From Knobbly Bits to Whole Vessels – Information Gleaned from Pottery from Large Disturbed Contexts

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Pottery represents the largest find group in almost all excavations in Egypt. Whilst not every context type can, or should, be treated in the same way, each of these provides data and insights into the history of the site under scrutiny. Besides dating, typology and functional issues can also be highlighted as well as raw material distribution, history of technology and units of measurement.

Even very broken material in surface contexts informs us about the periods in which activities took place, because the general sequence of pottery development is well researched, so that, at the very least, a general date can usually be proposed. This is not to say that no more progress and refinement can be achieved or that new research is superfluous in the light of advances in research method and technology. The practice of dating by parallels from other sites is to a certain extent problematic especially in transitional periods because an absolutely uniform time horizon for certain pottery types seems to be the exception rather than the rule as well as total conformity in technology as well as in typology across Egypt and Nubia.

Methodology in processing, data collection and ways to tease out information from the smallest pieces of pottery including material from drill cores is also discussed. Last but not least the controversial topic of discarding ceramic material will also be debated.

1 Introduction

The purpose of this article is to draw attention to the type of information and data inherent in pottery finds from large and disturbed contexts and how to unlock it for the benefit of the archaeological interpretation of a site.[1] The strategy to be chosen and followed depends, of course, on the type of the site, the amount of material recovered and the financial means and team power of the project to collect, process, record and interpret pottery data. It must be made clear in this instance that a good result can only be obtained

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1 At this point I would like to thank Andrea Kilian and Monika Zöller-Engelhardt for their initiative and the organisation of the inspirational workshop "Excavating the Extra-Ordinary" at Mainz. My thanks go to D. Aston for correcting my English. All remaining mistakes are my own.

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with full support for the ceramicist as the process of collecting the data is not particularly complicated but is time consuming and therefore a major financial factor. It must also be stressed here, that current developments to officially forbid the storage and safekeeping of pottery in safe places in Egypt jeopardise the best possible collection of data and as a knock-on effect the knowledge to be gained from this immensely important source. This political move even threatens material from secure contexts, which is so rare and so valuable for Egyptian Archaeology. Without this input of data, we might as well stop research, because if the most ubiquitous source type is missing any result gained by archaeology will be compromised. Therefore, this article should also serve as an appeal to stop this development because we will lose the backbone of archaeology – the pottery as well as other broken finds as a vital source. This would definitely throw us back to procedures common at the beginning of the 19th century AD, when archaeology in Egypt was all about colonial hunting for treasures for museums in the west.

It is not the intention to duplicate previous work on functional aspects of pottery[2] or quantification[3] but to give a brief overview of the types of data elucidating ancient activities[4] at any given site from large and disturbed contexts that may otherwise remain invisible and lost to research. The simple reason is that human activities in ancient times are very often carried out in connection with pottery. Turned on its head this means, where ancient pottery was found, there is a high probability that human activities had taken place. This fact is relevant not only for large surface contexts but also for the microcosm of material recovered from augering (see below).

2 Types of information to be gained – general benefit

The evidence from pottery collected from large and most probably disturbed surface contexts can be summarised as follows. The scrutiny of **all** sherds found provides hard data on the variety of pottery fabrics having been used at the site, as well as on surface treatments, and manufacturing technologies. Already at this stage of excavation some conclusions about a rough estimate of use periods can be undertaken, which may prove essential for further planning of excavation – e.g. concentrations of sherds of uniform date as focus for intended future work. It is immediately roughly apparent which periods occur because the pottery develops sufficiently to divide the ceramic material even from the surface: the Pre-dynastic-Early Dynastic, Old Kingdom, Middle Kingdom, New Kingdom, Late Period to Ptolemaic, Roman and Late Roman to Islamic and this knowledge is widely distributed among scholars and ceramic specialists. Depending on the nature of the site it may be necessary to wash the ceramic material - with utmost care and scrutiny - to see if dockets or ostraca are present. Most likely the pottery from the surface is broken (although that is not always the case), but even the smallest sherd of a Late Roman Amphora 7[5] vessel is recognisable as well as that of a Meidum bowl[6] or an Old Kingdom 'beer jar'[7].

Beside the use of surface finds to roughly date the activity periods at the site[8] at least in the beginning of the archaeological work, the occurrence of certain fabrics – especially Marl clay

2 Bader 2013: see also for bibliography.

3 Bader/Kunst/Thanheiser 2008; Bader 2010; see also for general bibliography: Bader 2016.

4 Some of the points are mentioned in Bader 2017.

5 E.g. Peacock/Williams 1986: 204–205; Pyke 2005 with references.

6 Op de Beeck 2000 with references.

7 E.g. Rzeuska 2011 with references.

8 That such an endeavour is entirely possible and feasible has been shown by Rzeuska 2017, who used a large body of uncontexted material that was not too fragmented. See also Bader 2019 for a review.

fabrics – should be noted in order to produce a dense distribution network of raw materials. While for Nile clay fabrics such an approach is more problematic without scientific testing, because macroscopically the petrofabrics often look very similar to the unaided eye or under 10 x magnification, the Marl clay fabrics provide a better chance of identification by means of using macroscopic methods (although, obviously, scientific testing would be an asset[9]). In this way it is possible to draw distribution maps of raw materials and to better understand the production and transportation modes of marl clay pottery as well as distribution of vessels made of certain materials. In this question, quantification is of more importance due to the thought that any given raw material is most frequent close to the site where it had been produced.[10] Whether surface pottery should also be quantified depends very much on the specific nature of the site[11] and most definitely needs the keen support for the ceramicist by the excavating team. However, the disturbed nature of the material needs to be made clear and consequently the limitations of the validity of any results for the interpretation of the site. In general, quantification serves to answer the question how many? in any type of context. As one example I can quote the situation to the north of the Temple of Millions of Years of Thutmosis III in Qurna, where depositions of tons and tons of pottery were found. Initially, it was not clear whether this was a modern deposit, or an ancient one and it turned out that at least in some stretches the deposit had been initiated in antiquity with exclusively contemporary or roughly contemporary material.[12] The predominance of Holthoer's BB jars[13] led to the development of a specific recording form (Fig. 1), which was entirely devoted to cope with the immense frequency of this vessel type and get some analytical results from this deposit in a reasonable way. The result of this scrutiny is a robust data set of the frequency of occurrence of fabrics, base diameters, the frequency distributions of the various base types as well as the presence of pierced bases in this material. The other example comprises shaft fills from Deir el-Bersha, which were quantified although it was known that they were disturbed from antiquity up to the very recent past. The task was to have a means to compare the character of different shafts quite beyond the fact that they were severely disturbed. The results show that each of these shafts has a different set of characteristics, which opens up possibilities for interpretations.

