Apliki, Cyprus: preliminary technical textile tools report

A total of 61 objects are recorded in the database. Of these, 49 are loom weights, and 12 are spindle whorls. All of the textile tools are dated to LC IIC/IIIA (1300-1200/1156 BC); 60 of them come from household contexts in House A (possibly representing one or two households [cf. Smith 2007: 229]), while the remaining loom weight comes from Area B.

Spinning at Apliki

Of the 12 items classified as spindle whorls, six are biconical, four are lenticular, one is cylindrical and one is spherical. All of these objects are manufactured from clay; four are made from fired clay, seven (four lenticular, three biconical) are made from burnt clay (not intentionally baked) and one biconical whorl is low fired.

Three of the whorls had a recordable weight and thickness (figure 1).

Type	weight	diameter
cylindrical	145	62
spherical	45	41
biconical	40	43

Figure 1. Spindle whorls with recordable weight and thickness.

Of the remaining objects, two are approximately half preserved, with a weight of 20 g and 25 g respectively, suggesting original weights of c. 40 g and 50 g. The rest are more than half preserved, with weights ranging from 35 g to 105 g, suggesting original weights of ≤70->105 g. The original weights of these whorls are therefore also likely to have fallen within a similar weight range to that represented by the complete whorls. The lightest of these whorls (40 g) could be suitable for spinning thick thread. It is possible that the heaviest tools may have been used for spinning twine (cf. Smith 2007: 230). However, it should be noted that seven of the whorls are made of unbaked clay; the use of unbaked clay for spindle whorls is rare (although ethnographic examples are not unknown[1]), and would be far from optimal, given the wear caused by fitting the whorl on a spindle ready for use, the constant rotation during spinning, and the friction of the secured yarn against the whorl. The shape and weight of the unbaked clay whorls (as well as that of the fired clay whorls), would not rule out the possibility that they were used as loom weights, rather than as spindle whorls. If they were used as whorls, they are likely to have had a short use life.

Weaving at Apliki

[1] S D McCafferty & G G McCafferty 2000: Textile Production in Postclassic Cholula, Mexico. *Ancient Mesoamerica* **11**,42.

Of the 49 items classified as loom weights, one is conical truncated, 14 are pyramidal/pyramidal truncated, three are cylindrical short and 31 are torus shaped. Twenty five of the loom weights have a complete weight and thickness, and a further eight are recorded as having 'small fragments missing' (figure 2). These 33 loom weights (including those with 'small fragments missing') vary in weight from 20 g to 270 g, with the majority weighing ≤150 g. The presence of a few heavier, incomplete weights should also be noted - a torus weight, APL-A2:13:1, at 200 g, and a cylindrical short weight, APL-A3:22.16, at 280 g.

