



## Textile tools from Kition, Cyprus

Smith, Joanna; Cutler, Joanne; Andersson Strand, Eva; Nosch, Marie Louise Bech

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# TOOLS, TEXTILES AND CONTEXTS

*We dedicate this book to Betschen Barber,  
the pioneer of the study of Aegean Bronze Age textiles.*

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# TOOLS, TEXTILES AND CONTEXTS

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edited by

*Eva Andersson Strand and Marie-Louise Nosch*  
*with the editorial and analytical assistance of Joanne Cutler*



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*Front cover: clockwise: MM II Quartier Mu, Malia, Crete, map (after Poursat 1996, pl. 81), spindle whorls from Phaistos, Crete (courtesy of P. Militello), Khania, Crete, Late Bronze Age ribbon, reconstructed loom weights in TTTC experiments.*

*Back cover: Splicing (drawing: Annika Jeppsson)*

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## CHAPTER 6.15

# Textile tools from Kition, Cyprus

*Joanna S. Smith, Joanne Cutler, Eva Andersson Strand  
and Marie-Louise Nosch*

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The Late Bronze Age settlement of Kition (Fig. 6.15.1) is situated on the south coast of Cyprus. Areas I and II, excavated by the Department of Antiquities of Cyprus (Karageorghis 1985; Karageorghis and Demas 1985), were first occupied in the 13th century BC, towards the end of the Late Cypriot IIC (LC IIC) period. The sequence of occupation down to the eleventh century BC is recorded in a series of 'Floors'. In Area I, the buildings contain relatively small rooms, while Area II contains five monumental structures that have been interpreted as temples and administrative areas (Smith 2009, 31–70), as well as two workshop areas. One of these workshop areas, the 'northern' workshop, has significant evidence for metal working, whereas the other, the 'western' workshop, was associated with textile production; 80% of the textile tools from Area II were recovered from rooms or outdoor spaces associated with the area of the western workshop (Smith 2002, 299).

A total of 323 textile tools from Kition are recorded in the TTTC database; 275 of these date to the Late Bronze Age (Figs. 6.15.2 and 6.15.3). Forty-seven objects date to the Cypro-Geometric I period (not discussed here).

### **Spindle whorls and spinning**

Of the 13 spindle whorls (four spherical, four biconical, three conical and two convex) dating to the Late Bronze Age, nine are from LC IIIA contexts, while four were recovered from LC IIIA-B deposits (Fig. 6.15.4). A number of small conical yet very flattened steatite and ivory objects (not recorded in the database), sometimes thought to be buttons rather than whorls, were additionally recovered from the site.

The two convex whorls, one of the spherical and one of the conical whorls are made of stone (all dated to LC IIIA). One of the LC IIIA conical whorls is made of unfired clay, another is made of low baked clay; the remaining nine whorls are made of fired clay.

One of the LC IIIA-B biconical whorls has an hourglass hole. This would have caused the spindle to rotate unevenly if used as a spindle whorl, and it therefore would not have functioned well if used for this purpose. Similarly, the use of unbaked clay for a whorl would not be optimal (see comments on unbaked whorls from Apliki in chapter 6.14).

