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B. Bader, Ancient Egyptian Pottery, in: I.M.E. Shaw, E.R. Bloxam (eds.), Oxford Handbook of Egyptology, Oxford University Press, Oxford 2020 (10 November) as Print version , before online. DOI:10.1093/oxfordhb/9780199271870.013.1; ISBN 978-0-19-927187-0.

[312]

chapter 15

Ancient Egyptian Pottery

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Introduction

The examination of ceramics in Egypt has a relatively short history compared to archaeologies in other areas of the world (see Chapter 13 in this volume), previously seriously neglecting an important and abundant source that can be used for historical interpretations far beyond chronological disputes. The study of such material should not be considered in isolation, but in relation to other sources. It provides insights into issues connected to exchange of commodities, socio-economy, and functional interpretation of archaeological features. The ceramic repertoire found in and around tombs and cultic installations gives direct clues concerning the cult, how the cult was conducted, and how long it may have lasted. Technological questions connected to the production and firing of ceramics can be addressed as well as metrology and supply routes, and even organizational or socio-economic developments might be visible in the way ceramics were distributed. Together with textual evidence and other archaeological finds, the interpretation of the archaeological record as a whole provides a powerful tool towards a more comprehensive view on numerous aspects of life and culture in ancient Egypt.

History

While beautifully decorated painted vessels of the Predynastic Period and New Kingdom blue-painted jars were always prized as objects of early art, the same cannot be said for the bulk of undecorated wares which abound on Egyptian sites. In the late 1800s and early 1900s archaeology in Egypt began to be conducted in a more scientific and controlled way, mostly due to the work of Flinders Petrie and, as a result of his influence, pottery vessels gained value as chronological markers and as ethnographic objects illustrative of daily life in Egypt.[1] In the late nineteenth and early twentieth centuries Petrie shipped many pots

[1] Petrie 1904.

back to Britain for educational purposes, the majority of which ended up in University College, London, but other vessels were distributed as 'payment' for subscriptions from smaller provincial museums, which helped to defray the costs of Petrie's excavations.[2] Collections in Europe and the United States—New York, Leiden, Paris, Turin, Munich, London, Leipzig, Berlin, and Vienna come to mind—also started to obtain pottery vessels, mainly from excavations these museums had sponsored. Gradually Egyptian ceramics came to be displayed in the great museums, mostly complete and/or decorated examples like the assemblage of pottery from the tomb of Tutankhamun in the Museum in Cairo.[3] A boost for pottery in museum showcases came in the late 1970s and early 1980s, with exhibitions focusing on ceramics and their importance for interpreting ancient Egypt from another point of view.[4]

Early excavation reports treated ceramic finds somewhat cursorily, sometimes giving only a verbal description of vessels found. If such pieces were drawn, the drawings were made in perspective, much like a tracing from a photograph, and showed only the outline. While these are far from ideal, distinctive pottery types can usually be recognized.[5] Petrie's treatises of finds in his later years (in the 1920s) were exemplary for his time, because he supplied typologies of all find categories and tomb registers which listed all items found. If checked closely there are of course inconsistencies, but his publications can be used to reassess archaeological material to this day, because many of the finds still exist in museum collections all over the world, often with their contextual information available. While Reisner's work in Nubia provides the second example of early rigour in methodology concerning pottery analysis[6], the combined efforts of several excavators in the 1930s to bring some system into Egyptian pottery studies were not successful in the end.[7] In the 1960s and 1970s, when archaeologists in other parts of the world were no longer content with the traditional approach to archaeological interpretations[8], a new generation of excavators in Egypt began to regard ceramics as an additional source for dating, and collected more ceramic material than ever before.[9] This can also be seen in connection to the salvage campaign of UNESCO in Nubia before the Aswan High Dam was built.[10]

The year 1975 saw the publication of the first volume of the *Bulletin de Liaison du groupe international d'étude de la céramique Èqyptienne*, which was the first successful public forum for general information on pottery found in excavations around Egypt including a gazetteer. Soon thereafter a need was felt to categorize the wares and fabrics, and due to the initiative of a group of field archaeologists working in Egypt the so-called 'Vienna System' of fabric classification was created in the 1980s.[11] This system, based on pottery mainly from the Middle Kingdom and the Second Intermediate Period, was meant to provide a general framework that could be utilized at any site and for various periods, with the inbuilt intention of extending and elaborating it as the ceramicist at a given site would see fit (Nordström and Bourriau 1993: 168). At the same time it provides the possibility of comparing the ceramic material from different sites and ascertaining that the same kind of material appears at

[2] Stevenson 2016.

[3] See El-Khouli et al 1993, although the addition of new drawings would have been an asset in view of such an important and well-dated assemblage.

[4] Arnold and Schulte 1978; Bourriau 1981.

[5] E.g. De Morgan 1895; Garstang 1907.

[6] Reisner 1910.

[7] Bader et al. 2016: ix–x.

[8] E.g. Binford 1972.

[9] Arnold 1968.

[10] Bourriau et al. 2000: 121.

[11] Bourriau 1981; Arnold 1982; Bourriau and Aston 1985; Bietak 1991a: 324–30; Nordström and Bourriau 1993, and see also 'Fabrics: Vienna System', later in this chapter.

various sites. It also facilitates mapping the distribution of certain fabrics in Egypt and beyond, and thus emerging spatial patterns can be interpreted. There are local differences between certain Nile clay fabrics in some periods[12], but currently there are no additional scientific studies to test this hypothesis. While this is perhaps less significant for the ubiquitous alluvial Nile clay fabrics, it might give a better idea of the origin of the 'desert wares' or marl clay fabrics, which to this day remain a grouping much more difficult to distinguish. This particularly holds true for the earliest periods of Egyptian history—the Predynastic, early Dynastic, and Old Kingdom marls—due to the very elaborate preparation of fabrics in these periods.

