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Assessment of biological remains from excavations in Wellington Row, York (sitecode 1988-9.24)

by

John Carrott, Keith Dobney, Allan Hall, Michael Issitt, Deborah Jaques, Cluny Johnstone,
Harry Kenward, Frances Large, Barrie McKenna, and Annie Milles

Summary

The bioarchaeological potential of a large number of samples from 1st Millennium deposits excavated from a series of five trenches in Wellington Row, York, has been assessed by means of examination of plant and animal remains from selected samples of raw sediment and sieved residues, together with bone from hand-collection and sieving.

The concentration and quality of preservation of plant and invertebrate remains was very variable through the samples examined, but several groups of deposits gave interpretatively useful assemblages. In particular, some samples from an early 'turf bank' and others from mid/late 2nd Century Roman occupation deposits evidently containing highly organic material similar to stable manure, are likely to be valuable in understanding aspects of the local environment and human activity at this site. Another group of samples (of 3rd/4th Century date) contained few biological remains other than peat. For samples from these three groups of deposits, further analysis is worthwhile, in some cases by means of larger subsamples. Samples from a few other deposits showed some bioarchaeological potential but the concentrations of remains were low. For these and some other groups of samples (especially those from the phases of late Roman abandonment and re-use in Trench 7), a low-cost review is recommended.

Bone was often very sparse in these deposits, but some large assemblages, mainly of heavily butchered cattle and other large domesticates, were recorded. The characteristics of most of the assemblages indicated continuity of commercial butchery from the 2nd to 4th centuries. The heavy fragmentation of this material means that few useful biometrical data will be obtained. It is recommended that detailed recording of the less well-dated material is undertaken in order to address the problems of residuality.

Keywords: York; Wellington Row; Roman; early medieval; sediments; occupation deposits; plant remains; parasite eggs; insect remains; molluscs; vertebrate remains

Authors' address

Environmental Archaeology Unit
University of York
Heslington
York YO1 5DD

Prepared for:

York Archaeological Trust
Piccadilly House
51 Piccadilly
York YO1 5PL

Telephone: (0904) 433843-51
Fax: (0904) 433850

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Introduction

Excavation at a site in Wellington Row, York (variously known as 'Leedham's Garage' and 'Stakis Hotel') was undertaken by York Archaeological Trust as a series of three small trial trenches in 1987-8 and a further six, much larger ones in 1988-9. This report assesses the bioarchaeological potential of samples of sediment and hand-collected bone from deposits dated to the 1st Millennium AD which were revealed by the 1988-9 campaign.

The nature of the bioarchaeological archive

During excavation, a hierarchy of sampling was adopted along the lines of Dobney *et al.* (1992). Wherever possible, a 10 litre plastic tubful of unprocessed sediment (a GBA, 'general biological analysis' sample) was taken from each context. Then a BS sample of generally about 30-60 kg was taken for bulk-sieving (on site) 1 mm. Finally, if enough material was available, a site-riddled (SR) sample (usually about 100 kg) was processed by wet-sieving (again on site) to 12 mm. In the last case, residues were sorted during processing for bone and artefacts and the rest of each residue was discarded after brief recording of the components.

In addition, some 'spot' finds of isolated biological remains or unusual sediments were recovered and there were a few 'context samples' (CS) taken as standards to represent the nature of certain layers (but not considered here).

As well as bone from SR samples, a large corpus of hand-collected material was

available.

The numbers of samples of different types and the numbers of contexts represented, analysed by period, phase and context group, are presented in Appendix Table A1. Some information about the archaeological nature of the groups is given in Appendix Table A2.

