Chapter 8: environmental evidence

AN ANALYSIS OF THE HUMAN REMAINS
by Angela Boyle

Both inhumations and cremations were recovered from the 1987–88 excavations, and these will be dealt with separately.

The inhumations
Two crouched burials were recovered from similar oval pits. In both cases the bone was in very poor condition, particularly in the case of skeleton 7264, which had suffered severe plough damage. Much of the bone was very fragmentary and identification difficult, although unusually the very fragile nasal and lacrimal bones were recovered among the remains of skeleton 7264. Skeleton 3376 has survived in a slightly better state.

Stature could not be calculated because of the absence of complete long bones, which also made any metric study impossible. Estimation of sex is tentative and is based on skull morphology and robusticity of long bones. Only fragments of acetabulum survived from the pelvic bones. Both individuals have been classified as female. The skulls of both individuals were very fragmentary and although sutures could be examined it was impossible to identify their location with certainty. Dental eruption and attrition, the only alternative means of age determination, did not justify a more precise estimate than 30+ for both individuals. Only dental pathology could be identified, although the dentition of both skeletons survived relatively well considering the extent of the damage to the rest of the bone material. In a number of cases, however, crowns were sheared clean off from roots.

Skeleton 7264 exhibited a mild degree of calculus, although it is possible that much of this fragile material has been lost *post mortem*. It was possible to identify some alveolar resorption extending beyond the root/crown interface. There were two carious cavities present on mandibular molars. The dentition of skeleton 3376 is massive in comparison and attrition is slightly more marked. A carious cavity was present on the interproximal surface of a mandibular molar.

The cremations
Three cremated deposits were recovered, two from near-circular pits in Area 7000 and the third from a small circular pit in assessment trench 3012. Again, preservation was poor and the bone much degraded.

All the cremations were weighed and the number and size of fragments estimated. Deposit 7181 was a mere 60 grammes with approximately 70 fragments of bone. The weight of deposit 7180 was 65 grammes with around 200 fragments of bone. The largest deposit by far was 3049, weighing 700 grammes and containing around 2500 fragments. Given these statistics it seems likely that deposits 7180 and 7181 contained only samples of the individuals cremated.

Examination of the fragments themselves yielded little information, the majority being less than 10 mm in diameter. Colouration was generally uniform, from white through to brown and almost black. Whiter bones indicate more efficient burning. It is possible that different shades indicate the cremations of different individuals, but it might equally be that this is a consequence of differential burning due to the position of either the body, the pyre, or both.

It was possible to identify similar fragments in all of the deposits: long bones, skull, rib and metatarsal/metacarpal shafts. Tooth roots were also recovered. Deposit 3049 contained one certainly identified atlas fragment indicating the articular facet for the odontoid process of the axis.

Since suitably diagnostic fragments were not recovered from deposits 7180 and 7181 it is not possible to estimate the number of individuals represented. On the basis of the atlas fragment it can be definitely said that at least one individual is represented by deposit 3049. This cremation also produced one mastoid process.

No evidence was recovered which would have indicated the sex of the remains. Age was based on cranial vault thickness, degree of suture closure and the development of tooth roots. It is possible to say only that the remains recovered are those of adults.

The lack of dating evidence makes it impossible to compare the inhumations and the cremations, though given the poor state of preservation it is unlikely that much information would be forthcoming from such an exercise.

VERTEBRATE REMAINS
by Bruce Levitan

Introduction
A total of 1331 bones were submitted for analysis, but as Table 21 shows, 26 bones are from modern or undated contexts. The remaining 1317 bones may be divided into three periods: Neolithic (112 bones plus 109 from a burial); Bronze Age (477 bones) and Romano-British (607 bones). A common factor in all periods is the high proportion of unidentified bones (87 Neolithic (excluding the burial), 78%; 346 Bronze Age, 73%; 352 Romano-British, 58%). The sample of identified bones available for analysis, there-

Table 21: Summary of the vertebrate remains from Reading Business Park

Neolithic species	N	%
cattle*	16	64
sheep/goat	5	20
pig	4	16
sub-total	25	
unident. large mammal	56	
unident. medium mammal	31	
Total	112	

Bronze Age species (includes Late Bronze Age material)	N	%
cattle	62	53
sheep/goat	44	38
pig	6	5
horse	3	3
red deer	2	2
sub-total	117	
human	14	
unident. large mammal	187	
unident. medium mammal	159	
Total	477	

Romano-British species	N	%
cattle	151	59
sheep/goat	61	24
pig	10	4
horse	23	9
dog	9	3
domestic fowl	1	+
sub-total	255	
unident. large mammal	247	
unident. medium mammal	105	
Total	607	

Modern/undated species	N
cattle	4
sheep/goat	3
unident. large mammal	17
unident. medium mammal	2
Total	26

* excludes 109 bones from a skeleton (context 7057)
\+ less than 1%

fore, is very small: 25 Neolithic (excluding the burial); 131 Bronze Age and 255 Romano-British. These samples are clearly too small for detailed analysis, and when the fact that several excavated areas were combined to make up this assemblage, the usefulness of detailed analysis is further reduced.

Although the samples are small, the prehistoric element is definitely worth analysis because Neolithic and Bronze Age assemblages are few, and assemblages from occupation sites even fewer. The same cannot be said of the Romano-British sample, as large Romano-British assemblages have been analysed in this region and elsewhere, so the emphasis of this report has been placed on the Neolithic and Bronze Age material.

Neolithic assemblage

Species exploited

Table 21 indicates that cattle was the predominant species, followed by sheep/goat and pig in about equal proportions. This tiny sample, however, cannot be used intelligently to make any interpretative statements about exploitation or site economy.

Table 22: Summary of epihyseal fusion for cattle, Bronze Age

Anatomy	Fused	Not fused
scapula D	3	
radius P	2	
pelvis	2	
phalanges	2	
humerus D	3	
metacarpal D	1	
tibia D	2	
metatarsal D	1	1
humerus P		1
radius D*		2
femur P		1
femur D	1	
tibia P	1	1
calcaneum		1
vertebra		1

P = proximal
D = distal
first group: infant fusing age
second group: juvenile fusing age
third group: sub-adult fusing age
fourth group: adult fusing age

* additionally, one unfused distal radius is present from the Neolithic assemblage

Table 23: Summary of Neolithic cattle burial, context 7057

Anatomy	Comment
skull	very fragmented; no teeth; horned
mandible	pair; permanent incisors 1-2, deciduous incisors 3-4 in wear
cervical vertebrae	axis plus nos. 3-7; centra epiphyses not fused
thoracic vertebrae	9 present; centra epiphyses not fused
lumbar vertebrae	3 present; centra epiphyses fused
sacrum	centrum epiphyses fused
caudal vertebrae	7 present; centra epiphyses fused
rib	minimum of 15 present, very fragmented
costal cartilage	minimum of 12 present
sternum	
scapula	pair, F
humerus	pair, PJ-DF
radius	pair, PF-DN(+)
ulna	pair, PN
carpals	7 present
metacarpal	pair, DF
pelvis	pair, F
femur	pair, PJ-DF
patella	pair
tibia	pair, PN(+)-DF
astragalus	pair
calcaneum	pair, PN(+)
tarsals	6 others present
metatarsal	pair, DF
sesamoid	4 present
1st phalanx	8 present (full set), PF
2nd phalanx	7 present (one fore-limb missing), DF
3rd phalanx	4 present (hind limb set only)

P - proximal epiphysis; D - distal epiphysis; F - fused; J - just fused;
N - not fused; (+) - unfused epiphysis present.

Table 24: Measurements of Neolithic cattle burial bones, context 7057

scapula	SLC: 39.2	GLP: 56.2	SG: 40.4	
humerus	GL: 206.0	SD: 27.0	BT: 60.0	HMT: 26.8
radius	GL: 236.0	BFp: 58.5	Bp: 62.0	SD: 31.2
metacarpal	GL: 168.0	BFp: 45.0	SD: 24.6	Bd: 47.0
femur	GL: 275.0	SD: 26.8		
patella	GL: 50.5	GB: 49.5		
tibia	GL: 283.0	GL: 28.3	Bd: 49.1	Dd: 36.3
astragalus	GLl: 54.1	Dl: 29.3	Bd: 32.8	
metatarsal	GL: 192.3	GL: 20.0	Bd: 43.4	
1st phalanx (f:l/m)	GL: 51.2	GL: 51.6		
1st phalanx (h:l/m)	GL: 52.6	GL: 54.7		
2nd phalanx (f:l/m)	GL: 34.1	GL: 34.1		
2nd phalanx (h:l/m)	GL: 32.1	GL: 32.9		
3rd phalanx (h:l/m)	DLS: 44.5	DLS: 47.5		

In all cases, the right hand limb is measured.
f = forelimb; h = hind limb; l = lateral; m = medial
All measurements described in Dreisch (1976) except:
scapula SG = shortest distance from base of spine to rim of glenoid cavity
humerus HMT = height at middle groove of distal trochlea
All measurements in millimetres

Table 25: Summary of Bronze Age measurements

Cattle:				
scapula	SLC: 48.0	GLP: 68.0	SG: 49.0	
tibia	SD: 40.0	Bd: 59.3	Dd: 41.4	
astragalus	GLl: 59.2	Dl: 33.5	Bd: 41.8	
Sheep:				
tibia	GL: 197.0	SD: 12.5	Bd: 22.2	Dd: 19.0
	14.5	26.9	20.0	
astragalus	GLl: 25.5	Dl: 14.5	Bd: 15.8	

Key: see Table 24

Cattle burial (Fig. 56)

The most interesting find from the site is that of a cattle skeleton (109 bones recovered) from context 7057, layer 3. The bones recovered are summarised in Table 23, and the measurements of the bones are given in Table 24. This was a juvenile or sub-adult. Unfortunately only the anterior ends of the mandibles were recovered: two incisors are permanent and coming into wear and two are deciduous. The epiphysial fusion results show that most late fusing bones are either unfused or just fused. It is interesting to note that for the vertebral column, the caudal, sacral and lumbar vertebrae have fused central epiphyses, whereas the thoracic and cervical vertebrae are unfused. For the measurements given in Table 24 the greatest lengths include the epiphyses for the unfused bones.

