could be observed from the Abkan productions onwards indicated that sediments of Holocene alluvial origin were preferred instead of residual clay sediments (D'Ercole *et al.* 2017b). Differences also occurred in the sizes of the pots, which were lighter and with thinner walls (Table 2). Unlike in the Khartoum Variant period, surfaces were burnished; they were occasionally black topped, undecorated, except for a few sherds with oblique incised lines on the lip, and sometimes rippled. Vessels were fired in bonfires in short oxidizing atmosphere (Table 2, Fig. 4: e-g, Garcea 2012; D'Ercole 2015; D'Ercole *et al.* 2015).

Comparable Abkan pottery appeared in a more restricted area with respect to the extent of the previous Khartoum Variant sites (Garcea and Hildebrand 2009). With the onset of a nomadic pastoral economy, different local regional identities developed in various parts of Nubia and Sudan. Even though hunting, fishing and gathering were still practised, and even though the shift toward food production was slow and uneven, the radical cultural changes between the Khartoum Variant and the Abkan horizons occurred with a drastic social and economic shift, where animal husbandry appeared as an efficient mean to further defer the previously adopted foraging strategies of delayed-return resources. As social complexity started to grow, social networks became stronger and social units became geographically smaller. At Sai Island, the Abkan had insignificant affiliations with the southern Shaheinab traditions and even lesser with the Saharan early pastoral cultures and the areas in the Egyptian Nile valley.

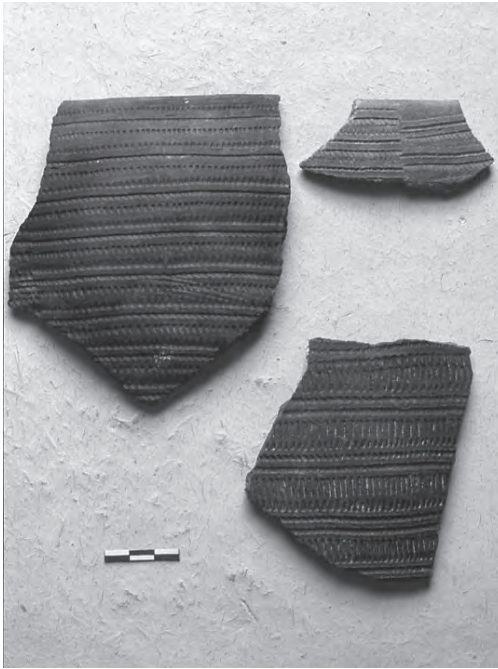


Fig. 6. Neolithic potsherds from Esh-Shaheinab
(Photo: R. Ceccacci)

The Neolithic occupation at Shaheinab was later than at Sai Island, being dated between about 4580-4460 BC and 4500-4380 BC (Haaland 1987). The corresponding pottery production exhibited fine-grained textures with vegetal, probably dung, tempering material, some burnished surfaces, and, unlike the Abkan pottery, a wide range of decorations, including impressed decorations made by alternately pivoting and rocker stamping (Table 3). However, the latter employed different implements compared to the previous period, which had unevenly serrated edges, producing bands of vees and dots (Fig. 6, Garcea 2006a; 2006b).

Preliminary isotopic data on organic residues from some Neolithic samples from Shaheinab provided chromatograms with high C16 and C18 fatty acids, which are typical of a degraded animal fat profile (Dunne *et al.* 2012). They also showed the use of both ruminant and non-ruminant fats (Dunne personal communication).

The time of these developments corresponds to the ‘marginalization phase’ by Kuper and Kröpelin (2006), which features the formation of regionally diverse and specialised cultural enclaves. At the same time, early pastoralism was able to stimulate a system of long-distance trade and exchange among different cultural groups, supporting the introduction and spread of domestic animals and plants imported from the Near East (Garcea 2016).

