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Investigating Intra- and Inter-site Variability of Late Predynastic – Protodynastic Settlements of Egypt

Introduction

Over the past forty years archaeological investigations in Egypt have amassed a considerable amount of new data on settlements of the Predynastic period (*c*. IV millennium BC). The first compendium reviewing the old, renewed and new research on habitation sites along the Lower Nile Valley and the Delta for this period was published more than ten years ago (Tristant 2004). Since then, further valuable data has been provided by continuing settlement' excavations (*e.g*. Kopp 2006; Chłodnicki *et al*. 2012; Midant-Reynes and Buchez 2014; http://www.hierakonpolis-online.org, amongst many others). Despite these research efforts, some crucial questions long posed about the nature, layout and structure of Predynastic settlements in both Upper and Lower Egypt remain unanswered, for example: „*What is the typical size of houses? How are they positioned in relation to each other, or the site as a whole?* […] *Are elite residences clustered in one restricted area of a settlement, or scattered and surrounded by lower classes* […]? *What is a typical Predynastic settlement*?" (Anderson 2006: 263–264).

It is not so infrequent the case that such habitation sites preserve scanty architectural remains or consist of only shallow occupational debris, thus our ability to discern within their material culture remains any significant variability is still quite limited, as well as our understanding of how the latter might have been related to other domains, *e.g*. socio-economic structure, administrative control, cultural interaction, *etc*. Given such circumstances even the smallest details of

the artefactual vestiges, their physical attributes as well as their location, density, distribution and diversity, must be used to try to infer a site's status, function, sociocultural complexity and to catch some glimpses of its internal structure.

The study reported here represents an attempt to use data on pottery from two distinct Late Predynastic – Protodynastic settlements for elucidating the range of ceramic-related activities and their relative importance in the respective contexts, with the aim of gaining information on the internal differentiation and general character of these sites. More specifically, the focus of this investigation is on charting functional variability at the intra-site and inter-site level via quantitative methods.

Unpublished ceramic data from approximately coeval[1] settlement contexts[2] from within two sites of equal status have been studied. These sites are Nekhen and Naqada „*South Town*" (or Zawaydah), which might be considered first rank settlements in their respective regions (Hierakonpolis and Naqada) in the wider period under examination[3] (Fig. 1). As for Nekhen, this study involves ceramics recovered within a 10 x 10 meter square called 10N5W[4], which lies not far from the temple of Horus (Fig. 1C), and was stratigraphically excavated by Michael A. Hoffman in 1984 (Hoffman 1986; 1989). For Naqada, the pottery[5] derives from

[1] The relative chronology suggested for the contexts under investigation (see further below) is based on the presence/absence of stylistically distinctive pottery types and comparative ceramic data drawn from other settlements of Upper Egypt.
Besides deriving from nearly contemporaneous contexts, pottery assemblages selected for analyses are assumed to be large enough to be statistically reliable and representative of the pottery population; cfr. Millett 1979: 39.

[2] At least initially, known functional differences amongst these settlement contexts, suggested by elements different from the pottery (*e.g.* architectural features or small finds; see further below), have been "put in brackets" and the pottery assemblages were used to investigate any evidence of variability.

[3] For the status of Naqada during the latter part of the Predynastic – Protodynastic period see: Fattovich *et al*. 2007: 53.

[4] The entire pottery assemblage from the 1984 excavation at Nekhen 10N5W was sorted and recorded by Barbara Adams in 1984 and partly re-examined by Michael A. Hoffman in 1987. The relevant archive was kindly made available to me by Renée F. Friedman (Director of the Hierakonpolis Expedition). Moreover, between 2012 and 2014, I had the opportunity to re-analyse a sample of this material, which is currently stored in Egypt. Both archival data drawn from the examination conducted by Barbara Adams and data collected by me have been used in the present study.

[5] The analysis of the ceramic material collected during the first field seasons at Zawaydah/Naqada (1979–1983) was carried out by Rodolfo Fattovich (Barocas *et al*. 1989: 298–300). The unpublished documentation and data from these analyses, presently kept at the University of Naples "*L'Orientale*" in Italy, were kindly made available to the me by R. Fattovich. Furthermore, as part of my doctoral research project, in 2008 and 2009 I re-analysed a sample of the pottery assemblage from this excavation still stored in Egypt (Di Pietro 2016).

the settlement labelled Zawaydah (Fig. 1B), which is situated on a gravel terrace at the edge of the low desert and was excavated by an Italian expedition directed by Claudio Barocas, Rodolfo Fattovich and Maurizio Tosi in 1977–1986 (Fattovich *et al*. 2007 with references).

Some interesting differences, potentially related to functional diversity, have been identified within and between the ceramic assemblages of these sites.