In the late 1980s a new journal with a focus on ceramic studies in Egypt was launched, the *Cahier de la Céramique Égyptienne* (founded by Pascale Ballet and now edited by Sylvie Marchand, ceramicist at the Institut Française Archéologique Orientale, Cairo). It provides a venue for longer reports and articles than the *Bulletin de Liaison* as well as themed discussions. Since then numerous reports and books with ceramic studies as their sole topic, based on painstaking work, have come into the public domain. These reports improved continuously in their standards, particularly in terms of general description of shape and fabric, craftsmanship of drawings, and the amount of material covered. The works include pottery catalogues from excavations, typologies, and analyses, as well as interpretations.[13] Sometimes pottery is the only type of artefact recovered from a site, and therefore the only means for dating and interpretation in addition to the excavated structures. A certain caveat is still noticeable in the interpretation of ceramic finds, which is not as far advanced as in other areas of the world.[14]

Undoubtedly progress has been made, as demonstrated by the variety of contributions to the conference *Vienna 2* in 2012.[15] In the twenty-first century, excavators in Egypt are generally conscientious not to leave pottery they have unearthed unprocessed or unanalysed. However, the resources put into the study of ceramics differ to a great degree and this has an immediate bearing on the quality and extent of the results that can be achieved. It is hoped that this chapter will help to remove some of the barriers which still exist, and raise awareness for the use of ceramics as a source in the historical disciplines in conjunction with all other available sources.

Fabrics: Vienna System

The first specialized treatise on the raw materials of ancient Egyptian ceramics was by Alfred Lucas in *Materials and Industries in Ancient Egypt*.[16] He distinguished the fabrics in the first place by colour, with the additional remark that there was a difference between 'desert' wares and wares with organic inclusions. He also devoted some attention to surface treatments and pigments.

In order to use ceramic material for any interpretation a categorization is a necessary first step. It has been stated in the past[17] that vessel shape is not sufficient for a proper assessment, because similar shapes were manufactured from different raw materials. And those, in turn,

[12] Bourriau 1998; Bader 2009: 602–39.

[13] Millet 2007.

[14] Arnold 1985; 1993.

[15] Bader et al. 2016.

[16] Lucas 1948: 425–41.

[17] Bourriau 1991.

could be derived from different locations or workshops. Therefore the interpretation of the vessel being made locally or imported from somewhere else (even within Egypt) depends heavily on the identification of the raw materials. Crucial for the correct identification of fabrics of wheel-turned pottery is the examination of a fresh sherd break made parallel to the rim, because due to the centrifugal force of turning devices the organic inclusions are oriented in the same way. In handmade pottery the classification may be based on scrutiny of the surface and closer examination of the raw material.

Because several works on fabric classification of various periods have already appeared, the description is here kept short.[18] The classification of ceramics is based on the division between Nile clay fabrics, marl clay fabrics, a mix of the two, and ceramics imported into Egypt from the Aegean, Cyprus, Syria/Palestine, and Nubia. The first three groups are distinguished as follows. The Nile clay fabrics are divided into A, B1, B2, C, D, and E according to their inclusions. Nile A shows fine mica and mineral inclusions, B1 some mineral inclusions and chaff, B2 a larger amount of mineral inclusions and chaff, C contains pieces of straw and some mineral inclusions, D includes limestone particles, and E rounded mineral inclusions. The Nile E fabric was further divided into two groups depending on the number of quartz grains and the presence of additional chaff.[19] Some pottery classification systems divide between Nile C1 and C2 depending on the size of the straw particles.[20] The marl clay fabrics are divided depending on the presence and quantity of mineral inclusions, limestone, and argillaceous inclusions/'marl pieces'. Marl A can be broken down into A1, A2, A3, and A4, whose appearance seem to be chronologically significant.[21] Marl A3 is the most distinctive of the group due to the density of the groundmass and relative scarcity of inclusions. Marl A1 is also relatively dense and limestone inclusions dominate, with some coarser mineral inclusions. Marl A2 appears well sorted and contains a large quantity of limestone particles, sometimes small pieces of marl/argillaceous inclusions, as well as some fine quartz. Marl A4 contains the same range of inclusions but coarser. Marl B shows many mineral grains in different colours and a dense groundmass. Marl C[22] was divided into three distinct sub- groups: Marl C compact, Marl C1, and C2, with 'C compact' being distinguished by its very thick white surface layer and extraordinary density. The nature and reason for the development of this surface layer has recently been examined using chemical analysis.[23] C1 shows a dominance of limestone particles over mineral inclusions and C2 is dominated by mineral inclusions over limestone particles. All three varieties contain relatively coarse brownish reddish marl/argillaceous inclusions which give the fabrics their distinctive appearance.[24] Marl D appears first in the 18th Dynasty, showing a red-brown section with many very small limestone inclusions. Like Marl C, the surface shows a naturally developed light sur- face that is often burnished, particularly in the later New Kingdom.[25] The designation of Marl E was given to a fabric similar to Marl B, but additionally containing coarse straw. The

[18] Nordström 1972; Holthoer 1977: Bourriau and Aston 1985; Bietak 1991a: 317–33; Bourriau and Nicholson 1992; Nordström and Bourriau 1993; Bourriau et al 2000; Aston 1998; Bader 2001; Cyganowski 2003; Rzeuska 2006: 35–44; Rose 2007: 11–16.