Five of the 13 Late Bronze Age whorls were recovered from Area I (one dated to

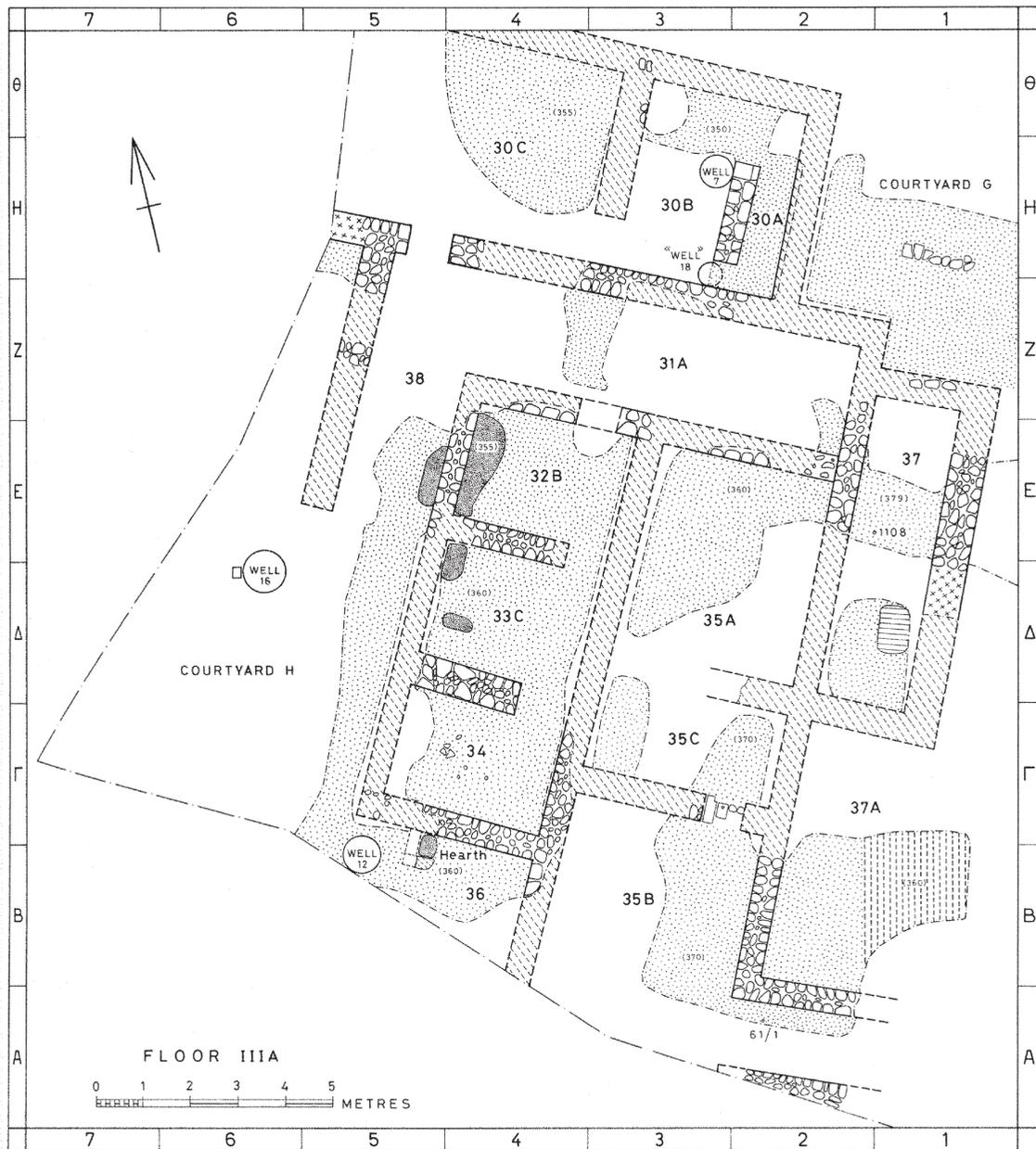


Fig. 6.15.1.a. Site plan: Area I, Floor IIIA (LCIIIA) (plan: reproduced with the permission of the Department of Antiquities, Cyprus, after Karageorghis and Demas 1985c, Plan 9, as reproduced in Smith 2009, fig. II.17b).

LC IIIA and four dated to LC IIIA-B). The remaining nine whorls (all dating to LC IIIA) were recovered from Area II.

Nine of the Late Bronze Age whorls are complete or only have small fragments missing; they range in weight from 14 g to 82 g (Fig. 6.15.5). The stone convex whorls are heavier than the other whorls, weighing 45 g and 82 g.

The lighter spindle whorls, weighing 14–19 g, would be suitable for spinning a thin to medium thread that would require a tension of *c.* 20–

30 g in a loom setup. The heavier, 40–47 g whorls could be used to spin thick thread, while the 82 g whorl could produce a very thick thread. The complete or nearly complete whorls from Area I weigh 18–45 g and those from Area II weigh 14–82 g. One incomplete, LC IIIA conical whorl from Area II, made of low fired clay and with a partial weight of 120 g, should also be noted. It is possible that this may have been used for spinning twine (cf. Smith 2007, 230), but it is also possible that it may have functioned as a loom weight.