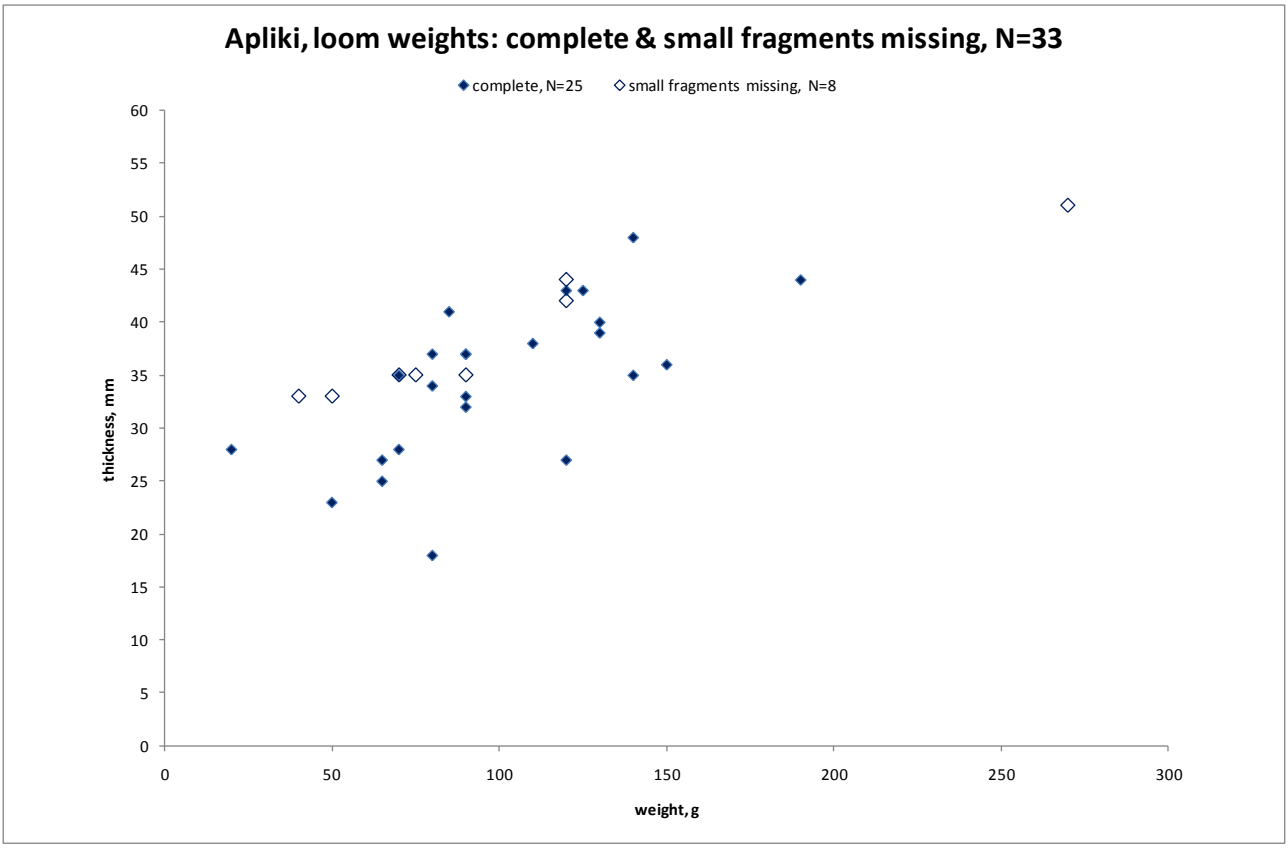

Figure 2. Loom weights, complete and small fragments missing, weight/thickness.

The loom weights weighing <100 g would be suitable for use with very fine thread requiring c. 5 g tension; APL-B82 (from Area B), weighing 20 g with a thickness of 2.8 cm, could function with extremely fine thread requiring <5 g tension and/or with less than 10 warp threads fastened to it. The loom weights weighing 100g-150 g would be suitable for use with thread requiring c. 5-10 g tension. The heaviest loom weight, weighing 270 g, would work well with thread needing c.10-25 g tension.

The 33 loom weights with a complete/small fragments missing weight consist of one conical weight, 13 pyramidal/pyramidal truncated, 17 torus and two cylindrical short (figure 3). The two main types, pyramidal/pyramidal truncated and torus, fall within very similar weight ranges. The torus weights are generally thinner, however, and would therefore have been suitable for

producing denser fabrics, with more threads per centimetre. The cylindrical short weights are heavier than the other loom weight types.