Pre-assessment prioritisation of samples

For the assessment, a computer database (compiled during excavation) of information concerning samples and their type and size was available. This was used to determine the numbers of samples of each kind from 1st Millennium deposits using information supplied by YAT. On the basis of this and context information from the 'Level III' narratives, a selection of GBA and BS samples for further examination was made. Selection took account both of the nature of the of contexts and likelihood of good preservation of plant and invertebrate remains (including charred plant remains and landsnails) and, for the BS, also bone and shell. Deposits recorded as probably being 'occupation deposits' were generally selected, whilst those described as 'demolition debris' were not chosen (except for some contexts containing 'fire debris'). A total of about 120 '1st priority' and 170 '2nd priority' GBA samples were selected, and the corresponding figures for BS samples were 40 and 40 (cf. Appendix Table A3). As far as possible, only one sample of either type was selected for a given context.

All the '1st priority' GBA samples were examined briefly and a selection for

processing made on the basis of the nature of the sediment and the kind of archaeological feature they represented. The samples were scored on a scale A-C reflecting their likely value in archaeological interpretation, the 'A' samples (of which there were approximately 45) being chosen for subsampling in anticipation of processing. For '2nd priority' GBA samples, an initial selection was made on the basis of the context group to which the deposit concerned had been assigned (in order to give as broad a coverage as possible and generally avoiding selection of samples from context groups already represented in the first batch), and from these samples a further subset for processing was chosen by examining the sediment briefly (again the A-C ranking was adopted). No detailed sediment descriptions were made during the assessment; instead, a brief note of the nature of the samples selected for processing was made after subsampling.

In all, 77 GBA samples of the total of 1182 from 1st Millennium contexts were examined by means of a 'test' subsample and 102 BS residues from a total of 273 were examined. These represent 7% and 35%, respectively, of the sampled *contexts*.

Practical methods

'Test' subsamples from selected GBA samples were disaggregated using methods outlined by Kenward *et al.* (1980; 1986). Where it was clear that little or no organic material preserved by anoxic 'waterlogging' was present, a 'washover' was employed rather than a 'flot', the residue being oven dried prior to examination; in a few cases, neither extraction method was used and the whole sieved residues were simply dried.

All flots, washovers and residues from the test subsamples were scanned for plant remains, and these and all other components of the samples observed during scanning were recorded on a four-point scale of

abundance (Hall and Kenward 1990). Eggs of intestinal parasites were surveyed from a small selection of samples using the 'squash' method of Dainton (1992). Flots were examined for insect and other macroinvertebrate remains and 'assessment recorded' (*sensu* Kenward 1992). Quite large numbers of insects had failed to float during paraffin extraction and were recovered from the residues during recording of plant remains; these insects were recorded and the data incorporated with those from the flots. The presence and type of mollusc remains in the GBA test subsamples were recorded during checking for plant remains; for some subsamples, representative specimens of non-marine taxa were sorted from the flots, washovers and residues and these groups used to prioritise the samples for further work.

A priority for further work on the plant and invertebrate components was given to each sample (Appendix Table A3).

The selected bulk-sieved residues were checked quickly for their content of plant remains, bone, shell and other components, a record being made (using a three-point scale of abundance) on a standard *pro forma*. Those with a moderate or large bone content were then selected for examination in more detail, 41 residues falling in this category. Of these, a total of 34 were initially scanned, 25 of these in turn being recorded in more detail. Most of these residues remained unsorted and, for the purposes of this assessment, the bone component of each was recorded using a simple abundance scale (i.e. present—10% or less of the total assemblage; common—10% to 50%; and abundant—greater than 50%).

The SR samples were selected with reference to information supplied by the excavator and on the basis that they were representative of the range of deposits excavated. Almost all first and second priority samples (a total of 48) were initially

examined, seven (from three contexts) being recorded in more detail, and a further 30 (from seven contexts) being scanned.

A small amount of hand-collected bone (from five contexts) was recorded, and brief notes were made on material from an additional three contexts. Bone from these eight contexts amounted to approximately ten boxes (each box 31 x 31 x 22 cm) of the 30 prioritised.

Results and discussion

Sediment samples

The results of the analyses of 'test' subsamples of the GBA samples from 1st Millennium deposits at Wellington Row are summarised in Appendix Table A3.

