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**Chapter 17: Animal remains and the bone and antler industry (full report)**

by Paul Croft

**17.1 Animal remains.**

**Introduction**

This is the full report on the animal remains from Souskiou *Laona*; the report in the printed volume (Peltenburg *et al.* 2019, Chapter 17) presents no additional information and is a contraction of this report. An assemblage of over 4,600 identifiable animal bones was recovered by excavations at *Laona*. Numbers of identified bones of the larger mammals are presented in Table 17.1 according to the dating of the contexts in which they occurred, and Table 17.2 presents the representation of the animals by weight of bone. These different approaches to quantification yield broadly comparable results, and according to the weight data around half (52%) of all excavated bone proved identifiable. Identification was attempted for all skeletal parts except for ribs, and vertebrae other than atlas, axis and sacrum (with the exception that for the rarer animals of dog size or smaller, all identifiable vertebrae were counted). Single teeth that included less than half of a tooth crown were also excluded. Occasionally multiple items were encountered that were judged to belong together, such as articulating pairs or larger groups of bones, or teeth from the same tooth row, and these were counted as single fragments.

Table 17.1. Numbers of identified bones of the main animals by period.

Period	Taxon						Total
	<i>deer</i>	<i>caprine</i>	<i>pig</i>	<i>fox</i>	<i>dog</i>	<i>cat</i>	
I (including I?, I–I/II, and I or I/II)	2284 59.3%	316 8.2%	1121 29.1%	115 3.0%	9 0.2%	5 0.1%	3850
I/II	151	11	48	2			212
II	13	1	6				20
V or later	167	29	43	3		1	243
Not attributable to period	211	24	57	8			300
Total	2826 61.1%	381 8.2%	1275 27.6%	128 2.8%	9 0.2%	6 0.1%	4625

Table 17.2. Weights (g) of identified bones of the main animals by period.

Period	Taxon						Total	
	<i>deer*</i>	<i>caprine</i>	<i>pig</i>	<i>fox</i>	<i>dog</i>	<i>cat</i>	<i>identified</i>	<i>unidentified</i>
I (including I?, I–I/II, and I or I/II)	26291 70.1%	2529 6.7%	8450 22.6%	135 0.4%	57 0.1%	7 ---	37559	35971
I/II	1651	101	367	5			2124	1757
II	92	7	86				185	224
V or later	2363	338	387	10		2	3100	1995
Not attributable to period	2868	227	379	9			3483	2347
Total	33265	3202	9759	159	57	9	46451	42294

	71.7%	6.9%	21.0%	0.3%	0.1%	----	(52.3%)	(47.7%)
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\*weights of deer bone exclude 3038g of antler.

The *Laona* bones are very unevenly distributed across the chronological periods represented on the site and belong mostly to Period I (83% of identified fragments, 83% of identified bone by weight), which occupies two or three centuries toward the end of the 4<sup>th</sup> millennium BC, during the Middle Chalcolithic (Peltenburg *et al.* 2019, Chapter 2). Subsequent to Period I, chronologically successive faunal samples for Period I/II (a century or more at the transition from the 4<sup>th</sup>–3<sup>rd</sup> millennium BC, still Middle Chalcolithic), and Period II (the first couple of centuries in the 3<sup>rd</sup> millennium BC, Middle–Late Chalcolithic transition) are too small to permit an assessment of faunal change within Chalcolithic times at *Laona*. Some bones also came from post-Chalcolithic contexts that date to Period V (Late Classical–Early Byzantine) or later, and from contexts that cannot be attributed to any period(s) at all.

Since no other period has provided more than a small fraction of the amount of material that represents Period I, it is solely this period that forms the focus of this study. Included in the Period I sample of 3850 identifiable bones are 220 that come from contexts that may be attributed only uncertainly to that period, and 246 bones that were not more closely attributable than to a pair of periods (I-I/II and I or I/II). Together this material constitutes only quite a small minority (12%) of the assemblage that has been selected to represent Period I and, for reasons explained below, it seems highly probable that it does indeed date to Period I.

It may well be that the date of the formation of the later contexts at *Laona* (contexts that postdate Period II) is very often at variance with the true date of the bones that occur within them, since erosion and redeposition on such a steeply sloping site are liable to have resulted in high levels of residuality. It is probable, then, that bone from contexts that are not attributed specifically to Periods I, I/II or II nevertheless represents redeposited material that eroded out from Period I contexts. Thus, despite the possibility that a small proportion of the bone genuinely does date as late as the formation of later contexts on the site, almost the entire faunal assemblage (with the possible exception of the small amounts of Period I/II and Period II material) most probably originates from Period I. The similarity of the percentage figures for the representation of the various animals in the Period I sample and in the assemblage as a whole for both fragments counts (Table 17.1) and weights of bone (Table 17.2), accords with the conclusion that almost all of the bone recovered dates to Period I. Even so, bones from contexts that date to Period V or later, or that are not attributable to period(s), have been afforded only very slight consideration in what follows. The present study is concerned solely with the Period I animal remains, which include the great majority of the entire assemblage recovered. Henceforth in this report reference to *Laona* should be understood to indicate Period I alone. Where mention is occasionally made of items that are not attributable to Period I, then this is clearly indicated.

Table 17.7. Contextual integrity for Period I animal bones (numbers of identified bones).

	Taxon						Total
	<i>deer</i>	<i>caprine</i>	<i>pig</i>	<i>fox</i>	<i>dog</i>	<i>cat</i>	
Integrity not assessed	11	3	8	3			25
High integrity (S)	438 61.3%	51 7.1%	197 27.6%	25 3.5%	3 0.4%		714
Intermediate integrity (M)	658 62.0%	95 8.9%	291 27.4%	16 1.5%	2 0.2%		1062
Evidence of contamination (C)	1177 57.4%	167 8.1%	625 30.5%	71 3.5%	4 0.2%	5 0.2%	2049
Total	2284	316	1121	115	9	5	3850

The integrity of most contexts at *Laona* has been evaluated by the excavator mainly on the basis of their stratification and content of datable pottery, and it will be clear from Table 17.7, which presents the situation for Period I material, that the animal bones come from contexts of variable reliability. And whilst it might be considered desirable for the present study to deal only with bones from contexts of high integrity, such an approach would have the disadvantage of including only a small amount of material. Another possibility would be to include material from contexts of intermediate integrity, but to exclude from the analysis bones from contexts for which contamination is evident. However, such an approach would still cut down the total amount of Period I bone encompassed by the study by considerably more than half. Thus, in order to maintain sample size at a workable level, it seems worth considering animal bones even from those less reliable contexts provided that the extent of potential contamination does not seem to be very great. Contamination within the bone assemblage may be assessed by examining the proportions of the various animals amongst a series of Period I bone samples of varying reliability. Period I provides the only group of material that is large enough for sub-division in this way, and it will be clear from the percentage figures presented in Table 17.7 that the level of representation of the various animals varies little between the higher-integrity material, and that from contexts of intermediate or lower integrity. This suggests that at most only a low degree of contamination of the bone assemblage has occurred, so it was decided to include all of the Period I animal bone in the present study, irrespective of contextual integrity as assessed from stratification and pottery.

#### **Skeletal element representation.**

Representation of the various skeletal elements among the identified bones of deer, caprines and pig is presented in Table 17.8a–b, and these data have been grouped to create the patterns of body part representation that are illustrated in Figure 17.1. For deer and caprines, the composition of the bodily parts is as follows. Head includes atlas and axis vertebrae, as well as mandibles, but antler fragments are excluded. Upper forelimb comprises scapula, humerus, and proximal ends and shaft portions of the radius and ulna. Upper hindlimb encompasses pelvis, sacrum, femur, patella, and proximal ends and shaft portions of tibia. The meatless lower part of the forelimb includes distal ends of ulna and radius, carpals and metacarpals, and for the hindlimb the meatless lower part consists of distal tibia, os malleolare, tarsals and metatarsals. Fragments identified only as metapodial were apportioned to metacarpal and metatarsal *pro rata*. In an attempt to render body part representation for pigs more directly comparable with that for deer and caprines some selectivity and adjustments to element representation frequencies are needed in order to compensate for considerable anatomical differences. Proximal ends and shafts of pig fibulae must be excluded from the comparison, as must pig metapodia II and V and accessory phalanges, since all of these lack analogues in the skeletons of deer and caprines. Also, numbers of pig metapodia III and IV are halved, since these paired elements are represented by only a single element in ruminant skeletons. The single pig sesamoid has been included in the count of phalanges.

Several aspects of the body part distributions illustrated in Figure 17.1 are worth commenting on. The first concerns the representation of head fragments of pig, which are more frequent than those of caprines, and much more frequent than those of deer. This may probably be explained by pigs having a greater number of teeth, and their heads having a tendency to fragment into a larger number of identifiable pieces. A second disparity in body part representation which is apparent from Figure 17.1 is the high level of representation of the lower hindlimb of deer, and from Table 17.8a it may be inferred that this is largely due to the conspicuously high frequency of fragments of deer metatarsal shaft. This may well be due to a combination of factors. Even small pieces of deer metatarsal shaft tend to be particularly easy to identify due to their distinctive morphology (a natural groove that runs almost the entire length of the dorsal face of the bone shaft). Furthermore, since deer metatarsals are commonly the preferred raw material for the manufacture of substantial bone points (see Chapter 17.2 below), they are particularly likely to be

brought on to the site, and particularly likely to be subjected to fragmentation during working. This bias in favour of deer metatarsals will have depressed the apparent representation of other body parts of deer, in particular the upper parts of the limbs, which would otherwise appear relatively greater, making the representation of these parts among the caprine remains seem less elevated by comparison. A similarly high level of representation of lower hindlimb elements of deer by comparison with caprines was noted at the Chalcolithic hunting station at Politiko *Kokkinorotsos* in the central lowlands of Cyprus (Croft 2012, 115 and fig. 1; Webb *et al.* 2009, 220 and fig. 34).

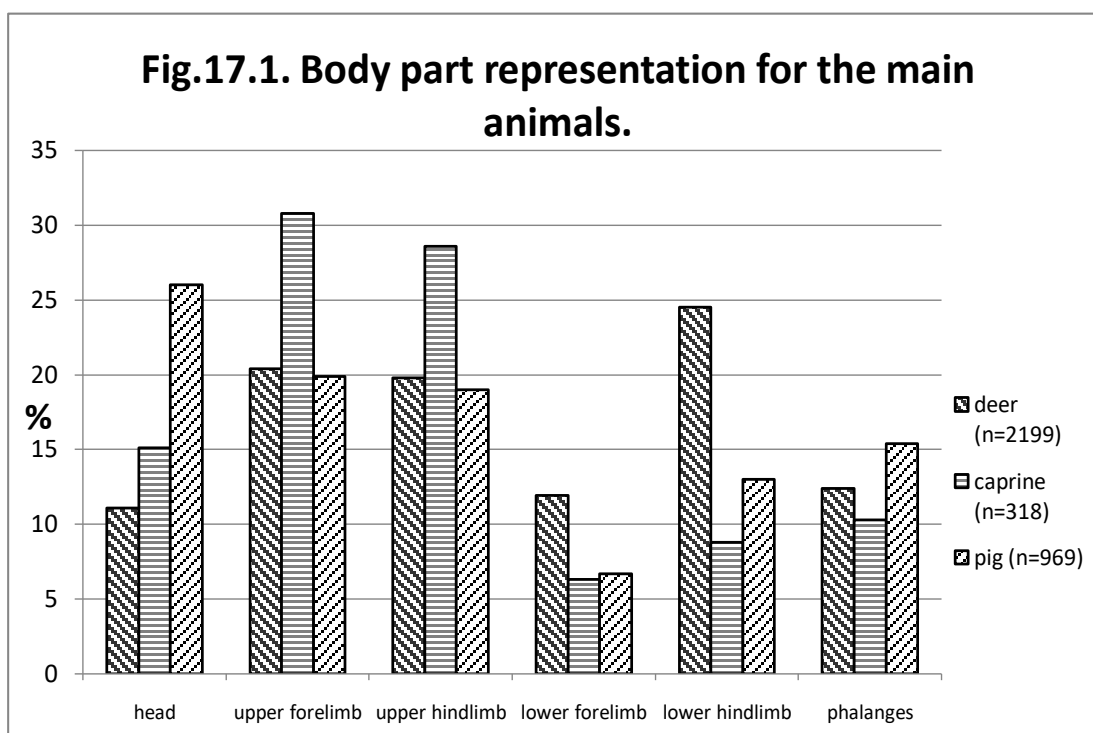


Table 17.8a. Period I. Element frequencies for deer and caprines.