4. Pre-Kerma and Late Neolithic pottery

In the subsequent period, the Pre-Kerma culture was defined at Kerma when an earlier settlement was found below a cemetery of the Kerma period (Bonnet 1988). The Pre-Kerma period paved the way to the rising Kerma kingdom (c. 2500 BC) and maintained relations with the already established Egyptian kingdom

(Bonnet 1991). On Sai Island, Sites 8-B-10A and 8-B-52A (Fig. 1, right), a habitation and a granary complex, respectively, best represent the Pre-Kerma period, which spans between about 3600 and 2500 BC and anticipates the emergence of the Kerma kingdom (Hildebrand and Schilling 2016).

The habitation site at 8-B-10A revealed a thick deposit of 1.5 metres and the granary complex confirmed an intensive use of the island during this period, as its more than 130 storage pits suggested (Garcea and Hildebrand 2009; Hildebrand and Schilling 2016). They contained both wild and domestic plant seeds, including barley and emmer wheat, which indicated the practise of a mixed, agropastoral economy. The barley was directly dated to around 2700 BC (Geus 1998), corresponding to the Late Pre-Kerma period. These plants were imported from the Near East, most likely by trading with A-Group populations settled in Lower Nubia, as the presence of A-Group pottery in some of the granary pits indicated (Hildebrand 2006-2007; Garcea and Hildebrand 2009).

From a petrographic, mineralogical, and chemical point of view, the Pre-Kerma pottery is comparable to the Abkan productions, being made with a secondary clay of alluvial origin, but including higher quantities of organic tempers, consisting of both dung and plant fibres (Table 1, Figs. 2: b and 3: d, D'Ercole 2015; D'Ercole *et al.* 2015; 2017b). As mentioned earlier, Instrumental Neutron Activation Analysis (INAA) showed high values of higher transitional oxides in this pottery, such as Scandium (Sc), Chromium (Cr), and Iron (Fe), which are related to the heavy minerals included as detrital components of Nile alluvia (Fig. 3: c, D'Ercole *et al.* 2017a). Red coated, black topped, and ripple wares are common and impressed geometric motifs are new types of decorations, which are typical of this period, in addition to rocker and alternatively stamped decorations. As in the Abkan, vessels were fired in bonfires at short oxidizing atmosphere (Table 2, Fig. 7: a-d).

Pre-Kerma pottery extended north to the Second Cataract, where it overlapped with the A-Group complex. It also appeared to the south beyond the Fourth Cataract (Garcea and Hildebrand 2009). During the Pre-Kerma period, small adjacent groups, but with distinct cultural identities, developed more intense interactions and emerging elites controlled long distance trade of exotic goods. They operated within large, tightly interwoven networks with precise social and economic roles along the Nile valley. Sai Island, being located on the frontier of the A-Group and the Pre-Kerma cultural spheres, was in a strategic position and established relations with both areas and beyond, that is, the spheres of the Egyptian kingdom to the north, and the Kerma kingdom to the south. It may also be possible that a fur-

