Chapter 4: Castle Hill Environmental Evidence

HUMAN BONE
by Peter Hacking, Annsofie Witkin and Ceridwen Boston

The skeletal analysis which forms the basis of this report was carried out by Peter Hacking. The assemblage comprised a disarticulated human bone from the late Bronze Age enclosure ditch; five articulated burials and three deposits of disarticulated human bone from middle Iron Age pits; one newborn, dating to the late Iron Age to early Roman period, inserted into the top of a middle Iron Age pit; one adult inhumation dating to the late Roman period; and numerous disarticulated bone recovered from late Roman, medieval and post-medieval contexts. Of particular interest is rare evidence of dismemberment of a middle Iron Age burial (3143), with cut marks clearly visible on the left femoral condyle of the knee joint.

Methodology

The skeletal inventory of the articulated remains was recorded pictorially. Disarticulated bones were recorded by side and element. The dental inventory followed the Zsigmondy system. Dental notations were recorded using the universally accepted recording standards and terminology of Brothwell (1981). The remains were sexed using a combination of cranial, pelvic and metrical data. Sexually dimorphic features were selected in accordance with recommendations set out in Buikstra and Ubelaker (1994) and Ferembach *et al.* (1980) and metrical data using ranges decribed in Chamberlain (1994). The following methods were used in the assessment of age: diaphyseal long bone lengths in perinatal skeletons (Scheuer *et al.* 1980), epiphyseal fusion (Chamberlain 1994), degenerative changes of the pubic symphysis (Todd 1921; Brooks and Suchey 1990), degenerative changes of the auricular surface (Lovejoy *et al.* 1985), dental attrition (Miles 1962), cranial suture closure (Meindl and Lovejoy 1985) and degenerative changes of the sternal rib ends (Iscan *et al.* 1985). Stature was estimated using regression formulae developed by Trotter (1970).

The human remains were examined for abnormalities of shape and surface texture. Pathological lesions were measured and described, but due to the small assemblage size, the prevalence of dental and skeletal pathologies was not calculated.

Results

Late Bronze Age

Fill 3081 of enclosure ditch 3017 contained a single fragment of left radial shaft of an adult individual of unknown sex. The bone was radiocarbon dated to 1050-890 cal BC/ 880-840 cal BC.

Middle Iron Age

Provenance

The articulated remains of four adults (3113, 3143, 3160 and 3163) and one neonate (3048) were recovered from pits dating to the middle Iron Age (Table 4.1). The articulation of body parts suggests that they had been buried in a fleshed state, probably not long after death. With the exception of skeletons 3143 and 3160, all skeletons were single inhumations placed within partly filled pits.

Pit 3152 was a cylindrical pit immediately west of pit 3019 (which contained the neonatal burial 3048). The feature is particularly interesting in that it contained the articulated remains of three individuals. The complete crouched skeleton of older adult male 3160 (radiocarbon dated to 370-160 cal BC) lay at the base of the pit, with a charred deposit (3163) at his feet, and fragments of a sheep/goat rib and humerus under his left arm. He was overlaid by the dismembered remains of an adult possible female (3143). The remains of this individual were scattered across the pit in four articulated units, which included the left pelvis and femur; the thoracic vertebrae and left and right ribs; the lumbar vertebrae and sacrum; and the left tibia. A cattle skull was associated with the partial skeleton, and a sheep/goat skull was present slightly higher in the same backfill. The two skeletons were separated by a thin deposit of clean soil, and are assumed to have been placed within the pit in one episode. Skeleton 3143 was covered by deposit 3146. This was in turn overlaid by secondary fills 3144, 3153 and 3154. In the late Iron Age-early Roman period, the last two fills were cut in order to bury neonate 3074 (radiocarbon dated 20 cal BC-130 cal AD). The choice of pit 3152 as the location for this much later burial may be coincidental, or may have been deliberately chosen, suggesting that its previous use as a place of burial was still remembered.

Disarticulated human remains were present in the fills of three middle Iron Age pits, 3015, 3058 and 6022 (Table 4.2). The primary fill (6023) of pit 6022 contained part of the left pelvis and proximal femora of an adult male, and a worn second permanent incisor, whilst the uppermost fill (3058) of pit 3057 contained cranial fragments and two hand bones of an adult of unknown sex. Fill 6023 of pit 6022 contained the distal femur and proximal tibia of the left knee joint of an adult possible male. The minimum number of individuals was three.

Bone preservation and completeness
The articulated skeletons were generally in a fair condition with little erosion to the cortical surface, although preservation did vary between elements. The disarticulated bone was in good condition. There was no evidence of weathering or abrasion consistent with trampling or prolonged exposure to the elements, and no evidence of animal gnawing.

The preservation of neonatal skeleton 3048 was fair, and much of the skeleton was represented, with the exception of a number of the long bones. Skeleton 3113 was discovered within a heavily truncated pit and appears to have suffered damage from ploughing and/or machining. Although fragmentary, most elements were present albeit incomplete. The cranium was absent, however, and only fragments of the mandible remained. The four articulated body parts of skeleton 3143 comprised (1) thoracic vertebrae 4-11 and fragments of the left and right ribs; (2) thoracic vertebra 12, lumbar vertebrae L1-5 and the sacrum; (3) the left pelvis and femur; and (4) the left tibia. Skeleton 3160 was near complete with only a few thoracic vertebral bodies absent, as well as the thinner parts of the iliac blades. Skeleton 3156 was not retrieved in full as most of the skeleton lay beyond the eastern limit of excavation and hence was left *in situ*. Only the right humerus, radius and ulna were recovered.

Age and sex
The articulated assemblage comprised an adult female aged 25-35 years (3113); two possible females, one of which (3143) was aged 20-25 years; an adult male aged between 40 and 50 years (3160); an adult of indeterminate age (3163); and a neonate estimated to be 39 and 40 weeks *in utero* (3048). On the basis of repeating skeletal elements, the minimum number of individuals represented by the disarticulated remains was two, both adult males. However, given their archaeological contexts within three separate pits, it is probable that they represent three adults.

Stature
It was possible to calculate the stature of all four adult inhumations (Table 4.1). The average stature in the British Iron Age has been calculated as 1.68 m (5'6") for males and 1.62 m (5'3") for females (Roberts and Cox 2003, 396). Thus, the stature of adults from Castle Hill is typical of this period.

Dental pathology
Due to the small sample, it was not possible to calculate meaningful prevalences for dental or skeletal disease. Dental disease was observed in skeletons 3113 and 3160, although neither was severe. The dentition of young adult 3113 showed one small carious lesion (1/17), no calculus formation (0/17) and no ante-mortem tooth loss (0/17). Only two fragments of mandible were present. Both the left and right mandible showed bony resorption consistent with moderate peridontal disease. The crowns of the two upper central incisors each displayed one groove indicative of dental enamel hypoplasia (2/17). Skeleton 3160 had multiple caries (9/28), considerable periodontal disease, and calculus deposits. Six teeth (6/32) had been lost ante-mortem. The greater dental decay observed in this skeleton may well be associated with his greater age, as dental disease is progressive.

Periodontal disease, the horizontal reduction of the alveolar bone of the jaws, is implicated in dental decay and subsequent ante-mortem tooth loss as bone loss may cause teeth to loosen in their dental pockets and be shed. Calculus is a mineralised plaque that forms when teeth exposed to carbohydrates are not cleaned regularly (Roberts and Manchester 1995, 55). Dental caries are cavities in the enamel and dentine of teeth. They are caused by acids produced by oral bacteria during the breakdown of sugars (Roberts and Manchester 1995, 46). All of the dental diseases mentioned here are inter-related. Although genetic predisposition does play a role in the development of dental disease, behavioural factors, such as a diet rich in carbohydrates and poor oral hygiene, are most responsible.

Dental enamel hypoplasia (DEH) is caused by disruption of the mineralisation process during enamel formation of the dentition, which manifests as horizontal lines, pits and grooves on the tooth crowns. Although the aetiology of DEH is not clearly understood, it appears to be caused by prolonged nutritional deficiency and/or disease in the first seven years of life. DEH was noted on the dentition of skeletons 3113 and 3160. The unerupted deciduous dentition of neonate 3048 showed no DEH, indicating a lack of stress *in utero*.

Skeletal pathology
Skeleton 3160 displayed osteophytosis and porosity of cervical vertebra 6 and thoracic vertebra 10, and osteophytosis of T11-T12 and L3-L5. The former is consistent with osteoarthritis. Skeleton 3143 also showed slight osteophyte formation

on lumbar vertebral bodies L1 and 2. Slight Schmorl's nodes (indentations of the superior and inferior surface of the vertebral bodies caused by the herniation of the intravertebral disc) were observed in T11 and 12, and L2 and 3. The defect was severe in L1. These degenerative changes are associated with advancing age, but in such a young individual, they may also have formed in response to stress placed on the spine by repeated strenuous activity.

A small enthesophyte was present at the insertion point of *infraspinatus* muscle to the right humerus of skeleton 3143. This muscle assists in raising and lateral rotation of the arm. Enthesophytes are calcifications of a ligament which may develop following damage to the muscle or ligament, as a result of excessive muscle strain. The injury was healed and of long standing.

One rib fragment of skeleton 3143 displayed a smoothed raised plaque of new bone on the visceral surface. Such lesions are associated with chronic pulmonary disease, particularly infection (Roberts and Manchester 1995). In this individual, however, the lesion appeared well healed.

Peri-mortem modification
A number of parallel cut marks were clearly seen on the joint surface of the condyles of the left distal femur of skeleton 3143. Macroscopically these appeared as narrow, V-shaped grooves consistent with those made with a sharp blade. Faint cut marks were also seen on the left tibial plateau, but these have not been confirmed microscopically and may well prove to be taphonomic in nature. No cut marks were observed on the other bones of this skeleton.