	DEER				CAPRINES			
	<i>left</i>	<i>right</i>	<i>n.d.</i>	<i>total</i>	<i>left</i>	<i>right</i>	<i>n.d.</i>	<i>total</i>
scapula	39	32	4	75	14	6		20
proximal humerus	12	14		26	1	2		3
humerus shaft	32	31		63	6	6		12
distal humerus	41	49		90	19	10		29
proximal ulna	25	29	1	55	4	7		11
ulna shaft	1	2		3		4		4
distal ulna	1	4		5		2		2
proximal radius	38	38		76	7	3		10
radius shaft	20	25	14	59	7	2		9
distal radius	21	24	1	46	3	3		6
proximal femur	10	7	1	18	9	2		11
femur shaft	41	34	5	80	8	4	6	18
distal femur	14	12		26	3	1		4
proximal tibia	20	18		38	5	5		10
tibia shaft	38	38	9	85	10	7	2	19
distal tibia	40	49		89	3	5		8
astragalus	42	44		86	1	4		5
calcaneum	38	47		85	4	3		7
naviculocuboid	20	19		39		1		1
proximal metacarpal	35	23	1	59	3	1	1	5
metacarpal shaft			16	16			1	1
distal metacarpal			59	59			2	2
proximal metatarsal	37	31	3	71		2	1	3
metatarsal shaft	2		69	71				
distal metatarsal			65	65			3	3
metapodial shaft			21	21				
distal metapodial			19	19			1	1
atlas			23	23			17	17
axis			32	32			4	4
pelvis			148	148			25	25
sacrum			19	19				
carpals			64	64			4	4
other tarsals			4	4				
patella			20	20			4	4
os malleolare			1	1				
phalanx 1			106	106			8	8
phalanx 2			99	99			14	14
phalanx 3			70	70			11	11
head			84	84			8	8
mandible			104	104			17	17
horncore/antler			92	92			2	2
TOTAL				2291*				318#

\*Deer: Two paired elements, a proximal ulna and radius and a distal ulna and radius, have been listed here as four items, and a complete set of articulating phalanges have been listed here as 6 items, but all of these were counted as only three composite items in calculating the total of 2284 identified fragments of deer specified in Table 17.1. The way in which antler fragments have been counted is described in the text.

#Caprines: Two paired elements, both consisting of a proximal ulna and radius, have been listed here as four items, but were counted as only two composite items in calculating the total of 316 fragments of caprines specified in Table 17.1.

Table 17.8b. Period I. Element frequencies for pig.

	PIG			
	<i>left</i>	<i>right</i>	<i>n.d.</i>	<i>total</i>
Scapula	18	11	2	31
proximal humerus	5	6		11
humerus shaft	21	12		33
distal humerus	15	15		30
proximal ulna	19	20		39
ulna shaft	2	3	2	7
distal ulna	2	5		7
proximal radius	17	8	1	26
radius shaft	3	4		7
distal radius	5	6		11
proximal femur	16	13		29
femur shaft	7	12	6	25
distal femur	1	15	1	27
patella	3	2		5
proximal tibia	12	8		20
tibia shaft	10	15	1	26
distal tibia	10	15		25
proximal fibula			1	1
fibula shaft			22	22
distal fibula	1	1		2
astragalus	9	9		18
calcaneum	24	15		39
other tarsals			21	21
metacarpal iii/iv	13	15		28
metatarsal iii/iv	15	17	1	33
metapodial iii/iv			41	41
metapodial ii/v			57	57
atlas			12	12
axis			4	4
pelvis			43	43
sacrum			1	1
sesamoid			1	1
carpals			30	30
phalanx 1			71	71
phalanx 2			42	42
phalanx 3			29	29
accessory phalanges			43	43
head			147	147
mandible			77	77
TOTAL				1121

Apart from these matters, mentioned above, that arise from Figure 17.1, the patterns of body part representation for the main animals at *Laona* are reasonably similar. Specifically, no contrast is apparent between the evidence for deer, a hunted animal, and the other animals, which are presumably at least mainly domestic stock. Such a contrast had been apparent at the Early–Middle Bronze Age settlement at Marki in the central lowlands of Cyprus (Croft 2006a, 264–265), but not at Chalcolithic Kissonerga *Mosphilia* (Croft 1998b, 299 and fig. 108).

### Fallow deer (*Dama mesopotamica*).

The animal bones at Laona are dominated by deer (59% of identified bone, 70% by weight of identified bone), which are considered to have been free-living animals acquired by hunting (Croft 1991, 65–66). Epiphysial fusion data, presented in Table 17.3, indicate the pattern of mortality for deer. The ages that are proposed here to define the fusion stages are essentially estimates. These data imply a low level of culling during infancy (ca.6% killed at less than about a year of age) but a moderately high level during the juvenile stage (26% between 1 and 2–2.5 years of age). Culling during subadulthood was again at a relatively low level (11%), and thus the majority of deer (56%) lived on (beyond about 3.5 years of age) to be culled as adults. These data are plotted as a survivorship curve in Figure 17.2, along with the curve for caprines, and it is clear that the *Laona* caprines tended to meet their deaths somewhat earlier than the deer. Also emphasized in Figure 17.2 are the equivalent curves for Early–Middle Bronze Age Marki *Alonia*, which display the same disparity between hunted deer and herded caprines, but to a greater degree than at *Laona*. Whilst deer were of considerable importance at Marki, the animal economy was to a far greater extent based upon domestic bovids (cattle and caprines), and the somewhat younger ages of death for deer at *Laona* than at Marki may reflect more intensive exploitation at *Laona*, where deer hunting was the main focus of animal exploitation (Croft 2006a).

Table 17.3. Mortality of Period I deer, based on epiphysial fusion.

STAGE	ELEMENT	fused	unfused	% dead by end of stage
<b>INFANT</b>				
	distal scapula	36	5	
	distal humerus	79	7	
	proximal radius	75	1	
	<b>TOTAL</b>	<b>190</b>	<b>13</b>	<b>6.4%</b>
<b>JUVENILE</b>				
	distal tibia	71	17	
	distal metacarpal	36	23	
	distal metatarsal	37	30	
	distal metapodial	6	3	
	<b>TOTAL</b>	<b>150</b>	<b>73</b>	<b>32.7%</b>
<b>SUBADULT</b>				
	proximal humerus	17	9	
	proximal ulna	14	10	
	distal ulna	1	1	
	distal radius	25	21	
	proximal femur	13	6	
	distal femur	9	13	
	proximal tibia	19	19	
	calcaneum	32	22	
	<b>TOTAL</b>	<b>130</b>	<b>101</b>	<b>43.7%</b>
<b>ADULT</b>				<b>100.0%</b>

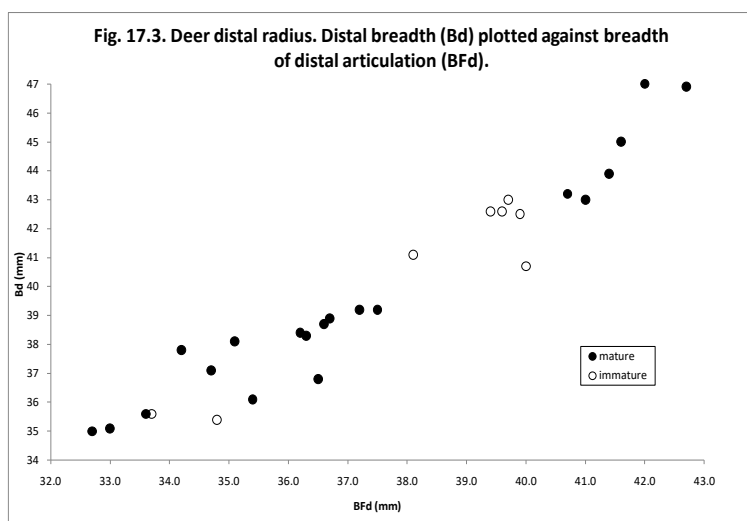
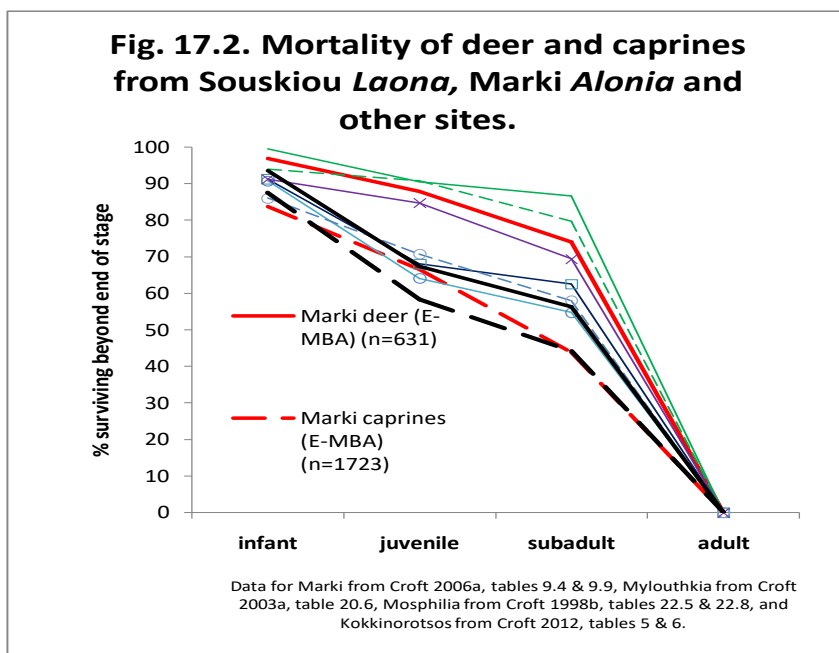
Evidence for dental eruption and wear is too limited to add to our understanding of deer mortality. The lower fourth premolar had erupted on 13 mandibular specimens, whilst it had not erupted in 5 instances, suggesting 28% mortality by about 18 months of age (Chapman and Chapman 1975, 91), which accords with 33% having died by the end of the juvenile fusion stage, that is by 2–2.5 years of age (Table 17.3).

The considerable importance of antler as a material is clear from both the numerous worked items, and from the still more abundant unworked pieces at *Laona*. Since ancient antler is often extremely prone to fragmentation it would be inappropriate to count each scrap as an identified bone, since this would greatly inflate the apparent representation of deer amongst the identifiable fragments. Accordingly, for analytical purposes, antler has been incorporated into the fragments counts by counting all shed antler bases, whole or partial, and if an excavation context (unit) yielded one or more non-basal antler pieces a count of one single antler fragment was recorded. Unshed antler bases, that remain attached to the frontal bone, were included in the count of head fragments. Only a minority of antlers were acquired from the heads of culled bucks (4 unshed specimens plus 2 pedicles that had been deliberately broken through, indicating the removal of unshed antlers) in Period I, more than twice as many (14 specimens) having been collected and brought onto the site as naturally shed antlers. (The figures for the entire assemblage are 21 shed and 12 unshed).

