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Large clay balls at Çatalhöyük East

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THE MATTER OF ÇATALHÖYÜK

REPORTS FROM THE 2009–2017 SEASONS



Edited by

IAN HODDER

BRITISH INSTITUTE AT ANKARA
Monograph 54
Çatalhöyük Research Project Series 14
2021

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Online supplementary material

Supplementary material available online (<https://doi.org/10.18866/BIAA/e-14>) comprises additional elements for chapters 7, 8 and 13. Colour versions of selected figures are available for chapters 4, 5, 6, 9, 10, 12 and 16.

7. Large clay balls at Çatalhöyük East: 16 figures (S7.1–S7.16) and eight tables (S7.1–S7.8).
8. The small geometric clay objects at Neolithic Çatalhöyük: 18 figures (S8.1–S8.18).
13. The ground stone technologies at Neolithic Çatalhöyük: six figures (S13.1–S13.6) and one table (S13.1).

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7. Large clay balls at Çatalhöyük East

Lucy E. Bennison-Chapman

Introduction

Since excavations began at Çatalhöyük in 1961, caches of mostly complete, well-formed, large clay balls were reported from the site (Mellaart 1962: 56; 1967: 63; Atalay 2005: 149). With many hundreds of examples of large clay balls recovered from inside buildings during the Hodder project's earlier years, clay balls have been subject to detailed study since the 1990s (Atalay 1998; 1999; 2000; 2001; 2003; 2005; 2008; 2009; 2012; 2013; Atalay, Hastorf 2005; 2006). Studies of food preparation form a fundamental part of archaeological research into human subsistence. Sonya Atalay's research into the function of Çatalhöyük's large clay balls places them in a central role within food preparation, as cooking 'stones'. In the earlier levels of occupation, a time when pottery suitable for cooking was not widespread, clay balls were heated and then transferred into baskets or skins full of liquid foodstuffs (Atalay 2005: 156–58; Atalay, Hastorf 2005: 118–19, 2006: 306–09).

Large clay balls (average 6.32cm diameter) remain a common find at Çatalhöyük. Thus, a new phase of clay ball study was initiated in 2015, which aimed to study all clay balls excavated from the site from 2009 until 2017. A total of 11,196 clay balls and clay ball fragments were excavated and studied during this period. Clay balls are abundant at the site, especially compared to quantities of other clay artefacts. During the same time frame, 1,879 small, geometric clay objects and 1,215 figurines (including stone examples) were recovered (Chapters 5 and 8). This chapter summarises the nature of the 2009–2017 large clay ball assemblage, highlighting unusual and unique examples within the collection. Details of form alongside contextual deposition are explored to seek support for the 'cooking' function. Other possible functional interpretations for their primary role, secondary use and re-use are explored.

Aims and research questions

Previous research

Reports of James Mellaart's initial Çatalhöyük excavations list 'sling-stones...of unbaked clay' amongst the clay artefacts recovered during his first season in 1961 (Mellaart 1962: 56). Mellaart later reported finding numerous examples of caches of 'sling ammunition' within the bins of various 'houses' and 'shrines' (Mellaart 1967: 63). These objects, which are not illustrated or

described in further detail in subsequent reports (i.e., Mellaart 1963; 1964; 1966), were later identified as groups of largely complete examples of the artefacts which later became known as 'clay balls' (Atalay 2005: 149).

Under the Çatalhöyük Research Project led by Ian Hodder, the ubiquitous clay balls were studied for 15 years by Sonya Atalay (1996–2008), who published a number of reports and research articles on their form and distribution (Atalay 1999; 2000; 2001; 2005; 2008; 2009; 2012; 2013). Atalay's research argued, based on almost 3,000 examples, that Çatalhöyük's large clay balls were cooking tools, utilised primarily during the lower levels of settlement as heating stones to cook foodstuffs (e.g., Atalay 2005: 156–57; 2013; Atalay, Hastorf 2005: 118–19; 2006: 305–09, fig. 8, table 5). Atalay argues that in Çatalhöyük's lower levels, prior to the widespread introduction of pottery suitable for cooking, waterproofed baskets or animal skins were used to hold liquid foodstuffs (Atalay 2005; Atalay, Hastorf 2005; 2006). Clay balls were heated in ovens, then transferred into stews of 'carbohydrate-rich plants with meat and plant or animal grease', providing secondary heat (Atalay 2005; Atalay, Hastorf 2005: 118–19; 2006: 306, 308, table 5). Such cooking methods, she argues, are mirrored in the ethnographic record, where cooking stones are utilised to boil both food and water (Atalay, Hastorf 2006: 309). It has also been proposed that clay balls might have been heated and placed next to ovens, allowing for the grilling of meat (Atalay, Hastorf 2006: 309).

Aims

With clay balls continuing to be a common find, especially in the earlier half of Çatalhöyük's occupation, and one of the research project's overall aims being to reach virgin soil in the South Area, it was important that clay balls continued to be studied during the project's final research phase (2009–2017). The present author took over the study of Çatalhöyük's large clay balls in 2015. The overall aim of clay ball study during 2015–2017 was to record all incoming clay balls from the current excavation season, working backwards to 2009. Evidence was examined to support or refute the use of clay balls as tools to be heated and placed into liquid meals, acting as boilers. Taking Atalay's 'cooking ball' interpretation as the starting

point, the goal was to gain an understanding of the bigger picture of clay ball presence and use at Çatalhöyük East. Rather than focusing on the study of specific units, buildings or areas of the site, a broad picture of clay ball distribution (by temporal period, stratigraphic level, site area and context type) along with changes evidenced in the *nature* of clay balls across these different elements was sought. Therefore, *all* known clay balls and fragments thereof excavated from 2009–2017 needed to be studied in as much detail as possible. This would enable broad contextual analysis of the count and the density, and changes in these two figures, of clay balls according to period, level, excavation area and context type.

Early on in the research, it was noted that a small yet significant proportion of clay balls differed from the ‘typical’ clay ball assemblage. Some had deliberate, seemingly meaningful incisions on their surfaces. Others were smaller than average or were oval in shape (Atalay 2005: fig. 6.1; Bennison-Chapman 2016). It might be thought that there would be no need to decorate boiling tools and nothing to be gained by deviating from the traditional spherical shape. Therefore, such examples were actively sought, especially amongst the fragments of clay balls. From this it was possible to accurately quantify the degree of artefact homogeneity within the clay ball assemblage and assess whether or not such non-typical examples were manufactured for a distinct function.

Specific research questions include:

- Are clay balls more common in/limited to the lower occupation levels?
 - When do they begin to decline and fall out of use?
- What is the most common primary deposition context represented by clay balls?
 - Are they really most commonly recovered in situ, in or around ovens inside buildings of the Early and Middle periods?
 - What proportion of clay balls are recovered alone, as opposed to in clusters?
 - When recovered in secondary contexts, does this represent their disposal or intentional re-use as rubble as part of structural elements?
 - What proportion of clay balls are decorated (incised with crosses, dots and so on), where are these examples recovered, and does the decoration carry any functional or symbolic significance?
 - Are the clay ‘balls’ of non-typical shape, and/or the smaller varieties, used in the same way?
 - Is there any relationship between clay balls and other artefacts at the site?
 - Do any of the above features change through time or across different occupation areas?

Particular attention was paid to recording detail of the clay objects and the context from which they were recovered. Many fragmentary clay balls were burnt on both their interior and exterior surfaces. This resulted in the questioning of their re-use and possible secondary function. Thus the research questions listed above sought to (1) identify the primary function of large clay balls, (2) identify secondary use/re-use and (3) to identify whether or not the non-typical clay balls held any specific symbolic value.

Methods

Commencing in 2015, all clay balls from the current excavation season were studied individually on site. Each clay ball or fragment thereof was assigned a unique find number, along with a corresponding unique database number (DB #). Each clay ball was studied in detail, with many varied aspects of form, appearance, manufacture, wear and indicators of post-depositional processes and activity studied. Clay balls were labelled *large clay* (*‘cooking’*) *ball* to differentiate them from the smaller spherical clay artefacts of the *clay object* category discussed in Chapter 8.

Definition

‘Clay balls’ are large, spherical-shaped artefacts made from clay. Their size (average 6.32cm diameter) and weight makes them distinct from the smaller spherical-shaped clay objects (previously defined as ‘mini clay balls’) (e.g., Atalay 2001; 2005; 2013; Bennison-Chapman 2015; 2016; 2017 and this volume, Chapter 8). Clay balls are far more homogenous than the smaller clay objects (Chapter 8; Bennison-Chapman 2015; 2016; 2017). Though largely present as fragments, clay balls are immediately recognisable due to a number of distinctive, shared characteristics. As their name suggests, the objects are spherical. This along with their large size make them easily recognisable, even when found in tiny fragments (fig. 7.1). Their outer surface is extremely smooth, burnished in most instances. This contrasts starkly with their coarse interiors. Clay balls are baked, possibly fired at low temperatures in order to achieve their characteristic appearance. The degree of completeness (either 100% complete, 99–75%, 74–50%, 49–25% or <25%) was recorded. By nature, clay balls are spherical, yet variations do occur. Shape definition was therefore recorded. Only when enough of the artefact was present to confirm that the *complete* artefact *definitely* represented a true sphere was ‘sphere’ recorded under ‘shape definition’. Otherwise ‘indicative fragment’ was logged. A small proportion of artefacts classified as clay balls varied from the traditional shape. They were



Figure 7.1. Typical clay ball (fragments) from Çatalhöyük East (DB# 3420–3430/21642.m106 to m116).

classified along with clay balls due to the presence of most of the typical characteristics of the artefact category. Oblate spheroids (asymmetrical ovoid with flattened ends) and ovoids are included here.

Recording

A detailed, individual recording process was carried out for a large number of clay balls (a total of 2,339). However, as the quantity of clay balls recovered during the final few excavation seasons was vast, and the study of the 2009–2017 excavated clay balls began with a large backlog (study commenced in 2015), the recording strategy was amended to a two-tier system. After registration, clay balls were studied at *either* Level 1 or Level 2 detail. Level 1 logged clay ball fragments as a group per unit. The artefacts were not assigned individual find numbers but were counted and weighed collectively, by unit of excavation. This allowed for the distribution of all recovered clay balls to be analysed (according to area of site, broad temporal period, stratigraphic level and nature of context). If a particularly rare form of clay ball

(decorated or complete, for example) was recovered during the Level 1 recording process, it would be put aside to be studied in detail. Specific units only (mostly the priority units) were then studied at Level 2. Once recording was complete, the data was analysed, looking at the detail of appearance, production and use of all Level 2 studied clay balls and the contextual deposition of *all* studied clay balls.

Artefact dimensions along with weight were recorded. Dimensions were taken from three angles (1. *length*, 2. *width* and 3. *height/thickness*), recording the dimensions of the complete sphere or remaining fragment. For complete examples, the length, width and height readings represent the radius from three angles. For fragmentary artefacts, the length and width represent the minimum and maximum dimensions of the remaining original face of the artefact and the thickness of the fragment, measured from the centre of the original face inwards. In addition, the circumference was recorded when a complete reading was possible (clay balls with 50% or more of the original artefact remaining).

Clay colour was logged, noting the dominant colour of the original exterior surface, the presence of a secondary colour on the exterior, and the interior colour where applicable. The presence of burning (blackened patches) was similarly recorded, including the location: *exterior, interior* or *both*. The presence of soot on an artefact (including whether this was on the interior or exterior surface) was also recorded. Evidence of the manufacturing process was sought, with the presence of fingerprints, deep finger impressions, basketry and/or matting impressions recorded. A small yet notable proportion of clay objects studied in the project’s final phase of research was found to exhibit intentional elaboration on the exterior surface. The presence and detail of this was recorded when discovered. Lastly, the presence of adhering substances such as lichen, paint or other secondary substances was sought and noted.

Clay ball character

A total of 11,196 large clay balls (or fragments thereof) were studied during the 2015–2017 seasons, 100% of clay balls excavated during the final excavation phase of the Çatalhöyük Research Project (2009–2017). The vast majority of examples (n=11,190) were recovered from the East Mound and represent 79.9% of all clay balls recovered since Ian Hodder’s excavations began in 1993 (table 7.1). N=8,852 were recorded by unit (Level 1) and n=2,338 were recorded individually, in detail (Level 2). Clay balls share many unique features in shape and manufacture, thus are easily recognisable, even when

represented by a small fragment. Clay balls are overwhelmingly recovered as fragments, just n=41 (<2%) of clay balls recovered in this final phase of research were 100% intact. Clay balls are generally recovered highly fragmented, with larger fragments represented by distinctive ‘wedge-shaped’ pieces. More than three quarters were represented by fragments constituting <25% of the original, complete artefact (fig. 7.2). As the name suggests, clay balls are rounded in form. More than two thirds (n=1,585 of the Level 2 recorded, 2009–2017 excavated) are fragments *indicative* of being spheres. Definitive, *true* spheres and *indicative fragments* combined form 99.4% of the study assemblage (table 7.2). A very small proportion deviate from the norm. Two examples of oblate spheroids (one of which is laterally asymmetrical) and 13 ovoids were recovered (table 7.2, fig. 7.3, online fig. S7.1).

The fragmentary nature of the clay ball assemblage is reflected in the diameters data. The *average* diameters (*length, width* and *height*) of the total assemblage are all less than 5cm, ranging from just 0.3cm up to 9.5cm (table 7.3). If only the clay balls with *complete* measurements are considered (maximum diameter measurement of clay balls ≥50% intact), clay balls vary in size from 3.6cm to 9.5cm, with an average maximum diameter of 6.32cm (n=170 examples). Considering the complete clay balls only (n=41), the typical character of the clay ball as an artefact category is revealed, with the diameter ranging from 3.6–9.5cm and an average circumference of 21.8cm (table 7.3, fig. 7.4). The *true* spherical shape of the

Excavation season	Level 1	Level 2	Total
1993–2008 (database records)	264	88	352
1995–2003 (counts published, Atalay 2005; 2009)	n/a	n/a	2,811
2009–2017	8,857	2,339	11,196
2009–2017 East mound only	8,852	2,338	11,190
Total	9,121	2,427	14,006

Table 7.1. Counts of the clay balls recorded during previous research seasons (Atalay 1993–2008), the most recent phase of the Çatalhöyük Research Project (Bennison-Chapman 2009–2017) and in total.

3D shape definition	Count	Percentage
Sphere	738	31.57
Indicative fragment	1,585	67.79
Spheres & indicative fragments combined	2,323	99.36
Oblate spheroid	2	0.09
Ovoid	13	0.56
Total	2,338	100.00

Table 7.2. Detail of the shape distinctions found within the large clay ball assemblage from the current 2009–2017 phase of the Çatalhöyük Research Project.

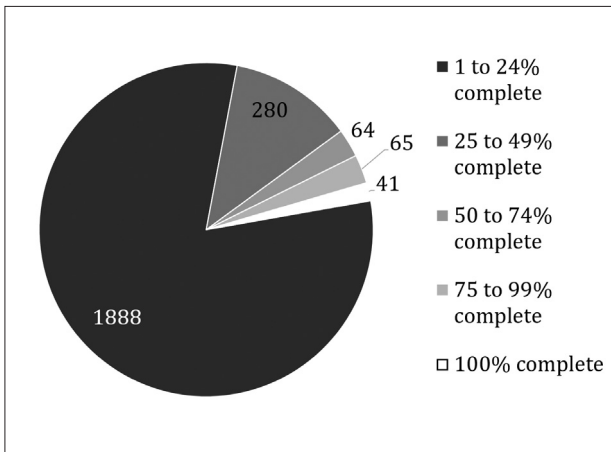


Figure 7.2. Degree of fragmentation evidenced within the 2009–2017 excavated clay ball assemblage.

majority of examples is highlighted when assessing dimensions of the complete clay balls, seen in the high degree of consistency across the three diameter measurements taken for each artefact. Notable amongst the 41 complete clay balls are the smaller examples. These remain larger than spherical forms of *clay objects* and display all of the typical characteristics of large clay balls aside from their reduced size, so were included in the clay ball category. The smallest example measures just 4.3 x 4.3 x 4.1cm (DB# 4959/22245.x2).

