Chapter 10: Environmental Evidence from White Horse Hill

ANIMAL BONE
by Claire Ingrem

Earlier prehistoric activity on the hilltop, prior to construction of the hillfort, is shown by an old ground surface which overlay the pre-construction surface and was preserved beneath the first phase rampart. This contained animal bone and Beaker pottery providing a *terminus post quem* for the first phase of construction. The calcified nature of the buried soil indicates a grassland landscape at the time of the hillfort construction.

The distribution of the animal bone on the site and its significance is discussed in detail below. The regional context of the material is presented in Appendix 4 together with a discussion of the effects of sampling on species representation.

Methodology

The animal bones were identified and recorded at the Centre For Human Ecology and Environment (CHEE), Department of Archaeology, University of Southampton. All of the anatomical elements were identified to species where possible with the exception of ribs and vertebrae which were assigned to size categories. Mandibles and limb bones were recorded using the zonal method developed by Serjeantson (1996). This produced a basic fragment count of the number of identified specimens (NISP). The presence of gnawing, butchery and burning together with the responsible agent was recorded. Measurements were taken according to the conventions of von den Driesch (1976). The wear stages of the lower cheek teeth were recorded using the method proposed by Grant (1982) and age attributed according to the method devised by Payne (1973) and Halstead (1985). The fusion stage of post-cranial bones was recorded and age ranges estimated according to Getty (1975). The minimum number of elements (MNE) was calculated by adding together the most numerous left and right-sided zones for each element. The minimum number of individuals (MNI) was estimated as the highest MNE score obtained from an element derived from one side of the body.

The fragmentary nature of the assemblage resulted in a large proportion of unidentifiable material, however all fragments representing less than 50% of a zone, but over 1 cm, were counted. Where possible these were ascribed to the relevant size categories and noted as either long bone, vertebral or skull fragments. Those fragments categorised as large mammal are probably derived mainly from cattle and horse, similarly medium sized mammal fragments will be derived predominantly from sheep/goat and pig. For this reason they have been included in the count of identifiable fragments. To prevent bias, elements belonging to complete and partial skeletons have been excluded from the tables.

A selected suite of elements was used to differentiate between sheep and goat during recording according to the methods of Boesneck (1969) and Payne (1985). These were; the distal humerus, proximal radius, distal tibia, metapodials, astragalus, calcaneus and deciduous fourth premolar. Only one element was positively identified as goat and for the purposes of this report elements assigned to the sheep/goat category will be treated as sheep. During recording a few fragments of human bone were extracted.

Data

A total of 3190 fragments (excluding burials) of animal bone was recovered from a variety of contexts dating to the late Neolithic/Bronze Age, Iron Age and Romano-British periods. Of these 663 (20%) were identified to species or family. A further 585 fragments were identified as large, medium or small mammal (18%). Fourteen species are present excluding the fragments of human bone which were extracted. These are cattle (*Bos taurus*), sheep (*Ovis aries*), goat (*Capra hircus*), horse (*Equus caballus*), dog (*Canis familiaris*), roe deer (*Capreolus capreolus*), red deer (*Cervus elephus*), fox (*Vulpes vulpes*), rabbit (*Oryctolagus cuniculus*), bank vole (*Clethrionomys glareolus*), water vole (*Arvicola terrestris*), field vole (*Microtus agrestis*), house mouse (*Mus musculus*), and domestic fowl (*Gallus gallus*).

The majority of fragments were recovered from pits and postholes located in the interior of the hillfort and dated to the early Iron Age, middle Iron Age and Romano-British periods (Table 10.1). A considerable amount of bone was also recovered from Iron Age phase 2 features associated with the blocked eastern entrance. In contrast, the old ground surface beneath the ramparts, the round barrow and phase 1 features associated with the blocked eastern entrance produced only small amounts of animal bone.

The old ground surface

Seventeen identifiable fragments representing four species were recovered from the old ground surface (Table 10.2). Sheep are represented by the highest number of fragments however cattle, pig and horse are also present. Fragments derived from medium sized mammals are also more numerous than those from large sized mammals. Rodent was represented by a tibia and probably represents a natural fatality.

The small sample size restricts further analysis concerning species and body part representation. However the presence of robust elements such as mandibles and major long bones coupled with the absence of less dense elements suggests that the assemblage has been subjected to density related differential preservation. No ageing or sexing data is available. Eight fragments displayed evidence of gnawing by canids; six fragments of sheep and one fragment each of cattle and large mammal (Table 10.3). The high incidence of canid gnawing suggests that dogs were also present and that bone refuse was avaliable to them. No other evidence of taphonomy was observed.

The round barrow

Two contexts in the early Bronze Age round barrow (3023, 3015) produced 79 animal bone fragments. The majority were unidentifiable to species (Table 10.4), however both cattle and sheep were present. The small sample size prohibits further analysis concerning species and body part representation. There was no evidence for butchery and only one bone had been burnt.

The ramparts and eastern gateway: Iron Age

A larger number of identifiable fragments was recovered from pits, postholes, gullies and dumps in the blocked eastern entrance. A total of 96 identifiable fragments represents six species and indeterminate rodent. Sheep were the most frequent species according to NISP, followed by almost equal amounts of cattle and pig (Table 10.5). Calculation of MNI suggests that a minimum of three sheep, three cattle and two pigs were represented. Dog was represented by an upper molar and a metapodial, and both red and roe deer were present. The indeterminate rodent remains probably represent natural fatalities.

The cattle remains comprise loose teeth, radial, tibial and metapodial fragments which are all robust elements. The sheep remains also contain a considerable number of loose teeth although the skull, forelimbs, hindlimbs and extremities are also represented. Similarly, pig is represented by elements from all areas of the body. Two fragments of roe deer antler are present, and red deer is represented by fragments of antler, humerus and metatarsal. The presence of fragile elements such as rodent remains, sheep phalanges and skull fragments indicates that the assemblage has been well preserved. Therefore, body part representation is likely to be a reflection of disposal practices. Several bones exhibited surface modifications (Table 10.6), and a few fragments of each of the three major domesticates had been gnawed. A radius and tibia belonging to cattle, a red deer pelvis and a vertebral fragment belonging to a large sized mammal all displayed cut marks. With the exception of the cattle radius from a postpit (7506) the butchered bones were all recovered from dump deposits. Evidence of burning was visible on several fragments belonging to all species except dog and rodent.

There was little evidence for age and sex. Epiphyseal fusion data was available from a small number of bones but were too few to provide a reliable sample. However, it was noted that some of the bones of sheep and pig belonged to juvenile animals. In addition, the fused red deer humerus indicates that this animal was adult. No information was available from the cattle remains. Only one isolated third molar provided toothwear data, this belonged to a sheep between four and six years of age at death (Table 10.19).

The sample size is small, but sheep are only slightly better represented than cattle according to MNI, suggesting that beef was the meat most often eaten. The greater number of sheep fragments recovered from pits concurs with observations by Maltby (1985a; 1987) on animal bone from other Iron Age sites. At Winnall Down and Owslebury it was shown that ditch deposits were dominated by large mammal bones, whilst pits contained a higher proportion of sheep and pig bones. Therefore, in the absence of deposits from the ditch at Uffington, the numbers of cattle may be under-represented. Both sheep and pig are represented by all parts of the body indicating that whole carcasses were originally present. Wild animals were also being exploited for food as evidenced by the bones of red deer. In contrast, the only evidence for roe deer is the presence of antler fragments which may have been gathered locally. Cut marks on the bones of cattle and red deer suggest that the animal bone deposits represent the disposal of butchery waste. However, the absence of butchery marks on sheep and pig may suggest that the carcasses of large and medium mammals were treated differently. The presence of gnawing and burning indicates that bone refuse was left lying around the site before being disposed of in pits, postholes and dumps. The recovery of a dog metatarsal from a postpit containing the butchered cattle bone attests to the presence of dog and may indicate that dogs received similar treatment to the major food species. The length of this bone suggests an animal of about 52 cm at the shoulder (Clark 1995).

Hillfort interior

Early Iron Age

A total of 72 identifiable animal bone fragements were recovered from early Iron Age pits and postholes. The three major domesticates (cattle, sheep and pig), horse and dog were all present. Rabbit, water vole, indeterminate rodent and amphibian were also present although the former is likely to be intrusive. The rodent and amphibian remains probably represent the natural fatality of animals which became trapped in pits.

According to MNI a minimum of one cattle, two sheep and one pig are represented. It is not possible to estimate the relative abundance of cattle, sheep and pig due to the small number of individuals (Table 10.7). A few fragments of horse and one fragment of dog were also present. Deer are absent.

Cattle are represented by loose teeth, mandibles, upper forelimbs, a femur and a metapodial. The presence of cattle maxillary teeth indicates that the absence of skull fragments is probably due to poor preservation. Sheep are represented by all parts of the body. Pigs are represented by fragments belonging to several of the major limb bones and feet. Two fragments of bone, one from the skull and the other a tibial fragment, and a tooth belonging to horse were recovered. These may represent butchery waste and suggest that all parts of the body was originally present. A scapula belonging to a neonatal dog was also recovered and a few vertebrae and ribs from large and medium sized mammals.

