Chapter 20: Other Artefacts

by

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Objects from the ploughzone, from all disturbed units except graves, and from unspecified or modern periods were normally excluded from the following distribution tables. Data was generated from a reduced sample of 1758 Kissonerga units. In the temporal bar charts shown in § 8, only objects from OK and M contexts are used, and those from mixed periods like 3A/3B are ignored. Thus, the temporal charts are comprised of a smaller, but more precise database.

§ 20.1 Metal and metalworking (E.P. and P.W.) Pl. 36.1-6; Fig. 97.1-5

Here we treat those items which form the basis for the discussion of metals and metalworking in § 8.1. Presentation comprises a Catalogue of registered material and analytical results. For lead isotope analyses see Gale 1991a. For further XRF and microprobe analyses see Zwicker 1988, 1989.

§ 20.1.1 Catalogue (E.P.)

Ores

KM 633 Copper ore
Nugget of oxidised, rust coloured core with greenish envelope of oxidised copper. 7.5 x 6 x 3.2 cm. Unit 150, Period 4 (See Fig. 40, at juncture of B 1 and 98, beside stakescape 21).
Analyses: Zwicker 1988, 427 gives it at 500 gm, but in 1989, 1 kg (note only one piece from Kissonerga was given to Zwicker, not two as stated); Gale 1991a.

KM 701 Copper ore or corroded lump of copper
Two amorphous pieces with bright green area of copper corrosion, the largest 3 x 2.3 x 1.6 cm. Fill 238 of B 706, Period 4. For location, see Fig. 43. Gale 1991a.

KM 2109 Malachite ore
Vivid green stain coats entire inner surface of bivalve, and more thickly preserved near apex. Gr. 554, Period 3A?. Pl. 36.6.
Analysis: Gale 1991a; below, § 20.1.4.

C 384 Copper flakes
Small flakes of green, oxidised copper recovered from flotation. Floor 1416 = B 834 Floor 1, Period 4. For location, see Fig. 48.
Analysis: see § 20.1.2.

Copper and copper alloy objects

Axe/adze

KM 457
Flat trapezoidal butt, slightly rounded corners, broken where thickening towards middle? of probable axe or adze. L 3.3 x W 3.6 (butt 2.9) cm. Wt. 250 gm. General 66, just above B 86, Period 5. Pl. 36.1, Fig. 97.1.
Analysis: Gale 1991a.

Chisel

KM 694
Frag., square-sectioned, tapered just above cutting edge, bent and broken, thinner rectangular-sectioned beyond bend. 9.8 x 1.1 x 1.1 cm. Wt. 85 gm. Fill 246 of B 706, Period 4. Fig. 97.2. For location, see Fig. 43. Gale 1991a.

KM 986
Square-sectioned, sides taper to flat square butt, convex working edge. 11.2 x 0.8 x 0.75 cm. Fill 678 of quarry 654, Period 4. Pl. 36.3, Fig. 97.3. Gale 1991a.
Analysis: Pickles (1987, 37, 45) carried out INAA analysis on this chisel. Results were: copper 99%, antimony 6 ppm, silver detected, tin n.d., gold n.d., cobalt, n.d. and arsenic n.d.

KM 2174
Tip of oval-sectioned chisel with bevelled cutting edge. L 2.5, W 0.5 cm. External skirting 1296 against B 834, Period 4. Pl. 36.2. For location, see Fig. 48.

Awl

KM 416
Square-sectioned tapered to point. Mounted in cylindrical bone handle with flattened square butt. Awl: 3.9 x 0.45 x 0.45 cm. Handle 7.7 x 1.4 cm. Surface, Quadrant 22.24.2, just above stones of fill 80, pit 411, Period 4. Pl. 36.4, Fig. 97.4. *Preliminary* 6, 62 Fig. 4; Gale 1991a.

Earring

KM 1182
Spiral with expanded and pointed terminals, two pieces. Diam. 1.7 cm. Fill 902 of Gr. 529, Period 4/5. Pl. 36.5, Fig. 97.5. For location, see Fig. 55. *Preliminary* 10, 234 Fig. 3; Gale 1991a.

Bronze objects

KM 539
Buckle or clasp frag, with flat, constricted terminal bearing traces of incised lines. 5 x 1 x 0.8 cm. General 173, over B 200, Period 4.

KM 584
Corroded coin. Surface.

Crucible?

KM 693
See § 7.1 and Fig. 95.14. From fill 238 of B 706, Period 4. For location, see Fig. 43.
Analysis: § 20.1.3

KM 1007
See § 7.1 and Fig. 95.15. From occupation fill 652 of B 3, Period 4.

§ 20.1.2 Analytical research on C 384 (P.W.)

Summary

A small bag of green fragments from excavations at Kissonerga were analysed to obtain chemical and metallurgical information prior to lead isotope analysis of the samples.

Five fragments were analysed by X-ray fluorescence and no significant differences were found. Each fragment was copper rich with traces of iron and calcium (possibly contamination from adhering soil). Tin was just detectable, but lead was not detected.

Scanning electron microscopy of a section through a fragment showed it to be corroded copper. The metal was in the as cast state with no evidence of working. Energy dispersive X-ray microanalysis showed it to be of high purity as no elements other than copper were detectable in a general analysis although interdendritic copper-cuprous oxide eutectic was present. Inclusions rich in tin and in lead and selenium were observed. The presence of tin suggested that the metal was probably smelted rather than native copper. The corrosion products included both chlorides and oxides, and possibly other copper compounds.

Introduction

A group of fragments of green mineral with brown soil? adhering from the site at Kissonerga, Cyprus was supplied for analysis. The fragments were to be the subject of lead isotope analysis and the aim was to obtain as much information as possible before their destruction.

Method

Five of the fragments were analysed without preparation by energy dispersive X-ray fluorescence (XRF). The primary X-ray beam was produced by a Rhodium target X-ray tube run at 46 keV and a silicon (lithium) detector was used to detect the fluorescence X-rays. The sample-detector path was through air.

A small piece of the largest fragment which was observed to contain uncorroded metal, was mounted in a polyester resin and a polished metallographic section was prepared in the usual way. The section was examined before and after etching using both optical and scanning electron microscopy (SEM) and was analysed qualitatively using a Link Systems AN10000 energy dispersive microanalysis system (EDX) attached to the SEM.

Results

No significant differences were observed between the results of XRF analysis of the five selected fragments analysed. Only copper and, at low levels, iron, calcium and tin were detected (spectrum F4029B). The method used would not detect elements of atomic number less than 20. Iron and calcium levels were higher in the adhering brown layer.

During examination under a low power optical microscope metallic copper was observed in the largest fragment. Metallographic examination showed it to be essentially pure dendritic copper, with interdendritic copper-cuprous oxide eutectic. Other inclusions were found using back-scattered electron detection in the SEM. The chemistry of these has not been fully elucidated but the majority were tin rich (spectrum C&AR 4644 D), although occasional inclusions rich in lead and selenium were also found (spectrum C&AR 4644 C). No elements other than copper were detected by EDX in the bulk metal (only elements of atomic number 11 or above would be detected) despite the presence of the inclusions. EDX is not a sensitive analytical technique and the detection limit for most elements was probably about 0.1% or higher. Nevertheless the results show that the copper was quite pure and had certainly not been alloyed.

Discussion

It is not possible to identify copper as native metal solely on the basis of high purity (Rapp 1982). Certain metallographic features have been reported as being typical of native copper, but if the metal has been melted these are lost and in the present case the cast microstructure shows that if the metal was native it has been melted. However, the tin content of native coppers has usually been found to be low (Rapp 1982; Hancock *et al*. 1991). Rapp quotes a figure of l ppm for the mean of three Cypriot native coppers. In this sample tin was detectable by XRF and tin rich inclusions were present suggesting an overall tin content of a few hundred ppm although a quantitative analysis has not been carried out. It seems more likely therefore that the metal is a pure smelted copper. Further analysis might shed more light on this question.

I can make no comment on which, if any, Cypriot copper ores could have been used. However, further study of the distribution of trace elements in inclusions in early copper alloys might be of value in attempting to answer questions about the source of copper. It could give complementary information to that provided by the purely chemical approach.

Further work could be carried out on the section in the future, assuming it is not required for lead isotope analysis.

20.1.3 XRF Analysis of crucible KM 693 (P.W.)

Summary

The surface of a vessel from Kissonerga was analysed. The inner surface and part of the external surface of the vessel was vitrified indicating that it had been exposed to high temperatures, and it was thought that the vessel might have been used as a crucible. Copper was detectable at trace levels on the inner surface, but was also detected in most of the external areas analysed although possibly at a slightly lower level. The results did not allow any conclusion about the function of the vessel to be drawn.

Introduction

A vessel from Kissonerga was submitted for non-destructive analysis. It showed extensive surface vitrification particular on the internal surfaces but extending over part of the external surface, indicating that it had been subjected to a high temperature and suggesting that it might have functioned as a crucible. Qualitative analysis was carried out to determine whether the composition of the vitrified layer provided any support for this hypothesis

Analytical method

All analyses were carried out by energy dispersive X-ray fluorescence. No surface preparation was carried out. To allow comparison between areas the ratio of the copper Kα peak to the local background was obtained. This value should be less sensitive to the inevitable variations in geometry and surface finish than a simple measure of copper counts per second.

Further details of the method are given in the appendix.

Results and discussion

Copper was detectable in many of the areas analysed (see Table 20.1) but no other elements which might have indicated non-ferrous metalworking were detected, with the exception of zinc. Zinc was detected in all areas, but its presence was not considered significant.

Table 20.1. XRF analysis for copper on possible crucible, KM 693

Spectrum	*Time s*	*Area*	*Copper peak/bgd*
F5301B	200	Base, external, not vitrified	0.000
F5302B	200	Grey lump, internal	0.309
F5303B	200	Wall, internal, vitrified	0.091
F5304B	200	Base, internal, vitrified	0.290
F5464B	200	Wall, external, vitrified	0.024
F5465B	200	Wall (near base), external, not vit.	0.038
F5466B	200	Wall (near rim), external, vitrified	0.211
F5467B	200	Base, external, not vitrified	0.094
F5495B	2000	Base, external, not vitrified	0.084
F5496B	2000	Base, internal, vitrified	0.142
F5497B	2000	Base, external, not vitrified	0.079
F5517B	2000	Drilling from inside vessel	0.152
F5518B	2000	Internal, vitrified	0.122

Note: bgd=background

Initial results (F5301B-4B) suggested that copper was only detectable on the internal surface of the crucible. Although the levels were low, this seemed to provide some support for the hypothesis that the vessel had been used as a crucible. However further analyses carried out to confirm the initial results showed that copper could be detected on the external surfaces, raising the possibility that its presence is due to factors other than use as a crucible.

Conclusion

Copper was present at slightly higher levels and was more consistently detectable on the internal surfaces of the crucible. However no evidence for the presence of metallic copper was found, and the levels of copper detected were low, and therefore the results do not prove that the vessel was used as a crucible.

Appendix - XRF Method

The analysed areas were irradiated with a primary X-ray beam produced by a Rhodium target X-ray tube run at 46 kV with an anode current of 0.30 mA. The primary beam was collimated to give an elliptical irradiated area about 1.5 x 1 mm. Secondary X-rays were detected using a silicon (lithium) solid state detector.

The path between the sample and detector is through air which normally limits the range of detectable elements to those of atomic number 20 or above.