Not surprisingly, in view of the immense heterogeneity of the deposits in terms both of lithology and archaeological identity, concentrations of remains and the quality of their preservation varied greatly. Some subsamples were completely or effectively barren of plant and invertebrate remains of any kind; others yielded only charred or other durable remains; a substantial number contained mostly rather poorly preserved 'waterlogged' fossils; and a few gave quite well preserved plant and invertebrate remains in numbers large enough for interpretation. The concentrations of remains, particularly of insects and other arthropods, were often very low, so that quite large subsamples would be required for effective analysis.

Certain groups of samples stand out as deserving particular attention. The flood silts and ditch silting deposits of Periods 0, 1 and 2 (i.e. all material in Period 0, and groups 6.2, 7.2 and 7.4 of Period 1 and groups 4.9, 5.2, and perhaps some others of Period 2) contained low concentrations of plant and invertebrate macrofossils which, nevertheless, have a potential to provide

information concerning vegetation and land-use, as well as flooding. Provisionally, it may be suggested that this low-lying riverside area was subject to sufficiently frequent inundation to bring about the gradual accumulation of overbank deposits, probably slowly enough for the growth of vegetation to be continuous where not affected by human activity. Very large quantities of sediment will, however, need to be processed in order to extract sufficient remains, and sedimentological analyses may be required to illuminate the processes involved in the formation of these deposits.

The second notable group of samples was taken from the 'turf bank' exposed in Trench 4 in deposits dated to Phase 3 of Period 1 (groups 4.4-4.6). That these *are* turves is clear from the biological analyses, even at assessment level. Further investigation is required to establish (a) the precise nature of the vegetation represented and (b) (from this and other evidence) the likely source of the turves. In particular, are they likely to have been cut from soil adjacent to the River Ouse, so that they would stand as evidence of pre-Roman or early Roman land-use in the area?

Some of the occupation deposits described as relating to pre-building activity in Period 2 have considerable potential for determining the nature of human exploitation of this area early in the Roman period. On the basis of botanical evidence from the assessment, it can be stated that several of the deposits have provided strong indications of the presence of hay and there are plant and invertebrate remains which, together with the evidence for hay, lead to a provisional interpretation that stable manure was present.

Questions to be addressed in relation to these deposits containing putative stable manure include (a) What was the origin and nature of the hay? (b) What materials were used for litter in stables? (c) Were the food remains present in some of the samples

waste from human consumption or spoilt (or specially produced) food fed to animals? A particular area for investigation in this respect relates to the grain which was apparently used as animal feed at this and other sites—was the grain used grown as mixed crops and stored under poor conditions (and thus almost always infested by grain pests), or was the feed simply grain originally intended for human consumption but too spoiled in storage to be acceptable? It has been assumed that ‘stable manure’ of the kind recorded here (and at many other sites, including the nearby 24-30 Tanner Row, Hall and Kenward 1990; see also comments in Carrott *et al.*, forthcoming) originated from the keeping of equines, but an attempt should be made, through more detailed investigations, especially of the degree of comminution of the plant remains and the presence of any gut parasite eggs and insect parasites, to determine whether other stock were being kept.

Peat was recorded from several samples from the Period 2 samples rich in evidence of ‘stable manure’; it was also recorded from various deposits of Period 4 date. This material clearly merits further investigation to establish the nature and origin of the peat: was it, for example, from raised bog, fen or grass turf? Why was it brought to the site and for what was it used (some of the peat appears to be present in deposits rich in ash and this may have been fuel)?

More general questions to be addressed through the plant and invertebrate remains relate to: (i) the exploitation of plant foods and storage of cereals, in particular; (ii) plant raw materials in addition to those mentioned above; (iii) ecological conditions on the site (and thus the environment experienced by the occupants); (iv) matters concerning waste disposal and cleanliness; (v) the function of buildings and open spaces.