Several fragments displayed evidence of gnawing by canids (Table 10.8). Butchery marks were visible on few bones, two fragments of sheep had been cut and one cattle bone had been chopped. Several fragments had been burnt including two sheep bones.

Few bones were able to provide ageing information and therefore age estimates based on epiphyseal fusion must be treated with caution. It is only possible to say that one sheep was below three and a half years, one sheep was over three and a half years and one pig was over two years of age at the time of dealth. Ageing data from toothwear was similarly sparse with only one mandible belonging to a sheep aged between 6 and 12 months (Table 10.19).

Table 10.9 shows the species representation in the three largest concentrations of animal bone. These were recovered from two pits, one in the eastern area of the hillfort (8514) and another in the northern area (9005 and 9008). Metrical data are shown in Table 10.10.

The sample is too small to warrant detailed discussion however it is worth considering some of the possible effects of sampling on species representation. In the absence of deposits from the ditch it is possible that species representation has been biased by cultural practises such as differential butchery and carcass disposal. At Winnall Down (Maltby 1985b) and Owslebury (1987) a higher proportion of cattle remains were deposited in the ditch than in pits. The converse was seen for sheep and pig and this led Maltby (1985b) to suggest that large animals may have been butchered on the periphery of settlements and their bones stripped of meat, before being dumped in the ditch. Meat from the smaller animals may have been cooked on the bone and the waste disposed of in pits close to the settlement focus. Pig appears to have been present in similar numbers to cattle, although again this may be a reflection of disposal practices. Pigs are generally exploited before reaching skeletal maturity and juvenile bones are porous and susceptible to degradation, therefore pigs may also be under-represented.

Body part representation suggests that the major domestic animals were originally present on the site as whole animals. The scarcity of fragile skull elements and small bones such as the carpals and tarsals is most likely a reflection of differential preservation. Similarly, the absence of neonates is probably due to the porous nature of juvenile bone rather than an indication that breeding was not taking place.

Young sheep would have been exploited for meat whilst adults were kept for breeding stock and to provide wool, manure and possibly milk. Pigs would have been kept primarily as meat producers, although hide, manure and bristles would also have been valued commodities. All of the horse remains were from mature animals.

The presence of dog is best attested by the incidence of gnawing which again suggests that bone refuse was not buried immediately but may have been left lying around the site for some time before being deposited in pits. The evidence for butchery confirms the domestic nature of the animal bone deposits.

Middle Iron Age

Only 31 identifiable animal bone fragments (excluding burials) were recovered from pit fills dated to the middle Iron Age. The majority of these are from cattle and sheep with a few fragments belonging to pig, horse and dog. Rodent, amphibian and indeterminate bird were also present.

Cattle are represented by skull, teeth, pelvis and lower limbs (Table 10.11), and most parts of the sheep skeleton are present with the exception of the skull. Two ribs from both a large and medium sized mammal were also recovered together with a cervical vertebrae belonging to a medium sized mammal. A few fragments had been gnawed (Table 10.12). Butchery marks were seen on two bones; a sheep bone had been cut and an unidentified bone fragment had been chopped. A few bones had also been burnt.

Again, epiphyseal fusion data is too scarce to allow the reconstruction of husbandry practices. It is only possible to say that one cow was older than three years, one sheep was below one year and another sheep was above three years at the time of slaughter. Toothwear data was available from the mandible of one sheep aged between 12–24 months (Table 10.19). There is no evidence for immature horse.

The largest concentrations of animal bone were recovered from the fill of a reused storage pit (Table 10.13) in the eastern area of the hillfort (8004) the lowest fills (8010, 8012) of which contained an articulated dog skeleton.

The dog skeleton, in its association with a fragmented globular pot, may suggest a symbolic deposit, but equally it could represent disposal of the carcass of a severely injured animal which was already in poor health. Looking at the general state of the animal, the stature of the dog, and the conformation of the head as suggested by the metrical analysis of the cranium and mandibles, are similar to that of a modern labrador, although the mandibular tooth row and the muzzle lengths are rather shorter, and the anterior width of the cranium is broader. Several pathological manifestations were observed. The right radius and ulna have suffered fractures just below mid-shaft which have remained unreduced. Some healing had taken place and substantial callous formation had occurred, but it was unlikely to be sufficient to stabilise the limb. It is estimated that the trauma was sustained not more than two weeks prior to death, and that no intervention took place to ameliorate the displacement of the elbow joint. A lateral third phalanx has infection of the bone affecting the lateral edge of the shaft, and there is evidence of gum disease on the buccal side of both mandibles, where the jaw is pitted and porotic below the alveolar margins of P3 to M1 inclusive. In addition, there is an infected area of the palate adjacent to the upper left carnassial. These indications of infections reaching the bone are interesting in that the teeth themselves are in very good condition; there is no ante-mortem tooth loss, wear is minimal for an animal of at least 1.5 years of age, and there are no signs of periodontal disease.

The major domesticates, horse and dog were all present at the site but there is no evidence to suggest that the inhabitants were exploiting wild species. The rodent and amphibian bones are likely to represent pitfall victims. As with the material from early Iron Age deposits the presence of gnawing and butchery marks attests to the domestic nature of the bone refuse and its availability to dogs.

It is interesting how many Iron Age dogs found articulated in pits also have obvious pathological manifestations. For example, a male dog from Winklebury, Hants (Jones 1977) had a healed fracture of the muzzle and an infection of the radius and ulna, and an animal from a pit at Farmoor, Oxon (Wilson 1979) had suffered a fracture of the distal humerus which had only partly healed. A dog found with the remains of two vessels at Little Somborne, Hants (Locker 1980) had also sustained a fracture of the distal humerus and the ulna, which it had survived with subsequent false joints developing between the ununited bone ends. A young adult dog from Dibbles Farm in Somerset (Everton 1988) had advanced arthritis and periostitis resulting from the multiple fractures sustained in one foot, and an animal of between three and four years from Bramdean in Hampshire (Clutton-Brock 1981) had also suffered serious infection and deformation of a front paw. At Birdlip, Glos (Dobney and Jaques 1990) a dog with extensive arthritis and dental pathology was recovered from a storage pit. At Blewburton Hill a dog was recovered which had survived extensive trauma to the skull and injuries to the feet, but was suffering from an infection of the genitalia visible in the lesions on the baculum (Clark nd); this dog, however, was found in clear association with the skeletons of a man and horse (the man being astride the horse) and a pot (Collins 1953), which almost certainly constitutes a ritual deposit. Whether all complete dogs found in Iron Age pits with pottery fragments should be considered symbolic depositions is still very much a matter of debate.

Romano-British

The majority of animal bone was recovered from deposits dated to the Romano-British period including a pit, posthole and an oven/kiln all located in the western area of the hillfort. In addition, a considerable amount was recovered from the uppermost fills of Iron Age pits. Sheep are the most numerous species according to NISP and MNI being more than twice as numerous as cattle (Table 10.14). A humerus was positively identified as goat. Pig is present in smaller numbers according to NISP although MNI suggests that they were present in similar numbers to cattle. Several fragments of horse and dog were recovered representing a minimum of three and two individuals respectively. In addition to the domestic mammals, red deer, roe deer, fox and domestic fowl were all present. House mouse, bank vole and field vole were identified amongst the rodent remains, and indeterminate bird and amphibian were represented by one fragment each.

Cattle are represented by all parts of the body including the skull and feet as are sheep. Most parts of the pig skeleton are also represented with the exception of the skull, however the presence of loose maxillary teeth indicates that is probably a reflection of differential preservation. Horse is represented by a mandibular tooth, three radii, two ulnae, at least two hind lower limb joints (ankles) and two carpal bones. In contrast, apart from a single toe bone, dog is represented entirely by cranial elements. A pelvis, femur and antler belonging to red deer were recovered whilst roe deer was represented solely by an antler fragment. The forelimbs and pelvis of domestic fowl are also present. A considerable number of bones displayed evidence of surface modification (Table 10.15). Several bovid bones and one bone each of pig, horse and domestic fowl had been gnawed. Cut marks are more frequent than chops, although chop marks were more frequently seen on the remains of sheep and sheep-sized animals than cattle. An ulna, astragalus and carpal of horse exhibited cut marks and both red and roe deer antlers had been chopped.

The majority of burning was seen on the medium sized mammals, especially sheep. No cattle or horse bones displayed evidence of burning and only one large sized mammal fragment had been burnt. Epiphyseal fusion data (Tables 10.16 to 18) suggest that the cattle were not slaughtered below three years of age and that at least one cow was slaughtered between the ages of three and four years of age. Another cow was adult at the time of death. In contrast, almost half of the sheep were slaughtered before reaching three years of age. Five sheep mandibles provided ageing data, and these give additional evidence for the slaughter of young sheep; one lamb was below 6 months, two were aged between 6–12 months and two were aged between 12–24 months at the time of death (Table 10.19). Pigs were slaughtered before reaching skeletal maturity. The epiphyses of horse bones were all fused apart from a calcaneus, this indicates that one animal was below three years.