The detection limit varies for different elements and is affected by the matrix and the particular analytical conditions. However it is typically in the range 0.05% - 0.2%.

§ 20.1.4 SEM examination of a deposit in shell KM 2109 (P.W.)

A green deposit contained in a shell was examined in the scanning electron microscope (SEM). No preparation, coating or sampling was permissible and therefore the object was examined in the as-received condition. Energy dispersive x-ray microanalysis was carried out in various areas and the spectra obtained are retained on file.

As expected, in areas not coloured green (the rim and 'low copper' areas) calcium was the main element detected, with low levels of silicon, iron and potassium, all elements which might be expected on an uncleaned shell from the site. Some copper was detected in the 'low copper' area inside the shell but much higher levels were present in the green ('copper rich') area, indicating that the green is a copper based compound. The only other element, apart from calcium, detected at high levels in the green area was silicon which could be contamination (sand) but does raise the possibility of a silicate. Egyptian Blue, for example, is a copper-calcium-silicate. Alternatively the deposit could be a copper compound containing elements not detectable by the method used (elements of atomic number less than 11).

A few small barium and sulphur rich particles were also detected (probably barium sulphate). The significance, if any, of this is not clear but barium sulphate is used in modern pigments.

It is recommended that the green deposit is identified further by x-ray diffraction.

§ 20.2 Pendants (E.P.) Pl. 36.7-14; Figs. 97. 6-29, 98

Kissonerga yielded 107 pendants, or 132 if one includes anthropomorphic picrolites which were also probably secured to necklaces. To facilitate inter-site comparisons, pendants are treated here by unpierced and pierced classes according to the Lemba typological enumeration (*LAP* I, 284), and following Beck's (1927) terminology where possible. Sizes conform to the Lemba range. Many shell examples are barely altered natural shells and are not given a type. Not included here are probable other marine shell pendants: *Charonia variegata*, *Trunculariopsis trunculus* and Helmet or bonnet shells (*Phalium* spp.)(see § 24).

1. Unpierced

Type 6 Dumb-bell (Fig. 97.6)
The only example, KM 580, is constricted by a groove near the smaller terminal. It was presumably suspended by the groove and may be a schematised anthropomorph.

Type 7 Axe-shaped (Fig. 97.7)
A single picrolite, KM 1644, flat with smooth sides and faces. It is hard to see how this could be suspended. Possible blank for Type 2.3? See also Fig. 98.18.

Type 8 Drop with elongated suspension rod and splayed terminal (Pl. 36.8, third row)
Bottle-shaped, cf. Type 2.15. Variant of Type 1.4 One example, KM 1791.

Type 9 Button pendant
One example, KM 1562.

2. Pierced

Type 1 Plain drop (Fig. 97.9, 11, 14)
These plain, flat types can be very small, as in the case of KM 370 intended for a baby.

Type 2 Rectangular, flat-sectioned (Fig. 97.10, 12, 13, 15, 16, 21)
Made in many types of materials.

Type 4 Triangular with round or elliptical section (Fig. 97. 20)
One example, KM 1356.

Type 6 Cylindrical with swollen lower body (Fig. 97. 17, 18)

Type 8 Multiple pierced slab (Fig. 97. 19)
One possible example, KM 1053 (only one perforation remains). See also Perforated tusk piece, PT1, §20.7, Table 20.7.

Type 9 Swollen body with expanded terminals (Fig. 97.22).
One example, KM 592.

Type 10 Solid ball with corrugated suspension stem (Fig. 97.24)
Unique example, KM 860.

Type 11 Globular, perforated through narrow part of body (Fig. 97. 25)
Unique, KM 861.

Type 12 Spurred annular (Pl. 36.9; Figs. 97. 29; 98. 1)
Flat ring carved from shell or bone, perforated at swollen apex, diamond-shaped projection opposite.

Type 13 Perforated shell (Fig. 98.2)
Natural shell perforated near apex.

Type 14 Splayed axe (Fig. 98.3)
Unique example, KM 1338. Splayed metal axes are only known from Philia and later contexts (cf. Dikaios 1962, 175, Fig. 84.1), hence the axe prototype may not be correct.

Type 15 Drop with elongated suspension rod and splayed or pointed terminal (Fig. 97.26-8)
Cf. 1.4 and 8.

Type 16 Ridged cylinder (Fig. 98.4)
Body tapers in steps, with perforation through thickest step. One specimen, KM 1582.

Type 17 Crescentic pebble (Fig. 98.5)
Barely altered pebble, thicker than plaque, Pierced Type 5. One example, KM 1792.

Type 18 Lozenge (Fig. 98.6?, 7, 8?)
Pierced through tip of circular-sectioned lozenge.

Type 19 Anthropomorphic (Pl. 36. 11-14; Fig. 98. 10-14)
Cruciform-shaped with perforation through plain head. Although many pendants are probably highly schematised anthropomorphs, this shape with leg articulation is less ambiguous.

Type 20 Solid ball with knurled stem, suspension loop opposite (Fig. 98.9)
Unique, KM 2105. Cf. Type 2.10.

Type 21 Bar-shaped (Fig. 98.15)
Rectangular-sectioned bar with perforation near tapered terminal.

Type 22 Notched crescent (Pl. 36. 10; Fig. 98. 16,17)
Made exclusively from a curved sliver of pig's tooth or bone which has been perforated just below the notched thicker terminal. Toggle?

Examples without typological designation include KM 1543, possibly the legs of a picrolite figurine, KM 1345 (Pl. 36.8 second row; Fig. 98.22), a re-used fragment from an elaborate picrolite object, Fig. 98.21 and 'dress pins' KM 3120 (Fig. 98.26) and perhaps KM 3034, derivatives from Period 1A. Other objects not treated here could also belong to the pendant class: KM 1752, type 1.9; burnisher KM 1091, a broken type 2.2 pendant; bead KM 686, a large 2.10 or 2.20 pendant; object KM 1678, broken type 2.2 pendant; and inlay KM 2490, blank for Type 2.2 pendant.

Type 2.10 occurs here for the first time in controlled excavations (cf. *Sotheby's Catalogue* 9.12.1974; *Christie's Catalogue* 27.4.1978, Pl. 4), and, of the other new types, 2.11 is known at MChal Souskiou-Vathyrkakas (Vagnetti 1980, Pl. XVIII.98-9).

Table 20.2. Occurrence of pendants by type and period

Type	*Period*						*Intra*	*Extra*	*Pit*	*Grave*
	3A	*3A/3B*	*3B*	*3/4*	*4*	*5*				
1.08	0	1	0	0	0	0	0	1	1	0
2.01	1	0	1	0	5	0	1	6	4	1
2.02	13	2	1	0	4	0	5	15	7	0
2.04	0	0	0	0	1	0	0	1	1	0
2.06	0	0	0	0	1	0	0	1	0	0
2.08	0	0	0	0	1	0	1	0	0	0
2.09	0	0	0	0	1	0	0	1	1	0
2.10	0	0	0	0	1	0	1	0	1	0
2.11	0	0	0	0	1	0	1	0	1	0
2.12	0	0	0	0	5	1	5	1	5	1
2.13	1	0	0	0	3	1	4	1	0	0
2.15	1	0	1	0	1	0	0	3	0	1
2.16	0	0	0	0	1	0	0	1	0	0
2.17	0	1	0	0	0	0	0	1	1	0
2.18	2	0	0	0	1	0	0	3	1	1
2.19	0	0	4	0	1	0	0	5	1	4
2.20	0	0	0	0	1	0	0	1	0	0
2.21	0	0	0	0	1	0	0	1	0	0
2.22	3	0	1	0	0	0	0	4	1	0
2?	2	0	2	2	1	0	0	5	1	1
?	2	0	0	0	17	0	8	13	7	0
Misc	0	0	0	0	4	0	2	2	1	0
Total	25	4	10	2	51	2	28	66	34	9

Note: Data obtained from OK, M and C units, together with D units from graves; surface finds excluded; doubtful ascriptions amalgamated, e.g. Period 4? ascribed to 4.

Materials

Picrolite and shell were the two commonest materials selected for pendant manufacture, accounting for 49.3% of the recovered sample. Shell and bone were used especially for Types 2.12-13, picrolite for 2.2, 15 and 19; bone and pig's tusk were used exclusively for Type 2.22, hitherto unattested in Cyprus. Many types are only represented by single examples and it seems pendant-makers had an empirical attitude to materials; there is no strict type/material correlation. Harder stones such as diabase, basalt and melagabbro were used for simple shapes, more elaborate creations are in easily carved picrolite. Contrasting colours, as in banded sandstone KM 1793 (Pl. 36.8, third row), were frequently chosen. Mother-of-pearl (Pl. 36.7, third row right) is attested for the first time on a LAP site (cf. Vagnetti 1980, Pl. XVII.93-5), as is the spiny cockle which was probably selected for its deep grooves (Fig. 97. 12, 15). Where well preserved, picrolite is pale green as frequently occurs in the Kouris River source (cf. Peltenburg 1991), but many examples have been discoloured.

Manufacture and wear

A fine drill was needed for some of the picrolite pendants and, as usual, facets are not polished away and scratch marks from other fine tools are ubiquitous on picrolites. Fine incision-work on Types 10 and 20 may indicate the onset of the use of metal tools in Period 4 (cf. also KM 929, Type 2.21, with its sharply cut lines, Pl. 36.8, top row). Discards are attested for shell Type 2.1? (KM 1740), 2.8? (KM 1567), 2.12 (KM 653, 747); blanks for basalt Type 2.1 or 2.2 (KM 1678) and for chalk Type 2.1 or 2.2 (KM 2490). Most production evidence is available for picrolite, but the numbers of blanks seem excessive and it may be that these objects were used for other purposes (e.g. polishers, KM 2081). Thus, there are blanks for Type 2.1 (KM 1975, 3267), for 2.1, 2 or 8 (KM 100), for 2.2 (KM 2824) and for unknown Types (KM 1042, 1774, 3269). Type 2.2 pendants in picrolite and chalk, KM 1410 and 3089, were only partly pierced. The clearest evidence for local manufacture of anthropomorphic Type 2.19 is provided by KM 1361, a fragmentary example in which the head, Rodin-like, is only partly freed from the picrolite block (Pl. 32.5). In another instance, KM 1837, a broken cruciform figurine, has been pierced so its incised arm served as a pendant (Fig. 98.21). Most of this evidence comes from general habitation levels, but a concentration around B 1547 suggests that a pendant workshop existed in its vicinity.

The evidence for the existence of pendant manufacture in or near B 1547 comes from raw material, waste trimmings, incompletely finished discards and pristine, but snapped, pendants inside its entrance and around the building (Pl. 36.7). Carvers here specialised in Type 2.2 pendants in a variety of media: picrolite, chalk, bone, shell and perhaps mother-of-pearl. There are partly worked chalk blanks (KM 3076), bone blank KM 3446 (but see § 20.4), a partly pierced chalk (KM 3089), waste picrolite slivers (KM 3323, 5102, 5172) and finished products in picrolite (KM 3021, 3074, 3077, 3415, 3455, 3483), bone (KM 3088, 3440, 3449), shell (KM 3291) and mother of pearl (KM 2978). KM 1410, with asymmetrically placed, incomplete drill holes through the picrolite, from pit 999/1012, 15 m away may also belong, as may the shell KM 3147 (cf. KM 3291) from the floor makeup of B 1565. Blanks were trimmed to create objects which were then drilled with one or two holes. Plaque-like products are thicker and larger than most Type 2.2 pendants which come from Period 4 and the corrugations of the shells were emphasised in a manner not seen again at Kissonerga. Material was carefully selected to avoid blemishes. This is seen particularly in the exclusive choice of pure Kouris pale green picrolite, a dominance not found in picrolites from Kissonerga as a whole. A second type of pendant, the notched crescent, KM 3440, 3449, was also found here, and one of two pieces of pig's tusk debitage, KM 2123, 5175, was located in pit 999/1012 (see above and Pl. 36.10).