The lower torso and left hip and leg of skeleton 3143 had been divided into four parts and placed within pit 3152 immediately following the interment of the fully fleshed corpse of 3160. The cut marks on the femur suggest dismemberment at the left knee joint. The separation of skeleton 3143 into four parts might suggest that the corpse had been allowed to partially decompose prior to burial. The presence of cut marks on the femoral condyle, and the articulation of body parts, however, are not consistent with the normal sequence of decomposition of soft tissue, in which joints separate in a specific order, according to the relative strength of muscle and ligament attachments. The large joints of the shoulder, elbow, hip and knee are first to separate, followed by the joints between the sacrum and pelvis, the bones of the hand, the lower leg and foot, the radius and ulna, the sacrum and fifth lumbar vertebra, the skull and axis, the lumbar segments, the first and second vertebrae, the skull and mandible, and the C3 to C7. Last to disarticulate are the thoracic vertebrae, the tibia and fibula, and the bones of the feet (Ubelaker 1974, 28). Whilst the femur and tibia of the left knee of skeleton 3143 were separated (apparently dismembered), the left hip was still articulated. The spinal column had been separated between T11 and 12, but otherwise remained intact. The skull and vertebrae of the neck and upper chest, however, were missing. The evidence suggests that decomposition was not advanced and that certain body parts had been deliberately selected whilst the corpse was still fairly fresh. It is possible that further fine cut marks may be identified under magnification near these joint articulations. Evidence of dismemberment is rare in the osteological record and has considerable importance in the current debate on the nature of Iron Age funerary ritual (see Discussion below).

Late Iron Age and Roman period

Provenance

Two articulated skeletons (3012 and 3074) and 11 deposits of disarticulated bone dated to this period. Neonatal skeleton 3074 was radiocarbon dated to the late Iron Age-early Roman period (20 cal BC-130 cal AD). As described above, this skeleton had been inserted into the top of middle Iron Age pit 3152, within either a shallow recut or a hollow created by the decay of the two burials lower down in the pit (3143 and 3160). The legs were flexed at the hip and knee, with the lower legs and feet folded beneath the torso, which had been laid prone. The arms were elevated and flexed at the elbows, so that the lower arms and hands were folded beneath the infant's head. The head was turned to the right side. This body position would have been achieved by initially positioning the infant upright and flexing the legs (a normal sitting position for an older infant), and then laying the body forward, and tucking the arms beneath the head. Considerable care appeared to have been taken in laying out this infant. The burial was orientated north-south. In common with many neonatal burials of this period, the burial was unaccompanied by grave goods, and there was no evidence of a coffin.

The burial of adult male skeleton 3012 was dated through associated pottery to the late Roman period. This skeleton had been placed within a shallow, purpose-built trapezoidal grave cut into the upper fills of Iron Age pit 3015. The body had been laid out in a supine and extended position with the feet together and the hands overlying the pelvis. The burial was orientated south-west/north-east. The grave had been heavily truncated by ploughing causing the removal of much of the skull, with the exception of the right zygoma and the mandible. The size and shape of the grave cut indicated that the body had been uncoffined. Sherds of three late Roman pots overlay the pelvis, but due to plough disturbance, it was impossible to establish whether these were residual or had originally been grave goods.

Disarticulated human remains were found within 11 late Roman contexts (Table 4.3). The majority of these were fills of the hillfort ditch and quarry pits 3047 and 3157. The rest of the bone lay within colluvial layers (2006, 2007 and 3062), pit fills (3085 and 3161) and midden 2017. It is probable that the disarticulated remains were redeposited within these contexts, having originated from disturbed Iron Age deposits, such as pit fills. None, however, were scientifically dated.

Bone preservation and completeness

Bone preservation of both skeletons 3012 and 3074 was fair. The former individual was near complete, but lacked most of his cranium and both feet. The disarticulated remains were generally in a poor condition and displayed numerous old post-mortem fractures suggestive of disturbance and redeposition.

Age and sex

Skeleton 3012 was male, aged between 35-45 years. Skeleton 3074 had died either as a late foetus or as newborn shortly after birth (39-40 weeks). In accordance with accepted practice, sexing was not attempted.

All disarticualted human bone from the Late Roman contexts was adult, but only one (1013) could be more specifically aged or sexed. The morphology of the mandible indicated a possible male, whilst ante-mortem tooth loss and marked tooth wear of the remaining teeth suggested a mature adult. The deposit comprised a single individual, possibly entering the hillfort ditch from a disturbed context above.

Stature

The average stature of Roman males has been calculated as 1.69 m (5'5") and that of females as 1.59 m (5'2") (Roberts and Cox 2003). At 1.59 m (5'2"), male skeleton 3012 was considerably below average height for the period.

Dental pathology
The partial mandible of skeleton 3012 displayed considerable peridontal disease but no abscesses (0/10) or ante-mortem tooth loss (0/10). Tooth crowns showed calculus (7/8), but no caries (0/8) or dental enamel hypoplasia (0/8). The dentition of the disarticulated mandible from fill 1013 showed calculus deposits. Six teeth (6/16) had been lost ante-mortem.

Skeletal pathology
The dens of the axis found within fill 1013 displayed considerable osteophyte formation consistent with spinal degenerative joint disease. Meanwhile, a healed and longstanding fracture was present on the proximal end of the left first metacarpal of skeleton 3012. This had united with an angular deformity.

Disarticulated skeletal remains in medieval and post-medieval contexts

Disarticulated human remains were present in six medieval (3022, 3028, 6012, 6024, 6030 and 6033) and four pot-medieval contexts (1002, 2000, 2001 and 5050) (Table 4.4). Bone was also recovered from layer 3096, which contained artefacts of both Roman and medieval date. All these human remains were redeposited, possibly the disturbed remains of Iron Age or Roman burials, although no radiocarbon dating has been carried out on this material.

   Human remains within 1002, 3028, 3096, 6033 were identified as adult. The greater sciatic notch of the pelvis within 3028 was definitely male. The bones from 5050 were from an adult aged over 32 years, as indicated by a partial fused ectocranial suture. Two bones within the buried plough soil 3022 were those of a subadult aged 8-10 years. No pathology was noted on these bones.

Discussion

Middle Iron Age

The insertion of complete articulated individuals, articulated but incomplete body parts, and isolated, presumably skeletonised human bones into pits and other settlement features is a well-recognised characteristic of the Iron Age in southern England and the Midlands (Whimster 1981; Wilson 1981; Wait 1985; Hill 1995a). The variation in the treatment of human remains suggests a range of concurrent burial practices, which appears to include the careful placement of the complete corpse within empty or partially features soon after death; dismemberment of fleshed cadavers and the selection of body parts for interment in the above features and/or possible curation elsewhere amongst the living; and the deliberate and/or accidental incorporation of skeletonised bones within settlement features and occupation layers, possibly as a burial rite secondary to excarnation (Carr and Knüsel 1997). The last, however, has yet to be proved osteologically.

Six pits at Castle Hill contained articulated skeletons or disarticulated human bone. Other Oxfordshire examples of Iron Age 'pit burials' include Queen Street, Abingdon (Parrington 1975), Ashville, Abingdon (Parrington 1978), Cassington Mill (Chambers 1977), Allen's Pit, Dorchester (Whimster 1981), Gravelly Guy (Lambrick and Allen 2005) and Watkins Farm, Northmoor (Allen 1990).

The presence of clear cut marks on the femur of skeleton 3143 at Castle Hill is highly valuable to our understanding of this aspect of funerary ritual in this period. Although many authors have associated dismemberment with the presence of partial articulated body parts found within features dating to this period (eg Carr and Knüsel 1997; Cunliffe and Poole 1991, 424), osteological evidence of cut marks consistent with dismemberment is extremely rare, and cited examples such as that from Danebury (a 'dismembered' male pelvis, deposit 47: Cunliffe 1995, 77) rely more on anecdotal evidence than systematic osteological examination.

Roman period

One late Iron Age-early Roman neonatal pit burial and one late Roman adult male inhumation within a purpose-cut grave were excavated within the hillfort. A number of deposits dating to the late Roman period also contained disarticulated human bone, although in many cases it was uncertain if these were deliberately included (possibly a continuation of much earlier Iron Age burial practice) or were inadvertently redeposited from disturbed burials within Iron Age pits or Roman graves. Given the limitations of excavation, it is unclear whether the two burials were isolated features, or parts of larger burial groups. Possible evidence for the latter is provided by four inhumation burials excavated just outside the eastern entrance to the hillfort in the 1980s. These burials were unaccompanied, but the burial rite would be consistent with a date in the late Roman period (Chambers 1986).

ANIMAL BONE
by Fay Worley and Jennifer Kitch, fish bones by Rebecca Nicholson

Introduction

The excavations produced a total of 23,726 animal bone fragments (refitted count) weighing 72.025 kg. The majority of this material was analysed and recorded by Jennifer Kitch at Oxford Archaeology with a small sample recorded by Gill Cox, the sieved fraction by Emma-Jayne Evans and fish bone by Rebecca Nicholson, also at Oxford Archaeology. The small assemblage of bone from Trenches 7 to 9 was recorded by Fay Worley. A total of 10,561 (45%) bone fragments were identified to taxon. A further 6905 (29%) were identified as large, medium or small mammal sized.

The largest proportion of the animal bone assemblage was recovered from the Early Iron Age and late Roman phases which together made up 61% of the total assemblage. A further 19% of the assemblage was dated to the medieval period and 10% to the middle Iron Age, with the remaining fragments divided between the late Bronze Age, late Iron Age/early Roman and post-medieval periods, or less well defined phases (see Table 4.5).

Methods

The method used for primary bone analysis is documented in the archive but summarised here. The animal bone was recovered by hand collection and from wet-sieving, using a 500 μm residue mesh and 200 μm flot mesh. The fragments were washed prior to analysis. The assemblage was identified through comparison with textual and faunal reference material at Oxford Archaeology. Fragments were counted, weighed and recorded using the zone system as suggested by Serjeantson (1996). Identifications were made to as specific taxonomic levels where possible but with classes of large (cattle size), medium (sheep size), small (rabbit size) and micro (mouse sized) used where further identification was not possible. Bone fusion, tooth eruption and attrition were recorded and interpreted following Silver (1969), Halstead (1985) and Grant (1982). Evidence of butchery, gnawing and burning was also noted and interpreted. Where possible, bones were measured following standard conventions (Driesch 1976) and where appropriate, metric data was used to calculate withers heights of individual animals.

Condition of assemblage

The condition of the assemblage varied from excellent to very poor, but the majority of the assemblage was recorded as good to poor. Bone from the earlier phases of activity was generally in better condition than that from the later phases (Table 4.6; Figure 4.1). The 'Roman to medieval' bone assemblage was in particularly bad condition. This assemblage derived from colluvial layers overlying late Roman midden deposits, which contained mixed pottery, predominantly Roman material but including some Saxon and medieval sherds. The relatively poor condition of the bone fragments in these contexts may be used to suggest that much of the animal bone is probably disturbed Roman material.

The proportion of bone fragments with recent breaks varies from 1% of Roman to medieval fragments, 2% of middle Iron Age fragments and 3% of late Roman fragments to 53% of medieval fragments (see Table 4.7). High proportions of recently broken fragments were also recovered from late Bronze Age and Romano-British contexts.