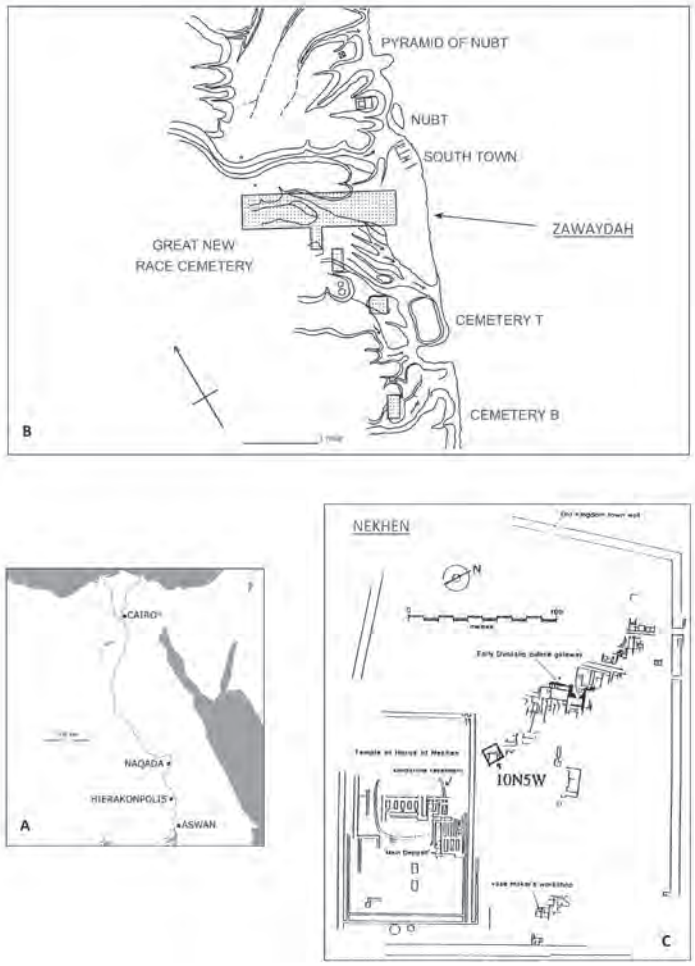

Figure 1. A. Map of Egypt with sites considered for the analyses
B. Sketch map of the site of Naqada (source: Petrie and Quibell 1896: pl. IA with modifications; digitised by the writer)
C. Map of the site of Nekhen with indication of the square 10N5W (source: Adams 1995: 66, fig. 23)

Details of the methods adopted, analyses performed, results and potential significance of this investigation are discussed in the following sections, along with some recommendations for future research.

1. Methods

1.1. Preliminary remarks

Before detailing the methods used in this study, it is necessary to highlight some of the assumptions and limitations of the present work.

One of the key assumptions is that ceramic material was deposited relatively near its primary area of use in both of the contexts taken into consideration. For Nekhen this assumption is based on the description of the relevant archaeological units and stratigraphic information provided by the excavator, while for Zawaydah it is more problematic due to extensive disturbance suffered by the site. This issue is more extensively discussed below (see: Discussion).

The contexts examined from the two sites were excavated using slightly different archaeological procedures. This disparity imposes caution on the interpretation of the analyses conducted on their respective ceramic assemblages. However, the recovery techniques employed were quite similar[6] and most of the ceramic samples have been re-examined by the writer using standard recording procedures.

Another problem relates to the fact that in different archaeological contexts the deposits might have undergone different formation processes, that, as far as the pottery is concerned, might result in different degrees of fragmentation (cfr. Schiffer 1996: 282–284). Any discrepancy concerning this aspect (*i.e.* an assemblage being more broken than another) is considered to compromise the validity of results of comparisons between assemblages, especially when „sherd count"[7]

[6] For Zawaydah, the archaeological deposit of the contexts considered here for the analyses was sieved. For Nekhen, at least two of the archaeological units examined (# 153 and # 156) derive from sieved deposits, while information on the collection strategy is missing for the third context (# 173).

[7] As a measure of pottery quantification, the "rim sherd count" has been employed in the present study. Although more reliable measures exist (*e.g.* "estimated vessel equivalents" or EVES and "sherd weight" (Orton 1993: 175; Orton and Hughes 2013: 206–208), whose use is desirable especially when conducting inter-assemblage comparisons, for the assemblages studied here none of these methods could have been used consistently for practical reasons. Indeed, at least two of the most common pottery types (cfr. shape classes coded as 1-1b5 and 1-1o in

is used as a measure of quantification (Orton and Hughes 2013: 35, 206–207). In order to test the comparability of the available pottery assemblages and before performing any analysis, the so called parameter of „*brokenness*" (defined as „*the average number of sherds into which each pot in the assemblage has been broken*"; Orton 1985: 114) was calculated[8] and assessed for each of the samples. The levels of brokenness did not differ significantly across assemblages from distinct sectors at Zawaydah[9] nor between the assemblages here considered for Zawaydah and Nekhen[10]. Therefore, this factor should not affect significantly results of the inter-assemblage comparisons conducted in this study[11].

1.2. Establishing ceramic functional categories

The ceramic material[12] constituting the study sample, previously examined and classified, was assigned to a series of broad functional categories[13]. Attributions to these categories and inferences about a plausible primary function for the shape classes identified were based on a set of criteria, ranging from a consideration of known morphotechnological characteristics (cfr. Rice 1987: 207–232) to suggestions and evidence of use discussed in previous studies on Predynastic ceramics (Friedman 1994: 240–262; Hendrickx 1994: 80–94; Hendrickx *et al*. 2002; Bu-

the Hierakonpolis system; Friedman 1994) have an elliptical orifice, so that no EVEs could have been calculated for them. Furthermore, since only diagnostic sherds were preserved for the assemblages under study, weight estimates would have been pointless.

[8] The parameter of brokenness was calculated by using the formula "nos. sherds/EVEs", devised by Orton (1985: 114). In particular, as "nos. sherds" all rim sherds deriving from concentric pottery types (*i.e*. excepting rim sherds with elliptical orifices; cfr. above) were considered. As for the "nos. EVEs" or "estimated vessel equivalents", it was calculated as sum of rim-EVEs. The EVE value of a single rim-sherd, that represents the portion of the rim that survives of the vessel, was measured by means of a rim chart (cfr. Orton and Hughes 2013: 210), for example, the EVE value of a rim representing 25% of the original vessel orifice was expressed as 0.25.

[9] The index of brokenness for the pottery deriving from four distinct sectors at Zawaydah ranges between 9.83 and 15.11. The lack of any statistically significant pattern in the data has been assessed via a T-test.

[10] The overall level of brokenness of the pottery from ZWE (see further below) is similar to the level of brokenness of the pottery from Nekhen Structure 84-III (cfr. below). The pertinent values are 12.13 and 11.99 respectively.

[11] Usually when conducting inter-assemblages comparisons a minimal assumption is made that "*the relativities between the lifespans of different types remain constant between different but comparable assemblages*"; Orton and Hughes 2013: 204.

[12] Only data on rim sherds or vessels with reconstructible profiles was taken into account.

[13] The main interest here has been on the function of the vessels as containers (cfr.: Rice 1987: 210), and not on their potential function as display items or, more generally, their symbolic meaning (cfr. Orton and Hughes 2013: 260–261).

chez 2004; Anderson 2006: 56–57, 59–61, table 4.2). These potential functional categories and the reasons for inclusion of the main ceramic shape classes in them are summarized below.