This workshop material seems to have become scattered on the abandonment of B 1547. A finished pendant was found above the east floor, blanks and partly pierced ones inside the entrance, a shell one in the top of pit 1586 which included subsided floor material, wasters re-deposited in pit 1575 and Gr. 567 immediately west and above B 1547, and the remainder in the artefact-rich unit 1539 that surrounded B 1547. Further examples were found above B 1547 (KM 3415, 3575). We can infer from the consistently high quality of this workshop's material and the techniques that its products, including the largest Kissonerga pendant, KM 3021 (Pl. 36.8, fourth row right), and translucent, wafer-thin KM 2978, were distinctive and recognised as such in Period 3A. There is no evidence that carvers here fashioned anthropomorphic pendants. They specialised in plain, rectilinear ornaments, hence other carvers may have concentrated on anthropomorphic pendants.

Contexts and function

Anthropomorphic picrolite figurine pendants sometimes served as centrepieces or elements on necklaces. Direct evidence for this is provided by cruciform KM 2717 which was found with a dentalium necklace (Pls. 24.3, 37.6). Pendant KM 1273 (Figs. 55.529, 98.1) was also found where it was probably part of a dentalium necklace, but the ratio of pendants to dentalia suggests that not all pendants are residues from multi-coloured dentalium necklaces. Only 400 dentalia spacers were recovered, and the 1:4 pendants to dentalia proportion does not fit conventional reconstructions of Cypriot chalcolithic dentalia necklaces. Kissonerga pendants, therefore, were most likely worn in other arrangements, such as a group of pendants with only one dentalium, as shown in Pl. 24.2.

The general assumption that pendants were primarily intended for funerary use is not borne out by the Kissonerga evidence. Only 9 of the 107 total were recovered from graves, 13 if we add those from pit 911 connected to Gr. 528 and 534, pit 913 associated with T. 523 and 541 and B 1052 containing Gr. 542 and 544. It is possible to argue from their proximity to certain graves and tombs (Figs. 8.1, 2 to Fig. 17) that others could be derived from 502, 526 (or the disturbed ?grave 746 beside it), 548, 552 and 560, but the spatial correlation between pendants and graves is not a strong one in any period. Over 50% were found discarded in general habitation deposits and pits, a pattern suggesting *in vivo* use, loss of value when the circumstances for which they were made passed and mainly of secular significance. The same pattern holds for anthropomorphic figurines. There is a weak concentration of pendants near or in buildings (B 3, 706, 1547) and four anthropomorphic figurines were incorporated into structural features: the wall plaster of B 3, the floor of B 834, the foundations of B 493? and the wall of B

1016. However, small pierced shells seem to be associated with B 3: 8 of the 14 Period 4 examples come from that building and its vicinity.

Chronology

Many types are represented by single examples so it is not possible to monitor typological evolution in detail. Nearly half the assemblage comes from Period 4 contexts whence the most delicately carved Types 10 and 20. Anthropomorphs, on the other hand, mainly occur in Period 3B. Leaving aside single specimens, only Type 2.12, the annular spurred shell, and 2.21 are introduced in Period 4. All the others, Types 2.1, 2.2, 2.13, 2.15, 2.18 and 2.19 have precursors in Period 3A or 3B. This recurrence suggests that the Period 4 peak for pendants in Fig. 8.3 is misleading. Most Period 4 pendants may be derived and pendant production may have declined after Period 3A/3B. The paucity of *in situ* Period 4 pendants tends to support this conclusion. Only two Period 4 graves contained pendants. Increased use of serpentinite in Period 4 and absence of poor quality picrolite in Period 3A-3B give further support and suggest that, with the contraction or settlement shift of Erimi, the major supplier of Kouris pale green picrolite, good quality raw material became harder to procure. The same reservations apply to the increased variety of materials in Period 4, though an early preference for bone and pig's teeth, and a late growth in the use of shell other than dentalia seem real enough. Small pierced shells, in particular, inflate the figures for Period 4. Of these, only two come from Period 3, 14 from Period 4. Leaving aside the equivocal evidence of blanks, manufacture of picrolite, chalk, bone, shell and perhaps mother-of-pearl pendants is attested at Kissonerga in Period 3A, of shell in Period 4.

§ 20.3 Beads (E.P. and M.T.) Pl. 37.1-3, 6; Fig. 99.1-17

Some 511 beads and fragments or offcuts were recovered. The predominance of dentalia (409) is expected on western chalcolithic settlements, but the occurrence of the material faience (21) is remarkable since this is the first time it has been found on a chalcolithic site in Cyprus, it is the earliest in the Mediterranean and probably constitutes rare evidence for extra-island contact (see Peltenburg 1995). The assemblage is presented by Type, and it should be noted that, contrary to the Lemba typology where this was by material, the key here is shape (cf. *LAP* I, 285-8). Not included here are probable other marine shell beads: *Charonia variegata*, *Conus mediterraneus*?, *Columbella rustica* and bivalves (See § 24).

Type 1 Oblate disc (Fig. 99.1,2)
32 examples, mainly faience. The latter are standard-sized, with irregular, uneven edges.

Type 2 Large oblate disc (Fig. 99.3, 4)
This variant occurs in a greater variety of materials than 1, and with more irregular thicknesses and faceted edges. Average diam. 1.23 cm. Total: 6.

Type 3 Ring (Fig. 99.5)
The perforation is large in relation to the diam, and in the one case, KM 3605, it was probably determined by the material, shell. Total: 3.

Type 4 Thick oblate (Fig. 99.6)
Compressed globe with convex faces and large perforation. Differentiated from stone discs or whorls by having finished edges, trimmed corners and thick walls: they may, nonetheless, have functioned as whorls. Most are chalk. Total: 9.

Type 5 Globular (Fig. 99.7-9)
Mainly produced in chalk, these are heavy, like Types 4 and 6, and as none has been found *in situ*, and they have such large perforations, their use as beads is uncertain. Total: 9.

Type 6 Standard truncated bicone (Fig. 99.10)
Only two large specimens of chalk and chert, KM 1304, 1587 and four miniature examples of faience, KM 1932.1-3 and 1784. Total: 10.

Type 7 Cylindrical (Fig. 99.11-16)
Short cylinders, mainly in bone and antler (See § 20.74). The faience cylinders are much shorter. Total: 23.

Type 8 Natural dentalia (Pl. 37.2,3,6)
Trimmed or cut flat at both terminals, used as spacers in necklaces. Sections of dentalia may also have served as spacers. Most examples are fragmentary. Excluding the latter, av. L 1.61 cm. Total 409.

Type 9 Double chamfered ring (Fig. 99.17)
Total: 2.

Type 10 Long barrel
Three small antler examples (See §20.7).

Table 20.3. Occurrence of beads by type and period

Type	*Period* 1/2	2	2/3A	3A	3A/3B	3B	3/4	3B/4	4	4/5	5	*Intra*	*Extra*	*Pit*	*Grave*
1	0	0	0	0	1	0	0	0	25	0	0	2	24	7	17
2	0	0	1	0	0	1	0	0	4	0	0	3	3	2	0
3	0	1	1	0	0	0	0	0	0	0	0	0	2	0	0
4	0	0	0	0	1	0	0	0	6	0	0	2	5	1	1
5	0	1	0	0	0	1	0	0	4	0	0	4	2	0	0
6	0	0	0	1	0	2	0	0	7	0	0	2	8	1	1
7	0	0	1	4	2	5	1	1	6	0	0	4	16	4	1
8	0	2	3	27	2	58	9	0	234	1	34	205	165	189	64
9	0	1	0	0	0	0	0	0	1	0	0	0	2	2	0
10	1	1	0	1	0	0	0	0	0	0	0	0	3	1	0
Misc	0	1	0	1	0	0	0	0	2	0	0	2	2	2	0
?	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0
Total	1	7	6	34	6	68	10	1	289	1	34	225	232	209	84

Note: Data obtained from OK, M and C units, together with D units from graves; surface finds excluded; doubtful ascriptions amalgamated, e.g. Period 4? ascribed to 4.

Materials

Faience is attested for the first time in Cyprus in Kissonerga 4. It is used primarily for small discs and barrels, but also occurs as larger discs and cylinders. There are no globular faiences which occur commonly in EB Cyprus. Cores are friable white with interstitial glassy phase rendering them pale white to light blue. The monochrome blue glazes are variably preserved, from no glaze to devitrified matt buff, to relatively thick, lustrous, deep blue-green. This intense blue-green (e.g. KM 2057, 2059) most likely existed on all beads originally. As Tite reports below, the glaze was probably formed by the florescence technique, a considerable and unlikely achievement for Cypriots, but one well established on Mainland Asia and Egypt. For discussion see Peltenburg 1995.

Several factors demonstrate that the advent of faience had a significant impact on the established picrolite industry. The preferred earlier picrolite has a delicate pale blue-green colour (Munsell 5GY7/1 to 5G7/2) rather than the glossy deep blue-green of glazes used on faiences. Some typologically late picrolites are harder and darker than before, suggesting emulation. KM 3141 which is classed as picrolite could even be faience. This interaction is more clearly borne out by the appearance of picrolite beads for the first time in Period 4, and exclusively in the faience shapes Types 1 and 7. This correlation is matched by the suspected decline in other classes of picrolite objects in Period 4 (see § 8.2), hence emulation is accompanied by a restriction in the repertoire. A real modification in the evolution of the picrolite industry is thus evident from the Kissonerga evidence.

Antler and bone were reserved for Types 1, 7 and 10, chalk mainly for the heavy 4 and 5 which, together with 6, have such large perforations (see Pl. 37.1) that they may have functioned as whorls or other objects. The material of the five white Type 1 beads from T. 526 is uncertain: they could be made of shell.

Other materials include beads of basalt, chert, dense chalk and limestone, limestone, peridolite, sandstone and siltstone/sandstone. Crystal KM 3023 may also have been a bead.

Manufacture and wear

One chert (KM 1755) and one chalk (Fig. 99.9, KM 1559) are incompletely pierced, and could be evidence for local production. See also *LAP* I, 286. Picrolite KM 1625 is harder and darker than normal, and was cut asymmetrically from a rod. Possible evidence for production comes from KM 853, offcuts? from trimmed dentalium beads (Pl. 37.3). The 158 dentalia are mostly tapered terminals with broken edges. They vary in length from 4 to 10 mm, and in diameter from 2 to 5 mm. They were found in pit 279 in B 706, a building that contained evidence for craft activities (see § 3.5). Also from B 706 were seemingly finished dentalia cuts (L 1-1.5 cm), as if necklaces at that time included some made with segments of dentalia. This raises the possibility that KM 853, although comprising much smaller dentalia cuts than within the building, was part of a necklace. It was found with finished shell and picrolite pendants which could have belonged to such a necklace. In favour of this hypothesis is a process of miniaturisation in bead production in Period 4, as indicated independently by the picrolite evidence just discussed. Until an *in situ* necklace with reduced dentalia is found, or they are recovered from a grave, we shall continue to have two alternative possibilities. Their close association with complete pendants, however, marginally favours their use as complete beads.