Gnawing was identified on low numbers of fragments from most phases (Table 4.7). The gnawing evidence appears to be generally consistent with carnivore tooth marks, although infrequent occurrences of possible omnivore gnawing were also noted. Burnt bones were recovered from all closely dated periods except the late Iron Age/early Roman period (Table 4.7). The highest proportion of burnt bones was recovered from the early Iron Age phase, the majority of these coming from the fills of pit 3006.

Species identified

The animal bone assemblage was found to contain cattle (*Bos taurus*), sheep (*Ovis aries*), sheep or goat (*Ovis aries* or *Capra hircus*), pig (*Sus scrofa*), horse (*Equis caballus*), dog (*Canis familiaris*), red deer (*Cervus elaphus*), roe deer (*Capreolus capreolus*), fox (*Vulpes vulpes*), badger (*Meles meles*), rabbit (*Oryctoladus caniculus*), hare (*Lepus* sp.), weasel (*Mustela nivalis*) field vole (*Microtus agrestis*), water vole

(*Arvicola terrestris*), domestic fowl (*Gallus gallus*), raven (*Corvus corax*), blackbird (*Turdus merula*), teal (*Anas crecca*), herring (*Clupea harengus*), eel (*Anguila anguilla*), pike (*Esox lucius*) and dace (*Leuciscus leuciscus*). Further fragments were identified as large, medium or small mammal, frog or toad, mouse, duck, finch, bird, and fish.

Wild mammals and disturbance to archaeological contexts

The archaeological deposits had been disturbed by animal burrows, especially in the hillfort rampart. This disturbance included the introduction of faunal material. For example, a complete badger skeleton was recovered from a burrow in the hillfort rampart (2022) and rabbit bones were recovered from the late Roman midden (2017) and layer 2016 on the hillfort rampart. The burrowing nature of rabbits means that they cannot be securely attributed to the Roman period. Current consensus holds that rabbits were not present in Britain between the last Ice Age and subsequent reintroduction by the Normans (Yaldon 1999, 158-61). Rabbit bones in the medieval fills of the hillfort ditch may similarly be intrusive. Further badger bones were also recovered from the upper layers of the hillfort ditch including late Roman and post-medieval layers. The presence of small numbers of badger bones in the late Roman fills of the ditch suggests that badgers may have become established at the hillfort during the Roman period, which would suggest a period of relatively low use of the hillfort at some stage. The most likely origin of these bones is from skeletons eroded from the ramparts or counterscarp bank after they had become inhabited by badgers.

Small mammal and microfaunal bones were recovered from some contexts. Table 4.8 presents the location of these specimens. The presence of voles and weasel bones indicates a grassland or deciduous woodland habitat nearby. The water voles from the Iron Age and Roman periods and anura (frogs or toads) from the Iron Age and medieval periods indicate proximity to slow moving water or ponds.

Metric analysis

Although 328 bone fragments from the assemblage were measured (Tables 4.9 and 4.32), when these are divided into phase, taxon and element categories, too few measurements are available in any one category to provide data for meaningful interpretations of sex classes or stock improvement. Using published indices (Fock 1966; Matolsci 1970; Teichert 1975; Clark 1995), withers heights could be calculated for 22 cattle, sheep, sheep or goat and dog specimens (Table 4.10).

Five early Iron Age cattle stood at between 1.05 m and 1.18 m at the shoulder. These heights are within the general range found at other Iron Age sites (Wilson 1978, 116). The largest two individuals are within the range suggested for bulls from Ashville, Abingdon (*ibid*.). A single Roman to medieval individual stood at 1.02 m.

The withers height of nine early Iron Age, two middle Iron Age, two late Roman and one medieval sheep or goat specimen could also be calculated. These animals were all found to fall within the same height range: early Iron Age individuals ranged from 0.48 m to 0.59 m, middle Iron Age individuals from 0.49 m to 0.59 m, late Roman individuals from 0.56 m to 0.58 m and the medieval individual stood at 0.55 m tall at the shoulder (Table 4.10). The size range of Iron Age sheep/goats from Castle Hill is slightly shorter than that recorded at some other Iron Age and Roman

sites (Wilson 1978, 117). The sizes of the Roman and medieval sheep/goats are comparable to those found elsewhere, for example at Exeter (Maltby 1979, 51).

The withers height of two late Roman dogs could be calculated. A metacarpal from the partial dog skeleton found in Roman fills of the hillfort ditch (context 1011) indicated that the animal stood at approximately 0.54 m, only slightly smaller than the Late Roman sheep. A dog metatarsal from Roman layers overlying the rampart indicated that a second animal was slightly smaller, standing at a withers height of 0.42 m. Roman dogs are known to have stood at a range of sizes from 0.24 to 0.80 m tall at the shoulder, but with very few animals over 0.58 m (Harcourt 1974; Clark 1995). The larger of the Castle Hill dogs falls towards the top of the range for most larger dogs of the period (following Clark 1995), which Harcourt (1974) suggests may have been used as hunting dogs, guard dogs and fighting dogs.

Evidence for pathology

Eight bones had evidence of pathological change. Two early Iron Age sheep or goat third phalanges from pit 3006 were particularly flat and wide which may be a developmental or pathological condition. A sheep or goat first phalanx from the pit was also remodelled and had extra bone on its distal epiphysis, possibly due to a trauma. A bird third phalanx, probably from the raven skeleton in the same feature, had evidence of bone remodelling on its proximal shaft.

A middle Iron Age sheep or goat metacarpal (context 3003) had a misshapen shaft, possibly due to a healed fracture. A large mammal sacrum (context 3020) from the same period had slight eburnation on the spinous process at the point of articulation with the last lumbar vertebra. The aetiology of this joint disease is unclear but it may have been caused by pressures on the hips from heavy work, or related to other joint disease elsewhere in the skeleton.

A possible fracture was identified on a medieval long bone from context 4002. The bone may be a bird or small mammal radius but could not be identified with certainty.

A post-medieval cattle navicular-cuboid tarsal from context 3023 had fused to the cuneiform and also had extra bone formation. This pathology may be due to the joint disease spavin (Baker and Brothwell 1980, 117-20) and may indicate that the animal was used for heavy traction, although it can also be hereditary or related to ageing or husbandry (Bartosiewicz *et al.* 1997; Holmberg and Reiland 1984).

The assemblage by period

Late Bronze Age

A small late Bronze Age animal bone assemblage was recovered from the lower fills of the hilltop enclosure ditch. The assemblage included domestic taxa (cattle, sheep or goat and pig) but the majority could only be identified to large, medium and small mammal categories. Four vole molars were also recovered from late Bronze Age deposits. Very few bones had butchery marks and no evidence of pathology was noted.

Taken as a proportion of all late Bronze Age domestic mammal bones (n=45), cattle and sheep or goat bones were the most frequent (44% and 36% of the

assemblage respectively). Pig bones were less frequent representing only 20% of the assemblage.

20 cattle elements were identified, comprising a tooth, an axis, three radius fragments, two ulna fragments, an innominate, three femur fragments, a patella, six tibia fragments and two second phalanges. Large mammal fragments included mandible, vertebrae, ribs, scapula, radius, innominate, and long bone fragments which may also all be cattle (Table 4.11). A cattle tibia and large mammal scapula and innominate had been butchered. The tibia had cut marks at its proximal end and chop marks were identified on the scapula. These butchery marks probably resulted from division of the carcass and possibly meat removal.

Sixteen sheep or goat elements were identified, including all regions of the skeleton. Nine pig bone fragments comprised mandible, tooth, innominate and metapodial fragments. Meat bearing long bones were not represented. Forty-six further fragments were identified as medium mammal and may be pig or ovicaprid. The medium mammal fragments primarily comprised vertebral fragments and long bone diaphyses. No butchery was noted on any medium sized mammal fragments.

The only burnt animal bones from burnt deposit (3099) within the enclosure ditch were 25 unidentifiable calcined fragments. A further 58 fragments of unburnt animal bone were recovered from the deposit. These included a cattle tibia fragment, large mammal innominate and vertebra fragments, a sheep or goat innominate fragment, medium mammal rib, vertebrae and long bone fragments, all small mammal fragments and all vole fragments. Only two unidentified fragments from elsewhere in the ditch fills were burnt.

Early Iron Age

The early Iron Age contributed the largest number of animal bone fragments from any phase represented in the assemblage (8034 fragments). The largest single group of material was recovered from pit 3006, discussed in a subsection below. The remainder of the material was recovered from contexts including the upper fills of the late Bronze Age enclosure ditch, and the hillfort ramparts and counterscarp bank.

In the complete early Iron Age assemblage, cattle, sheep or goat and pig are the most common taxa. Taken as a proportion of their sum (n=1452), sheep or goat represented 45%, cattle represented 34% and pig represented 21% of fragments. Excluding the material from pit 3006, cattle was the most frequently represented taxon followed by sheep or goat and then pig. Taken as a proportion of their sum (n=831), cattle represented 45%, sheep or goats 31% and pig 25% of fragments.

Pit 3006
Over a third of all early Iron Age animal bone fragments were from the fills of pit 3006. These included cattle, sheep, sheep or goat, pig, horse, dog, roe deer, weasel, raven and fish bone, with further fragments identified to mammal size classes and as bird. The fish bone (ctx 3061) could not be identified.

Although there are several taxa included in the pit fills, only cattle, sheep (including sheep or goat specimens), pig and raven were represented by more than one or two fragments of bone. As a proportion of their sum (n=621), the relative proportion of the taxa were 64% sheep or goat, 20% cattle, and 16% pig. Little can be said about the remaining taxa other than their presence on site. However, the roe deer,

horse and fish are noteworthy. The inclusion of a roe deer metacarpal can be used to suggest that this animal was hunted in the early Iron Age. The assemblage included a butchered horse tibia. The tibia had several cuts on the anterior side and a chop across the posterior mid-shaft which can be interpreted as indicating division of the carcass and possibly removal of meat. The fish bone is of note due to its general scarcity at British Iron Age sites.

The 25 raven bones comprised an articulated skeleton. Both coracoids, scapulae, humeri, ulnae, carpometacarpals, innominates, femora and tibio-tarsals were identified, as was one radius and one tarsometatarsal. Two vertebrae and six phalanges recovered from this context may be from the raven skeleton. One third phalanx exhibited possible bone remodelling at its proximal end. There was no associated eburnation of the articulation. No evidence of butchery or burning was noted on the skeleton. Skeletons of ravens are relatively common at hillforts in southern Britain, for example at Danebury and Winklebury in Hampshire (Grant 1984; Hill 1995a). They are also known from early Iron Age storage pits in the Upper Thames Valley at Coxwell Road, Faringdon (Weaver and Ford 2004, 167). Skeletons of ravens are frequently found on Romano-British sites and may have been husbanded during that period (Parker 1988). They also often have an association with death in European mythology, most likely related to their appearance and nature as carrion eaters.