Bronze Age assemblage

Chronological comparison

Table 21 illustrates that the basis for a chronological comparison is very poor because the samples are extremely small. Cattle again predominate, followed by a higher proportion of sheep/goat and a lower proportion of pig than in the Neolithic sample.

Species exploited

The range of species exploited appears to be very narrow: cattle, sheep, pig, horse and possibly red deer. Nine of the sheep/goat bones were identified as sheep, but no goats were identified. The assumption, therefore, is that all or most of the sheep/goat bones are from sheep. None of the pig bones appear to have been from wild pigs. Only two red deer bones were recovered, a lower molar tooth and a piece of antler. The antler may well have been picked up as a shed piece, so it is impossible, on the basis of one tooth, to say if red deer were actually hunted. Clearly, the emphasis appears to have been placed upon domestic animals.

Cattle

Cattle bones are the most common (53% of identified bones, excluding human), so cattle may have been the most important species. Ageing evidence is very scanty. Two mandibles provide age stages of 21 (Grant 1982), this being from a juvenile (third molar not yet erupted, second molar at wear

Figure 56 Area 7000, Neolithic cattle burial in pit 7057

state d); and 49, this being from an adult (third molar at wear state k). The epiphysial fusion data are summarised in Table 22. This shows quite clearly (though the sample is very small) that the majority of cattle were sub-adult or older since no unfused bones are present in the infant fusing age group and only one unfused bone is present in the juvenile fusing age group. Conversely, the majority of bones in the sub-adult fusing age group are not fused, and all the bones from the adult fusing age group are not fused.

The pelvis morphology suggests that the sex of two specimens is female (Grigson 1982). Cattle bone measurements are given in Table 25. There was no evidence of butchery on any of the cattle bones.

Sheep/goat

As previously mentioned, the few bones identified to species level are all from sheep. About a quarter of the bones are loose teeth, these being mostly permanent teeth which were in wear. One is not worn and there is one deciduous tooth (in wear). Two teeth are third molars (wear states e and g). One mandible with teeth present is at wear stage 12 (second molar erupted but not yet in wear). Evidence from epiphysial fusion is scanty: out of eleven bones, one has an unfused epiphysis (proximal ulna—a late fusing epiphysis). Of the other bones six are early/juvenile fusing epiphyses: distal humerus (three), proximal radius, pelvis, distal tibia. The remainder are late fusing: distal radius, proximal femur, distal femur, proximal tibia. Most of the sheep, therefore, appear to have been adults. Bone measurements are given in Table 25. There is no direct evidence of butchery.

Pig

The six pig bones include three third molars one of which is unworn and two worn (a lower third molar at wear state a). One mandible also has a third molar at wear state a. There are no fusion data, but the general appearance of the bones implies that the pigs were mainly sub-adult or juvenile.

Horse

The horse bones are a left mandible (permanent dentition in wear), a fragment of proximal tibia and a left distal tibia (unfused). Both tibiae could conceivably be from donkeys, but the mandible is definitely horse. None of the bones are complete enough for measurement, but they are from small (pony-sized) individuals.

Red deer

The bones recovered have been listed above. The antler is a piece of tops and the tines have been cut off (the only definite butchery marks observed on the Bronze Age material).

Comments

The cattle burial is interesting because animal burials seem to be reasonably common on ceremonial Neolithic sites, but are uncommon on domestic sites (for example, see reports

on Hazleton, Gloucestershire (Levitan 1990), and Charterhouse Warren Farm Swallet, Somerset (Levitan *et al.* 1988; Levitan and Smart 1989)). It is difficult to know whether or not any ceremonial activity may be imputed from such deposits on settlement sites. It is not possible to say if this is the case simply from the bones themselves, but the lack of butchery means that the animal was at least not cut up in the way one would expect had it been eaten. It could have been diseased. If it was a deliberate burial of a healthy animal, it should be taken into account that it would represent a sacrifice in economic terms. This may hint at a ceremonial aspect. The reports on Charterhouse Warren Farm Swallet, cited above, have detailed discussions on this topic.

To draw 'conclusions' from so small an assemblage would be folly. This does not, however, detract from the importance of the Neolithic and Bronze Age assemblages for the reasons stated in the introduction. It is interesting to note that the site of Barrow Hills, Abingdon, has a very different species representation for the Bronze Age. Cattle are still predominant (70%), but pig are second in rank (10%) and sheep/goat account for only 7% (Levitan, nd). In her survey of Bronze Age sites, Grigson shows that there is quite a lot of variation in this respect (Grigson 1981). Sites with similar results to Reading are Snail Down, Wiltshire (early Bronze Age); Ramshill, Oxon; Eldon's Seat, Dorset and Grimsthorpe, Yorkshire (Middle and Late Bronze Age). With the exception of Snail Down these are all settlements or associated with settlements. Results that are similar to Barrow Hills include Gortnacargy, Co. Cavan, Eire; and Balinderry, Co. Offaly, Eire (one a cairn and one a settlement). These results indicate that Reading Business Park fits into the range of Bronze Age sites, and is, if anything, one of the more typical sites in terms of species representation.

Finally, it is worth mentioning in passing that the wider variety of species present in the Romano-British assemblage is typical, particularly the occurrence of domestic fowl.

Archive

The bones are in the care of the Oxford Archaeological Unit. The records of the identifications, measurements, etc. are on computer and are available on 5.25" and 3.5" floppy discs. The records were made using the DBASE IV database, and are available either in .dbf form or as ASCII comma delimited files. Copies of this archive are housed at Reading Museum and with the author of this report.

BRONZE AGE PLANT REMAINS

by Gill Campbell

Features at Reading Business Park were sampled extensively with samples ranging in size from 0.5 to 16 litres, but averaging about 10 litres. Samples from non-waterlogged contexts were floated over a 0.5 mm mesh using a simple washover technique. The resulting flots were then dried and scanned in the laboratory for identifiable charred remains using a dissecting microscope. Where charred remains other than charcoal occurred, the flot was fully sorted and these remains identified with the aid of a modern reference collection. The results of this work are laid out in Table 27.

Samples from waterlogged features were processed in the laboratory. Small sub-samples were wet sieved down to 0.212 mm and scanned under a microscope to assess their content as to the preservation and quality of plant material. As a result of this assessment six samples were analysed in detail: a sample from a possible pond W of Area 5 (sample 3, context 104/A/6) and another five samples taken from a number of pits in Area 3100. Further sub-samples were taken, wet sieved through a series of sieves down to 0.212 mm and then sorted and identified. Only 10% of the fine fraction (0.5–0.212 mm) was sorted, and any identifications made from this fraction were multiplied up in the tables. The assemblages in the samples taken from the pits proved to be fairly similar. Thus only two of the sub–samples were fully quantified. For the other three sub-samples only the relative abundance of the different items was recorded using a four point scale:- {+ = 1–3, ++ = 4–25, +++ = 26–100 and ++++ = >100 items}. The full results of the analysis are presented in taxonomic order following Clapham, Tutin and Moore (1989) in Table 26. Where charred remains other than charcoal were present in the waterlogged samples, these have been recorded along with the results from the flots in Table 27.

Results

Charred plant remains

The majority of the samples contained very little charred material and this material was badly preserved, consisting of only comminuted fragments of charcoal less than a millimetre in diameter. It is thought that this poor preservation might be the result of mechanical damage caused by the wetting and drying of deposits over centuries due to a fluctuating water table. In about one third of the samples preservation was satisfactory and large amounts of charcoal were recovered, but this always seemed to occur in the deeper features where the problem of continual wetting and drying would have been less severe. No one sample contained a large number of remains other than charcoal, cereal remains were very scarce and some of the taxa present are likely to have had a non-arable origin. It therefore seems sensible to look at the assemblages as a whole rather than at the results from any one sample.

The presence of six-row, hulled barley (*Hordeum vulgare var. vulgare)* is deduced from the occurrence of hulled barley grain and six-row barley rachis fragments in the samples. The other two crop species present are emmer wheat (*Triticum dicoccum*) and horse bean (*Vicia faba*). The percentage of chaff as compared to cereal grain is quite high, 38%, but given the small number of items involved cannot be regarded as statistically significant.