Possible debitage from production of disc beads from worked pig teeth comprise small, fragmentary plaques with cut-outs, KM 2006 (Pl. 36.10 top row right) and 2123. No end-products have been found and the attribution is uncertain (see § 20.7).

Contexts and functions

Faiences were mostly found in or near chamber tombs and seem to replace the larger Period 3B picrolite accessories in Kissonerga 4. Gr. 538 yielded one example, T. 546 eight. Units 984 and 1038 are fills in a large pit cut into Gr. 532 and T. 541, and the seven beads from those fills are probably funerary derivatives. A further three come from the fill of a scrappy basin beside T. 566, and they too are likely to be redeposited. Each group is a discrete assemblage. Those from T. 546 are flat discs, diam. 6-7.5 mm, from 532/541 markedly smaller Type 1, 3.5-4.5 mm diam., with less well preserved glazes, from T. 566? small barrels, L 3 mm and from Gr. 538 a wide, irregularly pierced disc. Considered together, faience beads forming coherent sets within a narrow range are primarily associated with chamber tombs for children and adults of both sexes, a situation very different from the use of dentalia (see below). The remaining two come from B 3 and 834, and they suggest that necklaces with faience disc beads also had non-funerary roles. An adolescent female in T. 526 and a child in Gr. 538 wore single strand necklaces with only 3-5 beads, so faiences were extremely rare at this time and the situation may be contrasted with the hundreds of beads that are typical of mainly later disc bead necklaces (e.g. Hennessy *et al.* 1988, Fig. 25.39).

Of the 409 dentalia, 83 were found in general habitation levels, 61 in various fills and 65 in graves. The first group largely comprises single examples. The second come mainly from building fills. It is not advisable to infer *in vivo* use from this evidence uncritically. Given the close association of graves with buildings and the occurrence of post-deposition grave disturbance, many are probably derived. Thus, 3 from B 866, one from B 1044 and 8 from B 1161 may be attributed to Gr. 563, 538 and 546 respectively. The 8 from B 1161 fill form a particularly coherent set average L 2 cm. There are no nearby graves that can account for 11 examples from B 3 however, and these provide more conclusive evidence for *in vivo* usage suspected from abrasion on some grave specimens. A cache of 9 from

B 206 also probably belongs to this category of evidence since, although there are nearby disturbed later graves, the beads were securely sealed in the ash lying on the floor of the Red Building. They are all fragments, L 1.1-1.5 cm. and include one slotted inside another.

Most dentalia in the funerary group come from two graves: 19 from Gr. 529 and 34 from Gr. 563. The former were found in disarray beside and under skull fragments of a male juvenile, together with an annular spurred pendant and copper spiral hairring (Fig. 55). The pendant presumably formed the centrepiece of a single strand dentalium necklace (Pl. 37.2). Two necklaces may be inferred from the distribution and sizes of dentalia with multiple burials in Gr. 563. The first was found with a disproportionately large cruciform figurine at the base of the mandible of a 1½ year old baby Fig. 57. The beads lay in a heap save for KM 2754 and 2757 which extended in a line from the inner edge of the mandible to the heap, and KM 2766-7 which were paired. A single or double-stranded necklace of 17 worn and broken dentalia and a heavy cruciform pendant probably slipped to this position upon interment (Pl. 37.6). The average length of dentalia in this necklace is 2.77 cm, and this contrasts with the 1.975 cm average length of the remaining dentalia in the grave fill. A second necklace of smaller dentalia may, therefore, have been associated with the adjacent 4-5 year old, where a single bead (L 2.2 cm) was located, or with the other children attested in this grave. It probably included the anthropomorphic and bottle-shaped picrolite pendants (Pl. 36.13,14; Fig. 98.11) also found in the upper fill, but no evidence is available regarding its internal arrangement.

Dentalia did not always comprise the major components of necklaces. In Gr. 560, a broken dentalium and two pendants formed a cluster of ornaments at the neck of a 6 month old baby (Pl. 24.2).

Dentalia are associated primarily with children in the Kissonerga burial population. Eight children whose ages ranged from 1 month to 8 years were accompanied by dentalia. The only adults with dentalia were female. Implications of this correlation are pursued elsewhere (Peltenburg 1992).

Chronology

Several chronological trends are evident from the data. In terms of material, 73% of stratified bone and antler occur in Periods 3A-B, 80% of the large chalk beads occur in Period 4 together with all the faiences and picrolites. Since picrolites are popular ornaments in 3B, the absence of picrolite beads in that period and their appearance in 4 is significant. The dentalia, however, seem popular throughout, starting in Period 2, and peaking in Period 4 when there is possible evidence for production (Table 20.3). In spite of this, a higher proportion of Period 3B dentalia come from graves than in 4. Only one (or 2.56%) of the Period 4 graves retained dentalia more or less *in situ* whereas three Period 3B graves (or 60%) did so. This does not include dentalia found loose in grave fills. Gr. 563 suggests they are necklace remnants, but including them increases the occurrence in Period 4 graves to only 6.6%. To conclude, we may infer a change of use in which dentalium necklaces were more frequently buried in 3B, and circulated amongst the living in 4.

In terms of types, discs (Types 1-2) appear in Period 4 and are closely related to material. Heavy Types 4 and 5 are most common in Period 4, and the little evidence for earlier occurrences needs to be treated with caution. KM 1319 comes from the fill of B 855 where there was some admixture of material even though the disturbance could not be isolated. KM 2369 comes from a Period 2? unit consisting of stones beside B 4 wall where there was no sign of intrusion, but the type is unique in that period. In general, therefore, there is a tendency to a greater diversity of types and materials in Period 4.

Report on SEM examination of faience bead, KM 2056 (M.T.)

See § 8.3.

Table 20.4. Energy dispersive X-ray spectrometry analysis of faience bead KM 2056.

Compound[1]	*Bulk body %*	*Interstitial glass %*
SiO_2	90.0	79.8
Na_2O	2.6	4.1
K_2O	0.3	1.3
CaO	1.0	3.0
MgO	0.4	0.7
Al_2O_3	2.0	3.4
FeO	1.8	3.2
CuO	1.0	4.6

[1] Normalised to 100 percent

§ 20.4 Small conical and grooved stones (E.P.) Pl. 37.7, 8; Fig. 99.18-31

These two classes of small objects are typologically and chronologically related, hence they are considered together. Some 345 conical stones and 36 grooved stones were recovered. Cones stand upright on wobbly convex bases, grooved stones rest on the flat, plain reverse of their essentially cylindrical bodies. Obverse and sides are transversely incised with a groove. There is considerable morphological variation within types, probably because they are roughly-finished objects.

The Lemba typology has been refined to admit the existence of conical stones with incisions (Type 3). The incisions are sometimes lightly scratched around the complete circumference of the cone, whereas the more deeply incised grooves on grooved stones do not extend onto the flat face, either originally or through wear. Grooved stones have plano-convex sections rather than the circular sections of the cones. In this revised classification, Lemba LL 677 (*LAP* I, Fig. 85.4), for example, would be a Type 3 conical stone. Only 4% of conical stones belong to Type 3 at Kissonerga. There are a few ambiguous cases: KM 757 (Fig. 99.26) with incision near the apex, for example, may be a phallus. Where the object is broken, as in KM 541, classification is problematic.

Most (93%) conical stones belong to plain Type 2: there are only a few oddities. KM 1386 (Fig. 99.25) is nail-shaped with thickened 'head'. Its similarity to nail-shaped clay objects (see § 8.8) is probably fortuitous. It could readily have served as a stopper for flexible containers, although pottery and stone stoppers and lids of different shapes are well known. KM 1775 and 3276 are tetrahedrons.

Type 1 occurs in varied materials (Table 20.5) and may have been used for different purposes than the standardised Type 2.

There are more variants within the grooved stone class. KM 125 (Fig. 99.30) is unique and may better be classed as a grooved pebble. KM 458 and 2566, although included here, are more like squat, rough stone reels (Fig. 99.31) and probably should be considered separately. So too should KM 148. KM 2184 is bobbin-shaped. KM 3262 (Fig. 99.29) is an elaborated grooved stone. Its vertical and horizontal grooves suggest anthropomorphism, but the cross on the base seems more like a stamping device. In all other respects it is like remaining grooved stones.

Materials

Carvers overwhelmingly preferred chalk for these two classes. Other soft stones occur occasionally and they frequently correlate with typological deviations from the Type 2 norm.

Manufacture and wear

The convex bases, swollen sides and pointed tops of the conical stones are usually modified in some way. Thus, bases are sheared or frequently bevelled around the edges, lower sides are chipped, and tops are blunted. Faceted sides and vertical striations are more likely the result of manufacture in which faces were left unpolished.

Contexts and functions

Conical stones occur equally outside and inside buildings (Table 20.5). This may be a little misleading, however, since many extra-mural examples come from units like 815 (Quadrant 20.23.2) which was associated with vestiges of disturbed late buildings. Other extra-mural instances come from discrete locations (e.g. quarry 654 in 22.23.4 and pit 911 in 21.25.1). Virtually every unit class, from postholes to hearths, has yielded examples. There are few caches, and these show little coherence. Thus, 5 examples from unit 1416 are different in size but have no obvious gradation, one is stubby, another tall and slender, another larger and smoother than the others. Two are white, three grey.

Three cones are probably in primary positions in graves. In T. 526 a Type 2 example was associated with a flat stone that could have served as a palette, but no ochre or other discoloration is found on conical stones, or on the 'palette'. Both objects belonged to an adult female who was also accompanied by a bowl (Pl. 22.2). Two Type 2 cones were also buried with an adult female in T. 561. One was found at her feet beside a spouted jar (Fig. 56). If it had a practical function, it could have plugged the spout, but it would not have made an effective seal. A dark patch in the area may indicate a perishable container. Cones could have sealed such objects with semi-rigid narrow mouths, but there is no direct evidence to support this function. All that can be stated with certainty is that their funerary associations are with pots and adult females.

Conical stone sizes are only weakly correlated with individual buildings. Given their rough finish, heights rather than weights, may be a preferable method of assessment. A real contrast is evident between cones from B 3 (average Ht. 3.5 cm) and B 1 (average Ht. 4.02 cm), but less so with B 493 (average Ht. 3.53 cm).

A possible inference to be drawn from the generic connection between cones and the conical seal from above B 3 is considered in § 8.4.

Table 20.5. Occurrence of small conical and grooved stones by type and period

Type	*Period*												*Material*				
	2	*2/3A*	*3A*	*3B*	*3/4*	*4*	*4/5*	*5*	*I*	*E*	*P*	*Gr.*	*Ca*	*Ch*	*Li*	*Sa*	*?*
Conical Stones																	
1	0	0	0	0	0	4	0	0	1	3	1	0	0	2	1	1	0
2	1	1	1	5	11	220	14	12	128	137	37	3	13	233	18	0	1
3	0	0	0	0	0	5	1	1	3	4	1	0	0	6	1	0	0
?	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0
Total	1	1	1	5	11	230	15	13	132	145	39	3	13	242	20	1	1
Grooved Stones																	
1	0	1	0	1	0	17	1	0	6	14	4	0	3	13	4	0	0
?	0	0	0	0	0	2	0	0	1	1	1	0	0	2	0	0	0
Total	0	1	0	1	0	19	1	0	7	15	5	0	3	15	4	0	0

I - Intra, E - Extra, P - Pit, Gr. - Grave, Ca - Calcarenite, Ch - Chalk, Li - Reef & Grey Limestone, Sa - Sandstone

Chronology

Both classes were most likely introduced in Period 4. There are 10 earlier occurrences from uncontaminated contexts, but these are suspect on typological or other grounds. They need to be considered here.