[19] Bietak 1991a: 326.

[20] Bietak 1991a: 325–6.

[21] Nordström and Bourriau 1993: 176–8.

[22] Nordström and Bourriau 1993: 179–81; Bader 2001; Cyganowski 2003.

[23] See Ownby and Griffiths 2009.

[24] Cyganowski 2003; Griffiths and Ownby 2006: 67; Ownby and Griffiths 2009.

[25] See Nordström and Bourriau 1993; Aston 1998: 65–6; McGovern 1997, but note that this study is flawed due to the lack of a control sample: see Aston 2004c: 236.

main inclusion characterizing Marl F, the latest addition to the Vienna System, is mineral grains, which are densely packed and give the fabric a crumbly and loose structure. It is found mainly in the Eastern Nile Delta.[26] There may be some overlap with a very sandy fabric belonging to the Marl C2 grouping that appears at Tell el-Dab'a in the late Second Intermediate Period, but a thorough analysis is needed to find distinguishing criteria.

The existence of fabrics mixed from Nile and marl clays was proved by means of petrologic and chemical analysis for the Old and the New Kingdoms.27 The visual identification of such mixes by means of macroscopic detection with a 10x hand lens, which is the usual tool for the bulk of the material, is not easy and identification can only be ascertained by means of technical analyses (see 'Scientific Technologies used for Analysis of Ancient Ceramics (Overview)', later in this chapter).

Imports into Egypt, particularly from Syria/Palestine, are found on a regular basis, ranging from the Predynastic to the Late Periods and beyond.[28] While the differentiation of imports from the Egyptian fabrics in the Pharaonic periods is, in most cases, straightforward (despite exceptions to this rule, particularly in the Early Bronze Age), the distinction between the various imported fabrics poses more problems. Ground-breaking petrographic work has been done for the New Kingdom[29], but the assumed less standardized organization of production of transport containers (Figure 15.1) in the Middle Kingdom and the Second Intermediate Period creates more difficulties. It is possible to define areas of origin, but the distribution within Syria/Palestine is still largely unclear. Shape catalogues (also of rims) might help in demarcating the distribution of certain form varieties. Such corpora are available only for very few areas, such as Jericho and Aphek.[30] A combination of petrologic data and vessel or rim shape might also suggest origins of transport vessels. To date it is not certain if there is a relationship between fabric and shape in the Middle Bronze Age material, because pilot studies are sorely missing. This information could be used for interpretation of transport routes and volume as well as for detection of shifts in trade patterns.

Imports from the Aegean and Cyprus are generally less common, but this is subject to change during different periods.[31] Such imports are considered particularly important for the establishment of chronological networks between those cultures, and are used extensively.[32]

Other fabric classification systems

For the Predynastic and early Dynastic periods as well as for the Late Period, the Greco- Roman period, and late antiquity, it has been noted that fabrics appear that cannot be easily accommodated within the Vienna System, and thus somewhat defy the original idea of a comparative 'skeleton'. Pottery specialists of the early periods therefore created their own

[26] Bietak 1991a: 328; Aston 1998: 67; Aston 2004a: 35; Bader 2009: 652–3.

[27] Nordström and Bourriau 1993: 166–7; Aston 1998: 68; Bourriau et al 2000: 19–25; Rzeuska 2006: 42–4.

[28] Hartung et al. 2015; Nordström and Bourriau 1993: 183–6.

[29] Smith et al. 2000; Serpico et al. 2003.

[30] Kenyon and Holland 1982; Beck 2000.

[31] See Merrillees 1968; Kemp and Merrillees 1980; Bell 1985; Walberg 1991; 1992; Maguire 1995; Hankey 1995; Bourriau and Eriksson 1998; Fitton et al 1998; Merrillees 2003; Hein 2007.

[32] Åström 2001; Bietak 2000–07; Phillips 2008.

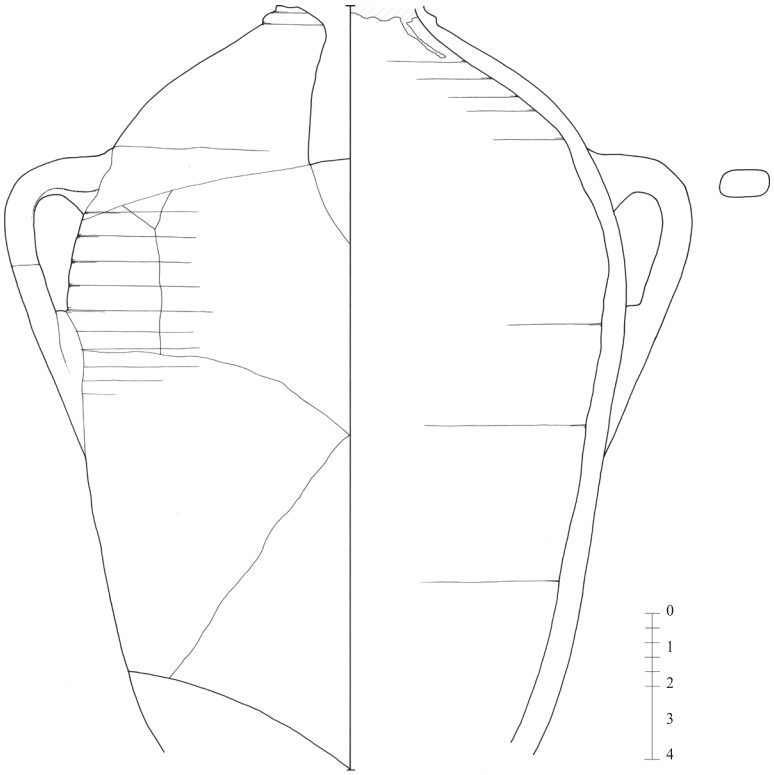

Figure 15.1 New Kingdom Amphora made of oasis fabric, after Bader 2006, fig. 3.