The variety of pottery types and shapes can best be tackled by dividing the diagnostic pottery fragments from the less diagnostic body sherds if there are no joins to be found: here the rims, bases and handles have predominance, but also painted, incised and otherwise remarkable fragments should be collected and studied. From this body of material a preliminary typology of vessel types occurring can be arranged to be used as an open type corpus after Petrie's practice[14] to which more shapes and rim and base variants can be added as the work progresses and thus a useful catalogue of pottery vessels and parts thereof can

9 Considering the cost of such scientific analyses as well as the difficulties met to try and do so in the modern Egyptian context, it would be advisable to use such methods rather for well contexted material with a recognisable shape. This would serve to connect certain fabrics with certain shapes rather than testing only more ambiguous surface sherds. The strategy depends on the circumstances of the site.

10 See for example Arnold 1981.

11 Op de Beeck 2006 for an example of quantification of a spoil heap, where such a study was usefully applied.

12 Bader/Seco Álvarez 2016: 247–249, 253–256. This circumstance could be tested by means of a small trench (1.0 m by 1.0 m), from which all ceramic fragments were collected and recorded.

13 Holthoer 1977: 86–88, fig. 18.

14 E.g. Petrie 1921; Petrie/Brunton 1924.

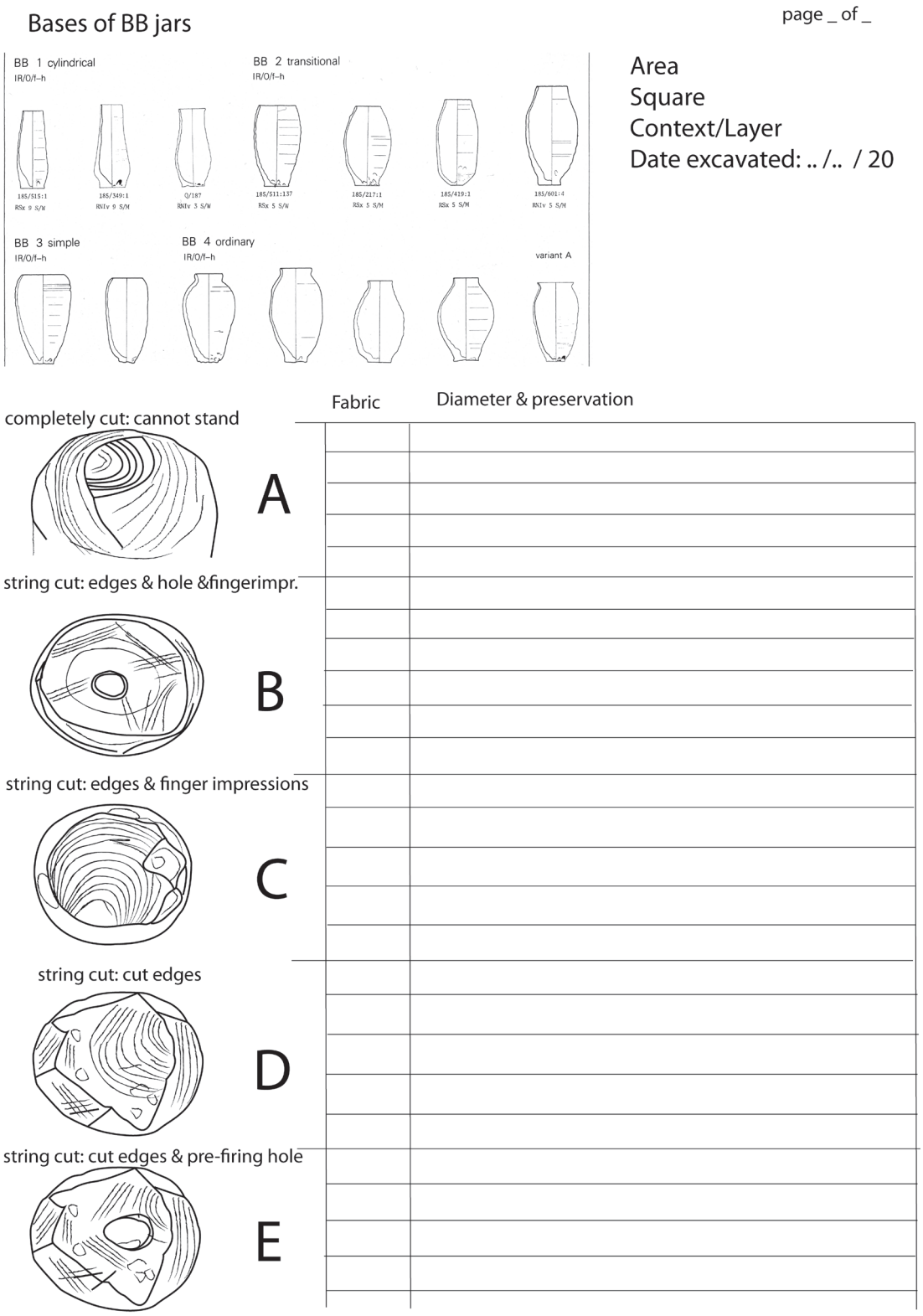

Fig. 1: Recording sheet designed for the recording of Holthoer's type BB.

be produced for immediate reference and later publication. While most likely the type corpus from surface layers consists of fragmented material and is therefore of a certain ambiguity, it is of vital importance to know which shapes are present in the material to allow a judgement of function of the site. For frequently appearing pottery types the introduction of special recording forms may be viable, especially if the degree and date of disturbance of the context is not clear. The benefit of creating a typology connects again with a more secure means of general dating, because the pottery types can be better defined and also paralleled at other sites. For dangers of exclusively relying on dating by external parallels see below. Moreover, the typology provides evidence for the activities conducted at, and functions of, the site (open and fine table wares – consumption of food; closed, large vessels for storage; pottery used for cooking; bread moulds for a bakery; even very specific insights such as e.g. vessels for animal mummies or the ubiquitous Late Antique 'pigeon pots', etc. to name but a few[15]). The distinction of size classes in pottery provides information on measurement systems as certain sizes might be related to inherent systems of units about which other sources do not come forward.

The scrutiny of the manufacturing technology in the widest sense (including *chaîne opératoire*[16]) gives clues on the history of technology on a general level and the organization of pottery production (mass production versus small scale individual production) on a more specific level. For example the presence of 'touching stains' on pottery in regular places proves the firing in a kiln situation in larger batches (Fig. 2). In general, the technological sophistication used for pottery production is also a splendid marker for dating the material, especially in the earlier periods of Egyptian history, such as the Predynastic up to the New Kingdom.[17] This does not mean, of course, that early pottery cannot be made to a very high level of quality. Some technologies, on the other hand, can with certainty be dated to later periods, such as material with diagnostic narrow ribbing, which is derived from using a fast wheel.

Fig. 2: Kiln stain on a vessel from the Egyptian Museum Berlin ÄM 18718 (© Courtesy of the Egyptian Museum Berlin, photo: C. Knoblauch).