Period 2: KM 3538, conical stone with flat top, concave sides and made of calcarenite, all features which distinguish it from the standardised Type 2.

Period 2/3A: one of each class. KM 3565 is larger than most Type 2 conical stones (Ht 6 cm; the average height is 3.632 cm and only KM 462 at 6.5 cm is taller), and made of calcarenite. Grooved stone KM 3320 is more a grooved pebble, with pecked groove all round and possibly a weight, with atypical height (8.9 cm).

Period 3A: KM 2505, although classed as a conical stone, belongs to a large conically-shaped stone well known in EChal (cf. *Preliminary* 2, Pl. IIA), not to be confused with the smaller variety treated here. It is Type 1 which probably includes the disparate, squat, early type and others which are different in height, and often material, from Type 2.

Period 3B: Five conical stones and one grooved. Two of the former come from fill 882 of B 855. There was a concentration of 10 conical stones in 821 immediately overlying 882 and since the interface between the two units was blurred, their stratigraphic integrity is suspect. Period 4 sherdage also occurred in minuscule amounts in 882. A similar situation obtained in respect of KM 2064 from the fill of B 1103. It is most likely intrusive from overlying B 3 which contained many conical stones. KM 1393 comes from the fill of B 1000 which was cut by large pit 911. It is probably derived from that irregular Period 4 cut. Another conical stone comes from a disturbed Period 3B context. Lastly, grooved stone KM 103. Unlike congeners, the groove extends around the entire circumference, hence this fragmentary example may in fact come from another object (phallus?).

In sum, these earlier instances do not provide secure evidence for pushing the inception of conical and grooved stones before Period 4. Their appearance in Period 4, therefore, is even more dramatic that suggested by the histogram of Fig. 8.9. While they may have been used in MChal Cyprus (cf. Dikaios 1936, 50), incontrovertible evidence is lacking for their use at that time at Kissonerga.

§ 20.5 Discs (E.P.) Pl. 37.10, 11; Fig. 100.1-15

Some 353 pottery and 41 stone discs were recovered. These are classified as at Lemba (see *LAP* I, 290).

Pottery discs

The intended shape was roughly circular, but it is not possible to classify the pottery discs by the variations circular, elliptical or polygonal, as was attempted at Alambra (Palmer pers comm), since fabric, wear and manufacture techniques yielded shapes that are too irregular for these criteria. Some discs (e.g. KM 1397, 3316) are sub-square or trapezoidal in plan. They range from 1.9 to 7 cm in length, with a single outsize specimen (KM 438, L 11.1 cm) that probably served another function. Types 2-5 have centrally placed depressions or complete hourglass perforations.

Type 1
Unpierced. Total 31.

Type 2
Semi-pierced on one face. Total 40.

Type 3
Semi-pierced on two faces. Total 36.

Type 4
Pierced discs. Total 222.

Type 5
Decorated pierced discs. These have 2-4 peripheral depressions or perforations. Some appear to be trial borings rather than attempts at decoration. Total 9.

Stone discs

Traces of striations on faces (especially on Type 3), scoring around perforation and smoothed edges are common. Most are plano-convex in section. One example, KM 1679, is decorated with radial incisions on one face (Fig. 100.15).

Table 20.6. Occurrence of pottery and stone discs by type and period

Type	*Period*									*Context*		
	2	*2/3A*	*3A*	*3A/3B*	*3B*	*3/4*	*4*	*4/5*	*5*	*Intra*	*Extra*	*Pit*
Pottery Discs												
1	0	0	13	3	2	0	9	0	0	9	18	7
2	0	0	23	2	0	2	7	0	1	11	24	9
3	0	1	13	4	1	2	11	1	0	7	26	9
3/4	0	0	1	0	0	0	0	0	0	0	1	0
4	2	3	122	15	20	1	28	0	1	43	149	50
5	0	0	4	0	1	0	0	0	0	2	3	0
?	0	0	2	1	1	0	2	0	0	1	5	4
Total	2	4	178	25	25	5	57	1	2	73	226	79
Stone Discs												
1	0	0	2	0	0	0	1	0	0	1	2	2
2	0	0	6	0	0	1	5	0	1	3	10	1
3	0	0	8	0	0	0	6	0	0	3	11	5
4	0	0	1	0	0	0	0	0	0	0	1	0
?	0	0	2	0	0	0	0	0	0	0	2	0
Total	0	0	19	0	0	1	12	0	1	7	26	8

Note: Data obtained from OK, M and C units, together with D units from graves; surface finds excluded; doubtful ascriptions amalgamated, e.g. Period 4? ascribed to 4

Type 1
Unpierced or partly pierced. Total 3.

Type 2
Pierced, thin, flat, polygonal with sides perpendicular to faces. Total 16.

Type 3
As 2, bevelled faces and rounded edges. Total 17.

Type 4
Tapered cylinder. Total 2?

Material

BTW, RW, RMP, "X" and RB/B were the primary sources for pottery discs. The majority, 261, are of RMP-A and -B, largely a result of chronology (see below) and the unsuitability of RB/B which has a very rough break.

For stones discs, see under **Chronology**.

Manufacture and wear

There is little to add to *LAP* I, 291. All pottery discs are modified sherds, most with rough edges which have also been chipped, perhaps due to abrasion in use and redeposition. A minority are reworked from rim sherds so that they are quite asymmetrical. KM 890 is a recycled angular butt end of a pottery burnisher. Many have scratched all over convex faces, some are quite deeply scored. Others bear drill marks around the perforation, fewer have a square scratched in the surface there (e.g. KM 3399, 3448). These marks are always on the convex surface and it was from here that most drilling for the uneven hourglass perforation took place. Several stone perforators from Period 3A retain red discoloration on their tips (see § 21.4). This correlates well with the high numbers of red painted Period 3A discs, and suggests discs were drilled with such perforators.

Type 1 tends to have smoother edges as if unused, or complete but used for a different, less robust function. Types 2 and 3 are seldom broken along the axis of the attempted perforation. Leaving aside Type 3 specimens with misaligned drill holes, they seem unlikely wasters.

Contexts and functions

The majority of all Types occur in extra-mural contexts: almost four times as many Type 4 come from outside buildings as inside (Table 20.6). The greatest concentration of discs was in Unit 1539, where 43 were found in a general habitation deposit below B 1016 (Fig. 8.11 left). None can be regarded as in a sealed position however and so they have been discarded rather than used there. There is no strong correlation with a particular unit class.

Internal evidence does not readily assist in determining their use(s). They are frequently regarded as spindle whorls. Many have such large perforations, or small ones, or are so curved (KM 554 comes from a flask neck), or possess such asymmetric plans that they would rotate inefficiently. Although wear and breakages obviated analysis of discs by weight, many are close to or below the lower limit of 10 gm for whorls (Carrington Smith 1977, cited in Palmer - see above).

Occurrence rates of breakage are varied, but their significance is unclear. Only 17.7% and 21.2% of Types 1 and 2/3 are broken, 50.2% of Type 4. In other words, half the pierced discs were discarded in a complete and usable state, while 80% of the others were discarded in a similar state.

The proportions between stone types are very different from pot disc counterparts.

Chronology

Pottery discs of all types were virtually unknown in Period 2 and then extremely popular in Period 3A (Fig. 8.13). This is unlikely to be a result of functional differences since the same types of units are attested in both periods. All disc types, with the exception of Type 1, decline sharply thereafter, especially if derivatives (e.g. 3 BTW in Periods 3B and 4 after BTW ceased to be manufactured) and larger volumes of excavated soil are taken into account in the later periods (see Fig. 8.13). That they were still being made in Period 4 is indicated by the 11 examples chipped from RB/B pottery, but the histogram probably exaggerates the number in Periods 3B and 4. The reason for the Period 3A peak is unclear.

Discs became thicker, and probably heavier, as the chalcolithic progressed. The average thickness of all discs in Period 3A is 76 mm, in 3B 84 mm and in 4 93 mm. While this may have something to do with changing function, it may also be related to source material. RMP, which, as mentioned, was the source for the majority of discs, was mostly used for small vessels in Period 3A, but for larger and thicker-walled vessels subsequently.

Stone discs also evince change in size and material through time. In Period 3A they are generally smaller (av. L 3.75 cm) than in 4 (av. L 4.12 cm). All but one of the 3A discs are made of chalk, whereas discs of Periods 4 and 5 occur in six other materials amounting to 50% of the assemblage. As noted elsewhere, this is part of a hybridisation trend typical of several Period 4 object classes.

§ 20.6 Spindle whorls (E.P.) Pl. 37.9; Fig. 100.16-20

All six examples of this small assemblage are made of pottery. Some are so small they might have been used as beads, but the material would be exceptional in the Kissonerga bead repertory. They are discussed in § 8.6. For other possible whorls, see discs (§ 8.5, 20.5) and beads (§ 8.3, 20.3).

Catalogue

Biconical

KM 573 White filled incised radial lines from terminals, single horizontal incision below carination. Chipped and worn narrow end of perforation. Lustrous RP (Philia). Ht. 2.1 D. 2.5. General Unit 66, Period 5. Pl. 37.9 top left; Fig. 100.16.

KM 946 Cord? impressed horizontal grooves. Traces white filling. Frag., damaged around carination. RP?, blackened. Ht. 2.4 D. 2.6. General Unit 445, Period 4/5. Pl. 37. 9 top row second from left; Fig. 100.17.

KM 1305 Cord? impressed horizontal grooves above and below carination. RP. Ht. 2.3 D. 3.0. General Unit 814, Period 4. Pl. 37. 9 top row second from right; Fig. 100.18.

KM 1677 Plain, coarse. RP. Ht. 3.1 D. 3.7. Surface, Quadrant 20.23.4. Pl. 37. 9 bottom row second from right.

KM 2367 White filled groups of two/three oblique incisions from perforations. Worn around carination. Lustrous RP (Philia). Ht. 2.3 D. 2.3. Wall 798 of B 866, Period 4. Pl. 37.9 bottom row right; Fig. 100.19.

Spherical

KM 1307 Worn, plain surface, dark gritty core. RP. Ht. 2.7 D. 3.0. General Unit 814, Period 4. Pl. 37.9 bottom row left; Fig. 100.20.

§ 20.7 The bone and antler industry (P.C.)

Introduction

Because it is generally readily available, strong and easily worked, bone (including antler) was seldom neglected as an industrial raw material by prehistoric communities. The assemblage of bone and antler artefacts from Kissonerga is typical for Early Prehistoric Cyprus, consisting mainly of bone points and needles and antler hafts and hammers, but including numerous examples of other types of artefact such as beads and pendants.