A. Vessels used for food preparation (with or without heat) Fig. 2, 1–2: two main shape classes have been included into this category, namely large basins with thick walls and rough shallow platters[14]. Considering their size and the strength provided by their walls, the former might have been used primarily as grinding or mixing bowls (cfr.: Rice 1987: 227; Friedman 1994: 243). For the latter a function as bread baking pans is usually suggested based on traces of soot and heat discoloration which they sometimes show (Friedman 1994: 722; cfr. also Hendrickx *et al*. 2002: 296, Tab. 5, type R1g3).

B. Vessels mainly connected with food serving (Fig. 2, 3–8): a series of platters and shallow bowls in a different array of fabrics have been included into this category[15] (cfr. Fig. 2, 3–5). The relative shallowness that characterizes such vessels would have allowed their contents to be immediately visible and accessible, while their moderate size and weight would have favoured their handling and movement (cfr.: Rice 1987: 225–266; Friedman 1994: 243). Small and medium sized bowls made of marl or untempered Nile silt are generally considered serving vessels, because both their fabric and slipped and/or polished surfaces made them particularly resistant to breakage from impact (Friedman 1994: 257; Hendrickx 1994: 82). For this reason they are included in this category as well (Fig. 2, 6–8)[16].

AB. Vessels for food preparation/serving (Fig. 2, 9–11): into this category a range of medium size bowls made of straw tempered Nile silt fabric with diverse shape profiles and surface treatments have been included[17]. Their unrestricted shape and limited size and weight hint at a serving function for them (cfr. above

[14] These correspond to the subjective shape classes coded as 1-1n and 1-1o1 in the latest version of the Hierakonpolis system (Friedman 1994), to which the reader is referred for a full description. Specific subtypes of the subjective classes 1-1b, 1-1g, 1-1h, 5-1g, 12-1h, but characterized by large diameter and thick walls have also been included into this functional category.

[15] Pertinent subjective shape classes in the Hierakonpolis system are coded as 1-1b5 (characterized also by an elliptical orifice; cfr. Fig. 2, 3) and 5-1b2 (cfr. Fig. 2, 5); see Friedman 1994.

[16] Remains from beakers, although they might have been mainly residual elements in the assemblages under study, have been considered as having mainly a serving function when originating from relatively small vessels (cfr. Friedman 1994: 262). They have been considered within the functional category of storage containers when originating from large vessels (cfr. Friedman 1994: 641; Anderson 2006: 61).

[17] Pertinent subjective shape classes in the Hierakonpolis system are coded as 1-1a, various subtypes of 1-1b (except for 1b2 and 1b5), 1-1f (Fig. 2, 9), 1-1e, 1-1g (Fig. 2, 10), 1-1h (Fig. 2, 11), 1-1j; cfr. Friedman 1994.

category B)[18]. For bowls with a tronco-conical shape a function as bread moulds has also been suggested due to characteristics, such as their rough exterior, smoothed interior and relatively thick walls, considered typical of bread moulds (Hendrickx 1994: 91; cfr. also Wengrow 2006: 87–88, 94). The straw tempered fabric out of which these bowls were made would have been fit for the suggested purpose, since it is recognized as having good heat transfer and thermal shock resistance properties (Friedman 1994: 258–260 and bibliography; Buchez 2004: 22)[19].

C. Vessels mainly used for storage (both long-term and temporary) Fig. 2, 12–14: *pithoi* as well as large jars with a direct rim[20] have been included into this class, mainly based on their morphology, which is suited for holding a variety of contents, as well as their size, which made them too heavy to be moved (cfr.: Rice 1987: 226; Friedman 1994: 244). The lack of a pronounced rim, that would have ensured tight closure, and the relatively wide orifice of the hole mouth jars suggests unsuitability for their use in transport. They are included in this category for this reason.

CD. Vessels used for storage/transportation (Fig. 2, 15–18): small and medium sized jars with modelled, everted or ledge rim, necked jars, as well as bottles[21] might have served well in a storage function[22], since their prominent rims and

[18] It must be noted that bowls might have been used not only for food consumption, but also as lids for large containers.

[19] It is interesting the fact that what appears to be later versions of these bowls, as observed by the writer within pottery from several desert settlement localities at Hierakonpolis, have a higher sand content in their fabric. Sand is known as a high thermal conductor (Friedman 1994: 260) and might potentially support the hypothesis that such vessels were used in connection with food processing with heat.

[20] Pertinent subjective shape classes in the Hierakonpolis system are coded as 2n and 2a (cfr. Friedman 1994). Although here a primary storage function is suggested for these vessels, alternative uses are attested as well: *e.g.* in some specific contexts "*pithoi*" might have been used as vats in which beer was brewed (Friedman 1994: 656–657). Hole mouth jars made of straw tempered Nile silt (1-2a) might have also been used as cooking vessels; cfr. Buchez 2004: 22–24, 41, fig. 6; Friedman personal communication, May 2016.

[21] Cfr. subjective shape classes coded as 2b (cfr. Fig. 2, 15), 2c (cfr. Fig. 2, 16), 2d (cfr. Fig. 2, 17), 2e (cfr. Fig. 2, 18), 2f, 2k in the Hierakonpolis system; cfr. Friedman 1994.

[22] Empirical data on the storage function of at least one type of jar, that is a modelled rim jar with flat base made of straw tempered Nile silt fabric, exists; see: Baba 2009: 7.
On the other hand, it cannot be ruled out that some jars made of straw tempered Nile silt fabric and characterized by a large orifice, slight modelled rim and low shoulder (cfr. subjective shape class 1-2b1 in the Hierakonpolis system) and, presumably, a conical bottom, might have also been used as cooking pots (cfr. Friedman 1994: 531), as suggested by a number of complete jars bearing evidence of soot staining from fire on their external surface, recovered at the Cemetery Hk43 at Hierakonpolis; Friedman personal communication, May 2016.

necks would have facilitated tight closure of their mouth and protection of their contents. Their moderate size would have also allowed them to be moved with relative ease (cfr.: Rice 1987: 226; Friedman 1994: 245).