In weight, clay balls are dense, with a small fragment of clay ball weighing noticeably more than a small, geometric clay object or clay figurine of comparable size. The combined weight of all 2009–2017 excavated clay balls is 445,902.7g, with an average fragment/artefact weight of 40.0g (table 7.4). The lack of difference

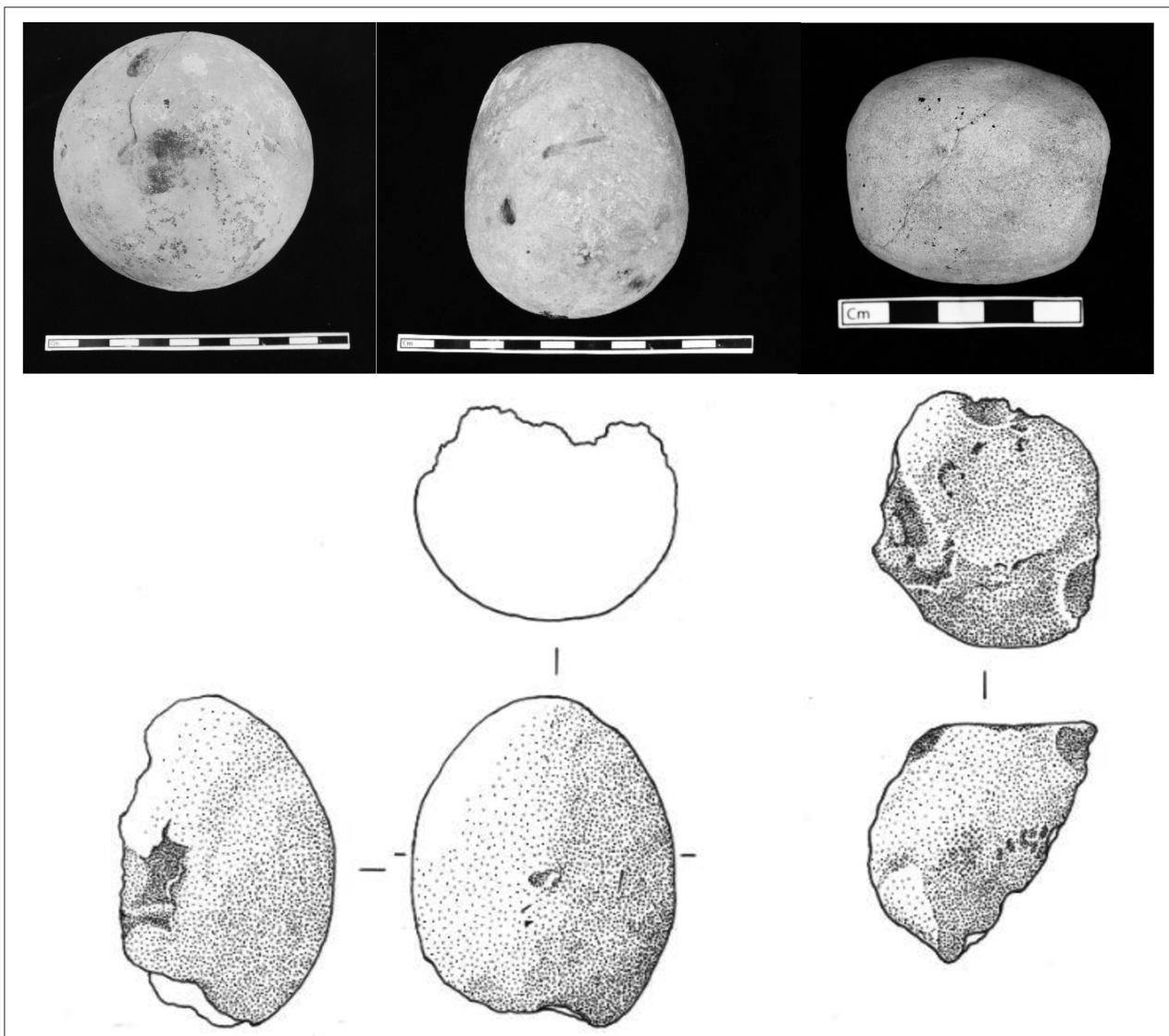


Figure 7.3. Examples of variation in clay ball shape. Top left: typical, true sphere (DB# 3839/22314.x1); centre: oblate spheroid (DB# 4304/22300.m101); right: ovoid (DB# 6936/21859.m1); drawing: asymmetrical ovoid (DB# 3685/21661.m173) (illustration by Jennie Anderson).

Dimensions	Min. cm	Max. cm	Av. cm
<i>All clay balls (n=2,338)</i>			
Diameter 1 (length)	0.6	28.1	4.6
Diameter 2 (width)	0.4	8.9	3.5
Diameter 3 (height/thickness)	0.3	8.9	2.7
<i>Complete clay balls only (n=41)</i>			
Diameter 1 (length)	4.3	9.5	6.7
Diameter 2 (width)	4.3	8.9	6.4
Diameter 3 (height/thickness)	3.6	8.9	6.4
Circumference	14.0	30.0	21.8

Table 7.3. Minimum, maximum and average measurements of the 2009–2017 excavated East Mound clay ball assemblage (Level 2 recorded, n=2,338). Top: all artefacts; bottom: complete examples only (n=41).

between the average fragment/artefact weight of the Level 1 and the Level 2 assemblage confirms that the latter is representative of the former. The relatively light average weight reflects the true nature of the clay ball assemblage, the vast majority of which are proportionally small fragments. Therefore, 91% of clay balls weigh less than 100g. This contrasts with the weights of the complete clay balls, which average 306.7g. The lightest complete clay ball is the sphere mentioned above (22245.x2), 79.8g. The heaviest, in contrast, weights 712.1g, demonstrating a large degree of variation in weight (fig. 7.5). Shape definition does not affect clay ball weight. The weight of the complete ovoids (n=3) and oblate spheroid (n=1) falls within the standard range, and the fragment weight of the other non-true spheres reflects that of similarly proportioned spherical fragments.

Manufacture. Çatalhöyük’s clay balls are crafted from a fine, highly compacted clay, with few visible inclusions. The clay is dense in make-up. Clay balls typically have an extremely smooth, almost burnished exterior surface, often exhibiting many shallow fingertip depressions from manufacture. This along with the dense clay make-

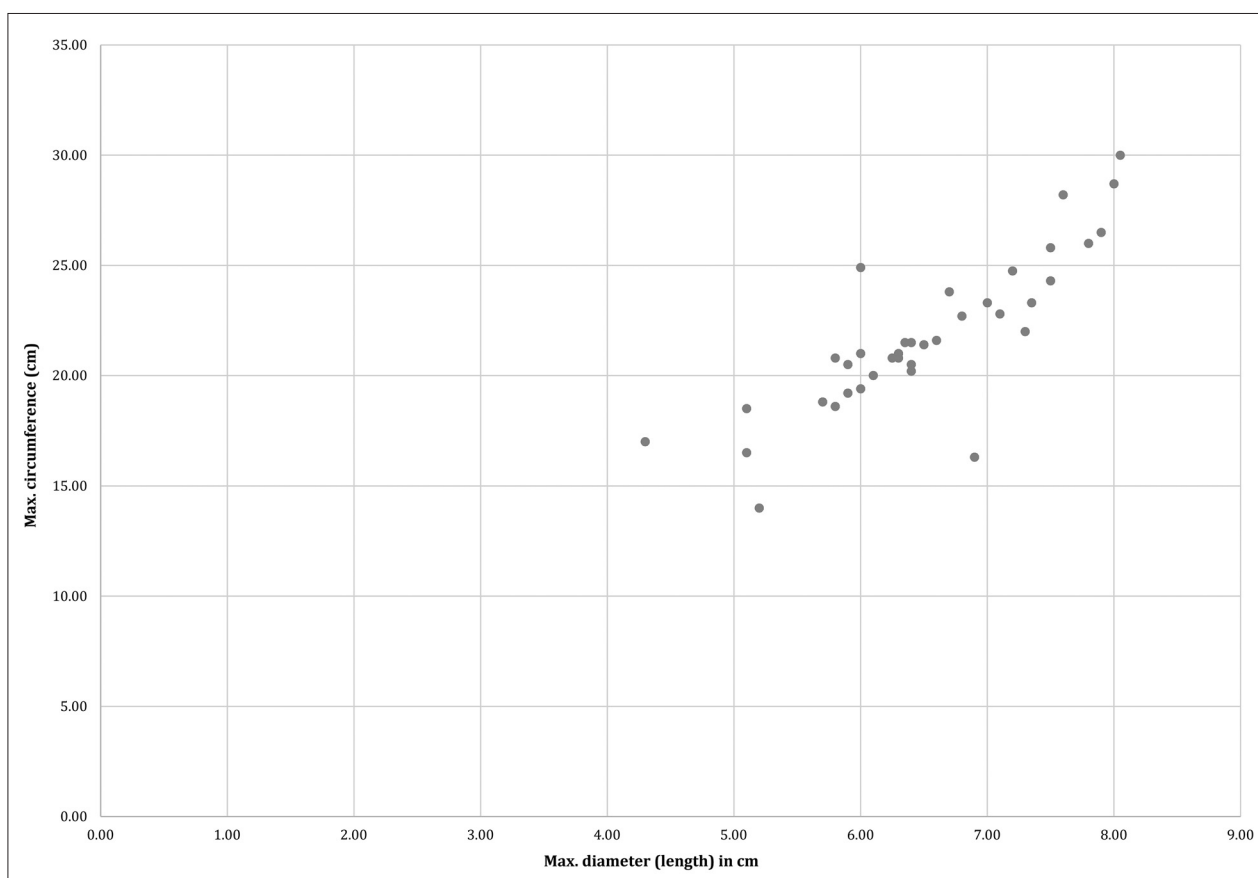


Figure 7.4. Comparison of the length/maximum diameter and circumference of the n=41 complete clay balls (excavated 2009–2017).

up suggests clay balls were manufactured by careful and lengthy manipulation within the hands (rather than rolling on a flat surface, for example), followed by exposure to heat.

Analysis of the clay colouring, texture and inclusions suggests clay balls are made from a limited range of widely locally available clays, namely backswamp, silty and sandy calcareous types. This reflects conclusions reached in previous research into the clay sourcing of figurines, clay balls and clay objects at Çatalhöyük (Doherty 2017: fig. 4.1, fig. 4.3, 44–47;

also see Avis 2010; Bennison-Chapman 2013; Doherty 2013; Bennison-Chapman, this volume, Chapter 8). Clay balls are dominated by grey shades. The largest single colour category is ‘mid-grey’, 185 (n=425). Shades of mid-light grey combined are the primary colour of almost half of all clay balls recovered (40.7%, n=951). In contrast, very pale clays of beige, cream, light grey and white are extremely rare, representing just 12% of the assemblage (n=287) (table 7.5, online fig. S7.2). The range of clay colours reflects post-depositional practices and the secondary use of clay balls.

At least four clay balls are unusual for displaying extremely deep finger or fingertip depressions. Two have deep, pronounced fingertip depressions all over their surfaces (DB #3390/21660.m101, 3433/21660.m108). The third displays three long and flat finger impressions (DB #3839) and the final example has three deep, vertical finger depressions, thus resembling a bowling ball ((DB #3840/22314.m106), fig. 7.6). These examples likely represent mistakes in the production process, a lapse in care whilst moving clay balls from one place to another during manufacture (also see online fig. S7.3).

Record	Combined weight (g)	Count	Weight (g) Av. per artefact/fragment
Level 1	346,561.9	8,852	39.16
Level 2	99,340.8	2,338	43.21
All	445,902.7	11,190	39.99

Table 7.4. Weight per clay ball/fragment according to recording level of study (2009–2017 excavated East Mound artefacts only).

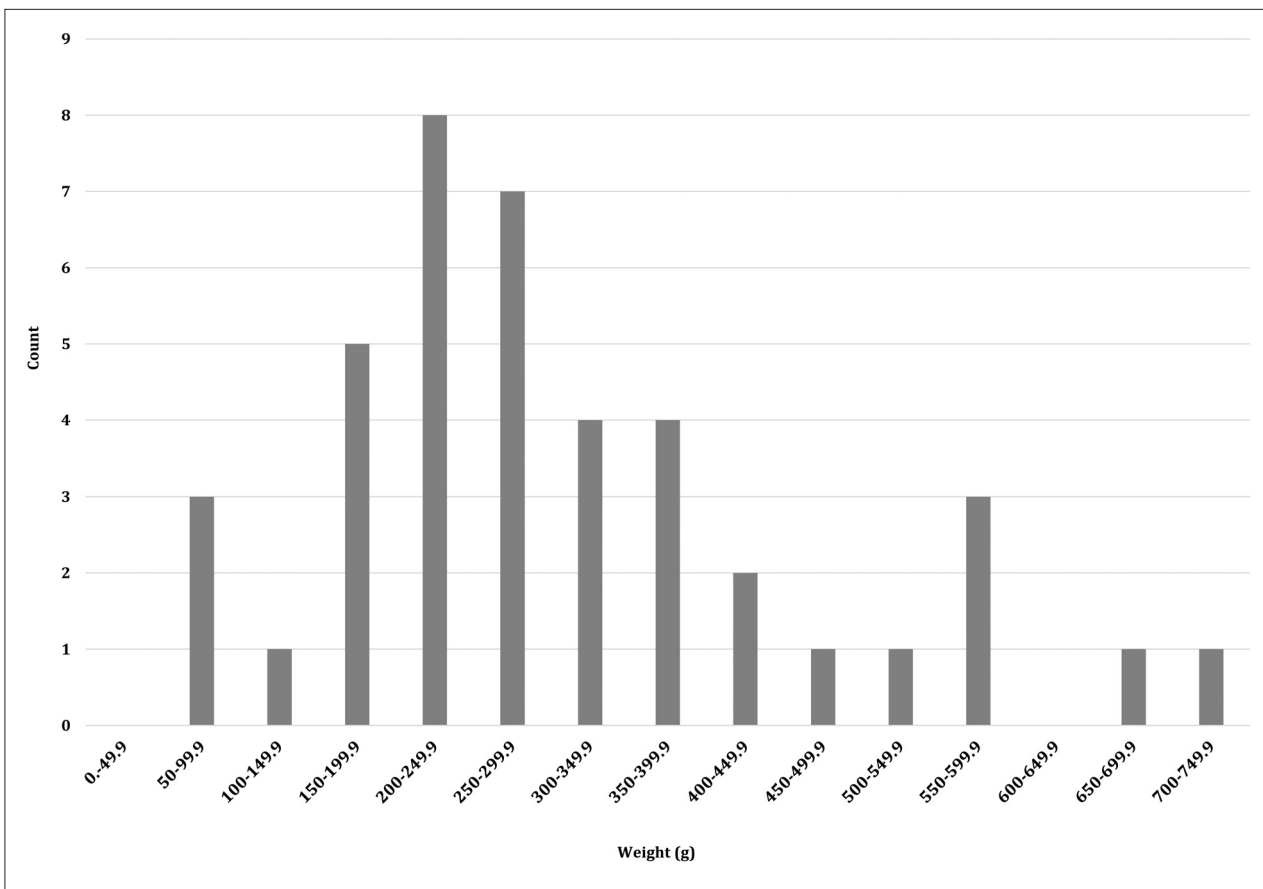


Figure 7.5. Clay ball weights (complete examples from 2009–2017 excavations only, n=41) distributed by 50g bins.

<i>Primary clay colour (simplified)</i>	<i>Count</i>	<i>Percentage</i>
Grey	951	40.68
Orange	427	18.26
Pale (white/cream/grey/beige)	287	12.28
Black	234	10.01
Brown	230	9.84
Other	209	8.94
Total	2,338	100.00

<i>Primary clay colour</i>	<i>Count</i>	<i>Percentage</i>
Mid-grey	425	18.18
Orange/cream	232	9.92
Orange/orange-brown	195	8.34
Dark grey	192	8.21
Light grey	177	7.57
Mid-brown	157	6.72
Mid-light grey	157	6.72
Black/v. dark grey	139	5.95
Light beige/cream	122	5.22
V. Light brown/beige	106	4.53
Black	73	3.12
Dark brown	47	2.01
V. Light grey-white	30	1.28
V. Light cream/white	29	1.24
Light brown	26	1.11
Black/dark brown	22	0.94
Red/red-brown	5	0.21
Red/pink	3	0.13

Table 7.5. Primary clay colour (main colour of the exterior surface) of clay balls, simplified and detailed (2009–2017, East Mound excavated, Level 2 recorded artefacts, n=2,338).

However, the depressions on DB# 3840 are far too deep to have been accidental and remain unnoticed. This example represents the production of a tool for a distinct use, perhaps enabling the better handling of the ball.

Also reflective of manufacture is the presence of basketry and matting impressions on the outer surface of clay balls. These are rare (26 definitive examples), yet when found are deep and clear, identifiable to three common forms: (1) ‘twill plaited matting’ (e.g., Wendrich 2005: fig. 15.3 right, fig. 15.5); (2) ‘tabby weave’ (Wendrich 2005: fig. 15.6; Jørgensen et al., this volume, Chapter 11); and (3) coiled basketry (Wendrich 2005: fig. 15.2–3) (table 7.6, fig. 7.7). The presence of these impressions suggests clay balls were stored in large groups inside baskets or piled up on matting on the floors of buildings. The rare examples with impressions likely



Figure 7.6. Clay ball fragment with three deep finger impressions (DB# 3840/22314.m106).

represent the premature stockpiling of clay balls before they had completely hardened. It is likely one batch of clay balls was prepared at a time, then stashed in a pile inside buildings before baking; thus the lowest received basketry or matting impressions, which occasionally were neglected when it came to smoothing them before they were placed into the oven.