The typology which has been used in this study of over 400 pieces of worked bone and antler from Kissonerga has developed out of the writer's experience in studying worked bone from a number of Early Prehistoric Cypriot sites. The typology is essentially that which was used for the Lemba assemblage (*LAP* I) and although, inevitably, the larger Kissonerga assemblage includes a wider range of definable types, the great majority of the material falls within the limited range of types which accounted for most of the Lemba material. This is not to argue for any particularly close relationship between the bone and antler industries of Kissonerga and Lemba, but rather reflects the limited potential for variability when fundamentally simple techniques of manufacture are applied to the same limited array of raw materials to produce mainly unembellished functional items.

Where practical, the categories employed in the typology have been defined in terms of morphological criteria, and the types have been accorded descriptive, neutral names. Commonly used terms such as "awl", "borer", "threader" and "pin" have been avoided since they involve *a priori* assumptions regarding function; all such items would be categorised as "points" of various sorts in the present typology, differentiated by size or other morphological attributes rather than by assumed function. Type names which do suggest function have been retained only in such cases where there is no (or minimal) ambiguity regarding function. A needle is indubitably a needle and a haft a haft, and to call them otherwise would seem impractical since it would only serve to confuse the issue.

The terminology employed in morphological descriptions is such that the *tip* and the *butt* are located at opposite ends of the body of a point or needle. The terms proximal, distal and shaft are reserved to convey anatomical information.

The study of "simple" faunal remains and the study of artefactual bone are clearly complementary, and they are interrelated in several ways. Much of the worked bone from any excavation is likely to be extracted from faunal samples, since the zooarchaeologist's knowledge of the morphology of natural bone and normal traces of butchery enables him more certainly to distinguish industrial modification than can most excavators. Furthermore, the zooarchaeologist's knowledge is needed to establish which bone constituted the raw material for a particular artefact. Finally, it is also the case that worked bone comprises part of the overall faunal assemblage, and it is essential that any "faunal" information (e.g. taxon, element, age at death) latent in the artefacts should be included in the faunal analysis, and not be overlooked.

The Typology - Abundant Types

The artefactual types most abundantly represented at Kissonerga, and accounting for the bulk of the assemblage, are described below, subdivided according to the particular skeletal material (bone or antler) on which they were manufactured. Other, less abundant, types will be described and discussed in the following section. A complete list of bone and antler artefacts is presented as Table 20.7. Numbers and letters in square brackets in the text represent class codes, which are also quoted in Table 20.7.

Bone

Large Points and *Small Robust Points* [L and SR] are sturdy, well-worked points of respectively greater than and less than 10 cm in length. They often incorporate part or all of an articular end into the butt [LA and SRA], but sometimes do not [LB and SRB].

Large Points are represented by 17 examples of which 11 (65%) include part or all of an articular end in the butt, whilst of 30 Small Robust Points only 7 (23%) do so.

When articular ends of bones are retained as point butts, it is generally possible to determine which element of which animal has been used as the raw material. Even when Large Points are made on bone shaft fragments, lacking articular ends, it is very often possible to make an identification to element and taxon, whilst on Small Robust Points this is less commonly the case since there is less evidence to go on.

Most Large Points which employ an articular end as the butt are made on deer ulnae , this bone accounting for 8 of the 11 examples (KM 727, 1358, 1420, 1506, 1658, 3660 (Fig. 101.2), 3667 and 5111 (Fig. 101.3)). Of the remainder, two (KM 1030 (Fig. 101.1), 3388) were made on caprine proximal and distal radii and one on a deer distal metatarsal (KM 1660 (Pl. 38.12)). Of the 6 large points which did not employ an articulation as the butt, the raw material of 5 was identifiable as

Table 20.7. Classified list of artefacts of bone, antler and pig tusk

Code	*Class*
BONE	
LA	Large Point with joint for butt - 727, 1030, 1358, 1420, 1506, 1658, 1660, 3388, 3660, 3667, 5111.
LB	Large Point without joint for butt - 1629, 1664, 2697, 3394, 3662, 5136.
SRA	Small Robust Point with joint for butt - 3639, 3647-8, 3661, 3690, 5139, 5260.
SRB	Small Robust Point without joint for butt - 1029, 1193, 1342, 1427, 1651, 1655, 1685, 1778, 1805, 1966, 2106, 2241, 2273, 2706, 3284, 3389, 3506, 3643, 3645, 3656, 5143, 5145, 5180.
P	Damaged Large/Small Robust point - 293, 384, 396, 716, 841, 1033, 2039, 2224, 3098, 3101, 3390, 3392-3, 3395, 3651, 3654-5, 3691, 5114, 5118, 5124, 5128, 5142, 5146, 5164, 5174, 5179.
SF	Small Flat Point - 579, 1329, 1341, 1894, 2569, 3014, 3635, 5173.
F	Fine Point - 362, 397, 722, 743, 776, 1099, 1601, 1652, 1654, 1656-7, 1762, 1797, 2034, 2218, 2405, 2522, 2701, 3391, 3509, 3653, 5122, 5126-7, 5129-31, 5144, 5148, 5167.
C	Crude Point - 2331, 3646, 5133, 5138, 5161, 5169.
N	Needle - 886, 959, 1021, 1026, 1031, 1122, 1183, 1195, 1300, 1374, 1381, 1408-9, 1411, 1421, 1428, 1454, 1505, 1721-2, 1744, 1763, 1779, 1815, 1829, 1836, 1861, 1882, 1969, 1984-5, 2009, 2012, 2028, 2068-71, 2078-9, 2090-4, 2107, 2124, 2162, 2213-7, 2240, 2265, 2305, 2311, 2313, 2329, 2334, 2560, 2680, 2771, 2795, 2813.01-02, 2842, 2879, 2881.01-02, 2882, 2918.01-04, 2919, 2989, 3010, 3063, 3066, 3097, 3163, 3219, 3225, 3240, 3378, 3410, 3437, 3441, 3484, 3663-5, 3718-9, 5109, 5155, 5182-5256.
B	Bead - Type 7: 25-6, 1028, 1741, 2773, 2859, 3241, 5119, 5137, 5170. Type 9: 3385.
M	*Miscellaneous Items*
M01	Spatulate Implements - 1343, 1663, 2038, 2235, 2239, 3641-2, 5113, 5125, 5135, 5168.
M02	Tube - 692.
M03	Pendant Type 2.02: 1965, 3088, 3446; Type 2.12: 857, 859; Type 2.19: 2402; Type 2.22: 3440, 3449.
M04	Hook - 2920, 3285.
M05	Blank - 1501, 3279, 3640, 5149.
M06	Worked Bird Bone - 3015.
M07	Denticulate - 3644.
M08	Double Ended Point - 5123
M09	Utilised Scapula - 3652, 5257-9.
M10	Modified Deer Distal Metatarsal - 3466, 3703.
M11	Drilled Bone - 5132.
X	Unclassifiable Fragments of Worked Bone - 658, 1032, 1507, 1659, 1666, 1955, 2330, 2779, 2843, 2913, 3659, 3666, 5134, 5160.
ANTLER	
A1	Haft - 416, 779-80, 847, 1068, 1580, 1662, 1667, 2242-3, 2245, 3102-3, 3379, 3382, 3649.01-03, 3671, 3689, 5110, 5121, 5166.
A2	Bead Type 7: 2067, 2122, 2126, 2129, 2352, 2434, 2582, 3702.01-02, 5165, 5171, 5178; Type 10: 2915-6, 3669.
A3	Hammer - 1436, 5112, 5140.
A4	Worked Tine - 594, 3650, 3668, 5117, 5141.
PIG TUSK	
PT1	Perforated Tusk Piece - 1040, 2006, 2123, 2271, 2785, 2807, 3164.
PT2	Hook - 2345, 3019.
PT3	Pendant - Type 2.22: 2272, 2797.
PT4	Miscellaneous Worked Pig Tusk - 398, 1169, 5175.

deer metapodial shafts whilst one remained unidentifiable. Metatarsi (KM 1664, 3394, 3662 and 5136) were clearly preferred to metacarpi (KM 2697), undoubtedly because the natural morphology of the cervid metatarsal (specifically the existence of a deep groove on its dorsal surface) facilitates its longitudinal splitting.

Small Robust Points with articular ends as butts were most commonly made on deer metapodia, again with a strong preference for metatarsi as the raw material (metapodial: KM 3661 (Fig. 101.6); metatarsal: KM 3639 (Fig. 101.4), 3647 (Fig. 101.5), 3690 (Fig. 101.7). Also recorded as raw materials for such points are pig fibula (distal end plus shaft - KM 5139 and 5260) and caprine metatarsal (KM 3648).

The majority of Small Robust Points do not have articular ends as butts. The raw material on which most of these was made was not determinable (e.g. KM 1193 (Pl. 38.1), 1805 (Pl. 38.10), 1029 (Fig. 101.8), 1778 (Fig. 101.9) and 1966 (Fig. 101.10)), but where it could be established it was normally a deer metapodial, specifically a metatarsal (metacarpal: KM 3643; metatarsal: KM 1655, 1685, 2273 (Fig. 101.11), 3506 and 3604).

Both Large and Small Robust Points seem well suited to have served as awls; where articular ends were retained as butts they would have served to provide a good grip, polish is usually more pronounced at the working tip, and these points are all sufficiently robust to withstand the application of considerable pressure. The lengths of Large and Small Robust Points which could be measured or reliably estimated range from 2.9-16.7 cm, and are summarised in Table 20.8. The majority fall within the range 3.0-6.9 cm in length, although points of length 8.0-9.9 were also reasonably frequent. There is a curious absence of examples of length 7.0-7.9 cm; perhaps this size was too long to be comfortably used when gripped between index finger and thumb (as the shorter points must have been) but too short to be gripped effectively using more fingers.

Table 20.8. Lengths of large and small robust points

Length (cm)	*KM*
2.0- 2.9	1342
3.0- 3.9	1778, 1966, 2032, 3690, 5139, 5145
4.0- 4.9	652, 2706, 3389, 3506, 3647, 3661
5.0- 5.9	1029, 1427, 1685, 5143
6.0- 6.9	1651, 1655, 2241, 5260
7.0- 7.9	
8.0- 8.9	1193, 1805, 3284, 3648
9.0- 9.9	3639, 2273
10.0-10.9	5111
11.0-11.9	3388
12.0-12.9	
13.0-13.9	1030
14.0-14.9	1660
15.0-15.9	
16.0-16.9	2697

Numerous damaged items were fairly clearly either Small Robust or Large Points, but could not confidently be assigned to one or the other class. This general category [P] may possibly include a minority of abraded fragmentary fine points on which the high quality surface finish could not be observed.

Fine Points [F] are generally characterised by their slender proportions (the body of the point is generally parallel sided, and narrow in proportion to its length) and by being well-polished, often to a high gloss finish, over their entire surface. They do not have articular ends for butts. The strong impression is that aesthetic considerations have played a part in determining the quality of their finish if not their form.

The fragility of Fine Points is reflected in the fact that they are mostly represented by highly fragmentary specimens. Because of this, and since they are of slender form and very well smoothed and polished, it is seldom possible to be certain which bone Fine Points have been made on. In all three instances out of a total of 31 examples of Fine Points where the raw material could be identified with reasonable confidence, they seem to have been made on deer metatarsals (KM 2405, 2701 and 3509). It is suspected that this bone was probably the standard raw material for this class of points also.