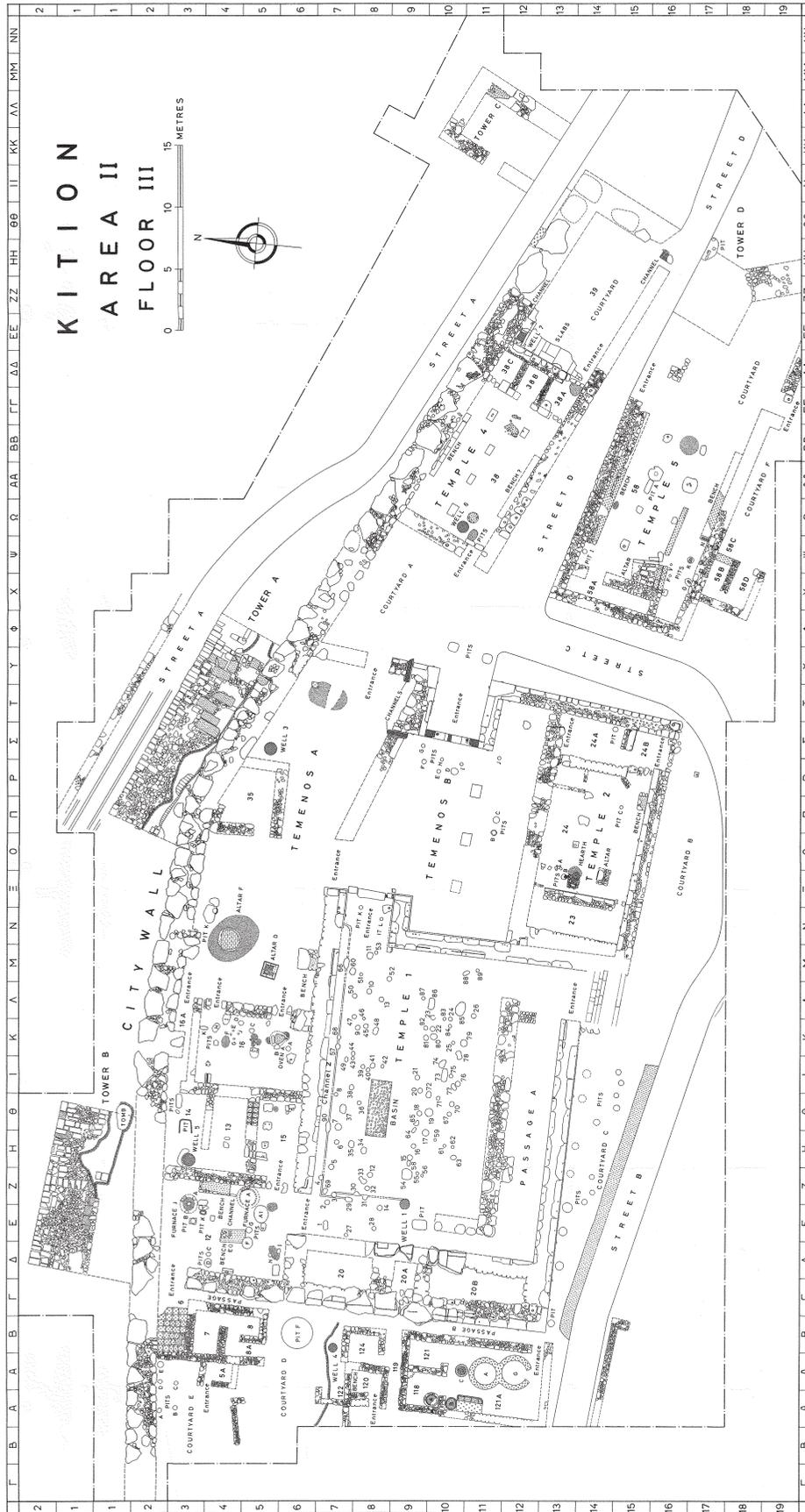


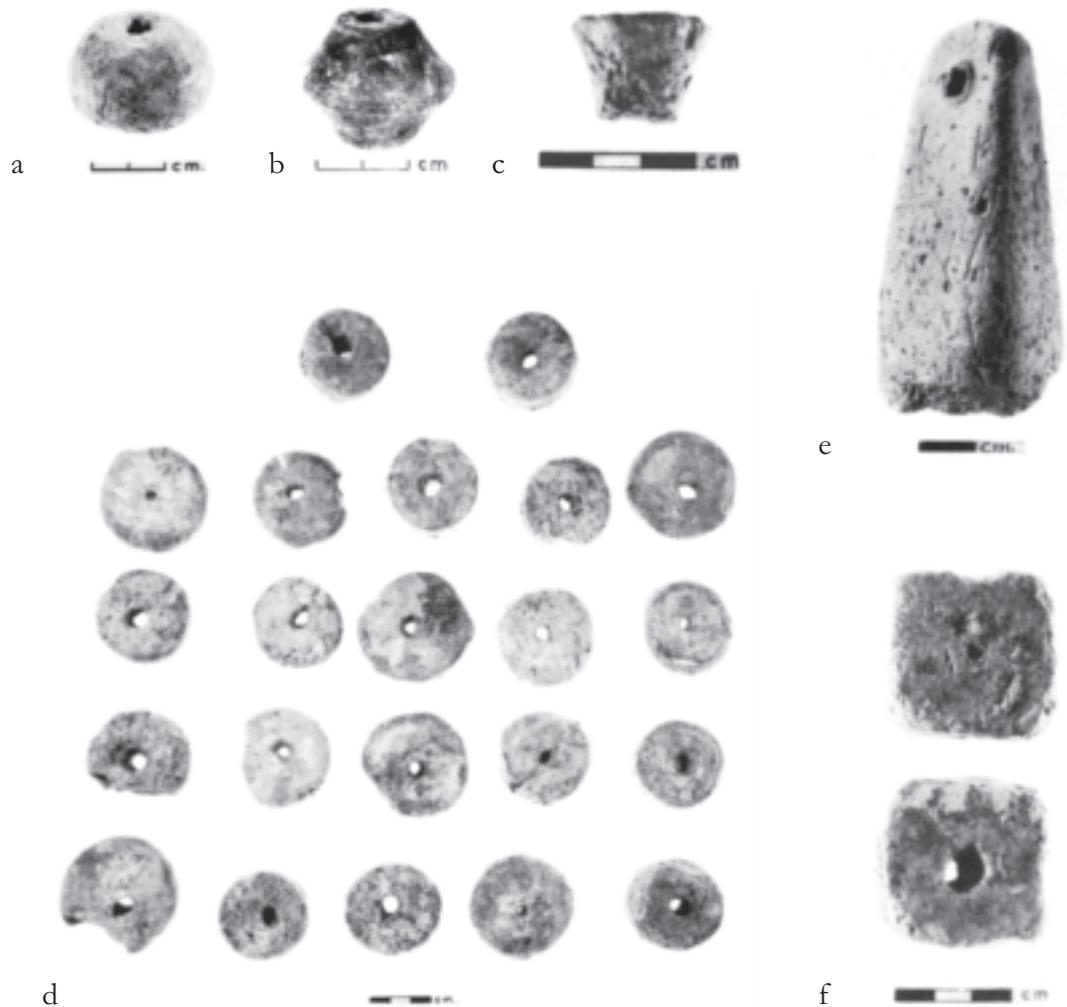
Fig. 6.15.1.b. Site plan: Area II, Floor III (LCIII.A) (plan: reproduced with the permission of the Department of Antiquities, Cyprus, as adapted from Karageorghis and Demas 1985:c, Plan V, with channels, basin, and other cuttings in courtyard of Temple 1 included. After Smith 2009, fig. II.3).

Fig. 6.15.2. Textile tools from Late Bronze Age contexts:

- a) spherical spindle whorl  
 b) biconical spindle whorl  
 c) conical spindle whorl  
 d) cylindrical loom weights  
 e) pyramidal loom weight  
 f) cuboid loom weight.

(photos: reproduced with the permission of the Department of Antiquities, Cyprus, after Karageorghis and Demas 1985b;

- a. plate XVI.423/2,  
 b. plate CXX.2042,  
 c. adapted from plate CXXI.5077 by rotating the image 180°;  
 d. plate XVI.423,  
 e. plate CL.904,  
 f. plate XXVI.433/1.



	Spindle whorl	Loom weight	Spool	Pointed tool	Total
LC IIC-III A		14		2	16
LC III A	9	124	32	14	179
LC III A-B	4	70	3	1	78
LC III B				1	1
LC		1			1
CGI	1	36	9	1	47
Unstratified	1				1
<b>Total</b>	<b>15</b>	<b>245</b>	<b>44</b>	<b>19</b>	<b>323</b>

Fig. 6.15.3. Textile tools, by type and date.