15 See for more detail on this question Bader 2013; Sullivan 2013: 113–137 with references.

16 Leroi-Gourhan 1993; De Vreeze 2016.

17 Bourriau 2006.

While scientific analyses,[18] such as chemical analysis, petrography, pigment analysis, residue analysis and x-ray technologies used for the study of provenience, surface treatment and contents analysis of pottery might be applied to material from closed contexts, it is usually not considered viable for finds from the surface due to high costs. Exceptions may be made for particularly unusual vessels/vessel fragments. Also x-ray technologies e.g. x-radiography and Computer Tomography (visibility of technological details) may be used for exceptional material to add knowledge.

While much information can still be collected even if the 'context' is as vague as 'disturbed surface' (Fig. 9) such as the nature of activities (filling up to raise levels, depositions of waste, cooking, cultic activities) and certain functions (storage, dining, cooking, offering, cultic activities, etc.), a clear statement of the duration of activities in certain places and specific locations may not be possible or is at least compromised.

The study of re-used and worked pottery fragments should not be neglected, as this re-cycling habit – a very ancient social practice currently particularly relevant – is still not very well understood, because the tools and objects made from disused pottery are either not usually collected and studied in their own right for recording and publication or they are already separated from the contexts they were found in so that this aspect of pottery tools is not obvious to the ceramicist.[19] These finds provide vital clues for the social practice in ancient times, which will continue to be missing if research ignores them.

Finally, the distribution patterns of pottery, even when it is broken, provides clues on post-depositional processes such as frequent movement either by human or natural agency. Especially the detection of cross joins between contexts elucidates the connection between assemblages that are conceived as contexts but might have been mixed more frequently than it appears during the actual excavation.

The interpretation of all of this data feeds into the dating of the pottery within the periodization of Egyptian history from the Pre-dynastic to the Late Antique Period and up to modern times. It is a commonplace to state that pottery changes over time in a number of characteristics, by which it can be identified and compared with other sites and dated accordingly. However, awareness should be raised that searching for external parallels and dating the pottery of one site exclusively by parallels from others leads inevitably to circular arguments. Thus, in a best case scenario the information from large disturbed contexts is there to be used additionally to the contexted material and not on its own. One could say the scrutiny of large surface layers gives a précis of activity periods and the nature of activities conducted before proper excavation proceeds although in some cases it might provide all data available (e.g. when sites are destroyed).

2.1 What and how to record? Data collection – a personal view

The following is a sketch of the kind of data routinely collected and the kind of results expected. Of course, there are other ways of analysing ceramic material, and often time constraints are such, that not all of these areas can be covered.[20] Nevertheless, it is hoped that the examples given below serve to demonstrate the immense possi-

18 The following references are only intended to give a start and are not thought to list all possibilities available: Bader 2017; Ownby 2011; Ownby 2016; Tschegg/Hein/Ntaflos 2008.

19 One notable exception Raedler 2007 for scrapers. Often material has been collected but never published, e.g. in the settlement finds from a late Middle Kingdom settlement at Tell el-Dabᶜa. Cf. Bader in preparation.

20 Arnold 1985; Sinopoli 1991; Rice 1987; Orton/Tyers/Vince 1993; Orton/Hughes 2013.

bilities inherent in pottery as source material, rather than to view it as a nuisance that has to be dealt with as quickly as possible and can then be safely discarded in a deep dark hole never to be seen again. Not only does that defeat the scientific requirement to make results reproducible, but also other ceramicists and other scholars will not be able to study pottery corpora from specific periods and sites: a tragic loss of the opportunity to build up site specific study collections for teaching and research purposes. Moreover, if the material is dumped in its entirety there is no way to be able to fulfil scientific demands of reproducibility and repeatability of results, which compromises not only specific results but the whole field of Egyptian archaeology.

2.1.1 Fabric

The single most important descriptive property of fired pottery is the raw material: the fabric or as it is called in petrography, petrofabric.[21] In the current understanding this consists of the raw material and any natural or artificially added inclusion with the characteristics acquired during the process of firing, such as colour, hardness and porosity.[22] The best known fabric classification system in Egypt is the so-called Vienna System.[23] It has to be stressed that this classification system was agreed upon as a reference system for comparative purposes rather than as a fabric classification system in its own right to be used at every site regardless of the historical period(s) occurring at Egyptian sites. This is simply not what the Vienna System was set up for. Thus, every site and period needs their own fabric classification system, even more so as for example the predynastic period[24] is quite different in terms of raw material from the classic pharaonic period[25] and Late Antiquity.[26] Also there may be regional variations that are otherwise lost, if immediately the Vienna System is used instead of a local, site specific fabric classification system, which is specifically adapted to the site under study and later given as correspondence to the Vienna System.[27] Moreover, different periods see the advent of different fabrics, and this is particularly obvious with Egyptian Marl clay fabrics. Scholars have noted that the Vienna system does not work for them, but it was never thought to be universal for all periods and sites.[28]

Continuously collected evidence on the marl clay fabric 'Marl C' as classified by the Vienna System[29] shows that the distribution of vessels made of certain fabrics within Egypt and also outside of it gets better known and allows glimpses on commodity exchange patterns, which are otherwise very remotely known and only for very restricted periods. Since the last comprehensive distribution study the material was also identified[30] in Egypt at Tell el-Retaba,[31]

21 Köhler/Ownby in press.

22 Nordström/Bourriau 1993: 40.

23 Nordström/Bourriau 1993; Bader 2001; Bader/Knoblauch/Köhler 2016; Bourriau/Bellido et al. 2006; Bietak 1991b: 317–333.

24 Köhler 1998; Köhler/Ownby in press.

25 For the New Kingdom also other fabric classification systems exist: Bourriau/Aston 1985; Bourriau/Nicholson 1992; Bourriau/Smith/Nicholson 2000.

26 Bader/Knoblauch/Köhler 2016; Köhler 1998; Gates-Foster 2012; Pyke/Ownby 2016.

27 Bourriau/Gallorini 2016: 22–37; Budka 2017: 120–126 as example.

28 Nordström/Bourriau 1993; Bader/Knoblauch/Köhler 2016.

29 Nordström/Bourriau 1993: 179–180; Bader 2001; Bader 2002; Bader 2009: 646–652.

30 Unfortunately, at many sites only a macroscopic identification could be done, as petrography and other analyses were not possible. It is hoped that these analyses proving or disproving the presence of that fabric at these sites can be conducted soon.

31 Seen at a site visit in 2019. Rzepka/Hudec et al. 2014: 97–98.

Sedment,[32] Kom el-Hisn,[33] Abu Ghalib,[34] Heliopolis,[35] Deir el-Bersha,[36] Asyut,[37] Qau el-Kebir,[38] Western Thebes,[39] Hierakonpolis,[40] Edfu,[41] and Elephantine[42]. In Nubia it has been reported at Toshke,[43] Gebel el-Asr,[44] Debeira East,[45] Uronarti,[46] and Kerma[47] as well as in the Levant.[48] The vessel types found belong to the pottery repertoire of the Middle Kingdom and the Second Intermediate Period. Although the distribution pattern of that material was already known along these lines, the additional data show that the material was in much wider use than hitherto acknowledged. The importance of this data for the economic history goes well beyond the scope of this short article but renewed scientific analyses should be undertaken to scrutinise whether the oft repeated dogma of the exclusively northern origin of Marl C in the Memphis-Fayoum region is actually tenable.[49] The many visual varieties of the fabric group observed over the years in terms of colours, firing variants and spread of inclusions as well as the long use period (Old Kingdom to beginning of New Kingdom) might suggest a series of workshops rather than a single one (or a group of workshops spatially close together) but only more petrographic as well as chemical analyses can clarify this question as well as the discovery of a kiln site.

