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Egyptian Pottery from the New Kingdom Temple Town of Sai Island

Introduction

Sai Island is one of the major find spots for 18th Dynasty pottery in Upper Nubia and is currently under investigation by the ERC project AcrossBorders.¹ The ceramic material from Sai not only finds ready parallels at other Egyptian sites in Lower and Upper Nubia,² but also at various New Kingdom towns in Egypt.³ However, a local component and site-specific features are present on Sai, a topic studied within the framework of the AcrossBorders project.⁴

The Pottery from the New Kingdom Temple Town of Sai Island

Within the New Kingdom temple town of Sai, several excavated sectors yielded pottery discussed in the following:⁵ SAV1 North,⁶ SAV1 East,⁷ and SAV1 West. It is beyond the scope of this paper to highlight the individual differences between these corpora despite their strong similarities.⁸ Another aspect which will not be addressed in detail is the close parallels between these Egyptian ceramics and the material from the local cemeteries, especially pyramid cemetery SAC5.⁹

In the earliest levels of the town, the pottery material can be attributed to the very early 18th Dynasty. Within these layers, the assemblages include a substantial amount of material which is seemingly 17th Dynasty in character.¹⁰ However, rather than being connected with the nearby Kerma cemetery, these sherds are always

¹ European Research Council (ERC Starting Grant no. 313668) and Austrian Science Fund (FWF START project Y615-G19). Cf. BUDKA 2015a, p. 41 with other references.

² Cf. HOLTHOER 1977. See also MIELLÉ 2012, pp. 173-187.

³ Cf. BUDKA 2011, pp. 23-33; BUDKA 2016a.

⁴ BUDKA 2015a; BUDKA 2016a; BUDKA 2017a. Cf. also MIELLÉ 2014.

⁵ The individual numbers of the pottery fragments correspond to the following: "N/C + consecutive number" (e.g. N/C 642) refers to material from SAV1 North; SAV1 West and SAV1 East are abbreviated with "P + consecutive number" (e.g. SAV1W P044).

⁶ BUDKA 2011, pp. 23-33; MIELLÉ 2012, pp. 173-187; MIELLÉ 2014, pp. 387-392; BUDKA 2017b.

⁷ BUDKA 2014, pp. 68-69.

⁸ Cf. BUDKA 2016b; BUDKA 2017a.

⁹ Cf. MINAULT-GOUT, THILL 2012, pls. 132-145. Cf. also BUDKA 2015a, pp. 48-50.

¹⁰ BUDKA 2016a.

associated with Egyptian vessel types – like carinated bowls and carinated jars – datable to the early 18th Dynasty. Therefore, the formation of these earliest levels of Egyptian presence probably took place under Ahmose II Nebpehtyra or Amenhotep I.¹¹

Fabrics: Nile Clays and Marl Clays

The Vienna System¹² works well for New Kingdom fabrics from Nubia, especially if one includes local variations. Nile silt fabrics form the most common group by far, which is very typical for settlement pottery. A considerable number of Nile clay vessels have been modelled on Egyptian types but were locally produced. From a macroscopic point of view, it is not always possible to distinguish imported Nile clays from Egypt (“Real Egyptian”) and locally produced Nile variants (“Egyptian-style”). Chemical and petrographic analyses can help to differentiate between these two sub-families of Nile clays.¹³

The following Vienna System groups are well attested at Sai (see Appendix): Nile B2 (with a chaffy variant), Nile C, Nile D and Nile E. The latter is an Upper Egyptian equivalent¹⁴ of the typical Nile E¹⁵ used for cooking pots (fig. 1, SAVIE P 179). The bread moulds (fig. 1) were made of a typical mixture of sandy mud, clay and organic temper, classified as “bread mould clay” or Nile D4.¹⁶ Consistent with the distribution of Egyptian Nile clays, the local Nile variants comprise primarily Nile B and Nile C variations. These are less well sorted than the real Egyptian variants and seem to have a higher proportion of organic inclusions.

Though less commonly used than the Nile clays, the following types of Marl clays have been identified from the New Kingdom town of Sai: Marl A2, A4 (Variant 1 and 2) and A3; Marl B; Marl C (Variant 1 and 2), Marl D (Variant 1 and 2) and Marl E. Within the material of the early 18th Dynasty Marl A2, A4 and Marl B were used most often. During the late 18th and 19th Dynasties, Marl D appears in considerable quantities. This fabric, primarily used for amphorae and jugs, is known from Egypt as early as the reign of Thutmose III.¹⁷ Marl C and Marl E are both rare at Sai and restricted to vessels dating to the early 18th Dynasty: Marl C was mainly used for large *zir* vessels,¹⁸ while Marl E was used for thick-walled bread trays (so-called *Schaelbecken*).¹⁹

Imported Wares and Mixed Clays

In addition to the Egyptian Nile and Marl clays, some other imported pottery (Canaanite, Levantine and Cypriote) and a few sherds in Oases ware are attested from the New Kingdom temple town of Sai. Most common are Non-Egyptian amphorae from Syria/Canaan. The most frequent fabric in the 18th Dynasty levels is a variant similar to Marl D, with a dark grey or brownish matrix and abundant particles of limestone. Another reddish-yellow amphora fabric, with numerous mineral inclusions and abundant limestone particles, corresponds to P11 at Saqqara and Memphis.²⁰

11 Cf. BUDKA 2015a, p. 50; BUDKA 2016a.

12 NORDSTRÖM, BOURRIAU 1993.

13 For chemical and petrographic analyses see CARRANO et al. 2009, pp. 785-797; SPATARO et al. 2015, pp. 399-421.

14 Cf. BUDKA 2006, p. 84 (for a local variation at Abydos).

15 See NORDSTRÖM, BOURRIAU 1993, p. 175.

16 Cf. BUDKA 2006, p. 84.

17 See BUDKA 2006, p. 84 with references. For a Marl D sherd from a context probably datable to Hatshepsut at Dukki Gel, see RUFFIEUX 2016, p. 516, fig. 11.5. For other vessels in Marl D from Nubia, cf. MIELLÉ 2016, p. 430.

18 Cf. BADER 2001.

19 Cf. BUDKA, DOYEN 2013, pp. 190-191.

20 NORDSTRÖM, BOURRIAU 1993, p. 185; ASTON 2008, p. 40; BOURRIAU 2010, p. 31.

Egyptian Mixed clays are attested from all excavated sectors. Mixed Fabric A (III-a) is well known from early 18th Dynasty and Thutmoside contexts at Elephantine, where it is used almost exclusively for *zir* vessels. This fabric seems to be an innovation of the New Kingdom,²¹ as it has not yet been found in Second Intermediate Period contexts.²² For Ramesside amphorae, the Mixed Fabric B (III-b) was sometimes used.²³

Production and Technology

The general co-existence of Egyptian (wheel-made) and Nubian (hand-made) pottery traditions on Sai Island finds many parallels at other Upper Nubian New Kingdom sites.²⁴ Hand-made Nubian cooking pots and some Kerma fine wares (cups and beakers) are well attested, especially in the early levels, and are comparable to contemporaneous sites like e.g. Sesebi.²⁵ The locally produced Egyptian-style Nile clays are almost always wheel-thrown. Egyptian hand-made pottery is rare and the examples are restricted to bread plates and *Schaelbecken*, attested both in imported and local wares.²⁶

Little is known about the ceramic industry on Sai, though the finished products and their technological features testify that Egyptian potters skilled in the wheel production were certainly present at the town. To date, no New Kingdom kilns or pottery workshops have been identified with certainty.²⁷ Furthermore, hybrid types attest to a regional style, despite a general similarity with contemporary pottery in Egypt. Sometimes locally produced Nile clay pottery vessels have been modelled on Egyptian examples, but with local influences concerning the surface treatment, production technique or decoration.²⁸ Egyptian types made of Nubian fabrics, shaped by hand rather than wheel-thrown, or with a Nubian surface treatment (like ripple burnishing and incised decoration) might be products of a local fashion and local potters, but could also refer to the cultural identity of their users or be the result of more complicated processes. All in all, this material seems to attest to a complex mixture of lifestyles in New Kingdom Sai.²⁹

Main Types

The following presents an overview of the most important types, with a focus on assemblages from early and mid-18th Dynasty contexts in sectors SAV1 North and SAV1 East. In general, small and medium-sized dishes, various plates, pot stands, storage vessels and jars,³⁰ cooking pots, beer jars, beakers and bread plates dominate the corpus of ceramic types. Bread moulds, bread trays and spinning bowls, as well as carinated Marl clay vessels, amphorae and decorated jars are also present.

The most common functional vessel types in 18th Dynasty Sai (fig. 1) comprise numerous bread plates of different sizes, usually made in Nile C, and some conical bread moulds of Jacquet's Type D.³¹ Pot stands are very frequent and vary from low, transitional to tall, and are made primarily in Nile B2 and Nile C, but also

²¹ SEILER 1999, p. 217; see also BUDKA 2005, p. 94, n. 321.

²² See BUDKA 2006, p. 85.

²³ For two variants of Mixed clays see ASTON 1999, p. 6.

²⁴ Cf. SMITH 2003a; SMITH 2003b, pp. 43-53; SPENCER 2014, p. 55.

²⁵ ROSE 2012; cf. also BUDKA 2017a.