Only two examples of Fine Points were complete. KM 3509 (Fig. 101.15) is of standard form, whilst KM 722 (Fig. 101.13) is more elaborate, a delicately wrought point which broadens out gradually from the tip to the butt, which is decoratively bifurcated. This latter piece, like many other Fine Points, seems rather fragile to have served as a piercing implement, and it seems more likely that rather than being used as implements, points of this type fulfilled a more passive role as pins, possibly for hair or clothing.

Needles [N] are, naturally, firmly defined by possession of an eye, almost invariably drilled from both sides. They are normally well-polished all over as befits their function. The bodies of needles are generally round or oval in section, but occasional specimens are quadrangular or triangular. Needles are generally made on small slivers of longbone shafts of large mammals, only one specimen (KM 2313) clearly having utilised a fragment of longbone shaft of a small mammal, or perhaps even a bird. The maximum diameter of the body of unambiguous needles never exceeds 5 mm, whereas the bodies of fine points appear always to be greater than 5 mm in diameter. Thus, well-polished small body fragments are fairly confidently attributable to needles or fine points depending on whether or not they exceed 5 mm.

172 needles and fragments thereof were recorded from Kissonerga. In 50 cases the eye was partly or wholly preserved, and eye (minimum) diameters were measurable in 19 instances; diameters ranged from 0.6 to 1.8 mm, most (n=11) falling within the range 0.9 to 1.1 mm. Many examples had been broken across the eye in antiquity (e.g. KM 2028 (Pl. 38.4)), and although some exhibited traces of having been re-bored (KM 1454 (*LAP* II.2, Pl. 15, Fig. 20), 2091, 2092, 2771 and 3484), most did not. Of course, others may have been re-bored on one or more occasions, the traces of this process having been effaced during reworking. In fact, since re-boring a broken needle must require considerably less effort than making a totally new one, it seems very likely that re-boring would have been the norm wherever possible, perhaps until the needle became too short to be conveniently handled.

Complete needles are represented by 11 examples (KM 1300, 1374, 1411 (Fig. 101.16), 1454 (LAP II.2, Pl. 15, Fig. 20), 1836 (Pl. 38.5), 2012 (Pl. 38.3), 2091, 2092, 3219 (Fig. 101.17), 3225 and 3484). The lengths of ten of these fall within the range 18.7 to 54.5 mm, but one (KM 1411) is exceptionally long (119.8 mm). Several others are largely complete (e.g. KM 3063 (Pl. 38.7)) and of these only one example (KM 2881.01 a body fragment 92.3 mm in length) appears to represent a second very long needle. Whether such long needles were indeed as uncommon as their observed frequency would suggest, or whether they are more frequent but generally represented by small undiagnostic fragments remains a moot point.

Several needles display features of interest, and will be described. One example (KM 2771) exists of an incompetent attempt to rebore a needle following breakage across the eye; boring from both sides immediately below the broken eye was misaligned, and although perforation was achieved from one side, the eye would have been rather distorted so the attempt was abandoned. KM 2216 is a needle which was never finished; apart from the point, which remains blunt and chisel ended, it has been ground into shape, but not polished. Boring of the eye has been started by drilling from both sides, but again misalignment seems to have resulted in the piece being discarded. KM 2012 (Pl. 38.3) shows evidence of a false start having been made on one side in drilling the eye, the eye ultimately having been successfully bored (from both sides) immediately above the initial indentation.

KM 2079 (Pl. 38.6) clearly broke across the eye, which was subsequently ground down to square off the butt, but no attempt seems to have made to rebore the needle.

The butt end of KM 1408 (through which the eye is bored) has been ground down to about one third of the thickness of the body of the needle. The eye of this needle is the largest of all the Kissonerga specimens (1.8 mm) and presumably designed to take thicker than normal thread. Fining down the butt of the needle would assist the passage of a double thickness of this thread through the fabric being stitched.

Spatulate Implements [M01] constitute a fairly heterogeneous group of bone artefacts ranging from somewhat pointed implements with rounded tips to implements with much more distinctly squared-off working ends. Tips tend to be well polished, whilst the degree of smoothing to the bodies of the implements is variable.

Two implements, KM 3642 (made on a pig fibula) and 3641 (made on a rib of a deer/pig/caprine-sized mammal) possess polished working surfaces on their long edges.

Spatulate implements were, like Large and Small Robust Points, most often made on deer metapodia. Again metatarsi were clearly preferred (KM 2038 (Pl. 38.11), 2235 (Pl. 38.8), 2239 (Pl. 38.9; Fig. 101.19), 5113 and 5168), but metacarpi seem also occasionally to have been utilised (KM 1663 (Fig. 101.18)). Other elements on which spatulate implements were manufactured include, in addition to the pig fibula and the rib mentioned above, a deer tibia shaft fragment (KM 5135).

These spatulate implements could all have functioned as polishers of one sort or another, possibly used in the manufacture of ceramic vessels.

Beads [B] (See also § 8.3 and 20.3) utilising bone as the raw material were slightly fewer than those of antler, amounting to 11 in number. They seem mainly to be made on longbone shafts of the smaller animals. KM 26 (Fig. 99.12) and 1028 were made on femur shafts of fox and, less certainly, KM 25 (Fig. 99.11) was made on a fox tibia, KM 2773 and 2859 on dog metapodia and KM 5170 on a pig metapodial ii or v. KM 1741 was made on an unidentified small animal longbone shaft. Ten bone beads are essentially cylindrical in form (Bead Type 7), whilst one (KM 3385 (Fig. 99.17)) is a fragment of a shorter type with a bevelled external face (approximating to Bead Type 9).

Antler

The writer has previously discussed the working of antler at the nearby Chalcolithic site of Mylouthkia, and the comments on antler technology (*Prehistory* 2, 19-21) are equally applicable to the Kissonerga assemblage, and will not be reiterated here.

Hafts [A1] were the most abundant type of antler artefact at Kissonerga. Twenty three examples were recognised, but considering that antler in general was often poorly preserved and abraded it is most probable that numerous other fragmentary hafts were recovered but not recognised as such.

Two main types of haft existed, the difference being the portion of the antler from which they were made. One type, made on the lower portion of the distal palmation of the antler, was a more or less bell-shaped antler sleeve (e.g. KM 779, 1580, 3102 (Fig. 102.3), 3103 and 5121). The few antler hafts found at Lemba were principally of this type (*LAP* I, 201).

The second main type of antler haft at Kissonerga, which is essentially similar to the first, was made on the basal sections of substantial (normally, if not invariably, trez) tines (e.g. KM 780 (Fig. 102.1), 847 (Pl. 38.13; Fig. 102.2), 1068, 3379 and 3382).

In either case, the desired portion of the antler was detached by grooving and snapping, the snapped ends ground down, and a slot cut into the spongy core of the antler at the broader end to permit the insertion of the tool. The butt ends of hafts often show signs of shaving, sometimes right down to the spongy core of the antler. Where preserved, the size of the slots suggests that small axes or adzes were normally the hafted tools. In a single instance in which such a haft (KM 847) retained its tool it housed a jasper adze (KM 765 (Pl. 38.13; Fig. 102.2)), an unusual item which had been placed with the deceased in Grave 507.

Only one other example of a haft with its tool in place came to light. The tool was a most unusual one, a copper awl (KM 416 awl and haft (Pl. 36.4; Fig. 97.4)), the slenderness of which permitted an unusual piece of the antler, a straight central portion of an antler tine, to be used as the haft. One other example of a haft made on an antler tine (KM 2243 (Pl. 38.2)) was recorded at Kissonerga. This item was shaved and polished, the antler tip faceted away to a blunt point, and the wider end damaged in antiquity (perhaps motivating its discard). The socket which had been hollowed out in the spongy antler core was preserved to a depth of 60 mm, and could have accommodated a tool which was not greater than 6x8 mm. This haft thus seems likely also to have housed a metal tool.

Numerous fragments were clearly parts of hafts, but the portion of the antler on which they had been made was not determinable.

Beads [A2] (See also § 8.3 and 20.3) made on hollowed out portions of antler tine were represented by 15 examples at Kissonerga. The most abundant type (12 examples) is more or less parallel sided, generally 1-2 cms long and roughly as wide as long (Bead Type 7). Occasional specimens are longer or wider. The surfaces of these beads have often been shaved and polished, and they commonly show signs of concentric grooving and snapping at the ends subsequent to having been shaved. Only 3 examples (KM 2915, 2916, 3669) of a rarer, somewhat barrel-shaped type of antler bead (Bead Type 10) were recorded. These beads are 14-24 mm long, and two well-preserved examples were about half as wide as they were long. In other words the second type of bead tends to be more slender than is generally the case for the first type.

The Typology - Less Abundant Types

Less abundant artefact types were not only manufactured of bone and antler but also, relatively infrequently, of pig tusk. Since some items (viz. pendants of Type 2.22 and hooks) made of the latter material have exact counterparts in bone, pigs tusk has been included in the discussion of bone artefacts.

Bone (including pig tusk)

Small Flat Points [SF] are points less than 10 cms in length made on slivers of longbone shaft or, occasionally, rib. They often have (or had) a well-polished surface, and preserve a flat cross-section throughout their entire length. Butt ends may be perforated and may incorporate part of an articular end.

Small Flat Points are relatively rare at Kissonerga compared with Lemba, being represented by eight examples, only two of which are fairly complete. KM 3635 lacks only the very tip and is 51.0 mm long (estimated original length 54 mm), 5.0 mm in breadth and 1.7 mm thick. It has a squared off butt with a transversely located perforation 3.2 mm wide and 2.2 mm in height. The pronounced curvature of the body of this point suggests that it was made on a rib fragment. KM 1329 is broken towards its tip, and is a more substantial Flat Point with a squared-off butt, circular perforation of diameter 3.2 mm and tapering body, manufactured on a straight piece of longbone shaft. Additionally, 5 tips and a body fragment were recorded.

Crude points [C] encompass a variety of shapes and sizes of point, the unifying factor in this category being that relatively little care has been taken over their production and finishing. Only 6 examples of this type of point came to light at Kissonerga.

Tube [M02]. A single example of a bone Tube (KM 692 (Fig. 101.20)) consists of the neatly cut central portion of a caprine tibia 90.3 mm in length. It could have been stoppered at the ends to form a small container.

Pendants [M03 and PT3] (See also § 8.2 and 20.2). A variety of pendants was manufactured of bone, and these fall into 4 categories. Annular Spurred Pendants (Pendant Type 2.12) are represented by KM 857 (Pl. 6.3 (bottom left)) and KM 859 (Pl. 36.9 (middle row)) in bone, but seem more commonly to have been manufactured of shell (cf. KM 852 (Pl. 36.9 (top row)), 856 (Pl. 36.9 (top row)), 858 (Pl. 36.9 (top row); Fig. 97.29) and 1273 (Pl. 36.9 (bottom row), 37.2; Fig. 98.1)). Similarly, Rectangular Pendants (Pendant Type 2.02), represented in bone by KM 1965 (Fig. 97.21) and 3088 (Pl. 36.8 (second row), are more commonly found in a variety of other materials. Unperforated bone plaque KM 3446 (Pl. 36.7 (top row)) is viewed by Peltenburg (§ 20.2)) as a rectangular pendant in the course of manufacture and it is, for the sake of convenience, classified as such in the present study. However its well-worked faces do not convey the impression of an unfinished piece, and its considerably larger size than the two complete examples of Type 2.02 pendants in bone, and its somewhat waisted shape, suggest that it could well be a finished item of a different type. Notched Crescent Pendants (Pendant Type 2.22) are also represented by two examples (KM 3440 (Pl. 36.7 (bottom row); Fig. 98.16) and 3449 (Pl. 36.7 (bottom row)) in bone, but were as frequently made of pig tusk (KM 2272 (Pl. 36.10 (middle row); Fig. 98.17) and 2797 (Pl. 36.10 (middle row)). A final type of bone pendant, vaguely Anthropomorphic in shape (Pendant Type 2.19), is represented by a single very abraded example (KM 2402 (Fig. 98.10)) which accompanied the infant in Gr. 560 (Pl. 24.2; Fig. 56).