Cattle bones comprised 126 fragments from a minimum of four individuals (Table 4.12). Evidence from bone fusion suggests that at least one individual was over the age of 3.5-4 years old at death with a second individual at least 2-2.5 years old. At least one individual under 1-1.5 years old at death was also present. Evidence from mandibular tooth attrition indicates that one animal was adult or senile. A withers height of 1.18 m could be calculated for one individual. This animal was large for the time and may have been a bull (see above). All regions of the cattle skeleton were present but they were not included as complete individuals.

Butchery marks on twelve cattle bones indicate that the animals had been divided into portions (Table 4.13). Butchery evidence indicated that at least two cattle heads had been decapitated with a chop through the occipital condyle. Cuts on the parietal region of one cattle skull also indicate that that animal had been skinned. Cuts on a goneal angle of a mandible may also have been inflicted when the animal was skinned or may have resulted from removal of cheek meat. There is evidence that the cattle long bones had been disarticulated using cleaver chops and finer knife cuts to separate the bones. A cattle innominate had cut marks suggesting that the femur was dismembered from the pelvis using a knife (following Landon 1996, 83-4). The femur and tibia had been separated in two ways. Chops on a femoral condyle indicate the use of a cleaver, whereas cuts on the intercondyloid eminence of a tibia indicate the use of a knife. The forelimb was divided with cleaver chops across the neck of a scapula and knife disarticulation between the humerus and ulna. Cuts on the proximal anterior surface of a first phalanx may indicate removal of the foot at this joint. A calcaneum chopped longitudinally may have been processed for bone marrow.

Pig bones comprised 100 fragments from a minimum of eight individuals (Table 4.12). Mandibular tooth attrition indicates that one animal was foetal or neonatal, one animal was immature, three individuals were sub-adult and three individuals were adult. Pig canine teeth indicate that at least four individuals were male and at least one was female. There is no evidence for whether the pigs were domestic animals or wild boar, but the presence of a foetal or neonatal individual suggests that they were domestic. Like the cattle remains, the pigs seem to have been

included as carcass portions rather than complete animals. Mandibles and forelimb long bones are over-represented in the assemblage compared to other regions of the skeleton. Butchery mark evidence also suggested the portioning of carcasses using knives and cleavers. Cuts on an atlas indicate the use of a knife to decapitate an animal, cuts on a distal humerus may relate to dividing the forelimb at the elbow and chops on a posterior crest of an ulna may relate to the same activity. Cuts on a proximal calcaneum suggest the removal of the foot at this point.

Sheep or goat bones, including some identified as sheep, are the most common taxon identified in the pit assemblage, with 395 fragments of sheep or goat bone recovered. The sheep goat bones represent a minimum of 19 individuals (from a minimum of 19 right mandibles) but were not recovered as articulated skeletons. There is a bias towards certain elements, particularly mandibles, scapulae, radii and tibiae, but also with many metapodials, humeri, ulnae and innominates represented. Femora are underrepresented among the long bones. Butchery marks were identified on 21 sheep or goat bones and indicate that, like the cattle, pigs and horse, sheep or goats were included as portions rather than complete individuals. The majority of butchery marks were identified on the hind limb. Cuts on the ilia and ischia of five innominates and three femora indicate the use of a knife to dismember the hind limb or separate the pelvis and sacrum. A chop on a proximal tibia suggests that cleavers were sometimes used to disarticulate the knee, and cut marks on a distal tibia indicate removal or the foot at this joint. Cuts on a calcanuem and four astragali indicate that the foot was also sometimes removed through the tarsal joint. Cuts on a skull occipital condyle and dorsal atlas indicate that a knife was used to decapitate the carcass. Cuts on three radii and an ulna suggest that knives were used to disarticulate the forelimb at the elbow and between the radius and metacarpal.

Tooth attrition from sheep or goat mandibles indicated that the assemblage included six neonates (found in contexts 3034, 3036, 3059 and 3061). In the British Iron Age sheep most likely lambed in March and April (O'Connor 1998), so the presence of these individuals could perhaps suggest that the pit was filled in spring.

Early Iron Age animal bone excluding pit 3006
Of the total of 5168 bones, 47 came from the hillfort ditch, 48 from the counterscarp bank, 72 from the rampart and the remainder (5001) from the upper fills of the hilltop enclosure ditch. Cattle bone was the most frequently represented taxon, with 370 fragments recovered. All regions of the skeleton were represented. The cattle remains derive from a minimum of seven individuals (from seven left radii). Humeri, radii, metapodials, tibiae and crania are the most frequent elements represented (Table 4.14). Butchery marks were identified on 21 cattle bones, 18 of which were recovered from ditch fills. The butchery marks indicate the use of knife cuts and cleaver chops to prepare cattle carcasses. Cut marks on two atlases indicate decapitation using a knife. A chopped horn core may indicate horn working. Cuts on the zygomatic suggest that the mandible was removed from the skull. The forelimb was divided with a chop through the neck of a scapula, and between the humerus and radius/ulna (one humerus had cuts on its medial condyle and cuts were also identified on a proximal radius). The hind limb was disarticulated with chops through the pelvis (three examples) and proximal femur. The feet were removed with a knife or cleaver at the tarsals (disarticulation cuts were recorded on two astragali and a calcaneum) or at the metapodials (cuts were recorded on the proximal and distal ends of two metatarsals and two metacarpals and a metatarsal and a metapodial had been chopped through).

Sheep or goats were the second most common taxon, with 254 fragments identified. These included a metatarsal from ditch 3017 and a horn core from counterscarp bank layer 1008 positively identified as sheep. The element representation indicates a prevalence of proximal forelimb elements, mandibles and tibiae. Like the cattle bone assemblage, loose teeth are also over represented (Table 4.14). Vertebral elements are underrepresented in the assemblage but may be accounted for in the medium mammal assemblage. The bones derive from a minimum of six individuals (from six right radii, six right and six left tibiae). Butchery marks were only identified on six elements, all from ditch fills. The butchery marks indicate that the hind limb was portioned using knife cuts and heavier cleaver chops. Cut marks on two femora and an ilium were probably inflicted during dismemberment of the hind limb. Cut marks on an astragalus indicate the disarticulation of the foot at this point.

Pigs were the third most common taxon, with 207 fragments recovered. Similarly to sheep/goat bones, the element representation of the pig bones exhibits an overrepresentation of proximal fore limbs and loose teeth (Table 4.14). Vertebral elements are underrepresented in the assemblage but may be accounted for in the medium mammal assemblage. The pig bones derive from a minimum of 10 individuals (from 10 left humeri). Butchery marks were identified on seven pig bones. Four calcanea exhibited cut marks indicating that a knife was used to remove the foot at this point. Two ulnae were butchered indicating that either knives or cleavers were used to disarticulate the elbow. One mandible had a chop to its basal side.

Four horse teeth, a first phalanx and third metacarpal were recovered from the fills of ditch 3017. Attrition of a maxillary cheek tooth was used to indicate that the animal was 11-15.5 years old at death (following Levine 1982), suggesting that it was not primarily utilised for meat. One metacarpal and one innominate fragment were recovered from other contexts.

Ten early Iron Age loose dog teeth and two mandible fragments were recovered from ditch 3017. With the exception of two mandibular right second molars, all these specimens may have originated from a single dog cranium and mandibles. Tooth eruption (following Silver 1969) indicates that the teeth were from an individual aged over 5-6 months old at death. The upper fill of this feature also included a fragment of dog femur.

A metapodial fragment and two pieces of red deer antler and were recovered from ditch 3017. Unspeciated deer antler was found in the same ditch.

Two small mammal long bones and a vertebra were recovered from ditch 6003, and a second vertebra was recovered from posthole 6028. Ditch 3017 contained four small mammal ribs and a small mammal calcaneum. No small mammal fragments could be identified to species.

In addition to the raven skeleton recovered from pit 3006, four bird bones were identified from Early Iron Age deposits. Bird long bones were recovered from layer 2018 and ditch 3017 and a bird phalanx was recovered from ditch 3017. The only bird bone which could be identified to species was a blackbird tarsometatarsus recovered from ditch 6003.

Of microfauna, mouse, field vole, vole sp. and frog or toad were identified in ditch 3017. Ditch 6003 also contained a frog or toad humerus and a water vole mandible.

Middle Iron Age

A total of 2305 fragments of bone were recovered from middle Iron Age pit fills. The assemblage included domestic mammals (cattle, sheep and sheep or goat, pig, horse), wild mammals (red deer and badger, although the single badger tooth may be intrusive), a single bird phalanx, microfauna (water vole, vole sp., frog or toad) and fish bones.

Cattle, sheep or goat and pig were the most common taxa identified. Taken as a proportion of the sum of all cattle, pig and sheep or goat fragments in this group (n=210), sheep or goats represented 55%, cattle 29% and pigs 15%. These proportions are similar to those for the middle Iron Age assemblage at Hill Farm adjacent (see Chapter 10). Sheep or goat bone fragments are more frequent at Hill Farm at the expense of pigs (64% and 7% fragments respectively).

Cattle were the second most common taxon, with a total of 62 fragments identified from the fills of nine pits. All regions of cattle skeletons are present. Mandibles, loose teeth and tibia were the most frequently represented elements. The bones are from a minimum of two individuals (two left innominates, left tibiae and right tibiae) (Table 4.15). Mandibular tooth attrition could only be used to indicate the age-at-death of one animal, an eight to eighteen month old individual (Table 4.28). Butchery marks were identified on three bones. Knife cuts on the goneal angle of a mandible from ctx 3005 may have been inflicted during preparation of the head meat or decapitation. A femur from ctx 3020 had been chopped through the proximal shaft indicating the division of the hind limb at this point. Knife cut marks on a navicular-cuboid from ctx 3003 indicate that the hind foot was disarticulated at the tarsals.

Sheep and sheep or goat bones were the most common taxa, with 116 fragments recovered from 13 pits. All regions of the skeleton were represented (Table 4.15). A skull fragment from pit 3098, a horn core from pit 3152 and a metatarsal from pit 3029 were identified as sheep. The sheep or goat bones derived from a minimum of five individuals (five left mandibles). Mandibular tooth wear indicated an age-at-death for four sheep or goats ranging from three to ten months old to five to eight years old-at-death. (Table 4.27). Butchery marks were identified on a single right scapula. Two cut marks on the anterior surface of the neck indicate that the foreleg was disarticulated at this point.