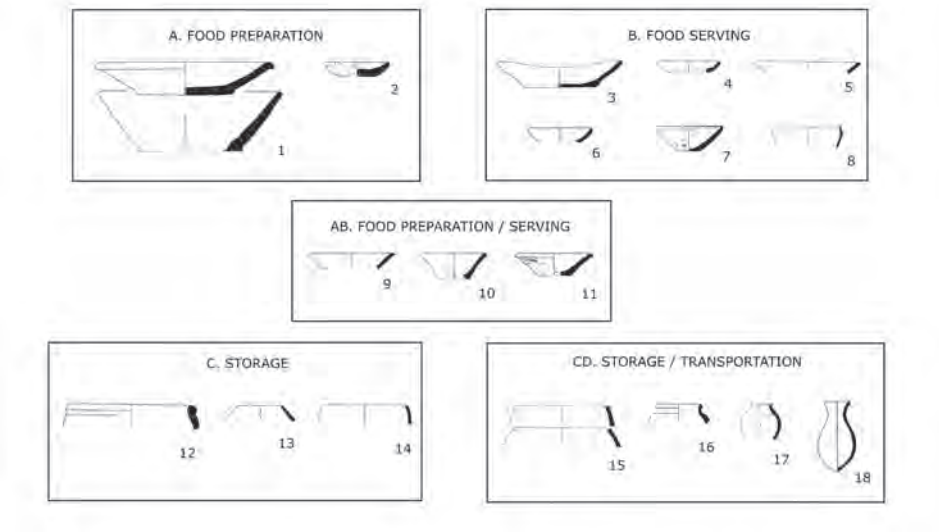

Figure 2. Tentative ceramic functional categories (A-D) and main subjective shape classes (1-18) attributed to them

Legend: 1 = 1-1n; 2 = 1-1o1; 3 = 1-1b5; 4 = 3-1b; 5 = 5-1b2; 6 = 2-1a; 7 = 2-1e; 8 = 5-1e; 9 = 1-1f; 10 = 1-1g; 11 = 1-1h; 12= 1-2n; 13 = 2-2a; 14 = 1-2a; 15 = 1-2b; 16 = 5-2c; 17 = 1-2d; 18 = 1-2e (source of drawings and subjective shapes nomenclature: Friedman 1994: 282–295)

It is clear that the foregoing functional categories remain tentative. The many problems surrounding the determination of the function for archaeological ceramics have already been pointed out in a number of studies. For example, vessels might have had multiple uses at the same time or vessels with specific functions might have been re-used for different purposes (secondary usage), once they were no longer suitable to fulfil their primary capacity (*i.a.* Rice 1987: 209, 210–211, 232–233; Orton and Hughes 2013: 247–248, 258). For the present study, to these limitations and other issues highlighted in the notes (cfr. notes nos. 13, 18, 20, 22) must be added the fact that shape classes have been mainly determined based on fragmentary material.

Despite these difficulties, an attempt has been made to assess the range of human activities conducted within the areas of the sites here considered, as reflected

by the associated ceramic assemblages. In other words, the focus of this investigation has not been to establish the specific use of the individual vessels or shape classes, but rather to try to recover potential functional information from the pottery assemblages considered as a whole (cfr. Orton and Hughes 2013: 246).

1.3. Comparison of ceramic assemblages

The composition of each of the ceramic assemblages selected for this study was compared and, in particular, the proportions of the different functional categories in these assemblages have been compared (cfr. Orton and Hughes 2013: 34). More specifically, according to a method devised by Robert D. Drennan, these proportions have been used as estimates of the population proportions of the corresponding site's sectors from which the pottery has been collected. The estimated population proportions, to which error ranges were attached for different levels of confidence (80%, 95% and 99%), were compared via a graphical technique known as „bullet plots" (Drennan 2009: 181–182, 191; Johnson 2013).

Different scales of spatial resolution were considered for these analyses: what can be defined as a micro-scale, *i.e.* within a single structure (cfr. „*micro level*"; Clarke 1977: 11), a middle scale, within a single settlement (cfr. „*semi-micro level*"; *ibid.*: 11–13) and a macro-scale, involving a comparison between distinct sites in a large region (Upper Egypt). Results of these analyses and tentative interpretation are reported in detail below.

2. Analysis and results

2.1. Intra-site variability at Nekhen

Intra-site investigation for Nekhen was focused on ceramic material[23] retrieved over the floor of one of the structures excavated by Michael A. Hoffman in the square 10N5W (Fig. 1C). Here, beneath remains interpreted as a Protodynastic „shrine", cleared in 1969 (Hoffman 1971–1972: 36–37, 41, 44–45, figs. 8–9), a building consisting of three major rooms was excavated in 1984. Room A is described as a large fenced courtyard. Room B was a small oblong fenced enclo-

[23] The pottery sample taken into consideration includes all rim sherds and vessels with reconstructible profile for which an attribution to one of the subjective shapes as described in the Hierakonpolis system (cfr. previous notes) and to the broad functional categories outlined above was possible.

sure on the western end of Room A and was considered to have functioned as an animal pen (Fig. 3). Room C was a rectangular shed which formed the southern end of the building and was defined by a mudbrick wall on its southern side, while on the north it joined the fenced courtyard (Room A). This complex was labelled collectively as „Structure 84-III". It included a variety of domestic features such as ovens, pot basins and a possible grinding pit. A large number of potsherds and several reconstructable vessels were also found over its floor (Hoffman 1984: 5).