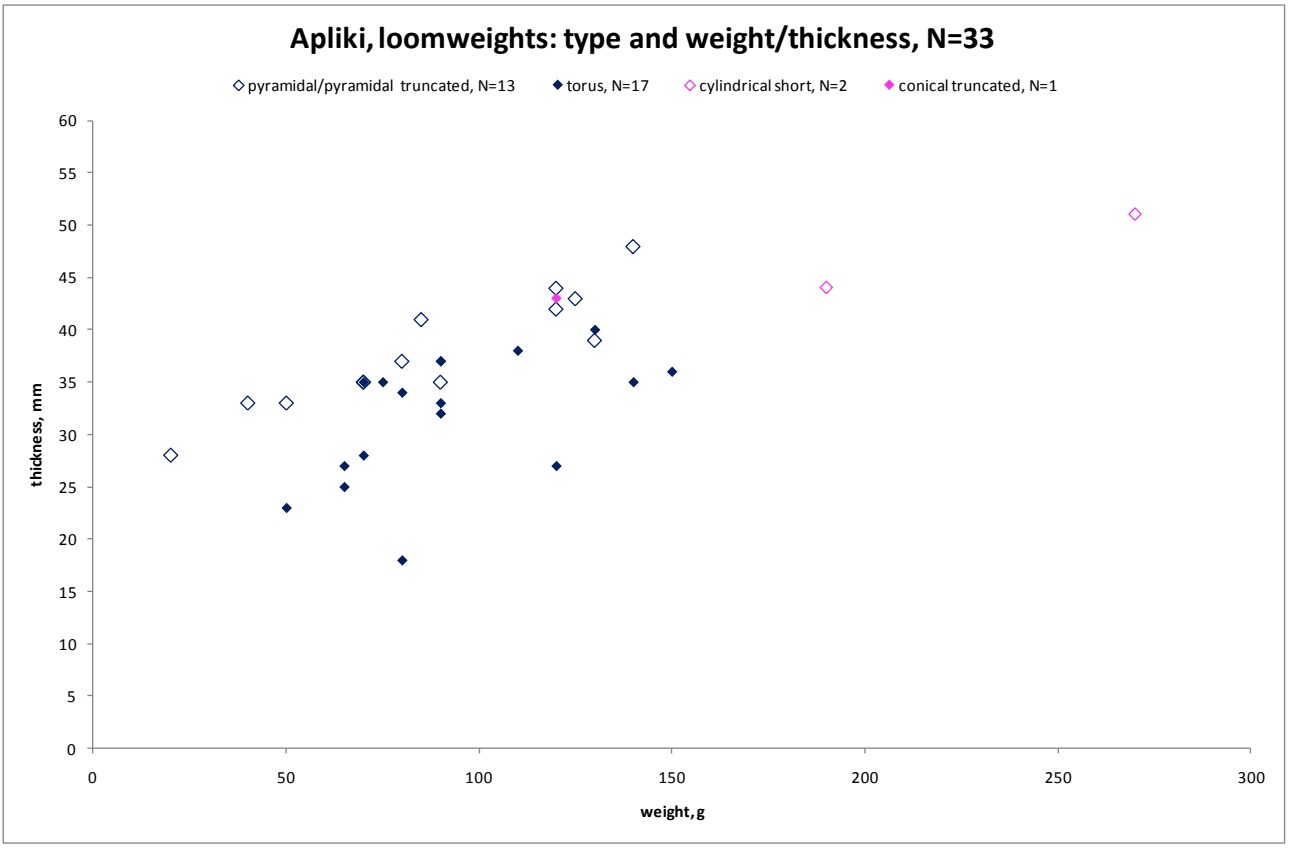

Figure 3. Apliki loom weights, weight and thickness.

Loom weight groupings

House A, Room 2:13. Three loom weights (two torus and one cylindrical short), made of burnt clay (not intentionally baked), were found under burnt ash and carbonised wood in House A, Room 2:13. Only one of these loom weights (cylindrical short) is complete, with a weight of 190 g and a thickness of 4.4 cm. The remaining two weights are more than half preserved, with extant weights of 200 g and 105 g and thicknesses of 4.7 cm and 3.3 cm respectively.

Seven spindle whorls (four lenticular and three biconical) were also found in the same deposit. These, like the loom weights, are made of burnt (not intentionally fired) clay. 21 other fragments were also recovered, possibly representing the remains of additional loom weights/spindle whorls (Smith 2007: 232). None of the seven spindle whorls have a recordable weight. However, two of the whorls are approximately half preserved, with a weight of 20 g and 25 g respectively, suggesting original weights of c. 40 g and 50 g. The remaining five whorls are more than half

preserved, and have extant weights of 35-105 g. It is estimated (Smith 2007: 230) that the partially preserved spindle whorls are each missing <20 g of their original weights, thus suggesting a range of original weights varying from >35-<55 g to >105 g-<125 g. If, as discussed above, the objects classified as spindle whorls are also considered as possible loom weights, the weights of the overall group therefore range from >35-<55 g to 200+ g, and the thickness range is 1.6-4.7 cm (figure 4).

loom weights	**preservation**	weight (g)	wt (g), not complete	thickness (mm)
APL-A2:13.1	partial (more than half)		200	47
APL-A2:13.3	partial (more than half)		105	33
APL-A2:13.8	complete	190		44
spindle whorls				
APL-A2:13.10	Half	40	20	16
APL-A2:13.2	partial (more than half)	<125	105	35
APL-A2:13.4	partial (more than half)	<80	60	27
APL-A2:13.5	partial (more than half)	<70	50	25
APL-A2:13.6	partial (more than half)	<60	40	28
APL-A2:13.7	Half	50	25	22
APL-A2:13.9	partial (more than half)	<55	35	22

Figure 4. Weight/thickness of loom weights and spindle whorls(?) found in House A, Room 2:13. Calculated approximate whole weights in red.