	Biconical	Conical	Convex	Spherical	Total
LC III A	2	3	2	2	9
LC III A-B	2			2	4
<b>Total</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>4</b>	<b>13</b>

Fig. 6.15.4. Spindle whorls, by type and date.

## Loom weights and weaving

Of the 244 loom weights (including spools) dating to the Late Bronze Age, 117 were recovered from Area I, while 127 come from Area II (Fig. 6.15.6). The majority of the loom weights from both areas are from LC III A contexts (62 from Area I and 94 from Area II). A variety of loom weight types are represented, but the cylindrical and pyramidal types are the most frequent (Fig. 6.15.6). A higher number of spools were recovered from Area II than from Area I.

The majority of the loom weights (232) are made from fired clay; 11 are made from unfired clay (six cylindrical, four pyramidal and one spool) and one flat trapezoidal weight is made of stone.

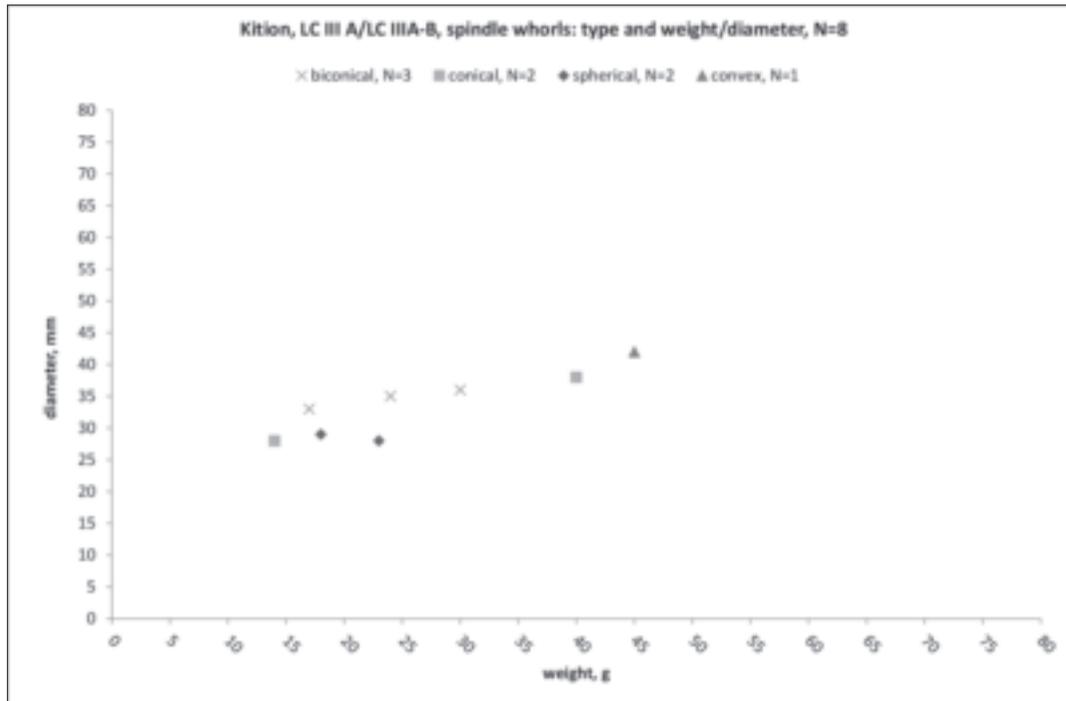


Fig. 6.15.5. Spindle whorls, LC IIIA/LC IIIA-B: type and weight/diameter (excluding a convex whorl weighing 82 g).

Area 1	Conical	Cuboid	Cylindrical	Flat trapezoidal	Pyramidal	Spherical	Spool	Total
LC IIC-III A			2	2	5			9
LC III A	1		32		26		3	62
LC III A-B		2	25		15	1	2	45
LC					1			1
<b>Total</b>	<b>1</b>	<b>2</b>	<b>59</b>	<b>2</b>	<b>47</b>	<b>1</b>	<b>5</b>	<b>117</b>
Area II	Conical	Cuboid	Cylindrical	Flat trapezoidal	Pyramidal	Spherical	Spool	Total
LC IIC-III A					5			5
LC III A	1		34	1	29		29	94
LC III A-B		1	8		18		1	28
LC								0
<b>Total</b>	<b>1</b>	<b>1</b>	<b>42</b>	<b>1</b>	<b>52</b>	<b>0</b>	<b>30</b>	<b>127</b>
<b>Overall Total</b>	<b>2</b>	<b>3</b>	<b>101</b>	<b>3</b>	<b>99</b>	<b>1</b>	<b>35</b>	<b>244</b>

Fig. 6.15.6. Loom weights by area, type and date.