Evidence of post-depositional processes. A small yet significant proportion of clay balls have a deep orange or orange/brown primary colour, 8% (n=195). When fragmented, these examples almost always have a grey interior, showing that the orange colour was not the original shade of the clay. The bright orange colour is identical to the colour of the clay floors and mudbrick walls of heavily burnt buildings at Çatalhöyük (online fig. S7.4). Therefore, it appears to be the result of exposure to high temperatures post-manufacture, likely during post-abandonment burning of a building.

More than half of clay balls (55%, n=1,158) have a *secondary* colour suggestive of heat exposure. Small patches of blackened surfaces, resulting from the direct exposure to flames, is common, seen on 93.4% of examples (n=1,949). A far smaller proportion are thoroughly and entirely burnt to a solid black colour, 10% (n=234, table 7.5, online table S7.1). Though blackening may occur during the initial firing or baking of clay balls in manufacture, direct exposure to heat continued as a result of the activities linked to their daily use. Indeed, daily/primary use involved the heating of clay balls to



Figure 7.7. Impressions on clay balls. Left: coiled basketry, DB# 3686/21661.m174 (4.9cm x 4.6cm x 2.9cm); centre: coiled basketry, DB# 6961/32673.m1; right: tabby weave, DB# 3893/22332.m101 (illustration: Jennie Anderson).

Impressions	Count	Percentage
Coiled basketry	8	30.77
Tabby weave matting	7	26.92
Twill plaited matting	5	19.23
Unidentified matting	6	23.08
Total	26	100.00

Table 7.6. Range of matting and basketry impressions identified on the surface of clay balls.

Adhering material	Count	Percentage
Brown lichen	3	8.33
Lenticular gypsum	14	38.89
Red paint	1	2.78
Yellow/orange lichen	17	47.22
Total	35	100.00

Table 7.7. Detail of the n=35 clay balls displaying adhering material (aside from soot).

high temperature, resulting in their initial fragmentation into large, wedge-shaped pieces. Clay balls are commonly blackened on both their exterior and interior surfaces, accounting for 73% of examples (n=1,705) (online fig. S7.5). Thus initial breakage did not lead to the disposal of clay balls or a change in use. Exposure to heat was integral to the function of clay balls, and even though a negligible proportion show no blackened surfaces, soot is found adhering to the surfaces of many of the clay ball fragments which otherwise show no clear sign of burning as evidence of heat exposure (n=51, 2.2%). Such examples were clearly placed alongside heavily burnt clay balls or other burnt items. Indicative of post-depositional processes, a small proportion of clay balls display material adhering to their original, outer surface. Thirty-four examples (1.5%) are covered in white or brown specks, demonstrating the growth of lichen and the adherence of lenticular gypsum from surrounding soils (Porta, Herrero 1990; Herrero, Porta 2000) (table 7.7).

Clay balls are almost exclusively plain in appearance. A single example (half of a clay ball, DB #5074/22301.m153) has a faint yet certain covering of red pigment. Twenty-four clay balls (1%) display

markings on their exterior surfaces. Applied during initial manufacture, these marks appear to be decorative, possibly symbolic in function in some instances. The markings display a variety of application techniques, styles and motifs, yet just two examples are from complete clay balls. Some markings comprise a single element, others have a design consisting of up to 18 markings or more, with the design covering the entire remaining fragment (table 7.8, online table S7.2 and online fig. S7.6). Markings may have had a practical function, such as the large cross incised on one ball, which could have been grooves created specifically to hold two pieces of string in place in order to carry the ball or tie it to something (DB #5681/20965.m3. fig. 7.8 top). This could be particularly useful if the ball was to be transferred from location to location whilst hot. Similarly, the 18 notches covering one side of the surface of a complete oblate spheroid may be symbolic, retaining information and meaning (DB #4304/22300.m101. fig. 7.8 bottom). The use of small holes (made by inserting a thin implement into wet clay) is a common motif. The resultant hole can be found singly on small fragments, yet most likely

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	<i>DB no.</i>	<i>Find no.</i>	<i>Marking(s) description</i>
1	3683	21661.m171	Total of five very clear markings: one set of three and one set of two on the opposing sides of this complete ball. The set of three form a triangle shape and are equally spaced 2.5cm apart. The two markings on the opposing side are the same.
2	3684	21661.m172	Two markings which cover almost the entire remaining surface. They are two deep, incised dots 0.5cm deep. One is in the fragmented edge.
3	4285	32106.m124	A total of seven markings. All are shallow, 0.5cm x 0.3cm, and run in two parallel rows. Located on a flattened part of this fragment. Possibly unintentional.
4	4287	32106.m126	Five clear, deep grooves running in parallel. They extend to the edge of the present fragment.
5	4300	31594.m103	Three deep holes closely spaced, forming a triangle shape. Partially in the fragmented section. Each is identical; they are 0.3cm wide and spaced 0.8cm apart from one another. Each is at least 1.0cm deep.
6	4304	22300.m101	Approximately 25% of this complete object has markings, a total of 18. Each is a deep, diagonal notch. They are generally placed in groups, closely spaced. In addition, there are three single, isolated long notches (ca 2.0cm long).
7	4307	22300.m104	Three faint notches can be seen on one side of the object. Similar to those seen on #4304 (22300.m101).
8	4905	22343.m106	One single deep, incised hole.
9	5129	32467.m127	Two rows of dots. Each row measures 1.2cm long. The two rows are spaced 1.0cm apart.
10	5568	32128.m.73	Total of 21 small incised dots, running in pairs, resembles the number '5'.
11	5616	19836.x.1	Two rows of small dots arranged in a zigzag design.
12	5657	30127.x.1	Three dots incised into the exterior surface. Each measures 0.3cm x 0.2cm wide. They are equally spaced, 1.2cm apart.
13	5671	19596.m.8	One single rounded hole, 0.3 cm deep and 0.3 x 0.3 cm wide. Located 1.5cm from the fragmented edge.
14	5681	20965.m.3	Two lines crossing each other.
15	5725	20965.m.15	One single deep fingertip depression. It is located on the fragmented edge, so possibly one of many. Measures 0.9cm x 1.0cm, 0.30cm deep.
16	5823	20965.m.113	Three deep fingertip depressions (first and second fingers and the thumb fit perfectly inside). Two are located on the fragmented edge – just half of each of these remains. The depressions measure 3.0cm x 1.9cm, 0.3cm deep. They are spaced approximately 1.5cm apart.
17	5833	20965.m.123	Three incised lines, two forming an 'L' shape, and one line inside running diagonally. The length of each line is 2.3cm (complete), 1.8cm (centre-fragmented) and 1.5cm (fragmented). Each is 0.2cm wide and 0.15cm thick.
18	5978	32692.m.45	Three holes run in a line left to right, spaced 0.50cm apart. The third hole is in the fragmented edge. A further two holes are placed at a 90° angle to these, one of which is in the fragmented edge, thus barely visible. A total of five incised holes, three of which are complete.
19	5989	32692.m.56	Two incised dots located along the fragmented edge. Each measures 0.2–0.3cm (diameter). They are spaced 0.4cm apart.
20	6113	21841.m.22	Tiny fragment with two shallow, circular markings.
21	6211	19486.m.19	Two complete, clear and deep holes on the surface. Each measures 0.25cm x 0.25cm, 0.90cm deep. The holes are spaced 0.60cm apart. Two further holes are located along the fragmented edge (larger at 0.60cm).
22	7130	23143.m.29	There are eight incised holes running along the broken edges.
23	7175	23143.m.74	Two parallel incised lines.
24	7541	21634.m.1	Two crossing lines covering the entire remaining face.

Table 7.8. Detail of the 'markings' found on n=24 clay balls.

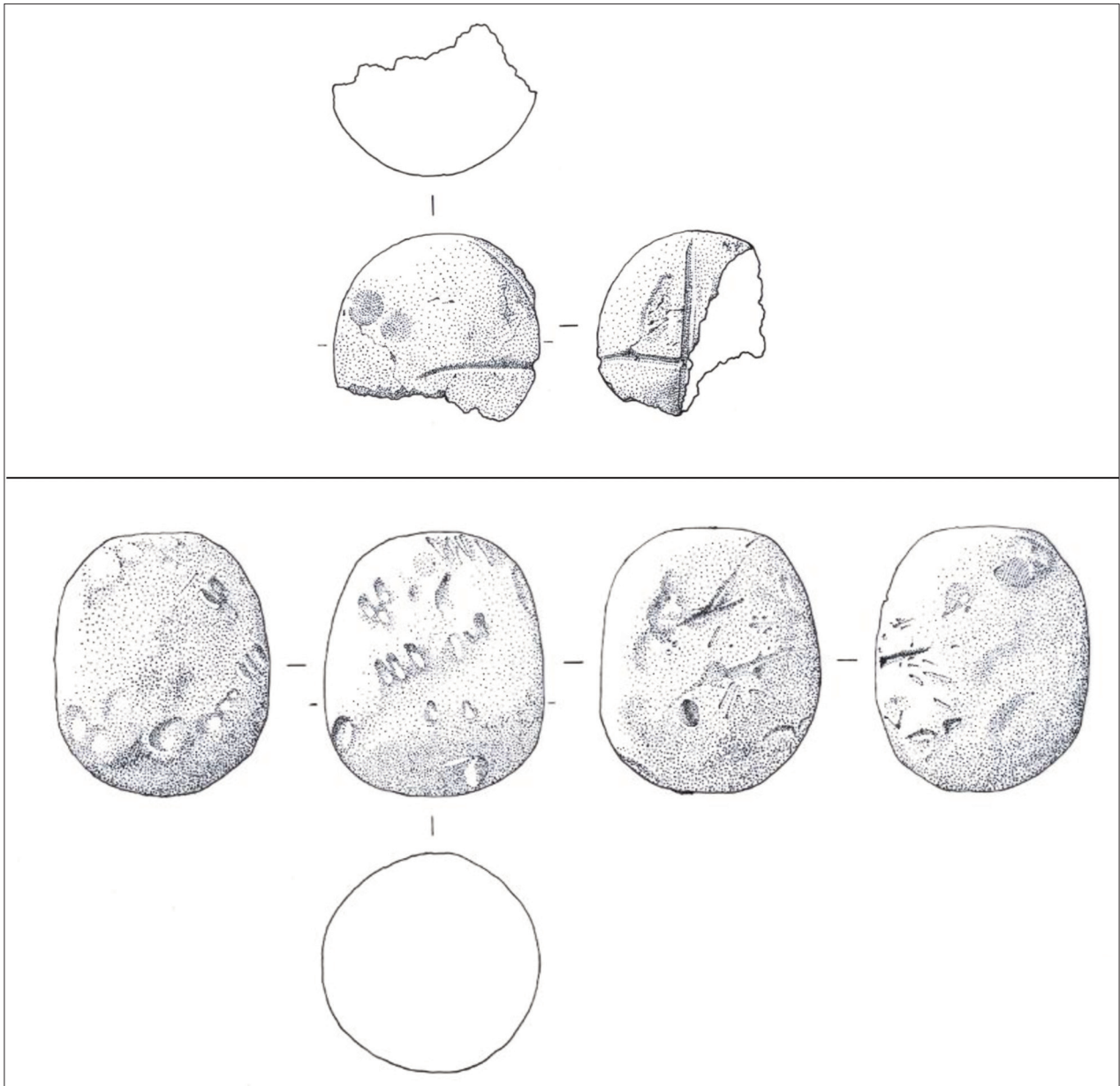


Figure 7.8. Clay balls with markings. Top: notched cross, DB# 5681/20965.m3 (5.5cm x 3.8cm x 5.3cm); bottom: oblate spheroid with 18 notches, DB# 4304/22300.m101 (6.0cm x 5.6cm x 7.2cm) (illustration by Jennie Anderson).

they were used in decorative combinations (online fig. S7.7). One complete ball has two triangles on opposing sides, each made from three small holes (DB #3683/21661.m171). A triangle formed with three dots is seen on other examples such as DB# 5705/20988.m11 and DB# 6955/23143.m3. Many other clay balls with markings display intricate designs made with the same technique, creating swirls, curves and zigzags (fig. 7.9, table 7.7).

Clay balls are highly uniform in manufacture and appearance, present in a limited range of clay colours reflecting the utilisation of a limited range of local clay types. Clay balls are easily recognisable, even as

fragments, due to their dense clay make up, the shallow curve of their surface and their extremely smooth finish. Markings, matting and basketry impressions are distinctive yet exceptionally rare. The spherical shape of clay balls is highly regular, and though variants to shape do occur, they are infrequent. The overwhelming majority of clay balls are fragments. Over 80% (n=1,888) of the assemblage is fragments of less than 25% of the original artefact. Just 41 complete clay balls were recovered in the 2009–2017 seasons (1.8%). These examples averaged a 21.8cm circumference, 6.7cm diameter and 306.36g weight; thus they are extremely heavy and comparable to a grapefruit or baseball in size.

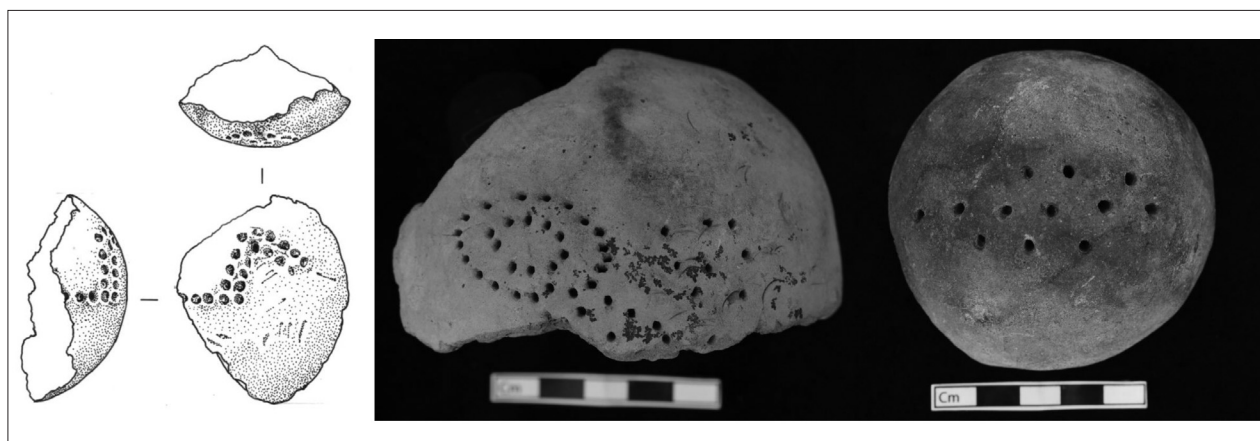


Figure 7.9. Clay balls with decorative markings. Left: zigzag design, DB# 5616/19386.x1 (6.5cm x 5.3cm x 3.0cm); centre: intricate design, DB# 69413/2616.m1; right: linear pattern, DB# 6963/32685.m1 (illustration by Jennie Anderson).

Though baked or fired during manufacture, the overwhelming majority of clay balls were, post-production, heated and re-heated time and time again in a practice related to their function.

Re-use

Detailed analysis of the small geometric clay objects (Chapter 8) and large clay balls, along with a general survey of all other clay artefacts and materials recovered at Çatalhöyük, has revealed the existence of a small number of artefacts which do not fit into any previously designated typological category. Twenty-six disc-shaped objects have been identified, manufactured via the re-use of fragments of large clay balls. As such, the discs are dense in clay make-up and their upper surface has a shallow convex curve. The upper surface is extremely smooth, as it is formed from the original exterior surface of a clay ball. The base surface in contrast is almost flat and is coarse in texture, being formed from the interior clay of a large clay ball (online fig. S7.8). The *re-used discs* are small in size, slightly larger than an average small geometric *clay object* at 4.73cm x 4.21cm x 2.23cm average dimensions. Yet due to their raw material, *re-used discs* are significantly heavier than *clay objects* (average weight of 4.65g), with an average weight of 41.93g. *Re-used discs* all share the characteristics of disc type-3, lenticular in shape with lightly convex upper and base surfaces, joined by sharp or rounded corners (Chapter 8). Viewed from above (plan view), they are a mixture of round and oval (table 7.9). It is unclear whether the *re-used discs* were deliberately crafted into their present shape for use in a specific activity, or whether their shape is simply the result of the re-use of clay ball fragments in a rubbing, polishing or grinding activity.