A total of 32 pig bones were recovered from ten pits. Most regions of the skeleton were represented but loose teeth are the most common element (see Table 4.15). The pig bones derived from a minimum of two individuals (two right ulnae), at least one of which was female (two female canines). No age-at-death could be determined from mandibular attrition. No butchery marks were identified.

A total of eight horse bones were identified from five pits. A limited range of elements were present, comprising four loose teeth from pit 3052, an ulna fragment from pit 3002, a metatarsal fragment from pit 3004, a fragment of burnt metapodial from pit 3013 and a tibia fragment from pit 3098. These bones couldall have been from the same individual, though spatially this is perhaps unlikely. No butchery marks were identified.

A red deer radius fragment was recovered from pit 3002 and a red deer metatarsal fragment was recovered from pit 3152. Neither bone had evidence of butchery. These bones suggest that red deer were hunted in the middle Iron Age. A single badger tooth was also recovered from pit 3015, anda bird phalanx was recovered from pit 3025.

Two fish bones were identified. The upper fill (3030) of pit 3029 (ctx 3030) contained a single eel vertebra, although the presence of small intrusive Roman and

Saxon pottery sherds in this deposit is problematic. Apparently more securely stratified are indeterminable fragments of fish bone from the lower fill (3051) of pit 3002, . although this pit is adjacent to early Iron Age pit 3006 that contained a fish bone, and could therefore contain residual finds from it.

Vole teeth were identified in the fills of pits 3029, 3152 and 3098. A vole femur was recovered from pit 3029. A water vole femur was recovered from the fill of pit 3057.

Animal bone from middle Iron Age pits containing human burials
A crouched burial of an adult woman was recovered from truncated grave pit 3116. This feature also contained 61 fragments of animal bone including a sheep or goat pelvis fragment, a large mammal rib fragment, a medium mammal long bone fragment, a small mammal tibia, an amphibian vertebra and 56 unidentified fragments of animal bone. These animal bones are probably incidental in the grave back fill although a patch of bright blue staining on the sheep or goat pelvis suggests that the bone was laid close to a metal artefact in the grave (now lost).

Pit 3152 contained three human burials including a crouched adult male, a dismembered adult female and a new-born infant (deposited later). The pit contained 218 fragments of animal bone, some of which may have been placed in the pit as intentional burial goods. A sheep or goat humerus and a rib were found below the adult male's left arm and a cattle skull was placed at the same level as the adult female. The remainder of the animal bone assemblage comprises fragments of a cattle navicular-cuboid tarsal, four horse teeth, a red deer metatarsal, a pig innominate and tooth, a sheep horn core, eight sheep or goat elements including cranial elements and long bones, large and medium mammal fragments and two vole teeth. The only evidence of butchery was a large mammal vertebra with a knife cut. Four unidentifiable fragments had been burnt.

The top fill of pit 3098, layer 3020, contained a new-born infant and 385 fragments of animal bone, 100 of which (including large and medium mammal long bones and vertebrae) were charred. Unburnt animal bone from this pit included cattle, horse, sheep, sheep or goat, pig, large mammal, medium mammal and vole fragments. The animal bone from this pit appears to be general refuse rather than deliberate grave goods.

A total of 35 fragments of calcined animal bone and 41 fragments of unburnt animal bone were recovered from the truncated fills of pit 6022 which also contained human remains. None of the animal bone fragments could be identified.

Late Iron Age/early Roman period

A total of 106 fragments of animal bone were recovered from late Iron Age/early Roman deposits within the hillfort ditch. Cattle, pig, sheep or goat and deer were identified, along with large, medium and small mammal fragments. Pig was the most common taxon represented (13 fragments), followed by sheep/goat and cattle (nine and eight fragments respectively), but the size of the assemblage is too small to interpret the relative importance of the species. A total of 21 fragments of deer antler were recovered, which may have originally formed a single antler.

The element representation for the domestic mammals indicates a limited distribution for each taxon (Table 4.16) but this may simply be due to the small size of the assemblage. Cattle element representation indicates that only forelimb elements

were included from a minimum of two individuals (from two left scapulae). Pig element distribution indicates that only hind limb and foot elements were included from a minimum of two individuals (from two right astragali). Sheep or goat element distribution includes the skull and elements of a fore limb, hind limb and foot. A minimum of one sheep or goat is represented. No butchery marks were identified.

Late Roman period

A total of 6193 fragments of animal bone were recovered from late Roman contexts. Species identified include domestic mammals (cattle, sheep, sheep or goat, pig, dog, horse) wild mammals (red deer, badger, fox, hare, rabbit), birds (domestic fowl, duck including teal, corvid and finch), microfauna (field and water vole, vole sp., frog or toad) and fish. Further specimens were identified as large, medium and small mammal sized. Sheep or goats were the most frequently identified taxon followed by cattle and then pig. Taken as a proportion of their sum, 47% fragments were sheep or goat, 37% cattle and 16% pig. A large number of dog bones were recovered from a partial skeleton (see below). Few late Roman mandibles provided evidence of age-at-death. Two late Roman sheep or goat mandibles indicate that the animals died at between five and eight years old (Table 4.27). This may be taken to suggest that they were utilised for wool or milk or as breeding stock prior to death. Tooth attrition of a late Roman cattle mandible suggests that the individual died in adulthood (Table 4.28). Three late Roman pigs were immature (*c* 4-13 months), one was sub-adult (*c* 7-22 months) and a fifth was sub-adult to adult at death (> 7 months) (Table 4.29).

   The low frequency of wild mammals does not give any indication of hunting. The only red deer specimen was an antler fragment. This may have been a traded or collected raw material and does not indicate that deer were hunted or venison consumed. The fox bones (a humerus and a radius from hillfort ditch fills 1004 and 1010) and badger bones may derive from material eroded from the ramparts and counterscarp bank (see above).

Midden layer 2017
The midden included 1674 fragments of animal bone, many of which were recovered from sieved environmental residues. The identifiable assemblage primarily comprised domestic mammals, but four small mammal ribs and vertebrae, 17 rabbit bones, a water vole tibia, a teal humerus and four fish bones were also recovered (Table 4.28). The fish bones comprised single vertebrae from herring, eel and pike as well as a single lower pharyngeal bone from a tiny dace. These bones indicate the occasional consumption of freshwater fish (pike, dace) as well as eel (probably also from a freshwater source) and herring (a marine taxon, probably imported salted or pickled).

   Cattle and sheep or goat were the most common species in the midden deposits (73 fragments, MNI of 3 cattle; 79 fragments, MNI of 5 sheep and sheep or goat). A further 218 fragments identified as large mammal were probably also cattle, and many of the 145 medium mammal fragments may be sheep or goat. Pigs were represented by 17 fragments, all of which could have come from the same individual. Taking into account the large and medium mammal fragments, all regions of the skeleton of cattle and sheep or goats were present in the midden deposits. Only nine fragments of bone from the midden had butchery marks, a cattle mandible, innominate and metatarsal, a large mammal sacrum, a pig atlas, a sheep or goat innominate and two medium mammal ribs and a vertebra. The butchery marks were

primarily chops and related to portioning the carcasses. Cuts on the rib fragments may indicate removal of meat. Only four fragments of bone from the midden were burnt.

Late Roman fills of the hillfort ditch

A total of 1197 fragments of bone was recovered from late Roman fills of the hillfort ditch. These included domestic animals (cattle, horse, sheep, sheep or goat, pig, dog, domestic fowl), wild mammals (fox, badger) wild birds (finch, corvid) and microfauna (field vole, vole, frog or toad) (Table 4.19). Cattle and large mammal bones include all regions of the skeleton, while sheep or goat and pig are represented by all areas except the vertebral column. The ditch deposits include bones from a minimum of two cattle and two pigs (44 and 28 fragments respectively) and three sheep or goats (49 fragments).

A significant deposit of dog bones was found in the ditch. Deposit (1014) consisted of a partially articulated skeleton including cervical, thoracic, lumbar and caudal vertebrae, sacrum, ribs, right radius and right ulna. Epiphyseal fusion of the radius indicates that the animal was aged over 11-12 months when it died. Although no measurable bones could indicate the withers height of the animal, comparison of metric data from the ADS Animal Bone Metrical Archive Project suggests that it was a large individual. The partially articulated skeleton was generally in a good condition, with no evidence of gnawing by scavengers, suggesting that it was buried relatively quickly after deposition while it still had some soft tissue covering. There is no evidence of butchery to indicate that the carcass had been utilised.

The partial skeleton was deposited within layer 1011, which also contained a dog right pelvis, right metacarpals, two further metapodials and a left and right first phalanx. Although these bones were separate from the main concentration of bones, these elements could have come from the same skeleton. The length of the metacarpal can be used to suggest that the animal stood at a withers height of 0.5 m. Ditch fill 1004 lying above layer 1011 included dog right humerus, right tibia and right mandible fragments. Ditch fill 1010, above 1004, contained two canines and a mandible, probably from the same individual. Again, although found in different contexts these elements may also have been disturbed from the same partially decayed dog skeleton deposited in the ditch in the late Roman period. Deposit 1014 also contained some partial articulated human remains. The context may have consisted of of material disturbed from elsewhere, possibly outside the ditch. There were no clear differences in the condition of the bone from layer 1011 and that from the late Roman layers above.

Further dog elements were found in late Roman deposits above and behind the hillfort rampart. A tooth was found in midden layer 2017, and a complete left fifth metatarsal and left tibia fragment in layer 2016. The length of the metatarsal can be used to suggest that the animal stood at a withers height of 0.42 m and is therefore not the same individual as that deposited in the ditch.

The condition of bone from the late Roman layers in the ditch is different to that from the midden behind the ramparts (see Table 4.20). Bone from the midden layers is generally in poorer condition and has a much higher proportion of moderately preserved remains at the expense of all other condition categories. It is therefore unlikely that the ditch deposits are actually material from midden 2017 which has eroded from the ramparts.

Pit 4009

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Pit 4009 contained 611 fragments of bone (Table 4.21). The bone primarily consisted of cattle, sheep or goat and pig bone, but also included a horse tooth, small mammal rib and a single domestic fowl tarsometatarsus from a male individual (ie a cockspur). A total of 453 unburnt and five fragments of burnt unidentified bone were also recovered from the pit. Element distribution and zoning data indicates that a minimum of two sheep or goats were represented (from two left humeri), while cattle and pigs were represented by a minimum of one individual.