A plot of the distal breadth (Bd) of deer radii against the breadth of their distal articulations (BFd), presented in Figure 17.3, shows that mature (fused) specimens fall into clearly separated size groups that represent males (Bd  $\geq$ 43.0mm, BFd $\geq$ 40.7mm) and females (Bd  $\leq$ 39.2mm, BFd $\leq$ 37.5mm). Whilst two measurable immature specimens appear to be females, six are of intermediate size between mature females and mature males, suggesting that the culling of immature deer concentrated mainly on young bucks. Since most males are surplus to breeding requirements, this indicates that the hunters pursued a sound approach to game management designed to ensure sustainability. Clear separation between males and females was similarly apparent amongst the deer at Early–Middle Bronze Age Marki (Croft 2006a, text figure 9.9), and although sexual size dimorphism was less distinct at the nearby Chalcolithic site of *Kokkinorotsos* (Croft 2012, figure 3), the culling of young deer clearly focused on males at both of these sites also. Again, this is suggestive of the rational management of deer populations that has long been apparent as a pervasive phenomenon in prehistoric Cyprus (Croft 1991; 2002). Without the selectivity that is displayed at *Laona* and other sites, predation on deer could not have persisted as a hugely significant contributor to the sustenance of human communities through so many millennia of prehistory within the limited area of land offered by the island of Cyprus, from early on in the Neolithic (ca.8,000 BC) through to at least the 12<sup>th</sup> century BC (Croft in press).

Comparison of the plots of distal radius measurements referred to above suggests that both male and female deer tended to be larger at *Laona* than at Marki and *Kokkinorotsos*; perhaps the environment of the southwest coastal hinterland provided a higher level of nutrition for its deer population than did the central lowland region of Cyprus.





### Caprines

By comparison with the predominant deer, caprines were a relatively minor taxon in the *Laona* Period I bone assemblage (8% of identified fragments, 7% by weight of identified bone). Of the 77

caprine bones that could be attributed specifically to genus, 40% were of sheep and 60% were of goat, and even if free living sheep and goats may have existed and occasionally have been hunted, the *Laona* sheep and goats were presumably at least mainly domestic livestock.

Epiphyseal fusion data for the *Laona* caprines, presented in Table 17.4, are illustrated as a mortality curve in Figure 17.2. Sheep and goats have necessarily been considered together since aging information for these animals individually is sparse. The curve shows that caprines tended to be killed younger than deer, although it follows along very similar general lines, which suggests that caprines, too, were exploited mainly for their meat. The death of 12.5% of the *Laona* caprines in infancy (by 6–10 months of age) is double the equivalent figure for deer and may reflect some subsidiary interest in milk production. The culling of 29% of caprines as juveniles aged between 6–10 and 18–28 months of age, and a further 14% during the succeeding subadult stage left only about 44% of caprines alive into adulthood (greater than 2.5–3.5 years of age), reflecting a slaughter pattern in which a large proportion of animals were killed when well-grown but not old. Although these fusion stages are essentially successive, they cannot be correlated precisely with absolute ages and they overlap to a considerable degree due to variability in the age at which each skeletal element is expected to fuse (Silver 1969, table A). There is too little evidence for eruption and wear of caprine teeth to augment the mortality pattern that has been deduced from bone fusion. The *Laona* caprine mortality curve closely resembles that for domestic caprines at Early–Middle Bronze Age Marki, where these animals account for the majority of identified fragments, implying a similar pattern of slaughter geared primarily to meat production by both communities.

Table 17.4. Mortality of Period I caprines, based on epiphysial fusion.

STAGE	ELEMENT	fused	unfused	% dead by end of stage
<b>INFANT</b>				
	distal scapula	5	4	
	distal humerus	27	2	
	proximal radius	10	0	
	<b>TOTAL</b>	<b>42</b>	<b>6</b>	<b>12.5%</b>
<b>JUVENILE</b>				
	distal tibia	4	2	
	distal metacarpal	0	2	
	distal metatarsal	3	0	
	distal metapodial	0	1	
	<b>TOTAL</b>	<b>7</b>	<b>5</b>	<b>41.7%</b>
<b>SUBADULT</b>				
	proximal humerus	1	2	
	proximal ulna	4	1	
	distal radius	1	6	
	proximal femur	7	4	
	distal femur	1	2	
	proximal tibia	3	6	
	calcaneum	2	3	
	<b>TOTAL</b>	<b>19</b>	<b>24</b>	<b>55.8 %</b>
<b>ADULT</b>				<b>100.0%</b>

### Pig

Judged by either the proportion of identified fragments (29%) or by weight (23%), pigs were clearly of considerable importance to the people at *Laona*, ranking second only to deer in their level of representation. Epiphysial fusion data for pig bones, presented in Table 17.5, suggest that 48% died during the infant stage, at less than about a year of age. The incidence of death by the end of the juvenile stage, at c. 2–2.5 years old was nearly identical, suggesting that pigs were not slaughtered during this age stage. In the subsequent subadult stage, however, 42% of pigs met their deaths, leaving only 10% to survive beyond 3–3.5 years of age, into adulthood.

Dental eruption and wear data do not further elucidate pig mortality to any significant extent. A lower 4<sup>th</sup> premolar tooth, which probably erupts during the second year of life (Silver 1969, table G) was only just coming into wear, suggesting that a very few pigs may, in fact have been slaughtered as juveniles, even though this is not reflected in the fusion evidence, and must have been an uncommon occurrence. Only 4 examples of erupted lower third molars could be allocated to one of the wear stages illustrated by Grant (1975), two were at stage a, one at stage e, and a final damaged specimen at stage e–f. More numerous were erupted upper third molars that could be allocated (n=9), of which 7 were at stage a (enamel wear only), and two displayed only very slight dentine exposure (comparable with mandibular stage b). Since upper third molars of Cypriot prehistoric pigs may erupt at around 29 months, some 4 months later than lower third molars (Matschke 1967), it seems likely that pig mortality during subadulthood was distinctly clustered, possibly quite early on during that stage at about 2.5 years of age.

Table 17.5. Mortality of Period I pigs, based on epiphysial fusion.

STAGE	ELEMENT	fused	unfused	% dead by end of stage
<b>INFANT</b>				
	distal scapula	11	7	
	distal humerus	13	25	
	proximal radius	19	8	
	<b>TOTAL</b>	<b>43</b>	<b>40</b>	<b>48.2%</b>
<b>JUVENILE</b>				
	distal tibia	14	15	
	distal fibula	1	1	
	calcaneum	3	20	
	distal metapodial	55	31	
	<b>TOTAL</b>	<b>73</b>	<b>67</b>	<b>47.9%</b>
<b>SUBADULT</b>				
	proximal humerus	1	10	
	proximal ulna	3	11	
	distal ulna	0	7	
	distal radius	2	9	
	proximal femur	4	24	
	distal femur	0	27	
	proximal tibia	3	22	
	proximal fibula	0	1	
	<b>TOTAL</b>	<b>13</b>	<b>111</b>	<b>89.5%</b>
<b>ADULT</b>				<b>100.0%</b>

Free-living feral pigs may well have lived in the bottom of the Dhiarrizos valley and, if present, would doubtless have been hunted. It seems unlikely, though, that a settlement of the substantial size that may be envisaged for *Laona*, could have relied to any great degree on pig hunting, and the consistency of the wear state for the upper third molars described above would have been difficult to achieve by hunting. It seems probable, then, that at least the great majority of the many pigs consumed at *Laona* were domestic swine.

The high reproductive rate and rapid growth of young pigs means that their efficient exploitation entails the slaughter of a very high proportion of individuals at young ages, before their growth rate declines. Just as young slaughter of pigs is attested at *Laona*, so it is observed at numerous other prehistoric sites in Cyprus. At Kissonerga *Mosphilia*, for example, 39% of pigs were killed as infants, 19% as juveniles, and only 17% lived long enough to become adults (Croft 1998b, table 22.6a).

### Carnivores

Fox was moderately abundant amongst the identified bone fragments (n=115). All parts of the body are well-represented (e.g. 21 head fragments, 18 phalanges, 29 forelimb elements, 28 hindlimb elements), suggesting that whole carcasses were probably brought on to the site.

Fragments of dog (n=9) are quite rare, but more numerous than these are bones of the main animals which had been modified by dogs: 12 fragments display gnawing that may be attributed to

dogs and 13 (including 10 phalanges) appear dissolved through having been ingested. The second domestic carnivore, the cat (n=5), occurred infrequently.

### **Birds**

Bird bones were moderately abundant at *Laona*, and their occurrence here (42 bird bones compared with 4722 identified fragments of larger mammals) is broadly in line with their frequency at Chalcolithic Kissonerga *Mosphilia* (107 bird/11,302 mammal) (Croft 1998a, 212 and table 10.1). The *Laona* bird bones are all from Period I contexts (including a single piece from a context that is only uncertainly attributed to Period I). Half of the bird bones (23 fragments) came from contaminated contexts, whilst the other half came from contexts of standard and high integrity.

Identification of bird remains, especially when fragmentary, poses particular problems (Croft 1998b, 309) and only a minority of the *Laona* bird remains could be identified. As at *Mosphilia*, pigeons were the commonest group among these, with ducks also prominent. Pigeons were represented at *Laona* by four fragments of woodpigeon (*Columba palumbus*), and three additional fragments are almost certainly of rock dove (*Columba livia*). Duck remains from *Laona* comprised three fragments of mallard (*Anas platyrhynchos*). The proximal end of a tarsometatarsus could confidently be identified as crane (*Grus grus*), a species of large bird that had only tentatively been identified at *Mosphilia*. Also prominent among the *Laona* bird remains was kestrel (*Falco tinnunculus*), represented by seven identified fragments. The remaining 24 bird bones could not be identified, but doubtless include additional species to those mentioned here.

### **Mammalian and other microfauna**

A small number of mouse bones, retrieved mainly from wet sieved samples, includes 17 fragments from 6 different contexts, all of Period I. Although mouse remains perhaps have a high probability of being intrusive, traces of gnawing by mice on 8 bone fragments of deer, pig and caprine that come from 7 different contexts (all of Period I) indicate that mice were present in the Chalcolithic settlement. SL 3115, a fragmentary antler bead, is included amongst these mouse-gnawed items. *[Editorial note: here and subsequently in this report, registered finds are referred to by 'SL' plus their registration numbers in normal font while in the book publication these numbers are italicised and not preceded by 'SL']*.

A small amount of reptile bone, also retrieved mainly from wet sieved samples, includes 14 fragments from five different contexts, all of Period I. Apart from a group of three undetermined reptilian vertebrae, all comes from lizards, and two mandibles were identified as starred agama (*Laudakia stellio*). These few lizard bones are highly likely to be intrusive, and even if they are not, their presence is culturally uninformative.

Crab remains were sometimes considered as bones by the excavators, and sometimes as shells, and those submitted as molluscan remains have been studied by Ridout-Sharpe (Peltenburg *et al.* 2019, Chapter 21). The remainder, examined in the course of the present study, consist mainly of 38 claws along with one other exoskeletal fragment, and all seem to derive from the freshwater crab *Potamon potamios*. A dozen of the claws had been burnt, probably during cooking. The great majority are attributed to Period I, but two belong to Period I/II, one to Period II, and one comes from an unattributable context. Ridout-Sharpe lists 52 additional freshwater crab claws (Peltenburg *et al.* 2019, Table 19.1) that come mainly from the settlement.

A small number of fish remains, amounting to only nine fragments, were recovered from the *Laona* settlement, primarily by wet sieving. Seven of these are vertebrae of medium-sized fish, generally measuring around 9-10 mm across the vertebral centrum, and the remaining two fragments are dorsal spines. Two additional fish vertebrae that have been perforated to become beads came from two tombs in the cemetery (see below). The Souskiou *Laona* fish remains have not been examined by a specialist and have not been more closely identified.

### Distribution of the faunal remains

Examination of the distribution of the faunal remains across the various contexts at *Laona* did not reveal any convincing patterning. Individual contexts (units) tended to yield few identifiable bones; most (123) of the 193 Period I contexts that contained identifiable bone yielded fewer than 10 items, whilst only 13 contexts provided more than 50. Two contexts yielded larger samples of 100–200 items, while only two samples were still larger than this. The largest, from midden deposit 1038, which filled pit 1073, included 672 bones of the main animals, which were represented in the proportions 57% deer, 34% pig and 8% caprines. The second came from unit 1130, a fill deposit overlying floor 1137 within building 1149, and consisted of 352 bones composed of 56% deer, 36% pig and 8% caprines. These two largest single-unit bone samples are thus almost identical in composition.

Efforts were made to compare aggregated samples from various groups of associated units but again, significant patterning did not prove discernible. For example, the proportions of 57% deer, 34% and 8% caprines calculated for an aggregated sample of 1093 identified bones of the main animals from Period I building deposits are identical to the 1038 midden deposit.