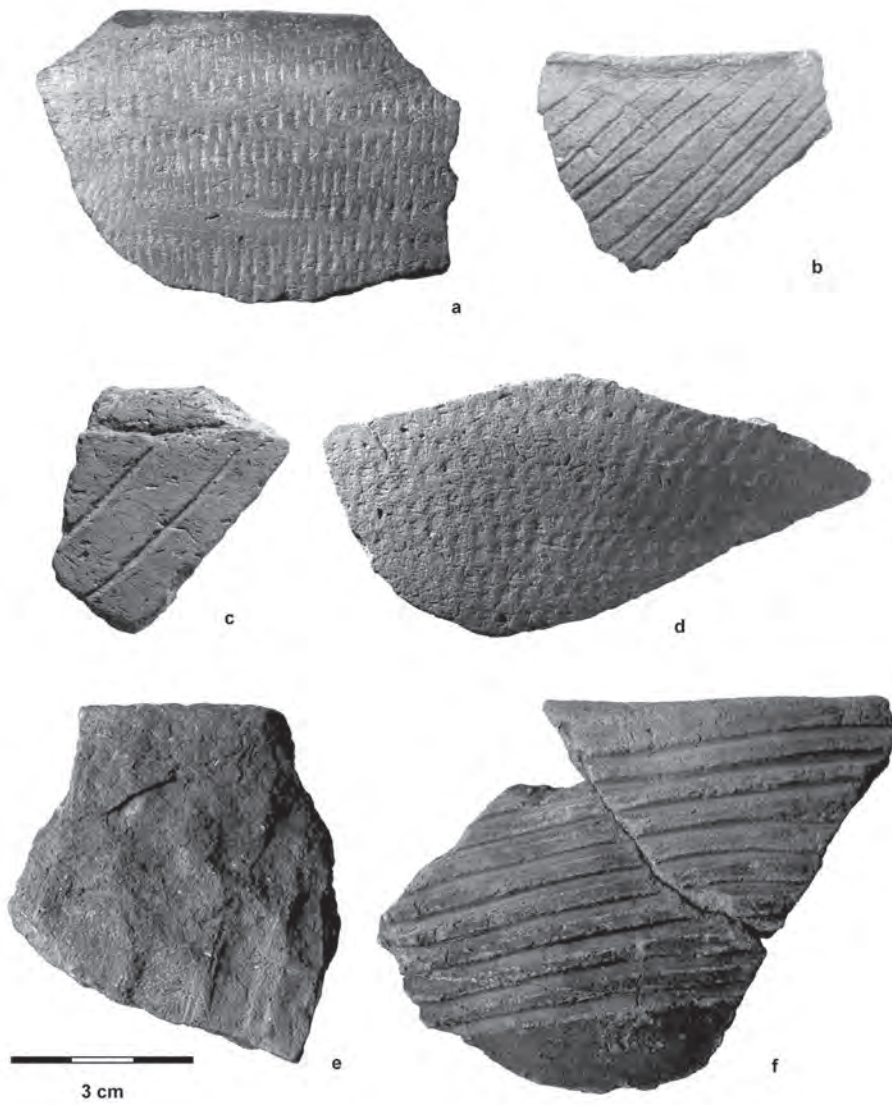


Fig. 7. Potsherds from Sai Island. a-d: Pre-Kerma; e-f: New Kingdom, 18th Dynasty, 'Nubian style' (Photos: R. Ceccacci)

ther push of A-Group peoples at the beginning of the 3rd millennium BC could have been triggered by Egyptian military campaigns in Lower Nubia (Garcea in press).

The Late Neolithic pottery from Shaheinab is technologically comparable to the local Neolithic production with fine-grained textures and the use of dung as tempering material (Table 3). Surface treatments are different, though, showing frequent burnished surfaces, and different and more standardised decorations than in the Neolithic (Fig. 8, Garcea 2006a).



Fig. 8. Late Neolithic potsherds from Esh-Shaheinab (Photo: R. Ceccacci)

5. New Kingdom pottery

At the beginning of the Egyptian New Kingdom, with the rise of the 18th Dynasty around 1550 BC, military troops advanced southwards into Upper Nubia, in northern Sudan. While Sai Island previously was the northern outpost of the kingdom of Kush, Egypt's rival, it was soon conquered by the Egyptian forces. By the mid-18th Dynasty, around 1450 BC, the island became one of the most important Egyptian centres in Upper Nubia and the place of foundation of a fortified town, built on the north-eastern bank of the island (Fig. 1, right, Budka 2014; 2015).

At the time of the Egyptians' arrival, local pottery was still made according to the traditional Nubian and Kerma techniques of pottery hand-making which was derived from the previous productions (Tables 1 and 2) and was in contrast to the Egyptian ceramics that were wheel-made (Budka 2011; D'Ercole *et al.* 2017a). From a petrographic, mineralogical, and chemical point of view, the locally made New Kingdom pottery thrown on the wheel was manufactured with the same raw materials as the Pre-Kerma and Kerma productions and included herbivore dung and vegetal fibres as tempering material (Table 1, Fig. 3: e, D'Ercole *et al.* 2017a).

The most common vessel types from the Kerma tradition are cooking pots, large storage jars, and black-topped fine ware fired in bonfires. Surfaces were decorated with incised geometric motifs and rocker-stamped decorations, as in the previous periods, in addition to mat and basket impressions (Table 2, Fig. 7: e-f, Budka 2014).