²⁶ Cf. BUDKA, DOYEN 2013, pp. 190-191; BUDKA 2017b.

²⁷ Cf. HESSE 1981, pp. 7-67 (for a possible production area at SAV2).

²⁸ BUDKA 2017a.

²⁹ BUDKA 2014, pp. 68, 71.

³⁰ In general, the corpus of various jars is better illustrated by finds from tombs due to the complete state of preservation, cf. MINAULT-GOUT, THILL 2012, pl. 134-135; see also WILLIAMS 1992, pp. 81-84.

³¹ JACQUET-GORDON 1981, p. 18, fig. 5. See also ROSE 2007, HC 2, p. 288.

attested in Marl clay (especially Marl B and Marl E). Egyptian wheel-made cooking pots of the 18th Dynasty appear within the New Kingdom corpus as imported and locally produced variants. The imported cooking pots correspond to types at Elephantine (fig. 1, SAVIE P179).³² Another variant is reminiscent of Second Intermediate Period ceramic style and very close to Nubian cooking pots (fig. 1, N/C 959.8).³³

Ceramic Cluster from SAV1 North, Early 18th Dynasty

For establishing an absolute dating of the ceramics from Level 4 in sector SAV1 North, a set of vessels discovered in Square 180/2270 is important (fig. 2).³⁴ With the predominance of coarse Nile C variants and Marl B, the general character of the wares shows a close affinity to Second Intermediate Period traditions. Significant wares like black rim and red splash ware are absent, and the scarcity of Marl A decorated wares points towards a Pre-Hatshepsut/Thutmose III date.³⁵ In addition, common types like carinated and simple dishes with ring bases frequently occur in a design that identifies them as early variants – according to the Second Intermediate Period style of applying a wash to vessels, the bottom of the ring base is left uncoated in most cases.³⁶

Two Egyptian-style vessels (N/C 647 and N/C 652) of this ceramic cluster are most likely of 17th Dynasty date considering the shape, manufacture and ware.³⁷ Another vessel of pre-18th Dynasty character is a large Nubian storage jar (N/C 650) of Classical Kerma tradition (Gratien's Type C IX).³⁸

The other vessels from the cluster find close parallels at sites of the early 18th Dynasty, in particular from the early phase of "Bauschicht 10" in the New Kingdom town of Elephantine (dated as Pre-Hatshepsut) and from the Ahmose II complex at South-Abydos (dated as Ahmose II-Amenhotep I).³⁹ Deep carinated bowls with red rims and coarse flat bases (N/C 646.1-2) are typical for the early 18th Dynasty, both in Egypt (e.g. Elephantine) and Upper Nubia (Dukki Gel).⁴⁰ A variant of this type is the uncoated deep carinated bowls with several rope impressions and again a very coarse flat base (N/C 641). Simple dishes with a flat base and irregular red rim (N/C 658) are common types as well, with good comparisons from other contemporaneous sites. N/C 660 is the rim sherd of a typical Egyptian cooking pot in the sandy cooking pot ware, labelled as Nile E2 (see Appendix).⁴¹

Finally, white-washed Nile clay storage vessels or *zirs* were found in the ceramic cluster of Square 180/2270 (N/C 642, fig. 7). This type of *zir* – possibly an imitation of Marl clay vessels – is short-necked, with a ledge at the junction of the neck and the shoulder. It is quite a common vessel type in the New Kingdom town of Sai (fig. 7). A vessel sequence based on its morphological development (especially the height of the neck, but also the globular or more slender overall shape) shows that little change occurs from the early to mid-18th Dynasty.

³² See SEILER 1999, p. 223, fig. 53.

³³ See SEILER 1999, p. 221, n. 516.

³⁴ BUDKA 2011, p. 29.

³⁵ Cf. BUDKA 2005, p. 97; BUDKA 2016a.

³⁶ Cf. BUDKA 2011, p. 28.

³⁷ See BUDKA 2011, pp. 25-27.

³⁸ GRATIEN 1986, pp. 434-435, fig. 324c. Cf. BUDKA 2011, p. 27.

³⁹ Cf. also Deir el-Ballas, estimated in date as 17th/18th Dynasties: BOURRIAU 1990, pp. 15-22.

⁴⁰ RUFFIEUX 2009; RUFFIEUX 2011; RUFFIEUX 2014.

⁴¹ BUDKA 2017a.

Pottery from Silo N12D, SAV1 North, Thutmocide

Excavated in 2011 within Room N12/2 (building unit N12), the circular storage pit N12D⁴² is one of the rare cases from SAV1 North of an almost intact context. Its ceramic material spans the time from the late Second Intermediate Period/early 18th Dynasty until the reign of Thutmose III.⁴³ The pottery from N12D is a typical household assemblage, but with a large repertoire of forms. The most common types and wares of Level 3 in SAV1 North are represented here, supporting the assessment that Level 3 can be predominately associated with the later reign of Thutmose III.⁴⁴ The corpus comprises small and medium-sized dishes which usually have ring bases, various plates (usually with flat bases), storage vessels, cooking pots, beer jars, beakers, flower pots and bread plates.⁴⁵ The type of *zir* discussed for the Level 4 cluster, in a chaffy white washed Nile clay variant, is well represented by rim fragments in N12D (fig. 7). Especially remarkable amongst the ceramics from N12D is a small black burnished jug of Black Lustrous Wheel-made ware (N/C 763).⁴⁶ A small quantity of Nubian cooking pots and some Kerma black-topped cups complement the pottery from silo N12D. Overall, the complete assemblage finds close parallels at Elephantine, in material associated with “Bauschicht 10”.⁴⁷

Pottery from Feature 15, SAV1 East, mid-18th Dynasty

Among the most significant discoveries in the sector SAV1 East is Feature 15, a large subterranean room located in the central courtyard of Building A and in use from the reign of Hatshepsut until Amenhotep III.⁴⁸ Dug into the natural gravel deposit, Feature 15 represents a rectangular storage installation, with a now missing vaulted roof (5.6 x 2.2 x 1.2 m). More than 80 almost intact vessels were found in this cellar (figs. 3, 5-6), mainly plates and dishes, beakers, storage jars, *zir* vessels and pot stands.

Open forms from Feature 15 (fig. 3) find close parallels at Elephantine (“Bauschicht 10”) and SAV1 North Levels 4 and 3. Simple dishes with flat or ring bases are very common, often with a red rim. Carinated dishes frequently show wavy incised or painted decoration (fig. 8).⁴⁹ Black rim ware and the Thutmocide red splash decoration⁵⁰ is regularly found on dishes (fig. 6). Chronological markers for the 18th Dynasty are the so-called flower pots, conical deep bowls with perforated bases (fig. 6, SAVIE P 147, 148 and 166).⁵¹ An unusual type is represented by two deep bowls with an irregular flat base and a modelled rim (fig. 6, SAVIE P128 and P165).⁵²

Beer jars with an inverted or direct rim, together with slender beakers of various sizes and types (fig. 5), are typical settlement forms of the New Kingdom (fig. 4). Several fragments of heavy-walled slender vessels with short flaring necks were also found in Feature 15 (fig. 5, bottom).⁵³ Nile clay squat jars that imitate Marl clay vessels are typical of the Thutmocide period (fig. 6) and though those from Feature 15 are not decorated, a large number of painted examples were documented from SAV1 East, West and North.

42 N17 in the former nomenclature, see BUDKA, DOYEN 2013, pp. 193-196; BUDKA 2016a.

43 See BUDKA, DOYEN 2013, pp. 190-196; BUDKA 2016a.

44 BUDKA 2014, pp. 70-71.

45 See BUDKA, DOYEN 2013, pp. 190-196.

46 BUDKA, DOYEN 2013, pp. 193-195, fig. 23.

47 Cf. BUDKA 2005, pp. 90-116.

48 BUDKA 2015a, pp. 44-45.

49 See parallels Sesebi: SPENCE et al. 2011, p. 37, fig. 5.

50 Cf. ASTON 2006, pp. 65-73.

51 HOLTHOER 1977, pl. 18; MINAULT-GOUT, THILL 2012, pl. 132.

52 This type finds a parallel in “Bauschicht 9” from Elephantine (no. 37601X/b-29), unpublished, courtesy of the author.

53 Well-attested at Elephantine (“Spitzbodenflasche”) from the late Middle Kingdom onwards, see VON PILGRIM 1996, figs. 142s, 147j-k. See also examples from Amarna: ROSE 2007, pp. 92-93 (type SG5).

Painted Wares

Painted wares are well attested in all sectors of the New Kingdom temple town, with a large variety of decorated open Nile clay forms. Most common are red-burnished or white-burnished carinated dishes and bowls with linear monochrome decoration, also present in Marl clays (fig. 8). Incised decoration, especially in the form of wavy lines, is also very popular.