The way to set up a fabric classification system is to begin observing fabrics macroscopically by means of simple stereoscopes with a magnification of up to 30 times and keeping a standard sample collection for continued visual comparison, which may be developed over time and ideally submitted for scientific analysis as soon as viable to check whether the visual division is congruent with the petrographic result. The most obvious divisions to start with in Egypt are alluvial clay fabrics, marl clay fabrics, imported fabrics (Levant, Cyprus, Nubia) and others that do not fit into these categories, for example mixed clays which are problematic to identify in any period.[50]

It is worth thinking about possible divisions the ancient potters might have made as the modern classification exclusively helps the modern ceramicist to categorise ancient but human made relics rather than a natural taxonomy as for example for animal bones. Because it is a human product there is no 'natural evolution' as in any biological remains. Observation of the same vessel types made of fabrics that the ceramicist divides but not the ancient potter might reveal hidden connections and social processes.

32 Identified among the material excavated by Brunton and Petrie during 1920/21 in the Royal Museum of Art and History, Brussels, with many thanks to L. Delvaux and I. Thalasse.

33 Wodzinska in Wenke/Redding/Cagle 2016: 297.

34 Bagh 2012: 29.

35 Ahmed Mahmud/Faris et al. 2008: 195–196, 204.

36 Willems/De Meyer et al. 2004: 253 and multiple incidents seen personally since 2013.

37 Rzeuska 2017: 438–439.

38 Visually identified by Bader among surface debris during a site visit in 2013.

39 Seiler 2012: Fig. 4, 7. Visually identified by Bader among surface material cf. Bader/Seco Álvarez 2016: 161, 222, 224.

40 Giuliani 2004.

41 Ayers 2018: 65.

42 Personal involvement in the Elephantine project (with the *Swiss Institute for Architectural and Archaeological Research on Ancient Egypt, Cairo*) since 2017 in addition to Von Pilgrim 1996.

43 Bader 2006 among ceramic material excavated by Junker.

44 Shaw/Bloxam et al. 2001.

45 Personal communication 2019, A. de Souza.

46 Personal communication 2013, C. Knoblauch.

47 Bourriau 2004: 8–12.

48 See Bader 2015 for the collected evidence with detailed references.

49 See also Bader 2019.

50 Rzeuska 2006: 522–536.

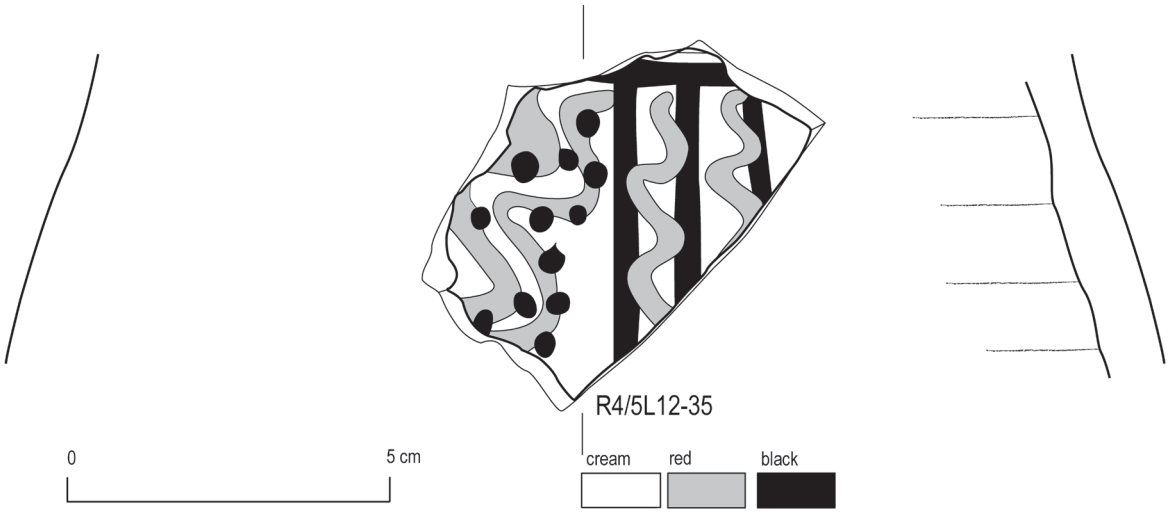

Fig. 3: Drawing of a painted sherd (after Bader/Seco Alvarez 2018: Fig. 48e).

2.1.2 Surface treatment and decoration

The definition of 'surface treatment' includes any steps after the manufacturing process proper with the aim to reduce porousness and to enhance the finished product, i.e. to remove (some of) the traces of the manufacturing process or to decorate the vessel to make it look more appealing to presumptive customers.[51] Sometimes it is not easy to decide whether appearances of vessels are intentionally produced or if they are brought about by firing.[52] Just as an example the white surface of some marl clay vessels may be mentioned, which had previously been described as a 'white coating' of some sort or a 'self-slip' before it could be proved that this effect is often brought about by chemical reactions during the drying and/or firing process.[53] It is also not easy to know whether a vessel had been wet-smoothed or wet-finished after the manufacturing process, because the wet smoothing might just have been a final brush over of the vessel with the wet hands of the potter as the same material is used as for the body of vessel. The term self-slip is avoided here for wet-smoothing as this is often defined very vaguely and used for widely different features.[54]

However, the classification of the surface treatment allows an opinion on the quality of the vessel under scrutiny and the effort expenditure afforded for each single item. Moreover, certain surface treatments and decoration types such as incised pattern or painting are more common in certain periods and thus, corroborate or refute an opinion about dating, e.g. blue painted pottery or decoration of pottery with black bands around the rim of vessels, most often on a dark red overall slip and many more. It seems superfluous to list all possible surface treatments and decoration types[55] especially as they change over time but I would like to focus on painting of vessels. Especially in the New Kingdom more complicated patterns are in use for vessel decoration and the observation of the *chaîne opératoire* of the painting process allows perhaps in the long

51 E.g. Sinopoli 1991: 23–27; Arnold 1993: 85.

52 Still this would imply that the ancient manufacturers knew very well about the properties of the material they were using.