Most of the other taxa such as *Rumex acetosella*

Table 26: Bronze Age waterlogged plant remains

Sample no.		3	3200	3243	3211	3215	3280
Sample size		250g	500g	500g	500g	500g	500g
Context no.		104/ A/6	3473/ 8/4	3796/ A/15	3475/ B/5	3514/ B/5	3812/ 8/5
TAXA (element if not a seed)							
Ranunculus acris L./*bulbosus* L./*repens* L.	buttercup	3	11	9	+	++	+
Ranunculus parviflorus L.	small-flowered buttercup	-	-	1	-	-	-
Ranunculus flammula L.	lesser spearwort	-	-	-	+	-	-
Ranunculus Subgen. *Ranunculus*	buttercup	2	2	-	+	-	-
Ranunculus Subgen. *Batrachium*	water crowfoot	-	-	-	+	+	-
Papaver rhoeas/dubium/lecoquii/hybridum	poppy	-	-	-	-	+	-
Thlaspi arvense L.	common penny-cress	-	-	3	-	-	-
Capsella bursa-pastoris (L.) Medic.	shepherd's purse	-	-	2	-	+	-
Camelina sp. (pod frag.)	gold of pleasure	-	1	-	-	-	-
Cruciferae indet.		-	1	-	-	-	-
Viola Subgen. *Viola*	violet	1	-	-	-	-	-
Viola Subgen. *Melanium*	pansy	1	-	-	-	-	-
Hypericum sp.	st john's wort	-	-	-	-	-	+
Cerastium cf. *fontanum* Baumg.	common mouse-ear chickweed	-	-	56	-	-	-
Cerastium sp.	mouse-ear chickweed	-	-	10	-	-	-
Stellaria media gp.	chickweed	2	28	55	+	++	+++
Stellaria palustris Retz.	marsh stitchwort	-	-	1	-	-	++
Stellaria graminea L.	lesser stitchwort	1	-	-	-	-	-
Sagina sp.	pearlwort	-	1	10	-	-	-
Spergula arvensis L. (small seeded)	corn spurrey	-	-	1	-	-	-
Carophyllaceae indet.		1	1	1	-	-	-
Montia fontana spp. *chondrosperma* (Fenzl) S M Walters	blinks	1	2	1	+	+	-
Chenopodium polyspermum L.	all-seed	-	-	11	-	-	-
Chenopodium cf. *album* L.	fat hen	2	18	9	+	+	+
Chenopodium ficifolium Sm.	fig-leaved goosefoot	-	2	9	-	+	-
Chenopodium rubrum type	goosefoot	-	2	-	-	+	+
Atriplex sp.	orache	3	15	3	-	-	+
Chenopodiaceae indet.		6	23	-	-	-	-
Linum usitatissum L.	cultivated flax	-	2	2	+	+	-
Linum usitatissum L. (capsule fragments)	cultivated flax	-	75	11	+	+++	+
Ilex aquifolium L. (leaf fragments)	holly	++	-	-	-	-	-
Trifolium sp. (petal fragment)	clover, trefoil	-	-	3	-	-	+
Trifolium sp. (calyx fragment)	clover, trefoil	1	-	-	-	-	-
Rubus fruticosus sens. lat.	blackberry	26	2	1	-	+	-
Rubus sp.		4	2	1	-	+	+
Rubus/Rosa type (thorn)		2	-	-	-	-	-
Potentilla anserina L.	silverweed	3	-	-	-	-	-
Potentilla erecta type	cinquefoil	-	-	-	-	+	-
Potentilla sp.	cinquefoil	1	-	-	+	-	-
Aphanes arvensis sens. lat.	parsley piert	2	-	-	+	-	+
Prunus spinosa L.	sloe	3	-	-	-	-	-
Prunus sp.	plum/ballace	1	-	-	-	-	--
Crataegus sp.	hawthorn	6	-	-	-	+	-
Crataegus/Prunus type (thorn)		1	1	-	-	-	+
Chaerophyllum temulentum L.	rough chervil	2	-	-	-	-	-
Aethusa cynapium L.	fool's parsley	-	1	1	-	+	+
cf. *Apium nodiflorum* (L.) Lag.	fool's watercress	1	-	-	-	-	-
Umbelliferae indet.		2	1	-	-	-	-
Polygonum aviculare agg.	knotgrass	-	7	1	+	+++	+
Polygonum persicaria L.	redleg	2	-	2	-	-	-
Polygonum lapathifolium L.	persicaria	-	1	19		-	-
Polygonum sp.		-	-	1	-	-	-
Rumex cf. *conglomeratus* Murray	sharp dock	-	-	-	-	-	+
Rumex sp.	dock	4	5	13	+	+	+++
Polygonaceae indet.		-	5	-	-	-	-
Urtica urens L.	small nettle	-	2	-	-	+	-
Urtica dioica L.	stinging nettle	18	133	22	+	++	+++
Corylus avellana L.	hazel	-	-	-	+	-	-

Table 26 (cont.)

Sample no.		3	3200	3243	3211	3215	3280
Sample size		250g	500g	500g	500g	500g	500g
Context no.		104/ A/6	3473/ 8/4	3796/ A/15	3475/ B/5	3514/ B/5	3812/ 8/5
Salix sp. (seed capsule)	willow	-	-	1	-	-	-
Salix sp. (leaf fragments)	willow	+++	-	-	-	-	-
Salix sp. (buds and bud scales)	willow	++	2	1	+	+	-
Solanum cf. *dulcamara* L.	woody nightshade	2	-	-	-	-	-
Solanum nigrum L.	black nightshade	2	1	8	-	-	-
Solanum sp.	nightshade	2	-	1	-	-	-
Linaria vulgaris Miller	common toadflax	-	-	-	-	+	-
Veronica sp.	speedwell	-	1	-	-	-	-
Mentha cf. *aquatica* L.	water mint	-	-	-	-	-	+
Mentha sp.	mint	5	-	1	-	-	+
Lycopus europaeus L.	gypsywort	5	-	-	-	-	+
Prunella vulgaris L.	self-heal	2	1	-	-	+	-
Lamium sp.	dead-nettle	-	2	17	-	-	+
Galeopsis Subgen. *Galeopsis*	hemp-nettle	1	1	-	-	-	-
Galeopsis sp.	hemp-nettle	1	1	-	+	-	+
Glechoma hederacea L.	ground ivy	-	-	-	-	-	+
Labiatae indet.		1	-	-	-	-	-
Plantago major L.	great plantain	1	23	20	-	++	1
Galium sp.		-	1	-	-	-	-
Sambucus nigra L.	elder	4	1	3	-	-	+
Bidens sp.	bur-marigold	-	1	-	-	-	-
Tripleurospermum sp.	mayweed	-	1	1	-	-	-
Carduus sp.	thistle	-	4	-	-	+	-
Cirsum sp.	thistle	-	2	-	-	+	+
Carduus/Cirsium sp.	thistle	-	3	-	-	-	+
Lapsana communis L.	nipplewort	-	-	-	-	+	-
Leontodon sp.	hawkbit	1	2	-	-	-	-
Sonchus oleraceus L.	milk thistle	-	2	4	-	-	-
Sonchus asper (L.) Hill	milk thistle	2	6	9	-	++	+
Compositae indet.		1	1	-	-	-	-
Juncus effusus type	rush	1492	741	100	-	+++	+++
Juncus cf. *effusus* type	rush	250	-	-	-	-	-
Juncus bufonius gp.	toad rush	-	449	451	++	+++	+++
Juncus Subgen. *Septati*	rush	-	132	-	-	++	+
Juncus sp.	rush	291	163	10	-	++	++
Sparganium erectum L.	branched bur-reed	-	1	-	-	-	-
Typha sp.	bulrush	-	-	-	-	++	-
Eleocharis palustris type	spike-rush	-	16	-	-	-	+
Carex spp.	sedge	21	8	16	+	+	++
Cyperaceae indet.		-	2	-	-	-	+
Triticum spelta/dicoccum (spikelet fork)	emmer/spelt wheat	-	-	-	-	+	-
Cereales indet. (bran fragment)	cereal	-	-	17	-	+	-
cf. Cereales indet. (bran fragment)	cereal	-	1	-	-	-	-
Gramineae indet.	grasses	1	53	85	+	++	+++
IGNOTA		5	14	2	-	+	+
Buds		++	+	++	-	+	++
Bud scales		++	+++	+++	-	+	+
Moss		++	+	++	+	+	+
Wood		+++	+++	++	+	+++	+
Charcoal		++	+++	+++	+	+++	++++

(sheep's sorrel), *Polygonum* species (bistorts) and *Tripleurospermum sp.* (mayweed) could have been growing as weeds of these crops but also occur in other disturbed habitats and could have been growing in the settlement itself.