Calculations of the type of fabric that the complete loom weight APL-A2:13:8 (190 g) could produce if used in a tabby weave with two rows of loom weights indicate that it would be suitable for use with threads needing tension of c. 10-20 g, and would produce a fabric with c. 9, 6 and 5 threads per cm respectively (figure 5). In a 2/2 twill weave using four rows of loom weights, the resultant thread count would be approximately double.

Find ID	**presevation**	**weight (g)**	**wt (g), not complete**	**thickness (mm)**	**thr/cm 5g**	**thr/cm 10g**	**thr/cm 15g**	**thr/cm 20g**
APL-A2:13.1	partial (more than half)		200	47				
APL-A2:13.3	partial (more than half)		105	33				
APL-A2:13.8	complete	190		44	x	9	6	5

Figure 5. Loom weights from House A, Room 2:13. Calculated threads per cm obtained if using the individual weights in a two-row tabby, with thread requiring 5 g, 10 g, 15 g and 20 g tension.

If used as loom weights rather than as spindle whorls, the lightest object, APL-A2:13.10, weighing c. 40 g, would be suitable for use with very fine thread needing less than 5g tension, or with thread requiring 5 g tension if less than 10 warp threads were fastened to it. Six of the remaining objects would function well with thread requiring c. 5 g tension; if used in a two-row tabby, they would produce a fabric with between 6 and 14 threads per cm (figure 6; a four row 2/2 twill would

have approximately double this thread count). The variation in the thread count is high, but this is based on the upper and lower limits of the calculated thread count ranges, and the variation is therefore likely to be less than this estimate.

Find ID	presevation	weight (g)	wt (g), not complete	thickness (mm)	thr/cm 5g	thr/cm 10g	thr/cm 15g	thr/cm 20g
APL-A2:13.10	half	40	20	16	x	x	x	x
APL-A2:13.2	partial (more than half)	<125	105	35	12-14	6-7	x	x
APL-A2:13.4	partial (more than half)	<80	60	27	9-12	x	x	x
APL-A2:13.5	partial (more than half)	<70	50	25	8-11	x	x	x
APL-A2:13.6	partial (more than half)	<60	40	28	6-9	x	x	x
APL-A2:13.7	half	50	25	22	9	x	x	x
APL-A2:13.9	partial (more than half)	<55	35	22	6-10	x	x	x

Figure 6. Spindle whorls from House A, Room 2:13. Calculated threads per cm obtained if using the objects as loom weights in a two-row tabby, with thread requiring 5 g, 10 g, 15 g and 20 g tension. For the partially preserved objects that are estimated to have lost less than 20 g of their original weight, the thread count per cm has been given as a range, representing the lowest and highest thread counts obtainable in relation to the lowest and highest estimated weight of the object.

The majority of these objects would not work well with the complete loom weight (or the incomplete loom weights) in the same set up, because they are best suited for use with different diameter threads. However, APL-A2:13.2, weighing c. 105 g (+≤20 g) could be used in the same set up as the lighter weights with thread requiring c. 5 g tension, or with the heavier loom weight APL-A2:13.8 with thread requiring c. 10 g tension.

If the seven objects APL-A2;13.2, 4-7, 9-10 were used as spindle whorls, none of them would be suitable for spinning the thread appropriate for use with the associated loom weights.

House A, Room 3:22. 27 loom weights made of unfired clay (26 torus and one cylindrical short) were found in House A Room 3:22, in a basket in black ash, together with one spindle whorl and three further shapeless fragments of unbaked clay, which may also represent between one and three further loom weights. Fourteen of the torus loom weights are complete or have 'small fragments missing'; the weight range is 50-140 g and the thickness range is 2.3-4.0 cm (figure 7).