53 Ownby/Griffiths 2009.

54 Arnold 1993: 85; Pape 1991: 55, 67–68.

55 Arnold 1993: 99–102.

run the identification of several workshop traditions or even single painters. This may be achieved by observing the overlaps of the single elements of the painting (Fig. 3). In this example first (a) the cream slip was applied, next (b) the black vertical lines, then (c) the red vertical wavy lines, (d) the black dots. When exactly the black horizontal line was added is currently not clear, but most probably between (a) and (b). In a similar manner the exact description of the patterns of ring pattern burnishing (fastest by digital photography) that is not always perfectly round has not been undertaken at different sites or regions. So we do not have information on the variety in this decorative pattern yet, and whether it might contain any meaning hitherto missed in the interpretation currently followed (Fig. 4). This figure suggests subtle differences in the way the rings are made: they could be derived from various potters, various work-shops or even various regions. To be certain which explanation is the most reasonable, we need more data and from more regions and to analyse it carefully.

2.1.3 Manufacturing technology

The detection of the *chaîne opératoire* of the manufacturing process of pottery vessels goes a long way towards finding out about the organisation of pottery production, the organisation of the mode of distribution of the finished product, and – most importantly – of the dating of the pottery. The process of producing pottery underwent an 'evolution', roughly and almost dangerously simplified, from entirely handmade to entirely wheel-made/wheel-turned,[56] the increasing use of *Rotary Kinetic Energy* (RKE)[57] and finally the production of pottery entirely made on the kick wheel.[58] The very rough dating of purely handmade vessels and those in combination technology can be set prior to the New Kingdom, while entirely wheel-made vessels occur more frequently after the beginning of the New Kingdom. Nevertheless it needs to be stressed that this transition is not smooth and clear cut and coincides with the transitional period of the later Second Intermediate Period to the early New Kingdom, again a historical division that is largely made up by modern scholars. Moreover, even after the beginning of the New Kingdom there are exceptions[59] and difficulties, which prevent us pinpointing an unequivocal date for the change from combination technology to entirely wheel-made pottery vessels. Thus, this development is not absolute and should not be viewed in a Darwinistic, teleological way.[60] There are always exceptions and difficulties as well as transitional periods, when more than one technology is used at the same time, for example trimming bases of jars with a tool by hand and turning the jar over on the wheel and trimming it with a tool horizontally using *Rotary Kinetic Energy* (RKE) which produces deep horizontal scratches in the area towards the base (Fig. 5). In general, it is unrealistic to expect that technological changes coincide neatly with different Egyptian Dynasties, as Dynasties are a retrospective, later concept and technological changes are induced by different processes than purely political ones. Moreover, such changes are also not always induced by innovations coming from

56 Beware of the fact that for turning lines no wheel is necessary: a turning device such as a bowl in a basket or a wooden board on a basket already provides momentum for wheel-aided turning.

57 Courty/Roux 1995.

58 Arnold 1993: 16–17, at least in the Late Period, but unclear when it started; Bourriau 2006. See also Klotz 2013, who found a depiction of a kick wheel in the Ramesside period in hieroglyphic signs. Unfortunately the pottery of that time does not look notably different to what was used before in terms of visible manufacturing processes. A real difference can be observed in pottery in the Late Period.

59 Aston 2020, in press.

60 Loney 2007; Loney 2011.

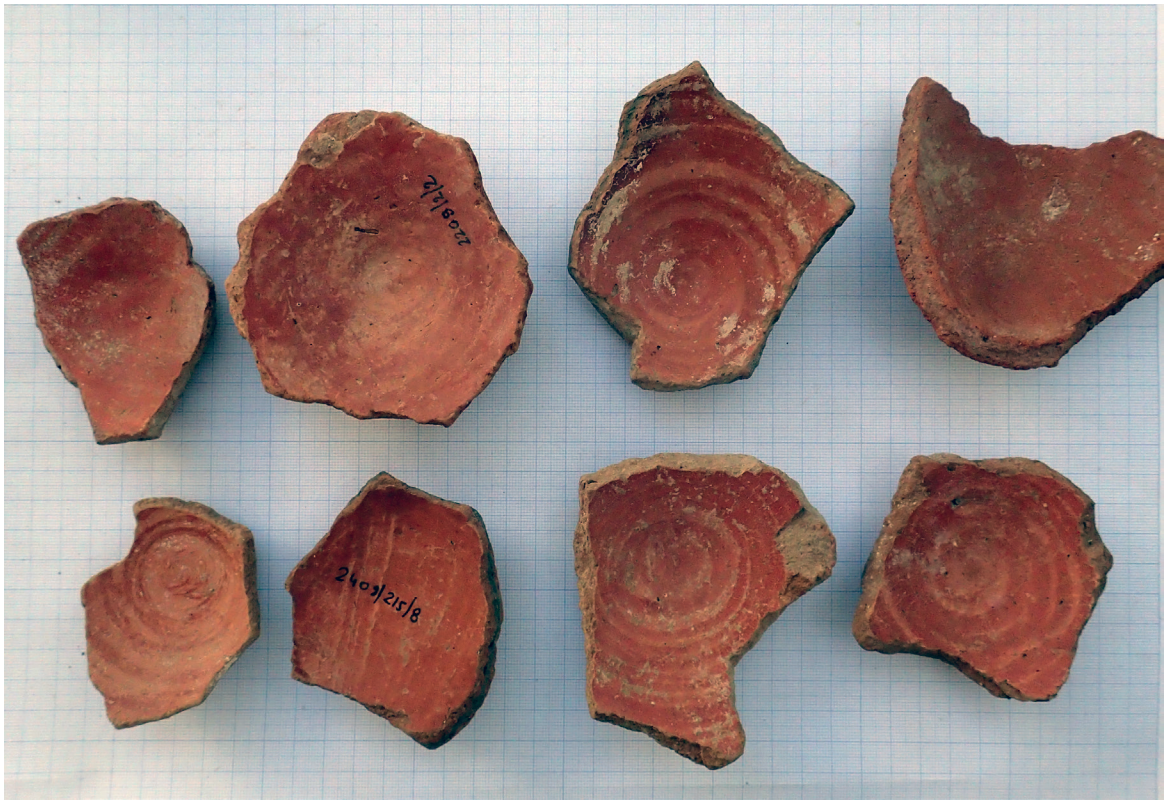

Fig. 4 : Variety of ring pattern burnishing (© Courtesy of KU Leuven Dayr el-Barsha Project, photo: B. Bader).

Fig. 5: Bases of jars: left trimmed obliquely with a tool; right trimmed with a tool on a turning device (© photos: B. Bader).

outside the local cultural environment, but they may be rooted in specific uses or developments of specific vessel types.[61] At the same time ancient techniques may be kept because it is necessary for specific reasons or material constraints, for which the improved technology did not provide a solution after all. The actual date of the widespread use of the kick wheel is also not particularly clear. It should also be stressed that even in the Late Period pottery is also produced using the 'normal' wheel.[62] Perhaps scientific methods such as xeroradiography or computer tomography may help to clarify this point in the future. However, the difference in manufacture between Pharaonic pottery and Graeco-Roman, Late Roman and Medieval productions can be used to get an overview for a rough periodization of a given site.

