TEXTILE TOOLS FROM ASINE

A total number of 217 objects were recorded in the database (figure 1). The majority of the tools is dated to MH and LH. The number of tools found in same context and dated to the same period is, however, small and in the context analysis we have just included objects (with object date) which are securely dated to EH, MH and LH (figure 2). It is also important to note the great difference in duration of the different periods (EH app: 1000 years, MH app: 300 years, LH app: 650 years) which means that the results from the three periods are not directly comparable.

To conclude these problems make it impossible to reach any secure conclusions on the development of textile production in time and we have therefore decided to focus mainly on the functionality of the recorded tools.

Object date	Spindle whorl	Conulus	Pierced sherd	Stone disc	Loom weight	Implement	In all
EH	5				2		7
EHII					1		1
EH/MH	7				3		10
EH?-MH	1						1
EH/MHI	1						1
MH?	9						9
MH	20				1	2	23
MHI	1						1
MHII	1						1
MHII?	1						1
MHII/III					2		2
MHIII	5					2	7
MHIII?					1		1
MH/LH	11				3		14
MH?-LH					1		1
MH? LH?	1						1
MH-LH?	2						2
LH/MH	1						1
LH?/MH					1		1
LH?	6				2		8
LH	58	4			23	2	87
LHI					2		2
LHIII	4						4
LHIII?	1						1
LH/Protogeometric	1						1
LH/PG?						1	1
LH/Geometric	8	3					11
LH/Geom?	1						1
LH(?)/Geometric(?)	2						2
G						1	1
unknown	6		1	1	1	4	13
In all	153	7	1	1	43	12	217

Figure 1. Total number of objects from Asine recorded in the CTR database.

OD			Spindle whorl	Pierced sherd	Conulus	Loom weight	In all
EH	settlement	household	5			3	8
MH	settlement	household	10	9		4	23
	necropolis	tumulus tomb	2				2
		other	1				1
	other	other	4			2	6
LH	settlement	household	18	5		26	51
		other	3				3
	necropolis	tomb	5		4		9
		chamber tomb	10				10
	other	other	18				20
		in all	76	14	4	35	133

Figure 2. Chronological and contextual distribution of the recorded objects based on object date and according to our evaluation of the recorded tools' function (see below).

SPINDLE WHORLS, CONULI, PIERCED SHERDS – SPINNING IN ASINE

Originally 160 objects from Asine were recorded as spinning tools. However 4 objects are more likely loom weights or weights (AS2581:1; AS2657:1, AS3376:1, ASI-AS4171:1) and have therefore been moved to the loom weight formulary. Another 3 objects (OTH0039; AS1422:1; AS5499) have been excluded as spinning tools (please see comments in database). To conclude: a total number of 153 objects will be included in this analysis.

Of these 153 objects 7 whorls are called conuli and 146 objects, of which 24 are made of pierced sherds, are recorded as spindle whorls. The pierced sherds will also be discussed separately. Please note that we will refer to *whorls* when spindle whorls, conuli and pierced sherds are discussed together.

Furthermore 94 of 153 whorls have a secured object date to EH, MH or LH. These objects will also be discussed separately.

Material and type

The majority of all whorls is made of clay and has a conical or discoid shape (figure 3a). Furthermore the majority of the stone whorls has a conical shape.

	clay	stone	bone
biconical	11	1	
concave conical	5	8	
conical	25	34	
convex	17	2	1
cylindrical		1	
discoid	27		
other	5		
various shapes with hollow top		12	
spherical	1		
not available	2	1	
in all	93	59	1

Figure 3a. The relation between type and material.

OD		clay	stone
EH	biconical		
	concave conical		
	conical		
	convex	4	
	cylindrical		
	discoid	1	
	other		
	various shapes with hollow top		
MH	biconical	4	
	concave conical		
	conical	6	
	convex	4	
	cylindrical		
	discoid	10	
	other	1	
	spherical	1	
LH	biconical		1
	concave conical	2	8
	conical	5	27
	convex		2
	cylindrical		1
	discoid	5	
	other	3	
	various shapes with hollow top		9
In all		46	48

Figure 3b. The relation between whorls' date and type/material.

However as can be seen in figure 3b the whorls made of clay are in general dated to EH and MH while the majority of the whorls from LH is made of stone.

Complete whorls and whorls with small fragments missing

A comparison between the complete whorls (51 objects) and the whorls with estimated weight and/or with small fragments missing (22 and 44 objects respectively) demonstrates that they do not always fall within the same weight range (figure 4). However, according to the pictures we have estimated that the margin of error in the calculation of weight of whorls with small fragments missing is less than 10% (1g for a whorl weighing <10g, 2g for a whorl weighing <20g etc.). This variation of 10% would not have affected the finished product of the whorls and we have therefore decided to include the whorls with an estimated weight and/or with small fragments missing in this study.