Taxa characteristic of damp ground such as *Iris pseudacorus* (yellow flag) which is not normally found preserved by charring, are also present in the charred samples as well as taxa associated with scrub or woodland such as dogwood (*Cornus sanguinea*) and hawthorn (*Crataegus sp.*). The charcoal recovered was not looked at in any detail, but species present included *Quercus* sp. (oak), *Fraxinus* sp. (ash) and *Corylus/ Alnus* (hazel/ alder) type.

Waterlogged remains

The results from the waterlogged samples are far more substantial. As well as the remains of cereals the samples

Table 27: Bronze Age charred plant remains

TAXA (element if not a seed)	SAMPLE	31	2005	3200	3238	3232	3243	5019	5023	7035
	CONTEXT	755/B/1	2214/A1	3473/B/4	3631/A/3	3631/B2	3796/A/15	5015/A/1	5170/A/1	7321/A/1
	sample size			0.5kg	12 litres	10 litres	0.5 kg	12 litres	8 litres	12 litres
Ranunculus acris/repens/bulbosus	buttercup	-	3	-	-	-	-	-	-	-
Chenopodium cf. *album* L.	fat hen	-	1	-	-	-	-	-	-	-
Chenopodiaceae indet.		-	-	-	-	-	-	-	-	1
Malva sp.	mallow	-	1	-	-	-	-	-	-	-
Vicia faba L.	horse/celtic bean	-	-	-	-	-	-	1	-	-
Vicia/Lathyrus sp.	vetch/tare	-	-	-	-	1	-	-	-	1
Leguminosae indet.		-	2	-	-	-	-	-	-	-
Crataegus cf. *monogyna* Jacq.	hawthorn	-	-	-	-	-	-	-	-	1
Crataegus sp.	hawthorn	-	1	-	-	-	-	-	-	-
cf. *Cornus sanguinea* L.	dogwood	-	1	-	-	-	-	-	-	-
Polygonum cf. *persicaria* L.	persicaria	-	1	-	1	-	-	-	-	-
Polygonum lapathifolium L.	pale persicaria	-	-	-	1	-	-	-	-	3
Rumex acetosella agg.	sheep's sorrel	-	17	-	-	-	-	-	-	1
Rumex sp.	dock	-	4	-	-	-	-	-	-	2
Plantago lanceolata/media	plantain	-	-	-	-	-	-	-	-	1
Tripleurospermum sp.	mayweed	-	-	-	-	-	-	-	2	-
Iris cf. *pseudacorus* L.	yellow flag	1	-	-	-	-	-	-	-	-
Eleocharis palustris type	spike-rush	-	-	1	-	-	-	-	-	-
cf. *Schoenoplectus lacustris* (L.) Palla.	bulrush	-	1	-	-	-	-	-	-	-
Cyperaceae indet.		-	1	-	-	-	-	-	-	1
Poa annua type	annual meadow-grass	-	-	-	-	1	-	-	-	-
Gramineae indet.	grass	-	4	1	-	-	-	-	-	1
Gramineae indet. (chaff)	grass	-	-	-	-	-	-	-	-	1
cf. Gramineae indet.	grass	-	-	1	-	1	-	-	-	1
Moss fragment		-	-	-	-	-	1	-	-	-
Triticum dicoccum Schübl. (glume base)	emmer wheat	-	-	-	-	-	-	-	-	2
Triticum cf. *dicoccum* Schübl. (spikelet fork)	emmer wheat	-	-	-	-	-	-	-	-	1
Triticum dioccocum/spelta (spikelet fork)	emmer/spelt wheat	-	-	-	-	2	-	-	-	2
Triticum dicoccum/spelta (glume base)	emmer/spelt wheat	-	-	-	-	2	-	-	-	-
Triticum sp.	wheat	1	-	-	-	-	-	-	-	-
Triticum sp. (glume base)	wheat	-	-	2	-	-	2	-	-	-
Hordeum vulgare (rachis fragment)	six-row barley	-	-	1	-	-	-	-	-	1
Hordeum sp. (hulled)	barley	-	-	-	-	-	-	-	-	1
Hordeum sp.	barley	-	1	-	-	-	-	-	-	1
Hordeum sp. (rachis fragment)	barley	-	1	-	-	-	-	-	-	4
cf. *Hordeum* sp.	barley	-	1	-	-	-	-	-	-	-
cf. *Hordeum* sp. (rachis fragment)	barley	-	-	-	-	-	-	-	-	1
Cereales indet.	cereal	1	4	1	-	1	-	-	-	-
Cereales indet. (chaff)	cereal	-	1	-	-	-	1	-	-	1
cf. Cereales indet.	cereal	-	-	-	1	-	-	-	1	-
IGNOTA		1	7	-	1	-	-	-	-	2

from the pits (samples 3200, 3211, 3215, 3243 and 3280; features 3473, 3475, 3514, 3796 and 3812 respectively) produced the seeds and capsule fragments of cultivated flax (*Linum usitatissimum*) and a pod fragment of a genus generally associated with flax *Camelina sp.* (gold-of-pleasure). Flax remains are present in each one of the pit samples and are also one of the most abundant remains. However, the assemblages also contain abundant seeds of *Juncus spp.* (rush), *Urtica dioica* (stinging nettle) and *Stellaria media* gp. (chickweed) and other taxa associated with a number of different habitats.

Some taxa which occur in samples that also produced waterlogged cereal remains, such as *Ranunculus parviflorus* (small-flowered buttercup) *Thlaspi arvense* (field penny-cress), *Papaver sp.* (poppy) and *Spergula arvensis* (corn spurrey) are likely to have been growing as weeds in the cereal crops. These weeds are generally characteristic of neutral soils and tend to be associated with spring sowing. However, this group of species (Order: Polygono-Chenopodietalia) is also characteristic of nitrogenous disturbed ground. Other weeds present belonging to this group and present in the pit samples where no cereal remains were recorded, for example *Stellaria media* gp. (chickweed) *Aethusa cynapium* (fool's parsley), *Urtica*

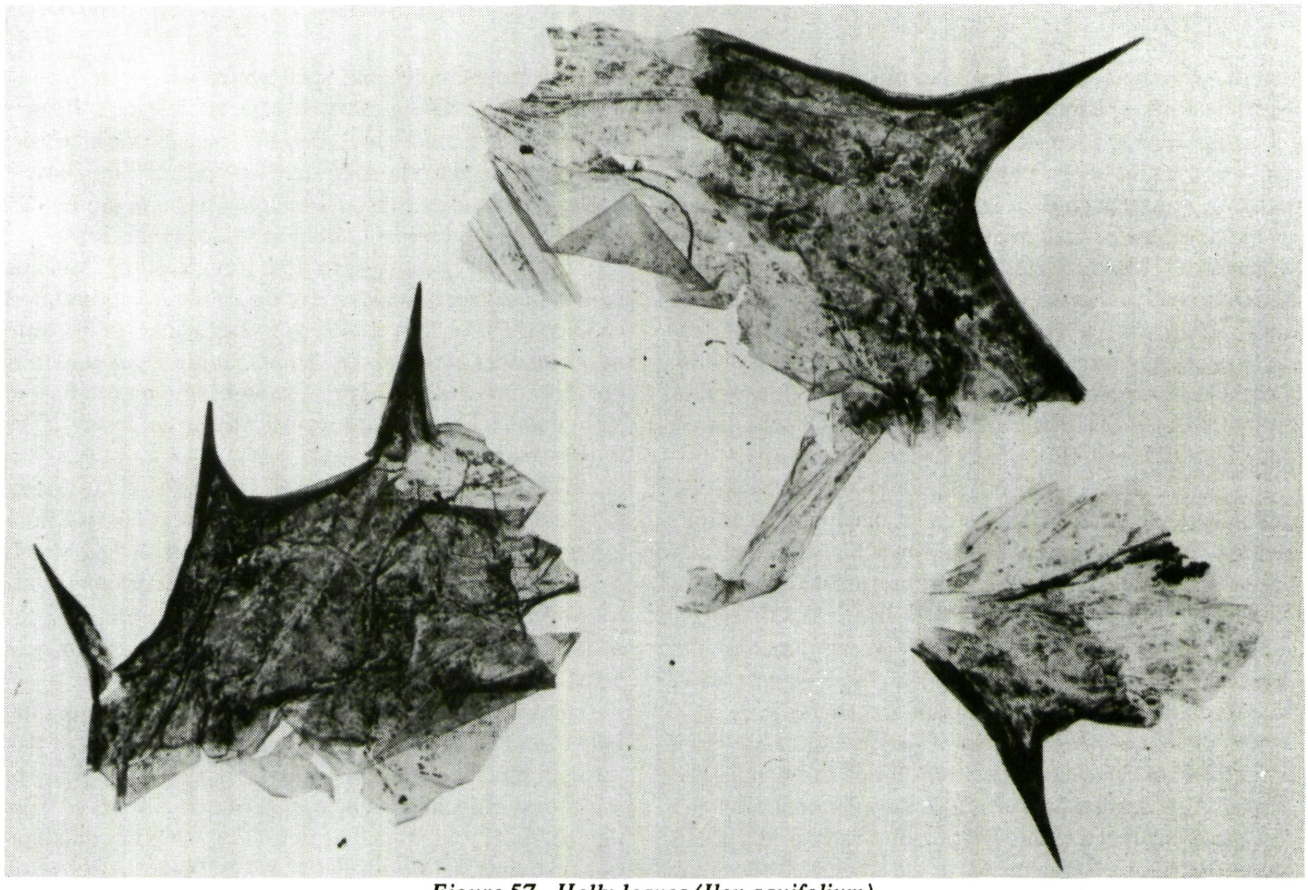

Figure 57 Holly leaves (Ilex aquifolium)
(Photograph taken by Norman Tait, Department of Botany, University of Glasgow)

urens (small-nettle) and *Tripleurospermum sp.* (mayweed) could either have been growing as segetal weeds, or on disturbed ground close to the site. All of these taxa, with the exception of *Stellaria media* gp. are notably absent in sample 3, from the possible pond (feature 104).