Several contexts in the eastern, northern and western parts of the hillfort contained significant concentrations of animal bone (Table 10.20). These are the uppermost fills of Iron Age pits (8504, 8506, 9002 8004, 11003), a Romano-British pit (10504) and an oven/kiln (11505). The species representation in these concentrations conform to the overall pattern although cattle and sheep are equally represented in contexts 8505 and 11004. The latter also contained the partial skeleton of a neonatal lamb. Amongst the animal bone in the Romano-British pit were several horse bones. These included a mandibular molar, two left radii and two right articulated rear lower limbs which were found in association with a dog skull and four mandibles. The fill of the oven/kiln stoke hole (11505) contained a considerable amount of burnt bone although the majority was unidentifiable to species.

Measurements taken from the cattle, sheep, goat, pig and horse bones are given in Table 10.21. Where possible these were compared to those held on the Animal Bone Metrical Archive Project (ABMAP) at CHEE and all were within the range for this period.

During the Romano-British period sheep appear to have been kept in greater numbers than cattle although the larger body size of cattle suggests that they probably contributed as much, if not more meat to the diet. Pigs also appear to have been kept in small numbers, however the practice of culling immature pigs whose bones are prone to degradation means that they may be under-represented. Although dogs were present it is not possible to determine whether they were deliberately kept by the inhabitants or if they were simply strays taking advantage of easy pickings. Domestic fowl is seen for the first time but wild species do not seem to be significant contributors to the diet although the presence of red deer limb bones suggests that some hunting was practised. Roe deer is represented solely by an antler fragment which may have been collected as shed antler. The fox bone may represent a natural fatality or alternatively, deliberate exploitation for fur. Both the rodent and amphibian remains are likely to represent the remains of natural casualties.

Body part representation suggests that cattle, sheep, pig and horse were originally present as whole carcasses. The scarcity of neonates may reflect preservation, disposal and recovery biases rather than a real absence as the presence of a neonatal lamb suggests that sheep breeding was taking place either inside or close to the hillfort.

None of the cattle was below three years of age which suggests that they were probably kept primarily to provide secondary products such as milk, manure and traction. In contrast, the slaughter of immature sheep suggests that these animals were kept to provide both meat, wool, manure and possibly milk. As would be expected in an animal kept primarily for meat, pigs were slaughtered before reaching maturity. Domestic fowl would have provided meat, eggs and feathers.

Similar proportions of butchery marks on the bones of cattle and horse suggest that both animals may have received similar treatment. It is interesting that only one large mammal bone had been burnt compared with several sheep bones. This may result from food preparation and cooking techniques such as the stripping of meat from the bones of large animals prior to cooking, whilst the meat of sheep and pigs may have been cooked on the bone. This may also explain the greater proportion of cut marks seen on the bones of large mammals. Cut marks on horse bones suggest that horse meat was being eaten, and chop marks seen on the red and roe deer antler provide evidence that antler was being utilised as a raw material.

The presence of a neonatal lamb in a deposit containing a large concentration of animal bone may indicate that a distinction was not made between domestic bone refuse and the disposal of dead animals. Alternatively, an ideological association may be drawn although there is no reason to assume that the neonatal lamb is anything other than a natural casualty. The presence of articulated horse ankles in association with a dog skull and mandibles in another deposit containing a large concentration of domestic bone may represent a symbolic rather than a domestic deposit and will be discussed further later in this report. The two horse carpals associated with the dog remains had been cut, possibly as a result of disarticulation.

The presence of house mouse in Romano-British deposits is not unusual; it has been recovered from several Iron Age sites such as Gussage All Saints (Harcourt 1979a, 155) and Old Down Farm (Maltby 1981a, 102) and is believed to have been introduced to Britain during that period (Corbet and Southern 1977, 229). Its presence at Uffington probably results from a natural fatality and its dietary preference for cereals may explain its attraction to a human habitation site. Today the distribution of water vole is restricted to the banks of rivers and streams, but in some parts of Europe they can be more terrestrial (Corbet and Southern 1977). The presence of water vole on this site, and at other chalk downland sites during the Iron Age (Grant 1984a; Maltby 1985a; 1987), suggests that water vole was more widely distributed in the past.

Conclusion

The animal bone assemblage from White Horse Hill suggests the continued exploitation of domestic animals throughout the prehistoric occupation. Sheep appear to have been the major species exploited as is generally the case on contemporary chalk downland sites. However, the absence of deposits from the ditch renders any analysis concerning relative abundance of species purely speculative because the assemblage is likely to have been affected by cultural biases. Whole carcasses were originally present on the site which suggests that livestock was kept by the inhabitants. During the Romano-British period, a significant proportion of sheep appear to have been kept to provide meat although older sheep were also kept as breeding stock and to provide secondary products. The absence of immature cattle during the Romano-British period suggests that they were kept primarily to provide secondary products. Lambing, and perhaps calving probably took place inside or close to the settlement and it is likely that some redistribution of livestock took place. This pattern is seen at most other chalk downland sites during this period and probably reflects the local environment. The association of horse and dog remains is not without parallel and may represent an extraordinary practice. The place of the animal bones from this site in a regional context is discussed in detail in Appendix 4.

HUMAN BONE
by Angela Boyle

The assemblage comprised four articulated skeletons (26, 4028, 4034, 4047 & 4048) and 14 disturbed and disarticulated deposits (3009, 3010, 3017, 3020, 3038, 4000, 4007, 4015, 4022, 4024, 4032, 4036, 4039, 4045 and 4048). With the possible exception of deposits 4000, 4015, 4036, 4039 and 4048 all of the latter are Roman burials investigated by Martin-Atkins in the 1850s. A further three skeletons or parts thereof were discovered in the ditch of the long barrow and reburied there. The details of all the deposits appear in Table 10.22. Skulls are largely absent because Martin-Atkins retained these for further analysis.

Methodology

The sexing of the adult individuals was based on standard morphological and metrical data (Workshop 1980) although in keeping with current practice no attempt was made to sex subadults. Age estimation for the adults was based largely on the degree of dental attrition (Brothwell 1981, 72) as pelvic bones did not survive well thus precluding the assessment of pubic symphysis and auricular surface. Subadults age estimates were based on degree of epiphyseal fusion (Brothwell 1981, 66). Adult stature was calculated using the regression formulae of Trotter and Gleser (reproduced in Brothwell 1981, 101). Dental notation is based on Brothwell (1981).

Discussion

The assemblage of articulated skeletons comprised two adult males and two subadults. Skeleton 26 exhibited medium alveolar resorption which is likely to be indicative of periodontal disease. Details of the skeletons are provided in Table 10.23.

CHARRED PLANT REMAINS
by Mark Robinson

Bulk samples were taken for analysis for charred plant remains from the 1995 season of excavations on White Horse Hill. The contexts sampled comprised: Iron Age postholes associated with the south-west entrance of Uffington Castle hillfort, Iron Age pits within the interior of the hillfort, a Roman oven and some prehistoric ditches outside the hillfort, including a Bronze Age ditch around a ploughed out barrow and a late prehistoric linear ditch overlain by the Ridgeway. The flotation and sorting of the samples was undertaken by Mrs Daisy Lange, who identified the remains under the guidance of the author.

Methods and results

The samples were floated in water onto a 0.5 mm mesh, dried and sorted under a binocular microscope. The plant remains so recovered were identified with reference to the collection of the Environmental Archaeology Unit of the Oxford University Museum of Natural History. All flots and identifications were checked by the author. The results are listed in Table 10.24. Charred plant remains were absent from the five samples from the prehistoric features outside the hillfort including the Bronze Age ring ditch in trench 1 and the fill of the late prehistoric linear ditch (trench 4, contexts 404 & 405). Remains were also absent from 5-litre samples from trench H7; context 9005, sample 2 from Iron Age pit 9002 and trench H8; context 9514, sample 9 from posthole 9505, in the interior of the hillfort.

Interpretation

The ring ditch and linear ditch outside the hillfort

The absence of charred plant remains from the ring ditch and the linear ditch is unsurprising. No cremations were found in association with the ring ditch and both ditches were distant from any settlement.

Early Iron Age postholes at the eastern entrance

Charred plant remains were recovered from all four postholes that were sampled at the eastern entrance (trench H4). One of them, context 7528, contained high concentrations of cereal grain and weed seeds. Lower concentrations of similar material was present in the other trench H4 postholes. The grain had been badly damaged in the charring process, leaving most of it unidentifiable. Much of the grain was probably hulled *Hordeum vulgare* (six-row hulled barley) although only one of the barley grains could be confirmed as six-row and only a few showed evidence of being hulled. A little of the grain could be identified as *Triticum* sp. (wheat) and there was one grain of *Triticum dicoccum* or *spelta* (emmer or spelt wheat). The only chaff was a single glume of *T.* cf. *dicoccum* from context 7528. All the identifiable weed seeds were from *Galium aparine* (goosegrass) or *Galium* sp. It is a common arable weed which is characteristic of autumn-sown crops (Reynolds 1981, 112). Also present were a couple of tubers of the grass *Arrhenatherum elatius* (onion couch) from context 7514 and a fragment of *Corylus avellana* (hazel) nut shell from context 7528.

The remains were probably derived from a deposit of burnt crop-processing debris in the vicinity of the eastern entrance which had become incorporated into the backfill of the postholes. It was quite possibly waste from the sieving of hulled barley and hulled wheat to clean it following de-husking, with almost all the chaff lost through complete combustion.