classification systems.[33] Similarly, the approach to the pottery fabrics in the later periods concentrates much more on *wares* (fabric + surface treatment) because by then it is safe to speak about large-scale industries that were distributed all over Egypt. This development had already started in the Late Period and continued.[34]

Scientific technologies used for analysis of ancient ceramics (overview)

Since the late 1960s, several modern technologies, generally used in other scientific fields, have found their way into Egyptian archaeology.[35] One of the first methods used was Neutron Activation Analysis (NAA), initially applied in order to obtain information on the

[33] E.g. Köhler 1998.

[34] See Aston 1999: 2–9; Marchand 2009; Ballet and Południkiewicz 2012; Gates-Foster 2012.

[35] I would like to thank M. Ownby for providing me with literature and discussing technologies with me.

chemical composition of ceramics and to detect the origins of the fabric.[36] It was used, on the one hand, to characterize Egyptian fabric groups and to check if they were consistent[37] and, on the other hand, to detect the origins of wares imported into Egypt from the Levant.[38] This expensive and destructive method involves the use of a nuclear research reactor and multivariate statistical analysis for interpretation. The interpretations of the results of such analyses can be very useful[39] but can also be misleading.[40] This depends both on the sampling strategy used by the archaeologists and the comparative databases of the scientific laboratory. It has also proved difficult to relate ceramics and raw materials within this method.[41] Another factor to be considered is whether the chemical soil composition in the regions under scrutiny is different enough to yield a meaningful result. It has been found that even Nile alluvium can be differentiated.[42] Recent years have seen a considerable reduction of research reactors and therefore fewer possibilities to use this method. Gradually NAA has been replaced by Inductively Coupled Plasma Mass Spectrometry (ICP-MS), which provides a similar set of data to NAA but without the toxic waste.[43] As for Egyptian ceramics and ceramics found in Egypt, petrography by itself, or in conjunction with X-Ray Fluorescence Analysis (XRF), is being used more frequently.[44] The principle of petrography is to link the geology of inclusions (minerals, microfossils, etc) and clay to the geology of a given region by scrutinizing a thin section. Not only does this method provide a way of getting closer to the origins of ceramics, but a check on grouping strategies for fabrics is also possible along with general information on shaping methods and firing temperatures.[45] The ideal way of publishing such information is in colour photographs of the thin sections in conjunction with the sherd break, because it is the sherd break the ceramicist tries to identify in the field. Thus, it would be possible to compare published fabric groupings to material currently under analyses (ideally executed by Smith et al 2000). Unfortunately, this is still not standard procedure and therefore much of the benefit of such analyses cannot be used by ceramicists.

Standard XRF analysis acquires bulk compositional chemical data from powdered ceramic material. However, non-destructive XRF analysis measures the chemical composition on the surface of pottery fragments or on the sherd break, as does Scanning Electron Microscopy (SEM). Both provide data for the interpretation of slips, washes, and other sur- face layers, as has been done on Marl clay fabrics. Such data allows syntheses on how and why surface layers develop.[46] The use of thermo-luminescence for Egyptian ceramics is quite restricted and generally applied in order to estimate firing temperatures and to detect the date of pigments and pottery.[47] It is well worth exploring scientific technologies for analysis of ceramic material, because, if used correctly, they can provide much additional information for a diverse range of research questions.

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[36] Perlman and Asaro 1969.

[37] Bourriau 1998; Bourriau et al 2006.

[38] McGovern and Harbottle 1996; McGovern 2000.

[39] Bourriau et al. 2006.

[40] McGovern 2000; Goren 2003; Aston 2004c.

[41] Bourriau 1998: 190–1.

[42] Bourriau 1998: 193–9.

[43] Mallory-Greenough et al. 1998; Tschegg et al. 2008.

[44] Bourriau, Nicholson, and Rose 2000: 133; Cohen-Weinberger and Goren 2004; Griffiths and Ownby 2006; Rzeuska 2006: 522–36; Ownby and Griffiths 2009.

[45] Bourriau et al. 2000: 132–3.

[46] See Ownby and Griffiths 2009.

[47] Bourriau 1981: 58; Crowfoot Payne et al. 1977.