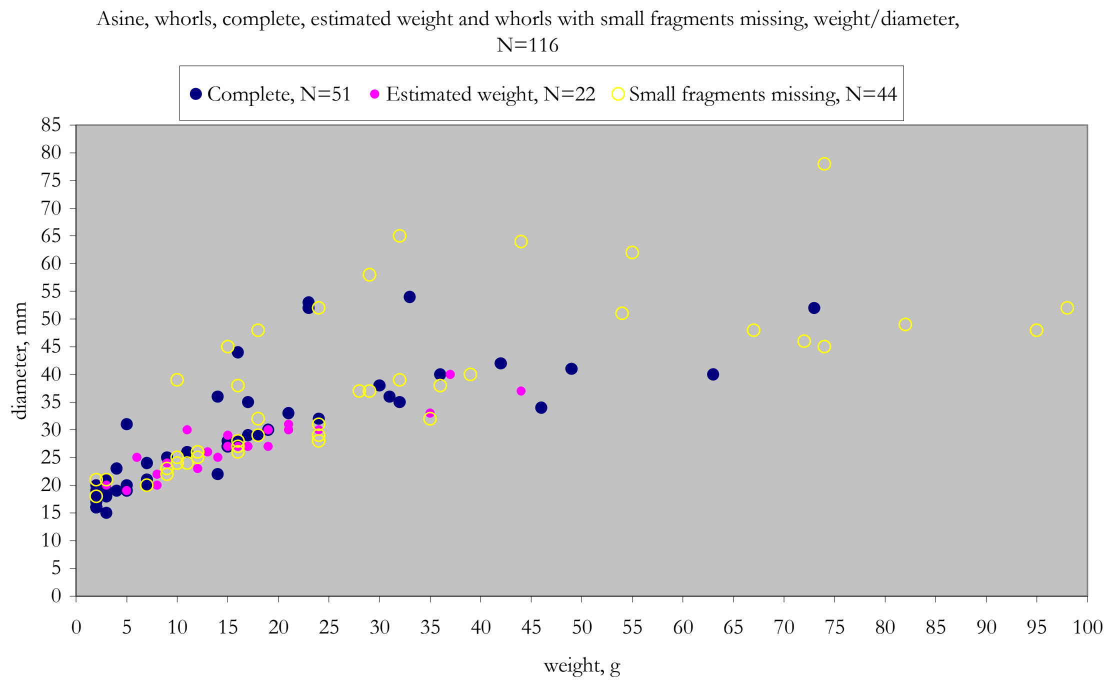

Figure 4. Complete whorls and whorls with an estimated weight and/or with small fragments missing, weight/diameter.

Type-material and weight-diameter

As can be seen in figure 5 whorls made of stone form a much more homogenous group than the group of clay whorls. On the other hand there is no clear relation between type and weight/diameter (figure 6), concial, biconical and convex whorls are recorded for a large variety of weights and diameters. However the majority of the whorls with a discoid shape has a larger diameter than whorls with other shapes.

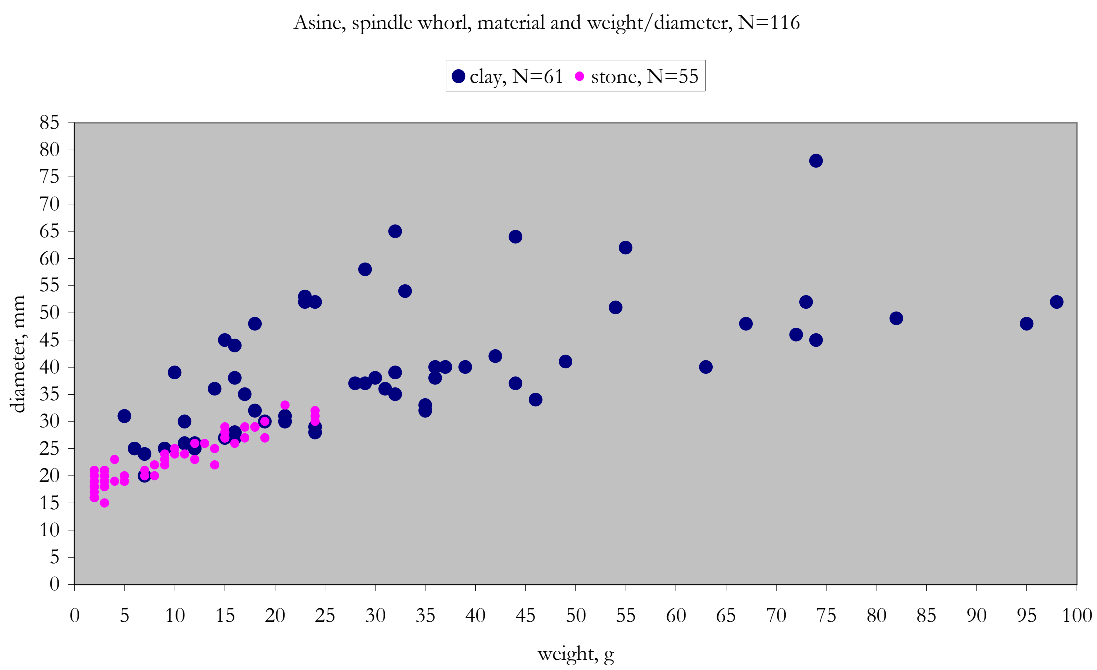

Figure 5. The relation between material and weight/diameter.

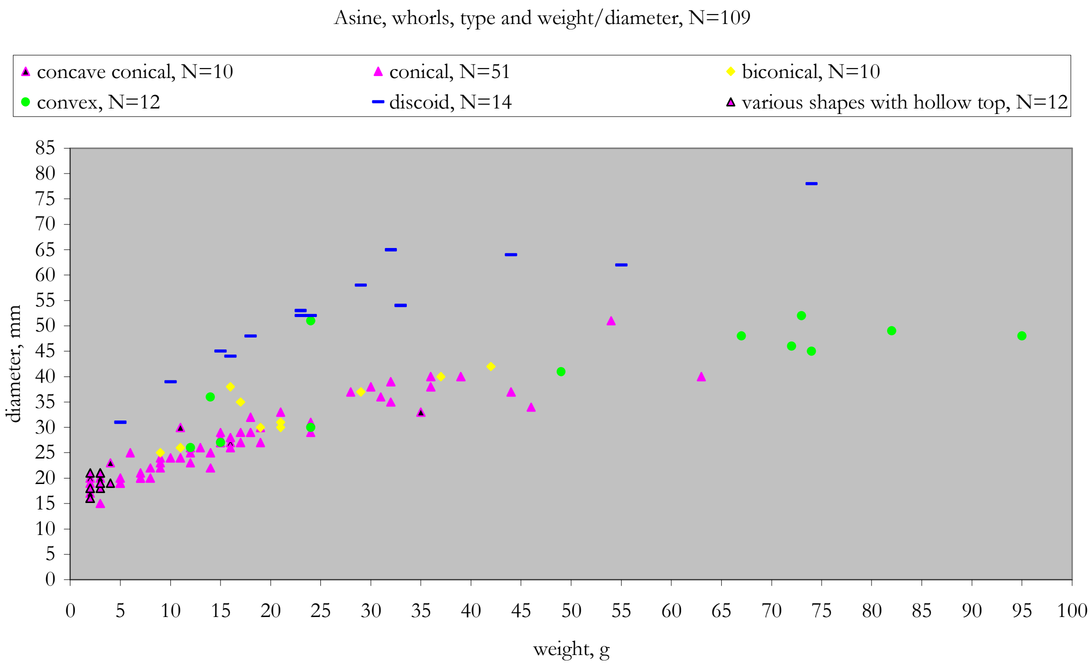

Figure 6. The relation between type and weight/diameter. Please note that types that are represented by only a single whorl are excluded from this figure.