Contextual deposition

Area and temporal period

Clay balls are distributed almost exclusively across the two main excavation areas, North (n=4,981, 45%) and South (6,096, 54%), with a slightly increased count and density in the South Area (0.0200 and 0.0139 objects per litre respectively) (fig. 7.10, online table S7.3). Less than 1% of clay balls were recovered from TPC and GDN Areas combined (n=83/0.7%). This is the result of the broad temporal distribution of clay balls, which are found almost exclusively in the first half of settlement at Çatalhöyük, the Early (7100–6700 BC, n=5,222) and Middle (6700–6500 BC, n=5,274) periods, prior to the occupation of TPC and GDN (fig. 7.11 top).

Ninety-four percent of clay balls are recovered from stratigraphic levels pre-ca 6500 BC (the Early and Middle periods). The Late period (ca 6500–6300 BC) sees a sharp decline in clay ball counts to just n=360, representing only 3.3% of clay balls. This is despite continued settlement in both the North and South Areas. Clay ball counts continue to decline through time, with just four fragments of clay balls belonging to the Final period, ca 6300–5950 BC (fig. 7.11 top, online fig. S7.9). The temporal patterning of clay balls clearly demonstrates they were most important during Çatalhöyük's Early period of occupation, declining in use through time, with an abrupt end in their widespread use ca 6500 BC. This is supported by density analysis (fig. 7.11 bottom).

Period and stratigraphic level

The South Area is the longest-occupied zone at Çatalhöyük, spanning from the start of the Early period into the end of the Late period, ca 7100–6300 BC. Temporally,

	DB no.	Find no.	3D shape	Registration	Weight (g)	L (cm)	W (cm)	H (cm)	Burnt?
1	4249	32405.co.2	Disc 3	'Re-used disc' (clay object database)	32.8	4.6	4	2	No
2	4950	32495.co.1	Disc 3	'Re-used disc' (clay object database)	24	4	3.6	1.9	Yes
3	4951	32495.co.2	Disc 3	'Re-used disc' (clay object database)	30.2	4	4.4	2	Yes
4	4952	32495.co.3	Disc 3	'Re-used disc' (clay object database)	37.4	4	4.7	2.3	Yes
5	4953	32495.co.4	Disc 3	'Re-used disc' (clay object database)	50.7	5	4.6	2.2	Yes
6	4954	32495.co.5	Disc 3	'Re-used disc' (clay object database)	56.9	5.5	5	2.3	No
7	4955	32495.co.6	Disc 3	'Re-used disc' (clay object database)	67.1	6	5.8	2.4	No
8	5062	22301.co.1	Disc 3	'Re-used disc' (clay object database)	29	4	3.9	2.2	Yes
9	5063	22301.co.2	Disc 3	'Re-used disc' (clay object database)	48.7	4.1	4	3	No
10	5144	32496.co.1	Disc 3	'Re-used disc' (clay object database)	45.8	5.2	4	2.1	No
11	5292	31583.co.1	Disc 3	'Re-used disc' (clay object database)	37.2	4.3	4	2.4	Yes
12	5293	22670.co.1	Disc 3	'Re-used disc' (clay object database)	27.7	4	4	2.2	No
13	6366	21873.m.1	Disc 3	'Re-used disc' (clay object database)	78.9	5.4	5	2.9	Yes
14	6924	32632.co.1	Disc 3	'Re-used disc' (clay object database)	30.3	4.4	4	1.7	Yes
15	6925	31542.co.1	Disc 3	'Re-used disc' (clay object database)	45.8	4.9	4	2.35	No
16	6926	23226.co.1	Disc 3	'Re-used disc' (clay object database)	62	5.2	5	2.5	Yes
17	6927	23226.co.2	Disc 3	'Re-used disc' (clay object database)	30.3	4.1	4	2.2	No
18	6928	21863.co.1	Disc 3	'Re-used disc' (clay object database)	48.7	5	4.7	2.3	No
19	6942	23831.x.1	Disc 3	'Re-used disc' (clay object database)	42.4	4.4	4	2.5	Yes
20	6943	32745.co.1	Disc 3	'Re-used disc' (clay object database)	31.7	4.2	4	1.85	Yes
21	6969	31906.co.1	Disc 3	'Re-used disc' (clay object database)	72.2	5.6	5	2.4	Yes
22	5034	22301.m.113	Disc 3	'Re-used disc' (clay ball database)	68.2	7.42	4	2.7	Both
23	5565	32128.m.70	Disc 3	'Re-used disc' (clay ball database)	5.7	3.1	2	1.6	Yes
24	5690	20489.m.4	Disc 3	'Re-used disc' (clay ball database)	28.4	5	4	2.1	Both
25	6588	21816.co.1	Disc 3	'Re-used disc' (clay object database)	39.9	4.5	4	2.4	No
26	6592	32433.co.2	Disc 3	'Re-used disc' (clay object database)	18.3	5	3.7	1.6	Yes

Table 7.9. Detail of the $n=26$ disc-shaped objects made from the re-use of large clay ball fragments.

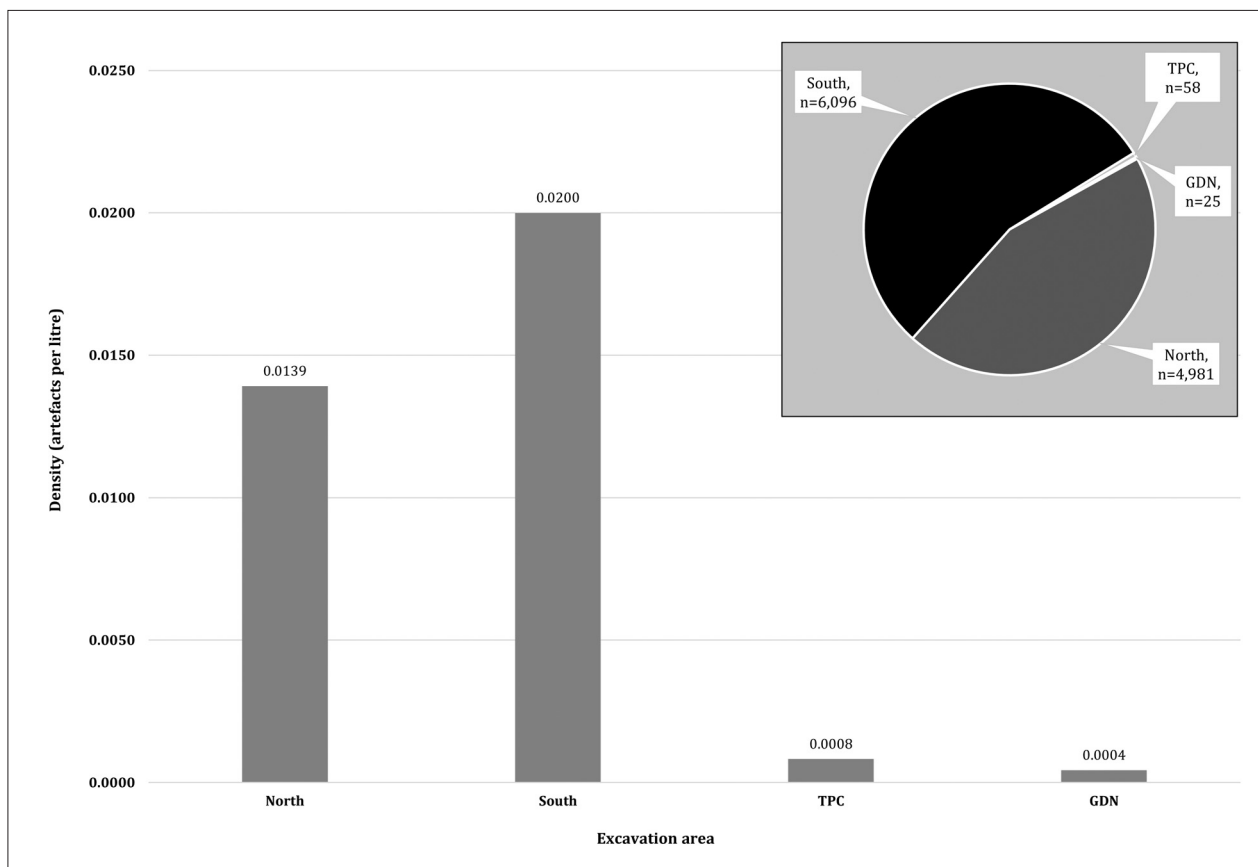


Figure 7.10. Distribution of clay balls across Çatalhöyük East's excavation areas. Main chart: density of clay balls per litre of sediment excavated per litre. Inset: counts (Level 1 and 2 data combined, $n=11,190$).

however, the use of clay balls is largely limited to the second half of the Early period. Eighty-six per cent ($n=5,230$) of clay balls of the South Area come from the Early period of settlement, the majority from a single level, South K, ca 6800–6600 BC (63%, $n=3,815$) (fig. 7.12 top). In contrast, no other level within the South Area contains more than 515 clay ball fragments, thus the widespread use of clay balls in the South is limited to a period of 200 years. Density analysis shows the same trend, with the greatest density of clay balls found in the South Area's Early period. There is no gradual decline in clay ball density, level by level. Levels South L (0.1650 o/l) and South K, at the end of the Early period, are both extremely dense in clay balls (fig. 7.12 bottom).

Occupied throughout Çatalhöyük's Middle and Late periods, from the North Area almost all clay balls recovered, 93%, date to the Middle period, ca 6700–6500 BC ($n=4,599$). This period is represented by just two stratigraphic levels, North F ($n=1,992$) and G ($n=2,475$), showing a slight increase though time within the Middle period. In contrast, the Late period in the North Area contains just 224 clay balls, almost all of which date to the start of the period, Level North H, the

earliest level of the Late period (fig. 7.13 top). No clay balls have been recovered from subsequent levels within the North Area. Once more, the relative temporal distribution of clay balls is mirrored in their distribution by density. Clay balls are present at the start of the Middle period of occupation in the North Area (Level North F). They increase dramatically to 0.1009 o/l in the second half of the Middle period (Level North G) before declining in density at the start of the Late period (North H). They disappear altogether ca 6400 BC (fig. 7.13 bottom). This places the peak time of use in the North Area at ca 6700–6500 BC. Very low numbers of clay balls are in circulation during the second half of occupation at Çatalhöyük (Late and Final periods), in the South, TPC and GDN Areas. Density analysis shows an extremely limited use of clay balls towards the start of the Late period in TPC (Level M) before their use disappears almost entirely into the Final period (fig. 7.14).

The temporal and spatial patterning demonstrates that the use of clay balls was widespread during the first half of settlement at Çatalhöyük only. Clay balls were commonly used in the South and North Areas at

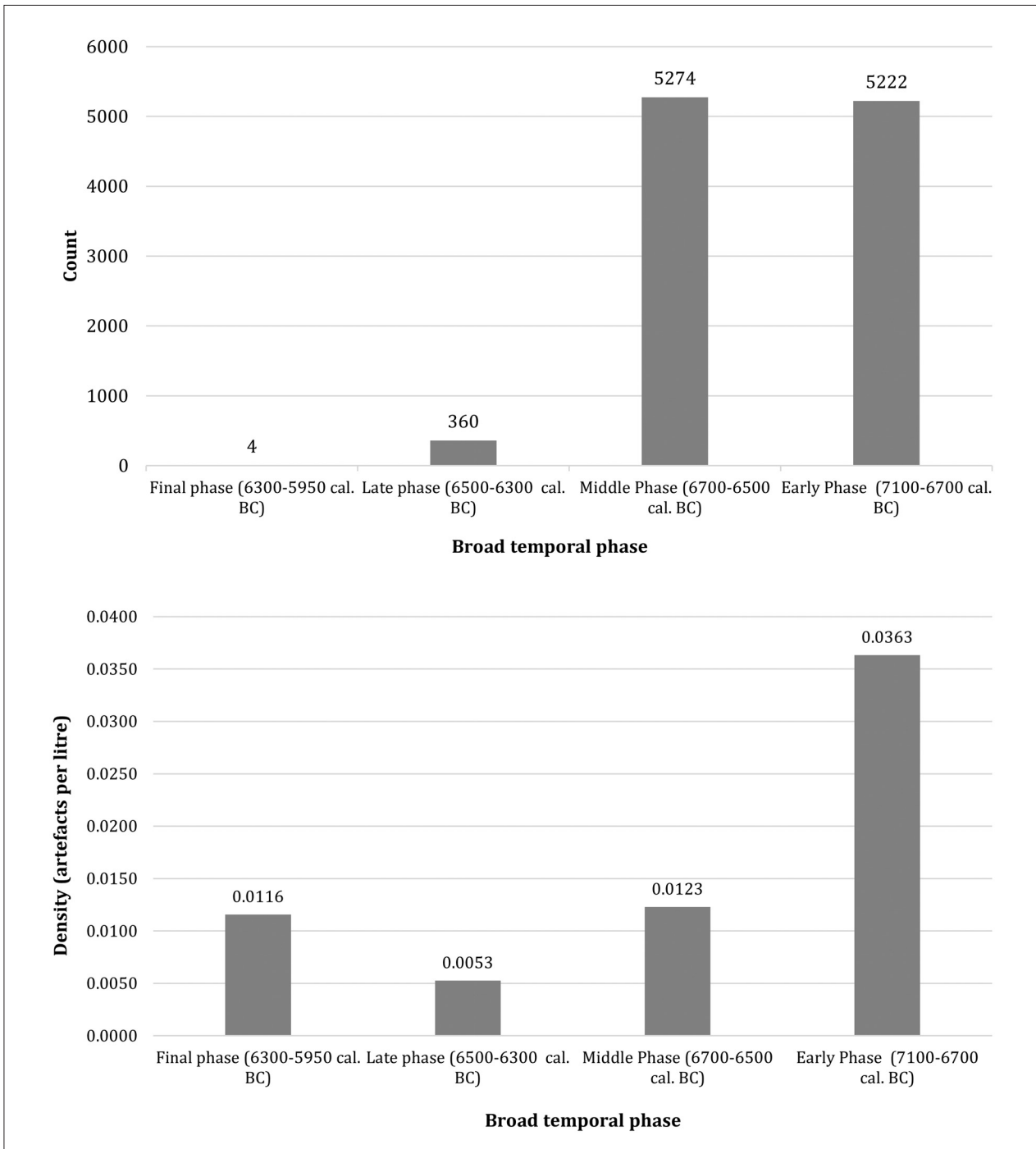


Figure 7.11. Count (top) and density (bottom) of clay balls (Level 1 and 2 data, n=11,190) across Çatalhöyük's four broad occupation periods.

this time. The South Area saw the height of clay ball use during a period of 200 years, ca 6800–6600 BC, with the peak of clay ball use in the North slightly later, ca 6700–6500 BC. Clay balls disappear in the North Area completely by ca 6400 BC and occur only in negligible quantities and densities elsewhere after this date (online fig. S7.12).