### Faunal remains from the cemetery

Whilst excavation records suggest that there may have been pieces of larger mammalian bone in several tombs at the *Laona* cemetery, these items were mostly deemed by the excavators to have been recently, sometimes freshly, deposited and were not saved. Only one definite piece of non-human mammalian bone deriving from an animal larger than a mouse (excluding artefacts made of skeletal materials) was identified in the present study. This was a fragmentary caprine mandible from 228.4, a disturbed fill in tomb 228, and since a damaged mandible seems an unlikely item to be included as part of the funerary ritual, it is presumably a chance inclusion and probably intrusive. By contrast, at the nearby Souskiou *Vathyrkakas* cemetery, which may also have served the residents of the *Laona* settlement, the presence of foot bones of pigs in several graves raised the possibility that pig skins, to which the trotters had remained attached, may have been used as shrouds, and a single foot bone of fox from another grave may similarly have been attached to a pelt (Croft 2006b, 152).

Two vertebrae of medium-sized fish (diameters of centrum 10.0mm and 8.8mm) came from different tombs, and since both had been deliberately perforated (cranio-caudally) through their centres to serve as beads, and both came from basal levels along with grave goods? they are surely deliberate inclusions: SL 266 (Plate 38.11) from T. 114.3; and SL 269 (Plate 38.11) from T. 131.3.

A number of graves in the *Laona* cemetery yielded microfaunal remains in small quantities, and a cursory examination of this material revealed that it included fragments of mice, reptiles (both snakes and lizards) and amphibians. These creatures probably found their way into the graves and died there; a burnt humerus of a lizard from tomb 168.26 seems to provide an exception to this rule and is probably a solitary chance inclusion dating to Chalcolithic times. Two bones of a small bird in one grave (T. 201.5) may well have been introduced by one of these incoming animals. A few of the *Laona* graves yielded small unidentifiable scraps of bone that may be either human or animal.

The only other animal remains from graves in the *Laona* cemetery were of the freshwater crab *Potamon potamios*. These came from T. 168.17, 168.22, 168.26 and 126.28 (four claws), T. 172.3 (three claws), T. 208.1 (two claws) and, notably, from T. 216, which contained 15 claws. Glimpsed by the writer at the time of excavation, but subsequently included amongst the molluscan remains and studied primarily by Ridout-Sharpe (Peltenburg *et al.* 2019, Chapter 19), most of these claws (12) came from T. 216.4, while two were from T. 216.3 and one from T. 216.2. None of the crab claws mentioned above is burnt, a common indication of consumption by humans, and it is uncertain whether their inclusion, as well as the single specimen from tomb 103 in the *Vathyrkakas* cemetery (Croft 2006b, 152), is a funerary practice at Souskiou, or whether crabs might naturally have found their way into moist, shady tombs. Ridout-Sharpe lists 22 freshwater crab claws (including those from T. 216) from the *Laona* cemetery (Table 19.1) and makes no mention of any of

these being burnt. On balance, particularly since the claws from the *Laona* settlement are often burnt, the evidence favours their occurrence in graves in the Souskiou cemeteries being natural rather than due to human intent.

### Discussion and conclusions

The nature of the settlement and cemetery evidence at Souskiou suggests that the *Laona* settlement was inhabited by a sedentary community that resided on the easternmost boundary of the coastal lowland region of southwestern Cyprus. A comparison is presented in Figure 17.2 of survivorship curves for deer and caprines from *Laona* and several other Cypriot sites of various dates. Solid lines represent deer in Figure 17.2, and dashed lines represent caprines. The Early–Middle Bronze Age village settlement of Marki *Alonia* and Middle/Late Chalcolithic hunting station at Politiko *Kokkinorotsos*, the latter probably seasonally inhabited (Croft 2012; Frankel *et al.* 2013; Webb *et al.* 2009, 230–1), both lie in the central lowlands of Cyprus, whilst the two near-adjacent multiperiod Kissonerga settlements of *Mylouthkia* and *Mosphilia* are only some 20 km or so to the west of *Laona*, at the opposite end of the same west coastal lowland region.

It has been suggested above that the location in Figure 17.2 of the survivorship curve for the *Laona* deer distinctly below that for the Marki deer denotes their more intensive exploitation at *Laona*. The *Laona* deer tended to be culled younger within an animal economy in which deer hunting was of considerably greater importance, and younger culling (up to a certain point) results in greater productivity (see Croft 1991, 72 for discussion of this matter). Indeed, the intensiveness of deer exploitation at *Laona* is emphasized by the location of the curve only a little above the curves for herded caprines at the two sites. The close proximity of these two very similar caprine curves reflects the predictable intensity of exploitation of domestic herds.

By contrast, both deer and caprines appear to have been exploited in a comparatively un-intensive manner by the *Kokkinorotsos* hunters in the central lowland region and this seems also to have been the case for deer at Early Chalcolithic *Mylouthkia*. However, at *Mosphilia*, only a few hundred meters inland from coastal *Mylouthkia*, deer and caprines seem to have been exploited with greater intensity during Middle and Late Chalcolithic times, perhaps reflecting an increasing human population in the vicinity during the 4<sup>th</sup> and earlier 3<sup>rd</sup> millennia BC (Croft 2012, 122–3). The location of the survivorship curves for *Laona* deer and caprines close to the curves for *Mosphilia* (well below the *Kokkinorotsos* and *Mylouthkia* curves) imply broadly similar levels of intensiveness, suggesting that the effects of population increase may have been felt throughout the entire lowland region of southwestern Cyprus.

In seeking to evaluate the significance of the *Laona* faunal remains it should be stressed that the relative abundance of a taxon in any assemblage of animal remains from an archaeological site, whether judged by numbers of identified fragments or by weight, does not necessarily very closely reflect the relative importance of that taxon to the human community that created the assemblage. Leaving aside the value of any secondary products such as milk and antler that caprines and deer may have provided, and concentrating solely on contribution to meat supply, it is necessary to take account of differences in body size between the various animals. It has been proposed elsewhere that deer, pigs and caprines may plausibly be assumed to have yielded meat in the proportions 3.4:3:1 (explained in Croft 1991, note b to table 1, with reduction of the factor for pigs from 4 to 3 as specified in Croft 1998b, 314), and application of these factors to the counts of identified fragments presented in Table 17.1 above suggests estimated contributions to meat supply at *Laona* of caprines 2.8%, pig 29.4% and deer 67.9%. The meat supply estimates for *Laona* differ only moderately from figures for relative taxonomic abundance, but for other assemblages, such as *Kokkinorotsos* (Croft 2012), the disparity may be more considerable.

If an animal economy dominated by deer hunting is clearly implied by the meat supply estimates for *Laona*, pork was also of great importance here. By contrast, the significance of sheep and goats as providers of meat was very low, and if milk production was an objective of caprine

husbandry, it seems not to have been very vigorously pursued. The sheep were probably not woolly at this time, more closely resembling the short-haired mouflon that still lives freely in upland Cyprus, but goats, somewhat more numerous among the caprines, may have provided hair for textile manufacture. It has long been suspected that caprine ownership may in itself have been prestigious in Chalcolithic Cyprus (Croft 1991, 74). The proportions of identified fragments (Table 17.1) and estimated contributions to meat supply (preceding paragraph) at *Laona* compare reasonably closely to the Middle Chalcolithic (early phase) Period 3A at Kissonerga *Mosphilia* (caprines 8.4%, pig 23.8% and deer 67.8% of meat, relative abundance and meat supply figures in Croft 1998b, tables 22.10, 14), and differ markedly from succeeding phases of the Chalcolithic (Periods 3B and 4) at *Mosphilia* when pigs rise to greater prominence (45–54% of meat) and deer decline (50–38% of meat). Since *Laona* Period I appears contemporary with *Mosphilia* Middle Chalcolithic (main phase) Period 3B (Peltenburg *et al.* 2019, Chapter 2) which witnessed a marked increase in intensity of animal exploitation on the west coast (Croft 1998a, 214, Croft 1998b, 315), a degree of local archaism may have existed in the area of *Laona* on the remoter and more elevated eastern margin of the coastal lowlands where a sparser population may have exerted less pressure on available resources.



## 17.2 The bone and antler industry

Items manufactured from bone and antler are typically abundant on Neolithic and Chalcolithic settlements in Cyprus, and this appears to be particularly so at Souskiou *Laona*. The present study of worked skeletal materials from the excavations at *Laona* is based primarily on 276 registered items (201 of bone, 61 of antler and 14 of pig's tusk). Forty-one other pieces that bear traces of working or modification were recorded but not deemed worthy of registration, mainly because they were modified to only a minimal degree, often being waste products of the manufacturing process. Application of the same criteria for selection had resulted in the registration of 411 items from the far more extensive excavations at the Chalcolithic settlement of Kissonerga *Mosphilia* (Items listed in Croft 1998c, table 8.1; Croft 1998d, table 20.7), so the occurrence of around two thirds as many registered items from a very much smaller excavation at *Laona* indicates that this site is particularly rich in such items. This accords with the prominence of craftwork in general in the settlement (Peltenburg *et al.* 2019, Chapters 11–13).

The typology employed in the present study is, with minimal modification, that which had been applied to the larger *Mosphilia* assemblage (described in Croft 1998d), and the same coded abbreviations have been used here for the various categories of artefact in order to facilitate comparison of the two assemblages. At both sites a limited range of common types accounts for the great majority of the assemblage viz points of various sorts, needles and beads. Whereas beads at *Mosphilia* were only slightly more often made of antler rather than bone (15:11=58% antler), at *Laona* antler beads were by far the commoner (43:7=86% antler). The considerably greater abundance of beads at *Laona* (50 of 276=18% of registered bone and antler items) than at *Mosphilia* (26 of 411=6%) accounts for the greater emphasis upon antler items within the assemblage at *Laona* (61 of 276 items=21%) than at *Mosphilia* (46 of 411 items=11%).

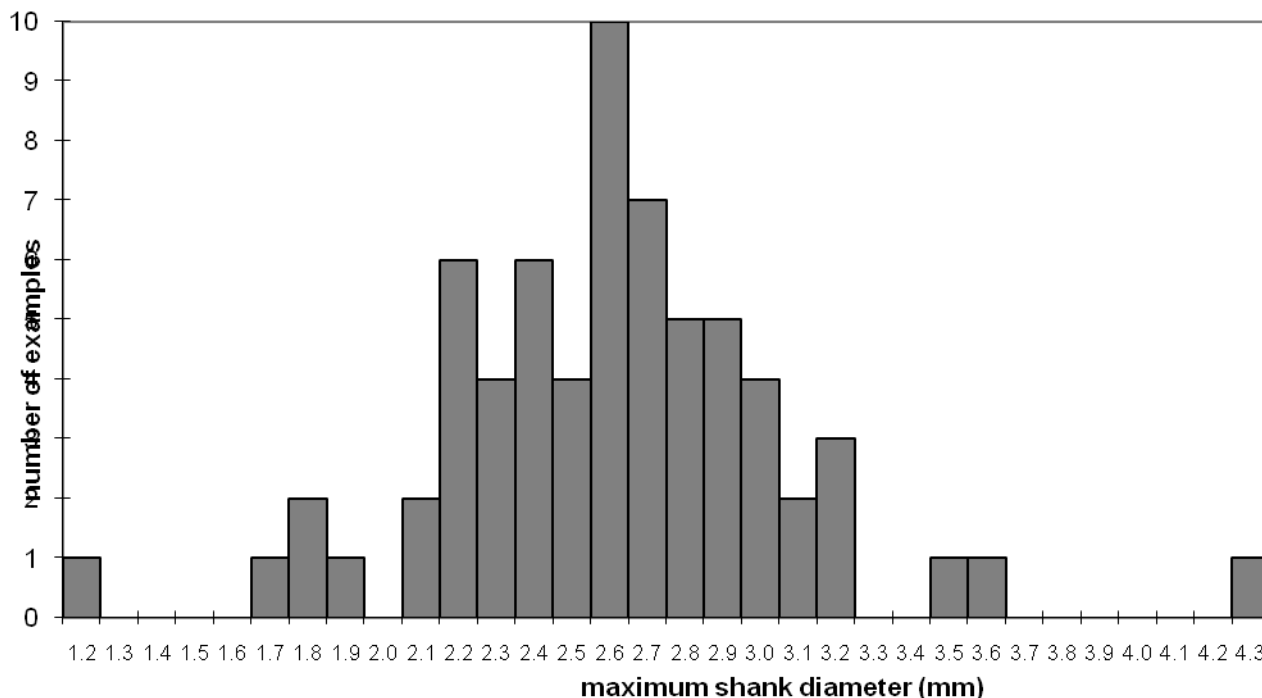
A classified list of artefacts from *Laona* that are made of skeletal materials is presented in Table 17.6. Plate numbers quoted in this table and elsewhere in the present study in relation to *Laona* artefacts refer to plates in the printed volume (Peltenburg *et al.* 2019); Plates 106 and 124, which contain almost all of the illustrations of bone and antler artefacts, are duplicated here on ADS. To view the illustrations of the three items which are presented as Plate 38.11 (two fish vertebra beads, SL 266 and 269) and Plate 59.6 (a pig's tusk pendant, SL 420) the reader must consult the printed volume, since those plates are not duplicated here.