Iron Age pits (Trenches H10, H5, H7 and H12)

The charred assemblages from the storage pits in the interior of the hillfort (pit 12003 in trench H10, pit 8004 in trench H5, pit 9002 in trench H7 and pit 11003 in trench H12) were similar to those from the eastern entrance postholes with low concentrations of remains. Grain from the pits included hulled *Hordeum* sp. (hulled barley) and *Triticum dicoccum* or *spelta* (emmer or spelt wheat) and the most numerous weed seeds were again, *Galium aparine* (goosegrass). Chaff was absent. The concentrations of remains however, was so low that they need represent no more than the general very mixed and degraded background debris from crop processing within the hillfort, becoming incorporated into the backfill of the pits.

The Roman oven

The four samples from the various parts of the oven (11504/11507 in trench H13) contained higher concentrations of charred plant remains than all but one of the Iron Age contexts. The range of remains in all four samples was similar. Grain predominated, much of it badly preserved, but with some identifiable as *Triticum* sp. (wheat) and a few which could be taken to be *T. spelta* (spelt wheat). There was also a slight presence of *Hordeum* sp. (barley) including hulled *Hordeum vulgare* (six-row hulled barley). The only cereal chaff was a single glume base of *T. spelta*. Non-cereal crops were represented by a single seed of *Pisum sativum* (pea). The weed seeds were all from species which readily grow as arable weeds, the most numerous being *Vicia* or *Lathyrus* sp. (vetch or tare) but also including *Agrostemma githago* (corn cockle), *Fallopia convolvulus* (black bindweed) and *Bromus* cf. *secalinus* (brome grass).

It is uncertain whether the remains represented grain that was being processed in the drying oven, that had been accidentally burnt, or what was left of crop-cleaning waste used to fuel the oven after most of the chaff had burnt away. Corn drying ovens seem to have been used both as malting ovens and for parching hulled grain, so that it could be de-husked. There was only a single grain, of hulled *Hordeum* sp. (barley), with evidence of sprouting, but the poor state of preservation of many of the other grains had resulted in the loss of their embryos, so their state could not be determined.

Discussion

Iron Age

The poor state of preservation and the low concentration of remains in the Iron Age samples means that the crop record for the site is incomplete. *Triticum spelta* (spelt wheat) and *Hordeum vulgare* (six-row hulled barley) were the main crops in the Upper Thames Valley throughout the Iron Age, with only a slight trace of *Triticum dicoccum* (emmer wheat), (eg Jones 1978, 103). Six-row hulled barley and hulled wheat were probably the main cereals used at Uffington during the Iron Age but whether the wheat was mostly spelt remains uncertain. Indeed the only wheat glume discovered more closely resembled emmer than spelt wheat.

The cereal crops could have been grown locally but the weed flora was not diagnostic of soil conditions. The occurrence of seeds of *Galium aparine* (goosegrass), which tends to be a weed of autumn-sown cereals, is very familiar from other Iron Age assemblages of charred crop-processing remains from southern England (eg Jones 1978, 106; Jones 1984, 489). The presence of tubers of *Arrhenatherum elatius* (onion couch) raised the possibility that cereal crops were being harvested by uprooting, but larger assemblages which contained cereal tillers with roots would be required to confirm this practice.

The results showed that cereals were being processed on the site at least in the early Iron Age but this need not imply that a full range of agricultural activities were being undertaken in the hillfort. It is possible that barley was imported as hulled grain or in the ear and wheat as spikelets or in the ear, stored in the pits and then de-husked and cleaned when needed for use.

The concentration of charred remains from the Iron Age pits within the interior of the hillfort was much lower than from large Iron Age settlements in the Upper Thames Valley or, for example, the interior of the hillfort of Danebury on the Hampshire Chalk (Jones 1984, 483–7). This was probably a reflection of the rather low intensity of occupation within Uffington Castle in the middle Iron Age. Preliminary results from two other hillforts along the Ridgeway, Segsbury and Alfred's Castle, where there appears to have been more intensive occupation, suggest somewhat higher concentrations of charred remains.

Roman

The cereals from the corn drying oven; spelt wheat and six-row hulled barley, were the main grain crops in the region during the Roman period (Robinson and Wilson 1987, 54). The seed of *Pisum sativum* (pea) could have been from a plant growing as a weed amongst the cereals, rather than from a crop of peas being processed in the oven, but it still provided a useful record of another field crop that was probably grown in the region. The weed seeds from the corn drying oven are typical of the weed seeds that occur in charred crop-processing assemblages of Roman date and one species, *Agrostemma githago* (corn cockle), was not introduced to Britain until towards the end of the Iron Age.

MOLLUSCAN ANALYSIS
by Mark Robinson

The underlying bedrock of the areas under investigation in this project is Chalk, although in places it has a covering of chalky clay, and it was realised that this would give a high potential for the preservation of the shells of land snails in the ancient soils and sediments. Sampling was therefore undertaken for molluscs with the general aim of tracing the environmental development of the area. Any evidence for the construction or past presence of the White Horse, however, was regarded as of particular importance, so sampling was undertaken in the Manger and below the belly of the Horse with this consideration in mind.

Deposits sampled

The deposits sampled are described in chronological order for each of the excavations, starting with the earliest sediment in each sequence.

The barrows

1 Long mound (Table 10.25, Fig. 10.1)

Context 4030 soil beneath mound, pale brown chalky silt loam with angular chalk fragments

2 The round barrow – sequence from ditch (Table 10.25, Fig. 10.1)

Context 3023, above loose chalk rubble of primary fill, dark brown silt loam with a few chalk fragments and flint pebbles
Context 3015, mid-brown silt loam with angular chalk fragments

3 The ring ditch (Table 10.25, Fig. 10.1)

Sample 4, fill of ring ditch, very pale brown chalky silt loam with many angular fragments

The hillfort defences

1 The rampart sequence at the north-east breach (Table 10.26, Fig. 10.2)

Context 31, medium brown silty clay loam with much sub-angular, coarse chalk gravel overlying chalk bedrock
Context 30, old ground surface beneath rampart, dark brown clay loam with occasional chalk gravel, which appeared to have experienced an episode of de-calcification and subsequent incorporation of chalk fragments into it, possibly as a result of turf removal during the construction of the rampart or ploughing
Context 26, soil developed over first phase of rampart, dark brown silty clay loam with a little chalk gravel

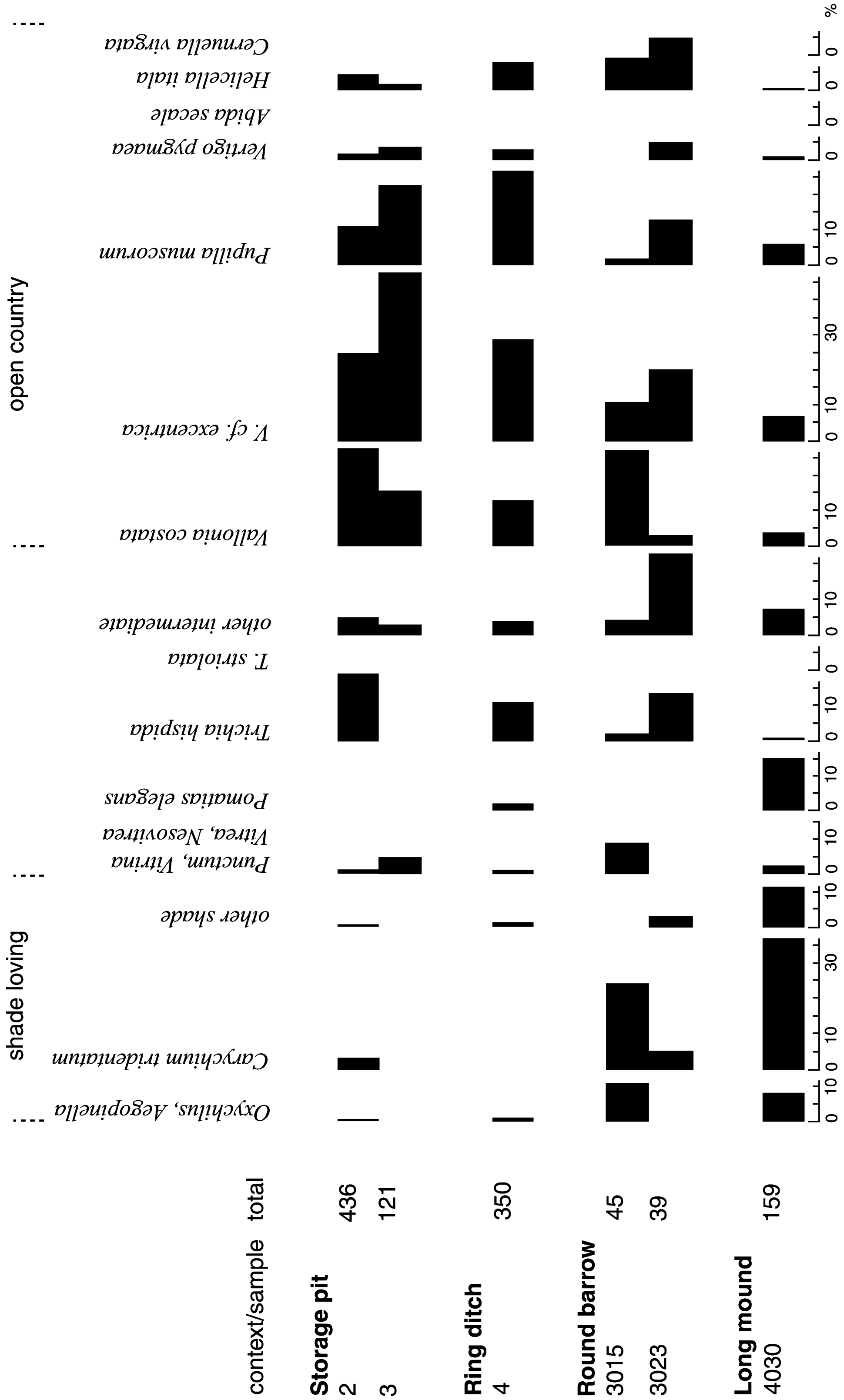

Figure 10.1 Results of deposits sampled for molluscan analysis, from long mound, round barrow, ring ditch and storage pit.