It has been stated that only a quite small proportion of the 1 kg subsamples assessed

contained sufficient remains preserved by anoxic waterlogging, charring, or inherent durability to permit straightforward reconstruction of past conditions and events without the need for investigation of larger subsamples. Many of the less productive subsamples did, however, contain an appreciable number of remains, and it is likely that, where there is an archaeological question to be addressed, intensive investigation of larger subsamples will provide useful information.

This assessment has only involved the examination of 7% and 35%, respectively, of the 1st Millennium *contexts* represented by GBA and BS samples. It is thus very likely that many samples with a content of biological remains valuable for archaeological reconstruction have not been assessed, even allowing for the fact that those studied were chosen on a priority basis. It will be essential to review a substantial proportion of the 93% of sampled contexts not assessed via a GBA sample and the 65% not represented by an assessed BS residue. Appendix Table A4 offers some recommendations concerning the numbers of GBA samples which should be reviewed in the main phase of work (column GR), as well as estimates of the numbers of samples which will certainly require full analysis (column MG).

It will be particularly important to review the samples from deposits associated with abandonment and re-use of the large stone Roman building in Trench 7 (Period 6). Although assessment suggests that preservation may be confined to the more robust remains, the archaeological significance of any assemblages of ‘waterlogged’ plant and invertebrate remains would be very great in determining the nature of any re-use and (for the insect remains at least) in relation to wider interpretative questions. In particular, this site may provide an opportunity to investigate the rate at which strongly synanthropic (human-dependent) insects

disappear when habitation is abandoned or occupation becomes more sporadic, matters which have considerable significance in understanding the nature of occupation at archaeological sites in general.

It will, of course, be necessary to view evidence from Roman deposits at Wellington Row in the context of other sites—in particular the nearby Tanner Row and Rougier Street excavations (Hall and Kenward 1990), as well as the growing number of Roman sites, both civilian and military, where combined evidence from plant and insect macrofossils is available.

Microfossils

A category of remains not considered in this assessment is plant micro-fossils—essentially pollen, spores and diatoms. The nature of the deposits at this site is such that routine analysis of these remains from most deposits would be worthless; however, the assessment has thrown up some questions which might be addressed through examination of plant microfossils. Three groups of deposits may deserve attention: (i) those containing evidence of peat; (ii) those consisting of turves; and (iii) overbank deposits. Pollen analysis will probably produce some useful information concerning the nature and origin of the peat and turves, while work on diatoms from the flood deposits may well provide evidence concerning the river regime and water quality (including salinity).

Material (other than vertebrate remains) from BS samples

Most of the BS residues inspected contained at least traces of marine mollusc shell and charcoal, and occasionally there was a component of uncharred plant material, usually wood fragments. Rarely were any of these components present in large enough amounts to justify further, detailed,

examination. In particular, charred cereal grains were extremely sparse. The best approach to this material will be to carry out a rapid survey and record a carefully targeted selection of samples (perhaps 30) in detail.

Spot samples

Of the total of 107 samples from 1st Millennium deposits designated as 'SPOT', well over half came from Trench 7 and of these the largest categories were those identified by the excavator as 'eggshell' (27) or 'charcoal' (14) and required no examination at this stage. No indication from the excavation records of the kind of material is available for at least 32 of the remaining 66 samples, the other 34 being variously designated as 'concretions', bone, plant remains, decayed wood, and so on, by the excavator. On the basis of the general nature of the deposits at this site, a decision was taken not to pursue assessment of the spot samples further for the assessment.

Bone

Not surprisingly, bone was most commonly recovered from deposits described as dumps, and ditch and pit fills. The recorded assemblage was divided into six chronological groups representing Period 2 (mid-late 2nd Century), Period 3 (late 2nd Century), Period 4 (early 3rd Century onwards), Period 5 (late 4th Century to immediate post-Roman), Period 6 (late 1st Millennium) and Period 9 (later than Period 4 but still 1st Millennium).