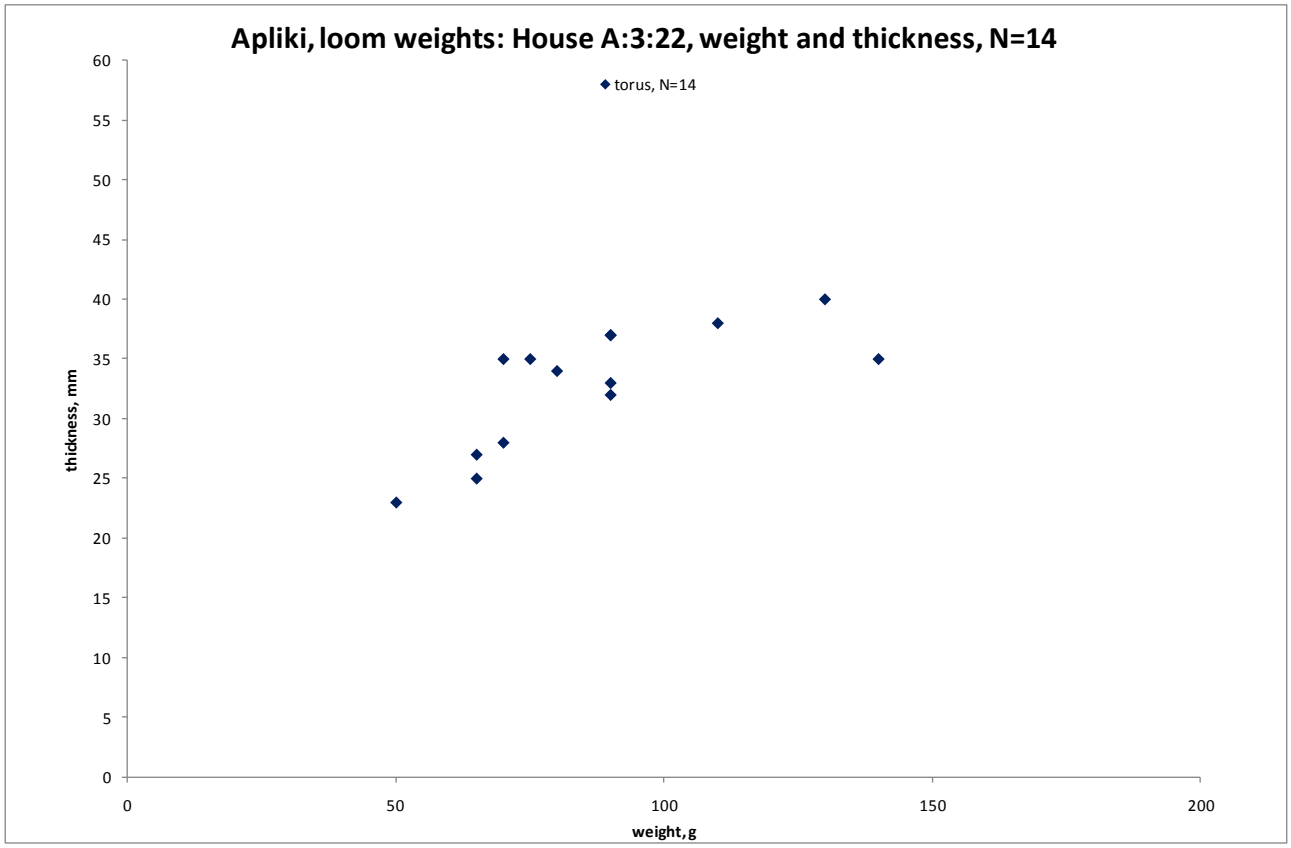

Figure 7. House A:3:22, loom weights, weight and thickness.

All of these loom weights would work well with very fine thread requiring 5 g tension (figure 8). In a tabby weave using two rows of loom weights, the resultant fabric would have between 8 and 16 threads per cm (approximately twice as many threads/cm if used in a four row 2/2 twill weave). The weights weighing >100 g would also work well with thread requiring 10 g tension, and could be used to produce a tabby (using two rows of loom weights) with 6-8 threads per cm (approximately twice as many for a four row 2/2 twill).