The sample from the pond also differs in that the only rush seeds found were of the *Juncus effusus*/inflexus/*conglomeratus* group, whereas the assemblages from the pits also produced rush seeds of *J.* Subgen. *articulatus*, and more notably, of the *J. bufonius* gp. Rushes of the last group in particular tend to be associated with trampled ground and mud, and together with the greater numbers of *Urtica dioica*, *Plantago major* (great plantain) and members of Polygonaceae and Chenopodiaceae in assemblages from the pits would seem to reflect increased disturbance. This greater disturbance is presumably due to the position of the pits on the edge of the settlement. There is evidence for wet ground and some standing water in the pits from the occurrence of such species as *Ranunculus* Subgen. *Batrachium* (water crowfoot) and *Sparganium erectum* (bur-reed). Both the samples from the pits and the sample from the pond contained many grass caropyses and taxa characteristic of grazed grassland communities, eg *Potentilla anserina* (silverweed) and *Plantago major* (great plantain).

Both types of feature also produced a number of scrubland or woodland species. Holly leaves (*Ilex aquifolium*; see Fig. 57) and willow leaves (*Salix* sp.) were recovered from the pond as well as seeds of blackberry (*Rubus fruticosus* agg.) and stones of hawthorn and sloe. This might in part reflect the vegetation growing immediately round the pond as well as that in the surrounding area.

Discussion

The plant remains from the pond (feature 104) would suggest that the site was set in an area of rough grassland with some scrub or woodland. Similar results were obtained by Wendy Carruthers from another waterlogged 'pond' in Area A (W of Kybe's Lane) and other low-lying late Bronze Age sites in the Kennet Valley have also produced evidence of damp grassland interspersed with scrub, or with some woodland (Carruthers, unpublished; Bradley *et al.*, 1980). Thorny scrub would have provided the inhabitants of the site with fuel, and also fruits and nuts such as blackberry, sloe, hazel and elderberry. However, such a habitat does not reflect intensive land use and though some grazing was clearly taking place it does not appear to have been very intensive as the thorny scrub would not have survived under such conditions.

The water table seems to have been fairly high at the time of occupation given the number of damp and wet ground species present in both the charred and waterlogged samples. The immediate vicinity of the site was probably not best suited to cultivation and it is unlikely that the cereals and other crops recorded from the site were grown

nearby, with the possible exception of flax. It seems more likely that higher ground, possibly at some distance from the site, would be used for this purpose.

The amount of chaff as opposed to grain from the site would suggest that crop processing was taking place, but it would be expected that greater numbers of cereal remains would have been recovered if this was a major activity. In addition charred remains such as culm nodes are absent which would suggest that the earlier stages of crop processing may not have taken place on the site, and that grain may have been transported to the site still in its hulls. However, as only the deeper features contained well preserved charred material it is possible that this evidence has been lost.

The occurrence of the emmer wheat and six-row hulled barley at the site fits well with other evidence from Kennet Valley. Emmer wheat, six-row hulled barley and naked six-row hulled-barley were recorded from Aldermaston by J R B Arthur (Bradley *et al.*, 1980). Naked six-row barley may also have been present amongst the indeterminate barley grains from Reading Business Park, but no grains of this type were positively identified.

Both emmer wheat and naked and hulled six-row barley appear to have been common crops throughout the Bronze Age. Spelt wheat was also an important crop and free-threshing bread wheat was probably present as a minor crop. The site of Runnymede, in the Thames Valley, has produced the full range of cereal crops, both hulled and naked barley, emmer and spelt wheat and even a small quantity of rye (Greig forthcoming), while a deposit associated with a cremation, at Ballast Hole, consisted almost entirely of bread wheat (Bradley *et al.*, 1980). Thus in contrast with other sites in the region those in the Kennet Valley have produced a limited range of cereal crops.

The single seed of *Vicia faba* from Reading Business Park is of interest. Evidence for the growth of leguminous crops in the Bronze Age is very sparse. However there are now a number of records of *Vicia faba* (horse bean) for this period including a large assemblage dated to the early/middle Bronze Age from Le Pinacle, Jersey (Carruthers, pers. comm.).

The presence of flax remains in each of the waterlogged pits studied, in conjunction with a find of flax from the adjacent site in Area A (Carruthers, unpublished) would suggest strongly that flax was being grown in the immediate vicinity of the site. The single find of *Camelina* sp., the earliest British record known to the author of this typical weed of flax, would lend support to this view.

Flax was probably grown both for its seeds and for fibre in the late Bronze Age. Evidence for the cultivation of flax for its fibre comes from the early-mid Bronze Age site of West Row, Mildenhall, where Peter Murphy identified large numbers of flax seeds and capsules in association with flax-like fibres in a pit (Martin and Murphy, 1988). No flax stems or fibres were recorded in the samples from the Reading

Table 28: Waterlogged plant remains from a Roman ditch (2822)

TAXA (element if not a seed)		No.
Ranunculus cf. *acris* L.	meadow buttercup	1
Ranunculus cf. *repens* L.	creeping buttercup	1
Ranunculus acris L./*bulbosus* L./*repens* L.	buttercup	8
Ranunculus parviflorus	small-flowered buttercup	1
Ranunculus flammula L. or *reptans* L.	spearwort	1
Ranunculus Subgen. *Ranunculus*	buttercup	7
Ranunculus Subgen. *Batrachium*	water crowfoot	3
Papaver argemone L.	long prickly-headed poppy	10
Papaver rhoeas/dubium/lecoquii/hybridum	poppy	12
Brassica sp.	cabbage/mustard	6
Thlaspi arvense L.	common field penny-cress	3
cf. *Sisymbrium officinale* (L.) Scop.	hedge mustard	1
Silene sp.	campion	1
Cerastium cf. *fontanum* Baumg.	common mouse-ear chickweed	1
Cerastium sp.	chickweed	4
Stellaria media gp.	chickweed	19
Stellaria graminea L.	lesser stitchwort	1
cf. *Sagina* sp.	pearlwort	20
Spergula arvensis L.	corn spurrey	1
Carophyllaceae indet.		1
Montia fontana L.	blinks	95
Chenopodium cf. *album* L.	all-seed	3
Chenopodium ficifolium Sm.	fig-leaved goosefoot	2
Chenopodium cf. *ficifolium* Sm.	fig-leaved goosefoot	3
Atriplex sp.	orache	4
Chenopodiaceae indet.		1
Malva sylvestris L.	common mallow	1
Malvaceae indet.		1

Table 28 (cont.)

TAXA (element if not a seed)		No.
Linum usitatissum L.	cultivated flax	4
Linum usitatissum L. (capsule fragments)	cultivated flax	12
Linum catharticum L.	purging flax	2
Trifolium sp. (calyx fragment)	clover, trefoil	3
Filipendula ulmaria (L.) Maxim	meadowsweet	1
cf. *Filipendula ulmaria* (L.) Maxim	meadowsweet	9
Rubus sp.		1
Potentilla anserina L.	silverweed	7
Aphanes arvensis sens. lat.	parsley piert	29
Chaerophyllum temulentum L.	rough chervil	3
Coriandrum sativum L.	coriander	1
Apium nodiflorum (L.) Lag.	fool's watercress	19
Torilis nodosa (L.) Gaertner	knotted hedge-parsley	2
Umbelliferae indet.		1
Polygonum aviculare agg.	knotgrass	27
Polygonum persicaria L.	redleg	15
Polygonum hydropiper L.	water pepper	16
Polygonum lapathifolium L.	persicaria	6
Polygonum sp.		13
Fallopia convulvulus (L.) Á. Löve	black bindweed	1
Rumex acetellosa agg.	sheep's sorrel	15
Rumex crispus L.	curled dock	6
Rumex cf. *crispus* L.	curled dock	4
Rumex cf. *conglomeratus* Murray	sharp dock	6
Rumex sp.	dock	17
Urtica dioica L.	stinging nettle	669
Salix sp. (leaves)	willow	*
Salix sp. (buds)	willow	14
Salix sp. (buds and bud scales)	willow	4
Hyoscyamus niger L.	henbane	4
Solanum nigrum L.	black nightshade	6
Solanum sp.	nightshade	1
Veronica Subgen. *Beccabunga*	brooklime/ speedwell	20
Odontites verna (Bell.) Dumort	red bartsia	4
Odontites/Euphrasia	red bartsia/ eyebright	2
Mentha sp.	mint	1
Lycopus europaeus L.	gypsywort	10
Prunella vulgaris L.	self-heal	9
Ballota nigra L.	black horehound	2
Labiatae indet.		3
Plantago major L.	great plantain	15
Sambucus nigra L.	elder	1
Bidens tripartita L.	tripartite bur-marigold	2
Tripleurospermum sp.	mayweed	4
Carduus sp.	thistle	2
Cirsum sp.	thistle	1
Carduus/Cirsium sp.	thistle	2
Leontodon sp.	hawkbit	2
Sonchus asper (L.) Hill	milk thistle	4
Juncus effusus type	rush	830
Juncus bufonius gp.	toad rush	301
Juncus Subgen. *Septati*	rush	150
Juncus sp.	rush	260
Eleocharis palustris type	spike-rush	4
Isolepsis setacea (L.) R. Br.	bristle club-rush	10
Carex spp.	sedge	11
Bromus sp.	brome	2
Triticum spelta/dicoccum (glume base)	emmer/spelt wheat	3
Hordeum sp. (rachis internode)	barley	3
Cereales indet. (bran fragments)	cereal	*
Gramineae indet.	grass	153
Gramineae indet. (spiklet)	grass	1
cf. Gramineae indet.		1
IGNOTA		6
Buds		*
Bud scales		*
Leaf abscision pad		*
Mosses		*
Wood		*