Characteristic markers of Thutmocide pottery include decorated squat jars of various sizes and proportions (fig. 9).⁵⁴ A large group of bichrome-decorated necked jars with linear, floral and figurative designs is of special interest. Good examples of mid-18th Dynasty date are known from Sai (fig. 9) and Dukki Gel,⁵⁵ but also from Askut, Buhen and Aniba.⁵⁶ The origin of these specific vessels is still an open question – based on parallels, the area of Elephantine seemed likely⁵⁷ until new finds from Dukki Gel suggested a possible local workshop in Upper Nubia.⁵⁸ Another category of painted forms is blue-painted pottery, which is only rarely attested in Nubia. At Sai, some pieces of this type do date to the mid- to late 18th Dynasty, but beakers with linear decoration like SAV1W P015+P085 are already early Ramesside in date (fig. 9).⁵⁹

A (so far) unique piece with floral and faunal decoration is a lower part of a decorated rhyton, covered in a red slip and burnished (N/C 1205, fig. 9). The area around the perforated bottom of this vessel which is imitating a characteristic Aegean type is painted with black floral elements. Just above these lotus flowers, a register with figural painting is still partially visible. It seems to be a scene in the marshes: a striding male figure is carrying two fish hanging from a pole set on his shoulder. This decoration might be interpreted within the context of the New Kingdom town of Sai as a symbol of renewal.⁶⁰

Summary and Outlook

The character of the ceramic material from the fortified town of Sai strongly attests to its identification as Egyptian town. It finds ready parallels not only in other Egyptian foundations in Lower and Upper Nubia, but also at various sites in Egypt, especially Elephantine and Abydos. An increase in the variability in shapes and wares can be noted from the time of Thutmose III onwards, the heyday of Sai as an administrative Egyptian centre. Imported wares from Canaan, the Levante and the imitation of an Aegean rhyton attest to the full integration of the town on Sai Island within Egyptian international trade routes of the second half of the 18th Dynasty.

Furthermore, despite a general similarity with contemporary pottery in Egypt, the Egyptian pottery from Sai Island can be used as a case study that local pottery workshops and traditions are traceable in New Kingdoms Nubia. Regional style was mostly expressed by surface treatment and decoration. Though Egyptian potters were certainly present at the colonial sites,⁶¹ it is currently difficult to assess the possible impact of Nubian potters. Hybrid versions of New Kingdom and Nubian style vessels illustrate the close interconnections between Egyptians and Nubians. One has to assume that Nubian potters were being trained in wheel-made production by Egyptians, at least in the first generation. For this training, but also to possibly explain higher

54 STEINDORFF 1937, pl. 82; HOLTHOER 1977, pl. 30-32; WILLIAMS 1992, p. 85, fig. 7.

55 RUFFIEUX 2009, pp. 124-126, figs. 3-5; RUFFIEUX 2016, pp. 512-513, figs. 7-8.

56 See BUDKA 2015b, pp. 334-335 with references.

57 BUDKA 2015b.

58 Personal communication P. Ruffieux, May 2016.

59 E.g. at Aniba, Sai, Tombos, Dukki Gel and Amara West, cf. BUDKA 2011, p. 30. See also HOLTHOER 1977, pl. 33, FU1.

60 See BUDKA 2016b, p. 95.

61 WILLIAMS 1992, p. 24, n. 3; RESHETNIKOVA, WILLIAMS 2016. Cf. also GARNETT 2014, p. 62.

quality products in local fabrics, the presence of Egyptian potters at the site is thus very likely.⁶² Therefore, hybrid versions could be products of local potters introduced to a new technological skill, but could also be the outcome of a Nubian influence on trained Egyptians spending time on the island. A number of questions about the individuals producing the pottery on New Kingdom Sai remain open. However, the newly established site specific corpus of fabrics and types allows embedding the ceramics into both the regional and supra-regional contexts.⁶³ Close comparisons for the material from Sai at sites both in Egypt (e.g. Elephantine, Abydos and Amarna) and Upper Nubia (e.g. Sesebi) are significant new results, allowing advances in fine dating and steps towards a better understanding of ceramic industries, trade, contact and household inventories at one of the most important New Kingdom Egyptian sites in Northern Sudan.

⁶² For this complex question, cf. RESHETNIKOVA, WILLIAMS 2016, pp. 487-505.

⁶³ See BUDKA 2016a.

Appendix

THIS APPENDIX presents the results of the petrographic analysis conducted on a set of Nile clay wares from the New Kingdom town of Sai Island. Within the AcrossBorders project's 2013-2015 field seasons, two hundred-sixty ceramic samples (SAV/S 01-260)⁶⁴ were collected from the New Kingdom site and submitted for archaeometric laboratory analyses. Over one hundred of these were Nile clay wares, either "Egyptian-style" vessels (locally produced after the Egyptian fashion and morpho-stylistic types) or "Real Egyptian" wares (manufactured in Egypt and imported to Sai Island).

All of the ceramic samples underwent Instrumental Neutron Activation Analysis (INAA).⁶⁵ Further, a select number of specimens were also analysed in thin section (OM). The Nile clays samples analysed come from sectors SAV1 North (SAV1 N), SAV1 East (SAV1 E) and SAV1 West (SAV1 W) of the New Kingdom town and include different shapes and macro fabrics (tab. 1).⁶⁶

Analytical procedure

The samples were impregnated in Araldite and ground down to a thickness of 30 microns. Petrographic observations were carried out with a Nikon Eclipse E600 POL microscope at the laboratories of the Department of Lithospheric Research and the Department of Geodynamics and Sedimentology of the University of Vienna.

The petrographic description considered non-plastic inclusions (NPIs), matrix and porosity. The abundance of the NPIs and macro-porosity was visually estimated using comparison charts.⁶⁷

⁶⁴ The acronym "SAV/S" stands for "SAV" = "Sai New Kingdom Town" and "Sample".

⁶⁵ Instrumental Neutron Activation Analysis (INAA) is ongoing at the Institute of Atomic and Subatomic Physics (AI) of Vienna.

⁶⁶ The macroscopic classification of the fabrics is according to the nomenclature system developed by J. Budka for the fabrics of Elephantine and Sai (with equivalents/variants of the Nile clays of the Vienna System, *supra*). The acronym "var." stays for "variation", "calc." stays for "calcareous". Note: the petrography of the two bread moulds SAV/S 55 and SAV/S 56 is not discussed in this paper.

⁶⁷ MATTHEW et al. 1991, pp. 211-263.

No. sample	No. pottery	Sector	Description	Macro fabric	Vessel form
SAV/S 14	N/C 702.1	SAV1 N	Egyptian-style	var. B2/C2	dish
SAV/S 15	N/C 702.2	SAV1 N	Egyptian-style	var. B2 (D?)	incense bowl
SAV/S 16	N/C 702.3	SAV1 N	Egyptian-style	var. B2 (D)	carinated dish
SAV/S 17	N/C 702.10	SAV1 N	Egyptian-style	var. B2/C2	jar
SAV/S 18	N/C 1295	SAV1 N	Egyptian-style	var. B2	base sherd
SAV/S 51	SAV1E P 015.2	SAV1 E	Egyptian-style	var. C2	deep bowl
SAV/S 52	SAV1E P 015.3	SAV1 E	Egyptian-style	var. C2	bread plate
SAV/S 53	SAV1E P 020.10	SAV1 E	Egyptian-style?	var. B2 (D?)	dish, black rim
SAV/S 54	SAV1E P 020.16	SAV1 E	Real Egyptian?	var. D2	neckless jar
SAV/S 55	SAV1E P 026.12	SAV1 E	Egyptian-style	var. C2	bread mould
SAV/S 56	SAV1E P 026.13	SAV1 E	Egyptian style	var. C2	bread mould
SAV/S 149=150	SAV1W P 2014/002	SAV1 W	Real Egyptian	E var.	cooking pot
SAV/S 151	SAV1W P 2014/003	SAV1 W	Real Egyptian	B2 var.	cooking pot
SAV/S 152	SAV1W P 012.5	SAV1 W	Real Egyptian	B2	cooking pot
SAV/S 153	SAV1W P 012.6	SAV1 W	Real Egyptian	B2 (sandy)	cooking pot
SAV/S 154	SAV1W P 012.7	SAV1 W	Real Egyptian	B2 (sandy, calc.)	cooking pot
SAV/S 155	SAV1W P 012.8	SAV1 W	Egyptian-style	B2 var. (chaffy)	cooking pot
SAV/S 156	SAV1W P 012.9	SAV1 W	Real Egyptian	E var.	cooking pot

Tab. 1. “Egyptian-style” and “Real Egyptian” samples analysed in thin section.

Petrographic Results: “Egyptian Style” and “Real Egyptian” Wares

Clay Matrix

Both the “Egyptian-style” and the “Real Egyptian” samples consist of a non-calcareous, fine and moderately homogeneous clay matrix, containing abundant mica and iron-oxides. In most of the samples, the clay matrix is optically active, which suggests firing temperatures were reasonably low, up to 800-850°C. However, in some examples the clay minerals show a moderate to low birefringence and signs of an incipient vitrification, indicating that the samples have been fired at temperatures higher than 800-850°C.

Porosity

Samples display different varieties of voids or pores. Amongst them, it is possible to distinguish between primary pores (related to the production stage) and voids originated after the organic substances added to the clay burn out. These voids make up *ca.*10 to 25% of the sample. Secondary porosity is rare. When shrinkage cracks are present, they are commonly infilled with secondary calcite.