The weight of the whorls varies from 2g to 98g and in diameter from 16 mm to 78 mm indicating a production of several types of yarn from very thin to very thick (figure 7). However there is a clear difference between on one hand the spindle whorls and on the other hand the pierced sherds (figure 7).

The pierced sherds generally have a larger diameter than the spindle whorls and conuli. According to the recordings in the database the pierced sherds are also often irregular in shape and would therefore not function well as spindle whorls. Another difference is that the hole shape of the pierced sherds is often double-conical (figure 8). It would be very difficult to fix a spindle whorl with a double-cone hole firmly on the spindle – the whorl would most likely wobble too much. To conclude the pierced sherds with a double cone hole would not function well as spindle whorls and can not be interpreted as spinning tools. We have therefore excluded the pierced sherds from the following analysis. The only spindle whorl with a double-cone hole is concal and made of clay. This whorl is still included because it is regular in shape.

The group of the smallest spindle whorls and conuli is homogeneous in weight, diameter and hole shape (figure 7). The yarn spun with lightest conulus and spindle whorl would be much thinner than the yarn spun with the heaviest spindle whorl. The thin type of yarn would demand well prepared raw materials and the spinners had to be experienced. The fabrics produced with these fine threads would have taken a considerable time to make. The yarn produced with the heaviest spindle whorls would be thicker and the fabric coarser but for the best result, a regularly spun thread, it would be preferable with well prepared raw material and experienced spinners.

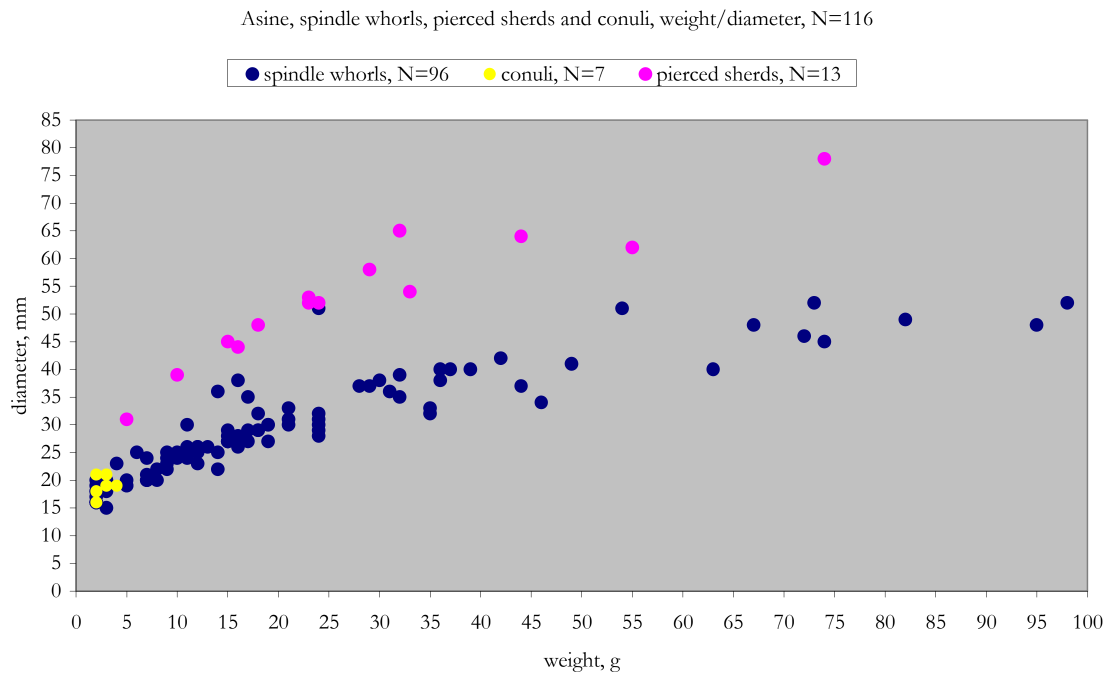

Figure 7. The relationship between whorl type and weight/diameter.

	plain	cone	double cone	not available	In all
SpW	102	13	1	6	122
Conuli	7				7
Pierced sherds	1	3	20		24
In all	110	16	21	6	153

Figure 8. The relationship between whorl type and hole shape.

EH - Spindle whorls and spinning

Only 2 spindle whorls with preserved weight of 66g and 73g and diameter 48 mm and 52 mm respectively, are dated to EH (figure 9). The yarn spun with these two whorls would be thick but no general conclusions on which types of yarn that were produced during EH in Asine can be drawn.

MH - Spindle whorls and spinning

The 15 whorls from MH vary in weight from 9g to 98g and in diameter from 25 mm to 52 mm indicating a varied production of thin to very thick yarn with emphasis on thicker yarn (figure 9). The majority of the whorls (19 objects) is from household contexts (figure 2). 3 whorls are found in the necropolis and the weight of the these whorls varies from 30g to 41g and the diameter from 37 mm to 40 mm.