Preservation overall was fair, although some contexts contained bones that were battered in appearance, with rounded, broken surfaces. Colour ranged from dark brown to fawn, with little variation apparent within the material from individual contexts. Fresh breakage and dog gnawing was observed on remains from all periods but few bones (i.e. 0-10% from any context) were affected.

Characteristic damage attributable to cat gnawing was present on a small number of bird bones, most being from Context 71862 (Period 5, dumping and decay within building). The proportions of butchered fragments in those groups selected for detailed recording was high (over 50% in most cases) and many of the cattle longbones had been split longitudinally. Most had been subsequently smashed into small pieces, this being particularly evident in assemblages from Periods 2-4.

Material from the SR samples and BS residues invariably included some burnt bone, mostly unidentifiable and exhibiting varying degrees of burning (blackened to calcined). A single BS residue (Sample 2789 from Context 71336) from Period 5 consisted almost entirely of very small burnt fragments and, although mostly unidentifiable, were these were thought to be domestic mammal bone.

The results of the examination of the SR and hand-collected bone are presented in Tables A5-A11. Table A12 shows the representation of different groups of taxa from the BS residues examined and, in the case of small mammals, birds, and fish, the likely diversity within each sample.

Periods 2 and 3

Of the major domesticates, cattle remains predominated throughout both the SR and hand-collected material. The bone assemblages from both periods were composed of many split and heavily butchered cattle shaft fragments, although SR samples from Period 3 did not present the same pattern. Instead, there were few split shafts and many small fragments, all the result of heavy and intensive butchery. This contrast may be explained by the fact that material from this sample does not represent a true 'whole earth sample', the larger fragments possibly having been removed as hand-picked finds. This pattern

of butchery and fragmentation appears to represent carcass reduction on a commercial basis, possibly for marrow extraction.

Non-meat-bearing elements, such as mandibles, metapodials, and phalanges, were also noted from the scanned material (particularly Context 72177, Period 2, pre-building activity) and the Period 3 SR samples. A single cattle scapula fragment showed characteristic damage to the blade consistent with puncture by a butcher's hook (see Period 5, below).

Pig and caprine remains were present but in smaller proportions, as were the remains of chicken and duck. Red deer was represented by only two distal metatarsal fragments, one of which had been sawn mid-shaft.

Period 2 and 3 material produced only forty-six measurable bones and eighteen mandibles with teeth. An additional eleven isolated teeth were recovered from the SR samples.

There were no SR samples recorded or scanned for Period 2.

None of the BS residues from these periods contained large amounts of bone and that which was present was mostly unidentifiable. This fraction is invariably very fragmented and, as a result, the numbers of both identifiable and measurable bones present are small. Thus, any additional information from this material will be limited.

Of the small amount of identifiable material from the BS residues, both scanned and recorded, large mammal remains dominated. They reflect similar activities to those seen in the SR and hand-collected material. A single cattle mandible with evidence of scorching in the vicinity of the diastema was also recorded.

Remains of both black rat (*Rattus rattus* (L.)) and mouse (*Mus* or *Apodemus*), were

present in five of the residues, whilst bird remains were recorded from seven. These bird species represent grey goose (*Anser* spp.), barnacle-sized goose (*Branta* sp.), jackdaw (*Corvus monedula* L.), rook or crow (*C. frugilegus* L./*C. corone* L.) and an unidentified wader.

One residue (from Context 72231, Sample 3538, Period 2, pre-building activity) gave a scapula of a garden dormouse (*Eliomys quercinus* L.). This species is not resident in Britain today and has previously only been recorded from Roman deposits at Tanner Row, York (O'Connor 1988) and South Shields, Tyne and Wear (Younger 1994).

Fish remains were recorded in only two of the residues and included a single mackerel (*Scomber scombrus* L.) vertebra and a perch (*Perca fluviatilis* L.) scale.