Quantitative analysis

The knowledge of the quantity of different types of pottery (and/or other artefacts) in contexts gives additional information about the character of a site: trade emporium versus settlement versus workshop, to name but a few. The consideration of the frequency distributions of pottery types in contexts may help to clarify functions or functional areas.[48]

The measurement for quantity of pottery forms the backbone of any statistical analysis. In the past several methods for quantification have been used, such as sherd count[49], number of vessels represented[50], surface measurement, displacement volume, or weight. The results of such methods may be useful, but some applications are either complicated or heavily biased, due to the various properties of ceramics. For example, sherd count is biased towards thin-walled vessels, because they break more easily and into more pieces, and besides it is not a constant measure.[51] The concept of *estimated vessel equivalents*, first described in print by Clive Orton, is based on the premise that each sherd broken off an ancient vessel represents a certain proportion or percentage of a formerly complete vessel, regardless of whether it is a body, base, handle, or rim fragment. This measurement represents the preserved part of a vessel and creates no bias due to ceramic properties. As it is not always possible to measure the preserved proportion of the rim/base exactly, the term *estimated* vessel equivalent is used.[52] Measuring the preserved (diagnostic) parts of the vessels for determination of quantity has been used in Egyptian archaeology by the founder members of the 'Vienna Group' since the mid-1970s, although it has not been formulated or tested theoretically. Only recently several studies were published using this kind of data.[53] Because body fragments are often ambiguous, the focus of quantitative studies is on so-called diagnostics like bases and rims. They provide the most information about ancient vessels, facilitating an attribution to a type. The identification of sherd material sometimes suffers from ambiguity, because some rim types could belong to more than one vessel shape.[54] Such cases must be taken into con- sideration in the analysis, but should not deter from the approach in general. A measurement of diameter is necessary for a measurement of the preserved part of the vessel (fractions of a circle), taken by means of a rim diameter chart.[55] This is the collected frequency data which will disclose the quantity of the pottery in the end, sorted by type, fabric, or any other criterion the analyst is interested in. Through a mathematical transformation, the estimated vessel equivalents can be turned into numbers that have the same statistical properties as counts, and can be used in statistical analyses[56], although this has not yet been attempted with Egyptian material. In connection with random sampling techniques such data provide a powerful tool to answer the question 'How many?' in an objective way.[57]

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[48] Bader 2010: Figure 9, 2016.

[49] Arnold 1982.

[50] Arnold 1988: 116, n 303.

[51] Orton et al. 1993: 169–70.

[52] Orton 1975; Orton et al. 1993: 21, 171–3.

[53] Bader 2007; 2009; 2015; Bader et al. 2016; Bourriau and Gallorini 2012; 2016; Kopetzky 2010; Müller 2008.

[54] See Figure 15.2, and also Bader 2010: Figures 8–10.

[55] Egloff 1973; Orton et al. 1993: Figure 13.2.

[56] Orton et al. 1993: 174; Orton 1993.

[57] Fletcher and Lock 1994; Orton 2000; Bader 2009: 58–74; Bourriau and Gallorini 2016.

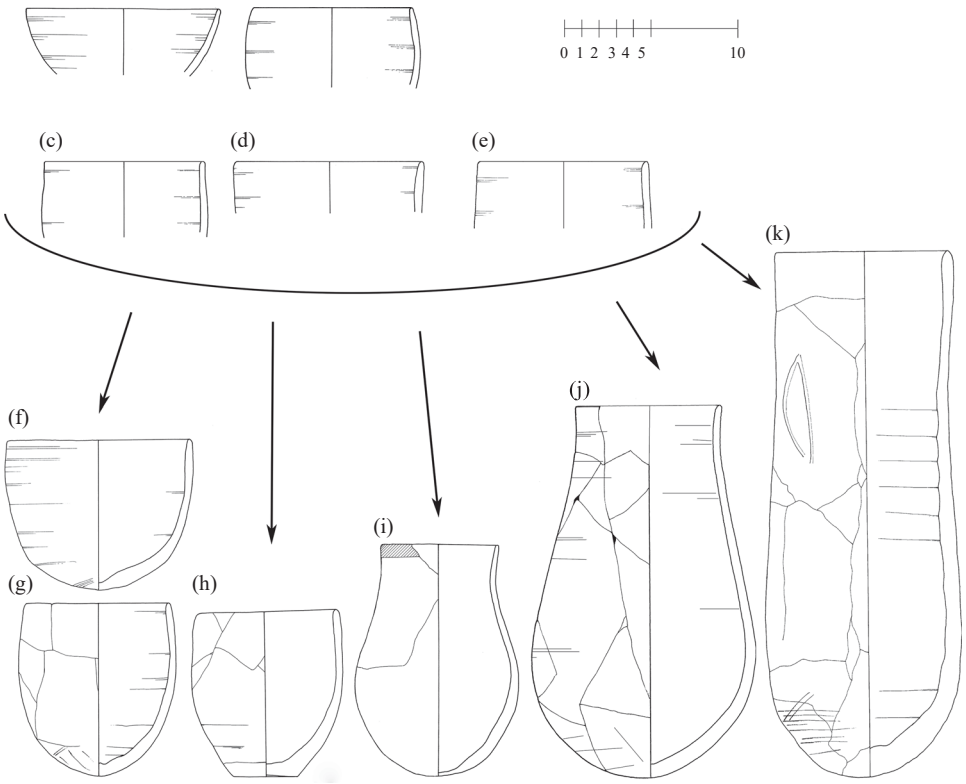

Figure 15.2 Various pottery types to which small fragments can be ascribed, after Bader 2010, fig. 9.