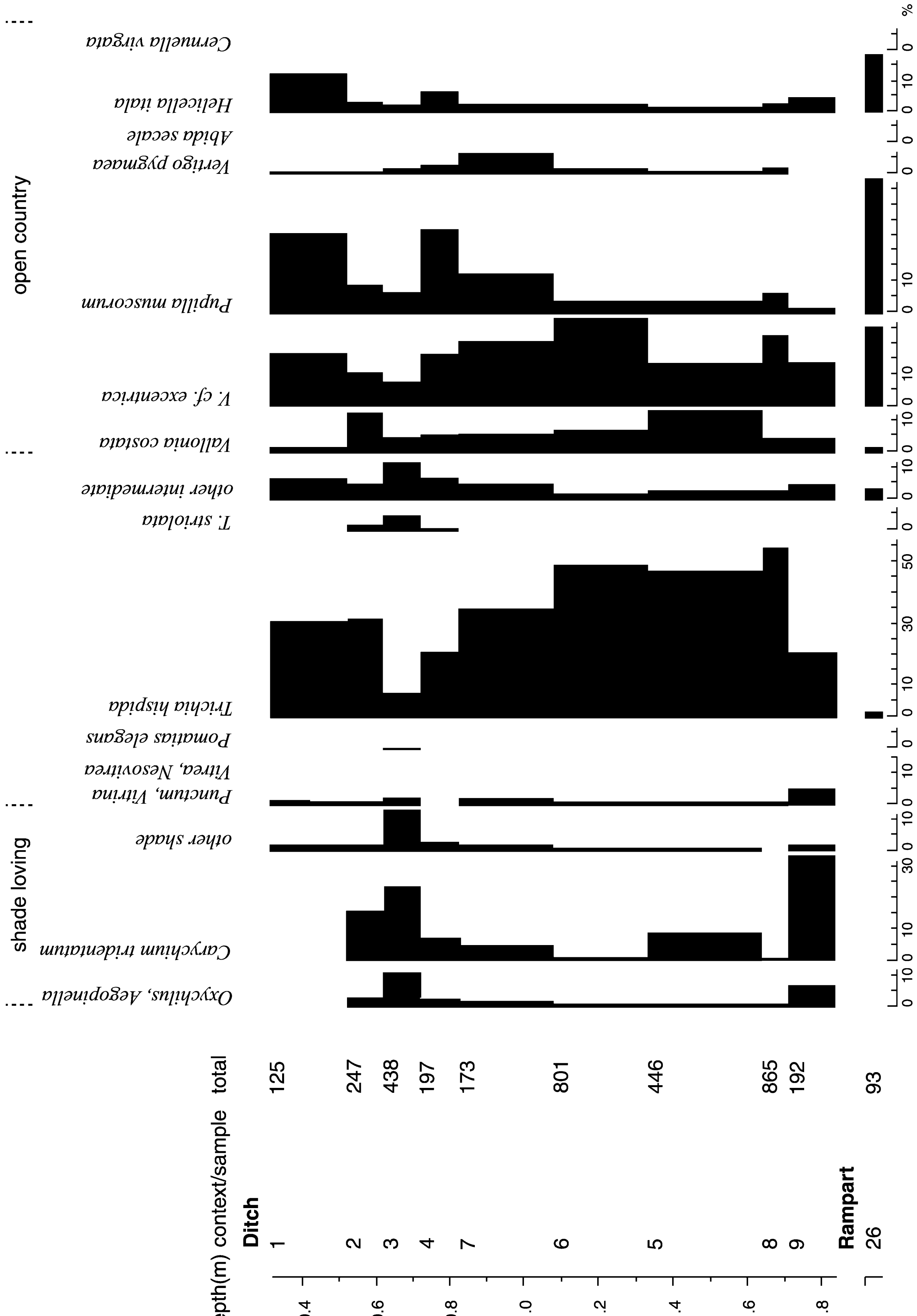

Figure 10.2 Results of deposits sampled for molluscan analysis, from hillfort rampart and ditch.

2 The secondary ditch sequence at the north-east breach (Table 10.27, Fig. 10.2)

Context 65, (sample 9), light brown silty clay loam with some small chalk gravel, above context 62, the chalk rubble primary fill to the ditch
Context 56, (sample 8), medium brown silt loam
Context 55, (sample 5), buff chalky silt loam with angular chalk stones, above sarsen stones of 56
Context 54, (sample 6), buff chalky silt loam
Context 50, (sample 7), pale brown chalky silt loam, with some chalk stones
Context 53, (sample 4), light brown chalky silt loam, with occasional chalk gravel
Context 63, (sample 3), light brown silt loam with chalk gravel
Context 41, (sample 2), light brown silt loam
Context 42, (sample 1), mid-brown silt loam, some chalk rubble, above 41, below recent ditch fills

The hillfort interior

1 Iron Age storage pit (Table 10.25, Fig. 10.1)

Context 8512, (sample 3), soil fill to Iron Age pit, dark brown clay loam with chalk gravel
Context 8505, (sample 2), Roman layer in top of pit, dark brown silt loam with some chalk gravel

The White Horse

1 Belly of Horse at trench 5 (Table 10.28, Fig. 10.3)

Context 1019/1020, pale brownish white chalk silt loam and grit with some larger angular chalk fragments, overlying chalk bedrock of edge of first phase of Horse, probably colluvium derived from the erosion and clearing of the initial phase of Horse, and possibly of late Bronze Age or early Iron Age date (OSL).
Context 1015/1018, very pale brownish white chalk grit with some silt and sludged chalk, above context 1019/20, surface of second phase of Horse
Context 1016, very pale greyish white chalk grit and silt, over 1015/1018, disturbed edge of Horse
Context 1005, very pale greyish white chalk grit and silt, some larger angular chalk fragments
Context 1004, grey chalky silt with some chalk grit
Context 1000, grey brown chalky silt with some grit, modern turf

2 Terrace below Horse at trench 2 (Table 10.28)

Context 1024/1025, pale buff chalky silt with angular chalk pebbles, above weathered chalk rubble
Context 1023, pale buff chalky silt with angular chalk pebbles
Context 1000, grey brown silt loam with a few chalk fragments, modern turf.

The Manger sequences *(Table 10.29)*

Context 2010, depth 2.00–2.10 Dirty white angular chalk pebbles, chalk sand and sludged chalk silt
Context 2010, 1.30–1.40, as below
Context 2010, 1.00–1.10, as below
Context 2008, offset from column, grey brown clay loam with some chalk fragments, above 2010, below 2004
Context 2004, 0.90–1.00, very pale brown chalky silt loam with angular chalk fragments to gravel size
Context 2004, 0.80–0.90, as below
Context 2004, 0.70–0.80, as below
Context 2003, 0.60–0.70, very pale greyish yellow chalky silt loam with angular chalk fragments to gravel size
Context 2002, 0.50–0.60, very pale grey brown chalky silt loam with angular chalk fragments to gravel size
Context 2002, 0.40–0.50, as below
Context 2002, 0.31–0.40, as below
Context 2001, 0.20–0.31, grey chalky silt loam with a few small chalk flecks
Context 2000, 0–0.20, dark grey silt loam, modern turf

Methods and results

The samples were analysed following the methods of Evans (1972, 445). One kilogram of each sample was broken up in water, any shells which floated were poured off onto a 0.5 mm mesh and the residue sieved down to 0.5 mm. The dried flots and residues were sorted under a binocular microscope for molluscan remains, which were identified with reference to the collections of the Oxford University. The results have been tabulated for each sequence in Tables 10.25–30. The tables give the minimum number of individuals represented by the fragments in each sample, excluding *Cecilioides acicula* from the totals because it is a species which burrows deeply. Nomenclature follows Kerney (1999).

Molluscan diagrams (Figs 10.1 to 10.4) were plotted for the sequences largely following the groups used by Evans (1972, 194–203). *Vitrea* spp., however, have been placed with *Punctum pygmaeum*, leaving only *Oxychilus* and *Aegopinella* in the woodland Zonitidae group. This was because it seems to have been occurring in more open habitats in addition to the shaded habitats favoured by *Oxychilus* and *Aegopinella*. Unidentified specimens of *Vallonia* were attributed as best as possible to *V. costata* and *V. excentrica* types, the remainder then being divided according to the ratio between the two. The same molluscan groups have been used in all the diagrams.