Pit 4009 contained thirteen butchered bone fragments. Of these, three fragments from two sheep/goat femora and one astragalus had cut or chop marks, while three further medium mammal rib fragments had cut marks and cut or chop marks were identified on and six unidentified fragments.

Rectangular feature 3067
Feature 3067 contained 573 fragments of bone, primarily cattle (MNI 1, 18 fragments), sheep or goat (MNI 2, 48 fragments) and pig (MNI 3, 24 fragments) (Table 4.22). A small mammal rib, duck scapula and bird long bone were also identified. A total of 136 fragments were identified as large or medium mammal size and 244 fragments were indeterminate. Only seven bone fragments were burnt, predominately charred.

The element distribution of pig bones indicates that only cranial and distal limb elements were included; no major meat-bearing elements were identified. All regions of sheep or goat skeletons were represented. The limited cattle element distribution includes foot bones, teeth and occasional long bone fragments.

Feature 3067 contained fifteen butchered bones. A sheep or goat radius had been disarticulated from the humerus with a cut through its proximal articular surface. A sheep or goat ulna had similarly been disarticulated with cuts identified on the posterior crest. A large mammal rib and long bone fragment had also both been cut with a fine blade. A total of seven medium mammal sized rib fragments had been cut on their medial side, either to portion the ribs or fillet the meat. A total of three medium mammal vertebrae had similarly been cut. Cuts were also identified on a medium mammal humerus distal diaphysis.

Broadly Romano-British deposits

A total of 59 fragments of bone were identified from 5064 (the fill of pit 5065), tentatively dated to the Romano-British period. This assemblage includes cattle, horse, pig, sheep or goat, large medium and small mammal bone and a duck carpo-metacarpal (Table 4.23). The only evidence of butchery was three fine, parallel transverse cut marks on a cattle nasal bone which suggest that the head meat was probably utilised.

Roman to medieval colluvial deposits

A total of 1282 fragments of bone was recovered from colluvial layers containing mixed Roman and medieval artefacts (Table 4.24). As stated above (see Condition), it is likely that most of these bones were Late Roman. Fragments of cattle, sheep or goat, large and medium mammal bone were recovered from all contexts. A sheep horn

core was recovered from 3096. Fragments of pig were also recovered from all contexts except 3120. Horse bones were recovered from 3028, 3096 and 3105 and a dog tooth and mandible were recovered from 3105. Taken as a proportion of their sum (n=159) cattle comprised 47% of fragments, sheep or goats 59% and pigs 16%.

Tooth attrition indicates that one cattle mandible was from an old adult individual and a sheep or goat mandible was from a individual aged between three and eight years old at death (Tables 4.27 and 4.28). These animals were probably used for secondary products during life.

Butchery was only identified on four fragments from 3028 comprising two medium mammal rib fragments, a large mammal long bone fragment and a cattle metacarpal. The rib and long bone fragments had cuts on their surfaces and the metacarpal had knife cuts at the proximal articulation indicating that the foot was disarticulated at that point. Four bone fragments from 3028, including the butchered long bone, had been charred.

Medieval period

Medieval deposits produced 3931 fragments of bone. The assemblage included cattle, horse, red deer, sheep/goat, pig, domestic fowl, bird and microfauna. Four rabbit bones were also recovered but may be intrusive. In addition to the animal bone in Table 4.25, a single eel vertebra was recovered from pit 6011. Cattle, sheep or goat and pig were the most frequent taxa identified. Taken as a proportion of the sum of all cattle, pig and sheep or goat fragments in this group (n=556), cattle represented 31% of fragments, sheep or goats 54% and pigs 15%. There is no evidence of hunting in the assemblage, as deer was only represented by antler fragments.

A total of 325 fragments were burnt, most of which were charred rather than calcined. Of the burnt bone, 283 fragments could not be identified but burnt pig and sheep or goat bones were recovered from 6012 and 6024, and burnt sheep or goat bones were also recovered from 6030. Burnt large mammal bones were recovered from 6024 and burnt medium mammal bones were recovered from 3045.

Cattle were the second most common taxon (175 fragments). The majority of these elements were loose teeth but bones from all regions of the skeleton were recovered. The cattle bones come from a minimum of four individuals (from four left and four right astragali). Butchery marks were identified on two bones. An innominate and left femur each had chop marks, probably resulting from the portioning or dismemberment of the carcass.

Sheep or goats were the most common taxon with 299 fragments, although none could be distinguished as sheep or goat. All regions of the skeleton were represented but again teeth were the most common element. The bones derive from a minimum of six individuals (from six right tibiae). Tooth attrition could be used to indicate an age-at-death for 21 mandibles (Table 4.27). Although one individual died aged one to three months old and four five to eight year old sheep or goats were identified, the majority (15 mandibles) died between the ages of 20 and 34 months. This may suggest that the sheep were primarily utilised for meat, although secondary products may have been utilised during life. Butchery marks were identified on 16 bones. Chop marks were identified on four axis vertebra fragments and a cervical vertebra, which may indicate that the animals were decapitated or that the carcasses were split into left and right halves. A cut mark on a lumbar vertebra probably indicates that meat was filleted off the bone. Two maxillae had chop and cut marks.

Evidence of disarticulation of the forelimb comprised a scapula with chops to the neck and three humeri, one with a cut mark to the head of the bone and two with chops or cuts to the distal humerus. A metacarpal had a chop on its distal shaft which may indicate that the foot was removed at this junction. A second metacarpal had had its shaft split suggesting that the bone marrow was utilised. Only two hind limb bones had evidence of butchery marks. A tibia had a chop at its proximal end and cut marks were identified on a calcanuem. These butchery marks indicate that the forelimb was divided at the knee and ankle.

A total of 82 fragments were identified as pig. These bones derive from a minimum of four individuals (from four atlas vertebrae). Loose teeth and foot elements dominate the assemblage. Long bones are also represented but few were identified from the hind limb. Two pig atlas fragments from the fill of pit 6011 had been butchered. Both bones were from juvenile individuals and had cut marks suggesting that the animals had been decapitated.

An innominate fragment and six loose teeth were the only horse elements identified. These elements may have come from a single individual. No butchery marks were identified.

A single dog scapula fragment was recovered. No butchery marks were identified.

Antler fragments comprised the only evidence for medieval utilisation of deer, including three fragments of red deer antler from pit 6011. The presence of antler fragments can not be taken to indicate that venison was consumed by the local population in the medieval period.

A total of nine bird bones including four domestic fowl bones were identified. The bones come from a minimum of two fowl (from two right femora). No evidence of butchery was identified.

Microfauna included six frog or toad bones, nineteen mouse bones, one field vole skull and seven vole sp. bones were recovered from pit 4003. A rodent femur was also recovered from medieval colluvium.

Post-medieval period

A total of 419 bones could be dated to the post-medieval period. These included domestic mammals (cattle, pig, sheep or goat, horse), wild mammals (badger, roe deer, rabbit, hare), domestic fowl and fragments which could only be identified as large, medium and small mammal.

The post-medieval animal bone was recovered from contexts including topsoil and subsoil layers and agricultural features such as furrows. Given the nature of these contexts no further work was conducted on this assemblage, but the element representation is given in Table 4.26.

The faunal economy at Castle Hill

The animal bone assemblage provides evidence for the faunal economy of the site from the late Bronze Age through to the post-medieval period. The majority of evidence relates to the early and middle Iron Age, late Roman period and medieval period. Throughout these periods, the faunal economy was dominated by the use of domestic mammals. Wild mammals, birds and fish played only a supplementary role.

The relative proportion of domestic meat taxa (cattle, sheep or goat and pig) varied throughout the occupation of the site. The minimum sample size required for reliable comparisons of relative proportions of species is 30 individuals (MNI) or 300 identified specimens (NISP) (Hambleton 1999). Only the early Iron Age, late Roman and medieval periods have a large enough NISP, and only the early Iron Age (including the remains from pit 3006) had a large enough MNI for comparisons with other sites (Table 4.33). The relative proportions of species from other periods are presented here as an indication of their prevalence and changes through time.

Late Bronze Age

The late Bronze Age activity was characterised by the utilisation of domestic mammals including cattle, sheep or goat and pig. The sheep or goat and cattle bones included elements from all regions of the skeleton indicating that the complete carcass had been present on site. Pig bones included only cranial and metapodial fragments. These may represent discarded primary butchery waste, although pig heads and feet might also have been butchering units for consumption. The late Bronze Age assemblage suggests that cattle and sheep or goat were of roughly equal importance to the economy, although cattle may have contributed more meat. Pigs were of a lesser importance but still constitute 20% of the total for these species.

Early Iron Age

The early Iron Age faunal economy was dominated by the utilisation of domestic mammals but occasionally supplemented by hunting wild game. Red and roe deer metapodials indicate that these species were probably hunted, although these bones may also have been brought to the site attached to deerskins. Early Iron Age activity on the hillfort included the deposition of a very large number of animal remains in pit 3006. Excluding the remains from the pit, cattle were the most well represented taxon (45% NISP), followed by sheep or goat (30%) and then pig (25%). This is very similar to the late Bronze Age species ratios from the site. When the contents of the pit are included, the relative dominance of cattle and sheep or goat switch, sheep or goat remains constitute 45% (NISP), cattle remains constitute 34% (NISP) and pig remains constitute 21%. If these ratios are compared with those at other early Iron Age sites in England, the proportion of sheep or goats is approximately average, the proportion of cattle bones falls into the lower end of the known range and pig bones are more frequent than at most other sites. This is also the case if the assemblage is compared to other Iron Age sites in the Upper Thames Valley (Hambleton 1999). The high proportions of pig remains suggest a relatively high status diet, as pigs provide very few secondary products and can therefore be perceived as a "luxury" meat (Grant 2002).

The animal bone in pit 3006 included butchered portions of cattle, sheep and pigs. The cattle bones were from at least four individuals of varying ages, probably including the remains of a bull. The sheep and sheep or goat remains were from at least 19 individuals, a third of which were neonatal. The pig bones were from at least eight individuals of varying ages from neonatal to adult. The pig bones also included both males and females. The bones in pit 3006 represent a huge quantity of meat possibly deposited over a short period of time. McCormick suggests that a single early

cow might provide approximately 176 kg of edible meat (McCormick 2002, 25). The volume of meat represented, the butchery evidence and the age-at-death of the animals in pit 3006 suggest that it might be the product of feasting activity in springtime. The pit also contained a single, butchered horse tibia, suggesting that horseflesh may also have been eaten. The presence of a near complete raven skeleton in the pit may be interpreted as indicating a ritual aspect to the deposition of the bones or feasting, although the raven could also have a more mundane interpretation as the disposal of a predator of lambs being bred in the vicinity of the site. This profane interpretation need not discount a ritual aspect to its deposition with neonatal lambs or kids in the pit.