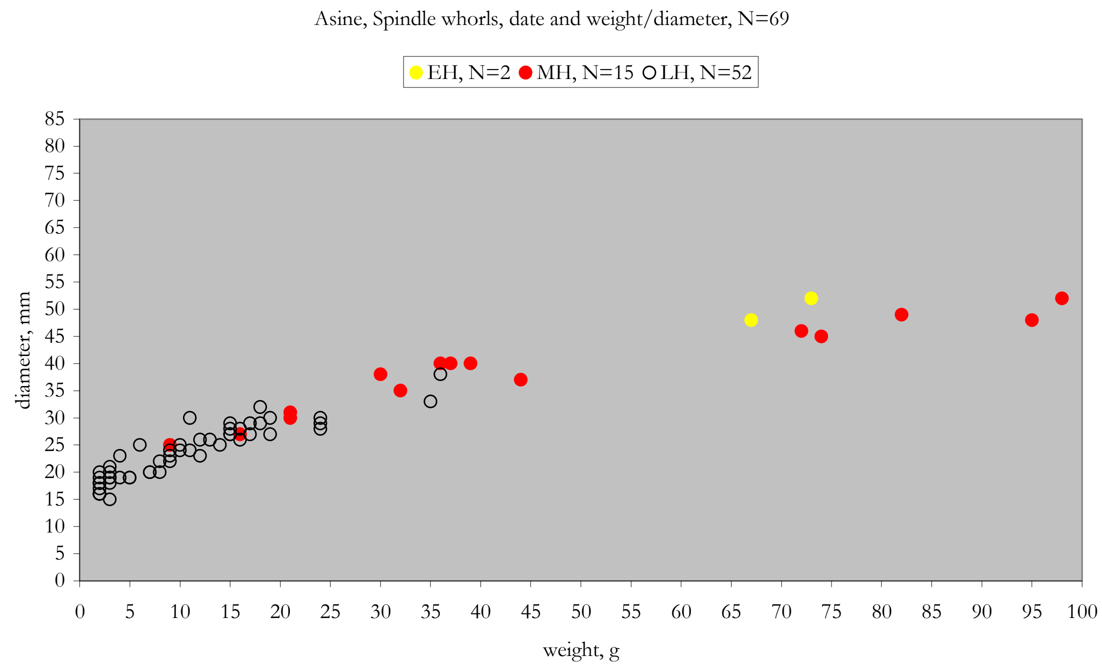

Figure 9. Spindle whorls and conuli, object date and weight/diameter

LH - Spindle whorls and spinning

The majority of all spindle whorls (57 objects) and conuli (4 objects) from Asine is from LH. (Please note that the pierced sherds recorded as spindle whorls are excluded)

48 LH spindle whorls and 4 conuli have a preserved weight and diameter. The whorls vary in weight from 2g to 36g and in diameter from 15 mm to 54 mm indicating a production of very thin to thick spun yarn with emphasis on thinner yarn.

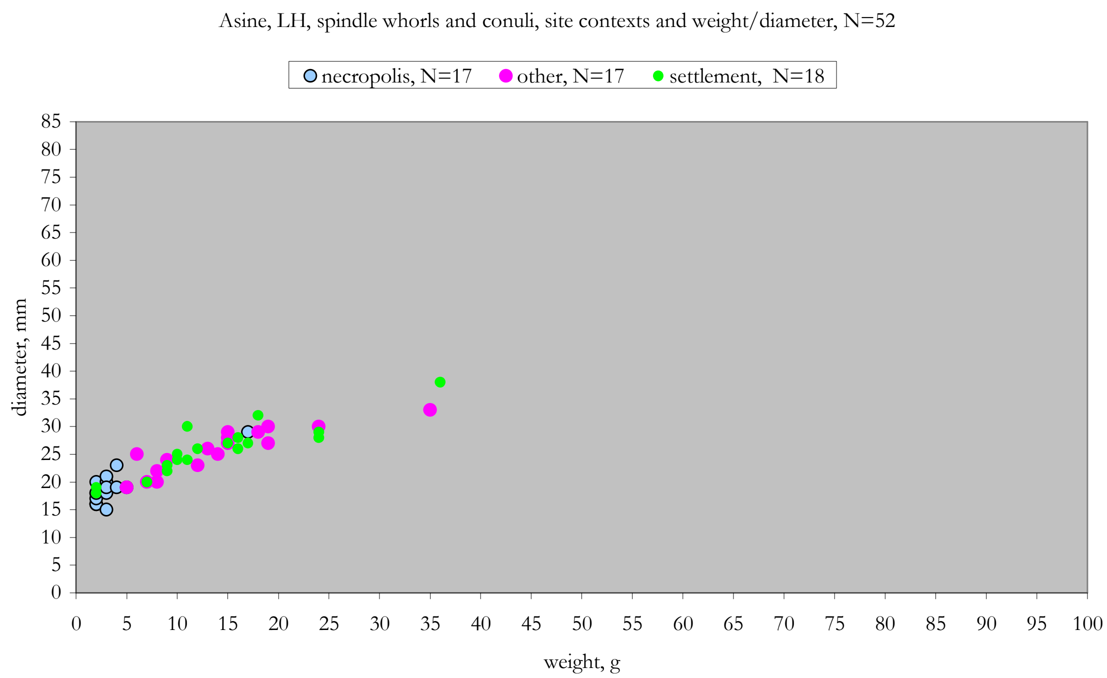

Figure 10. Spindle whorls and conuli, LH site contexts and weight/diameter

The majority of the spindle whorls is from the settlement and household contexts (18 objects) and other contexts (3 objects) while 15 spindle whorls and 4 conuli are from the necropolis and tombs/chamber tombs. Finally 18 spindle whorls in the dB are recorded from "other site types" and "other contexts" (figure 2).

As can be seen in figure 10 the analysis demonstrates a distinctive clustering of whorls from the Necropolis. These whorls are in general very small, the weight varies from 2g to 17g and diameter from 15 mm to 29 mm but only one whorl is weighing more than 5g. If these whorls functioned as spinning tools the spun yarn must have been very thin.

On the other hand, the two groups of spindle whorls from the settlement and from "other site types" seem very similar in the distribution pattern (figure 10) indicating a production of several types of yarn from very thin to thick but primarily very thin and thin.

Spinning in Asine – summary

The results from the three periods are not directly comparable. However, the analyses indicate a change in production between MH and LH. During MH the results clearly demonstrate a production of primarily quite thick yarn and during LH primarily very thin and thin.

WEAVING AND LOOM WEIGHTS IN ASINE

A total number of 43 loom weights was recorded in the database. Furthermore another 6 objects recorded in the *other textile tools formulary* and 4 objects recorded in the *spindle whorls formulary* are most likely loom weights or weights and have therefore been moved to the *loom weight formulary* (please see the comments in the database). To conclude: a total number of 53 objects will be included in this analysis.

Furthermore 35 of the 53 loom weights have a secured object date to EH, MH or LH. These will also be discussed separately.

The majority of the loom weights are made of fired clay and they are spool shaped (figure 11).

	fired clay	stone
cylindrical	1	
cylindrical long	4	
discoid	2	
other	1	
spool	38	1
torus	5	
not available	1	
in all	52	1

Figure 11. The relationship between type and material.

3 loom weights are from EH, 6 are from MH and 26 are from LH (figure 12). As can be seen in figure 12 the spool shaped loom weights are in majority both during MH and during LH. To conclude: the number of loom weights is small. Therefore it is impossible

to reach any (secure) conclusions on the textile production at Asine and consequently we have decided to focus mainly on the functionality of the recorded loom weights.