Non-Plastic Inclusions

The suite of non-plastic inclusions (NPIs) is dominated by the silicate minerals quartz and feldspar. Among them, monocrystalline quartz – with both straight and undulose extinction – is the most abundant, followed by plagioclase, K-feldspars and polycrystalline quartz. Mica, iron oxides and opaque phases are also

common, together with clinopyroxene (i.e. augite), epidote (i.e. zoisite), amphibole (i.e. green hornblende) and few titanium oxides. Most of the samples contain fine volcanic and, less commonly, larger metamorphic rock fragments. Carbonate rocks, mostly in the form of microcrystalline calcite (micrite) nodules, occur as characteristic features in some of the samples. These nodules are sub-rounded to well-rounded in shape and can measure up to 2.5 mm in size. They are distributed randomly through the paste and may glue grains of quartz and feldspar.

In addition, these ceramics also contain different kind of clay-rich inclusions – i.e. clay pellets and argillaceous rock fragments (ARF). Further, all the “Egyptian-style” and some of the “Real Egyptian” samples analysed were tempered with organic plant remains in a variable proportion.

Different micro-fabrics or groups can be distinguished within both the “Egyptian style” and the “Real Egyptian” wares, based on the proportion of the mineral phases, the grain size and the amount of organic tempers.

The “Egyptian-Style” Wares

Group 1 Very Fine Micaceous Samples with Common Clay Pellets and ARF Inclusions: SAV/S 14, 18 and 52

[fig. 10a-b]

Samples from this group display a fine and homogeneous framework with an average grain size of 0.062-0.125 mm (very fine sand) and few larger grains of quartz, microcline and microcrystalline calcite. The clay matrix has high optical activity and the shrinkage is very low. Among the non-plastic inclusions, monocrystalline quartz, iron-oxides, mica and plagioclase are the most common, while clinopyroxene and amphibole seem to be lesser compared to the other “Egyptian-style” samples.

A characteristic feature of this sample group is the occurrence in the paste of many plastic inclusions of clay pellets and ARF. The clay pellets are usually sub-rounded to well-rounded with high optical density and clear boundaries.⁶⁸ They are reddish to brown in colour and can range from 0.125 to 0.75 mm in size. The clay pellets are very similar in texture and microstructure to the surrounding clay matrix and can be interpreted as natural clay features related to the same raw material.

Within this group, SAV/S 18 contains few organic inclusions, while SAV/S 14 and 52 are both tempered with abundant organic material derived from straw, chaff and other plant remains. These inclusions measure from 0.5 up to 2.5 mm in size. They are either tubular-shaped (i.e. chaff) or may have a discoidal shape.

Group 2 Fine Samples with Abundant Quartz and Limestone Inclusions: SAV/S 15, 16, 53 and 54

[fig. 10c-d]

Samples from this group are characterised by a coarser and less sorted texture in comparison to Group 1, with an average grain size between 0.125 and 0.25 mm (fine sand) and a coarser population of grains consisting of rounded monocrystalline quartz and carbonate rock fragments (limestone). Among the non-plastic inclusions, clinopyroxene and amphibole are more common here than in Group 1. These samples seem to also contain more volcanic and metamorphic rock fragments. Furthermore, a few inclusions of chert were noticed in some specimens.

⁶⁸ Cf. WHITBREAD 1986, p. 80.

In SAV/S 15 the carbonate inclusions consist mainly of scattered sub-rounded nodules of microcrystalline calcite, up to 1.75 mm in size. In SAV/S 16, 53 and 54 the carbonate inclusions are more frequent and consist of both fine (0.125-0.25 mm) and coarse (up to 1 mm) limestone particles, partially decomposed in the paste. Signs of incipient vitrification and distinctive reaction rims from the limestone burning out can be observed in some of these samples, suggesting they were fired at temperatures higher than 800-850°C.⁶⁹ Organic inclusions are mainly tubular-shaped and appear completely carbonized.

Group 3 Fine Samples with Abundant Quartz and Organic Remains: SAV/S 17, 51 and 155

[fig. 10e-f]

This group of samples shows a grain size and a suite of non-plastic inclusions comparable to Group 2. However, it can be distinguished as a separate fabric due to the higher quantity of organic tempers added to the paste, recognizable to the naked eye.

The organic inclusions differ in shape and size, but most are tubular-shaped remains of chaff and vegetal fibres. Because of the partial decomposition of the organic matter during the firing, these samples are characterised by a chromatically zoned fabric with dark cores and brown-reddish oxidised surfaces.

Carbonate rocks, in the form of both small limestone particles and larger aggregates of microcrystalline calcite, are present in these samples although their proportion is lower in comparison with Group 2. Some of these inclusions appear partially decomposed due to the firing process.

The “Real Egyptian” Wares

Group 1 Very Fine to Fine Sandy and Micaceous Samples: SAV/S (151), 152, 153 and 154

[fig. 11a-b]

The group of “Real Egyptian” samples discussed here mainly comprises cooking pots and is therefore characterized by a sandy and micaceous texture. The size distribution of the non-plastic inclusions appears to be moderately to well-sorted with a dominant size ranging from very fine (SAV/S 153 and 154) to fine-grained sand (SAV/S 152), as well as a few larger inclusions of monocrySTALLINE quartz with a maximum diameter of 0.75 mm. In SAV/S 152 and 153 the non-plastic inclusions are particularly abundant and make up *ca.*40% of the sample volume. In SAV/S 154 the ratio matrix/inclusions is inverted and more volume is occupied by the clay matrix.

MonocrySTALLINE quartz, plagioclase, K-feldspar and biotite mica are the most common among the silicate minerals. These samples also contain numerous volcanic rock fragments. Clay pellets and ARF are part of the framework. Further, SAV/S 153 and 154 seem to contain grog inclusions of higher fired ceramic.

Organics are few and consist mainly of tubular-shaped remains burned out during the firing. Their size commonly ranges from 1 to 2 mm. SAV/S 151 could be included in Group 1, however in this sample the grain size distribution appears to be poorly sorted to moderately bimodal, with a fine population of grains between 0.062 and 0.125 mm and some larger inclusions of quartz 0.5-1 mm in size. Moreover, this sample contains common organic plant remains, consistent with its classification as Nile B2.

⁶⁹ NÖRDSTROM, BOURRIAU 1993, p. 175.

Group 2 Medium-Grained Sand Samples with Abundant Quartz, Feldspars and Biotite Mica: SAV/S 149=150 and 156

[fig. 11c-d]

Samples from this group again derive from cooking pots and have a set of mineral inclusions similar to Group 1. They are rich in monocrystalline quartz (sub-angular to sub-rounded in shape), K-feldspar, plagioclase and coarse biotite mica. Abundant volcanic and metamorphic rock fragments are also part of the framework.

What distinguished this group of samples in comparison with Group 1 is the coarser grain size, with a dominant “mode” in the medium sand (0.25-0.5 mm), and the complete absence of organic remains. Some clay pellets are part of the framework. These features display the same *petrofacies*, however their grain size is definitively finer and the ratio matrix/framework is also different.

Discussion

The results of the petrographic analysis of the New Kingdom Egyptian Nile clay wares from Sai Island are consistent with the macroscopic classification realized during the fieldwork, confirming the macro-groupings defined according to the Vienna System. Overall, the “Egyptian-style” and “Real Egyptian” samples share a similar petrography, both displaying a non-calcareous clay matrix, rich in mica and iron oxides, and a similar suite of non-plastic inclusions. This leads to two main considerations:

- 1) The source of the raw clay material used for making these vessels was generally the same, being alluvial silt clay collected from different deposits along the Nile.
- 2) As the petrography of the Nile alluvium is rather homogeneous,⁷⁰ the petrographic composition of the samples does not itself allow discriminating among the different clay deposits.

Despite this general homogeneity, the petrographic results highlighted significant differences in the grain size of the samples and in the proportion of non-plastic inclusions and organic remains. These differences reflect the macroscopic classification of the fabrics and in most cases indicate a technological variability.

Concerning the “Egyptian-style” wares, three main petrographic groups were recognized. The first group (SAV/S 14, 18 and 52) refers to a very fine fabric related to a silty alluvial deposit particularly rich in mica, iron oxides, clay pellets and argillaceous rock fragments. The grain size distribution and the sorting of the non-plastic inclusions suggest that no additional sand was added to the paste. Instead, these samples were tempered, in variable proportions, with different kinds of organic plant remains. In SAV/S 14, the organics display an orientation strongly parallel to the walls of the vessels as a consequence of the use of the wheel. In SAV/S 52, a hand-shaped bread plate, they instead appear randomly orientated.

In Groups 2 (SAV/S 15, 16, 53 and 54) and 3 (SAV/S 17, 51 and 155) the grain size appears slightly coarser and some large quartz and limestone inclusions are part of the framework. This might indicate either the selection of a lesser sorted sediment than Group 1 or the addition of coarser sand to the clay.

When carbonate inclusions occur as single scattered remains in the paste, it is difficult to determinate whether they were a tempering material or rather natural inclusions of unsorted or poorly sorted clay.⁷¹ When their presence is conspicuous and characterises the fabric, as in samples SAV/S 16, 53 and 54, it is likely that they represented a deliberate addition by the potters. From a macroscopic point of view, these samples are variations of fabric Nile B2 or Nile D of the Vienna System. According to their technological and stylistic features, SAV/S 53 and 54 could be considered real Egyptian imports. The results from INAA analysis will contribute to this preliminary attribution.