Table 29: Charred plant remains from sample 2006, taken from a Roman ditch 2221/A/2

TAXA (element if not a seed)		No.
Vicia cf. *tetrasperma* (L.) Schreber	smooth tare	1
Vicia sativa spp. *nigra* (L.) Ehrh.	common vetch	1
Vicia/Lathyrus sp.	vetch/tare	17
Rumex sp.	dock	4
Tripleurospermum sp.	mayweed	1
Bromus sp.	brome	1
Triticum dicoccum Schübl.	emmer wheat	1
Triticum dicoccum Schübl. (spikelet fork)	emmer wheat	1
Triticum cf. *dicoccum* (glume base)	emmer wheat	1
Triticum cf. *spelta* (glume base)	spelt wheat	1
Triticum dicoccum/spelta	emmer/spelt wheat	5
Triticum dicoccum/spelta (spikelet fork)	emmer/spelt wheat	5
Triticum dicoccum/spelta (glume base)	emmer/spelt wheat	3
Triticum cf. *aestivo-compactum* type	bread wheat	1
Triticum sp.	wheat	2
cf. *Triticum* sp.	wheat	2
Hordeum vulgare L. (rachis frag.)	6-row barley	7
Hordeum vulgare L. (rachis frag: side stalks)	6-row barley	3
Hordeum cf. *vulgare* L. (rachis frag.)	6-row barley	4
Hordeum sp. (rachis frag.)	barley	16
Hordeum sp. (hulled, straight grain)	hulled barley	137
Hordeum sp. (hulled, straight, germinated grain)	hulled barley	2
Hordeum sp. (hulled, twisted grain)	hulled barley	222
Hordeum sp. (hulled, twisted, germinated grain)	hulled barley	1
Hordeum sp. (hulled)	hulled barley	247
Hordeum sp.	barley	159
Hordeum sp. (germinated grain)	barley	5
cf. *Hordeum* sp.	barley	13
cf. *Hordeum* sp. (rachis frag.)	barley	1
Secale/Hordeum sp. (rachis frag.)	rye barley	9
Avena fatua/sterilis type (floret base)	wild oat	8
Avena sp.	oat	9
Avena sp. (twisted awn)	wild oat	22
cf. *Avena* sp.	oat	2
Cereales indet.	cereal	138
Cereales indet (fragmentary grain)	cereal	++++
Cereales indet. (embryo)	cereal	107
Cereales indet. (rachis frag.)	cereal	3
Gramineae indet.	grass	12
Gramineae indet. (rachis frag.)	grass	4
IGNOTA		3

Business Park pits and this could either be the result of poor preservation, or alternatively the remains could represent waste from flax beating or rippling, stage C1 or C2 in the model put forward by Pals and Van Dierdonck (1988). It is clear that the assemblages within the waterlogged pits originated from a number of different sources and probably represent material derived from the plants growing nearby, mixed with rubbish which may have included waste from flax processing. This does not necessarily mean that the pits could not have been used for flax retting prior to falling into disuse and being filled with rubbish. Indeed the presence of standing water in the pits as suggested by the wetland plants recovered in the samples and the insect evidence would make them very suitable for such a purpose.

Taking the results from the study of the plant remains as a whole, the inhabitants of the Bronze Age site at Reading Business Park seem to have been involved in mixed farming rather than specialising in animal husbandry or arable farming. If the settlement was wholly involved in the raising of livestock one would expect the area immediately around the site to have been more intensively grazed, with less scrub surviving. In addition the presence of some chaff on the site indicates that at least some crop processing was taking place. There is evidence for the growth of flax either for seed or fibre and some evidence to suggest that flax was being processed at the site.

ROMAN PLANT REMAINS

by Gill Campbell

10 litre samples were taken for waterlogged and charred plant remains from a number of features. Some of these features were waterlogged, and samples from these were assessed by Mark Robinson in 1987. Based on this assessment two samples from a ditch (fill 2822/A/3) were selected

for detailed analysis. 250 g sub-samples were wet-sieved to a mesh size of 0.212 mm and sorted and identified with the aid of a dissecting microscope and with reference to the modern reference collections at the University Museum. The results from both samples were broadly similar and since both samples were from the same context, they were combined. They are presented in Table 28, in taxonomic order following Clapham, Tutin and Moore (1989); * indicates presence.

The remaining four samples, from non-waterlogged features, were floated using a simple washover technique onto a mesh of 0.5 mm. The resulting flots were assessed by the author. Only one flot from a dump within a ditch (fill 2221/A/2) produced material worthy of further work. 50% of this flot was subsequently sorted and identified and the results are shown in Table 29.

In view of the limited material recovered no overall discussion concerning the nature of the Roman economy can be attempted. Thus each of the assemblages will be dealt with on their own merit and any conclusions drawn separately.

The waterlogged plant remains from ditch 2822

The assemblage from ditch 2822 was very mixed and contained a large number of species capable of growing in a variety of habitats. Remains of cultivated plants were present in small numbers; flax (*Linum usitatissimum*) was represented by both seeds and capsule fragments while cereal remains included bran fragments as well as barley and glume wheat chaff. A single fragment of coriander (*Coriander sativum*) was found; it was probably present in the deposit as the result of growing as a casual weed in arable fields.

The assemblage contained a number of weed species generally associated with arable fields on neutral soils, but also capable of growing in other disturbed habitats. These included: *Papaver argemone* (long prickly-headed poppy), *Thlaspi arvense* (field penny-cress), *Spergula arvensis* (corn spurrey), *Malva sylvestris* (common mallow), *Fallopia convolvulus* (black bindweed), *Rumex acetosella* agg. (sheep's sorrel), Odontites verna (red bartsia), Sonchus asper (milk thistle) and *Tripleurospermum* sp. (mayweed).

In addition, species more typical of grassland, including many grass caryopses and rush seeds were recorded. The presence of *Ranunculus acris* (meadow buttercup), *R. repens* (creeping buttercup), *Potentilla anserina* (silverweed) and *Plantago major* (great plantain) would suggest that there was some pasture within the catchment of the ditch.

The large numbers of *Urtica dioica* (stinging nettle) seeds recovered as well as seeds of *Hyoscyamus niger* (henbane), *Sambucus nigra* (elder) and members of the Chenopodiaceae family indicates that the ditch provided a nitrogen-rich substrate while the presence of taxa such as *Ranunculus* Subgen. *Batrachium* (water crowfoot), *Montia fontana* (blinks), *Apium nodiflorum* (fool's watercress) and *Polygonum hydropiper* (water pepper) illustrates that the bottom of the ditch held water for most of the year. Some of these species may also have grown on bare mud on the bottom or sides of the ditch along with other plants present in the assemblage eg *Polygonum persicaria* (redleg) and rushes of the *J. bufonius* group. A number of shrubs and trees are likely to have grown at the side or on the banks of the ditch including willow, represented by remains of buds and leaves, as well as elder and *Rubus* sp. (blackberry/raspberry) bushes.

While it is clear that the ditch itself provided niches for a number of aquatic or semi-aquatic species as well as moisture-loving species such as rushes and *Filipendula ulmaria* (meadowsweet) the assemblage also contained species more generally associated with dry ground such as *Aphanes arvensis* (parsley piert) and *Torilis nodosa* (knotted hedge-parsley). This suggests that the area surrounding the ditch was well-drained.

Considering the assemblage as a whole, while the majority of the plant remains recovered probably grew either in the wet ditch bottom or along its sides, what is of interest here is the small number of crop remains recovered along with typical arable weeds and the element of the assemblage which is indicative of grazed grassland or pasture. These results would support the interpretation, already put forward by the excavator, that the ditch formed a field boundary. Possibly it separated fields under pasture from arable fields and had the secondary function of improving the drainage of these fields.