OD	Type	fired clay
EH	cylindrical	1
	cylindrical long	
	discoid	
	other	
	spool	
	torus	2
MH	cylindrical	1
	cylindrical long	
	discoid	
	other	
	spool	5
	torus	
LH	cylindrical	
	cylindrical long	
	discoid	
	other	
	spool	22
	torus	3
	not available	1
In all		35

Figure 12. The relationship between date and type/material.

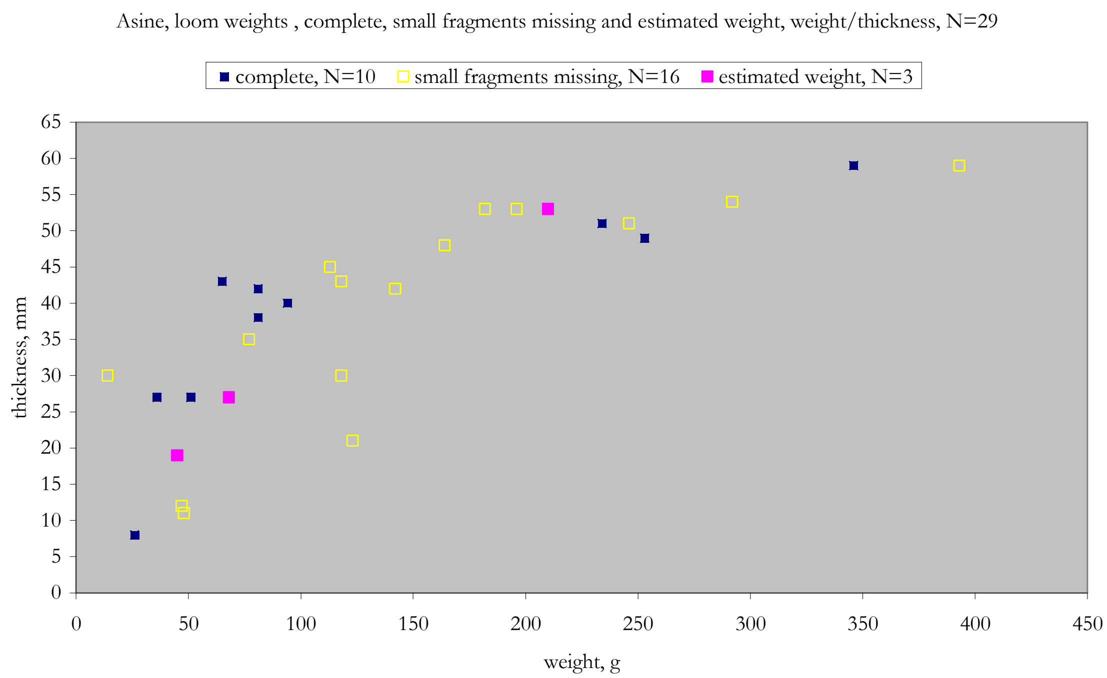

Figure 13. Complete loom weights, loom weights with small fragments missing and loom weights with an estimated weight. By 'thickness' we refer to the measurement that affects the loom setup (see p. 5 in introduction). In the dB this measurement has been recorded in different ways depending on which

type of loom weight is recorded, and we have therefore chosen to included data that is not recorded as 'thickness' but rather what is actually the part of the loom weight that affect the loom setup and the fabric.

Weight and thickness

Only 10 weights are completely preserved and it has been possible to estimate the weight of another 3 objects. Furthermore on 17 loom weights small fragments are missing (figure 13). We do not estimate that the margin of error in the calculation of weight would have affected the finished product and we have therefore decided to include the loom weights with small fragments missing and loom weights with an estimated weight in this study.

As can be seen in figure 13, the loom weights vary in weight from 14g to 461g and their thickness varies from 8 mm to 69 mm.

EH loom weights and weaving

Only 1 of 3 loom weights from EH has a preserved weight and thickness and no conclusions about EH fabrics can be drawn from these items. Two of the loom weights are made of sherds and are torus shaped. They are both fragmentary (less than half preserved) and the weight is 68g and 67g respectively which demonstrate that the complete weight on these two exceeds 140g. The thickness of these two weights is 17 mm and 18 mm respectively. If they functioned as loom weights the fabrics produced must have been quite fine with thin threads.

The third loom weight, from EH II, is cylindrical and small fragments are missing. The weight is 196g and the thickness 53 mm.

To elucidate our interpretation of this loom weight (ASI-AS1992:1) we have calculated four possible loom setups. Please note that these suggestions are based on our experience and experiments but are on the other hand conjectural as to what is optimal.

Loom weight ASI-AS1992:1: weight 200 (196)g, thickness 53 mm				
	A	B	C	D
Warp threads requiring	10g warp tension	20g warp tension	30g warp tension	40g warp tension
Numbers of warp threads per loom weight	20	10	6-7	5
Numbers of warp threads per two loom weights (one in front layer, one in back layer)	40	20	12-14	10
Warp threads per cm	7-8	4	3	2
TTTC's evaluation of suitability of the tool	TTTC choice	Possible	Unlikely	Unlikely

Figure 14. Calculation of possible loom setups with loom weight ASI-AS1992:1. Please note that small fragments are missing and the weight is not entirely complete. We have consequently calculated with a weight of 200g.

The calculation demonstrates that loom weight ASI-AS1992:1 would function best with a warp thread requiring 10g tension (A). The fabric produced with this loom setup would have 7-8 threads per cm in warp and weft (if weft faced 14-16 threads per cm in weft). Also a warp thread of 20g tension (B) is a possibility for ASI-AS1992:1. The fabric produced with this loom setup would have had 4 threads per cm in warp and weft (if weft faced 8 threads per cm in weft).

The types of fabrics that could have been produced with this loom weight (A and B) would be of a fine quality with very thin or thin threads. However, the fabrics would visually be completely different. The first fabric, woven with a warp thread requiring 10g tension (A) would be denser while the second fabric (B) would be more open. If the fabrics were weft faced they would differ even more (figure 15).