### Needles [N].

Needles were common in the *Laona* assemblage but, even so, their prominence here (68 of 276 items= 25%) was far outstripped at *Mosphilia* (172 of 411=42%). Due to the fragility of needles, only two examples (with eyes) were complete. SL 2109 (34.3mm in length, with a maximum shank diameter of 2.6 mm and an eye diameter of 1.0 mm) is clearly of standard size, from which most of the fragmentary specimens probably did not depart very greatly. The second complete needle, SL 2087 (Plate 124.6) is 129.0 mm in length (with a maximum shank diameter of 4.3 mm and an eye diameter of 2.4 mm) and is clearly of exceptionally large size. Eye diameters could be established for 11 apparently standard sized needles, and these all fall between 1.0 and 2.0 mm. Butts tend to be square and fined off, and perforations are normally distinctly hourglass shaped, having been bored from both sides (e.g. SL 2148, Plate 124.7).

Figure 17.4 illustrates the maximum shank diameter for 66 needles. It is apparent that this measurement most commonly falls between 2.1 and 3.2mm (58 out of 66, or 88% of instances). Occasional needles have shank widths that fall somewhat outside this range, 64 out of 66 (97%) falling between 1.7 and 3.6 mm, and only two outliers are conspicuously small (1.2 mm) or large (4.3 mm: SL 2087, mentioned above).

Fig. 17.4. Maximum shank diameters of needles.



Numerous shank fragments that lack either an eye or a sharp tip have nevertheless been identified as needle fragments on the basis of their normally round (or at least roundish) section and, particularly, because of their highly glossy polished surface. Occasional examples of needles with conspicuously flattish rectangular-sectioned shanks do exist (SL 2568, 2649 and 2759). A very smooth surface is a functional advantage for a needle that is employed to penetrate and pass through some other material. Butts are also normally fined off to facilitate passage through fabric of the needle with the added bulk of a double thickness of thread. Occasional items for which identification as fine points (which lack an eye) has been preferred fall within the size range of needles, normally because they retain pronounced striations (from working) that normally are aligned across the long axis of the object, and these items also lack the high-gloss polish that characterizes needles. A degree of ambiguity between fragmentary specimens of needles and the smaller fine points must nevertheless be admitted, especially since complete fine point SL 975 is of the size of one of the larger needles and (unlike most fine points) possesses a high gloss polish.

The heavily worn eye of SL 1610 (Plate 124.9) remains intact but is particularly fragile and, not surprisingly, breakage through the eyes of bone needles occurred quite commonly. Evidence of re-perforating was extant on two examples. The butt of needle SL 2586 consisted of a somewhat jagged end, smoothed over by usage, and it seems likely that this irregularity represents the remnant of an original eye. More clearly re-perforated was SL 2571 (Plate 124.10), which retained a smoothed-over vestige of the original eye on its butt. Of course, any number of needles may have been re-perforated, since all trace of an original eye might easily have become effaced by reworking.

Classified as needles, but clearly not functional for sewing during the latest phase of their use-life, was a group of six 'eyeless needles': SL 1261, 1972, 2691 (Pl. 124.11), 2851, 3091 and 3150. These needles had broken through their eyes in antiquity, and the roughness of the breaks had become smoothed due to their continued usage for a purpose other than sewing. They had not been re-perforated. A variety of uses may be envisaged for 'eyeless needles' such as, for example, piercing small holes in soft material, removing cooked snails from their shells, or use as pins or

toothpicks. Complete fine point SL 975 (mentioned above), of similar size to a substantial needle but lacking the eye and the fined off butt that characterizes needles, seems to be a purpose-made version of the same thing. SL 2625 is the butt of a similar needle-sized fine point.

#### Fine Points [F].

Fine Points, represented by 28 examples, were reasonably abundant. They are characterized by their slender proportions, being generally parallel sided, or nearly so, and they are narrow in proportion to their length. They do not have articular ends for butts. Fine Points are commonly square sectioned or, less frequently, rounded-triangular in section, and are normally at least somewhat polished, sometimes to a high gloss finish. Striations, often aligned (directly or obliquely) across the long axis of the item are frequently very apparent beneath the polish. These criteria allow most shank and tip fragments of Fine Points to be distinguished from needle fragments. In a very few cases for which these criteria proved insufficient to permit discrimination, specimens for which the maximum diameter of the shank is greater than 3.6 mm are considered as Fine Points. This cut-off value corresponds with the diameter of the largest normal sized needle fragment (SL 2570, a shank fragment identified by its round section and high-gloss polish. SL 2649 (Plate 124.8), with a diameter of 3.5 mm, is almost as large and there is no doubt that this is a needle, since it possesses an eye). The exceptionally large needle SL 2087, with a shank breadth of 4.3 mm, is excluded from consideration here since all of the shank fragments that are of closely similar maximum breadth (SL 2713, 2720, 3064, 3101 and 3148, all falling within the range 3.8 to 4.4 mm), are assignable to the category of Fine Point on other criteria. A tip fragment (SL 2855 with maximum shank breadth 4.2 mm) is therefore considered as a Fine Point rather than a needle. SL 2725 (a shank fragment with breadth 8.9 mm) is included with Fine Points since it is near parallel-sided and possesses exceptionally high gloss polish which would be uncharacteristic of Large or Small Robust points.

Complete Fine Point SL 975 (68.0 mm in length, with a maximum shank diameter of 3.4 mm) is of the size of one of the larger needles (mentioned above) and possesses a high gloss polish. It is the only complete example, reflecting the fragility of these slender items. Four other fragments of Fine Points have smaller diameters than this, ranging in maximum breadth down to 2.3 mm (SL 2625, a butt fragment, also with high gloss polish), whilst several are only slightly broader than standard sized needles. However, most Fine Points are considerably broader, suggesting that many of them may have been considerably longer than SL 975. The wide variation in size that is implied suggests a variety of purposes. Some Fine Points may have been implements used for relatively light tasks; tip fragment SL 3090 shows clear signs of damage from usage as an implement. Other Fine Points may have fulfilled a more passive role as pins, perhaps for hair or clothing.

#### Large Points and Small Robust Points [L and SR].

These are sturdy, well worked points of greater (Large) and less (Small Robust) than 10 cm in length. All three examples of Large Points for which this can be determined retain part or all of an articular end as the butt of the implement [LA], whilst a fourth Large Point (SL 2682) lacks its butt. At *Mosphilia*, Large Points included a substantial minority were made with butts that did not include an articulation [LB], but no examples of this type were positively identified at *Laona*. The articular ends that form the butts of these Large Points are: proximal metatarsal (SL 2734), distal metatarsal (SL 2893) and distal metacarpal (SL 3151), all of fallow deer. The preserved (shank) portion of SL 2682 (109.7 mm in length) consists of part of a metatarsal shaft, also of fallow deer. Recordable total lengths of these Large Points are SL 2734 (99.7 mm) and SL 3151 (121.5 mm).

The application of considerable force had clearly caused the tip of point SL 2734 to shear off in antiquity, and polish to the damaged tip indicates that use of the implement continued without reworking. Although it was only 99.7 mm in length when it was last used, SL 2734 had clearly been a Large Point, and the nature of the break suggests that it could originally have been considerably longer. The butt of Large Point SL 2893 consists of the ground down but complete distal articulation

of a deer metatarsal, much polished through handling. The tip is damaged and seems to have been in the process of being re-worked. The deer distal metacarpal that forms the butt of Large Point SL 3151 has been axially split, and the remaining epicondyle ground down distally and on the plantar side for the greater comfort of the user.

Small Robust Points may, like Large Points, be divided into those with butts that include part or all of an articular end (SRA), and those which do not (SRB). Four examples of the former are made on a proximal metatarsal (SL 2666 and 3063), distal metatarsal (SL 1138), and distal metacarpal (SL 2741). All bones are of deer. Both epicondyles of the metatarsal distal articular end which formed the butt of complete point SL 1138 (Plate 124.2) had been deliberately broken through, and the jagged break had become smoothed from handling. By contrast, the very similar bipartite articular end of a metacarpal that forms the butt of SL 2741 (Plate 124.5) appears unmodified. Recordable total lengths of this type of Small Robust Point (SRA) are SL 1138 (62.0 mm) and SL 3063 (79.0 mm). The length of SL 2741 is 82.4 mm, but its tip had suffered slight damage in antiquity, after which it continued to be used. Its original length is estimated to have been 85.6 mm.

Four examples were also found of Small Robust that did not include an articulation (SRB). Only in the case of SL 2706 could the skeletal element be securely identified, and this was a shaft fragment of a deer metatarsal. Points SL 1070 (Plate 124.1) and SL 2703 both seem very likely to have been made on deer metapodial shafts, and point SL 2675 is so small that the longbone shaft fragment upon which it was made could not even tentatively be specified. SL 2703 is decidedly expedient in nature, its butt and sides being left rough, but with a well worked tip. Recordable total lengths of this type of Small Robust Point (SRB) are SL 1070 (81.1 mm), SL 2675 (40.1 mm) and SL 2703 (77.3 mm).

More numerous than those points that could be attributed to the Large and Small Robust categories were the less complete items that were fairly clearly either one or the other but could not be assigned with confidence. Amongst these, five (SL 2514: Pl. 124.3, 2699, 2700, 2710 and 2730) were certainly made on a deer metatarsal shafts, whilst four, SL 2673 (Plate 124.4), 2712, 2732 and 3100, seem extremely likely to have been made on this same element. Four point butts consist of part of the proximal articulation of deer metatarsals (SL 2711, 3073, 3087, and 3093). A single unassignable point butt (SL 2857) retains one epicondyle of an axially split distal articulation of a deer metacarpal, a skeletal element that has been observed sometimes to form the butts of points that could confidently be assigned to both the Large (LA) and Small Robust (SRA) categories. In fact, no Large or Small Robust Point from *Laona* seems particularly likely to have been made on anything other than a deer metapodial. A similar concentration on metapodia (mainly of deer, but some caprine) has been noted for bone points at Late Aceramic Neolithic Khirokitia in Cyprus (Legrand-Pineau 2009, 117; 2010, 8), and points made on split ruminant metapodia are abundant in the broader region of Western Asia and beyond over a very long period of time (Le Dosseur 2008; Legrand and Sidera 2007, 67). At *Laona* deer metapodial points were far more commonly made on metatarsals (hindlimb) than metacarpals (forelimb), i.e. those points mentioned above as definitely or very likely having been made on deer metapodia include 21 on metatarsals compared with only three on metacarpals. This disparity, apparent also in the bone industry of Chalcolithic *Mosphilia*, is surely because the metatarsal lends itself especially well to being axially split, down the middle (Croft 1998d, 243).