2.1.4 Diameter and preserved percentages (for quantification)

The detection of the diameter or other diagnostic features as well as diagnostic fragments (if necessary with a diameter chart[63]) allows the division into size classes and, as well, the measurements of the parts preserved and therefore quantification.[64] Although I would not like to go into detail here, it is important to state how many specimens of one given type are represented for a reasonable interpretation of archaeological features such as cooking installations, storage facilities or the like. Also in comparative studies of any type quantity has an important role to play.[65] Suffice to say that most methods here have their merit in certain situations, but that simple sherd count is the worst approach because it is not a stable measurement: for an assessment of how broken pottery is in combination with weight on the other hand, it can be considered as useful, because this correlation gives evidence about the post-depositional process and leads to a better understanding of the fate of the material.[66] Quantification by means of minimum and/or maximum number of vessels represented makes sense if the pottery is fairly well preserved, because it is important to be able to assign pottery vessels or vessel fragments to types. The wider these types have to be defined due to small fragments from high breakage the less stringent any analysis can be applied. Material from surface layers is often very numerous and very broken and therefore the time consuming process may not provide a particularly useful result. 'Estimated vessel equivalents'[67] have the great advantage that there is no inherent bias due to vessel size or wall thickness. 50 % of the rim of a small vessel can be considered as the same quantity as 50 % of the rim of a large one. Problems arise for vessels with irregular rim shapes or heavily asymmetrical ones. Moreover, it is very easy to collect the necessary data with a diameter chart also including the percentage grid (Fig. 6).

2.1.5 Vessel shape – drawing or typing?

The best method to learn about vessel shape and vessel morphology (and incidentally manufacturing technology as well) is to record ceramic material by means of drawing it. No particular drawing skills are necessary for this type of drawing, as it is purely technical following a convention, to record certain properties of the vessel shape and the technology, because some details of shape are much easier to visualise than to describe with words. This recording process should also be done

61 Van Oyen 2017: 55–57.

62 I would like to thank D. Aston for drawing my attention to this fact.

63 Orton/Tyers/Vince 1993: Fig. 13.2.

64 Bader 2016; Orton/Tyers/Vince 1993.

65 Bader 2009.

66 Orton/Tyers/Vince 1993: 166–171, 178; for a use of this data see Bader/Seco Álvarez 2016: 199.

67 Bader 2010: 62–63; Orton/Tyers/Vince 1993: 171–173.

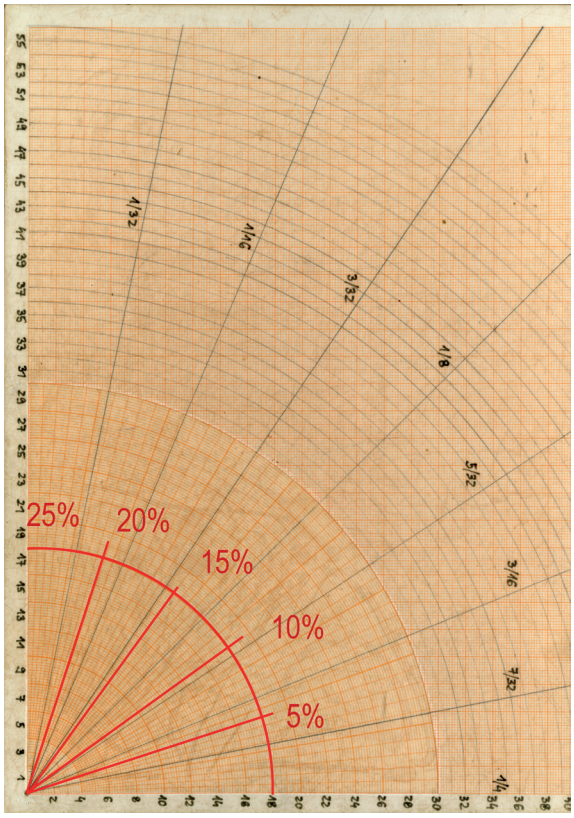

Fig. 6: Diameter chart with percentage divisions.

by the ceramicists themselves because, at least in the beginning of analysis at a new site or in a new period the best way to know is to handle the material for long enough to know how to identify it also by means of the finger tips. The tactile experience of objects is one of the most important aspects in recognising them. Thus, it follows that identification of pottery done by means of publications alone, can never be as certain as having seen and handled it. This experience is all the more valuable when it comes to identify various pottery types from very small fragments, which are in the end decisive about dating assemblages.

Recording a lot of ceramic material from a multitude of sites of roughly the same chronological period led to the realisation that generalisations across the whole area of Egypt are often not valid and that a diachronic regional view from intact contexts provides a better starting point to understand the material and its regional developments better. Recent research, for example, led to the observation that the bases of hemispherical cups, a hall mark of the Middle Kingdom and the Second Intermediate Period shows different patterns of base trimming in various regions. While we know for some time now, that the vessel index of such cups[68] is an important descriptive element for the pottery itself, it is not a given *a priori* that similar vessel indices indicate the same shape and the same manufacturing technology. At Memphis for example a type of round based cup develops over time that has a much thicker base and a different pattern of finishing the base on the exterior than in the previous period at Memphis[69] and at other sites. Most importantly their vessel index resembles more the earlier cup series at other sites, because instead of more closed the development reverts and the shape becomes again more open especially in the period after the Middle Kingdom.[70] Similar differences can be observed at Deir el-Bersha, where the cups are smaller with a different base finishing pattern.[71] The more research is conducted at Second Intermediate Period sites the more the diversity in the morphology of the cups becomes clear in the various regions of Egypt. Thus, a simple correlation of vessel indices does not work for a chronological synchronization especially if there are only a few.[72] Only a close look at a lot of vessels brought about this knowledge.

68 Arnold 1982: 60–62; Bietak 1991a: 49–50.
69 Bourriau/Gallorini 2016.
70 Bader 2007; Bader 2009: 281–285, type 28d2.
71 Bourriau/De Meyer et al. 2005: 118–120.
72 Bader 2009; Ballet 1990: 25–28; Bourriau/Gallorini 2016: 40–41; Rzeuska 2017: 157–159; Bader 2019; Von Pilgrim 1996: 186–188; Seiler 2012: 318–319, Fig. 19.

One of Petrie's darker legacies is the ongoing division and specialisation in finds according to raw material (pottery, stone vessels, textiles, wooden implements, etc) overriding the importance of the original assemblage (as found) for archaeology in Egypt,[73] which still persists and often leads to circular arguments as conclusions found by means of one material group often feeds back in the same context and is then re-applied. The other great problem is the culture-historical corpus approach, where only one specimen is shown and properly recorded while the numerous others are just seen as variations of this one proto-example and not separately recorded and drawn. Thus, we only have an overview of a small percentage of the actual material excavated. While typing, the notation of virtually the same kind of vessel or vessel fragment was contemplated in order to save time and recording resources, to actually draw the piece is often faster than to deliberate whether it is dissimilar enough to warrant its own drawing (especially when complete profiles are preserved). With hindsight I would insist on drawing all complete profiles as a record as well as a good sample of vessels and vessel fragments of each stratigraphic unit (ideally)[74] or chronological group (in case the context is from the surface). Such methodology prevents typing across stratigraphic units or chronological groups, which would compromise the result of the analysis.