Hook [M04 and PT2]. A largely complete bone hook (KM 3285 (Pl. 36.10 (middle row); Fig. 101.21) certainly has a sharp enough point to have been used for fishing, and a second more fragmentary item (KM 2920) probably represents another. Similar hooks of pig tusk (KM 2345 and 3019) occurred with equal frequency.

Blanks [M05]. Four examples were found of Blanks that is bone implements which are clearly in the course of being manufactured. KM 1501 is clearly a needle blank which had been ground into shape, but remained to be perforated and polished. KM 3279 seems to be a small point or fairly large needle which was still undergoing primary grinding into shape (the blank is somewhat angular in section and 56.3 mm long). KM 5149 is a sliver of longbone shaft of a small mammal which was in the process of being ground down, possibly to make a small needle. Finally, KM 3640 is a substantial fragment of deer metatarsal shaft 127.7 mm in length which has been somewhat ground and polished, but which retains a jagged edge still unworked. It seems likely to represent a bone point of one sort or another, the manufacture of which was never completed.

Worked Bird Bone [M06]. Only on piece of unambiguously Worked Bird Bone was located. KM 3015 is the very tip of a delicate pointed implement made on a longbone shaft.

Denticulate [M07]. Also unique was a fragmentary Denticulate piece (KM 3644 (Fig. 101.22)), possibly made on a flat fragment of a mammalian scapula. The edge of the piece was notched and polished.

Double-ended Point [M08]. Another unique item was KM 5123, a small Double-ended Point 34.3 mm in length. This implement was made on a thin sliver of longbone shaft, probably caprine but possibly from a smaller animal.

Utilised Scapula [M09]. Four examples of Utilised Scapulae were found. KM 5257, 5258 and 3652 are all pig scapulae (shoulder blades) which possess a high gloss polish in the region of the neck of the bone. Such polish must result from the bone being repeatedly handled, a grip around the neck being the easiest way to hold a scapula. This suggests that these scapulae were utilised as scoops or shovels. Only KM 3652 bears traces of deliberate modification; in this instance the spinal process of the scapula has been chopped off. KM 5259 is a deer scapula with a similarly polished neck, and from which both the spine and the *tuber scapulae* have been removed. The greater prominence of both the spine and the tuber on the distal end of the deer scapula than on the pig scapula makes their removal more likely if the bone is conveniently to be gripped for use as a shovel.

Modified Deer Distal Metatarsal [M10]. Two specimens of Modified Distal Metatarsi of deer were noted. KM 3703 (Fig. 101.23) had been grooved and snapped at the very base of the bone shaft to detach the distal articulation. The break thus formed and the adjacent surface of the bone were polished as if by repeated handling. The distal aspect of the epicondyles of the articulation had been ground down flat. Damage to the axial edges of the epicondyles shows that the gap between them was widened, presumably to improve access to the natural foramen which opens at their base. All of this suggests that the foramen was used for the hafting of some small tool. KM 3446 (Pl. 36.7 (top row)) represents a second example of such modification to a deer distal metatarsal, although in this case the articular end of the bone had not been detached from the shaft (the distal quarter of the shaft is retained, above which point it is broken off in a non-purposeful way). A little above the articulation of the bone, on the ventral face and on the axial line of the bone, has been drilled a small depression 0.5 mm in depth.

Drilled Bone [M10]. KM 5132 is a piece of Drilled Bone consisting of a small piece of longbone shaft (probably from a deer metatarsal) into which has been drilled a depression 5.1 mm in diameter and 1.5 mm deep.

Unclassifiable Fragments of worked bone [X] amount to 14 in number. Most of these are probably undiagnostic fragments of the bodies of points of various sorts, and are so incomplete as not to merit specific mention. Several other items within this general "unclassifiable" category are clearly of different origin, and will be mentioned, although possible functions cannot be ascribed to them.

KM 1032 is the proximal half of a pig metacarpal iv. On the shaft of the bone are numerous longitudinal striations, and centrally located on the dorsal margin is a shallow longitudinal groove. Some polish is also evident on this face.

KM 1666 is a scapula blade fragment, possibly caprine, with evidence of artificial rounding and smoothing of its margins.

KM 2779 is a portion of a longbone shaft, probably of deer in view of its robustness, which has been longitudinally split and its broken long edges ground flat and smooth.

KM 5134 apparently represents a piece of Debitage, perhaps from the manufacture of a bone bead. Alternatively it may represent an abandoned attempt to make a bead. It consists of a piece of longbone shaft of a fox/cat-sized mammal which has been grooved and snapped, but not further smoothed or otherwise worked.

KM 3659 is a distal fragment of an unfused deer metapodial on which a small circular hole perforates the plane of fusion. No particular evidence of rotary drilling is observable, and no particular function can be envisaged for the piece.

Perforated Tusk Piece [PT1]. The main type of object made of pig tusk, and not replicated in bone, is a Perforated Pig Tusk Piece, often multiple perforated and usually retaining its enamel. Two such pieces (KM 2006 (Pl. 36.10 (top row) and KM 2123) lack evidence for well-finished edges, and could conceivably represent tusk segments from which small (*c.* 5 mm diam.) disc beads had been cut, although the lack of such beads in this material amongst the finds from Kissonerga (or from Lemba) weakens this interpretation. A majority of perforated pig tusk pieces, KM 1040, 2271 (Pl. 36.10 (top row)), 2785, 2807 (Pl. 36.10 (top row)) and 3164, seems clearly to be fragments of (multi-)perforated decorative items (also occasionally encountered in picrolite from both Kissonerga cf. KM 1053 (Fig. 97.19) and Lemba cf. LL 1242). On all five pieces there is evidence that the edges of the tooth segment had been carefully smoothed, which would not be the case if the pieces were simply debitage from disc bead manufacture.

Miscellaneous Worked Pig Tusk [PT4]. KM 5175 is a small tusk fragment bearing traces of cutting and grinding. It is clearly an unfinished piece, and its size and shape suggest that it could have be a Notched Crescent Pendant in the course of manufacture.

KM 398 is a substantial segment of a tusk with well smoothed edges. It seems likely to be part of a finished item, but whether it was perforated is unknown due to breakage.

KM 1169 is a small well-shaped block of what is most probably dentine from a pig tusk.

Antler

Hammers [A3], presumably for flint-working, occur on many early sites in Cyprus. Two out of three examples recorded at Kissonerga are of the normal type (KM 5112 (Fig. 102.5) and 5140), also found at Lemba (*LAP* I, 201), which employ, in little modified form, a shed first-head (second year) antler, the base serving as the striking surface of the implement. Modification to such pieces consists simply of removal of the burr of the antler. The reason for this preference of raw material is probably that first-head antlers are small and of the right sort of weight, and that they do not possess a brow-tine which would have to be removed.

The third antler hammer (KM 1436 (Fig. 102.4)) is made on a larger shed antler base. The surface of the antler, preserved for some 7 cm above the base, has been smoothed, and no trace of a brow tine is evident which suggests that although rather large, this antler too came from a buck in his second year of life.

Worked Tines [A4] in a variety of styles probably fulfilled a diversity of functions. KM 3650, made on a shaved tine, is a blunt-ended point with very polished tip, possibly a burnisher, whilst KM 594 is smoothed with a notched tip. KM 3668 is a tine which has been shaved to a sharp point and KM 5117 is simply a piece of faceted antler tine.

KM 5141 is the tip of a tine which has been shaved and smoothed. Subsequently this portion was detached by grooving and snapping, and traces of this process were not erased, suggesting that despite apparent working the piece was debitage. Numerous other antler tines in the faunal samples showed evidence of having been detached in this manner.

Chronological discussion

Examination of the chronological periods in which the various classes of bone artefact occur at Kissonerga does not reveal any very convincing evidence for changes in their frequency through time.

An observation which may, however, be significant is an apparent reduction in the frequency of items made of antler in the later periods. If attributions (including uncertain ones) to Period 4 or 5 are considered as "later" and attributions to Period 3B or earlier as "earlier" (Period 3/4 attributions being ignored), then antler items comprise 10.8% of all earlier worked bone but only 8.6% of the later assemblage. This situation may reflect an increasing scarcity of antler through time.

The fact that only 25% of 8 "earlier" determinable antler bases are shed, whereas 60% of 32 "later" antler bases are shed, may perhaps reflect an increased inadequacy in the supply of (unshed) antler which came in on the head during Periods 4 and 5. This would provide a greater incentive to seek out shed antlers in the landscape and to transport them back to the settlement for industrial use (see also *LAP* I, 295-6).

§ 20. 8 Miscellaneous artefacts (E.P.)

Glyptics

KM 15 Fragmentary sealing? with eye motif, parallel lines and single border impressed? on flat obverse of curvilinear object, irregular reverse. Light brown, soft calcareous material. Ht 3.6, W 2.6, Th 1.0 cm. Surface find from Plot 139. Pl. 37.12; Fig. 102.6.

KM 597 Limestone conoid with wide cross hatched incised decoration on base, groove near apex. Ht 2.8, W 2.1 cm. From fill 246 of B 706, Period 4. Pl. 37.13; Fig. 102.7.

Clay cones

KM 2944 Smooth-surface cone with flat base. Ht 2.3, Diam. 2.3 cm. From fill 383 of the Pithos House, Period 4.

KM 3470 Smooth, slightly concave surfaces, flat base. Ht 1.7, Diam. 2.3 cm. From general 1570, Period 2/3A.

Clay nail-shaped objects

KM 345 Fragment with depressed oval head, tapered cylindrical shank, broken tip. Ht 3.5, L of broken head 2.7 cm. From general 32, surface. Fig. 102.8.

KM 1084 Circular flat head, asymmetric tapered shank, broken tip. Three irregular rows of painted vertical strokes below head and on shank. RW. From general 817, Period 4. Fig. 102.9.

Red-on-White pellets

KM 1911 Flattened oval terminal broken from larger object, with parallel bands placed diagonally across both faces. L 2.1. From fill 1265 of B 1161, Period 3B. Fig. 102.10.

KM 2075 Flattened oval pellet? broken along one edge, with fine parallel lines on one face, borders of squared arcades framing a central group of dots on the other face. Ht 1.1, W 1.2, Th 0.4 cm. From oven 1275 of B 1161, Period 3B. Fig. 102.11.

Painted pebble

KM 2957 Natural, flat, elongated pebble, one long edge straight, the other tapered with an indentation midway; two short edges sloped in opposite directions. Traces of red paint on most surfaces, including three parallel chequered bands on one face below the indentation. One band has four rows of checks, another two, the central a single ladder pattern with irregular additional cross and side bars. Fire blackened dense chalk. Ht 13.4, W 7.1, Th 2.2 cm. Found upright with narrow end embedded in the Pithos House floor, 905, Period 4. Pl. 38.15, Fig. 102.12.