When focusing on TTTC choice A (figure 14), we suggest the following loom setup:

Loom setup (ASI-AS1992:1) calculated on 10g warp tension (A)
Starting border (width of the fabric): 100 cm
Number of loom weights needed: 36
Numbers of warp threads: 800 threads, 2 m each=1600 m
Weft 1: if a balanced tabby = 1600 m
Weft 2: if a weft faced tabby = 3200 m
Total amount of yarn with weft 1 (+ 2%) = 3264 m
Total amount of yarn with weft 2 (+ 2%) = 4896 m

The calculations demonstrate that the amount of yarn needed is substantial. According to the TTTC experiments it would take approximately 93-139 hours to spin the thread needed to produce the fabric in this setup. Time for sorting and preparing the fibres is not included, neither is time for preparing the setup, weaving and finishing.

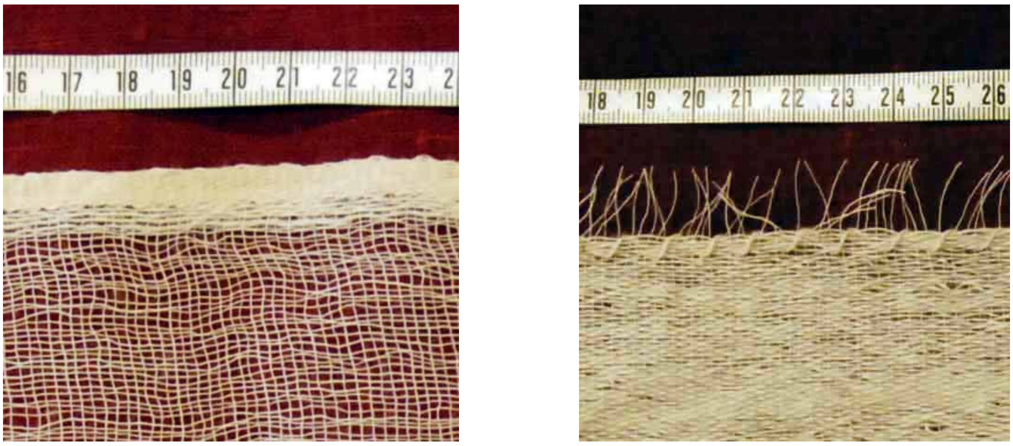

Figure 15. Two fabrics, both woven with threads requiring 10g warp tension. Left: a tabby with app. 5 warp threads per cm and 8 weft threads per cm. Right: a weft faced tabby with app. 6 warp threads per cm and 15 weft threads per cm. (Mårtensson *et al.* 2007).

MH - Loom weights and weaving

Only 2 of 6 weights are completely preserved from the MH period. All the weights have a weight below 50g (even with an estimated weight).

Loom weight ASI-AS4249:1 : weight 14g, thickness 30 mm				
	A	B	C	D
Warp threads requiring	10g warp tension	20g warp tension	30g warp tension	40g warp tension
Numbers of warp threads per loom weight	1			
Numbers of warp threads per two loom weights (one in front layer, one in back layer)	2			
Warp threads per cm	< 1			
TTTC's evaluation of suitability of the tool	Unlikely	Unlikely	Unlikely	Unlikely

Figure 16. Calculation of possible loom setups with loom weight ASI-AS4249:1

Loom weight ASI-OTH0035: weight 45g, thickness 19 mm				
	A	B	C	D
Warp threads requiring	10g warp tension	20g warp tension	30g warp tension	40g warp tension
Numbers of warp threads per loom weight	4-5	2		
Numbers of warp threads per two loom weights (one in front layer, one in back layer)	8-10	4		
Warp threads per cm	5	2		
TTTC's evaluation of suitability of the tool	TTTC choice	Unlikely	Unlikely	Unlikely

Figure 17 Calculation of possible loom setups with loom weight ASI-OTH0035

As can be seen in figure 16 weight ASI-AS4249:1 can not be considered functional as loom weight in a warp weighted loom.

However the calculation demonstrates that loom weight ASI-OTH0035 would function with a warp thread requiring 10g tension (A) (figure 17). The fabric produced with this loom setup would have 5 threads per cm in warp and weft (if weft faced 10 threads per cm in weft). The type of fabric that could have been produced with this loom weight (A) would be open and of very fine quality with very thin threads.

When focusing on TTTC choice A (figure 17), we suggest the following loom setup:
Loom setup (ASI-OTH0035) calculated on 10g warp tension (A)
Starting border (width of the fabric): 100 cm
Number of loom weights needed: 104
Numbers of warp threads: 500 threads, 2 m each=1000 m
Weft 1: if a balanced tabby = 1000 m
Weft 2: if a weft faced tabby = 2000 m
Total amount of yarn with weft 1 (+ 2%) = 2040 m
Total amount of yarn with weft 2 (+ 2%) = 3060 m

The calculations demonstrate that the amount of yarn needed is substantial. According to the TTTC experiments it would take approximately 58-87 hours to spin the thread needed to produce the fabric in this setup. Time for sorting and preparing the fibres is not included, neither is time for preparing the setup, weaving and finishing.

Furthermore to produce this fabric the calculations demonstrate that 104 loom weights are needed. In our opinion this is not realistic (see introduction) . However we do not know how wide the fabrics were. Our calculations are hypothetical but even if the fabric was just 25 cm in width one would have needed 26 loom weights of this type.

LH - Loom weights and weaving

It was possible to estimate the weight and thickness of 14 loom weights from LH. The weight varies from 36g to 461g and the thickness between 11 mm and 61 mm (figure 18).