Typology

The desire to try and impose order on things is perhaps deeply ingrained in human nature, thus a division into different groups either according to shape, function, or size is often presented. Ideas proposed for botany by Linné and for archaeology by Montelius (1903) found their counterparts in Egypt.[58] The compilation of typologies of various ceramic vessels in Egyptology began with Petrie. He and his followers were the first archaeologists in Egypt to arrange (complete) pottery vessels by shape into a system of types and subtypes arranged by letters and numbers, as for example in the Riqqeh corpus (e.g. 2k2 on pl. 28). A similar procedure was proposed by Guy.[59] Petrie also did the same for all other artefact groups.[60] This arrangement developed over time, and rather than presenting a range of pottery of the same type, as for example from Tell el-Yahudieh in 1906 (Petrie 1906: pl. 10), the approach later changed to providing one example of each type as in Riqqeh[61], Harageh[62], and Sedment[63], although quite a wide variety of pots was shown. An intrinsic problem in the re-evaluation

[58] Petrie 1904: 122–6.
[59] Cf. Rose 2007: 169–76.
[60] Engelbach 1915.
[61] Engelbach 1915.
[62] Engelbach and Gunn 1923.
[63] Petrie and Brunton 1924.

of work done by Petrie and his followers is that the criteria for ascribing a vessel to one type or another are unknown, and often vessels from one site were typed to vessels from another site.[64] It remains unknown how the early archaeologists typed pots from one site to another, as examples are not physically available. In order to use these valuable data collections, which are often the only information available from sites that are now destroyed, there is no choice but to assume that the vessels were very similar.[65] To disregard these early works entirely would be a loss of information we cannot afford (see 'Going Back to Material from Old Excavations', later in this chapter).

Nevertheless, it could only have been a small fraction of what was actually found and most broken pottery was ignored (as was usual in the first half of the twentieth century). Pots showing differences in fabrics or wares on the whole were not distinguished as separate types.

Since then ceramic typologies have been greatly refined, and not only do they take fabric and ware into consideration, but also sherd material and certain indices. The typologies of hemispherical cups[66] and so-called 'beer/wine jars'[67] in the Middle Kingdom and Second Intermediate Period provide a good example, as well as amphorae in the New Kingdom.[68] These particular cases demonstrate that minute changes in the morphology of vessel types are often of chronological significance, but not always. While passing time need not necessarily be the only reason for such changes, it is by far the most frequently observed one. Differences in morphology could also be due to regional shifts or the way in which work- shops are organized or knowledge is transferred, but painstaking analysis is necessary to find firm evidence for any of these interpretations. In contrast, other pottery types do not seem to show any remarkable changes in shape over long periods of time (e.g. large rough Nile C plates or dishes and pot stands in the Middle Kingdom and the Second Intermediate Period), but other changes such as in raw material or technology may occur. Crucial for inferences of this kind is the employment of enough well-stratified examples in order to be sure that a suspected change is not a mere coincidence, and consideration of all the different factors together.

The possibility of using computerized statistical seriation and correspondence analysis to define types and distributions has so far only been applied in cemeteries in Nubia.[69]

Why a good drawing is important

Drawings of vessels or diagnostic fragments, whether rim or base, handle or decorated wall fragment, constitute the main part of an accurate, up-to-date description of ceramics. Inaccurate drawings can very easily lead to misinterpretations.[70] Nevertheless good drawings convey a much better idea of the material than any verbal description could ever do, provided the published scale is not too small. It should be noted that the pottery drawings produced by Flinders Petrie and Guy Brunton in Sedment, for instance, were quite accurate even by

[64] See Petrie and Brunton 1924: pl. xlvii.

[65] Seidlmayer 1990: 5, 17–19.

[66] Arnold 1982; 1988; Bietak 1991b; Bader 2007.

[67] Arnold 1988; Szafranski 1998; Bader 2007; 2009: 160–82, 215–22.

[68] Aston 2004b.

[69] Säve-Söderbergh and Troy 1991: 220–93.

[70] See Bader 2003; Marcus et al. 2009; Doumet-Serhal et al. 2009.

modern standards. When the author redrew some vessels from Sedment, reduced them to a scale of 1:6 and overlaid them with the drawings of the same types from the original publication they looked exactly the same. However, for a critical consideration of various aspects of the vessel, a scale of 1:3 is highly preferable, where even small details of technology and rim morphology are recognizable.

Certain conventions should be followed, namely the combination of the outside view with the section of the vessel in order to make the material visually comparable. Additionally, an indication in the drawing of the manufacturing technique is useful, because it supplies further clues not only for the dating of the vessel but also for technological considerations. Sketching the quality of the surface, by drawing large straw, limestone, or other particles, may prove useful sometimes, but the fabric description includes the quality of the surface. Because time constraints are always involved, such a procedure is not considered crucial. Often this is subject to artistic taste, much like the question concerning whether the section of a vessel should be blackened in or left white, or whether the top line should touch the section or not. While the process of drawing a vessel brings the ceramicist very close to knowing its shape intimately, it is not sufficient by itself and needs to be complemented by a short description including fabric, surface treatment, state of preservation, and measurements, in order to produce a high standard for modern reports. Archaeological illustration today has come a long way from the standards of the late nineteenth century.[71]

Ready access to digital photography has certainly radically changed procedures in documentation of pottery in the last seven to ten years. But while it is an easy way to create a visual record of a sherd or vessel, or minute details of it, digital photography cannot replace drawing of pottery and with it the personal engagement with the material. The same holds true for 3D scanning of pottery vessels, which may make sense for very special or fragile material in museums.

Manufacture

The interpretation of pictorial evidence, mainly from tombs, helps in understanding the stages of manufacture of Egyptian pottery.[72] Additional data could be obtained from archaeological sites and scientific methods[73], as well as from ethno-archaeology.[74] By means of this combined approach it has been possible to obtain a clearer idea of which techniques were used in which periods. The particulars of collecting the raw material, processing it, various shaping methods by hand or wheel or combined techniques, drying of the vessels, and surface treatment and decoration, as well as firing, all have a potential bearing on the dating of ceramics75 as well as on the history of manufacturing techniques and organizational issues. Close scrutiny of the vessels and fragments themselves provides additional

[71] See pottery illustrations in De Morgan 1895; Nagel 1938; Bourriau 1981; Bourriau et al. 2000: Figure 5.4; as well as Wegner 2007; Rose 2007; and Hendrickx and Eyckerman 2016.