One hundred and thirty-one of the loom weights from LC IIC-III B contexts were complete, or only have small fragments missing (Fig. 6.15.7). The majority of the loom weights weigh less than 200 g, and would have been suitable for use with very thin to thin thread requiring less than 20 g tension. A smaller number weigh 200–355 g; the heaviest weight (355 g) would be suitable for use with thin to medium thread requiring c. 15–35 g tension. The pyramidal loom weights and the spools lie within a similar weight/thickness group, although the pyramidal weights lie at the lower

end of the weight/thickness range, while the majority of the spools are at the upper end. Most of the spools weigh more than 50 g and would work well as loom weights. The lightest spools would also be suitable for use in tablet weaving or other band weaving techniques (see chapter 4.1).

The cylindrical weights, on the other hand, are generally thinner, and would be suitable for producing denser textiles than the other types. This category of loom weight also contains a number of heavier weights, weighing more than 275 g.

Fig. 6.15.7. Loom weights, LC IIC-III B: type and weight/thickness. Please note that some markers represent more than one loom weight.

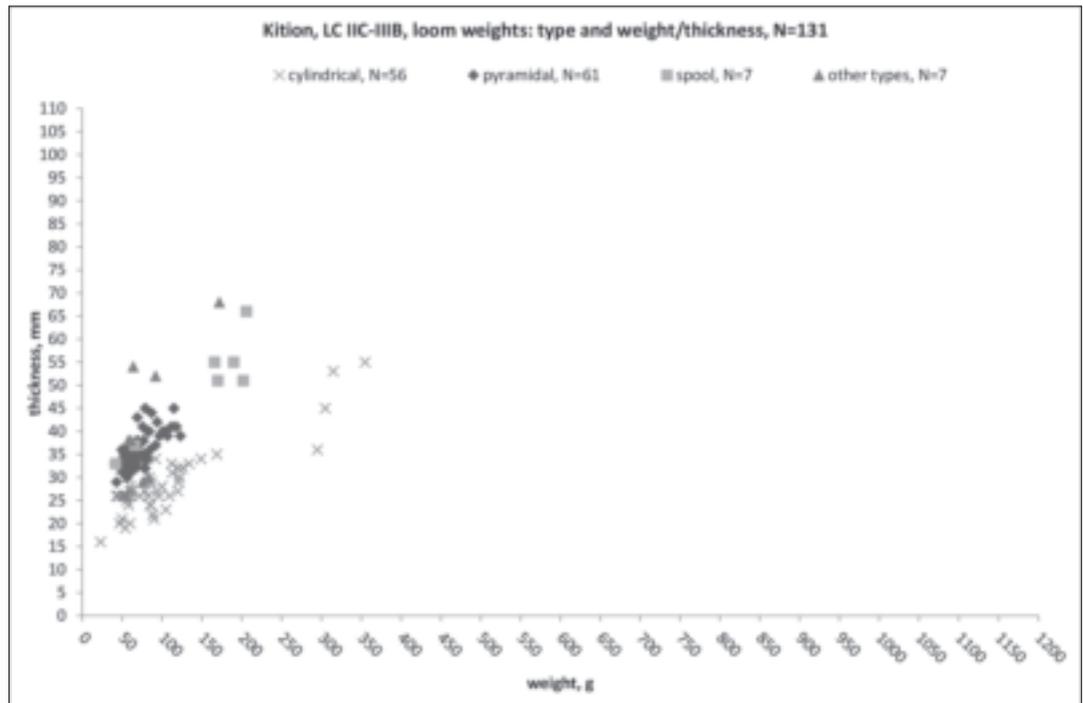
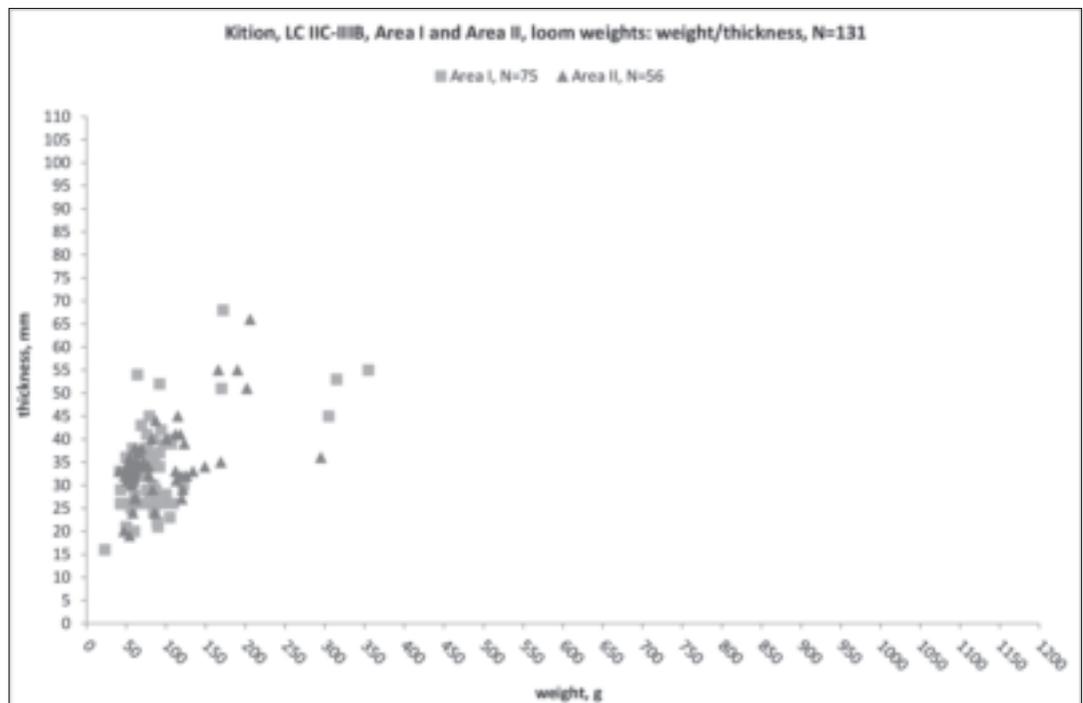