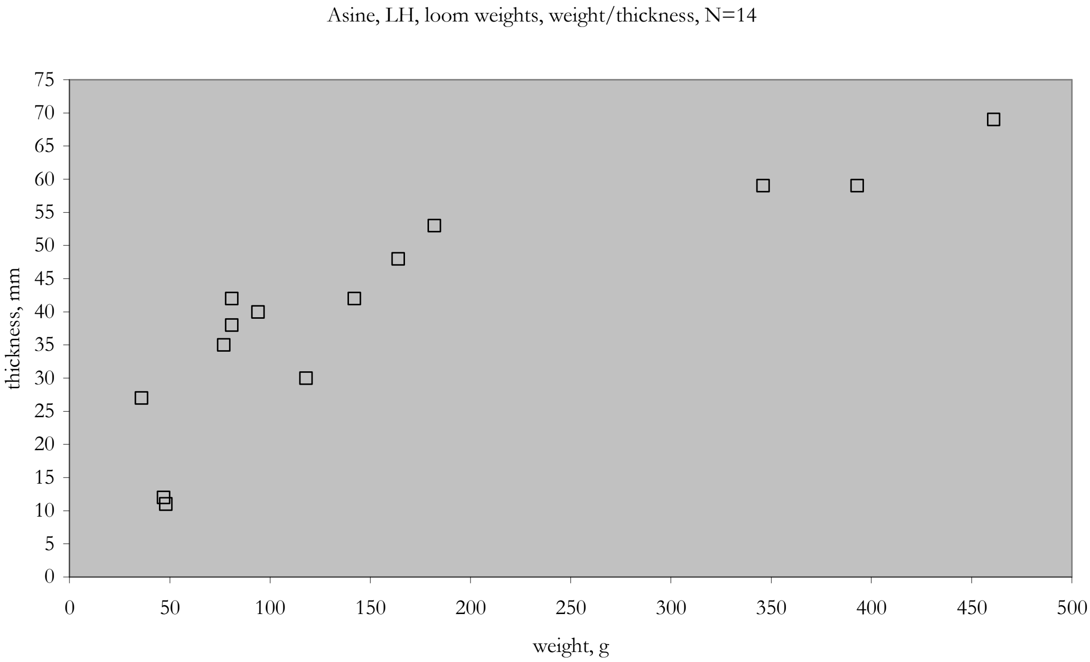

Figure 18. The relationship between weight/thickness on LH loom weights ..

To elucidate our interpretation of the loom weights we have calculated four possible loom setups on the basis of four LH loom weights, all from the settlement and household contexts, and suggested which fabrics we consider the most likely result. We have chosen 4 loom weights weighing 48g, 118g, 182g and 461g, respectively. Please note that these suggestions are based on our experience and experiments but are on the other hand conjectural as to what is optimal.

Loom weight ASI-AS3534:1: weight 48g, thickness 11 mm				
	A	B	C	D
Warp threads requiring	10g warp tension	20g warp tension	30g warp tension	40g warp tension
Numbers of warp threads per loom weight	5	2-3	6-7	5
Numbers of warp threads per two loom weight (one in front layer, one in back layer)	10	4-6	12-14	10
Warp threads per cm	9	4-5	3	2
TTTC's evaluation of suitability of the tool	TTTC choice	Unlikely	Unlikely	Unlikely

Figure 19. Calculation of possible loom setups with loom weight ASI-AS3534:1

The calculation demonstrates that loom weight ASI-AS3534:1 would function best with a warp thread requiring 10g tension (A) (figure 19). The fabric produced with this loom setup would have 9 threads per cm in warp and weft (if weft faced 18 threads per cm in weft).

The types of fabrics that could have been produced with this loom weight (A) would be of fine quality with very thin or thin threads. However, the fabrics would visually be completely different if weft faced (figure 15).

When focusing on TTTC choice A (figure 19), we suggest the following loom setup:
Loom setup (ASI-AS3534:1) calculated on 10g warp tension (A)
Starting border (width of the fabric): 100 cm
Number of loom weights needed: 182
Numbers of warp threads: 900 threads, 2 m each=1800 m
Weft 1: if a balanced tabby = 1800 m
Weft 2: if a weft faced tabby = 3600 m
Total amount of yarn with weft 1 (+ 2%) = 3672 m
Total amount of yarn with weft 2 (+ 2%) = 5508 m

The calculations demonstrate that the amount of yarn needed is substantial. According to the TTTC experiments it would take approximately 104-157 hours to spin the thread needed to produce the fabric in this setup. Time for sorting and preparing the fibres is not included, neither is time for preparing the setup, weaving and finishing.

Furthermore to produce this fabric the calculations demonstrate that 182 loom weights are needed. According to our experience this is not realistic. However we do not know how wide the fabrics could have been. Our calculations are just hypothetical but even if the fabric was just 25 cm in width one would still have needed 46 loom weights of this type.

Loom weight ASI-AS2657:1: weight 118 g, thickness 30 mm				
	A	B	C	D
Warp threads requiring	10g warp tension	20g warp tension	30g warp tension	40g warp tension
Numbers of warp threads per loom weight	12	6	4	
Numbers of warp threads per two loom weights (one in front layer, one in back layer)	24	12	8	
Warp threads per cm	8	4	3	
TTTC's evaluation of suitability of the tool	TTTC choice	Possible	Unlikely	Unlikely

Figure 20. Calculation of possible loom setups with loom weight ASI-AS2657:1

The calculation demonstrates that loom weight ASI-AS2657:1 would function best with a warp thread requiring 10g tension (A) (figure 20). The fabric produced with this loom setup would have 8 threads per cm in warp and weft (if weft faced 16 threads per cm in weft). Also a warp thread of 20g tension (B) is a possibility for ASI-AS2657:1. The fabric produced with this loom setup would have had 4 threads per cm in warp and weft (if weft faced 8 threads per cm in weft).

The types of fabrics that could have been produced with this loom weight (A and B) would be of very fine quality. However, the fabrics would visually be completely different. The first fabric, woven with a warp thread requiring 10g tension (A) would be denser while the second fabric (B) would be more open. If the fabrics were weft faced they would differ even more (figure 15).

When focusing on TTTC choice A (figure 20), we suggest the following loom setup:

Loom setup (ASI-AS2657:1) calculated on 10g warp tension (A)
Starting border (width of the fabric): 100 cm
Number of loom weights needed: 66
Numbers of warp threads: 800 threads, 2 m each=1600 m
Weft 1: if a balanced tabby = 1600 m
Weft 2: if a weft faced tabby =3200 m
Total amount of yarn with weft 1 (+ 2%) = 3264 m
Total amount of yarn with weft 2 (+ 2%) = 4896 m

The calculations demonstrate that the amount of yarn needed is substantial. According to the TTTC experiments it would take approximately 93-140 hours to spin the thread needed to produce the fabric in this setup. Time for sorting and preparing the fibres is not included, neither is time for preparing the setup, weaving and finishing.

Also in this example the need of loom weights is substantial, 66 loom weights, but if one produced a fabric with a width of 50 cm, it would only need is 33 loom weights.