Shells were also collected from the modern surface of the White Horse. Shells were absent from the central area of the body of the Horse and all that could be found on the back of the Horse was a fragment of *Cepaea* sp. However, shells of recently dead snails were present along the margin of the belly of the Horse with the turf, where debris washed off the surface of the Horse by rain action had accumulated. The results are given in Table 10.30.

Interpretation

The barrows *(Fig. 10.1 and Table 10.25)*

1 The long mound

The soil beneath the Neolithic long mound (context 4030) contained angular fragments of chalk and had clearly been disturbed, either by cultivation or

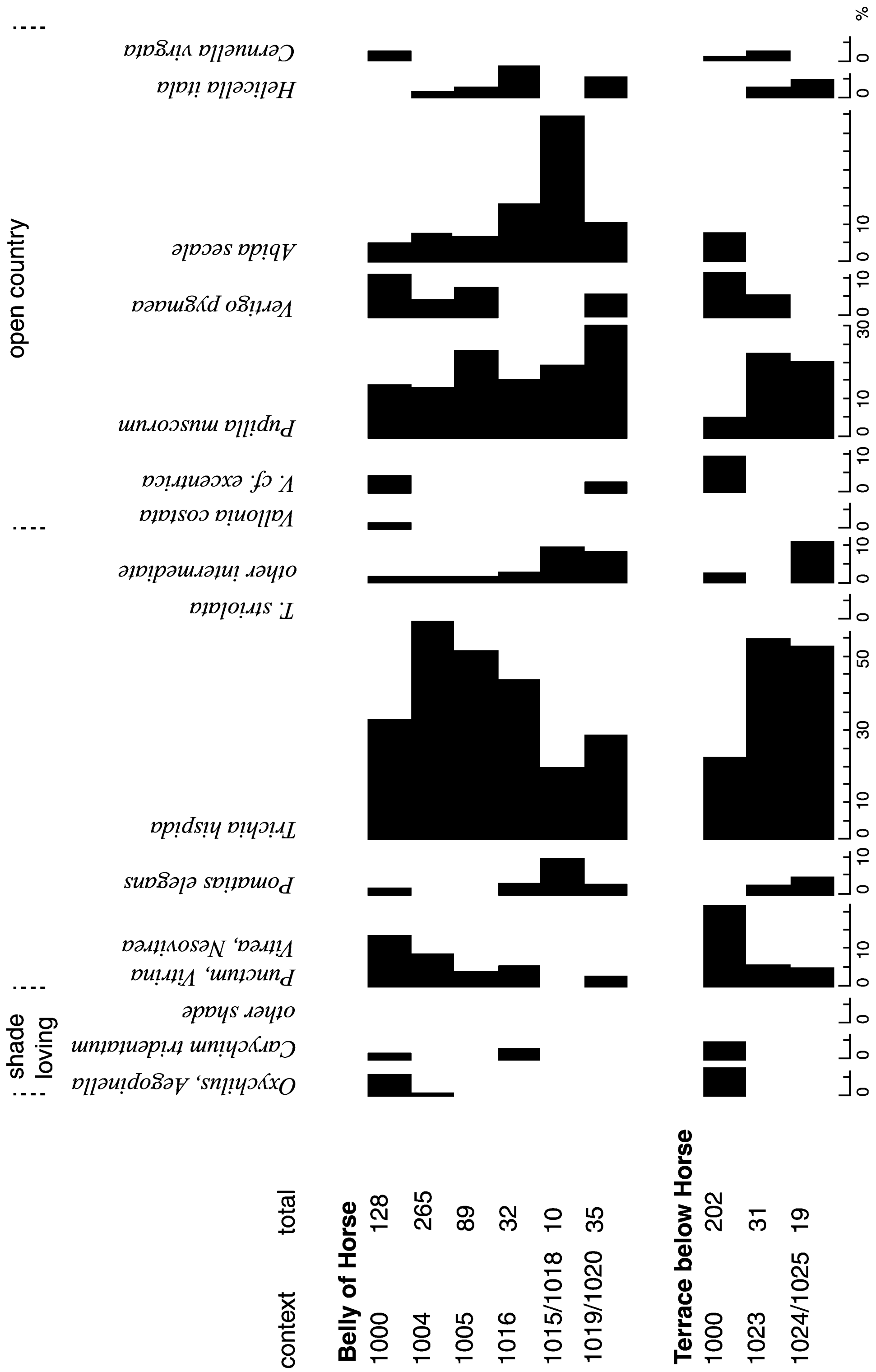

Figure 10.3 Results of deposits sampled for molluscan analysis, from belly of the Horse and the terrace below the Horse.

the construction of the mound. Open-country molluscs including *Pupilla muscorum*, *Vallonia costata* and *V. excentrica* were present but they only made up 19% of the assemblage. Shade-loving species, particularly *Carychium tridentatum* but including *Oxychilus cellarius* and *Clausilia bidentata*, were more numerous at 56% of the total. Some of the shells of the shade-loving species, including *Discus rotundatus*, *Ena montana* and *Macrogastra rolphii* showed traces of a secondary calcium carbonate encrustation which was not present on the shells of the open-country species. *Pomatias elegans*, a species which burrows into leaf litter and loose soil, was, at 15% of the molluscs, well represented although the remains were mostly shell fragments and apices rather than intact shells.

The molluscan assemblage from the buried soil probably represents a chronological sequence of faunas from at least two distinct environments which had become mixed as a result of the disturbance to the soil. *Ena montana* is characteristic of old, undisturbed woodland (Evans 1972, 165). *Macrogastra rolphii* is a woodland snail of widespread, although very local, occurrence (Evans 1972, 167; Kerney 1999, 170). These two species, along with many of the other woodland species, particularly those represented by encrusted shells, were possibly members of a pre-clearance fauna. *Pomatias elegans* possibly flourished at the time of clearance, as has been noted from other Neolithic soil sequences (Evans 1972, 134). While the open-country species possibly reflected conditions at the time of the construction of the mound, it is not possible to determine whether some scrub was present, enabling some of the woodland species to persist. Indeed, *Carychium tridentatum* also occurs amongst tall, ungrazed grass (Evans 1972). Given the high proportion of shade-loving molluscs in the assemblage from context 4030, it is likely that the transition from woodland to more open conditions occurred not long before the construction of the barrow. Earthworm activity results in shells being taken down through the soil profile and weathering processes gradually result in the destruction of the shells in an active soil (Evans 1972, 207–13). If open conditions had persisted for several hundred years before the soil was disturbed and buried, the shells of woodland species would mostly have been lost. These shells likewise would have been lost if there had been a long period of cultivation prior to burial.

2 The round barrow

Context 3023, the first soil to develop in the ditch of the Bronze Age round barrow, did not contain a high concentration of shells and the shells showed signs of weathering. However, the assemblage was suggestive of stable grassland conditions, with *Pupilla muscorum*, *Vallonia excentrica*, *Trichia hispida* and *Helicella itala* the main species. The sediment which comprised context 3015 belonged to an episode of more rapid silting in the ditch which sealed the soil. The high level of *Vallonia costata* was perhaps related to rupestral habitats, made by large chalk fragments in the sediment. Although open-country species predominated, a high level of *Carychium tridentatum* was possibly a reflection of tall herbaceous vegetation growing in the ditch.

3 The ring ditch

Chalky sediments in the Bronze Age ring ditch (sample 4) contained a high concentration of shells. They were almost all from species of open habitats, *Vallonia costata*, *V. excentrica* and *Pupilla muscorum* being the most numerous, but *Helicella itala* was also well represented. Such a fauna would be characteristic of grazed, chalk grassland although the nature of the sediments suggested unstable conditions, possibly due to the barrow mound or bank eroding into the ditch.

The hillfort ramparts and ditch (Fig. 10.2)

1 The Rampart sequence at the north-east breach (Table 10.26)

The poor state of preservation of shells from the base of the soil sealed beneath the rampart (context 31) and the almost complete absence of shells from the old ground surface immediately below the rampart (context 30), suggested that the soil had experienced decalcification. It is possible that a brown-earth soil had developed from a thin covering of clay over the chalk. Subsequently the soil had been disturbed, resulting in the incorporation of chalk fragments and possibly truncation. It is uncertain whether the site had been ploughed shortly before the construction of the rampart, or construction activities such as the removal of turf, had caused the disturbance.

An open-country molluscan assemblage dominated by *Pupilla muscorum* occurred in context 26, the soil which developed over the first phase of the rampart. *Vallonia excentrica* and *Helicella itala* were also well represented. This would suggest the rampart was covered with short turf with some bare patches.

2 The secondary ditch sequence at the north-east breach (Table 10.27)

The primary ditch was entirely filled with loose chalk rubble and the initial fill of the secondary ditch was also chalk rubble. Molluscs were present in the secondary ditch fills above this level. The first of these deposits, context 65 (sample 9) contained some chalk fragments, showing that the rampart and ditch sides had not fully stabilised. However, the molluscs from this context suggested that the ditch bottom was already well vegetated. *Carychium tridentatum* was the most abundant species but *Vallonia excentrica* was also quite well represented and numbers of shade-loving species including the Zonitidae were low. Such a fauna is suggestive of tall herbaceous vegetation.