Fig. 6.15.8. Loom weights, LC IIC-III B, Area I and Area II: weight/thickness. Please note that some markers represent more than one loom weight.



Seventy-five of the complete or almost complete loom weights come from Area I, while the remaining 56 are from Area II. The loom weights from the two areas fall within very similar weight/thickness ranges (Fig. 6.15.8).

#### **Area I, Floor IIIA, Courtyard H**

In Area I, 33 loom weights (25 cylindrical, seven pyramidal and one conical) were recovered from Floor IIIA, Courtyard H (LC IIIA). Twenty-two of the cylindrical weights were found in a group, while a further five pyramidal



Fig. 6.15.9. Loom weights, LCIII A, Area I, Floor III A, Courtyard H: type and weight/thickness. Please note that some markers represent more than one loom weight.

weights associated with them were possibly lying in a row; 17 of the weights are complete or only have small fragments missing. Their weights range between 43 g and 82 g (Fig. 6.15.9). Most of the incomplete weights are also likely to have fallen within a similar weight range, although a few are slightly heavier (with partial weights of 106 g and 109 g).

All 17 of the complete or nearly complete loom weights would function well with very thin thread needing  $\approx 5$  g tension. In a tabby weave, the pyramidal weights could produce a fabric with  $\approx 7$  warp threads per centimetre; based on their average thickness, the cylindrical loom weights could produce a fabric with  $\approx 7$ –12 threads per centimetre. If the fabrics were balanced, they would be open, and they are therefore likely to have been weft faced. In a twill weave the thread count would be approximately double, but this would still be an open fabric and would also be likely to be weft faced. The loom weights weighing less than 50 g would provide a slightly lower tension, unless fewer than 10 threads were fastened to each one. None of the loom weights would be suitable for use with thread requiring 10 g tension. It is interesting to note that the two types of loom weights – cylindrical and pyramidal – in this deposit could function well

together. The stone (white chalk) spindle whorl, possibly from this deposit (or from between Floors III A and III), weighing 45 g, would not be suitable for spinning such fine thread, but with a height (thickness) of 2.6 cm, it would function well with the other weights if it was used as a loom weight.