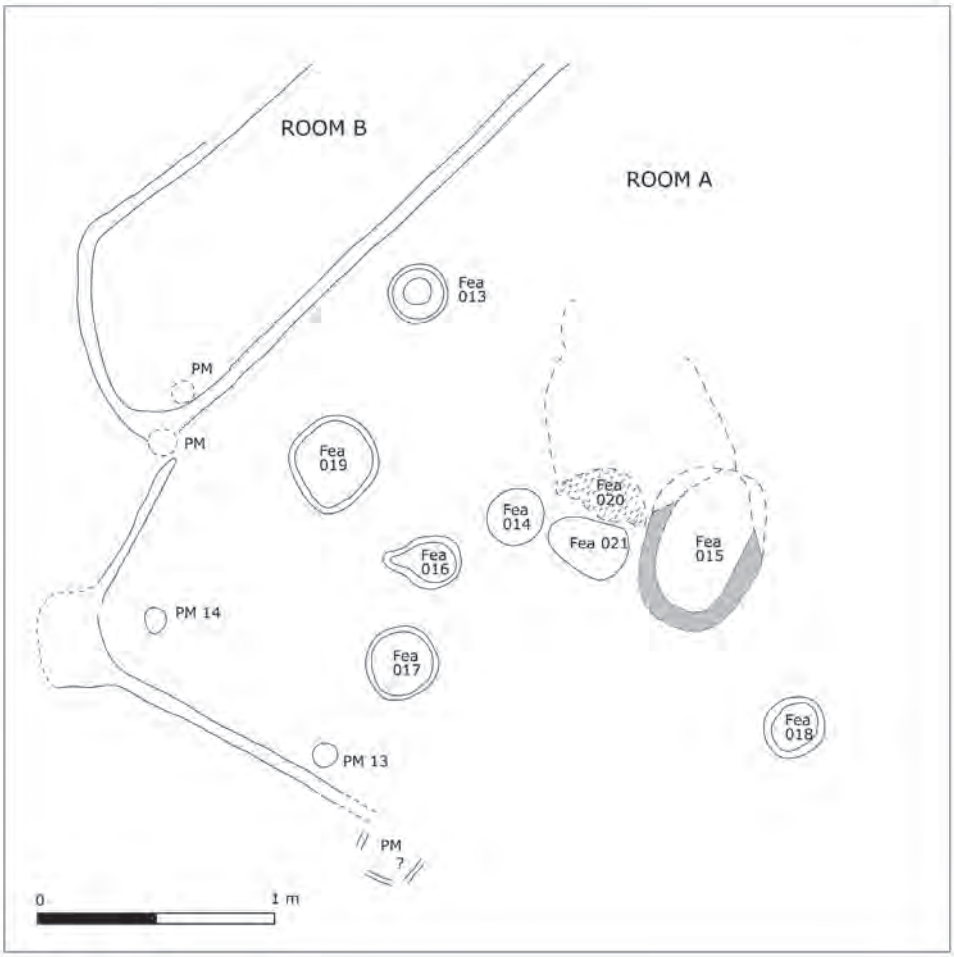

Figure 3. Plan of Structure 84-III (Rooms A and B) at Nekhen, square 10N5W (Courtesy: Hierakonpolis Expedition; digitised by Elli Petrocheilou)

The pottery assemblage associated with this structure[24] can be dated approximately to the Naqada IID2-IIIA1-2 phase. Its composition in terms of fabric and shape classes is quite homogeneous throughout the entire complex, however proportions of some of the functional categories described earlier are somewhat different within the two major parts of the building (Room A and Room C), potentially hinting at a differentiation in the use of space. In particular, in comparison with Room A, the ceramic assemblage of Room C includes a significantly lower proportion of vessels used for food preparation (category A) and a higher proportion of vessels used for serving and storage (categories B and C respectively; see Fig. 4)[25].

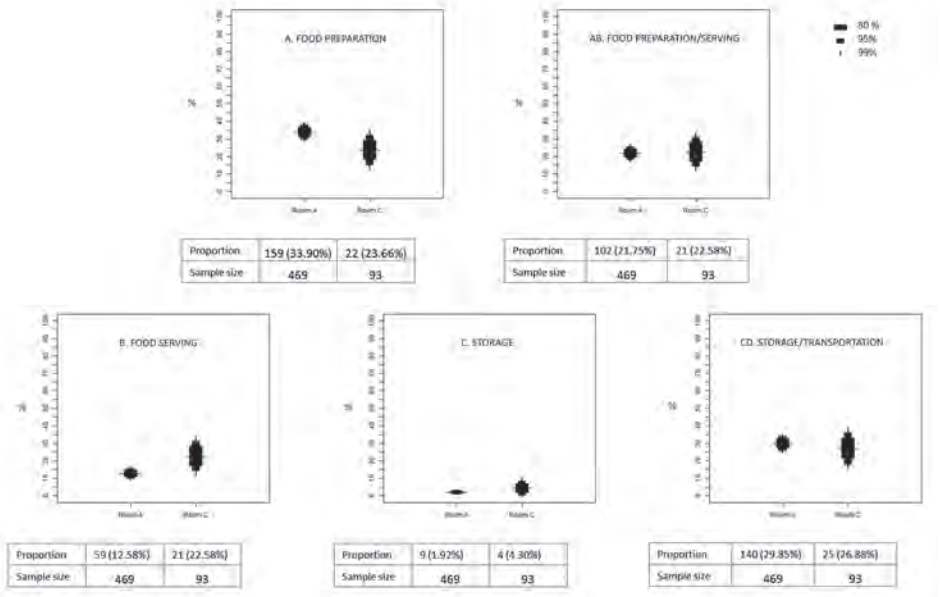

Figure 4. Comparison of the proportions of distinct ceramic functional categories within the pottery assemblage from two rooms of Structure 84-III at Nekhen 10N5W

[24] In particular, the pottery reported to have been collected over the floor within Structure 84-III was considered for the present study (Find units # 153, 156, 173).

[25] Vessels attributed to the other two broad categories AB and CD occur in almost the same proportion in both Room A and Room C.

2.2. Intra-site variability at Zawaydah/Naqada

Similar analyses were conducted for the pottery assemblage from the settlement excavated at Zawaydah/Naqada by the Italian Expedition and, in particular, that from the main trench (ZWE) located in the eastern portion of the terrace[26], south of the area known as Petrie's „*South Town*" (Petrie and Quibell 1896: 50, 54, pls. IA, LXXXV). In this part of the settlement the pottery can be roughly dated within the Naqada IIC-IID and Naqada IIIA phases (Di Pietro 2016), thus it is approximately coeval with the contexts examined at Nekhen. Pottery from four different sectors of the trench ZWE were considered and in particular from the east-central sector, labelled EC, the south-eastern sector (SE), the west-central sector (WC) and the south-western sector (SW) (Fig. 5). The comparability of the ceramic sub-assemblages collected from each area was first assessed (*i.e.* their level of brokenness calculated; cfr. above) and their composition in terms of fa-