#### Crude Points [C].

This category includes a variety of shapes and sizes of point which are distinguished by having been only minimally worked to produce functional implements. Their separation from Large and Small Robust Points is admittedly subjective, being based upon their displaying a high degree of expediency rather than upon hard and fast criteria. Whilst they have been only minimally or not at all worked specifically to create the point that they eventually become, Crude Points are, nevertheless, often made on pieces of bone that have previously been subjected to considerable

working towards other ends. An example of this would be a pointed broken piece of a well worked implement that had been secondarily utilized as a crude point with little or no evidence of additional working.

*Crude Points made on broken implements of other classes.*

SL 2667 is a point tip fragment made upon a deer metatarsal shaft. It appears to be a badly damaged portion of a well worked implement that broke off and then simply continued to be utilized as a Crude Point.

SL 2704 is a complete double-ended Crude Point (length 57.1 mm), apparently made on a shank fragment of a more formally prepared broken implement that is broken at both ends. Its ends are bluntly pointed, and both display smoothing and polish through intensive usage.

SL 3113 is a Crude Point shank with a roughly broken pointed tip that displays smoothing from usage. It is almost certainly on a deer metatarsal shaft, and it is likely that it was originally part a more formal point that broke.

*Crude Points made on implements that broke during the course of manufacture, or on pieces of debitage.*

Crude Points made on striated pieces of longbone that had originally been either pieces of industrial debitage or pieces of artefacts that broke during the course of manufacture include SL 2695, 2702, 2718, 3080, 3055 and 3095.

SL 2695 is a worked sliver of longbone shaft (probably deer metatarsal) with a sheared-off end that is clearly a shank fragment of a Crude Point. SL 3095 is similarly a Crude Point shank fragment, newly broken at both ends.

Complete Crude Point SL 2702 (length 89.0mm) retains part of the proximal articulation of a deer metatarsal as its butt.

An exceptionally blunt point SL 2718 (length 110.6 mm) was made on part of a deer metacarpal that retains the medial half of the proximal articulation of the bone as its butt. No attempt at all had seemingly been made to fashion the tip of this highly expedient point, which nevertheless displays a little polish acquired through usage. The original tip seems likely to have sheared off, apparently due to forceful usage. The shank of the item also displays use-polish over striations, suggesting that a more formal tool had originally been intended, and SL 2718 appears likely to have originated either as a discard portion or to have resulted from breakage during the manufacture of a Large Point. SL 3080 is similarly a highly expedient Crude Point, almost certainly made on an angular sliver of deer metatarsal shaft that broke as it was being prepared to make some other more formal implement.

SL 3055 is a complete Crude Point (length 36.8 mm) on an angular splinter of longbone shaft. It has transverse striations and polish on all sides, and its irregularly sharp chisel ended tip bears polish from usage. The roughly snapped off broader end has polish indicating that it functioned as the point butt. SL 3055 may have been a Fine Point that broke during the course of manufacture. Perhaps originally destined to have served as a pin, it found an alternative use as a small awl.

*Spatulate implements [M01].*

These are points with a more or less sharp-edged, distinctly transverse working end, rather than a pointed tip. In cases where it is unclear whether the working end should be considered as transverse or as pointed, it was considered as a point. Spatulate implements range from being highly expedient, with little working (e.g. SL 3060), to being highly worked (e.g. SL 2659).

SL 2659 (Plate 124.14) is a complete chisel-ended, flat sectioned point 170.5 mm in length. It is beautifully made on an axially split distal end of an immature deer metapodial, retaining part of the incompletely fused articulation as its butt. The articulation has been heavily ground down on all sides, retaining little of its surface detail. This is an elegant piece, and the fact that it is made on an

unfused bone, prone to fragmentation, suggests that it may have been intended for decorative rather than more active use. It is, in effect, a chisel-ended Fine Point.

By contrast with SL 2659, SL 2669 is little worked. It is a longbone shaft fragment, quite possibly a deer metapodial, representing the shank and tip of an implement. With a preserved length of 93.0 mm, its rather jagged broader end may or may not be its butt. Damage to its blunt tip in the form of major flaking attests the application of considerable force in the earlier use of this implement, but polish over this damage implies a later period of gentler use, conceivably in polishing or burnishing: SL 2669 apparently had a varied use-life.

SL 2694 is a tip fragment of a well worked chisel-ended implement that has a glossy polished surface over longitudinal striations. It is certainly made on a deer metatarsal, as is closely similar to glossy fragment SL 3153. An even smaller tip fragment of a similar glossy polished spatulate implement is SL 2866, which is almost certainly on a deer metatarsal.

SL 2745 is little worked with an asymmetric blunt tip that displays considerable polish from usage. It is unusual in apparently being a fragment of a flat bone (probably a scapula) rather than a longbone.

SL 3060 is a complete spatulate Implement (length 116.3 mm) made on a splinter of deer metatarsal and retaining part of the proximal articulation as its butt. It does not appear to have been deliberately smoothed in any way, and is therefore highly expedient, but its working end displays polish from use of the implement.

#### Tubes [M02]

Bone tubes occurred rarely at *Laona* (two examples), as they had at *Mosphilia* (a single example on a section of caprine tibia shaft). Fragment SL 2858 is almost certainly a piece of longbone shaft from a large bird, which has faint striations beneath its surface polish. Its ends are well smoothed, and a length of 24.3 mm is indicated. With an estimated original diameter of ca 15 mm, this thin-walled item seems rather gracile to have been a bead, but such a purpose cannot be excluded.

SL 2868 is a section of the shaft of a fox femur. Its ends display detachment by concentric grooving and snapping, and remain jagged, not having been smoothed over. The minimal working displayed suggests that this may well have been an item that was never completed. Breakage during excavation means that the length of this tube is unknown, but the two non-joining end fragments measure 41.5 mm and 20.3 mm, and the original total length is estimated at c. 66 mm.

#### Pendants [M03 and PT3]

Pendants made of skeletal materials almost all came from graves (18 of 20 pendants). Dentine (ivory) from pig's tusks (13 examples) seems more commonly to have been used than bone (seven examples) but, due to the eroded condition of most examples from graves, these two different raw materials could not be distinguished with great confidence and were sometimes rather uncertainly identified. Pendants made of skeletal materials have been described and classified by Peltenburg along with pendants made of shell and stone (Peltenburg *et al.* 2019, Chapter 12), and only brief comments upon them need be made here. Comments on pendants from the cemetery are made below in ascending order of grave number.

SL 430 and 1775 from T. 158.3 are uncertainly identified as being of bone rather than pig's tusk, whilst SL 1774 is more confidently identified as bone. SL 375 and 519 from T. 159.1 are uncertainly identified as being of bone rather than pig's tusk, whilst SL 2444 from the same context is more confidently identified as pig's tusk. SL 420 (Plate 59.6) and SL 2430–39, all from T. 172.3, have been identified with some confidence as pig's tusk. SL 487 from T. 227.2 is uncertainly identified as being of bone rather than pig's tusk. In none of the foregoing cases is identification of material considered secure.

The two pendants derived from non-funerary contexts are both flat plaques, a type not represented in graves. SL 3056 (from unit 1130, a fill in Building 1149, and measuring 26.3 x 13.4

mm, 2.0 mm thick) is a flat, thin rectangular bone plaque. Its surfaces and edges have been beautifully polished over striations. Perforation seems to have been the last action in the manufacture of the item. This was located centrally along one of the short sides and had barely begun on one side only. An old crack goes all of the way through the plaque in the vicinity of the perforation, and the appearance of this crack during manufacture might have caused the near-finished item to be abandoned uncompleted.

The presence of enamel upon the dentine that largely composes SL 3084 (from unit 1107, an occupation deposit in Building 897) clearly shows that the item is made on a flat piece of tooth, almost certainly pig's tusk. It is a plaque of elongated, rounded triangular shape (measuring 23.0 x 14.1 mm, 3.1 mm thick) with an hourglass perforation (diam. 2.0 mm) at its apex.

#### Blanks [M05]

Fifteen varied items seem best classified as blanks, that is artefacts that seem to be still in the course of manufacture. Such items are thus reasonably common.

SL 2665, 2863, 3074 and 3112 are worked splinters of deer metatarsal shaft which possess mainly or solely longitudinal striations. Probably pieces of deer metatarsal shaft, SL 2869 and 2987 are similarly striated, as are SL 2662, 2707 and 2862, also pieces of deer metapodial shaft. Additionally, SL 2864, 2865 and 3071 are striated longbone shaft fragments which are uncertainly identified as deer metapodial. SL 3096 is a small unidentifiable fragment of longbone shaft that bears striations. These may all be pieces that broke during the manufacturing process, although some could have been pieces that were simply never completed.

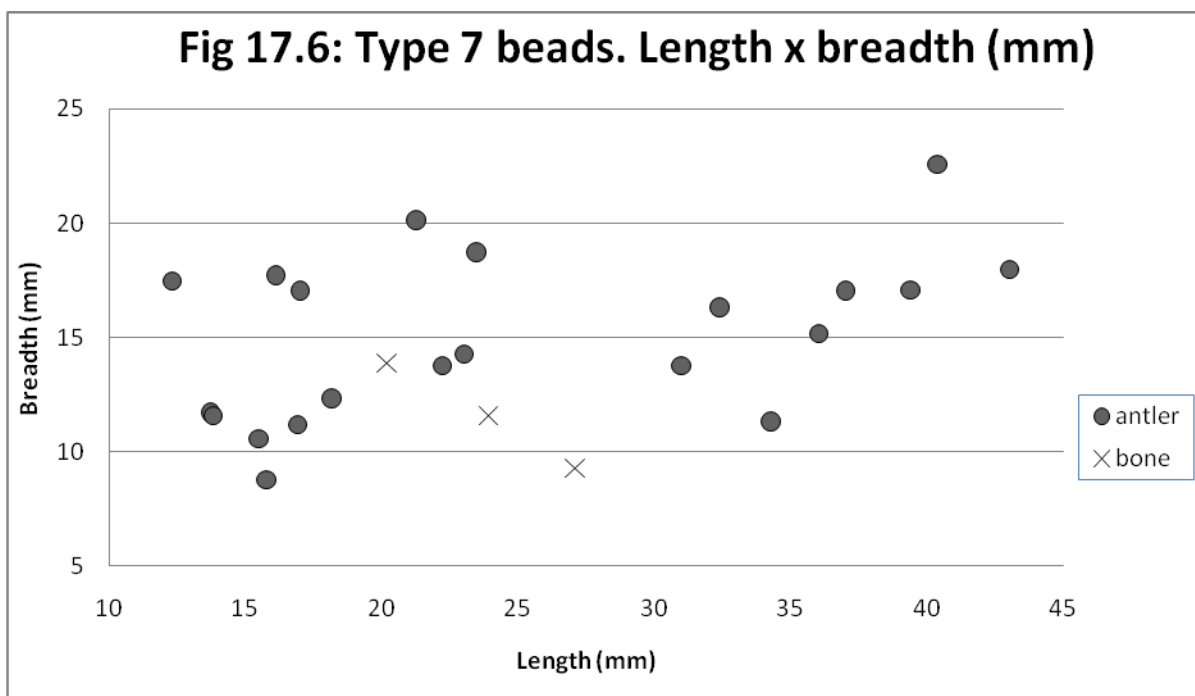
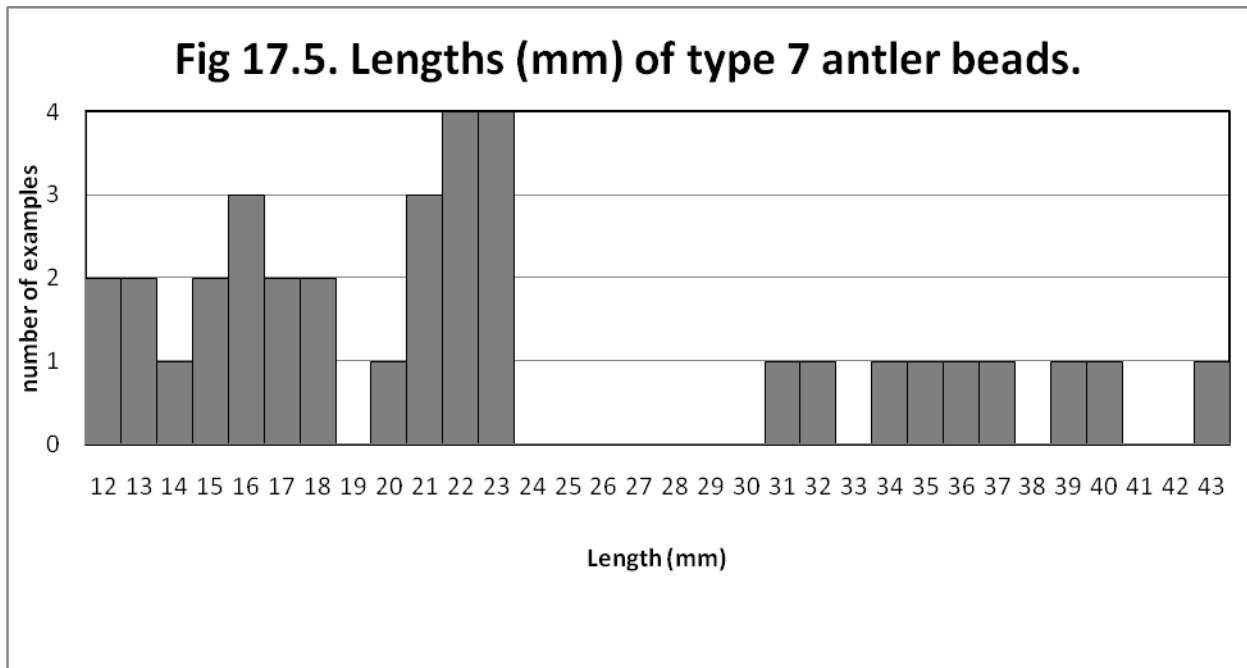
SL 2755 consists of two non-joining pieces that seem to be parts of the same left metatarsal of deer that has been axially split. With a combined total length of 186.5 mm, these fragments comprise almost the entire medial side of the bone. One fragment includes the medial quarter of the proximal articulation whilst the other incorporates the unfused medial half of the distal end of the bone. The entire length of the split (axial) edges of the piece has been ground flat. SL 2755 seems clearly to be a blank for a point that would have retained part of the proximal articulation as its butt, and perhaps a second point would have been made using the distal part of the piece, but the project was never completed.