Charred plant remains from a sample recovered from ditch 2221

This sample consisted almost entirely of barley grain from which most of the hulls had been removed. There were very few weed seeds present and very little chaff. The assemblage probably represents semi-clean grain that was accidentally charred during drying or roasting of the grain prior to grinding into meal or flour.

All the barley grain, where preservation was sufficiently good to allow identification beyond genus level, proved to have come from a hulled form of this cereal. The ratio of twisted to straight grains was roughly 1.6:1. This ratio is consistent with the ratio expected for 6-row barley which is 2:1. This theoretical ratio is rarely achieved in practice and a more usual ratio for twisted to straight grain is 1.3 or 1.4:1 (Mark Robinson, pers. comm.).

The presence of 6-row barley (*Hordeum vulgare*) is confirmed from the rachis fragments recovered in the sample. Two types of rachis fragments were identified. The majority were typical of 6-row barley, but three were atypical, in that they were rather slender with the side florets appearing to have been borne on short stalks with the rear glume of the side floret originating on this stalk. This character has been observed to be generally more pronounced in lax-eared or 4-row barley than in dense-eared or 6-row barley and is thought to be associated with naked barley (Jacomet 1987). The association of these stalks with naked barley however, is based on the examination of a

limited range of material and their presence in this sample, where naked grains were absent, would suggest that this character also occurs in hulled forms.

No complete rachis internodes were recovered from the sample so it was not possible to determine ear-laxity. However, the presence of 'stalked' rachis fragments and the relatively high ratio of twisted to straight grains in the assemblage would tend to indicate that the type of hulled barley being grown, although clearly multi-rowed, could have contained both dense-eared (ie 6-row barley) and semi-lax or lax-eared forms, (ie 4-row barley). Measurements of a range of barley rachis internodes of Iron Age/Roman date recovered from Abingdon, Oxon., produced a scatter diagram that suggested that at this period in Britain no clear genetic differentiation between lax-eared and dense-eared forms of barley had taken place (Jones 1978). The findings presented here would support this view but clearly more evidence is needed.

In addition to remains of barley, spelt and emmer wheat chaff, and a few wheat grains were present in the sample. This wheat was presumably contaminant in the barley crop. The weed flora is very sparse and very little can be said concerning it. However the relative abundance of vetches as compared to other weeds might suggest either that the barley was harvested high on the ear or that the crop was grown on soil of low fertility.

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INSECT REMAINS FROM TWO LATE BRONZE AGE WATERLOGGED FEATURES

by Mark Robinson

Introduction

Insect remains were picked out from the sub-samples sorted for macroscopic plant remains by Mrs G Campbell from two late Bronze Age waterlogged features, one the small pond W of Area 5 and the second a pit within Area 3100. Additional sub-samples were subjected to paraffin flotation after sieving over a 0.2 mm mesh in order to remove further insect remains. In total, insects were extracted from 2.0 kg from 104/A/6, the pond, and 3.5 kg from 3243, the waterlogged pit.

The insects were identified with reference to the Hope Entomological Collections of the University Museum, Oxford, and the minimum number of individuals of each species is listed in Tables 30 and 31. Nomenclature in Table 30 follows Kloet and Hincks (1977).

The composition of the faunas and general environmental conditions

The majority of the insects from the samples can still be found in the Reading area. However, the presence of two members of the Scarabaeidae, *Onthophagus taurus* and *Melolontha* sp., is of interest.

O. taurus is a dung beetle which is now extinct in Britain although there are some early 19th-century records of its capture (Jessup 1986, 26). It is common in southern and central Europe (Paulian 1959, 88–9). It has been identified from Neolithic contexts at Etton, Cambs., and Runnymede Bridge, Berks., (Robinson, unpublished) and a late Bronze Age deposit at Bidford-on-Avon, Warks. (Osborne 1988, 719).

There are two species of *Melolontha* (cockchafer) which occur in the British Isles, *M. hippocastani* (F.) and *M. melolontha* (L.) (Jessup 1986, 28–9). *M. hippocastani* is restricted to Scotland and northern England as far S as the Lake District whereas *M. melolontha* is more generally distributed. The remains from the site included a head and pronotum fragment which showed a pale colouration similar to *M. hipposcastani.* However, a firm identification could not be made. *M. hippocastani* was identified from the middle Bronze Age Wilsford Shaft, Wilts. (Osborne 1969, 561). Both species occur in central Europe (Harde 1984, 238).

A third scarab from the site, *Copris lunaris*, is now very rare in Britain but has been identified from late Neolithic sediments at Runnymede Bridge, Berks., and a late Bronze Age pond at Mount Farm, Oxon. (Robinson, unpublished).

The two insect assemblages from Reading Business Park each comprised a stagnant water component which lived in the feature as the sediments accumulated and a terrestrial element derived from the surrounding landscape. Table 32 shows the abundance of various groups of Coleoptera from the samples which tend to be related to particular habitats. Conditions seem to have been relatively open, with grassland species (Groups 2, 3 and 11) well represented. There was, however, at least some woodland or scrub present (Group 4). Although there was some evidence for damp ground at the margins of the two deposits, beetles which feed on marsh plants (Group 5) were absent and there was no indication of flooding. The evidence for settlement and buildings (Groups 8, 9 and 10) is slight.

Grassland

Chafers and elaterids with larvae that feed on the roots of grassland herbs, for example *Agriotes lineatus* (Species Group 11), were relatively abundant and suggest a significant presence of permanent grassland. Scarabaeoid dung beetles, particularly from the genus *Aphodius*, were, at 8% of the terrestrial Coleoptera, well enough represented to show that the grassland was being grazed, although not heavily. The lack of severe grazing pressure is hinted at by the clover- and vetch-feeding weevils from the genera *Apion* and *Sitona* of Species Group 3 but they were not so

Table 30: Coleoptera

Coleoptera	Minimum number of individuals 104/A/6	3243
Nebria brevicollis (F.)	1	-
Dyschirius globosus (Hbst.)	1	1
Trechus obtusus Er. or *quadristriatus* (Schr.)	-	1
T. secalis (Pk.)	1	-
Bembidion lampros (Hbst.)	-	1
B. tetracolum Say	2	-
B. clarki Daw.	1	-
B. biguttatum (F.)	-	-
B. guttula (F.)	-	2
Pterostichus diligens (Sturm)	-	1
P. longicollis (Duft.)	1	-
P. melanarius (Ill.)	1	1
P. cupreus (L.) or *versicolor* (Sturm)	1	1
Agonum muelleri (Hbst.)	1	-
A. obscurum (Hbst.)	1	-
Amara cf. *plebeja* (Gyl.)	-	1
Amara sp.	1	2
Harpalus S. *Ophonus* sp.	-	1
Stenolophus teutonus (Schr.)	-	1
Acupalpus cf. *exiguus* Dej.	3	-
Dromius quadrimaculatus (L.)	1	-
Hydroporus sp.	2	-
Agabus bipustulatus (L.)	1	-
Helophorus aquaticus (L.) or *grandis* Ill.	1	1
H. nubilus F.	-	1
Helophorus spp. *(brevipalpis* size)	8	7
Cercyon analis (Pk.)	-	2
C. pygmaeus (Ill.)	1	-
C. unipunctatus (L.)	-	1
Cercyon sp.	1	-
Megasternum obscurum (Marsh.)	1	1
Cryptopleurum minutum (F.)	-	1
Onthophilus striatus (Forst.)	1	-
Ochthebius cf. *bicolon* Germ.	1	-
O. minimus (F.)	2	-
O. cf. *minimus* (F.)	7	3
Hydraena cf. *riparia* Kug.	1	-
H. testacea Curt.	9	-
Ptiliidae indet. (not *Ptenidium*)	2	-
Scydmaenidae indet.	1	-
Micropeplus fulvus Er.	1	-
Lestera longoelytrata (Gz.)	-	2
Lesteva sp.	1	-
Omalium sp.	-	1
Xylodromus concinnus (Marsh.)	-	1
Carpelimus cf. *corticinus* (Grav.)	1	-
C. cf. *impressus* (B. and L.)	4	-
Platystethus arenarius (Fouc.)	-	1
P. cornutus gp.	-	3
Anotylus nitidulus (Grav.)	-	2
A. rugosus (F.)	1	-
A. sculpturatus gp.	1	1
Oxytelus fulvipes Er.	2	-
Stenus spp.	2	3
Lathrobium longulum Grav.	1	-
Lathrobium spp. (not *longulum*)	3	-
Gryohypnus fracticornis gp.	1	1
Xantholinus glabratus (Grav.)	-	1
X. longiventris Heer	-	1
X. linearis (Ol.) or *longiventris* Heer	1	1
Philonthus spp.	1	4
Gabrius sp.	-	1
Staphylinus caesareus Ced. or *dimidiaticornis* Gem.	1	-

Table 30 (cont.)