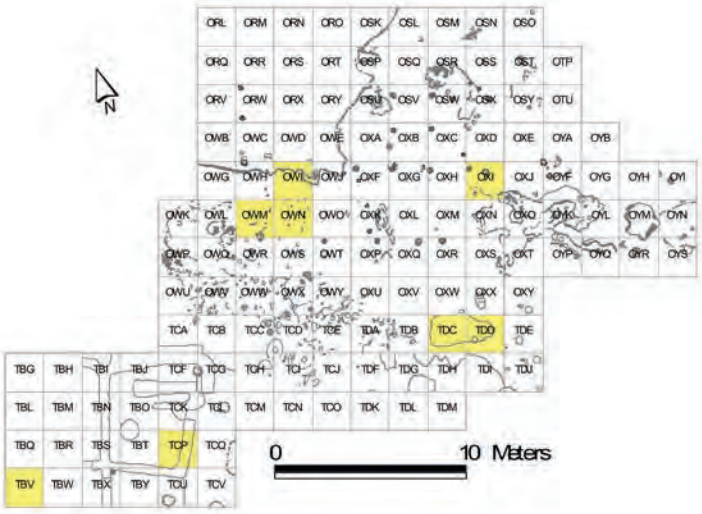

Figure 5. Planimetric map of ZWE. Squares from which the pottery sample considered derives are highlighted by a yellow filling (Courtesy: IUO Italian Archaeological Mission at Zawaydah; digitised by the writer)

Note: east-central sector (= OXI); south-eastern sector (= TDC, TDD); west-central sector (= OWI, OWM, OWN); south-western sector (= TCP, TBV)

[26] By the time of the Italian investigations, the terrace of Zawaydah had been greatly disturbed due to natural and anthropic factors (cfr. Fattovich *et al.* 2007: 47–48). As a result of the site's condition, all of the stratigraphical connections had been lost; nevertheless, it was assumed that the archaeological deposits had maintained the parameters of planimetric distribution (Fattovich *et al.* 2007: 48).

brics, shape classes and functional categories was examined in order to detect any possible significant intra-site variation.

In contrast to what was observed for the pottery from Structure 84-III at Nekhen, at Zawaydah the proportions of the main functional categories are approximately homogeneous in all of the four sectors taken into account. Most of the differences observed fall within the 80% confidence level and therefore are not very significant (see Fig. 6). Only the south-eastern sector stands out for a lower proportion of vessels of categories A and B (5.88% and 14.22% of the assemblage respectively), in comparison to sectors lying in the western portion of ZWE (9.16–10.67% and 17.18–18.86% of their assemblage respectively). A slightly higher proportion of vessels of the category AB is represented both in the east-central and the south-eastern sectors, than in the western part of the site[27]. Pottery belonging to the other two functional categories (C and CD) appears quite homogeneously distributed in all the four sectors of the trench ZWE.

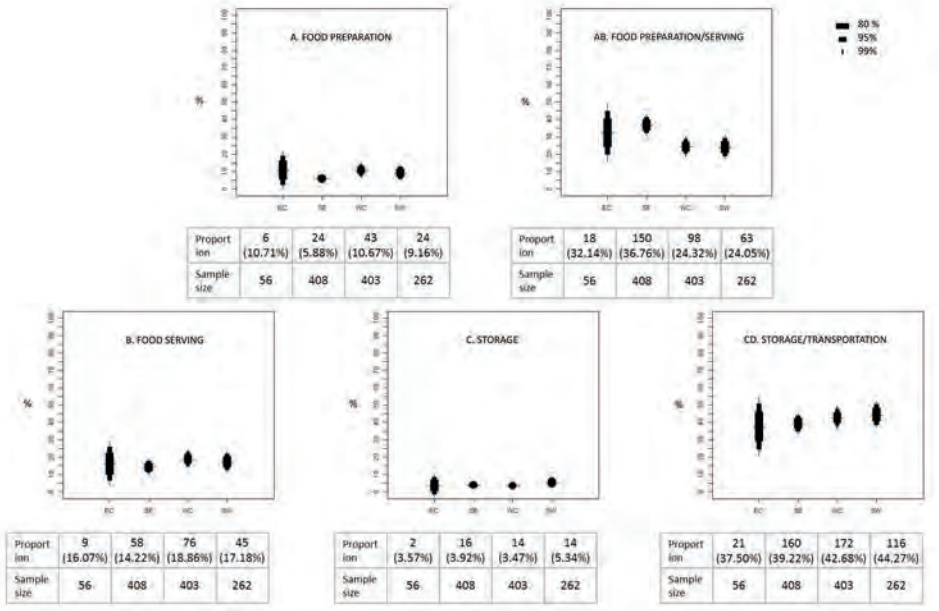

Figure 6. Comparison of the proportions of distinct ceramic functional categories within the pottery assemblage from four sectors at ZWE (Zawaydah/Naqada)

[27] The latter difference might be due to chronological rather than functional reasons since in this category mainly mould made bowls are present (cfr. further below).

2.3. Inter-site variability: Zawaydah/Naqada and Nekhen

The general character of the ceramic assemblage from Zawaydah/Naqada was further scrutinised by means of the same procedure detailed above. A specific research question was whether and to what extent this assemblage could be considered an „ordinary domestic assemblage" or might have had a „special" composition, also due to the fact that other artefactual remains (*e.g.* figurines and other miniatures, seals and clay sealings) found at the site of Naqada suggest that particular activities, administrative and ritual/ceremonial in nature, were taking place in the Late Predynastic period at the site (Di Pietro 2017). The pottery from Nekhen Structure 84-III, being nearly contemporaneous with the Naqada assemblage and deriving from a context of domestic nature, provided an ideal chance for comparison and contrast, by which the nature of the assemblage from Naqada could be assessed.

When comparing the entire ceramic assemblage of the trench ZWE at Naqada with the ceramic material from the domestic building 84-III at Nekhen, an interesting diversity in terms of the proportions of functional categories emerges (see Fig. 7). The greatest difference between the two assemblages is in the proportion of vessels used for food preparation (category A), which is considerably higher in Structure 84-III (32.21% of the total assemblage), than at ZWE (8.59%). The other marked difference is the higher proportion of vessels of the category CD (storage/transportation) at ZWE, where they account for 41.54% of the total assemblage, in contrast to 29.36% in Structure 84-III. This difference might suggest a larger circulation of „goods" at ZWE, in comparison to a „domestic" context such as the one reflected by the assemblage of Structure 84-III. Finally, the assemblage at ZWE is characterized by a significantly higher proportion of vessels assigned to the broad category AB („preparation/serving vessels"; 29.14% of the total assemblage), than the Structure 84-III assemblage (21.89%).