Nature of context

The distribution of clay balls according to the nature of their context shows they are most commonly recovered from refuse deposits and other secondary contexts. The Data Category context record shows a huge 86% of clay balls are recovered from the broad categories of 'fill' (n=4,503) and open area or 'midden' (n=3,448) (table

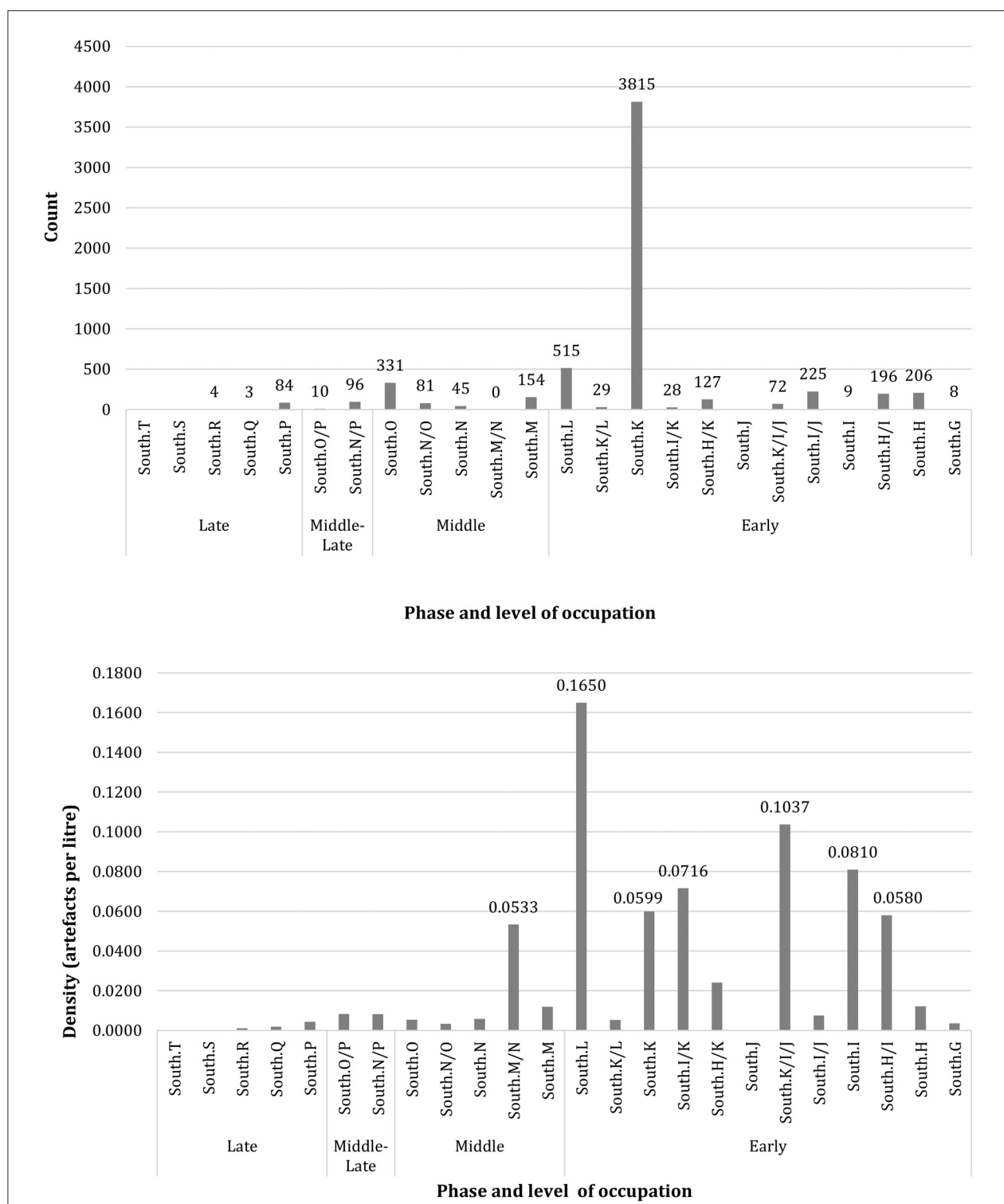


Figure 7.12. Temporal distribution of clay balls within the South Area by period and level of settlement (2009–2017 excavated artefacts, n=6,096). Top: count; bottom: density of clay balls per litre.

7.10). Midden contexts represent the accumulation and disposal of refuse in open spaces between buildings. These open areas also sometimes contained discrete surfaces upon which tasks such as craft production and food processing activities were carried out. Middens also accumulate less commonly inside disused buildings. Fill

in the broadest sense represents redeposited sediment into a variety of contexts. The infilled features are almost exclusively found inside buildings, and midden material likely served as general fill, including for the infilling of abandoned buildings. Like ‘fill’, the broad context of ‘construction/make-up/packing’ also represents the

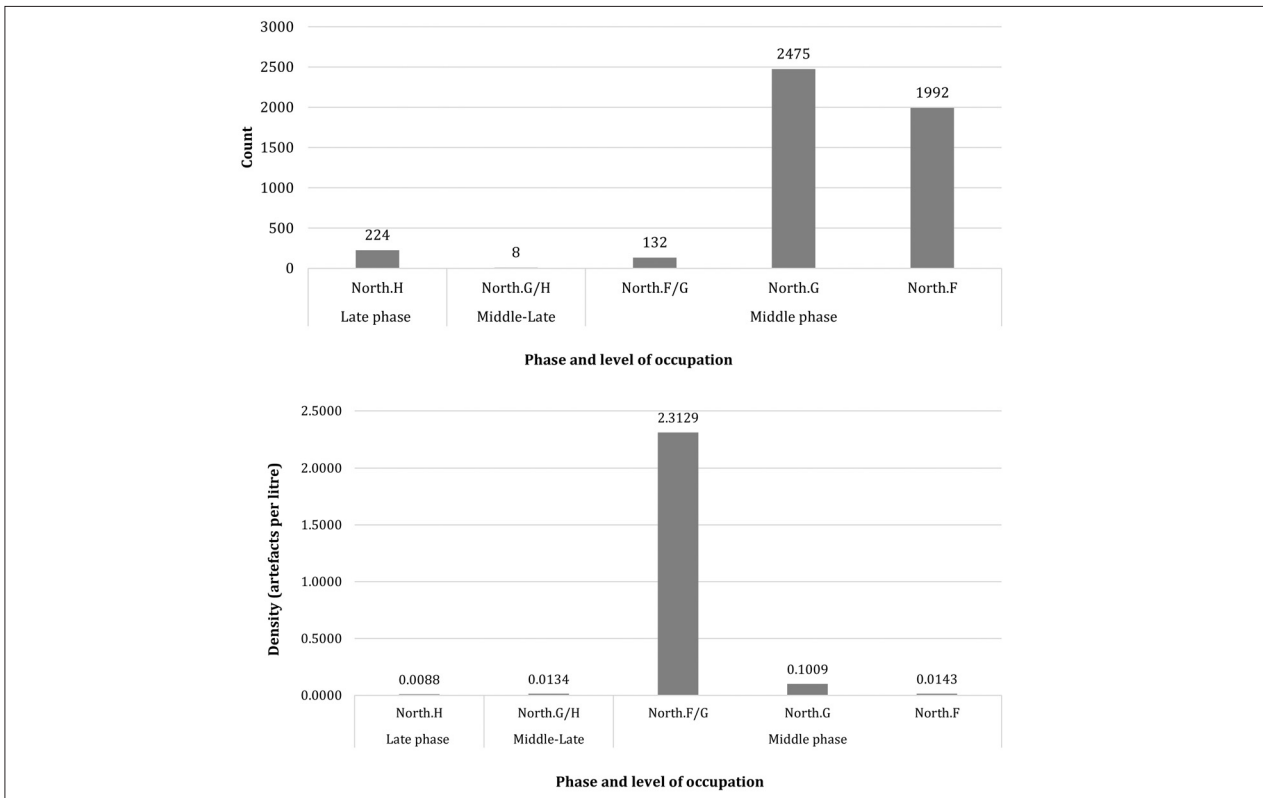


Figure 7.13. Temporal distribution of clay balls within the North Area (2009–2017 excavated clay balls, $n=4,981$). Top: count; bottom: density of clay balls per litre.

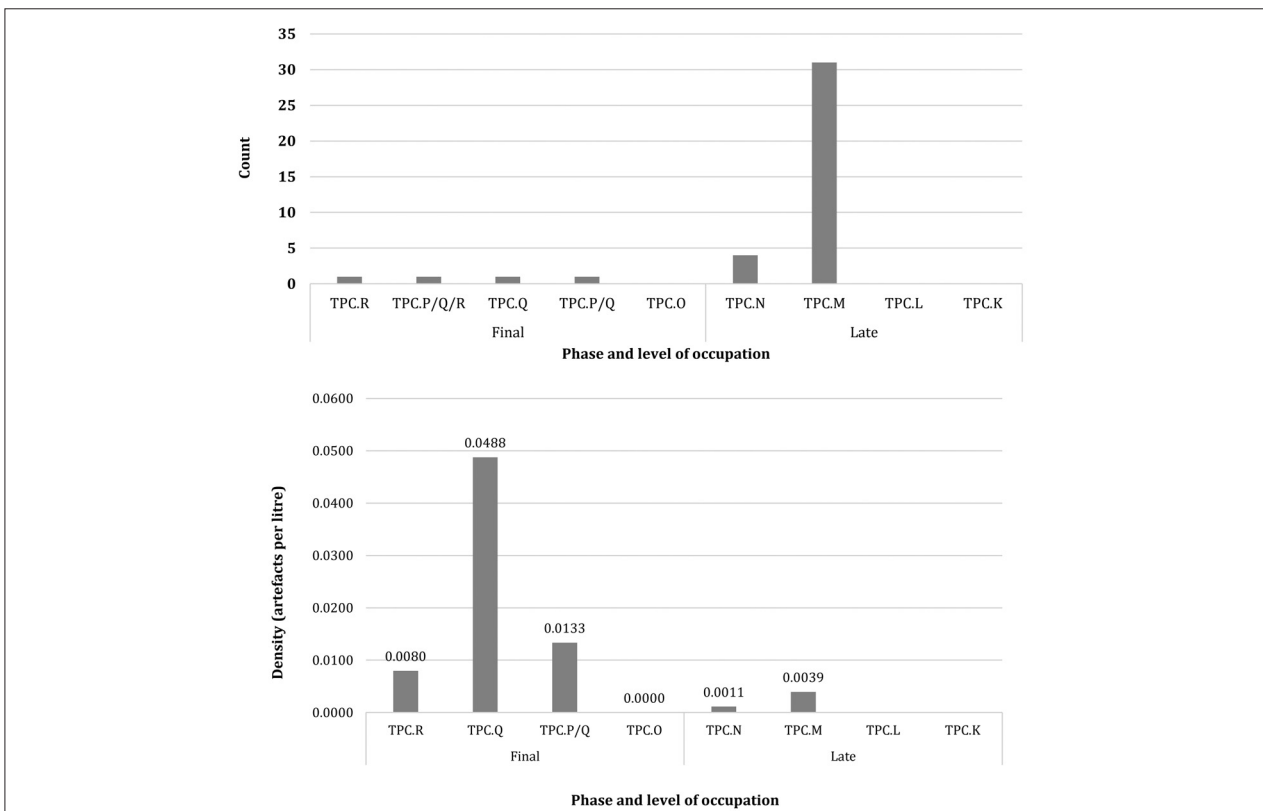


Figure 7.14. Temporal distribution of clay balls within the TPC Area (Late and Final periods). Top: count; bottom: density of artefacts per litre of sediment excavated.

incorporation of clay balls (or fragments thereof) into building material. This is the third most common broad context type after fill and midden (6.4%, n=593). All other broad (Data Category) contexts are represented by minimal quantities of clay balls. The recovery of clay balls from primary, in situ context types is therefore extremely rare. Just 4% of clay balls are recovered from the surface of floors, represented by ‘floors (use)’ Data Category contexts (n=378, table 7.10). Though found in small numbers in primary depositions, clay balls are most dense in contexts suggestive of primary use, including ‘activity’ (0.3834 o/l), ‘cluster’ (1.2040 o/l) and also ‘skeleton’ (23.8095 o/l) (table 7.10). Though when incorporated into burials, clay balls almost always appear as tiny, incidental fragments, ‘cluster’ and ‘activity’ contexts represent the intentional placement of clay balls in a primary context (see below).

General, data and interpretative category. Looking at contextual distribution in more detail, the exact nature and location of the midden and fill material (combining the most common context types as defined across all three of Çatalhöyük’s context indicators: ‘general’, ‘data’ and ‘interpretative’, see online table S7.4), the proportion of clay balls recovered from ‘midden/dump’ areas remains similar, at 39% (n=3,595, table 7.11). The fill contexts are dominated by ‘oven fill’ (1,376, 15%), ‘burial/skeleton fill’ (n=1,062, 11%) and ‘building/room-infill’ (n=860, 9%) (table 7.11, fig. 7.15 top). Clay balls from ‘construction/make-up and packing’ also form a noteworthy quantity (n=593, 6%). This reflects the basic patterning seen above, demonstrating that the bulk of clay objects are recovered from contexts representing their disposal or unintentional

inclusion within secondary contexts. The density of clay objects by detailed context type (all three categories combined) reveals a different picture, with primary deposits from internal spaces the densest in clay balls. Clay balls are most dense on floor surfaces (9.7881 o/l), where they are commonly recovered close to ovens. They are also dense within installations related to fire and heat (‘oven fill’ 1.0867 o/l, ‘fire spot/installation’ 0.6845 o/l, ‘oven base’ 0.3691 o/l) (table 7.11, fig. 7.15 bottom, online figs S7.10, S7.11). Clay balls were therefore most commonly used inside buildings in activities related to the use of heat.

Clay balls within buildings. More than half of all clay balls, 66%, are recovered from contexts associated with a building. The clay balls associated with buildings come from a variety of primary and secondary context types, including their incorporation into building material, such as walls, placements between the walls of two buildings, or underneath a building as part of a foundation deposit. Building 17 (South K, Early period) contains a disproportionately high number of clay balls, n=2,802. Most of the buildings prioritised for study by the project contain >100 clay balls, with B.77 (North G, Middle period), B.52 (North G) and B.89 (South N, Middle period) all having notably small quantities of clay balls (fig. 7.16).

Foundation deposits, the placement of items together prior to the construction of a building, incorporate a total of 157 clay balls (and fragments thereof). This practice incorporates 2% of all clay balls recovered from an internal space and represents the ritual use of clay balls (table 7.12). Such use is evidenced in B.160 (South K, Early period), where a number of foundation deposits

<i>Context type: data category</i>	<i>Count</i>	<i>Percentage</i>	<i>Density (o/l)</i>
Fill	4,503	48.62	0.0111
Midden	3,448	37.23	0.0360
Construction/make-up/packing	593	6.40	0.0084
Floors (use)	378	4.08	0.0291
Arbitrary	131	1.41	0.0056
Activity	55	0.59	0.3834
Cluster	36	0.4	1.2040
Skeleton	30	0.30	23.8095
Cut	6	0.06	0.0851
Natural	1	0.01	0.0003
(Blank)	80	0.86	0.0093
Total	9,261	100.00	0.0150

Table 7.10. Number and density of clay balls by context type according to the ‘Data Category’ (Level 1 and 2 clay balls from units with a total excavated sediment volume record, n=9,261).

Context type	Count	Percentage	Density (o/l)
Midden/dump	3,595	38.82	0.0269
Oven fill	1,376	14.86	1.0867
Burial fill/skeleton	1,062	11.47	0.0815
Building/room infill	860	9.29	0.0047
Construction/make-up/packing	593	6.40	0.0084
Pit-fill/infill	418	4.51	0.0140
Floor surface	328	3.54	9.7881
Oven superstructure	87	0.94	0.0867
Fire spot/fire installation	73	0.79	0.6845
Oven base/floor	67	0.72	0.3691
Post-retrieval pit fill/infill	43	0.46	0.0168
Oven superstructure	25	0.27	0.0256
Hearth base/structure	10	0.11	0.1195
Platform surface	5	0.05	0.0344
Hearth fill	2	0.02	0.1270

Table 7.11. Contextual distribution of clay balls (Levels 1 and 2 from units with a total volume of sediment excavated record, n=9,261) according to actual context type (combination of 'general', 'data' and 'interpretative' context categories). Most common contexts only.

were placed prior to building construction, many of which include clay balls (online table S7.15). Likewise, clay ball fragments are commonly recovered from a building's construction elements, representing their use during construction rather than inside a building during its main occupation phase. The large proportion of clay balls recovered from construction contexts seems to allude to the intentional incorporation of clay ball fragments as strong, study aggregate material, thus representing a secondary use of clay balls (table 7.12). Some buildings such as B.97 (South O, Middle period, n=197), record a high number of clay balls, yet closer inspection reveals they are mostly recovered from make-up and structural contexts related to the building's construction phase.

At the opposite end of a building's life history, clay balls are commonly recovered from activities related to building closure and abandonment. Over one quarter of internal space clay balls are recovered from building/room infill and midden contexts (n=1,097 and n=798 respectively) (table 7.12). Such contexts almost certainly represent the incidental inclusion of discarded clay balls. The vast majority of B.131's (North G, Middle period) n=405 clay balls are fragments, recovered from 'mixed dump' contexts dating to the building's construction phase (131.1C), 68%. Similarly, despite having over 100 clay balls, B.80 (South O, Middle period) has no evidence of their use during the main occupation phases. All recovered clay ball artefacts come from B.80's demolition material, infill or structural elements.

When recovered from a building's main occupation phase, clay balls are still most commonly incorporated into fill, unintentionally. Clay balls from such contexts are generally small fragments, suggesting non-intentional inclusion resulting from the re-deposition of midden material. Even in the case of clay balls from burials (15% of internal space clay balls), almost all examples are represented by tiny fragments placed within the loose fill, never in direct association with the skeleton or grave goods (table 7.12). Therefore, a very small number of buildings excavated during the Çatalhöyük Research Project's final phase of excavation contain significant quantities of clay balls linked to their *intentional* placement during the main *occupation phase* of a building. Contexts potentially representing in situ activities utilising clay balls include when they are found on floor surfaces, especially activity layers or dirty floors, in clusters, or recovered from fire installations and ovens. As seen above, all such contexts are dense in clay balls, suggesting these locations, despite evidencing clay balls in low quantities, represent the most common, primary locations for clay ball use. Just four buildings, B.17 (Early period, South K), B.132 (Middle period, North F), B.160 (Early period, South K) and B.161 (Early period, South J) have significant quantities of clay balls from such contexts (table 7.13, online tables S7.5, S7.6). Clay balls are dense on floor surfaces adjacent to ovens. Building 132, for example, contains 89 clay balls from 'floor surface' contexts (13% of the building's clay balls).