[72] Arnold 1976; Bourriau 1981: 14–22; Arnold 1993; Holthoer 1977: 5–37.

[73] Vandiver and Lacovara 1985/1986.

[74] Brissaud 1982; Nicholson and Patterson 1985a; 1985b. For a list of kiln sites over a larger spread of periods see Bourriau et al. 2000: 137–43 and Soukiassian et al. 1990.

[75] Bourriau 2006.

hints on the techniques used[76], because the potters did not always remove all traces of manufacture very carefully, and thus the ceramicist gains insights into the sequence of steps undertaken to produce the vessels (*chaîne operatoire*). One particular problem is the recognition in pottery vessels of the use of the fast or kick wheel, in contrast to the slow wheel, which according to Klotz's discovery of a depiction of the kick wheel in the Ramesside period should be dated much earlier than traditionally.[77] In particular the firing process is of great interest, because the technology used can tell us much about the temperatures achieved and therefore the technical abilities of the ancient Egyptians.[78]

Function of vessels

Beside the actual shape of vessels—open for presentation and consumption and closed for storage and preservation[79]—pictorial evidence is crucial in the Egyptian context for the interpretation of the function of vessels. This source helped to identify a number of functional vessels used such as bread moulds, spinning bowls, large vats for the production of beer, beer jars, and firedogs, to name but a few.[80] The identification of special ritual vessels like *hes*-vases or canopic jars does not pose further problems. Relating pottery to reliefs or wall paintings and ritual is very rewarding[81] and provides further insights into the use of ceramic vessels, even though there may sometimes be a discrepancy between the intended use and the actual use. The latter can occasionally be understood by traces of secondary modification and use like abrasions (stand) or smoke blackening marks from exposure to fire (for cooking).[82] The study of jar labels might also allow some interpretations, but whether the designation signifies usual or unusual contents often remains unresolved.[83] The archaeological context and additional non-ceramic finds often also allow interpretations concerning function.[84] Many avenues of exploration are still to be followed in this field.

Strategies to tackle ceramics: consideration of context

With an overwhelming amount of potsherds resulting from controlled excavations[85] a strategy for dealing with these finds is necessary. Because ceramics are often the only type

[76] Rzeuska 2006: 45–54.

[77] Klotz 2013.

[78] Nicholson and Patterson 1985b; Soukiassian et al 1990; Nicholson 1993; Hope 1993.

[79] Arnold 1988: 135–6.

[80] See for bread moulds Jacquet-Gordon 1981, spinning bowls Dothan 1963; Vogelsang-Eastwood 1987/1988; Allen 1998; Gould 2010, large vats for the production of beer Faltings 1998, beer jars Holthoer 1977: 86–8, and firedogs Aston 1989.

[81] E.g. Seiler 1995; Rzeuska 2001; Hendrickx et al 2002; Op de Beeck 2007.

[82] See Bourriau et al. 2000: 142–4.

[83] Aston 2007.

[84] Bietak 1985; Bader and Ownby 2013; Sullivan 2013.

[85] E.g. 1,000,000 diagnostics mentioned by Rzeuska 2006: 55, and 85,000 mentioned by Bourriau 1991: 264.

of artefact found, there should be a system in operation that allows evaluation of as many aspects as possible, in order to take the whole archaeological record into account. It will only rarely be possible to 'draw everything', except in very favourable conditions and with plenty of resources. Crucial in the decision of what and how to record is the nature of the site. If the ceramic material comes from the surface or contexts disturbed in modern times, it would be a waste of resources to concentrate on typological studies of certain morphological aspects of pottery. The same holds true for most known dumps of early excavators and the fills of casemate structures. While it would be deeply wrong to simply discard such material without any further study, a general corpus of shape and fabrics will enhance the knowledge of spatial distribution of shapes and fabrics within the country and the site. It will also allow periods of use to be pinpointed by comparative analysis with ceramic material from better dated sites. There may not be other types of finds in some periods, so ceramics are almost always the best way to get a comprehensive overview of the occupational history of a site. Another issue is controlled excavation versus survey, both of which require different approaches towards the material.

Certainly the most rewarding strategy is to concentrate on diagnostic fragments such as rims, bases, handles, and any painted, incised, or unusual sherds. The viability of the attempt to reconstruct complete vessels depends on the care taken in the excavation, the scale of the operation, and the nature of the site. While complete vessel shapes are much more common in grave contexts or special (e.g. foundation) deposits, the likelihood of such finds is rather small in settlements. Without doubt, complete vessels hold more information than partly ambiguous sherd material, therefore any chance for reconstruction should be taken wherever feasible. With some experience it is possible to judge fairly accurately if certain contexts will yield joins, making it potentially worthwhile to spend time on this. The body fragments of broken vessels also contain information that should not be disposed of too lightly. Non-joining body fragments of various contexts should at least be sorted into fabric and ware groups and the quantity measured. The most promising methods are weighing (e.g. Memphis) or measuring the surface area (practice at Dahshur, S. Allen, personal communication and Tell el-Dab'a), in order to gain independent quantitative data that is comparable between contexts in addition to the diagnostic fragments.[86] Moreover, fabrics may be represented among the body fragments missing in the range of diagnostics, and therefore such information would be lost. A combination of weighing and sherd count can provide interesting insights into post-depositional processes in different contexts, if compared.