⁷⁰ Cf. CARRANO et al. 2009, p. 788.

⁷¹ Calcareous aggregates, possibly originating from calcareous mud, are commonly attested in alluvial weathered deposits in arid or semi-arid regions: ERAMO et al. 2014.

The “Real Egyptian” wares analysed in thin section (SAV/S 149=150, 151, 152, 153, 154 and 156) are all samples from authentic Egyptian cooking pots manufactured either in Nile B2 or Nile E var. of the Vienna System.⁷² These samples display a distinctive sandy fabric with a range of variations in the grain size, from very fine to fine and medium sand. In SAV/S 149=150 and 156, in particular, the size and the distribution of the non-plastic inclusions, with abundant quartz, microcline, coarse biotite mica and metamorphic rock fragments, might suggest the intentional addition of a feldspathic medium-grained sand to the clay.

⁷² *Supra* and BUDKA 2016a; BUDKA 2017b.

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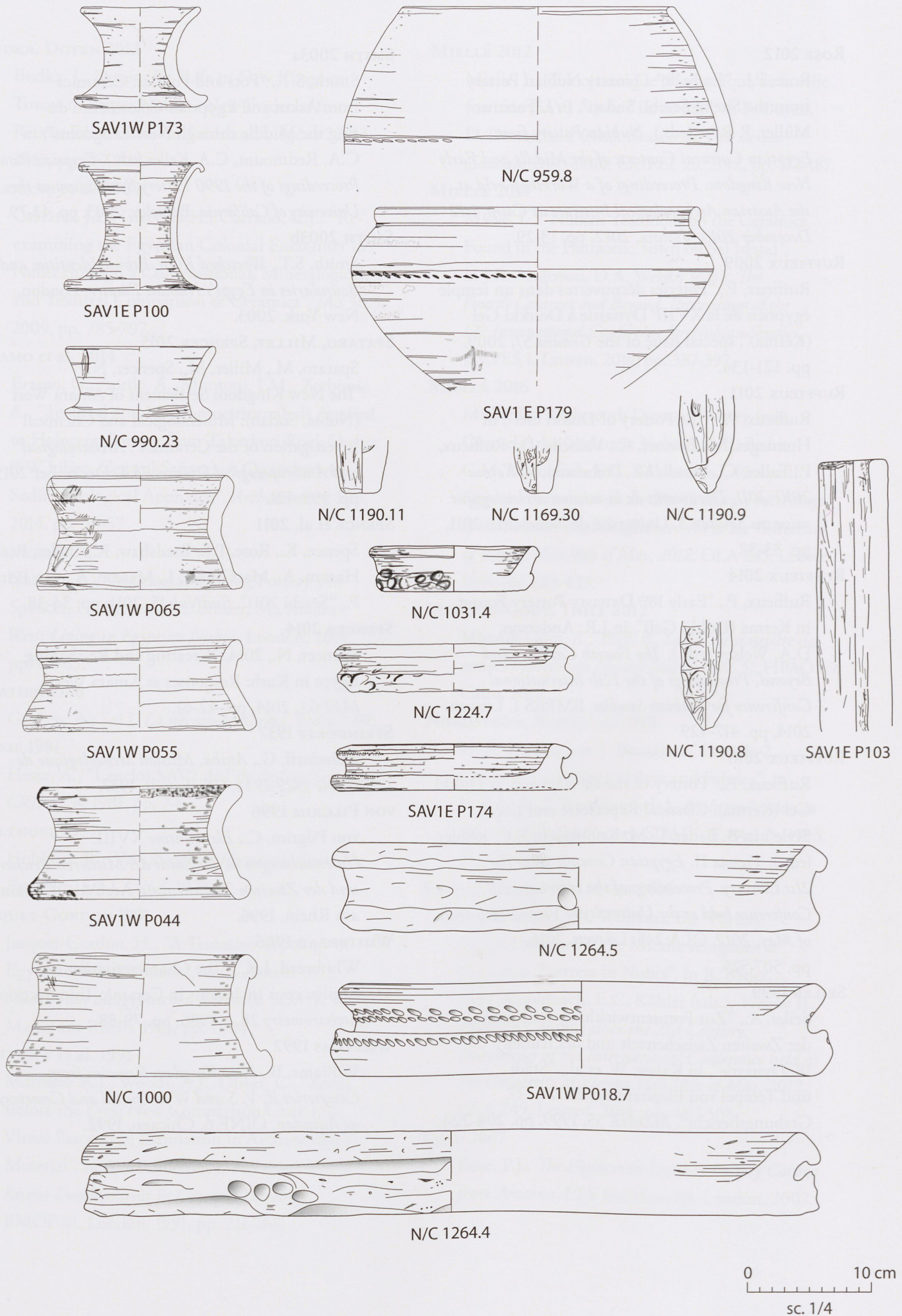
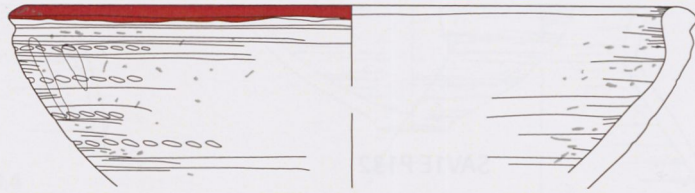


Fig. 1. Functional forms from the New Kingdom town of Sai.



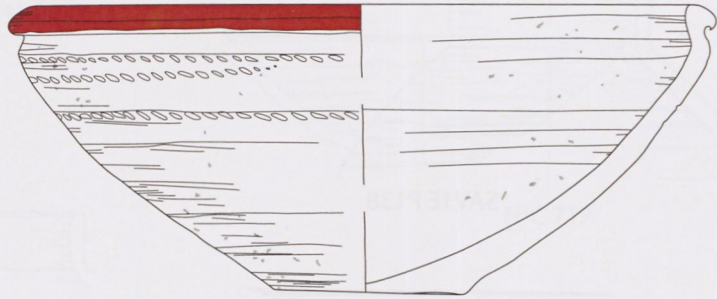
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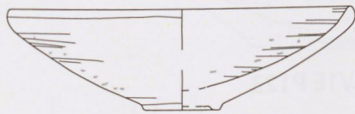
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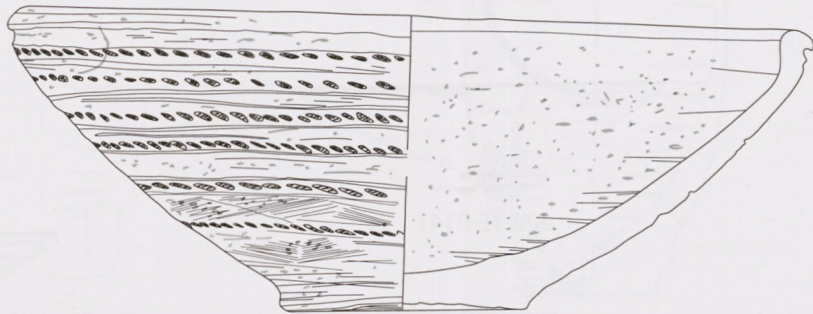
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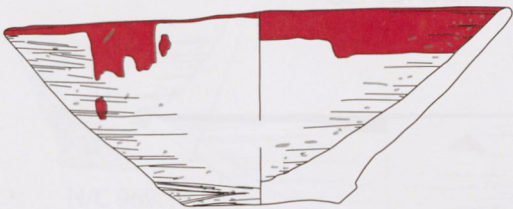
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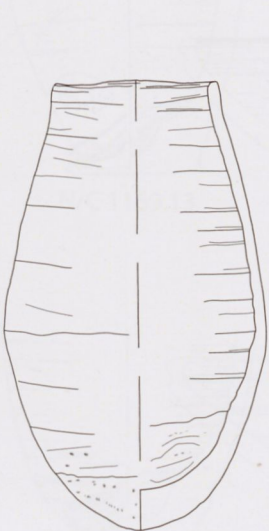
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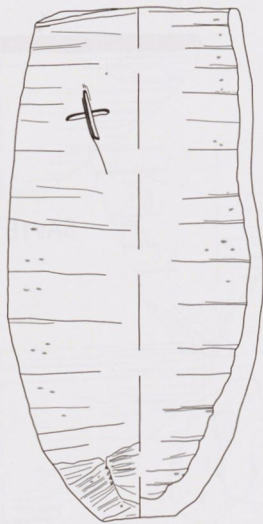
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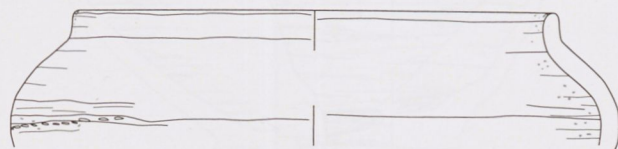
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N/C 660

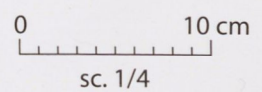


Fig. 2. Characteristic vessels from Level 4, SAVI North.