SL 2070 includes one of the epicondyles of the distal articulation of a deer metatarsal that has been subjected to some grinding and polishing but retains some jagged breaks. The intention seems to have been to make this the butt of an implement, but the epicondyle was not fully smoothed before the project was abandoned, probably due to breakage during manufacture.

#### Beads [B and A2]

While the study of beads from *Laona* was undertaken primarily by Peltenburg (see Peltenburg *et al.* 2019, Chapter 12), beads made of bone and antler were also included in the present writer's examination of all worked skeletal materials from the site, and a few points regarding this class of artefact may be offered here. It has been mentioned at the beginning of this study that beads are particularly common amongst the bone and antler artefacts at *Laona* compared with *Mosphilia*, and that a very much higher proportion of the *Laona* beads are made of antler (45 examples) rather than bone (n=7). In most instances the identification of the material as either antler or bone is confident, but in a minority cases there exists a degree of uncertainty. The great majority of the antler beads are cylindrical (Type 7) beads (e.g. SL 2368 (Plate 106.7), SL 2821 (Plate 106.9) and SL 2932 (Plate 106.10) made on normally more or less parallel-sided sections of antler tines (n=39 + 1 uncertain attribution to Type 7). This simple type was also heavily predominant amongst the antler beads at *Mosphilia* (Croft 1998c, table 8.1; Croft 1998d, 245 and table 20.7). These beads characteristically display grooved and snapped ends, but occasionally ends have been ground flat. They often bear traces of longitudinal faceting, resulting from shaving of the surface, sometimes with further

smoothing that can even amount to polishing overlying the facets. Perforation of the antler beads entailed the removal of some or all of the spongy tissue that forms the core of the tine.



The lengths of 35 Type 7 antler beads could be measured, and most of them (n=26) are between 12.3 mm and 23.5 mm. Nine longer examples range between 31.0 and 43.0 mm, so there is a conspicuous absence of beads with lengths that lie between 23.5 and 31.0 mm (illustrated in



Figure 17.5). Type 7 antler beads thus appear to be divided into two discrete groups of longer and shorter beads. More than half ( $n=21$ ) of these beads on which length measurements could be taken also provided width measurements, and these have been plotted against lengths in Figure 17.6. The scatter of points shows that longer beads are not just scaled-up versions of shorter beads, since longer and shorter beads do not differ significantly in breadth. The striking separation of the two groups of Type 7 antler beads leaves little doubt that the production longer and shorter forms was intentional. Perhaps the two forms had somewhat different uses, or they were manufactured by people with differing preferences; at any rate, antler beads of intermediate length seem not to have been manufactured.

Type 7 cylindrical beads made of bone, as opposed to antler, were relatively rare. Only four examples were found that were certainly or most likely made of pieces of longbone shaft, and it must be admitted that two of these, SL 2668 and 2688, might just be of antler. The other two examples were unambiguously of bone; SL 3005 is made on a section of longbone shaft of a fairly small mammal, uncertainly identified as a tibia of fox and SL 3085 is similarly made on a section of longbone, more likely from a large bird than a mammal. All four beads had measurable lengths (20.2 mm, 21.0 mm, 23.9 mm and 27.1 mm), and the three of these that also had measurable widths are plotted in Figure 17.6 along with the antler beads. The lengths of two of these four bone beads (SL 2688 and 3085) fall comfortably within the range of lengths of the shorter antler beads, whilst one (SL 2668, 23.9 mm long, most likely of bone but just possibly antler) only very marginally surpasses this range. These three examples seem to be the equivalent in bone of the shorter variety of antler bead. The fourth bone bead (SL 3005) has a length (27.1 mm) that falls, anomalously, around the middle of the gap (23.5 mm and 31.0 mm) that separates the two sizes of antler bead. Both ends bear traces of grooving and snapping that remain fairly jagged, but one end was slightly smoothed from use. Whatever this item was, it seems to be complete and to have been used, but in view of its intermediate length, one wonders whether it really was employed as a bead of atypical length, or whether this short tubular item had some other purpose. If bone and antler beads of intermediate length were made at all, they were clearly a rarity, and the reason for this remains a minor mystery.

Several Type 7 antler beads appear unfinished. SL 2930 has an unusually tapering perforation, which narrows down from a normal-seeming diameter of ca 4.1 mm at one end to ca 3.0 mm at the other end. Whilst one of the grooved and snapped ends of SL 2562 seems to have been deliberately smoothed the other is jagged and unsmoothed. SL 2859 has unsmoothed vestiges of grooving and snapping at both ends, and its spongy core has been incompletely removed so that the perforation has rough sides, and the exterior surface is also rough and unmodified. All of these peculiarities suggest that these pieces were not completed.

A second, more elaborate type of antler bead, represented by only two examples, is a cylindrical antler bead with central swelling (Type 11). SL 1137 (Plate 106.12) is almost complete, whilst SL 2724 is only a fragment, but clearly also belongs to this type. Type 11 beads did not occur at all at *Mosphilia*, but are well represented in Early and Middle Chalcolithic contexts at *Kissonerga Mylouthkia* (Croft 2003b, 197 and table 17.2).

Two antler items (SL 2658 and 2740) were only tentatively identified as beads by Peltenburg and not attributed to a specific type (Peltenburg *et al.* 2019, Appendix A). These are considered unlikely to be beads by the present writer and have accordingly been mentioned (below) as pieces of worked antler tine.

Two highly distinctive beads had been made on fish vertebrae by neatly boring a hole through the middle of the vertebral centrum: SL 266 from T. 114 (Plate 38.11) and SL 269 from T. 131 (Plate 38.12). This resulted in beads that were circular and flattish, being only just over half as long as their breadth. So far as the writer is aware, these are the only examples of fish vertebra beads from Early Prehistoric Cyprus.

Utilised Scapula [M09]

The occasional use of deer scapulae as shovels or scoops is attested by two deliberately modified examples that bear traces of polish due to handling during usage.

SL 2739, a right scapula of deer, displays evidence of the protruding spine of the scapula having been deliberately 'nibbled' off to reduce its height along the distal-most 35 mm of its length. This modification is clearly designed to make the distal end of the bone, which is present in its entirety, more comfortable to hold when the item is manipulated in the manner of a scoop or shovel. The cranial margin of the scapula is smoothed, and the cranio-proximal angle of the scapula blade is distinctly rounded off.

SL 3110, a left scapula of deer, has similar modification along the preserved length of the spine of the scapula, which is thus reduced to some 10 mm in height, and the margins of the distal articulation and the neck area of the scapula are polished through handling. Although damaged, it is estimated that the blade of the scapula had been trimmed down to a length of 175 mm.

#### Modified Deer Distal Metapodial [M10]

This heterogeneous group of ten items clearly indicates that distal metapodials, especially metatarsals, of deer were quite frequently selected to be worked for a variety of purposes. While some seem likely to have served as hafts for tools made of stone or metal, such a purpose seems unlikely for others.

The natural morphology of the distal end of the cervid (but not the caprine) metatarsal is such that a deep, axially situated cylindrical hole some 3 mm and comparatively very deep (characteristically >20 mm) in diameter emerges between the bases of the two epicondyles. A long thin flint (or metal) implement that thrust forcibly between the epicondyles and into the hole would be firmly wedged. In three out of five examples of modified deer distal metatarsals (SL 719, 2697 and 3066), damage to the axial edges of the epicondyles seems to result from such a forcible insertion into this cylindrical hole. Thus, these distal metatarsals may have served as hafts. SL 719 is the only complete example, and with a total length of 98 mm it retains about half the length of the bone shaft, suitable as a handle. SL 2697 presents traces of polish from handling on the shaft of the bone. All three of these items have been ground down to flatten the distal ends of the epicondyles and, additionally, between one and all four (lateral, medial, dorsal and plantar) of the sides of the distal end have been ground. SL 3062 and 3078, certainly ground down deer distal metatarsals, seem likely to be broken (axially split) examples of this type.

SL 2687 is a deer distal metatarsal that has been ground down distally, and also on its plantar, medial and lateral sides. The bone shaft is roughly broken across 45-51 mm up, and it may represent a haft of the sort described above in course of manufacture. If this is correct, then the implement to be hafted had probably not yet been inserted, since there is no damage to the axial sides of the epicondyles on SL 2687. Of course, it may have been intended to serve in some other way than as a haft.

SL 2698 is a fragmentary deer distal metatarsal with grinding on just its lateral and medial sides. It is not ground distally and has no evidence of damage to the axial margin of the one epicondyle that is well preserved, so it does not seem particularly likely to be a haft.

SL 2708 is similar to SL 2698, with grinding confined to its lateral and medial sides, and no particular evidence for use as a haft. It is polished all over from handling, and may have been the butt of an implement, the working end of which was broken off in antiquity.

SL 2705 is the distal end of a deer metatarsal that has been neatly ground down to such a degree that the entire distal articulation is absent. Perhaps it is a modified immature end (which the articular end was never fused on to). It is certainly not a haft, but it might conceivably have served as a hammer or as a pestle.

As the sole modified deer distal metacarpal in this heterogeneous group (alongside nine metatarsals), SL 2747 is something of an oddity. The cervid distal metacarpal lacks the natural hole that is tucked deep down between the epicondyles of the metatarsal, and which might conveniently

accommodate the tang of a long, narrow implement. Even so, SL 2747 resembles the hafts on metatarsals in so far as it is ground distally and on its plantar side, and there is damage to the axial side of one of the epicondyles. It is hard to imagine, though, that SL 2747 could very successfully have functioned as a haft, and some other purpose seems more probable.

Bone artefacts that could not be classified [X]

This group comprises a diversity of unclassifiable items:

SL 969 is probably the tip of a needle (or possibly a fine point) that snapped off and continued to be used. Although the broken end of this 21 mm long pointed item had not apparently been deliberately reshaped, the jagged break through the shank is rounded off and smoothed indicating that it continued in use. The tip has been reworked to be somewhat chisel-ended.