2.1.6 Recording of special features

The scrutiny of use traces such as smoke blackening, certain intentional abrasions, pre- and post-firing holes, pre- and post-firing marks, etc. provides crucial information about how vessels were used in daily life. Not so long ago Egyptian pottery was not described routinely when scorched and smoke blackened for example, so that for some periods it is not clear if cooking vessels as separate types existed or if vessels were used arbitrarily for that purpose. Also it is not possible to ascertain whether vessels depicted in cooking scenes in tombs were really found with smoke staining and thus corroborate the pictorial sources.

The rounded black/grey/reddish dis-colourations of the surface of pottery vessels termed kiln stains or touching patches have already been mentioned before, but they allow the observation that multiple pieces of pottery were fired together at the same time in batches proving serial manufacture. Whilst this is perhaps obvious, it is also nice to have proof for it.

The recording of the weight of pottery has increased in the past decade and the use of this measurement, which is quickly to obtain and stable and free of bias if the fabric groups are compared with each other has been used for some interpretations of material: in combination with sherd count it is possible to ascertain whether pottery of a certain fabric group is more broken than a comparable assemblage and allows inferences of post-depositional destruction and movement of material.[75]

Increasingly the documentation of details is done by digital photography, replacing time consuming drawing processes and allowing quick documentation. This is not to say that digital photography should replace old-fashioned recording by drawing because the haptic experience of exploring an object first hand cannot be easily replaced. To touch an object is very much connected to the overall experience to know and recognise it and no technological progress in 3D scanning technology can replace such kind of knowledge.

73 Van Oyen 2017: 55–56.

74 Bader 2009: 72 for typing fragments.

75 Orton/Tyers/Vince 1993: 171–173, 179; Maxwell/Peacock 2006: 5–6; Puschnigg 2006: 46.

3 Degree of preservation and information gained

Although ceramicists continuously stress that analytic work should concentrate on diagnostic pieces such as rim and base fragments, handles, decorated pieces etc. it also needs to be put in writing that body sherds do have their information value by their sheer presence: Old Kingdom Maidum bowl body sherds are almost as unmistakable as are body sherds of Late Roman Amphora 7 (ribbed or not). They point directly to a longer era, even if it cannot be said where exactly within it. That is most valuable information which should not be thrown away lightly. This fact is also of particular importance for work with material from drill cores, where well preserved diagnostics are rarely to be found. Crucially, anything that is not immediately known should be kept for study because it may become clearer later, after having seen more and perhaps more complete material. Thus, the 'unknowns' will become less over time.

Complete vessels give the most precise information about ceramic receptacles, while fragmented material can generally be divided into open, closed and restricted vessel types as well as some subgroups. These categories, albeit very broad still allow inferences on functions of the archaeological features but the ambiguity is much higher so that circumspection has to be applied when the final summary of the analysis is composed because often one rim fragment may belong to more than one vessel sub-type.[76] Despite these difficulties it would be wantonly negligent to disregard the information from broken and incomplete material, a point that sadly seems to need stressing over and over again. Very small fragments of different periods may entirely change the interpretation of an archaeological context.

Here a word about the use of collecting even 'knobbly bits'[77] is in place (Fig. 7). These are small rounded and partly eroded pieces of pottery and other ceramics defying classification as belonging to particular vessel types in many cases. Notably, most of them consist of Nile alluvium which is softer than the marl clay fabrics and while they are usually not assignable to any one group mentioned above their presence indicates post-depositional processes, which involve a lot of movement of ceramic material that is abraded and rounded as result of either human agency or natural causes. Observation of this phenomenon was particularly strong in sieved material, for example from tomb shafts. While their appearance and feel can be distinguished between pre- and post NK, exact dating cannot be achieved. Similar processes can be observed in ceramic sherds from drill cores and there it is important to note it for the processes of sedimentation of layers.

4 Strategies of tackling large amounts of pottery

In the process of sorting the material into fabric types and shapes it will quickly become clear if there are possibilities (or not) for reconstruction of larger pieces, which are more useful for typological analysis. Again the strategy will depend on how much is already known of a given site and on the resources available.

One of the crucial points in pottery processing is the knowledge of the composition of the context (or equivalent unit) before any reduction of material can be undertaken. It is essential to know the proportion of diagnostics and non-diagnostics and their characteristics, especially if any material is discarded afterwards. Generally,

76 E.g. Bader 2010: Fig. 8–9.

77 This term has been coined by Janine Bourriau.

Fig. 7: A heap of knobbly bits (© Courtesy of KU Leuven Dayr el-Barsha Project, photo: B. Bader).

the various fabrics occurring, the discernible shapes, diameters and quantity in various forms should be noted and, importantly, what was discarded and at which point. The development of time saving recording forms specific for each site requires experience and experimentation but the usefulness of such forms is indisputable. The design of such forms can also be done with the idea of digitisation in mind.

One way to cope with huge quantities of finds may be by means of random sampling techniques.[78] This does not mean a 'shopping list' approach but that a certain percentage of the finds is chosen in a random way without preconceived bias, for example, by means of the selection of each 10th context depending on the overall number of contexts to be analysed.[79] The procedures are complex and they should not be influenced by purposiveness in order to provide an overview of what is the common element in the assemblage, in which way ever the assemblage is composed. For the unusual element, additional choices can be made driven by personal experiences[80] or specific research questions. These two

78 Bourriau 1991: 267; Bader 2009: 61–147; Bourriau 2010: 1–16.

79 Consultation of a statistician is necessary.

80 This method was used for the comparative study between Tell el-Dabʿa and Kom Rabi'a in the Second Intermediate Period. One of the points that the existing research design did not cater for was the distribution of finger pinched ring bases. The random sampling technique concentrated on rims because they are more diagnostic for vessel typology than bases. The bases were exclusively chosen purposively and thus, it was not possible to prove the distribution because the bases were not taken systematically.

constituents of a context need to be marked clearly so that they will not be mixed and they can be analysed separately by means of strictly statistical methods. No information is lost. The advantage is the statistical validity of the material in the random sample, but the speed of the analysis is probably not much enhanced.