Coleoptera	Minimum number of individuals 104/A/6	3243
Tachyporus sp.	-	3
Tachinus sp.	2	1
Aleocharinae indet.	3	5
Pselaphidae indet.	2	
Colobopterus erraticus (L.)	-	1
Aphodius ater (Deg.)	-	1
A. cf. *foetidus* (Hbst.)	1	1
A. luridus (F.)	-	1
A. cf. *sphacelatus* (Pz.)	3	2
Aphodius spp.	-	2
Copris lunaris (L.)	1	-
Onthophagus ovatus (L.)	2	-
O. taurus (Schr.)	-	1
Melolontha sp.	1	-
Phyllopertha horticola (L.)	3	1
cf. *Cyphon* sp.	11	-
Byrrhus sp.	1	-
Dryops sp.	1	-
Agrypnus murinus (L.)	1	-
Athous haemorrhoidalis (F.)	1	-
A. hirtus (Hbst.)	1	-
Agriotes lineatus (L.)	1	2
A. obscurus (L.)	-	1
Agriotes sp.	2	-
Cantharis sp.	2	3
Grynobius planus (F.)	1	-
Anobium punctatum (Deg.)	2	-
Ptinus fur (L.)	-	1
Brachypterus urticae (F.)	1	-
Stilbus sp.	-	1
Orthoperus sp.	-	2
Coccidula rufa (Hbst.)	1	-
Lathridius minutus gp.	-	1
Enicmus transversus (Ol.)	-	1
Dienerella separanda (Reit)	2	-
Corticaria punctulata Marsh.	-	1
Corticariinae indet.	-	1
Pyrochroa serraticornis (Scop.)	1	-
Oulema melanopa (L.)	-	1
Gastrophysa polygoni (L.)	-	1
Phyllotreta atra (F.)	-	2
P. vittula Redt.	-	1
Longitarsus spp.	4	3
Chalcoides sp.	1	-
Chaetocnema concinna (Marsh.)	1	1
Apion urticarium (Hbst.)	-	1
Apion spp.	5	2
Sitona hispidulus (F.)	-	1
S. sulcifrons (Thun.)	1	-
Sitona spp.	-	1
Hypera punctata (F.)	1	-
Acalles turbatus Boh.	2	-
Ceuthorhynchinae indet.	1	-
Orobitis cyaneus (L.)	1	-
Anthomus cf. *rubi* (Hbst.)	1	-
Curculio salicivorus Pk.	1	-
Miccotrogus picirostris (F.)	1	-
Gymnetron labile (Hbst.)	1	-
Scolytus rugulosus (Müll.)	1	-
TOTAL	144	100

Table 31: Other insects

Other insects	Minimum number of individuals 104/A/6	3243
Sehirus bicolor (L.)	1	4
Pentatoma rufipes (L.)	1	-
Anthocorinae indet.	-	1
Aphrophora sp.	2	-
Aphrodes histrionicus (F.)	1	1
Homoptera indet.	1	-
Myrmica rubra (L.) or *ruginodis* Nyl.	-	1
Hymenoptera (not Formicidae)	3	7
Chironomidae - larvae	-	+
Diptera - puparia	1	2
Diptera - adults	2	2

Table 32: Species groups of terrestrial Coleoptera as a percentage of the total terrestrial individuals

	Samples
(1. Aquatic	22.0)
2. Pasture/Dung	8.0
3. ?Meadowland	5.0
4. Wood and Trees	3.5
5. Marsh/Aquatic Plants	0
6a. General Disturbed Ground/Arable	0
6b. Sandy/Dry Disturbed Ground/Arable	0
7. Dung/Foul Organic Material	5.5
8. Lathridiidae	3.0
9. Synanthropic	0.5
10. Esp. Structural Timbers	1.0
11. On Roots in Grassland	6.5
12. Unclassified	67.0
TOTAL NUMBER OF TERRESTRIAL INDIVIDUALS	200

Species in group:
1. water beetles (excluded from sum);
2. dung beetles from the genera *Colobopterus*, *Aphodius*, *Copris* and *Onthophagus*;
3. weevils of the genera *Apion* and *Sitona* excluding *A. urticarium*;
4. beetles of the genera *Rynobius*, *Pyrochroa*, *Chalcoides*, *Acalles*, *Curculio* and *Scolytus*;
5. absent;
6a. absent;
6b. absent;
7. *Cercyon* spp., *Megasternum* sp., *Cryptopleurum* sp., *Platystethus arenarius*, *Anotylus rugosus* and *A. sculpturatus*;
8. *Lathridius* sp., *Enicmus* sp., *Dienerella* sp. and Corticariinae spp.;
9. *Ptinus fur*;
10. *Anobium punctatum*;
11. beetles of the genera *Phyllopertha*, *Agrypnus*, *Athous* and *Agriotes*.

abundant as to suggest hay meadow conditions. Various of the phytophagous Coleoptera feed on grassland plants but few of them are sufficiently host-specific to give much indication of the composition of the flora. One of the beetles, however, *Gymnetron labile*, is restricted to *Plantago lanceolata* (ribwort plantain).

Arable and disturbed ground

The carabid beetles which comprise Species Groups 6a and 6b and tend to be favoured by arable conditions were entirely absent. The Bronze Age soil of the floodplain did not show any evidence of cultivation. However, it is possible that cultivation on the gravel terrace would not be reflected in the two insect assemblages. Table 33 gives the host plants of the phytophagous insects. They include a few weeds such as *Urtica* spp. (stinging nettle) and *Lamium* or *Ballota* spp. (dead nettle or horehound) which could have grown on disturbed or neglected ground around the settlement, but the macroscopic plant remains give much better evidence for this aspect of the flora.

Table 33: Host plants of the Phytophagous Coleoptera and Hemiptera

Host Plant	Insect
Cruciferae	*Phyllotreta atra*
	P. vittula
Viola spp.	*Orobitis cyaneus*
Leguminosae esp. *Medicago*	*Sitona hispidulus*
and *Trifolium* spp.	*S. sulcifrons*
	Sitona spp.
	Hypera punctata
	Miccotrogus picirostris
Rubus spp. and other Rosaceae	*Anthonomus* cf. *rubi*
Rosaceous trees and shrubs	*Scolytus rugulosus*
Polygonum and *Rumex* spp.	*Gastrophysa polygoni*
	Chaetocnema concinna
Urtica spp.	*Brachypterus urticae*
	Apion urticarium
Rotten wood esp. *Quercus*	*Pyrochroa serraticornis*
Salix spp.	*Curculio salicivorus*
Populus and *Salix* spp.	*Chalcoides* sp.
Lamium and *Ballota* spp.	*Sehirus bicolor*
Plantago lanceolata	*Gymnetron labile*

Woodland and scrub

Wood and tree-dependent species comprised 3.5% of the terrestrial Coleoptera. This is a rather higher value than might be expected from an almost fully cleared landscape in which trees and shrubs were restricted to hedgerows but is unlikely to represent much more than a quarter woodland cover in the catchment. The majority of these beetles which are associated with particular woody species feed on rosaceous trees and shrubs (hawthorn, sloe, etc.) and *Salix or Populus* spp. (willows or poplars) rather than trees of primary woodland. Willows probably grew in some of the wetter hollows of the site and along the water courses while there was perhaps some thorn scrub on the grassland.

Decaying organic material and buildings

The abundance of beetles which feed on a variety of decaying organic material including dung (Species Group 7) was not high enough to indicate the proximity of any accumulations of organic refuse. A couple of specimens of *Anobium punctatum* (woodworm beetle, Species Group 10) were present but they could have been living in naturally occurring dead wood along with, for example, *Grynobius planus*. The only beetle present belonging to the synanthropic species of Group 9, *Ptinus fur*, had most probably been derived from the settlement. It occurs in a variety of indoor habitats although it can live in birds' nests.

Differences between the assemblages

There were some differences between the insect faunas from the two deposits. Sample 104/A/6, being from a small pond, contained a higher concentration and greater range of species of small water beetles than sample 3243, from a pit. There was a higher proportion of scarabaeoid dung beetles (Species Group 2) in sample 3243 whereas the grassland beetles of Species Group 11 and the tree-dependent beetles of Species Group 4 were more abundant in sample 104/A/6. This is probably because sample 104/A/6 was giving a picture of the general landscape whereas the pit was on the edge of the settlement and perhaps reflected a concentration of domestic animals around it.

Comparison with environmental evidence from other late Bronze Age insect assemblages from the region

Insect assemblages have been analysed from three other late Bronze Age sites in the Middle Thames: Anslows Cottages (Robinson, unpublished) and Knight's Farm (Bradley *et al.* 1980, 282) on the Kennet gravels and Runnymede Bridge (Robinson, unpublished) on the bank of the Thames. The assemblages from Anslows Cottages and Runnymede Bridge were from channel deposits, which resulted in very different aquatic and waterside faunas. However, the terrestrial faunas from all four sites suggest largely open, predominantly grassland environments. At Runnymede, the floodplain pasture was perhaps more intensively managed that at Reading Business Park, with less scrub present. There was also evidence for arable on the higher ground. The site at Anslows Cottages was wetter than Reading Business Park and a contrast was presented between tree-covered small islands between the various channels of the river Kennet and grassland on the main body of the floodplain. The insect assemblages samples from Knights Farm were unfortunately very small but showed similarity to those from Reading Business Park.