Find ID	weight (g)	thickness (mm)	thr/cm 5g	thr/cm 10g	thr/cm 15g	thr/cm 20g
APL-A3:22.14	50	23	9	x	x	x
APL-A3:22.12	65	25	10	x	x	x
APL-A3:22.13	65	27	10	x	x	x
APL-A3:22.21	70	28	10	x	x	x
APL-A3:22.9	70	35	8	x	x	x
APL-A3:22.5	75	35	9	x	x	x
APL-A3:22.23	80	34	9	x	x	x
APL-A3:22.10	90	32	11	x	x	x
APL-A3:22.6	90	33	11	x	x	x
APL-A3:22.11	90	37	10	x	x	x
APL-A3:22.3	90	37	10	x	x	x
APL-A3:22.15	110	38	12	6	x	x
APL-A3:22.1	130	40	13	7	x	x
APL-A3:22.2	140	35	16	8	x	x

Figure 8. Group of textile tools found in House A, Room 3:22. Calculated threads per cm obtained if using the individual weights in a two-row tabby, with thread requiring 5 g, 10 g, 15 g and 20 g tension.

In a setup using thread requiring 5 g tension, the variation in thread count between 8 and 16 threads per cm is high, but the majority would give a thread count of between 8 and 13 threads per cm, and 10 of them would give a thread count of 9-11 threads per cm.

The preserved weights and thicknesses of the remaining 13 loom weights suggests that all except one of them would have fallen within the same weight/thickness range as the complete loom weights. The exception is APL-A3:22.16, a cylindrical short loom weight with a preserved weight of 280 g, which would not be suitable for use with thread requiring < 10 g tension, and would not be optimal for use with the other loom weights in the group.

The object recorded as a biconical spindle whorl, APL-A3:22.8, also made of low-fired clay and with a preserved weight of 90 g and thickness of 4.1 cm, would also fit well within the overall weight/thickness range of the loom weights, and this suggests that it may have been used as a loom weight rather than as a spindle whorl. If used as a spindle whorl, it could not have been used to spin thread suitable to be used with the associated loom weight group.

The combined thickness of the 14 complete/small fragments missing weights is 45.9 cm. Adding the thickness of the partially preserved loom weights (omitting the heavier 280+ g weight) and the 'spindle whorl' gives a total of 85.4 cm. If the three additional fragments represent one to three further loom weights, the total thickness could be 10 cm or so greater again. However, taking the extant thickness of c. 85.4, the 28 loom weights, if used in the same two row tabby set up (i.e. 14 loom weights in each of the two rows), could be used to produce a fabric c. 43 cm wide.

House A:5. Eleven loom weights were recovered from House A, Room 5, found in or near (as if fallen from) a niche in the north wall (Smith 2007: 232). Eight of these are pyramidal/pyramidal

truncated, two are re-used pottery sherds and one is a naturally pierced stone. All except one of the loom weights (pyramidal truncated) are complete or have small fragments missing (figure 9). The weight range is 80-150 g and the thickness is 1.8-4.8 cm. The preserved weight of the remaining incomplete loom weight, at 150 g, suggests that it would have been heavier than the other weights.