#### **Area I, Floor II, Courtyard D**

Seventeen loom weights were recovered from Area I, Floor II, Courtyard D (LC III A-B). Eleven of these (eight cylindrical, two cuboid and one pyramidal) were found in a group. Only four of the loom weights found together are complete or only have small fragments missing (two cylindrical and two cuboid). These range in weight from 76–122 g, suggesting that, like the loom weights from Courtyard H, they would be optimal for use with thinner threads. However, five of the incomplete weights have partial weights of 220–295 g, and these would not be suitable for use with thread requiring less than  $\approx 10$  g tension. The spherical spindle whorl also recovered from this deposit with a partial weight of 41 g would be optimal for spinning much thicker thread than would be suitable for use with the loom weights (although it is possible that this object may have been used as a loom weight).

**Area II, Floor III, Room 118**

In Area II, 18 weights (13 cylindrical and five spools) were found on Floor III, Room 118 (LC IIIA) of the western workshop; eight of the cylindrical weights were found in a group. Only three of these have a complete weight; their weight range, 48–126 g, indicates that they would be suitable for use with very thin threads. The weights of the incomplete weights (70–132 g) suggests that the weight range of the group would have extended further, however. The object classified as a spindle whorl found with this group, with a partial weight of 120 g, would not be suitable for spinning the thread that could be used with the loom weights, but if it was used as a loom weight it would fit well with the other loom weights in the deposit.

**Area II, Floor II, Room 8**

Ten loom weights (five pyramidal, four cylindrical and one spool) were recovered from Area II, Floor II, Room 8 (LC IIIA-B). Seven of these (four cylindrical and three pyramidal) were possibly in a row. Three of the cylindrical and three of the pyramidal weights are complete or only have small fragments missing and weigh 47–86 g. Although the group contains two types of weights, they could function together if used in a tabby setup with thread requiring *c.* 5 g tension, but the variation in the thread count, *c.* 6–14 warp threads per centimetre, is high, largely as a result of the cylindrical weight weighing 86 g, which would be suitable for producing a denser weave than the other weights in the group (Fig. 6.15.10).

Fig. 6.15.10. Loom weights, LC IIIA-B, Area II, Floor II, Room 8: weight tension/number of threads per cm in a tabby. The total number of analysed loom weights is six.

Warp thr/cm	5 g, N=6
5 thr	
6 thr	1
7 thr	2
8 thr	1
9 thr	1
10 thr	
11 thr	
12 thr	
13 thr	
14 thr	1

**Summary**

None of the spindle whorls recovered from Areas I and II would be optimal for spinning very thin thread requiring *c.* 5–10 g tension. The lightest whorls (14–19 g) could be suitable for spinning thread needing *c.* 20–30 g tension. It is possible that the heaviest spindle whorls were used for spinning twine (cf. Smith 2007, 230), but it is also possible that they were used as loom weights rather than as spindle whorls.

Most of the loom weights weigh less than 200 g, with the majority weighing less than 150 g. This indicates that they would have been most suited for use with thread requiring less than 20 g tension, with a concentration of loom weights being optimal for use with very thin thread needing less than 15 g tension. Many of the resulting textiles would be open, however, unless they were weft faced. Fewer loom weights could be used with thicker thread needing 20 g tension or more and none would be suitable for use with thread requiring more than 35 g tension. On the whole, the cylindrical loom weights, being generally thinner than the pyramidal loom weights with the same weight, would produce a denser weave. However, there is some overlap between the two groups, as can be seen in the case of the group of loom weights from Area I, Floor IIIA, Courtyard H and Area II, Floor II, Room 8.

A number of pointed bone tools were recovered from the same contexts as the textile tools; these bone tools would also be well-suited for use in weaving. Prior to the TTTC study Smith proposed that they were for beating in the weft in tapestry production (see Smith 2001, 2002, 2012, 2013; Smith and Tzachili 2012).

Although the loom weights from Area I were recovered from household contexts, while the majority of those from Area II come from the western workshop, the tools suggest that there was no significant difference in the range of textiles produced in the two areas. A series of pits and vats, together with materials such as bone ash, lime and copper fragments present in each floor of Area II, possibly associated with the washing and dyeing of textiles, suggests that fulling and dyeing activities on a larger scale may have taken place in this area, however (Smith 2002, 303). The finds of *in situ* loom weights in courtyard contexts in both Area I and Area II suggest that some weaving took place outside.

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