SL 2629 is a calcined fragment of longbone shaft (less likely antler) that bears six parallel transverse grooves incised into its convex outer surface. It is probably much shrunken and distorted. It is of suitable size and shape to be a bead fragment, but whatever it was it is unique.

SL 2671 is a very well worked piece of longbone shaft. It may be the butt of an exceptionally well made flat implement but, in view of the lack of demonstrable parallels in the assemblage, this suggestion is tentative.

SL 2721 is a flat piece of bone bearing striations and polish. It doesn't seem to be part of any of the standard types of point, which are not flat-sectioned, and is thus uninterpretable. Also a flat piece, but more amenable to interpretation is SL 2742, a sliver from the caudal margin of a scapula blade, almost certainly from a deer. It displays slight polish on all of its broken edges and seems likely to be an intact but distinctly expedient implement, possibly used as a scraper. No similar items were noted from the site.

SL 2746 is a fairly expedient blunt-ended implement made on a sliver of longbone shaft. It is angular in cross-section, somewhat smoothed from use, and its butt bears traces of grooving and snapping. Facetting and striations on its blunt tip are polished over and somewhat damaged through use.

SL 3082 is a group of 3 very small flat pieces of edge-ground and polished bone. SL 3098 is a flat piece of bone with striated and polished surface, and a ground and bevelled edge. SL 3105 is a small flat piece of worked bone with polished surface and smoothed edge. None of these three items, which display careful working, represents any of the standard types, but are they are otherwise uninterpretable. SL 3108 is a fourth small flat piece of worked bone. It is highly polished on one face, but the overall impression is that it probably is a small flake that became detached from large polished item.

SL 3111 is a worked fragment of deer metatarsal shaft. It displays longitudinal striations, over which glossy polish is evident, so it is presumably part of an implement, possibly a fragment of a point shank.

SL 3149 is a longitudinally striated fragment of a deer metatarsal that retains the latero-plantar quarter of the proximal articulation of the bone. It seems to be either an item that broke during the course of working, or an unwanted scrap that was discarded.

Antler haft [A1]

Fragmentary antler hafts are extremely likely to have gone unrecognized, due to the often poor state of preservation of antler. Even so, a sufficient number of definite or probable examples were identified to show that antler hafts, presumably for implements of stone or possibly metal, were common.

*Hafts on antler tines*

SL 1419 is the tip of a round-sectioned antler tine that has been neatly detached by concentric grooving and snapping. Its surface is faceted due to shaving, and polish from handling overlies the

facets. In the centre of the spongy core of the antler is an irregularly oval hole 7.0 x 5.1 mm, which narrows down to its full depth of 26 mm. Such a narrow hole might have accommodated a pointed metal implement, flint drill or the like. SL 1488 (Plate 124.13) is a similar haft on a tine-tip that has been neatly chopped and snapped off. It has a socket measuring 6.0 x 6.6 mm, also 26 mm deep. SL 3072 is also made on a tine. It has a finely faceted and well smoothed surface, and its base has been neatly cut to a concave shape. Centrally located in the base is a neatly made oval tapering hole measuring 11.5 x 9.3 mm, 32 mm in depth. SL 3053, a faceted tine-tip with a socket 6.4 x 5.4 mm and 13.6 mm deep cut into its basal end, seems likely to be a very small haft. SL 2717 is a final, poorly preserved example of a haft made on a shaved tine-tip.

#### *Hafts on antler beam portions*

Three poorly preserved items seem to be hafts made on pieces of antler beam. SL 2719 is a substantial beam fragment with a tapering socket measuring 25.2 x 19.6 mm, depth unknown, cut into the spongy antler core at its neatly grooved and snapped end. SL 2689 consists of poorly preserved antler beam fragments some of which display smoothed surfaces, and neatly finished edges, indicating that it had been a haft. Finally, SL 2663 is a beam fragment displaying many neat facets, consistent with it also having been a haft, although this designation is admittedly less secure than for the preceding items.

#### Antler hammer [A3]

There are four examples of hammers that consist of little modified, small spike-like antlers, lacking a brow-tine, naturally shed by young (third year) fallow deer bucks. Deliberate modification to all of these pieces extends only to removal of the burr that surrounds the antler base. SL 2010, 3061 and 3097 display signs of polish through handling during use of these hammers, whilst recent breakage to SL 2683 (Plate 124.15) may have removed traces of polish.

#### Worked antler tine [A4]

A heterogeneous group of six pieces of worked antler tine. SL 2728 is a faceted tine-tip with a neat row of 8 distinct notches cut into it. Its base is damaged, and its purpose incomprehensible. SL 2861 is a piece of a smoothed antler tine with a perforation aligned across the tine that is 6.3 mm in diameter. The interior of the perforation is polished and its rims on either side of the tine are rounded from wear. SL 3103, a smoothed and slightly polished, elaborately worked small piece of antler tine resembles SL 2861 in possessing a centrally located perforation with polished interior across its width. In the case of SL 3103, the perforation is aligned somewhat obliquely across the tine. The ends of this tine segment have been hollowed out to form conical depressions that each penetrate for about one third of the length of the item. Beyond concluding that a string had probably been threaded through the perforation in each case, the purpose of either of these items remains obscure. SL 3059 is a smoothed, strongly tapering tine-tip that has a narrow longitudinal perforation of diameter 2.4 mm. It is certainly not a bead, and the purpose of this unique item is unknown.

SL 2658 (Plate 124.12) resembles a bead in having grooved and snapped ends and a faceted surface, and its spongy core is absent (but not necessarily purposefully removed). However, with a measurable length of 53.1 mm it seems overly long to be a fragmentary bead (see Figure 17.5); given the lack of smoothing over the faceting, it seems unfinished and may well have been destined to be other than a bead. Similarly, SL 2740 has one faceted end preserved, a smoothed surface and its spongy core apparently deliberately removed, but its length (>49.8 mm) seems too great for it to have been a bead. It is clearly a fragment of some sort of hollowed antler item, perhaps more likely a haft than a bead. These two antler items that the present writer considers unlikely to be beads were tentatively identified as beads by Peltenburg (Peltenburg *et al.* 2019, Appendix A).

Antler tines that bear traces of concentric grooving and snapping, chopping, or surface shaving, and which seem to represent the waste products of antler working, were common on the site. Much more numerous than the registered pieces of worked antler tine that have been mentioned individually above, such pieces were not registered.

#### Miscellaneous Worked Pig's Tusk [PT4]

SL 3002 is a fragment of a lower tusk of pig that was clearly on the way to becoming a well worked, delicate decorative item. Its ends display traces of careful grooving and snapping, its long edges are smoothed, and its inner face (composed of dentine) is striated. The item seems to have broken during manufacture.

#### Unworked pieces of bone and antler (registered in error)

Insufficient familiarity with the natural morphology of skeletal materials sometimes leads archaeologists to mistake natural for worked pieces. Nine items from *Laona* were erroneously registered in the field for this reason. Prominent amongst these were unworked longbone shaft fragments of birds (SL 706, 2817 and 2847) and small animals (SL 977, possibly reptilian, and SL 2429). SL 1201, 2544 and 2642 are larger pieces of deer longbone bone that are suggestively shaped but not discernibly worked, and SL 1487 is an abraded, unworked tip of an antler tine. Additionally, SL 2110, initially registered as a "bone point", is not made of bone at all, but appears to be an unworked sea urchin spine.

#### Chronology of the assemblage

As with the ordinary, non-artefactual faunal remains (see above), the great majority of registered pieces of worked skeletal materials are attributed to Period I. Of the 276 registered items, 227 date to Period I (including two that were uncertainly attributed to that period, and 17 from contexts attributed to Period I–I/II and I or I/II). Period I/II yielded 19 items, and Period II yielded three items. The six items that came from contexts dated to Period V or later, and the 21 items that came from unattributable contexts have a high probability of being residual Period I material. Under the circumstances, a search for variability through time of the sort that has been identified (in the shape of needle butts) at the long-lived and well stratified Neolithic settlement of Khirokitia (Legrand-Pineau 2009, 119 and figure 8) would appear to be a lost cause.

Table 17.6 List of bone artefacts from Souskiou *Laona* according to material and type.

Material / code	Description	SL registration numbers
Bone LA	Large Point with joint for butt	2734, 2893, 3151.
Bone L	Large Point lacking butt	2682.
Bone SRA	Small Robust Point with joint for butt	1138 (PI. 124.2), 2666, 2741 (PI. 124.5), 3063.
Bone SRB	Small Robust Point without joint for butt	1070 (PI. 124.1), 2675, 2703, 2706.
Bone P	Damaged Large/Small Robust point	2514 (PI. 124.3), 2673 (PI. 124.4), 2684, 2699, 2700, 2710–2712, 2726, 2730, 2732, 2736, 2856–7, 3070, 3073, 3077, 3079, 3087, 3093, 3100.
Bone P	Point (not seen)	568
Bone F	Fine point	975, 1552, 2625, 2660–1, 2664, 2676, 2685, 2693, 2701, 2713–6, 2720, 2725, 2729, 2737, 2855, 3054, 3064–5, 3069, 3076, 3090, 3099, 3101, 3148.
Bone C	Crude point	2667, 2695, 2702, 2704, 2718, 3055, 3080, 3095, 3113
Bone N	Needle	1261, 1426–7, 1538, 1610 (PI. 124.9), 1972, 2009, 2087 (PI. 124.6), 2109, 2147, 2148 (PI. 124.7), 2218–9, 2565–70, 2571 (PI. 124.10), 2597, 2634, 2649 (PI. 124.8), 2677–81, 2691 (PI. 124.11), 2731, 2738, 2758–9, 2786, 2841–6, 2851, 2867, 2965, 2988, 3003–4, 3051–2, 3067–8, 3075, 3083, 3089, 3091–2, 3102, 3106–7, 3109, 3140–7, 3150.
Bone B	Bead type 3	2443
Bone B	Bead type 7*	2668, 2688, 3005, 3085.
Bone B	Bead (unclassified, fish vertebra)	266 (PI. 38.11), 269 (PI. 38.11).
Bone M01	Miscellaneous. Spatulate implements	2659 (PI. 124.14), 2669, 2694, 2745, 2866, 3060, 3153.
Bone M02	Miscellaneous. Tube	2858, 2868.
Bone M03	Miscellaneous. Pendant	375, 430, 487, 519, 1774–5, 3056
Bone M05	Miscellaneous. Blank	2662, 2665, 2670, 2707, 2744, 2862–5, 2869, 2987, 3071, 3074, 3096, 3112.
Bone M09	Miscellaneous. Utilised scapula	2739, 3110.
Bone M10	Miscellaneous. Modified deer distal metapodial	719, 2687, 2697, 2698, 2705, 2708, 2747, 3062, 3066, 3078.
Bone X	Unclassifiable fragments of worked bone	969, 2629, 2671, 2721, 2742, 2746, 3082, 3098, 3105, 3108, 3111, 3149.
Antler A1	Haft	1419, 1488 (PI. 124.13), 2663, 2689, 2717, 2719, 3053, 3072.
Antler A2	Bead type 7	2368 (PI. 106.7), 2562, 2626, 2653, 2674, 2686, 2690, 2692, 2696, 2709, 2722–3, 2727, 2733, 2735, 2743, 2748–9, 2809, 2820, 2821 (PI. 106.9), 2852–4, 2859, 2860, 2870, 2928–31, 2932 (PI. 106.10), 3057–8, 3081, 3086, 3088, 3094, 3104, 3114–5.
Antler A2	Bead type 11	1137 (PI. 106.12), 2724.
Antler A3	Hammer	2010, 2683 (PI. 124.15), 3061, 3097.
Antler A4	Worked tine	2658 (PI. 124.12), 2728, 2740, 2861, 3059, 3103.
Pig's tusk PT3	Pendant	420 (PI. 59.6), 2430–9, 2444, 3084.
Pig's tusk PT4	Miscellaneous worked pig's tusk	3002
Bone and antler	Unworked, registered in error	706, 977, 1201, 1487, 2429, 2544, 2642, 2817, 2847.

\*Type 7 bone beads were erroneously listed as Bead Type 3 in Peltenburg *et al.* 2019, Table 17.6.

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