The mortality profile of the early Iron Age herds and flocks is weighted by the bones recovered from pit 3006. However, it does suggest that sheep or goats may primarily have been kept for milk or meat (high proportions of young individuals killed) and that some cattle were allowed to reach adulthood and old age, suggesting that they had a function in life such as traction or milk production. Butchery evidence on a cattle horncore suggests that horn was utilised. All skeletal regions of cattle, pigs and sheep or goats were present on site, indicating that the animals were husbanded nearby and brought in on the hoof.

Middle Iron Age

The middle Iron Age faunal economy continued to be dominated by cattle, sheep or goats and pigs, although pigs and to lesser extent cattle were less common than in the early Iron Age. Pigs are still more frequent on Castle Hill than in the surrounding settlement (see Chapters 7 and 10). Again, all parts of the domestic mammal skeletons were present on site, suggesting that the animals were husbanded in the area or brought in on the hoof. There is some evidence for the supplementation of the middle Iron Age diet on Castle Hill with wild mammals and fish. A red deer radius and metatarsal were recovered, and although these are not particularly meat-rich elements, their presence does indicate the presence of deer carcasses and not just traded antler. Similarly, eel and indeterminate fish were utilised. The final possible aspect of animal utilisation is grave goods or structured deposits in pit 3152. Although animal goods in Iron Age pit burials have been found elsewhere (Whimster 1981; Wait in Lambrick and Allen 2005), no comparable examples with cattle skulls were found. Unfortunately, very little age-at-death data was available for domestic mammals, precluding the interpretation of animal utilisation from mortality profiles.

Late Iron Age and Roman period

Only a small late Iron Age/early Roman bone assemblage was recovered, which may not be representative of the faunal economy as a whole. The assemblage was again dominated by domestic mammals with the only evidence for wild species being the utilisation of antler.

The large late Roman bone assemblage suggests that the faunal economy continued to be dominated by domestic mammals with similar relative proportions to earlier periods. Pigs were less significant in the assemblage than they had been in the early Iron Age. There is no evidence that hunting contributed to the late Roman economy, although fishing contributed occasional freshwater fish to the diet and

marine fish were imported. Chickens and ducks were also used, and may have contributed eggs and meat to the diet.Cattle, sheep or goats and pigs were husbanded at the site or brought in on the hoof, as evidenced from the presence of all regions of the skeletons. There is little evidence for the mortality profiles of the herds and flocks but some cattle and sheep or goats were kept into maturity, suggesting that they may have been used for functions other than just meat.

Medieval period

Medieval activity on Castle Hill focussed on the utilisation of domestic animals (cattle, sheep or goat, pig, domestic fowl, dogs and horses) with the only some evidence for the catching of eels and the use of red deer antler. Sheep or goats were the best represented taxa (54% NISP) followed by cattle (31%) and then pigs (15%). All regions of the sheep or goat, pig and cattle skeletons were present on site indicating that they were husbanded or traded on the hoof. The medieval faunal economy appears to continue in the same style as in the Iron Age and Roman period. Although secondary products were probably utilised, the mortality profile for sheep or goats indicates that they may primarily have been kept for meat. However, the sheep were killed at an older age than earlier periods. The prevalence of mutton over beef suggested by the assemblage at Castle Hill is a general trend in medieval rural assemblages which has been attributed to the preferential export of beef into urban economies (Sykes 2006).

OYSTER SHELL
by Leo Webley

A total of 23 fragments (186 g) of oyster shell was recovered, all from Roman and medieval contexts (Table 4.34). This indicates importation and consumption of marine shellfish during these periods. In addition, five small fragments (5 g) of unidentified bivalve shell were recovered from early Iron Age contexts. This could indicate small-scale consumption of (presumably freshwater) shellfish, but as most of the fragments are from the upper fills of features they could be intrusive.

LAND SNAILS
by Amy Reynolds

A total of 39 samples were examined for molluscan remains in order to provide information on the local environment of Castle Hill during the period of occupation. The samples derived from late Bronze Age enclosure hilltop ditches 3017 and 6003, and from the Iron Age hillfort ditch.

Methodology

The sample processing procedure involved placing 2 kg of material into a bowl of water and collecting the shells, which tend to float, and pouring them off onto a sieve of 0.5 mm mesh size. The heavy residues were also sieved down to 0.5 mm.

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Both flots and residues were dried, and then sorted using a binocular microscope at a magnification of x12. Identifications were made under a binocular microscope at a magnification of up to x50, with reference to the collections held at the Oxford University Museum of Natural History. Species identification was confirmed by Professor Mark Robinson. Results are shown in Tables 4.35-4.37. The deeply burrowing species *Cecelioides acicula* has been excluded from all totals. Shells that could not be identified down to the species level (eg *Vallonia* sp.) were divided at the ratio between the identified examples (eg *V. costata* and *V. excentrica*). Descriptions of the ecological niche of each species follow Evans (1972) and Kerney and Cameron (1979).

Ecological interpretation and environmental reconstruction

Ditch 3017 (Fig. 4.2 and Table 4.35)

The lowest samples from ditch 3017 (samples 318 and 319) appear at first glance to show a shift from shade-loving species to intermediate/open-country species, but too few specimens are found to confidently infer the environment. However, the next sample in the sequence (321) consists of shade-loving species such as *Carychium tridentatum*, which is usually a reflection of tall, herbaceous vegetation and woodland, and intermediate species such as *Pomatias elegans*, which burrows into leaf litter and loose soil, and also more open-country species such as *Vallonia* cf. *excentrica* and *Pupilla muscorum*. The next sample (320) shows a decline in the number of open-country species and a marked increase in shade-loving species such as *Oxychilus* and *Aegopinella*, *Discus rotundatus* and in particular *Carychium tridentatum*, which is characteristic of woodland conditions. However, as demonstrated by the open-country species and intermediate species such as *Punctum pygmaeum*, *Pomatias elegans* and *Trichia hispida* there may have been some open patches surviving. The samples from 322 upward are dated to the early Iron Age. Sample 322, which was a smaller sample in total, shows the persistence of the woodland/shade-loving species (although there is a slight decline in their relative abundance) as well as intermediate and characteristically open-country species, although this sample size appears too small to infer much about the conditions. However, the next sample (338), which consists of over 250 specimens, inarguably demonstrates shaded conditions, whether through woodland regeneration or the growth of long grass. The ubiquitous presence of all of the aforementioned shade-loving species as well as most of the intermediate species and the general lack of open-country species supports this. The next few samples (323, 325, 327 and 329) indicate that such conditions persisted for some time, with greater numbers of shaded species and intermediate ones found than open-country ones. However, in the early Iron Age fills towards the end of the sequence there appears to be a gradual transition towards more open conditions, perhaps demonstrating a drawn-out phase of clearance by the occupants of the hillfort (samples 331, 332, 333, 334, 335 and 336). This is demonstrated by a reduction in the relative abundance of shade-loving species in tandem with a gradual increase in the percentage of intermediate species and - towards the top of the sequence - a marked increase in the abundance of open-country species.

Ditch 6003 (Fig. 4.3 and Table 4.36)

Basal sample 614 contained only a single specimen of an intermediate species and another specimen of a shade-loving species such as *Oxychilus* and *Aegopinella*. This is followed (sample 615) by a decline in the shade-loving species and an increase in another intermediate species, *Trichia hispida*, but once again this species is only represented by a single specimen. These lower samples contain too few snails to say much about the prevailing environmental conditions of the site. However, markedly increased numbers of shade-loving species such as *Oxychilus* and *Aegopinella* and a substantial increase of *Carychium tridentatum*, which also populates shaded areas, occur in sample 616. The sample also yielded several intermediate species as well as *Vallonia* cf. *costata*, which is an open-country species, but this only makes up 0.6 % of the assemblage. The results from this and later samples indicate that conditions at the site were becoming increasingly shaded, probably initially through the growth of long grass and then through the establishment of woodland. Such conditions appear to persist as indicated by the snail assemblages of samples 617 and 619, which preserved huge amounts of snails, both exceeding 400 specimens. Predominant in both of these samples are woodland species including *Oxychilus*, *Aegopinella* and *Discus rotundatus* as well as huge numbers of *Carychium tridentatum*. Intermediate species such as *Punctum*, *Vitrina*, *Vitrea*, *Nesovitrea*, *Pomatias elegans* and *Trichia hispida* were also obtained from these samples as well as very small numbers of open-country species of *Vallonia* cf. *costata*, *Vallonia* cf. *excentrica* and *Helicella itala* (at 3.2, 0.4 and 0.2 % respectively). The final two samples, 621 and 611, are from fills dated to the early Iron Age. Although for sample 621 there is an overall reduction in the amount of snails yielded, those that are obtained are still indicative of a predominantly woodland environment, with shade-loving and intermediate species making up the assemblage, with a marked absence of open-country species. This is in complete contrast to sample 611, which although smaller in size demonstrates a change of conditions at the site. No shade-loving species are obtained from the sample and open-country species including *Vallonia* cf. *costata, Vallonia* cf. *excentrica*, *Pupilla muscorum* as well as a few numbers of intermediate species make up the entire assemblage.

Hillfort ditch (Fig. 4.4 and Table 4.37)

Although woodland species *of Oxychilus, Aegopinella* and *Carychium tridentatum* are present at 4.2% each, the first sample from the sequence in the early Iron Age hillfort ditch (103) is strongly indicative of open conditions. Thus open-country species such as *Vallonia* cf. *costata*, *Vallonia* cf. *excentrica*, *Vertigo pygmaea* and *Truncatellina cylindrica* dominate, as well as huge numbers of *Pupilla muscorum*. Such open conditions persisted for some time, as indicated by early Iron Age samples 109 and 104-108, although the presence of shade-loving species may indicate that there were some areas of patchy tussocks sufficient to support such populations. However, the presence of *Helicella itala* (an open-country xerophile species) as well as the marked increase in the numbers of *Pupilla muscorum* was probably a reflection of bare unstable conditions in the ditch bottom. From sample 111 upward, dated to the late Iron Age/early Roman period, a rise in the number of snails suggests more stable conditions. There was also a more diverse fauna. The presence of *Carychium tridentatum* in small numbers indicate some shade, perhaps from tall grass in the ditch. The balanced fauna of open country species from sample 112 upwards suggests the

ditch was set amidst open grassland. Predominantly open grassland conditions appear to have persisted throughout the Roman period (samples 112, 113, 114, 115, 116 and 117). The colonisation and establishment of greater numbers of shade-loving species, as well as the persistence of both intermediate and open-country species, indicates mixed areas of long grassland or scrub and cleared areas. However, towards the end of the sequence, beginning in sample 118, there appears to be yet another shift in the habitat requirements of the present species as shown by an increase in open-country species such as *Vallonia* cf. *costata*, *Pupilla muscorum* and *Helicella itala*, and a marked decline in shade-loving species. This could thus indicate the beginning of another clearance episode.