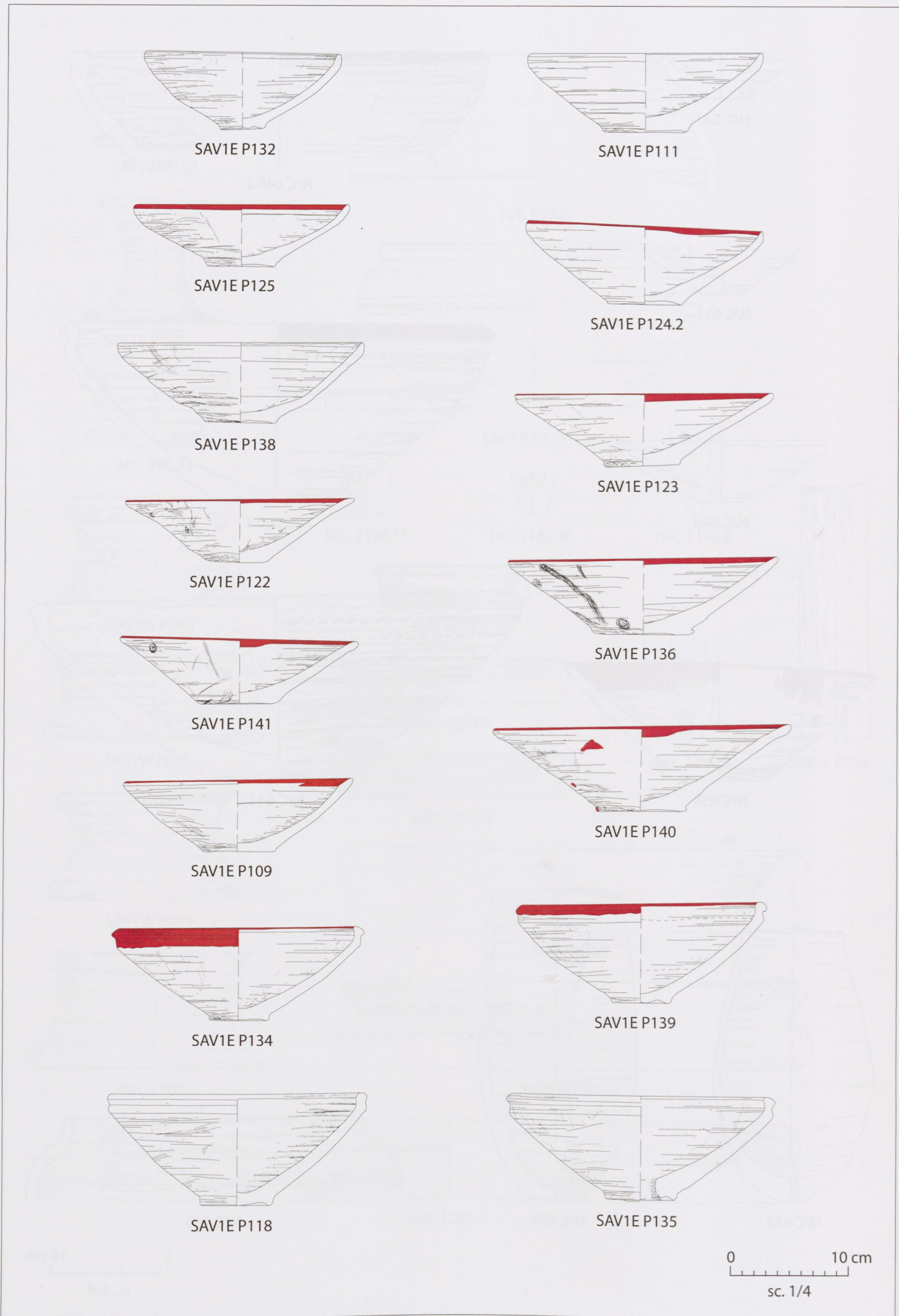


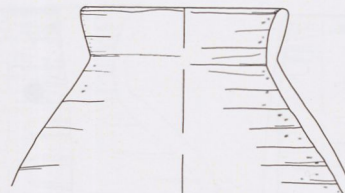
Fig. 3. Open shapes from SAVI East, Feature 15.



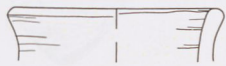
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N/C 610.4



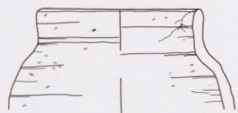
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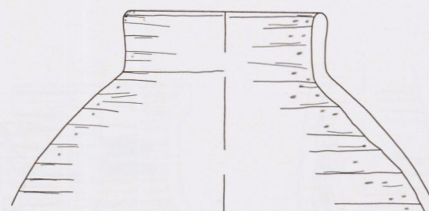
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N/C 1041.8



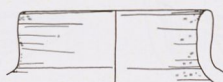
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N/C 717



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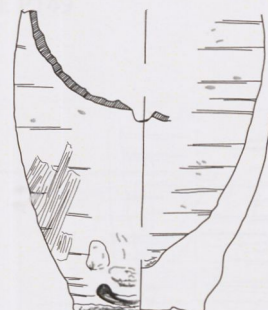
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SAV1W P 251.2



N/C 1206.5



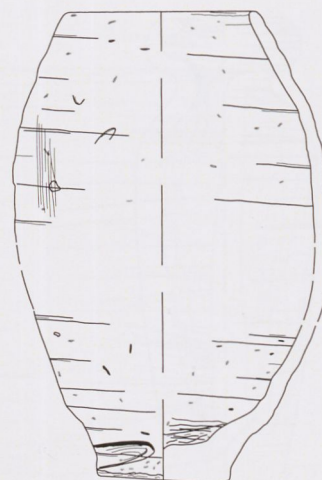
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SAV1W P 054.3



N/C 859.1

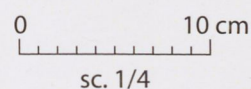


Fig. 4. Beer jars from the New Kingdom town of Sai.

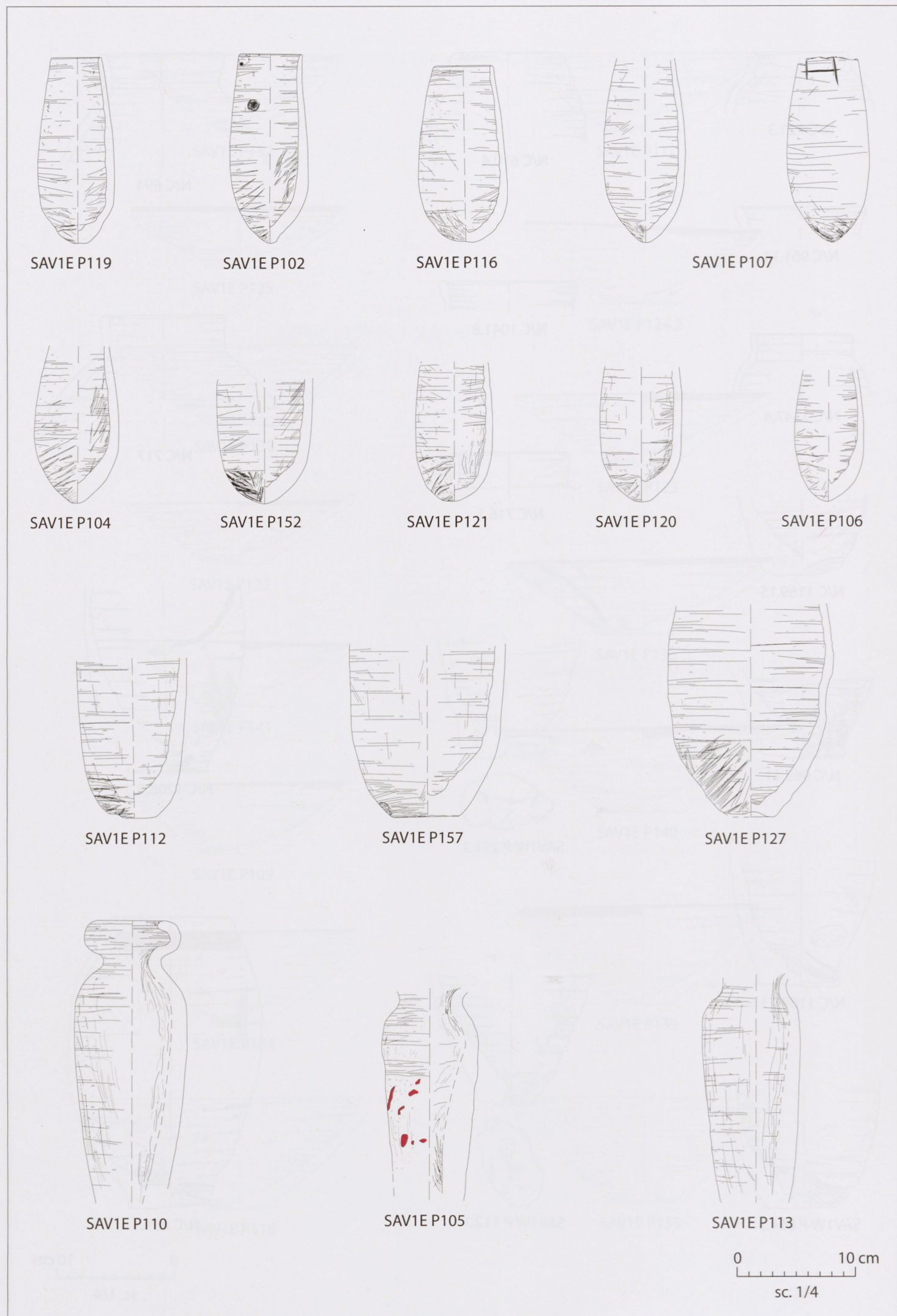
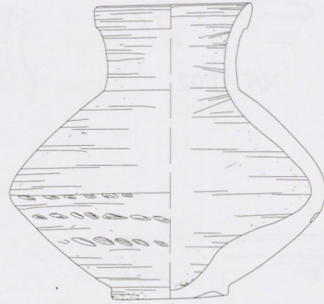


Fig. 5. Beakers and slender vessels from SAV1 East, Feature 15.