5 Drill cores

The ceramic material out of drill cores warrants a small paragraph on its own, due to the increasing amount of such work being done.[81] Again it depends on the questions asked from the material. While the description of the process of coring, the processing of the materials from the core and the analysis of the ceramic material goes beyond the scope of this paper, the engagement with extremely small fragments sieved with 4 mm mesh size is certainly a challenge but allows insights into the archaeology of sites in a depth usually well below accessible levels. The Theban Harbour and Waterways Survey project[82] not only looks at any dating possibilities for the layers within the cores but also at the processes that led to the formation of the layers and in this view it is very interesting to observe whether the material is very rounded, eroded or angular. Also the number of the fragments allows insights in the profile of the activities. Admittedly that is only valid for the tiny spot of where the core is set but that is 100 % more information than we had before, although the evidence is not easy to interpret. Best results can, of course, be achieved by coring in combination with excavation from which a valid stratigraphy can be used as immediate reference.[83]

Fig. 8: Fragment of a trimmed base sherd (© Courtesy of KU Leuven Dayr el-Barsha Project, photo: B. Bader).

The same but slightly different is done at Deir el-Bersha, where only larger material, i.e. sherds, is collected. The focus there is not so much on formation processes of the waterscapes as at Luxor but where the settlement areas were and the periods of activity. Of course, that cannot be too precise but sequences of several metres add significant evidence to the overall picture and some pottery is very distinctive even in small fragments. For example sherds of the base of a Middle Kingdom dish (Fig. 8) and a hemispherical cup cannot be mistaken for other pottery vessel types, if the ceramicist handled such material in the past.

6 Conclusions and appeal

The initial aim of the workshop in Mainz was to answer the following questions: (a) How do you deal with largely disturbed contexts? (b) How do you manage a huge quantity of finds? (c) How

81 Toonen/Graham et al. 2017 with bibliography.

82 Graham/Strutt et al. 2012; Graham/Strutt et al. 2015.

83 Toonen/Graham et al. 2017: 277.

do you identify specific items among mixed groups? (d) Which deeper insights do you gain by analysing difficult objects and contexts? (e) Which methods proved useful to you and which not at all? (f) How did you cope with inconclusive results? While questions (a) to (e) have been answered in the above text, I would like to sum up the contribution of data derived from pottery even from disturbed contexts for an enhanced interpretation of any given site : (a) general dating of activities at the site; (b) nature of activities at the site; (c) aspects of function of the site; (d) distribution/presence of certain raw materials and vessel types; and (e) history of technology.

The question of inconclusive results did not yet appear in my research as the data collection undertaken so far resulted in multiple lines of interpretation, which so far was not conceived as contradictory.

In an adaptation of a previous diagram[84] the information without the archaeological context is not so much worse (Fig. 9).

As a closing remark I would like to stress that project ceramicists **must** see everything that is contained in a context in order to date it correctly. There could be a tiny body sherd of a different date, which would change the interpretation of the context as a whole completely. If this information is missing or has been removed inadvertently, the final dating and interpretation of any given context is incomplete and perhaps totally wrong. Therefore any pre-sorting and discarding of pottery from any context compromises the result of the analysis before it even started. Nevertheless, the bulk of the context can likely be reduced by controlled, recorded and supervised discarding some of the material *without losing any information* and keeping the crucial elements of it – be they broken or not. This is something that needs to be stressed – even broken and 'non-diagnostic' material holds information that we cannot afford to throw on the dump heap.

For this reason archaeologists and ceramicists need to record clearly which and how much of the ceramic material was discarded, for the benefit of future students of the material.

How to deal with the ceramic material after its data and information was collected is also dependent on factors that are rarely in our own hands. While we can suggest strategies to reduce the bulk, although of course it would be much better and ethically correct to keep everything as the excavator is ethically obliged to do everything possible to safeguard, record, study and publish the excavated finds of all kinds, the total discard of the pottery as currently seen more frequently in Egypt is a huge step backwards to the bad old times. Nothing less than the credibility and scientific rigour of Egyptian archaeology is at stake, which will irretrievably be lost if there is no way to go back to ceramic material in order to reproduce and reassess previous results. Moreover, the chance to conduct new types of analysis will then also not exist.

84 Bader 2013: Fig. 1.

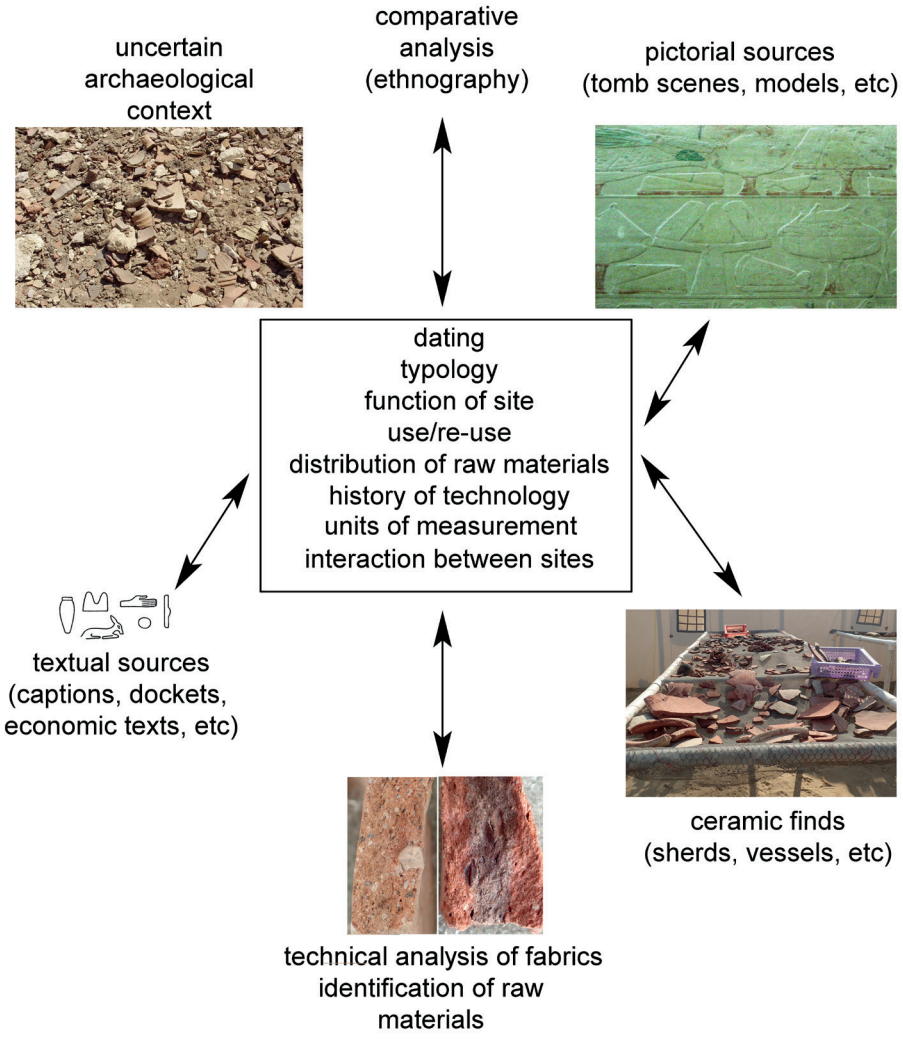

Fig. 9: Diagram of types of information to be gained from pottery and other sources (adapted from Bader *2013: Fig. 1).*

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