Discussion

The three molluscan sequences provide a useful contribution to the environmental history of the site. It is presumed that the construction of the late Bronze Age hilltop enclosure would have taken place within a cleared local environment, and this is reflected by the corresponding open-country molluscan assemblages. The assemblage demonstrates the subsequent growth of tall grass or herbaceous vegetation, which eventually led to scrub or woodland regeneration. However, a second phase of woodland clearance then took place during the early Iron Age, preceding the construction of the hillfort. This period would have been characterised by grazed, short-turfed grassland. The assemblage from the hillfort ditch suggests that predominantly open conditions persisted into the late Roman period.

CHARRED PLANT REMAINS
by Wendy Smith, Mark Robinson and Ben Harrold

Sampling for charred plant remains was carried out as part of excavations in five trenches around Castle Hill and Round Hill, Little Wittenham, Oxfordshire. A total of 38 samples were collected from Trenches 3, 4 and 6, six of which were considered suitably rich to merit further analysis (Robinson 2005). This report presents the results for six samples from late Bronze Age through middle Iron Age features and two Medieval pits from Trenches 3, 4 and 6. The majority of Iron Age samples are from pits, but an enclosure ditch (sample 606) and a post-hole (sample 604) have also been sampled. The pit samples have been phased as follows (Table 4.38)

Full analysis of the Castle Hill samples allows us to examine to following issues:

- what cereal crops were in use? and did this change over time?
- does this assemblage provide information on crop processing activities?
- does this assemblage provide information on cultivation conditions?
- does this assemblage provide information on the surrounding environment?
- does this assemblage provide information on patterns of rubbish disposal on site?

Method

Samples were collected from sealed deposits and were processed by the Oxford Archaeology environmental officers, using water flotation. The flots (the material which floats on the water's surface) were sieved to 250μm and the heavy residues (the material which does not float) were wet sieved to 500μm. Both the flots and heavy residues were air dried at room temperature. The Oxford Archaeology environmental officers examined the heavy residues for charred plant remains, but only charcoal was observed.

Ben Harrold sorted the flots for charred plant remains using a low-power binocular microscope at x10–x20 magnification. In all cases, 100 % of the flot was sorted for charred plant remains. Identifications were made at magnifications between x10 and x45, under the supervision of Professor Mark Robinson and in comparison with the Oxford University Museum of Natural History's archaeobotanical reference collection. Nomenclature for the plant remains follows Stace (1997) for indigenous species and Zohary and Hopf (2000) for cultivated species. The traditional binomial system for the cereals has been used here, following Zohary and Hopf (2000, 28, Table 3 and 65, Table 5).

Results

The charred plant remains recovered from Trenches 3, 4 and 6 are listed by period, in order of sample number in Table 4.39. The summary of the main categories of plant remains is presented in Table 4.40 and in Figure 4.5.

The deposits comprised a mixture of cereal grain, cereal chaff and weed/ wild plants. These types of remain are typical of most charred archaeobotanical assemblages and most likely represent crop processing activities (e.g. Jones 1988, 44). Trenches 3, 4 and 6 samples, including the Medieval samples, are primarily dominated by cereal grain (with the exception of sample 304 which has abundant cereal chaff remains).

Hulled barley (*Hordeum* sp.) and spelt wheat (*Triticum spelta* L.) appear to be the main cereals cultivated, although small quantities of possible emmer grain (*Triticum* cf. *dicoccum* Schübl.) and/or chaff fragments have been identified from the site. The majority of weed/ wild plants recovered typically occur as weeds of arable field and/or cultivation; however, there are some taxa present which suggest damp or even wet conditions. In addition, there is limited evidence for hedges or scrub.

Discussion
A comparative discussion of the charred plant remains from Castle Hill (Trenches 3, 4 and 6) and Castle Hill Environs (Trench 15) can be found in Chapter 7.

POLLEN AND PHYTOLITHS
by Adrian G. Parker

Introduction

Pollen analysis is routinely used in the evaluation and reconstruction of palaeoenvironments from natural sites (eg peat bogs, fens and lakes) as well as from

archaeological contexts (eg buried soils, wells, ditches and middens). Pollen largely survives under waterlogged, anaerobic conditions, and tends not to survive well under aerobic, oxidising conditions. However, several workers have recovered pollen from non-waterlogged contexts (Dimbleby 1985; Parker 1995).

Phytoliths (plant silica) preserve well under oxidising conditions and may be used as a tool for environmental reconstruction. Their application in environmental reconstruction is largely restricted to archaeological sites from New World (Piperno 1988) and Old World contexts (Ishida *et al.* 2003) with some studies examining longer Holocene environmental sequences (Parker *et al.* 2004). Within the UK, few studies have been used in which phytoliths have been implemented as an environmental archaeological tool (though see Hodson 2002). This is largely because few specialists exist within this area of environmental reconstruction, and because Phytoliths have a more restricted application within temperate regions when compared with drier climatic regions. Phytoliths can be used to differentiate different tribes of Poaceae (Grasses), generic woody taxa, and can, in certain instances be used to differentiate cereals (Tubb *et al.* 1993) and crop processing sites (Hodson 2002)

A number of column samples were submitted for pollen and phytolith evaluation from Castle Hill. A total of seven column samples were evaluated from a variety of deposition contexts of late Bronze Age, early Iron Age and Romano-British date.

Methodology

$1cm^3$ of sample for pollen analysis was prepared using the standard techniques outlined in Moore *et al.* (1991). The pollen residues were stained with safranin and mounted in glycerol jelly. Slides were scanned for their pollen content and preservation made using a Nikon Eclipse E400 light microscope under bright light with phase contrast being used for critical determinations. The pollen nomenclature is based on Clapham *et al.* (1989).

For the extraction of phytoliths, 5g of sediment from each sample was sieved (2 mm mesh) to remove the coarse sands and gravel prior to phytolith extraction. Organic matter was removed by using a warm 10% solution of H_2O_2 for 15 minutes or until the reaction had ceased. This was followed by deflocculation using 50 ml 2% Calgon in 250 ml distilled water and shaking continuously for 30 minutes. The samples were then passed through a 212 μm sieve, and the residues rinsed with distilled water and centrifuged. This was followed by heavy liquid separation using zinc iodide (2.35 s.g.) Material less than 5 μm in size was removed using the vacuum filtration method of Theunissen (1994). Samples were mounted onto microscope slides using Canada Balsam and identified at x400 and x1000 magnifications using a Nikon Eclipse E400 light microscope. The slides were scanned to evaluate the level and nature of phytolith preservation.

The phytolith morphotypes were compared with modern reference materials collected by the author and by comparison with phytolith keys including Cummings (1992), Mulholland and Rapp (1992), Piperno (1988) and Rosen (1993).

Results

The pollen and phytolith evaluations imply that pollen preservation is generally poor, which given the non-waterlogged conditions is not surprising. However, three samples did yield pollen, two coming from late Bronze Age buried soil layers, and one from a late Iron Age/early Roman fill of the hillfort ditch (Table 4.41). Within these samples the grains showed signs of deterioration, and selective preservation was evident amongst the assemblages observed. Resistant taxa such as Compositae Liguliflorae were dominant within the three samples. However other less resistant taxa including Gramineae and *Corylus* were also identified. These samples do provide some information but the pollen data should be viewed with caution owing to selective preservation.

A number of samples contained phytoliths, particularly from Roman deposits (Table 4.42). The chalk-rich samples from the lower part of the hillfort ditch tended to be devoid of phytoliths. In general, the phytoliths suggest open grassland conditions. However, it is notable that some samples, from the late Bronze Age enclosure ditch (ctx 3065) and the buried soil sealed by the hillfort ramparts (ctxs 1015 and 2031) suggest a non-grassland component to the vegetation derived from woody taxa. These may be derived either directly from trees and shrubs in the surrounding landscape, or indirectly from burning or from the decomposition of wooden structures on the site itself. Samples from late Roman contexts 3126, 3127 and 3129 contained dendriform long cell Poaceae morphotypes which are derived from the inflorescence bract of cereals, implying that these context contain the residue of threshed cereals.

Given the limited potential of both the pollen and phytolith evidence, no further work was carried out.

RADIOCARBON DATING
by Leo Webley

Nine samples were submitted to the Poznan Radiocarbon Laboratory for accelerator mass spectrometry (AMS) dating (Table 4.43 and Fig. 4.6). The determinations have been calibrated using OxCal v3.10 and atmospheric data from Reimer *et al*. (2004).

Four determinations were obtained from the late Bronze Age enclosure ditch. One was taken from charred grain from a middle fill (6027) of the ditch in Trench 6, and produced a date range of 905-805 cal BC (Poz-14319). The other three were obtained from the intervention in Trench 3 (3017). Two of these came from a distinct layer of charred material close to the base of the ditch (3099), one deriving from charcoal (Poz-14317) and the other from a disarticulated animal bone (Poz-12521). The third determination came from a disarticulated human bone fragment from stratigraphically higher fill 3081 (Poz-12519). All three determinations produced similar date ranges, suggesting that the two deposits could have been laid down within a short space of time. OxCal has been used to produce a Bayesian model for the sequence of dates, described by Figure 4.7. The model suggests a refined date of 1010-870 cal BC for 3099 and 970-830 cal BC for 3081, at the 95.4 % probability level (Fig. 4.8). The possibility that the human bone fragment from 3081 was curated for a period prior to deposition cannot be ruled out, however.

The remaining five determinations were obtained from pits containing middle Iron Age ceramics, and all are considered reliable as they were taken from articulated human bone. All of the calibrated date ranges fall squarely within the middle Iron Age, except for that from the uppermost burial in pit 3152 (Poz-12518), which produced a date range in the late Iron Age and early Roman period (20 cal BC-cal AD

130). While this could imply that the middle Iron Age pottery associated with this burial is residual, continuity in the use of middle Iron Age-type ceramics into the earlier part of the late Iron Age is attested at other sites in the Upper Thames Valley (e.g. Lambrick forthcoming).