3. Discussion

The analyses conducted on pottery assemblages from two discrete settlement contexts of Late Predynastic-Protodynastic age and sub-assemblages within them, based on the comparison of proportions of distinct functional categories, let to discern potentially significant functional variability both at level of a single site and between sites.

As for Nekhen, the ceramic evidence related to Structure 84-III might suggest a diversification of spaces within this building and, in particular, a division

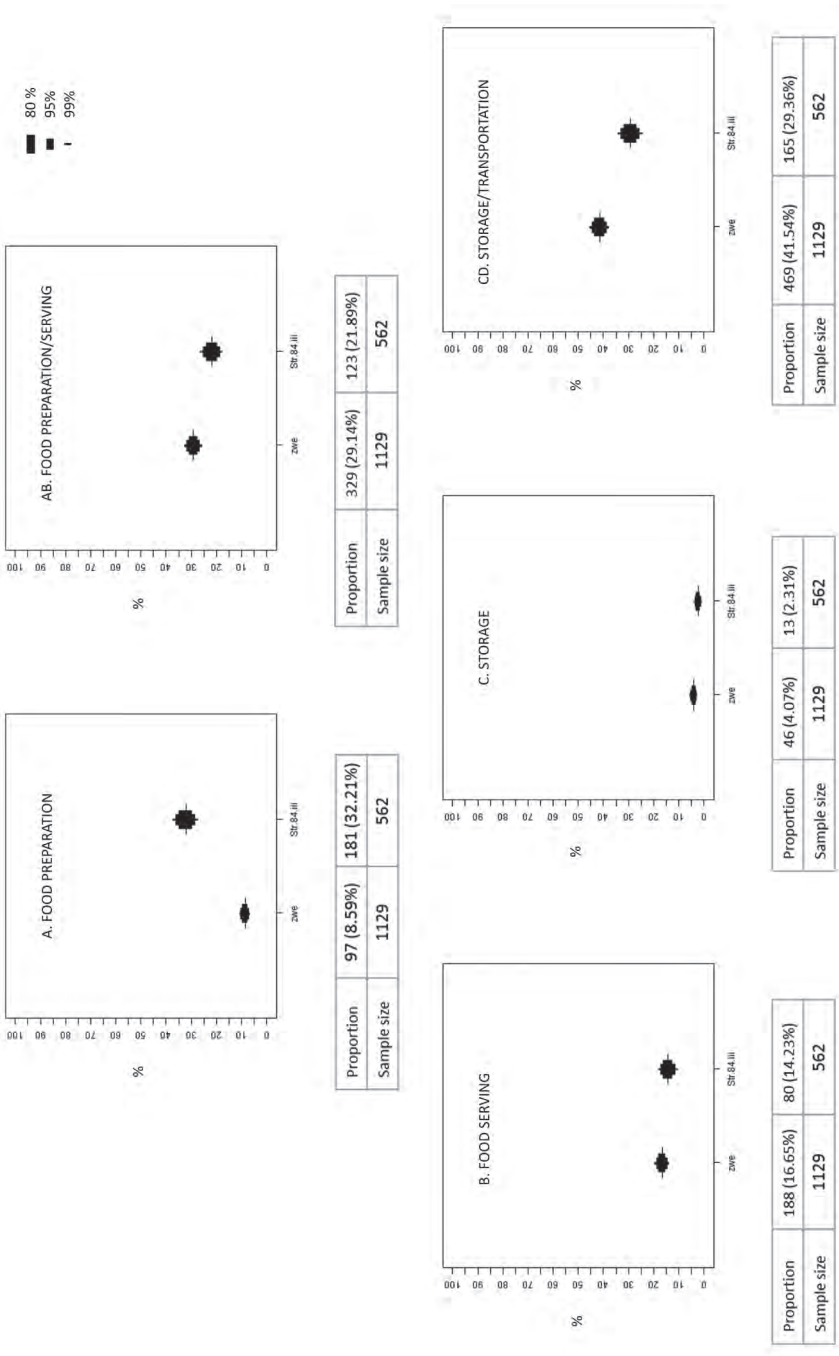

Figure 7. Comparison of the proportions of distinct ceramic functional categories within the pottery assemblage from ZWE (Zawaydah/Naqada) and Structure 84-III at Nekhen

into two major parts: one primarily designed for food preparation (Room A) and another where mainly activities connected with storage (and serving?) occurred (Room C)[28]. The architectural features of these two rooms would potentially fit the suggested functions: the former, being identified as an open area (a courtyard delimited by a shallow trench, which presumably once held a fence of organic materials), might have been suited for activities linked to food processing, especially with heat. While Room C, being partially defined by a more permanent architecture (a mudbrick wall on its southern end), might have served well a storage function or might have been a sort of utility-room for keeping vessels used in other areas. The suggested relationship between architecture and use of space requires further testing by means of a larger investigation. Furthermore, it cannot be excluded that other processes (*e.g.* refuse disposal patterns; cfr. Schiffer 1996: 281) might have produced the observed differences in pottery distribution.

At Zawaydah/Naqada, the lack of pronounced differences in the proportions of the various ceramic functional categories in the different areas of the trench ZWE might suggest that although a range of activities involving the use of different types of pottery were being conducted at the site, none of them were clustered in any particular location. The possibility that disturbance might have blurred activity areas at the site must be also taken into account. However, the pattern of small finds indicates that the archaeological deposit at Zawaydah maintained the parameters of planimetric distribution to a certain degree, that is the archaeological materials did not move too far from the place where they were originally used and/or discarded (Di Pietro 2017).