Loom weight ASI-AS1938:1 weight 182g, thickness 53mm				
	A	B	C	D
Warp threads requiring	10g warp tension	20g warp tension	30g warp tension	40g warp tension
Numbers of warp threads per loom weight	18	9	6	
Numbers of warp threads per two loom weights (one in front layer, one in back layer)	36	18	12	
Warp threads per cm	6-7	3	2	
TTTC's evaluation of suitability of the tool	TTTC choice	Unlikely	Unlikely	Unlikely

Figure 21. Calculation of possible loom setups with loom weight ASI-AS1938:1

The calculation demonstrates that loom weight ASI-AS1938:1 would function best with a warp thread requiring 10g tension (A) (figure 21). The fabric produced with this loom setup would have 6-7 threads per cm in warp and weft (if weft faced 12-14 threads per cm in weft). The type of fabric that could have been produced with this loom setup(A) would be open and of very fine quality with very thin threads.

When focusing on TTTC choice A (figure 21), we suggest the following loom setup:

Loom setup (ASI-AS1938:1) calculated on 10g warp tension (A)
Starting border (width of the fabric): 100 cm
Number of loom weights needed: 38
Numbers of warp threads: 700 threads, 2 m each=1400 m
Weft 1: if a balanced tabby = 1400 m
Weft 2: if a weft faced tabby =2800 m
Total amount of yarn with weft 1 (+ 2%) = 2856 m
Total amount of yarn with weft 2 (+ 2%) = 4284 m

The calculations demonstrate that the amount of yarn needed is substantial. According to the TTTC experiments it would take approximately 82-122 hours to spin the thread needed to produce the fabric in this setup. Time for sorting and preparing the fibres is not included, neither is time for preparing the setup, weaving and finishing.

Loom weight ASI-AS3409:1: weight 461g, thickness 69 mm				
	A	B	C	D
Warp threads requiring	10g warp tension	20g warp tension	30g warp tension	40g warp tension
Numbers of warp threads per loom weight	46	23	15	11-12
Numbers of warp threads per two loom weights (one in front layer, one in back layer)	92	46	30	22-24
Warp threads per cm	13	6-7	4	3
TTTC's evaluation of suitability of the tool	Unlikely	TTTC choice	Possible	Unlikely

Figure 22. Calculation of possible loom setups with loom weight ASI-AS3409:1

The calculation demonstrates that loom weight ASI-AS3409:1 would function best with a warp thread requiring 20g tension (B) (figure 22). The fabric produced with this loom setup would have 6-7 threads per cm in warp and weft (if weft faced 12-14 threads per cm in weft). The type of fabric that could have been produced with this loom weight (A) would be of fine quality with thin threads.

When focusing on TTTC choice B (figure 22), we suggest the following loom setup:

Loom setup (ASI-AS3409:1) calculated on 20g warp tension (B)
Starting border (width of the fabric): 100 cm
Number of loom weights needed: 700
Numbers of warp threads: 700 threads, 2 m each=1400 m
Weft 1: if a balanced tabby = 1400 m
Weft 2: if a weft faced tabby =2800 m
Total amount of yarn with weft 1 (+ 2%) = 2856 m
Total amount of yarn with weft 2 (+ 2%) = 4284 m

The calculations demonstrate that the amount of yarn needed is substantial. According to the TTTC experiments it would take approximately 71-107 hours to spin the thread needed to produce the fabric in this setup. Time for sorting and preparing the fibres is not included, neither is time for preparing the setup, weaving and finishing.

Loom weights and weaving in Asine

No general conclusions on the textile production of Asine can be drawn on the basis of only these loom weights. However, the recorded weights indicate certain types of production.

Even if the loom weights differ in type and weight/thickness, the analyses demonstrate primarily a production of fine quality textiles woven with very thin or thin threads. Furthermore the calculations indicate different qualities, both open and veil-like fabrics and more densely woven fabrics. However, productions of coarser textiles with thicker threads are not attested through the tools.

According to our experience some of the weights would not have functioned optimally as loom weights in a warp weighted loom. Attaching less than 4 warp threads to one single loom weight is impractical, sometimes even counterproductive. The thickness of a spool or of the cylindrical shaped loom weights becomes essential because consequently, if using a light but thick weight, the fabric will become very open, which is usually not desirable in a fabric; therefore we consider this setup unlikely on a warp weighted loom (figure 16). The thickness of a discoid or torus-shaped loom weight is essential if using a very light weight one needs a considerable number of loom weights which is impractical and unnecessary. On the other hand, these types of weights can be very useful as weights for tablet weaving, where one adds two to four threads per tablet or for other types of band weaving and braiding (see Gleba forthcoming).

TEXTILE PRODUCTION IN ASINE

The number of objects is small when comparing different contexts and periods and therefore the analysis cannot be considered statistically representative. However, the analysis demonstrates certain tendencies that must be discussed.

During EH two spindle whorls indicate very thick, spun yarn while the calculation on the only complete preserved loom weight demonstrates a fine open fabric woven with very thin threads. It is not possibly to draw any conclusions from these results and the use of other types of spindles and looms must be assumed.

During MH the spindle whorls indicate a varied production of thin to very thick yarn with emphasis on thicker yarn. The objects recorded as loom weights (5 objects) cannot because of their weight, be considered practical as loom weights on a warp weighted loom. They are too light to function optimally and could instead have been used for braiding or band weaving. This result also suggests that other types of looms could have been used. Another possibility is that the fabrics were produced on another location. On the other hand the analyses of the spindle whorls demonstrate that yarn for many different types of textiles was produced at the settlement in Asine.

During LH the spindle whorls indicate a varied production of very thin to thick spun yarn, primarily thin. The analysis of the loom weights demonstrates a varied production of quality fabrics woven with very thin or thin spun yarn. The yarn spun with the lightest spindle whorl would be much thinner than the yarn spun with the heaviest spindle whorl. The fabrics, produced with these different types of yarn, would visually be completely different. In conclusion, the textile tools from LH demonstrate a production of 'very fine' and 'fine' fabrics. Thus, according to the tool analysis the range of thread qualities is larger than the range of textile qualities produced with the loom weight ion the LH period. Furthermore, some of the recorded weights, that would not be practical as loom weight in a warp weighted loom, may have been used when weaving or braiding different types of band. It is likely that coarser textiles were produced in Asine but this production (both spinning and weaving) is invisible in the data and was probably performed with other types of spindles and looms, if not at another location. The attested production, however, demonstrates high quality textiles that would demand well prepared raw material, was time consuming to produce (compared to coarser textiles) and demanded experienced crafts people.