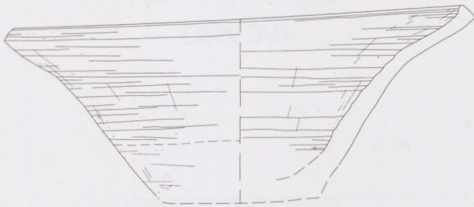
SAV1E P150



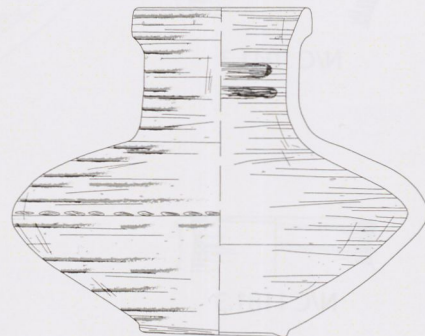
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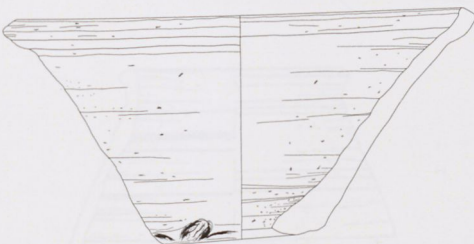
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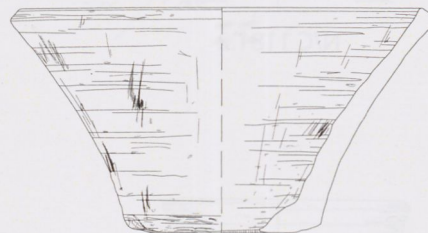
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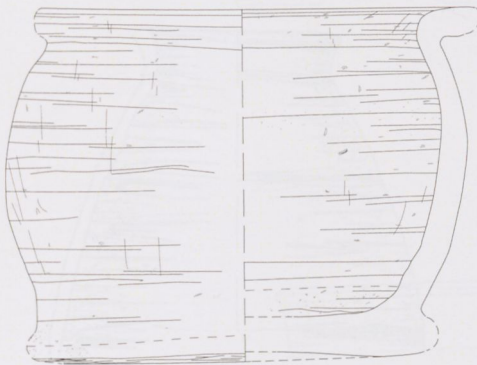
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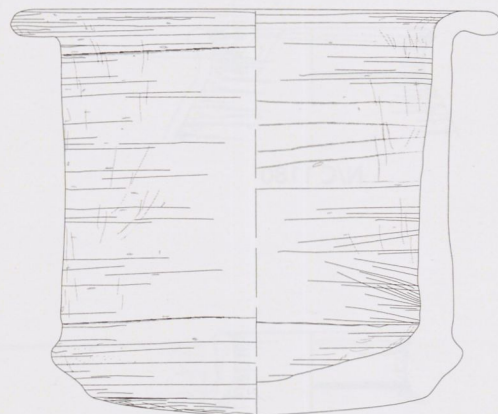
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SAV1E P148



SAV1E P165



SAV1E P128

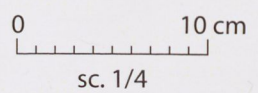
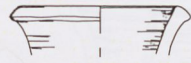
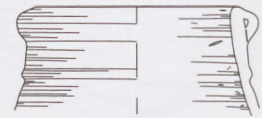


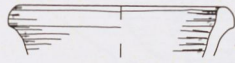
Fig. 6. Various shapes from SAV1 East, Feature 15.



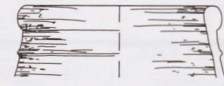
N/C 1002



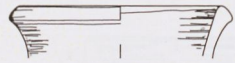
SAV1W P018.3



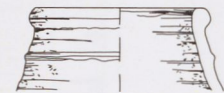
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SAV1E P26.6



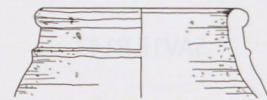
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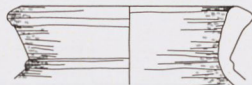
N/C 998.3



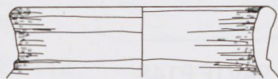
N/C 1181.3



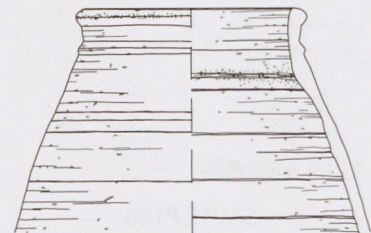
SAV1W P037



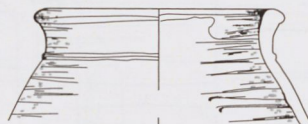
N/C 1181.2



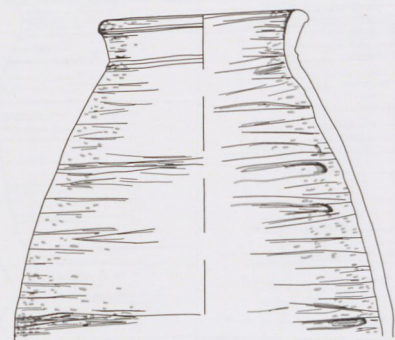
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SAV1E P167



N/C 1180



N/C 642



N/C 818.2

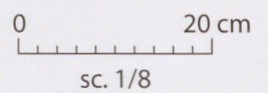
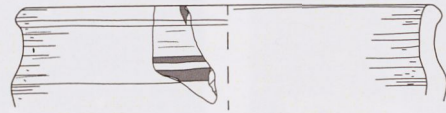
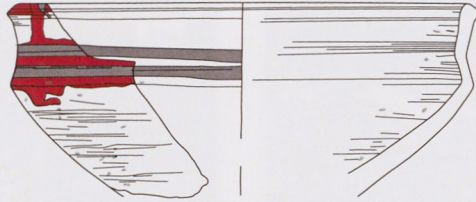


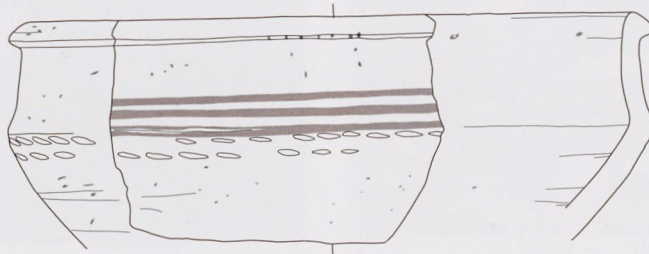
Fig. 7. Zir vessels (Marl and Nile clays) from the New Kingdom town of Sai.



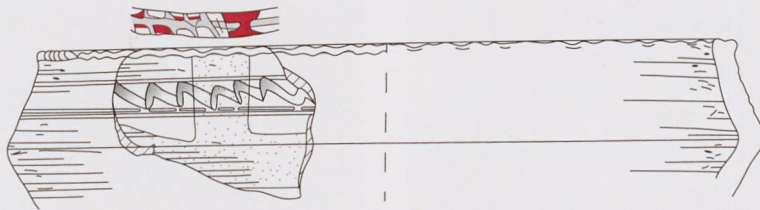
N/C 680.2



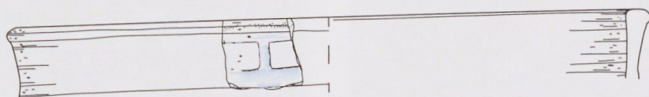
N/C 587



N/C 1088



SAV1W P20.8



SAV1E P078

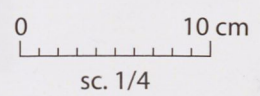


Fig. 8. Open decorated types from the New Kingdom town of Sai.