Context 56 (sample 8) was a soil which formed above context 65 under more stable conditions. The stable conditions were reflected by a very high concentration of shells. The remains from it showed major changes had occurred to the molluscan fauna of the ditch. *Carychium tridentatum* had almost entirely disappeared, whereas the proportion of *Trichia hispida* had more than doubled, making it the most abundant snail in the sample. The next-most abundant species was *Vallonia excentrica*, which, along with the remainder of the molluscan assemblage, suggested relatively short dry grassland. It is possible that since the ditch had become partly filled and its sides stabilised, sheep were managing to climb into it to graze the vegetation.

Unstable conditions returned with the collapse of sarsen stones, possibly from the rampart, into the ditch. The rupestral habitat they presented was possibly the reason for an increase in the proportion of *Vallonia costata* in context 55 (sample 5). Taller herbaceous vegetation was suggested by *Carychium tridentatum*. There followed further soil development with context 54 (sample 6), which contained a molluscan assemblage very similar to that from context 56. Context 50 (sample 7) and context 53 (sample 4) were sediments which accumulated more rapidly and contained open-country molluscan assemblages. However, context 63 (sample 3), which also contained some chalk fragments, had a molluscan assemblage suggestive of conditions in the ditch becoming more shaded. *Aegopinella* spp. and *Oxychilus cellarius* rose to 11% of the total, other shade-loving species, especially *Discus rotundatus*, comprised 13% of the molluscs and *Carychium tridentatum* had risen to 24% of the total. There was a significant presence of *Trichia striolata*, a snail which did not become common in Britain until the Roman or medieval period, when it started to occur in arable land, gardens and hedgerows (Evans 1972, 176–7). Open-country species were not entirely absent from context 53, for example *Vallonia excentrica* and *Pupilla muscorum*, each comprising around 7% of the total molluscs. It is thought likely that this context accumulated during an episode when scrub became established in the ditch bottom but that there were at least some relatively exposed grassy areas on the ditch sides. Conditions became more open with context 41 (sample 2) and context 42 (sample 1), the top of the sequence (although 0.30 m below the modern ground level in the ditch) contained an assemblage characteristic of short-turfed grassland. *Trichia hispida* gp. and *Pupilla muscorum* together comprised over half the assemblage, while *Vallonia excentrica* and *Helicella itala* were also very abundant. Shade-loving species were virtually absent. The absence of any of the exotic species of Helicellinae might suggest context 42 was no more recent than early medieval.

The hillfort interior *(Fig. 10.1 and Table 10.25)*

1 Iron Age storage pit

The snails from the Iron Age fill to a storage pit, context 8514 (sample 3), were almost all individuals from open habitats, particularly *Vallonia excentrica*, *V. costata* and *Pupilla muscorum*, which had probably been amongst backfill derived from the surrounds of the pit. There was very little evidence of a fauna which lived in the pit. A hollow in the top of the pit, context 8508 (sample 2), contained what was probably an autochthonous fauna, again indicative of open conditions but with *Trichia hispida* gp. more numerous than previously.

The White Horse *(Fig. 10.3 and Table 10.28)*

1 Belly of the Horse at trench 2

The initial sediment overlying the edge of the first phase (late Bronze Age) of the White Horse, context 1019/1020 contained a restricted open-ground assemblage in which *Trichia hispida* gp., *Pupilla muscorum* and *Abida secale* were the main species. The occurrence of *Abida secale* is of particular interest. It is a xerophile (dry ground) species of habitats with some bare ground that was abundant in the Late Devensian (Evans 1972, 152–3; Kerney and Cameron 1979, 84–5; Kerney 1999, 102). However, it is now of local distribution because unlike, for example, *Pupilla muscorum*, which was also present in the sample, it has been unsuccessful at colonising many of the bare ground habitats created by human activity. It does not occur in settlements, on the bare sides of ditches, nor in arable fields. It now tends to occur on unstable limestone slopes and on the Chalk in dry areas of juniper scrub where the turf is discontinuous. It seems likely that *A. secale* found a suitable habitat on the bare Chalk surface of the White Horse itself. Other indications of broken vegetation cover and surface instability were given by the relatively high numbers of *Pupilla muscorum* and the almost complete absence of species of *Vallonia*.

Context 1015/1018, the surface of the second phase of the Horse, and context 1016, the edge of the Horse, were likewise assemblages in which *T. hispida sp.*, *P. muscorum* and *A. secale* predominated. In context 1005, colluvium from the Horse, they had been joined by *Vertigo pygmaea*, a species more characteristic of stable grassy habitats. Possibly it was living in turf at the edge of the hill figure. These four species were joined by *Vitrea* cf. *contracta* as the main components of the assemblage from context 1004, soil which had developed from wash from the Horse. *V. contracta* is more shade-demanding than the other species and was perhaps living at the base of grass tussocks. The soil of the present-day turf, context 1000, had probably developed under relatively stable conditions. The most numerous species were the same five that were noted for context 1004. However, the occurrence of

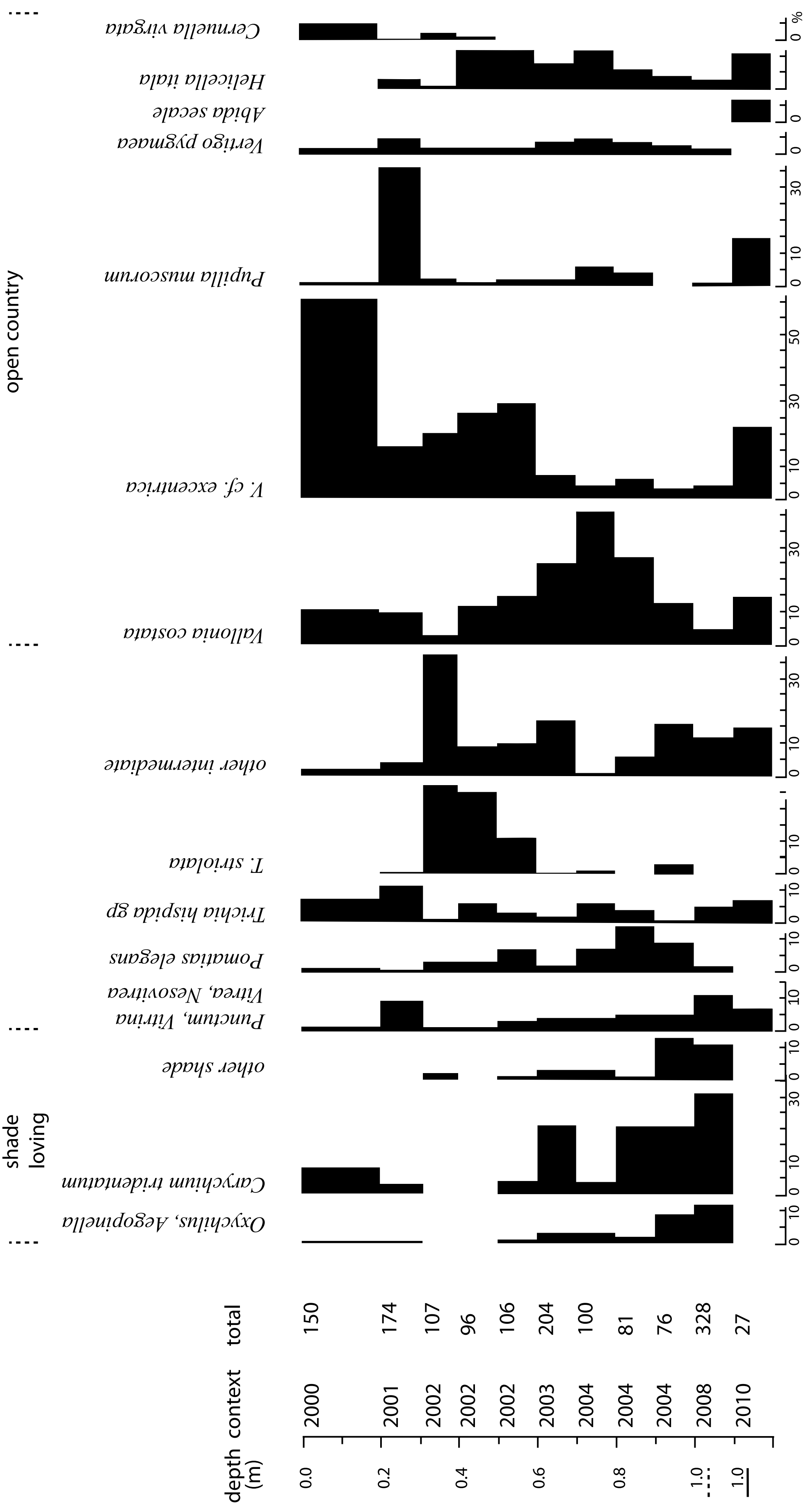

Figure 10.4 Results of deposits sampled for molluscan analysis, from the Manger.

Vallonia spp. was possibly a reflection of the more stable conditions. Numbers of two shade-loving Zonitidae, *Aegopinella pura* and *A. nitidula*, had increased, which was perhaps also due to the occurrence of grass tussocks. *Helicella itala*, an open-country xerophile species, which occurred in most of the earlier contexts, had been entirely displaced by *Cernuella virgata*, which was possibly an early medieval introduction to Britain (Evans 1972, 179) and lives in similar habitats.