The use of random sampling is an innovation in Egyptian archaeology and a few recent studies have utilized this methodology. It has to be understood that techniques like random sampling do not replace the knowledge of the ceramicist but form an addition to retrieving quantitative data in an objective way.[87] Random sampling does not mean a subjective choice (or 'shopping list') as many archaeologists still believe, and it is common practice in prehistory as well as in zooarchaeology and the study of human remains, and is now included in various computer programs (e.g. the Statistical Package for the Social Sciences).

[86] See Bourriau 1991.

[87] See Bourriau 1991 for an example involving a ceramicist collaborating with a trained statistician; see also Bourriau and Gallorini 2012; 2016; Bader 2009.

The art of discarding ceramics from archaeological excavations

With the need to process a huge amount of pottery unearthed every season in controlled excavations, sooner or later a lack of storage space will affect work. In Petrie's days after recording the pottery found, a selection of typical specimens was prepared for find division as well as for shipping back to Britain. Some of the bulkier material was reburied, for example, in excavated tombs. Some caches of such material left behind by Petrie have been found (e.g. Sedment: A. Abd el-Galal, personal communication). Since finds division between the Egyptian Antiquities Service and foreign missions was abolished around the mid-1980s, all ceramic material has to remain at the site, ideally in purpose-built magazines but not unfrequently in the open air. Thus, space restrictions apply and a decision has to be made as to which material can be discarded to make room for newly excavated material. For long-term projects it is an advantage to plan ahead where to rebury material, and to then take the coordinates and mark the spot of the reburial. The addition of several labels, as was done by the Expedition of the Metropolitan Museum of Art in Dahshur, can help to prevent future confusion. Ceramics derived from surface layers and large secondary pit fills lacking a secure stratigraphic position should be sorted into body and diagnostic fragments and then into fabrics and wares. The body fragments are subsequently weighed[88] or measured (surface area), ideally in combination with counting, while the diagnostics are kept for recording. The bulk of the body sherds can be discarded after processing, except for special imports, and painted or otherwise decorated fragments or pieces unknown to the ceramicist. Probably most of the diagnostics could also be discarded after recording, except for special fragments. A teaching collection at the site may be built up from such material.

Fragmentary pottery from closed contexts should be kept wherever possible, although non-joining body fragments might be discarded after recording and publication. It seems to be self-evident that intact or complete vessels must not be disposed of, even after publication. In no instance is it advisable to discard any ceramic material that is not processed or not identifiable by the ceramicist. Where no site magazine exists, for example during surveys, a controlled redeposition will be much appreciated by any following archaeological team.

Going back to material from old excavations

The increasing trend to re-evaluate pottery in museums from excavations conducted in the early part of the twentieth century offers valuable insights by means of re-recording and redrawing the material according to modern standards. This undertaking alone provides vital evidence for the distribution of shapes and fabrics in Egypt, hitherto only suspected due to the cursory description given in these old site reports.[89] Combined with a re-evaluation of the excavation itself, a possibility exists for more refined dating of find groups other than

[88] Bourriau 1991.

[89] E.g. Bader 2001: 111, for comparanda for 'type 36'.

just the pottery, and additional inferences may in many cases be possible.[90] Several such studies have been undertaken, but unfortunately not all have been published to date.[91] A re-evaluation of the early Middle Kingdom cemetery of Sedment undertaken by the author still awaits its final touches and publication.

The largest project making use of the excellent preservation of ceramic vessels was the Middle Kingdom Pottery Handbook project (initiated by Bietak in the framework of the Special Research Programme: Synchronisation of Civilisations in the Eastern Mediterranean in the 2nd Millennium BC), the results of which were published.[92] In this respect there are still many possibilities for future projects hidden in the storerooms of museums.

Suggested reading

During the past decade so many publications dealing with ancient Egyptian ceramics appeared that it is impossible to list them here in their entirety. The conference proceedings of Vienna 2—Egyptian Ceramics in the 21st century edited by Bader, Knoblauch and Köhler in 2016 may serve as a starting point because it contains a diachronic overview of the steadily growing field with many older references and new research avenues. Nevertheless, the fundamental works on Egyptian ceramic studies of the pharaonic periods out of which everything else developed are Arnold, D. 1981, Bourriau 1981, Arnold and Bourriau 1993, and Bietak 1991a. While those provide the foundations for successful engagement with Egyptian pottery on a practical level, works such as Aston 1998, Bourriau and Nicholson 1992, and Bourriau, Smith, and Nicholson 2000 point the way to New Kingdom fabric classification systems. For more fabric classification systems beyond the Vienna System see Ballet and Południkiewicz 2012, Gates-Foster 2012, Köhler 1998, and Marchand 2009.

Ideas for research avenues to be applied on data from Egyptian pottery can be found in Arnold, Dean 1985, Bader and Ownby 2013, Redmount and Keller 2003, and Orton et al. 1993 (with a new edition by Orton and Hughes 2013). Pollard et al. 2007 gives a comprehensive overview of the application of analytical chemistry to ceramics although many of those can currently only be applied to Museum pieces outside of Egypt due to severe sampling restrictions. Two specialized periodicals dealing with Egyptian pottery are Bulletin de Liaison de la Céramique Égyptienne (1975 onwards) and Cahiers de la Céramique Égyptienne (1977 onwards).

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[90] Seidlmayer 1990.
[91] See, however, Snape 1986; Orel 1993.
[92] Schiestl and Seiler 2012.

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