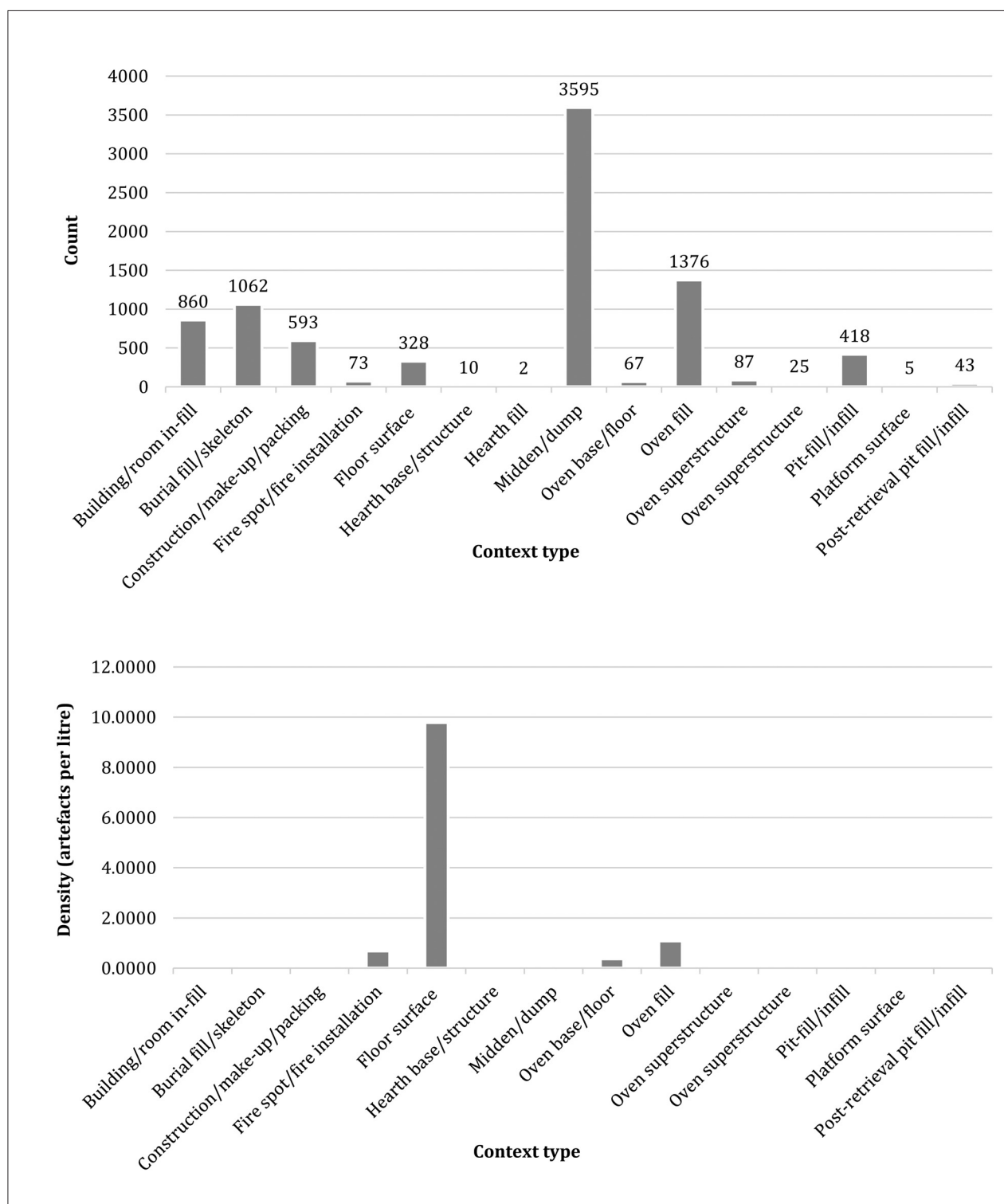


Figure 7.15. Contextual distribution of clay balls (Levels 1 and 2 from units with a total volume of sediment excavated record, $n=9,261$) according to actual context type (combination of ‘general’, ‘data’ and ‘interpretative’ context categories). Most common contexts only. Top: number of clay balls; bottom: density of clay balls.

Almost all are fragments (1–25% of the original artefact) recovered from ‘dirty’ floors in the main room of the building (online table S7.6). Buildings 160 and 161 also have significant quantities of clay balls recovered from their dirty floor surfaces (table 7.13). The largest

proportion of clay balls recovered from buildings come from *inside* ovens. Thirteen per cent of the total assemblage, 19% of clay balls from internal spaces, are recovered from such contexts ($n=1,422$, table 7.12). A single oven, F. 579 in the northeast corner of B.17,

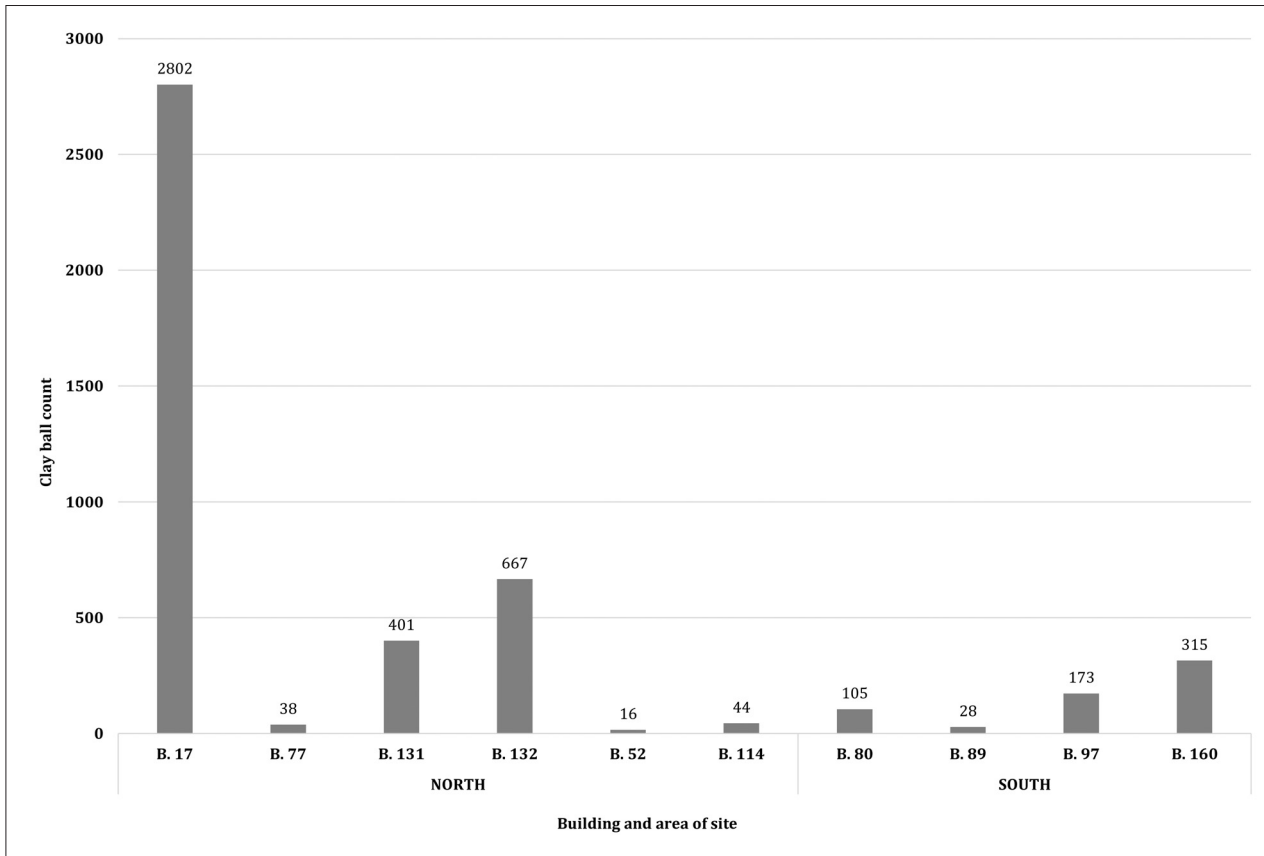


Figure 7.16. Distribution of clay balls across the 2009–2017 priority buildings.

contains 1,364 clay balls packed into its main cavity ((21849) and (21866)) (table 7.13, online fig. S7.11). Just one complete ball was recovered amongst the largely 1–24% complete fragments, which had an average weight of 30.24g. Almost all (Level 2) fragments were lightly burnt all over (online fig. S7.12). Building 132 also contains a large number of clay balls within a single oven, F.7732, a ‘cluster’, (32745) (table 7.14). The fragments average 109.40g, meaning they are around 25–50% complete. The most complete clay ball from this oven weighed 246.2g. Oven F.7732 is located in the main room of B.132, in the centre of the southern wall (online fig. S7.10). All other clay balls from oven fill contexts were recovered from four additional ovens, making the B.17 oven unique for the quantity of clay ball fragments recovered inside it. Though in some circumstances clay balls are used to line the base of ovens (such as oven F. 571, B.17), their use in the construction or repair of ovens remains rare.

‘Cluster’ as a context type represents the discrete deposition of a group of artefacts and/or cultural remains (as defined by Farid, Hodder 2014: 35). A total of 655 clay balls (6% of all 2009–2017 excavated clay balls) are recovered from a total of 23 deposits characterised as a cluster (table 7.14). The clusters range in composition: sometimes diverse, at other times consisting purely of clay

balls. Clusters can therefore, contain between one and 304 clay balls. Almost all clusters containing clay balls (18 out of 23) are located inside buildings, meaning 95% of all clay balls from clusters come from internal spaces (table 7.14). Temporally, clusters incorporating clay balls are found from both the Early and Middle periods, most commonly within B.17 (Early period), B.132 (Middle period) and B.160 (Early period). Clusters incorporate a range of clay ball types from complete to highly fragmented, yet a disproportionately high quantity of complete clay balls are recovered from clusters (50% of all complete clay balls are from clusters). Many clusters appear to be ritual in function. They are placed in a variety of internal spaces, including underneath features such as walls, basins and ovens, or externally, between the walls of two buildings (table 7.14, nos. 5, 7, 9, 11 and 19). Such depositions incorporate clay balls along with faunal remains, ground stone and obsidian flakes. They likely remained present in the memories of a building’s inhabitants, though they were invisible day to day. Some clusters were permanently installed as visible groups of artefacts placed on the surface of a building’s floor. As buildings were cleaned as part of abandonment activities, these clusters seem to represent staged depositions, placed as part of a building closure ritual (table 7.14 nos. 12, 13, and 14).

<i>Internal space</i>	<i>Total</i>	<i>Percentage (internal space clay balls)</i>	<i>Percentage (entire assemblage)</i>
Oven fill	1,422	19.26	12.71
Burial	1,107	14.99	9.89
Building/room infill	1,097	14.85	9.80
Construction/make-up/packing	821	11.12	7.34
Midden/dump	798	10.81	7.13
Cluster	672	9.10	6.01
Floor surface	368	4.98	3.29
Pit-fill/infill	365	4.94	3.26
Floor layer in midden	272	3.68	2.43
Foundation deposit	157	2.13	1.40
Post-retrieval pit fill/infill	76	1.03	0.68
Fire spot/fire installation	68	0.92	0.61
Oven base/floor	64	0.87	0.57
Activity layer	59	0.80	0.53
Oven make-up	18	0.24	0.16
Hearth superstructure	12	0.16	0.11
Niche fill	4	0.05	0.04
Hearth fill	2	0.03	0.02
Platform surface	2	0.03	0.02
Ladder cut	1	0.01	0.01
Bin fill/infill	0	0.00	0.00
Total	7,385	100.00	66.00

Table 7.12. Nature of context, clay balls from buildings/internal spaces only (n=7,385, 2009–2017 excavated examples).

There is no clear correlation between the nature of a building as assessed by its elaboration index (a numerical value based upon a building's size along with the quantity and quality of additional architectural features, burials and 'artistic' elements, see this volume, Chapter 1) and the quantity of clay balls recovered from it, whether relating to the building's construction, use or abandonment phases. However, a reverse correlation is seen in *some* buildings where there is a high clay ball count. Building 160 for example, has a very low elaboration index of 5, yet has a total of 314 clay balls, most from occupational phases, including many which were definitely intentionally placed within the building. B.160 also contains six artefact 'clusters', incorporating 116 clay balls. Buildings 132 and 161 also have low elaboration index values (11 and 8 respectively) and high numbers of clay balls in clusters and floor surface deposits.

In reverse, B.131 has a higher elaboration index of 18, yet a low number of clay balls, none of which come from deposits relating to the occupation phase. Likewise, B.52 has an exceptionally high elaboration index of 42, yet just 16 clay balls in total. The reverse

correlation is not true for all buildings. Building 17 is small, and plain, but other factors result in a high elaboration index of 22 (see Volume 12, Chapter 7). Yet B.17 has an extremely high number of clay balls (n=1,537), most from within an oven. Though the sample is small, the plainer, simpler buildings do appear to be those which used clay balls in larger quantities most commonly. Temporally, buildings with clay balls recovered in significant quantities from occupation phases and contexts related to intentional use come from both the Early and Middle periods, across both the North and South excavation areas. There is no grouping of evidence related to the actual *use* of clay balls limiting their distribution by phase, level or neighbourhood.

Clay balls from middens. Clay balls recovered from external spaces are almost exclusively recovered from middens. Midden clay balls are reflective of the clay ball assemblage overall. Middens contain typical clay balls of all fragment sizes, including complete examples. Non-typical shapes are also recovered from middens, as are decorated or 'marked' varieties. In fact,

<i>Building</i>	<i>Floor surface</i>	<i>Oven base/floor</i>	<i>Oven fill</i>	<i>Fire spot/installation</i>	<i>Total</i>
17	122	44	1,364	63	1,593
43	13	0	0	0	13
49	0	0	0	0	0
52	1	0	0	0	1
76	13	0	0	0	13
77	5	0	0	0	5
80	8	0	0	0	8
89	2	0	0	0	2
97	9	0	0	0	9
114	1	0	0	0	1
118	2	1	0	0	3
119	0	0	4	0	4
131	7	0	0	0	7
132	89	19	0	0	108
139	3	0	0	1	4
160	29	0	3	0	32
161	46	0	7	0	53
162	13	0	1	0	14
163	0	0	0	0	0
167	1	0	0	0	1
All	364	64	1,379	64	1,871

Table 7.13. The four contexts densest in clay balls (excluding ‘cluster’ depositions), all from within internal spaces and representing activity during a building’s occupation phase. Count of clay balls per building, select buildings only (Level 1 and Level 2, 2009–2017 excavated artefacts).

the lack of distinction between the nature of clay balls recovered from inside buildings compared to middens demonstrates clay balls were used and re-used over and over again. They were not thrown into middens as soon as they fractured or became burnt and discoloured. Different dumping events can be seen in the nature of clay balls within particular layers of discrete middens. At each stage, clay ball fragments of similar sizes, levels of burning, wear and discolouration point to the use of clay ball fragments in batches, which are disposed of together at the end of their life. The midden in the North Area located in Sp.489 and Sp.490 (Middle period, North G), for example, contains discrete dumps incorporating clay balls. Unit (21116), the earliest infill of the midden, has two batches of clay balls, totalling 97 fragments. The first group, 42 clay balls (DB#s 3683–3724, (21661.m171–m212) comprises large fragments of 25–50% of the original artefact. One complete ball (208.70g, 6.1cm diameter) is also included. All have very little evidence of burning. In contrast, the second group of clay balls from the midden unit are all much smaller elements of the original artefact. None of the n=52 fragments is more

than 50% complete and all are heavily burnt, on both the interior and exterior surfaces (see online figs S7.13–16). These depositions represent the clear-out of a buildings’ clay balls, en masse, which were likely replaced by a fresh batch of complete balls.