Although the ceramic analyses did not provide any clear indication of intra-site functional variation within ZWE, the same type of approach on a larger scale proved useful in elucidating the character of the Naqada ceramic assemblage as a whole in comparison with coeval assemblages, such as the one from Nekhen Structure 84-III[29]. In contrast to the latter, the composition of the pottery assemblage at Zawaydah suggests lower levels of food production, especially that involving the use of rough and shallow platters (included in the functional category A;

[28] The interpretation of Room B as an animal pen was suggested by M. A. Hoffman and was based on other sets of criteria (presumably faunal material and dung remains found at this spot).

[29] Besides the ceramic assemblage from Nekhen Structure 84-III, assemblages from other settlement localities at Hierakonpolis (*e.g.* Hk25, Hk29A) have also been compared with the assemblage from Naqada. This larger investigation reveals further differences in the composition of the examined assemblages, which deserve separate discussion for the complexity of the subject.

cfr. above) and a higher level of goods movement by means of middle / small sized jars (included in the category CD).

The third major element that distinguishes the composition of the ceramic assemblages under study, that is the functional category AB which occurs in higher frequency at ZWE, deserves further discussion. At both ZWE and within Structure 84-III the major component of the category AB consists of a particular type of tronco-conical bowls made of straw tempered Nile silt fabric[30], for which a function as „bread moulds" is suggested by some scholars (cfr. above). This specific shape class is also characterized by a relatively standardized size[31] and an untreated exterior surface bearing straw impressions, which suggest a manufacture by means of a straw filled mold[32]. This type of pottery has an intriguing similarity[33] with what are known as „*bevelled-rim bowls*", which are found in several administrative and temple contexts in Mesopotamia and surrounding regions (Middle-Late Uruk, *c*. IV mill. BC) and are supposed to have been employed to distribute alimentary rations, meals or bread to workers dependent on a centralized institution (Goulder 2010: 355 with references). It is also remarkable that the context of recovery of this type of vessels at the Naqada settlement parallels one of the commonest location where bevelled rim bowls are found in the Near East,

[30] Cfr: subjective shape classes coded as 1-1b6, 1-1f (Fig. 2, 9), 1-1g (Fig. 2, 10), 1-1h (Fig. 2, 11) in the Hierakonpolis system; Friedman 1994.

[31] The mean values of rim diameter and height of these bowls range between 12.5 x 5.5 cm, calculated for the assemblage of ZWE, and 15 x 6 cm, calculated for the assemblage of Structure 84-III.
An attempt has been done to assess the variability of the rim diameter (the only measurement variable that could be recorded consistently across the ceramic assemblages examined) of different categories of vessels by means of the "coefficient of variation" (see: Orton and Hughes 2013: 147-148). Rim diameters of the bowls under discussion resulted to have a lower coefficient of variation (*i.e.* to be more standardised), than rim diameters of other categories of vessels in the assemblages under study.

[32] The shape of the rim of these bowls can be direct, slight everted, modelled or ledge.

[33] Besides the analogous type of manufacture by the means of a mould, some other features which are common to both the bowls under discussion and the so called "*bevelled-rim bowls*" are: a heavy organic tempered fabric, straight sides and flat base, relatively thick walls, crinkled exterior vs. smooth interior surface (cfr.: Goulder 2010: 354, table 2). As far as the size is concerned, a close comparison between the Predynastic rough mould made bowls and the bevelled-rim bowls is arduous due to the very few vessels with reconstructible profile available in our sample and, on the other hand, the high variability of the bevelled-rim bowls size (Goulder 2010: 355 and bibliography). In general, if we consider only the measurements of the large corpus of bevelled-rim bowls from Susa and Khuzistan, published by Gregory A. Johnson in 1973 (Johnson 1973: 189-195), one could suggest tentatively that the Predynastic mould made bowls fall in the lower end of the bevelled-rim bowls' size range.

i.e. administrative buildings (Goulder 2010: 356, table 3, 359): according to the evidence provided by the small finds, at ZWE a sort of administrative-ritual/ceremonial complex might have stood (Di Pietro 2017). Based on these analogies and the different composition with respect to other coeval and functionally different contexts (cfr. above: Structure 84-III), the hypothesis that the Naqada assemblage could reflect to some degree administrative activities performed at the site, with the very high proportion of mould-made vessels potentially related to some kind of re-distribution (of local resources in form of meals?), is here suggested[34].

However, the possibility that also other factors (*e.g.* chronology, amongst others[35]) might have contributed to the distinctive composition of the ceramic assemblage at Naqada cannot be completely discarded. In particular, certain types of pottery, including the aforementioned mould made bowls, tend to increase in frequency over time, as part of general developments of pottery production during the Late Predynastic – Protodynastic period (cfr. Di Pietro 2012: 13).

Conclusion

The study presented here, based on archaeological pottery assemblages of coeval or nearly coeval contexts and analyses of their composition by means of quantitative methods, has allowed to identify subtle and potentially significant variation at intra- and inter-site level in two major settlements of the Late Predynastic – Protodynastic phase. These are suggested to elucidate the use of space across a site, at least at a micro-scale level (cfr. Structure 84-III at Nekhen), and inter-site differentiation and to be relevant for improving our knowledge of societal organisation in the period under study.

On the other hand, it is acknowledged that in order to further advance our understanding of functional variability of settlements, in Egypt as well as in other regions, the use of more sophisticated analytical techniques (*e.g.* analyses of artefacts and ecofacts integrated by chemical analyses of soil matrices; cfr. Wilson *et al.* 2008) are required. Visible and invisible residue analyses or systematic use-wear studies (Skibo 2013; Rice 2015: 425–431 with references) are also desirable

[34] This suggestion does not exclude the possibility that in other contexts the same type of bowls might have served other functions.

[35] Factors affecting variability of archaeological ceramic assemblages are reviewed in Rice 1987: 300–301; 2015: 218–219. Cfr. also Orton and Hughes 2013: 264.

to elucidate pottery function at the level of the individual vessel. Pottery can then provide more valuable information about the function of the site or part of the site where it has been retrieved (Orton and Hughes 2013: 246–259). Finally, besides considerations of use and activity, variability and diversity of archaeological pottery (or, more in general, artefact) assemblages should be further assessed in relation to other factors, such as socio-economic status of a site, specialisation of craft production, environmental features (cfr. Rice 1987: 300–301; 2015: 218–219) and variation thereof over the course of time.

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