2 *Terrace below Horse at trench 2*

Context 1024/1025 and context 1023 were deposits of mixed chalk silt with chalk gravel overlying the bedrock and below the belly of the Horse. They belonged to a period of surface instability and contained sparse assemblages of open-country molluscs. The assemblages showed some similarity to those from the lower part of the sequence from the belly of the Horse, with *Pupilla muscorum* and *Trichia hispida* gp. predominating. *Abida secale*, however, was absent. It is thought likely that these sediments belonged to the Late Glacial or very early Post-Glacial, from a period before vegetation cover stabilised conditions and soil formation began. The majority of the species would have been characteristic of deposits of this date, those that were not, for example, *Pomatias elegans* and *Cernuella virgata*, could be intrusive. If these deposits had been related to tree clearance, a significant presence of woodland snails would have been expected.

The soil of the present-day turf above the chalky sediments, context 1000, contained an assemblage of shells similar to that from the modern turf at the belly of the Horse. Stable grassy conditions were suggested by many examples of *Vertigo pygmaea* but *Abida secale*, which is associated with bare ground, was also well represented. Numbers of open-country species were equalled by individuals of shaded habitats, particularly *Punctum pygmaeum*, *Vitrea* cf. *contracta* and *Aegopinella nitidula*. The assemblage did not have the full range of species of a woodland or scrub fauna and the shade-loving species were perhaps related to dense tussocks of grass growing on this part of the site. The mixed nature of the faunal assemblage in this sample does present some problems of interpretation. It is possible that shells were being washed from the area of the Horse onto an area of grass tussocks.

The Manger sequence *(Fig. 10.4, Tables 10.28 and 10.29)*

The lowest deposit sampled in the Manger, context 2010, was sludged chalk silt with angular chalk pebbles which was likely to have been Late Glacial solifluction debris. The samples from 2.00–2.10 m and 1.30–1.40 m depth were devoid of shells. Towards the top of this sediment, however, conditions were perhaps becoming more stable and shells were present in the Late Glacial (Late Devensian Zone III), cold-tolerant assemblage. They included *Abida secale*, *Pupilla muscorum*, *Vallonia pulchella* and *Helicella itala*, suggesting an open tundra environment.

There was then a long hiatus in sedimentation. The earliest deposit overlying context 2010 was a ploughsoil, context 2008. It was not represented in the sample column, so was sampled from the section further to the north. Context 2008 comprised grey brown clay loam, which was probably the soil which had developed in the Manger from the early Post-Glacial onwards, mixed with chalk fragments by cultivation. Mollusc shells were abundant and shade-loving species comprised the major ecological group amongst them. *Carychium tridentatum* was the most abundant species, but *Vitrea* cf. *contracta*, *Aegopinella pura*, *Oxychilus cellarius* and *Clausilia bidentata* were all represented. There was a single example of *Macrogastra rolphii*, a local species of moist deciduous woodland (Kerney and Cameron 1979, 165). They possibly represented the pre-clearance woodland fauna of the Manger. Open-country molluscs were by no means absent, *Vallonia costata* and *V. excentrica* each comprising around 4% of the total snails. *Pupilla muscorum*, *Vertigo pygmaea* and *Helicella itala* were also present. As was considered likely for the soil buried beneath the long mound (above), the high proportions of shade-loving molluscs suggested that the transition from woodland to open conditions occurred not long before the burial of the earliest ploughsoil. It is difficult to establish whether there was a grassland episode between clearance and cultivation because most of the open-country species were able to occur in Neolithic and Bronze Age ard-tilled fields (Evans 1972) even though some are unable to thrive in modern arable.

Context 2004 resulted from continued ploughing but with the addition of colluvial sediment derived from the erosion of chalk, giving it a higher chalk content than context 2008. At the location of the sample column, context 2004 was 0.30 m thick and was directly on top of the Late Glacial sediment, to the north it overlay context 2008. There was a significant component of shells of woodland species between 0.90–1.00 m but they declined in the samples from 0.80–0.90 m and 0.70–0.80 m. Open-country species predominated, particularly *Vallonia costata*, which rose to over 40% of the total in the sample from 0.70–0.80 m. *Vallonia excentrica* only comprised around 5% of the shells from context 2004, but dryness and disruption of the soil surface by prehistoric ploughing favours *V. costata* while surface stability favours the latter (Evans 1972, 159). *Pomatias elegans* was well represented in context 2004 but apart from in the sample from 0.90–1.00 m, the remains were mostly worn shell spires, suggesting that they were residual from a population which thrived in the partly shaded broken ground with loose soil cover at the time of clearance.

Slope erosion, presumably as a result of cultivation, continued to result in colluviation in the valley bottom. Roman artefacts were recorded from context 2003 (0.60–0.70 m). Open-country species, particularly *Vallonia costata* and *Helicella itala*, were well represented but *Carychium tridentatum* had risen to 21% of the total snails. It is unable to survive in arable or short-turfed grassland habitats. Therefore it is thought likely that ploughing had ceased at the sampling point, which possibly became a grassy field boundary, but cultivation continued further up the hillside.

The disappearance of *Carychium tridentatum* from the upper part of context 2002 (0.31–0.60 m) suggested that cultivation on the site itself had resumed alongside colluviation. A decline in *Vallonia costata* to 3% of total molluscs and a rise in *Vallonia excentrica* to 20%, an increase in *Trichia striolata* to over 25% and the appearance of *Cernuella virgata* all point to medieval mould-board ploughing. A slight presence of *Vallonia pulchella*, however, hinted at the proximity of some damp grassland.

Above 0.31 m, conditions became more stable. Context 2001 (0.20–0.31 m) contained a very high proportion of *Pupilla muscorum*, which had risen from only 2% of the total molluscs, in the deposit below to a value of 36%. This is suggestive of grassland conditions. In contrast, *P. muscorum* had fallen back to 1% of the total molluscs in the modern topsoil, context 2000 (0–0.20 m), and *Vallonia excentrica* comprised nearly 60% of the total molluscs. The site is at present under grass but the bottom of the Manger has been ploughed for reseeding and it is thought likely that modern changes in grassland management were responsible for the faunal change.

Discussion

The evidence from the various molluscan sequences enables a useful environmental history to be reconstructed for White Horse Hill. The Late Glacial sediments from the Manger, and possibly the slope below the belly of the White Horse, as might be expected gave evidence of a tundra environment, with cold conditions and surface instability. They very possibly belonged to Late Devensian Zone III. There followed a long period of stability from which no undisturbed soils or sediments were discovered. However, there is every reason to believe that the usual pattern of woodland cultivation and succession occurred in the early Post-Glacial (early Flandrian). Evidence of woodland clearance in the Neolithic came from residual shells in the disturbed soil beneath the long mound. Similarly, residual shells in a prehistoric ploughsoil above the Late Glacial sediments in the Manger showed that clearance had occurred not long before cultivation. The occurrence of molluscs such as *Ena montana* and *Macrogastra rolphii* emphasised that this was well-established woodland that was being cleared. Unfortunately, it was not possible to establish whether woodland regeneration occurred at the Neolithic long mound or to date clearance in the Manger, where regeneration did not occur.

The molluscs from the fill of the round barrow ditch and the ring ditch comprised grassland assemblages, suggesting such conditions prevailed in the early to middle Bronze Age. The snail sequence from the White Horse indicated open conditions from the late Bronze Age onwards. It is possible that cultivation was occurring on the top of the hill prior to the construction of the rampart of Uffington Castle but the decalcified nature of the soil suggested that there had been a long stable phase, possibly grassland. Plough-induced colluviation, likely to be of late prehistoric date, was occurring in the Manger, although it did not lead to a substantial accumulation of sediment. The secondary ditch of the hillfort began to take on the character of the surrounding landscape once sheep began to graze the grass in it. This was possibly occurring during the Iron Age because it preceded the collapse of sarsen stones from the rampart.

Slope erosion continued in the Manger during the Roman period, probably as a result of cultivation. The ditch of the hillfort supported grassland between episodes of sedimentation at least until the end of the Roman period. However, in the Saxon or early medieval period, some scrub regeneration occurred in the ditch, although subsequently there was a return to grassland. There was no evidence for the development of scrub from the Manger sequence. In the Manger, the onset of more intensive cultivation was followed by the appearance of *Cernuella virgata*, a snail which is usually regarded as a medieval introduction. The final part of the Manger sequence showed the development of grassland.

Two points of interest emerged from the investigation of the White Horse. The first was the persistence of the snail *Abida secale*, which apparently found suitable conditions on the bare Chalk of the Horse, from the construction of the first Horse in the late Bronze Age until recent times. It possibly fed on algae gr'owing on the surface of the Chalk but it does not seem to have been able to find suitable conditions elsewhere on White Horse Hill. It is uncertain whether *A. secale* survived the covering of the Horse during the Second World War. An examination of the Horse in the summer of 1999 discovered many shells of *Cernuella virgata* but *A. secale* was not found.

The second point of interest was the presence of a significant proportion of snails of shaded habitats, for example *Aegopinella nitidula*, in the sample from the modern turf on the terrace below the Horse (1000). There certainly has not been any invasion of scrub in recent years. However, a photograph of the 1920s or 30s shows large grass tussocks in this locality whereas the grass around the Horse had been cut short. It is possible that the grass tussocks provided a sufficiently shady habitat.