Non-typical clay balls: spatial distribution

The contextual deposition of less typical clay balls mirrors that of all clay balls, suggesting that in general, the non-typical clay balls did not perform a distinct function related to their smaller size, shape or surface decoration. However, some exceptions do occur. The ovoids and oblate spheroids come from both the North and South Areas, in levels dating to the Early and Middle occupation periods. They are primarily recovered from midden and room infill contexts. The three complete ovoids all come from different deposits, ranging from middens to fire deposits and external surface dump contexts (online table S7.7). Notably, five examples of non-typically shaped clay balls (DB#s 3685/21661.m173, 3691/21661.m179, 3759/21661.m247, 3762/21661.m250 and 6280/20472.m5) come from a single midden (in Sp.489, further discussed below). Likewise, three of the

Clay ball count	Unit	Building	Space	Feature	Area	Phase	Level	Cluster description
1	19343	-	459	-	South	Middle	South N	'Cluster or basket of midden material, contains...large charcoal fragments and carbonised berries/ nuts'.
2	19392	-	470	-	South	Middle	South M	Cluster with a wide range of artefacts. Includes one 50% and nine complete clay balls, one horn core, one antler, four ground stones. 'All were sat on the thin occupational greasy layer [19394] considered to be an upper part of the earth floor'.
3	20542	-	492	-	South	Early	South L	It was a cluster of a wide range of artefacts registered under one (separate) unit number. It comprised of: ten partially – and four whole preserved clay balls; number of animal bones including at least three articulated ones (!), one animal skull (X-8); dozen
4	23248	-	620	-	South	Early	South I	This is a cluster of two stone balls, a small chunk of plaster and two stones, embedded in a chunk of wood-charcoal.
5	19818	76/80	135/137	-	South	Middle	South O	Artefact cluster within a fill (u.19802) between B.80's west wall (f.5036) and B.76's east wall (f.3401)... Contained large amount and types of inclusions...ground stone, variety of animal bones, obsidian and charcoal.
6	32200	5	154	3810	North	Middle	North F	Cluster within burial cut.
7	21833	17	170	-	South	Early	South K	Cluster formed mainly by clay balls fragments, animal bones, stones fragments, shell frag. Painted small plaster frag. and obsidian flakes. It is probably related to one deposition located underneath the basin F585 and podium F574.
8	21843	17	170	-	South	Early	South K	Concentration of stones in the southwestern corner of Sp. 170, close to wall F8201.
9	23224	17	170	567	South	Early	South K	Fragments of clay balls, stone and small pieces of animal bone...under the western wall of B. 17.
10	17928	49	334	-	North	Middle	North G	Cluster in southwestern corner of building, dating to the construction phase. Foundation deposit?
11	19386	104	470/474	-	South	Middle	South M/N	Concentration of clay balls placed between walls (19835). Included three whole and five large fragments.
12	30630	118	510	-	South	Early	South H	Cluster of clay balls located near northwestern corner and oven of B118, Sp.510. Cluster is top of dirty floor.

Table 7.14. Detail of the location of 23 'cluster' contexts incorporating n=655 clay balls.

	Clay ball count	Unit	Building	Space	Feature	Area	Phase	Level	Cluster description
13	1	30598	132	511	-	North	Middle	North F	Contains clay ball (50%) and seven stones, including one piece of ground stone (X1). Placed in the southeastern corner of Sp.511, on the dirty floor. Stone all cracked, burnt at high temperature.
14	1	32094	132	531	-	North	Middle	North F	A cluster of artefacts and ecofacts. Set in corner of the main room, between a wall and a column. Comprised of bone, clay ball and groundstone.
15	304	32745	132	531	7732	North	Middle	North F	(blank)
16	1	32776	132	531	8330	North	Middle	North F	Located in a small niche-like depression.
17	42	32418	160	551	7832	South	Early	South K	Pit interpreted as an abandonment deposit. Pit was opened and filled in a short period, likely in late summer/early autumn. Contained large volume of faunal remains along with clay balls.
18	22	32430	160	551	7833	South	Early	South K	Pit interpreted as an abandonment deposit. Pit was opened and filled in a short period, likely in late summer/early autumn. Contained large volume of faunal remains along with clay balls.
19	36	32467	160	551	7815	South	Early	South K	Cluster of varied finds consisting mostly of clay ball fragments, baked clay, worked stone and faunal remains. The cluster was found underneath the earliest base of oven F.7815 in its southern part, a possible post-retrieval pit infill onto which the oven was later built.
20	13	32494	160	552	7847	South	Early	South K	Cluster defined in the northeastern part of Sp. 552, the side room of B. 160. This cluster is composed mostly of clay balls and stones.
21	2	32495	160	552	7847	South	Early	South K	(blank)
22	1	32600	160	552	7847	South	Early	South K	Cluster defined in the central north of Sp. 552, the side room of B. 160. This cluster is composed of five elements (two animal bones, a stone axe, a clay ball and a wood plank, on the top of which all these elements were placed).
23	108	32668	161	605/606	8175	South	Early	South J	Cluster of artefacts made up mainly of fragments of clay balls and various stones. Placed intentionally into pit F.8175 that truncated floor U.32667 which is considered to be a sequence of the earliest floors of B.161.
	Total:	655							

Table 7.14 (continued). Detail of the location of 23 'cluster' contexts incorporating n=655 clay balls.

smaller ‘large’ clay balls come from a distinct context, a ‘cluster’ of artefacts located within Sp.459 of the South Area (19392). They appear to have been specifically selected for inclusion in the deposit due to their smaller size and the fact they are completely intact. The three balls (DB# 5645, 5647, 5648/19392.m6, 8–9) were recovered from an artefact cluster, located on a thin clay occupation layer within Sp. 470 (South M, Middle period). They were placed along with a further six complete clay balls, in addition to one tiny and one larger fragment of clay ball, along with a horn core, antler and four ground stones (table 7.14).

The marked balls decorated in geometric patterns likely express personal or corporate identity, denoting ownership of a valued tool. The marked clay balls do not, however, appear to have retained any special symbolic value once their use life was complete. Almost all were disposed of in middens, with others recovered from secondary deposits of burial fill and rubble (table 7.15). An exception is DB# 5129 (32467.m127), part of a cluster of finds in B.160 (F.7815) (fig. 7.9, tables 7.14 and 7.15). The cluster contained a total of 36 clay ball fragments, along with worked stone, animal bone and obsidian flakes. It was located underneath the first oven of B.160. It is likely the highly decorated clay ball fragment was selected for inclusion in the cluster due to its symbolic value.

The midden Sp.489 (North G, Middle period) contains a number of non-typical clay balls. Along with five ovoid-shaped clay ball fragments (online table S7.7), the lowest level of the midden (21661) contains two 100 per cent intact clay balls (DB# 3683/21661.m171 and #5716/20965.m6), along with two clay balls with markings (DB# 3683 and 3684, 21661.m171–72). This level of the midden contained significant quantities of eggshell, along with clay objects, zoomorphic figurine fragments, pottery sherds, an obsidian arrowhead, mollusc shells and beads. The upper part of the midden (20965) contains a further four clay balls with markings (DB# 5681, 5725, 5823 and 5833) (table 7.15), along with faunal remains, ground stone, obsidian, shell and pottery sherds. Though this midden contains a significant quantity of clay balls (97 in the lower and 123 in the upper part), the number of non-typical examples is notable and may point to dumping activity after a ritual or other event utilising symbolic artefacts.

The contextual deposition of the n=26 re-used clay balls shaped into discs clearly differs from the normal patterning. This marks the re-used discs out as a distinct category of artefacts, as reflected by their shape and raw material. A group of seven re-used discs were recovered together as part of a foundation deposit ‘cluster’ underneath

B.160, F.7847 (table 7.16). Most other re-used discs were deposited in groups within a building. Their distribution is limited to a small number of buildings, B.17, B.131, B.132 and B.160 (table 7.16).

Contextual distribution summary

Clay balls occur in almost equal proportions and densities in the North and South Areas, decreasing through time during Çatalhöyük’s occupation. Used most in the latter levels of the Early period in the South Area and the Middle period in the North Area, ca 6500 BC, clay balls drastically decline in both quantity and density. By the Final period, where only the TPC and GDN Areas remain occupied, clay balls have completely fallen out of use. Clay balls are most commonly recovered from midden deposits, with secondary deposits (features such as ovens and side rooms which were intentionally infilled after abandonment), likely utilising midden material (fill and construction/make-up/packing), also having significant quantities of clay balls. However, in density, primary depositions representing the use of clay balls inside buildings during the main occupation phase are most dense in clay balls. They are recovered from the dirty floors of buildings close to ovens, from inside ovens and fire installations and in clusters inside the main rooms of buildings. The contextual deposition of clay balls changes little across different neighbourhoods or areas of the site. Certain buildings contain higher numbers of clay balls than others, largely due to the presence of a specific cluster or feature containing clay balls in huge quantities. The marked clay balls, though highly detailed and likely symbolic in meaning, are recovered from the same contexts as plain examples. Though they may have held a special meaning during their use life, they are disposed of into middens and as building material as readily as their plain counterparts are. The exception to this is the quantity of marked, complete and non-typically shaped clay balls recovered from the midden represented by Sp.489.

All evidence points to clay balls being used primarily inside buildings, heated and re-heated time and time again in ovens and other fire installations. This resulted in their cracking and fragmentation. Initial fragmentation resulted in distinctive, large wedge-shaped pieces, indicative of the items being exposed to high temperature, then cooled very rapidly. Only after clay balls had fragmented into very small pieces were they disposed of. Yet in some instances, complete balls in good condition were also thrown into middens. Clay balls held symbolic value, as demonstrated by their incorporation in foundation deposits and clusters. Their symbolic value was related to the function they fulfilled, as used clay balls (fragmented and burnt) rather than complete, new and decorated clay balls are most common in foundation deposits and clusters.

	DB #	Find no.	Data category	Interpretive category	General context	Building	Space	Feature	Level
1	6211	19486.m19	Midden	Arbitrary layer - midden	Midden/dump		489		North G
2	5671	19596.m8	Arbitrary	Infill	(blank)		99		North G
3	5616	19836.x1	Floors (use)	Floor	Floor surface	89	379	3492	South N
4	5681	20965.m3	Midden	Midden	Midden/dump		489		North G
5	5725	20965.m15	Midden	Midden	Midden/dump		489		North G
6	5833	20965.m123	Midden	Midden	Midden/dump		489		North G
7	7541	21634.m1	Fill	Burial infill (?)	Burial fill/skeleton		602	7634	North G
8	3683	21661.m171	Midden	Midden deposit	Midden/dump		489		North G
9	3684	21661.m172	Midden	Midden deposit	Midden/dump		489		North G
10	6113	21841.m22	Skeleton	Skeleton	Burial fill/skeleton	17	170	8017	South K
11	4304	22300.m101	Fill	Room infill	Building/room infill	160	551		South K
12	4307	22300.m104	Fill	Room infill	Building/room infill	160	551		South K
13	3840	22314.m106	Midden	Midden layer	Midden/dump		559		South L
14	4905	22343.m106	Midden	Midden layers	Midden/dump		583		South K
15	7130	23143.m29	Midden	Midden	Midden/dump	139	623, 625		North F
16	7175	23143.m74	Midden	Midden	Midden/dump	139	623, 625		North F
17	5657	30127.x1	Fill	Rubble rich layer	(blank)	119	512, 513		North F
18	4300	31594.m103	Fill	Infill-post retrieval pit	Post-retrieval pit fill/infill	132	531	7873	North F
19	4285	32106.m124	Midden	Mixed deposit	Midden/dump		85		North ?H
20	4287	32106.m126	Midden	Mixed deposit	Midden/dump		85		North ?H
21	5568	32128.m73	Midden	Mixed dumps	Midden/dump	131	500, 610		North G
22	5129	32467.m127	Cluster	Cluster of finds	Cluster	160	551	7815	South K
23	5978	32692.m45	Midden	Midden layer	Midden/dump		620, 628		South ?I/?H
24	5989	32692.m56	Midden	Midden layer	Midden/dump		620, 628		South ?I/?H

Table 7.15. Contextual distribution of the 24 'marked' clay balls.

	DB no.	Find no.	Year	Area/level	Phase	Category	Interpretive category	Data category	Building	Space	Feature
1	5690	20489.m.4	2012	North	?	Layer	Arbitrary	Midden		1000	7107
2	6925	31542.co.1	2016	North G	Middle	Layer	Wall mortar	Construction		602	7869
3	6928	21863.co.1	2016	South K	Early	Layer	Layer	Floors (use)	17	170	
4	6366	21873.m.1	2017	South K	Early	Layer	Make-up layer	Construction	17	170	
5	6926	23226.co.1	2017	South K/I	Early	Cluster	Foundation deposit	Cluster	17	170 182 620	567
6	6927	23226.co.2	2017	South K/H/I	Early	Cluster	Foundation deposit	Cluster	17	170 182 620	567
7	6588	21816.co.1	2016	South K	Early	Layer	Post fill	Fill	17	170	8016
8	5565	32128.m.70	2017	North G	Middle	Layer	Mixed dumps	Midden	131	500 610	
9	5293	22670.co.1	2015	North G	Middle	Layer	Platform surface	Construction	131	500	7952
10	5292	31583.co.1	2016	North F	Middle	Layer	Infill post-retrieval pit	Fill	132	531	7725
11	6943	32745.co.1	2017	North F	Middle	Cluster	Cluster in oven	Cluster	132	531	7732
12	5062	22301.co.1	2015	South K	Early	Layer	Room infill	Fill	160	551 552	
13	5063	22301.co.2	2015	South K	Early	Layer	Room infill	Fill	160	551 552	
14	5034	22301.m.113	2015	South K	Early	Layer	Room infill	Fill	160	551 552	
15	4249	32405.co.2	2016	South K	Early	Layer	Dirty floor	Floors (use)	160	551	
16	6592	32433.co.2	2016	South K	Early	Layer	Plaster and make up	Construction	160	551	7834
17	4950	32495.co.1	2016	South K	Early	Cluster	Foundation deposit	Cluster	160	552	7847
18	4951	32495.co.2	2016	South K	Early	Cluster	Foundation deposit	Cluster	160	552	7847
19	4952	32495.co.3	2016	South K	Early	Cluster	Foundation deposit	Cluster	160	552	7847
20	4953	32495.co.4	2016	South K	Early	Cluster	Foundation deposit	Cluster	160	552	7847
21	4954	32495.co.5	2016	South K	Early	Cluster	Foundation deposit	Cluster	160	552	7847
22	4955	32495.co.6	2016	South K	Early	Cluster	Foundation deposit	Cluster	160	552	7847
23	5144	32496.co.1	2016	South K	Early	Layer	Foundation deposit	Fill	160	552	7847
24	6924	32632.co.1	2016	South ?K	Early	Layer	Oven superstructure	Construction	161	605 606	8160
25	6942	23831.x.1	2017	North F	Middle	Layer	Floor	Floors (use)	167	635	
26	6969	31906.co.1	2015	TPC L	Middle	Layer			170	611	

Table 7.16. Context detail of the n=26 disc-shaped objects made from the re-use of large clay ball fragments.

Discussion

Clay balls are an integral element of Çatalhöyük's material culture, yet only during the first half of the period of settlement. Present across both the North and South Areas in huge quantities ca 7100–6500 BC, clay balls were manufactured in a highly regular fashion. Their primary function led to frequent breakage; however, broken clay balls remained useful. They continued to be used and re-used as fragments until a shift in lifestyle led to a rapid decline in clay ball distribution and use ca 6500 BC.

Primary function

It has long been argued that clay balls were used as cooking 'stones' in the heating of liquid foods (Atalay 2005: 156–57; Atalay, Hastorf 2005; 2006). Evidence gathered from the final phase of excavation and research at Çatalhöyük broadly supports Atalay's claims. Clearly clay balls were primarily used within buildings, heated in ovens, yet direct evidence for their placement into stews to cook them is lacking. At 9.7881 o/l, the density of clay balls found in the primary context of internal 'floor surface' is higher than the density of clay balls across all other context types combined. The fact that 78% of clay balls are burnt on both their outer and inner surfaces demonstrates that although the heating of clay balls resulted in their cracking and breakage, clay balls continued to be heated and re-heated. Their proximity to ovens when recovered from floor surfaces, in addition to their significant density as part of oven fill contexts, shows ovens inside buildings were, as Atalay identified, the primary location for the heating of clay balls.

Clay balls were clearly heated inside buildings, yet why? The Early and Middle periods of occupation at Çatalhöyük lack pottery suitable for cooking. Therefore, basketry or skins were likely used as containers in which stews and soups could have been prepared and cooked. Basketry is attested archaeologically at Çatalhöyük. Mellaart speaks of large quantities of baskets in his early research reports, stating they are far more common than other container types, those made of stone, bone or antler (Mellaart 1964: 85, fig. 34). More recent research has confirmed the presence of coiled basketry made from flax at Çatalhöyük, including examples that were waterproofed using plaster (Wendrich 2005: 334; Wendrich, Ryan 2012; Demiregi et al. 2014: 93, 95; Jørgensen et al., this volume, Chapter 11). Almost all examples of coiled basketry come from Çatalhöyük's Early and Middle periods, with a sharp decline in use evidenced at the end of the Middle period into the start of the Late period in both the North (Level G) and South (Level P) Areas (Wendrich 2005: 337, fig. 15.7; Wendrich, Ryan 2012: 61). The decline in basketry corresponds to the

decline in clay balls, indirect evidence of a link between the two technologies. Yet even if baskets were used as containers for cooking, this is certainly not an exclusive function. Baskets have multiple uses and, at Çatalhöyük, could have served as vessels for transportation and storage, and as containers for bodies, as well as having a decorative role. Therefore, when interpreting changes in their temporal patterning, their multi-functional nature needs to be taken into account. Likewise, the identification of basketry from plant phytoliths is subject to a number of factors. Overall, the presence of significant quantities of baskets, capable of holding liquid foods and limited to the Early and Middle periods of settlement, opens up the possibility that hot clay balls were placed inside them to cook food.