6. Ethnographic pottery

The modern sample comes from a pottery workshop in the village of Abri, on the eastern coast of the Nile River, north-west of Sai Island (Fig. 1 right, D'Ercole *et al.* 2017b). The family of potters in the Abri workshop is of Egyptian origin and moved to Sudan in the 1910-1920s, where they practice this job since several generations (D'Ercole *et al.* 2017b).

As raw material, they use alluvial silty sediments that they collect on the Nile banks. These sediments are rich in plagioclase, resulting in high values of CaO, and quartz, originated from the sand naturally present in the sediments (Spataro *et al.* 2014). As tempering material, the Abri potters add herbivore dung, usually from donkeys to make large jars, and from small livestock for small pots (Table 1, Fig. 3: f). Mineral tempers are not intentionally added to the paste. Vessels are fired in either a kiln they have in the workshop, or in bonfires (Table 2, D'Ercole *et al.* 2017b).

The main productions are large jars for storing water, which are made on the slow wheel (Fig. 9). Smaller jars, bowls, and plates are also occasionally made with the coiling technique. Small jars and bowls are usually used for keeping milk and yogurt cheese, and for cooking and serving food. These potters also make flower pots and incense burners (D'Ercole *et al.* 2017b).



Fig. 9. Modern potsherd from the workshop in Abri (Photo: N. Trotti)

Altogether, the different types of vessels made in the Abri workshop are used to serve different functions in everyday life (water jars, cooking and serving bowls and plates), in ritual and ceremonial events (incense burners), as well as in funerary practices (small bowls) (Table 2). They are mostly for the local market in the village and the neighbouring areas, but they are occasionally carried to more distant places, including Khartoum.

Concluding remarks

Technological comparisons between temporally and geographically different ceramic assemblages from the Khartoum Variant and Early Khartoum productions until present ethnographic manufactures have allowed to describe and distinguish similarities and differences in manufacturing traditions over ten

millennia in northern Sudan and central Sudan. The cultural and technological processes that emerged revealed distinct social identities and marked regional boundaries.

This case study confirms that the recognition of continuities and discontinuities are effective means to describe cultural practises and to identify social identities (*sensu* Roux 2008). Continuities seem to be a peculiarity of Nubian pottery, particularly beginning from the Abkan productions up to the Pre-Kerma and present time (D'Ercole *et al.* 2017a). By contrast, major discontinuities occurred at the shift from Khartoum Variant and Abkan manufacturing techniques in most stages of the *chaîne opératoire*. They can be summarised as follows:

- 1) *Raw material procurement*: Pleistocene residual clay with K-feldspar and metamorphic rocks *vs.* Holocene Nile alluvial clay with plagioclase, volcanic rocks, and heavy minerals;
- 2) *Preparation*: no intentional addition of tempering material *vs.* addition of organic tempers;
- 3) *Production*: large unburnished bowls and jars *vs.* diversified shapes, burnishing, and different decorative techniques and motifs.

A discontinuity in the manufacturing techniques from the Early Khartoum to the Neolithic productions could be also observed in the assemblages from Shaheinab, in central Sudan, alongside technical continuities from the Neolithic to the Late Neolithic productions.

These technological changes could be related to both macroeconomic and social changes, including a new food-producing economy, the contribution of livestock providing new tempering material, such as dung, and a greater social complexity. With the diversification of economic activities, ceramic containers were likely to serve more different functions in order to satisfy new internal and technological social adaptations. This required a progressive acquisition of new technological skills by potters, i.e., the ability to make containers with thinner walls and different surface treatments, and, apparently, a new taste on visual aspects of the walls, decorations and colour of the pots.

From the Abkan and Neolithic periods, pottery making was the result of consolidated manufacturing skills that did not need further radical technological changes in successive productions, but visual stylistic discontinuities increased both geographically and chronologically. Altogether, the resulting data have been able to provide new insights on the cultural dynamics and economic relations in the region from the eighth to the second millennium BC, and on the role of Sai Island with other social groups in Upper and Lower Nubia, as well as the Sahara.

They also offered new evidence on the spread and occasional overlapping of different cultural traditions.

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