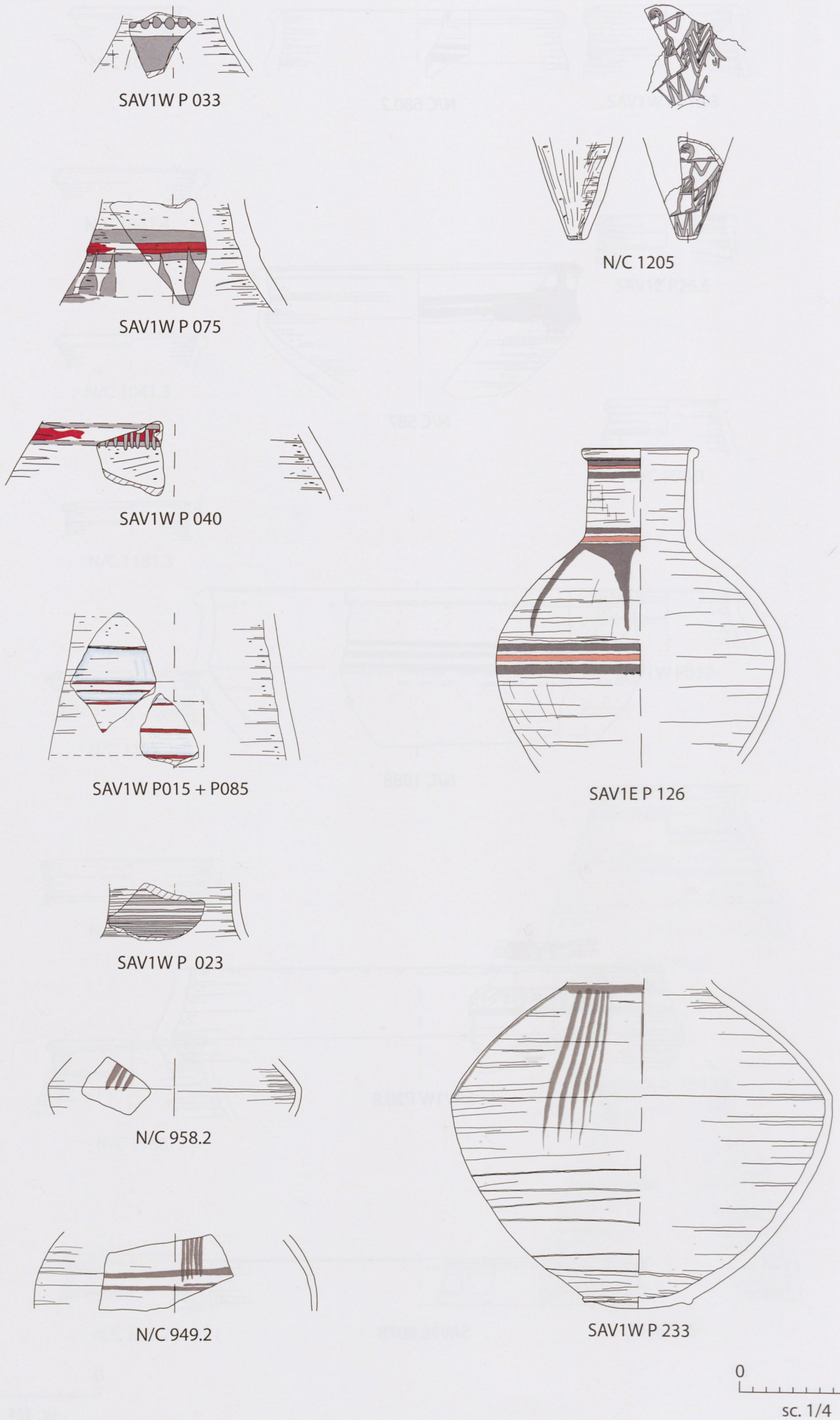


Fig. 9. Closed decorated types from the New Kingdom town of Sai.

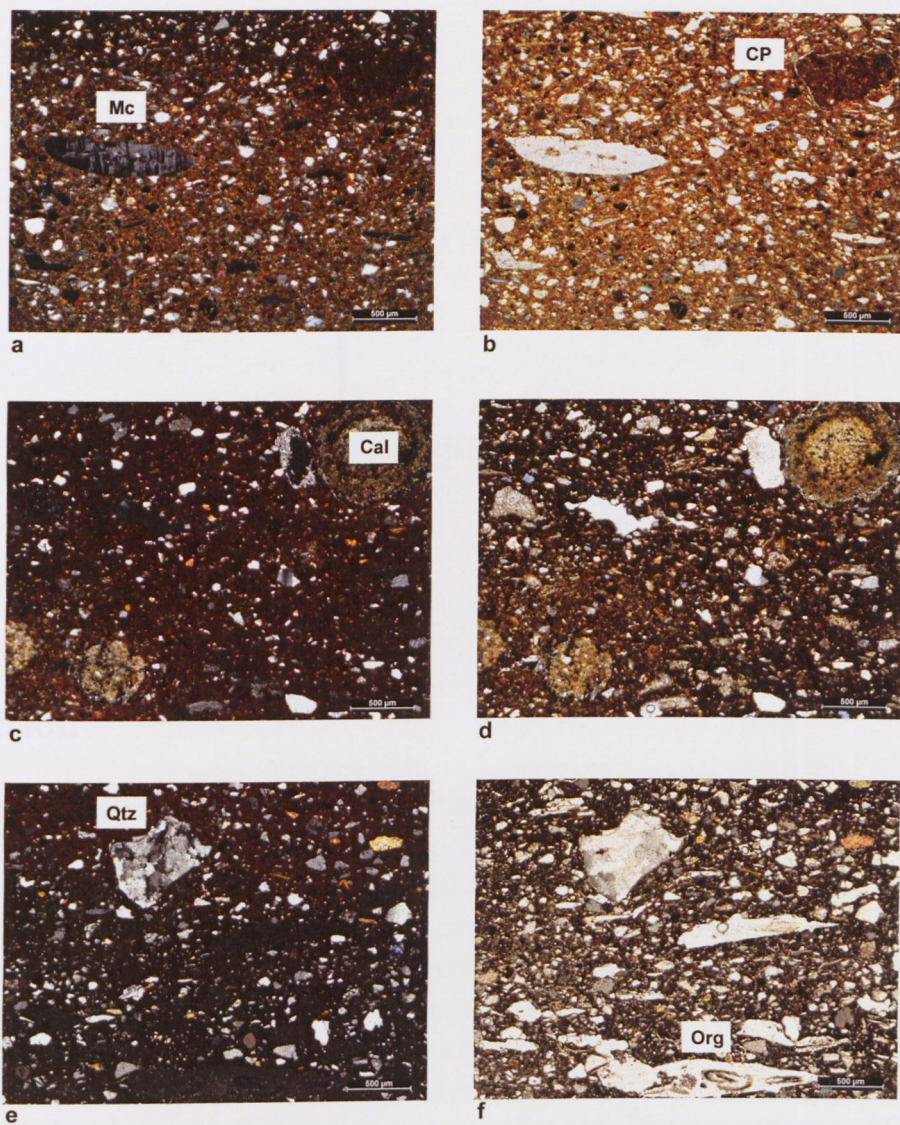


Fig. 10. Microphotographs of “Egyptian style” samples, a-b: SAV/S 14 from Group 1 showing microcline (Mc) (a, XPL) and a clay pellet inclusion (CP) (b, PPL); c-d: SAV/S 54 from Group 2 with rounded calcite inclusions (Cal) (c, XPL); e-f: SAV/S 17 from Group 3 with polycrystalline quartz (Qtz) (e, XPL) and organic plant inclusions (Org) (f, PPL) (© G. D’Ercole).

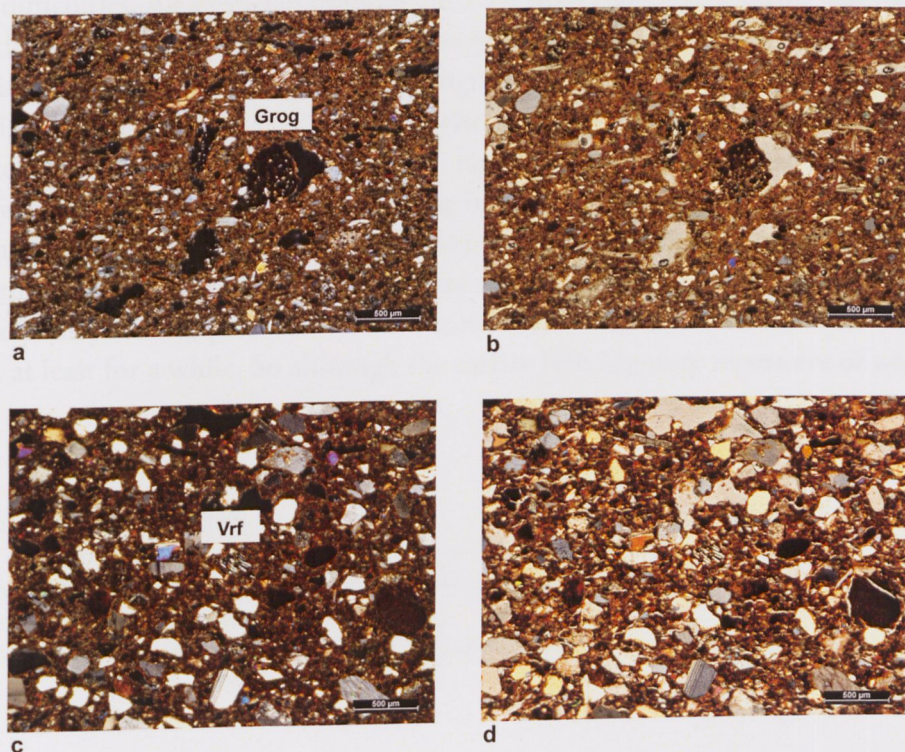


Fig. 11. Microphotographs of “Real Egyptian” samples, a-b: SAV/S 154 from Group 1 showing one inclusion of possible crushed pottery or grog (a, XPL); c-d: SAV/S 150 from Group 2 with abundant medium-grained quartz, feldspar and volcanic rock fragments (Vrf) (c, XPL) (© G. D’Ercole).