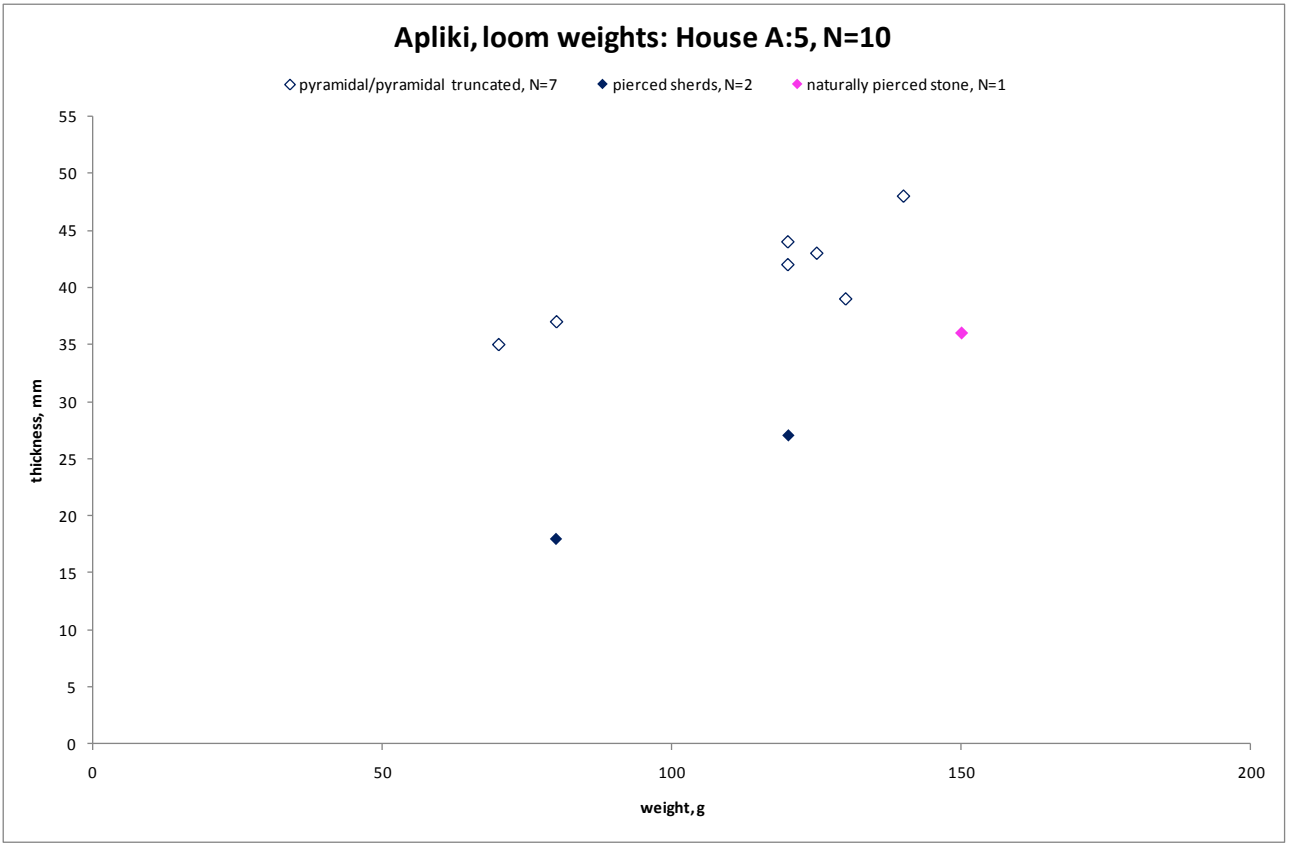

Figure 9. House A:5, loom weights, weight and thickness.

All of the loom weights would function with very fine thread requiring 5 g tension (figure 10). Five would additionally work well with thread needing 10g tension, and only one would be optimal for use with thread requiring 15 g tension. In a two row tabby weave with thread needing 5 g tension, the resultant fabric would have 9-18 threads per cm. If the two pierced sherds (APL-A5:31, APL-A5:11B) and the pierced stone were excluded, the thread count range would be much narrower (9-13 per cm for thread requiring 5g tension). This suggests that, while it would not be impossible to use the pierced sherds and the pierced stone in the same set up as the other loom weights, their use would not be optimal.

Find ID	weight (g)	thickness (mm)	thr/cm 5g	thr/cm 10g	thr/cm 15g
APL-A5:25	80	37	9	x	X
APL-A5:11A	130	39	13	7	X
APL-A5:36	125	43	12	6	X
APL-A5:24	140	48	12	6	X
APL-A5:26	120	42	11	6	X
APL-A5:27	70	35	8	x	X
APL-A5:28	120	44	11	5	X
APL-A5:31	80	18	18	x	X
APL-A5:11B	120	27	18	9	X
APL-A5:3	150	36	17	8	6

Figure 10. Group of textile tools found in House A, Room 5. Calculated threads per cm obtained if using the individual weights in a two-row tabby, with thread requiring 5 g, 10 g and 15 g tension.

Spinning and weaving at Apliki

The majority of the loom weights from Apliki would be suitable for use with fine thread requiring <10 g tension. If used to produce tabby fabrics, many of the resultant textiles would be relatively open, however, unless they were weft faced. Although very few twill textiles dating to the Bronze Age have been recovered from the eastern Mediterranean region, the analyses of the loom weights indicate that the possible production of twill textiles cannot be ruled out. None of the objects classified as spindle whorls would have been suitable for spinning the types of thread that could have been used with the loom weights. From their weight, thickness and shape, it is possible that some or all of these spindle whorls may have been loom weights.