Temporal patterning in pottery forms and distributions offers additional indirect evidence to support this theory. The Early period at Çatalhöyük is characterised by very low levels of pottery use, incorporating various forms. A shift occurs ca 6700 BC (South M) with the introduction of Dark Gritty Ware (see Chapter 4). Functioning as cooking pots, Dark Gritty Wares are hole-mouth jars in form, and fired at 700–800°C. They can be placed directly into a heat source, retain heat and do not crack, making them perfect for cooking. Dark Gritty Ware jars increase steadily during the Middle period, dominating the ceramic record of the Late and Final periods. The corresponding decline in clay balls is strong evidence that the former replaced the latter, and as Dark Gritty Ware is undoubtedly a cooking tool, clay balls likely functioned as cooking tools also (fig. 7.17).

If indeed the residents of Çatalhöyük were using heated clay balls to cook liquid foodstuffs, evidence to support this functional use of clay balls may come from food preparation and consumption evidence. Demiregi's (2015) research into food preparation and consumption at Çatalhöyük focuses on the meat element of the diet. Temporal changes in the preparation of the dominant meat animals (sheep and cow) suggest a change in the main meat-cooking practices mid occupation sequence. In the Early and Middle periods, sheep and cow-sized animal bones are dominated by those evidencing consumption cuts. These marks are produced when meat is cooked on the bone and are produced after cooking, as the meat is cut away (Russell, Martin 2005: 85). Such marks are largely restricted to baked and roasted meats; boiled and stewed meat results in meat which separates from the bone extremely easily, with no need for the use of a knife (Demiregi 2015: 133). The decrease in consumption cuts over time suggests a temporal decrease in the roasting and baking of meats at Çatalhöyük (Demiregi 2015: 144–45). There is a corresponding increase in the frequency of filleting cutmarks on sheep-

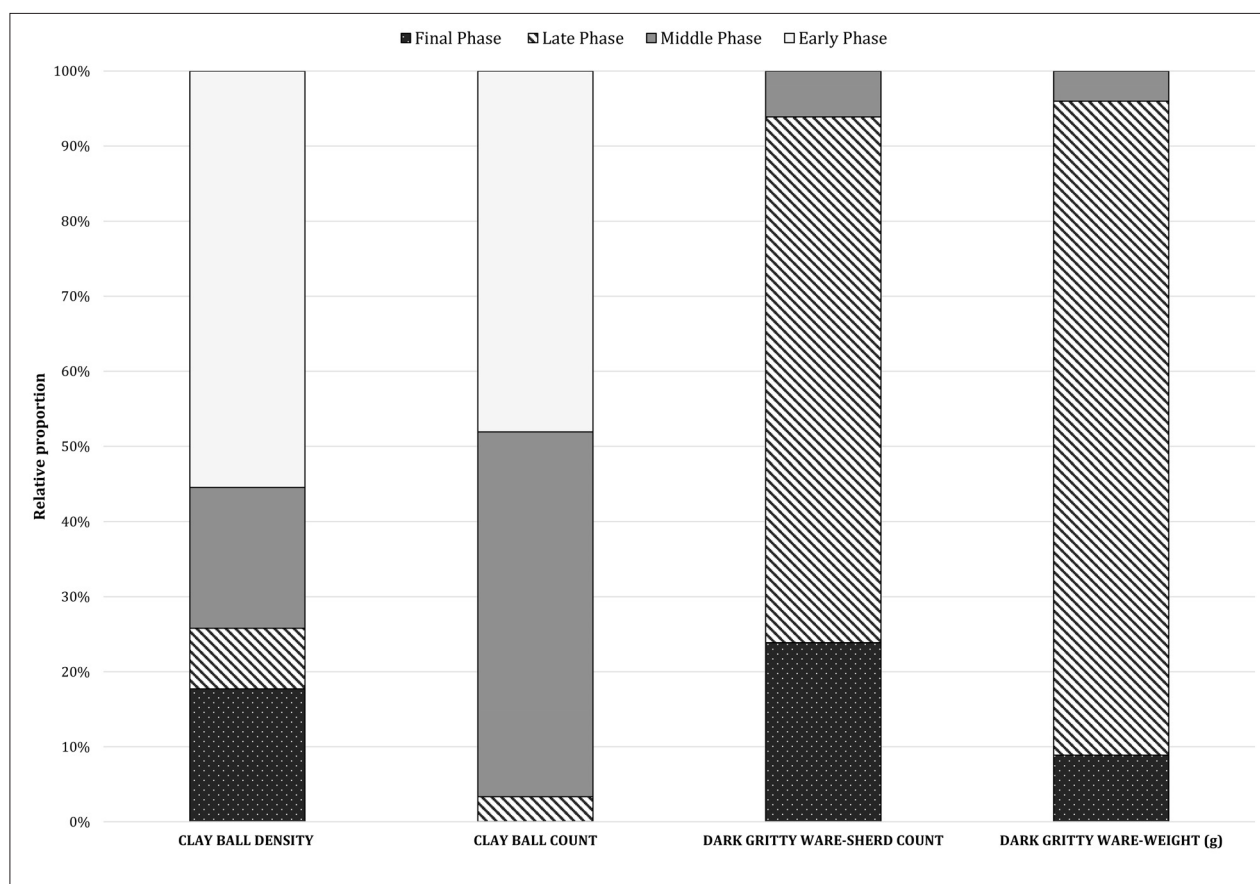


Figure 7.17. Cooking pottery (dark gritty ware) densities by period compared to clay balls density.

and cow-sized animals through time (Demirergi 2015: 143). Filleting indicates the processing of meat into small pieces, for drying and storage or to create manageable pieces of meat to be cooked and eaten off the bone (Demirergi 2015: 133, 143). The decrease in consumption cuts alongside the increase in filleting cuts implies a change in consumption practices, with meat more likely to be prepared in a liquid form, stewed or boiled, in the *latter* periods, as opposed to the roasting of large joints in the Early and Middle periods (Demirergi 2015: 143–44).

Demirergi's hypothesis is supported by wider research by Russell et al. (2013) which compared meat preparation and consumption in the South Area during the Early and Middle periods (Levels South H to M) against the Late period (Levels South P to T). Again, dismemberment and filleting patterns suggest a change from the dry roasting of sheep- and cow-sized meat fragments in the first temporal period, to the stewing of meat in the later periods (Russell et al. 2013b). The fauna data is direct evidence against the traditional theory of clay balls' use as tools to cook liquid foods, as clay balls have fallen out of use by the time stewing and boiling becomes the dominant form of meat preparation. However, it does not exclude them from a role in cooking entirely.

Evidence from the analysis of plant food remains shows a similar trend. González Carretero's research (Volume 15, Chapter 14) demonstrates a shift in cooking practices from the Early and Middle to the Late and Final settlement periods, beginning in the North Area Levels F/G, ca 6500–6700 BC. Çatalhöyük's Early and Middle periods are dominated by wheat, indicating the consumption of bread as the main source of grain at this time. With the introduction of cooking pots, a barley-based 'porridge' appears in the archaeological record. This liquid meal is prepared in pottery vessels using direct heat. The Late and Final periods of occupation see a dominance of barley, suggesting this meal formed an important element of the diet in the latter half of occupation. This evidence is interpreted as a dominance of dry baking and roasting ca 6500 BC, at which point plant-based foods are prepared in liquid form, heated via boiling and stewing, thus mirroring the faunal evidence (Volume 15, Chapter 19).

More general faunal and botanical evidence demonstrates Çatalhöyük's residents utilised a diverse array of plant and animal food sources (Jenkins 2005; Russell, Martin 2005; Russell, McGowan 2005; Bogaard et al. 2013; Hillson et al. 2013; Van Neer et al. 2013; Russell

et al. 2013b; Volume 13, Chapters 3, 5, 8). Therefore, although evidence suggests the preparation of dry food cooked via roasting and baking dominated in the Early and Middle periods, then was replaced by the stewing and boiling of liquid foodstuffs in the second half of settlement, diversity of foods suggests various cooking methods co-existed throughout the duration of settlement at Çatalhöyük. A study seeking to recover traces of organic residue from the surface of various materials at Çatalhöyük (to confirm the arrival of cattle domestication and milk production) failed to recover any trace of organic residues from the clay ball study sample (Pitter 2013: 66). This further casts doubt on the conventional interpretation of clay balls at Çatalhöyük. Clay balls are large and porous. If they were placed directly into liquid foods, being completely covered for extended periods of time, residues should remain.

Cooking balls?

Clay balls undoubtedly have a connection to heat and cooking during Çatalhöyük's Early and Middle periods. Clay balls were primarily used inside buildings, being heated in the same ovens where food was cooked. The simultaneous introduction of cooking pottery and disappearance of clay balls does not seem accidental. However, there is no direct evidence that acted as cooking 'stones' as originally hypothesised (Atalay 2005, 2013; Atalay, Hastorf 2005; 2006). In opposition to the traditional view, stone is plentiful at Çatalhöyük. It would be more logical to use small stones to be heated and placed into stews rather than large clay balls, and the use of stones in this way is suggested by Tsoraki (this volume, Chapter 13). Stone has better heat retention properties than clay, and is less porous and less likely to crack and fragment when exposed to direct heat. Clay balls do have the potential, however, to be used as cooking stones, yet the ceramic and food record clearly shows a preference for liquid foods in the latter half of settlement, at the time when clay balls disappear. During the Early and Middle periods, large joints of meat were grilled or roasted, and bread was the main source of grain. During the Middle settlement period, new food preparation and cooking methods were introduced, resulting in the preference for meaty stews and plant-based 'porridges' in the Late and Final periods, ca 6500 BC onwards. With clay balls disappearing from the archaeological record at the time boiling and stewing became popular, it seems highly unlikely that they were involved in such activities during the Early and Middle periods.

Yet perhaps clay balls were still used in the heating or cooking of food. Once heated, they could have been placed on the floor, adjacent to ovens, used to grill, or more likely, to keep warm recently grilled or baked foods.

This function could explain the repeated occurrence of hearths adjacent to ovens. Such a function for clay balls would also explain the continued use of fragmented clay balls, which could not have been placed into liquid foods, yet would not contaminate dry food items such as bread or cuts of meat, especially if matting, leaves or the like were placed above the heated clay balls, acting as a tray or hotplate. This interpretation seems likely considering all the evidence combined. Changes in food consumption practices beginning ca 6700 BC led to the discontinuation of clay balls by 6400 BC. The use of basketry was reduced and replaced by the appearance of cooking pottery. The reason for these changes is unclear, yet they follow a broader, site-wide pattern. The mortuary record sees a gradual shift from the dominance of primary and primary disturbed burials to secondary and tertiary during the Late and Final periods. The settlement becomes less dense in the Late and Final periods, with an increase in middens/open spaces between buildings. Charcoal analysis shows a change in tree species reliance ca 6500 BC (see Volume 13, Chapter 4). At the same point in time, there is a huge increase in sheep numbers, and isotopic analysis shows greater mobility related to sheep grazing territory in Çatalhöyük's Late and Final periods. The later periods of occupation also show a significant drop in *Unio* shell (freshwater) remains and a marked shift away from the dominance of emmer wheat in the botanical record (Asouti 2013; Pearson 2013; Russell et al. 2013b; Volume 13, Chapters 3 and 15). Whatever the impetus, the decline and disappearance of clay balls is part of the more general change in subsistence and culture at Çatalhöyük ca 6500 BC.

Alternative functions

Clearly clay balls were heated inside buildings, yet their use to cook/heat food is not the only possibility. With freezing temperatures in the winter (see Volume 13, Chapter 2), large clay balls have the potential to have acted as body warmers. They may have been wrapped in linen and held in the hands, or placed under matting or bedding, forming a warm base upon which to sit or sleep. People working on rooftops or in the fields in winter could place warmed clay balls in pockets or secure them to their body between layers of clothing, enabling them to remain outside in low temperatures. This would explain their relatively large size, as the larger they are, the more heat they retain. This theory would also account for their large numbers, as each person within a household would need at least one clay ball to heat themselves; perhaps up to ten or more to sleep on. This scenario is akin to the use of heated bricks or stones, placed at the end of children's beds among the lower classes in Victorian England up to more recent times,

until the relatively recent advent of the cheap, plastic hot wattle bottle. The older generation in Greece still today heat stones and pebbles in winter, placing them, wrapped in fabric, inside babies' cots. In this context, clay balls would need to be well made, with smooth surfaces and compacted clay, in order to be durable enough to survive repeated re-heating, yet variations in size, along with the occasional variation in shape would be unimportant. It is likely that when broken, large fragments (50% or greater) would retain their original use, still being effective warmers. Once highly fragmented, clay balls were disposed of in middens or recycled (see below). This functional explanation, however, does not account for the sudden discontinuation of clay balls midway through Çatalhöyük's occupational sequence.

Secondary use

Clay balls were used and re-used, as evidenced by the heavy degree of wear and re-heating. Over 40% of clay balls are recovered from middens, yet clay ball fragments are also common in 'structural' contexts, and thus appear to have been strategically used as packing elements and in construction projects such as walls. Extremely solid and hard, clay balls and fragments would have acted like pebbles, providing useful, heat-retaining rubble for lining the base of ovens (as seen in large quantities in B.17, for example), a quick and simple way to block up ovens to be taken out of use, and an aggregate in the construction of walls.

Clay balls also held a symbolic value. Their recovery alongside other cultural materials including ground stone, chipped stone and faunal remains in structured depositions attests to this. Clay balls are commonly recovered in artefact caches or clusters placed between walls, building foundations and clusters on building floors. Their role in the heating of food, if they were used in such a way, would have made them essential and valued tools, crucial in the performance of daily household tasks, thus their inclusion as part of ritual deposits is fitting. Clay balls may have also been used as weapons in a limited capacity. It has always been surprising that such a large and densely packed community appeared to have little or no evidence of violence and warfare. Current research by Knüsel et al. (2019), however, is recovering evidence of blunt force cranial trauma (Knüsel et al. 2019; Volume 13, Chapter 16). The weight, size and shape of clay balls enables them to be easily thrown, with the potential of causing serious injury. A number of individuals exhibiting cranial

trauma have been identified. Notably, this occurred in both males and females, all of whom survived their injuries. With many clay balls found easily to hand within the buildings of Çatalhöyük, at times of stress, they may have opportunistically been thrown or fired from slings.

Conclusions

Clay balls are an integral element of Çatalhöyük's material culture during the first half of its occupation. They occur frequently in both the North and South Areas, declining gradually into the Middle period, before disappearing almost completely ca 6500 BC. Their disappearance from the archaeological record corresponds to a time when many sweeping changes in lifestyle and subsistence strategies occurred. Pre-6500 BC, clay balls were tools used primarily inside buildings, in the areas close to ovens. They were heated and re-heated many times, even after they had cracked and fragmented. As such, clay balls undoubtedly functioned to heat or keep things warm.

It is highly unlikely clay balls were cooking 'stones' as originally theorised (Atalay 2005, 2013; Atalay, Hastorf 2005; 2006). Though baskets could have acted as vessels, baskets have a multitude of functions and the botanical and faunal evidence suggests that in the first half of settlement at Çatalhöyük, food was mainly baked and roasted. Furthermore, chemical analysis has failed to recover evidence of the clay balls' placement into liquid foods (Pitter 2013). In terms of cooking, all evidence points to the use of clay balls as a grill or hotplate onto which cooked foods such as bread, along with roasted meats would be placed to keep them warm. The negligible proportion of intact clay balls recovered, the high incidence of the reheating of fragmented clay balls, the density of clay balls on dirty floor surfaces and the dominance of dry cooking methods in the Early to Middle periods all point towards such a function. As time passed, more efficient methods of food preparation evolved. The introduction of Dark Gritty Ware cooking pots revolutionised cooking practices, and liquid meals in the form of stews and porridges became commonplace. Such foods were cooked and served directly from the pots, so clay balls were no longer needed. However, cooking may not have been the clay balls' sole function, as the evidence above suggests. Furthermore, the re-analysis of Çatalhöyük's clay balls has also revealed their secondary use as a construction aggregate and their symbolic value, attested by their inclusion in ritual depositions.

Supplementary material

For supplementary material related to this chapter, please visit <https://doi.org/10.18866/BIAA/e-14>. It comprises 16 figures: S7.1–S7.16 and eight tables: S7.1–S7.8.

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