Period 4

Hand-collected and SR material from Period 4 showed similar patterns to that from Periods 2 and 3. The assemblage consisted mainly of cattle remains, with few caprine and pig fragments. Interestingly, the proportions of cattle neonatal remains were high from Context 6310 (Sample 1389, Period 4, clay and mortar surfaces), with at least four individuals represented. Single fragments of horse and chicken were also recorded.

Most of the additional scanned SR samples were similar in nature, Sample 1388 (Context 6310) containing numerous neonatal cattle fragments, like the BS residue from the same context. Twenty-nine measurable fragments, 15 mandibles with teeth and 23 isolated teeth were recorded from this group.

BS residues from Period 4 deposits were again composed mainly of large mammal fragments. Four contexts—5378 (Samples 1052 and 1062, from surfaces); 5673

(Sample 1857, from mixed material including flood deposits); and 5675 (Sample 1863, from similar deposits)—contained large quantities of cattle bones, representing mostly humerus, radius, femur and tibia shaft fragments. The shafts appeared to have been split and smashed in a similar fashion to those described from Periods 2 and 3.

Small mammal bones were present in four residues from this period, whilst fragments of both dog and hare (*Lepus* sp.) were recorded from one (Context 5675, Sample 1863). Birds were represented not only by the remains of domestic fowl, but also by goose (*Anser* spp.), Corvidae (crow family) and Turdidae (thrush family). Few identifiable fish remains were noted, those present included eel (*Anguilla anguilla* (L.)) and Cyprinid vertebrae.

Scanned residues from this period yielded little additional material.

Period 5

As for the previous periods, common domesticates were present, with cattle again making up the largest proportion of hand-collected material. However, pig was also quite numerous. The cattle elements present were mostly metapodials and phalanges, suggesting waste from primary butchery.

The scanned material also contained several cattle scapulae which had been trimmed around the glenoid cavity. Additionally, rough holes had been punched through the blades, indicative of the damage caused by suspending the shoulder joint from a butcher's hook, possibly for curing.

Material from Context 71862 (from dump and decay deposits within the building; partly scanned) contained a large pig canine that may represent a wild boar.

No SR assemblages from Period 5 were recorded in detail and those scanned

consisted of numerous unidentifiable fragments and small quantities of burnt bone.

The five BS residues recorded in detail from this period produced mostly large mammal fragments. However, small mammal, bird, and fish remains were slightly more numerous from deposits of this period than from earlier ones. Black rat was recorded from three of the five residues, and mouse and a small number of microtine (vole) fragments were also noted.

Four of the five BS residues recorded produced wild bird species. These included woodcock (*Scolopax rusticola* L.), plover (*Pluvialis* sp.), and pigeon (Columbidae). Fish were noted in limited numbers from three of the residues. Most of the remains from Sample 2911 (Context 71397; dump and decay deposits within building) were scales, some of which could be identified as perch. A small number of vertebrae were identified as eel, Gadidae (cod family) and Salmonidae (salmon family). Two further fish vertebrae had a characteristic crushed appearance consistent with chewing (Jones 1986).

Period 6

Remains of cattle again predominated in the hand-collected assemblage (none of the SR samples for this period were recorded or scanned). Pig and caprine remains were also present, as were bones of fowl, goose and duck.

Cattle were represented mainly by mandibles and metapodials, although other elements were present. Several of the mandibles exhibited scorching to the diastema, a phenomenon encountered in one specimen from Period 2/3 (see above) and in the 4th Century material from Lincoln Waterfront (Dobney *et al.*, forthcoming). For the latter, it was suggested that mandibles were heated and broken to extract

liquid marrow fat.

A single goat metacarpal and a cranium fragment, with the horncore removed, were also recorded from this material.

A single goose radius was recorded as barnacle-sized, whilst a duck carpometacarpus was tentatively identified as teal (cf. *Anas crecca* L.). Red deer (*Cervus elaphus* L.), represented by a large worked antler fragment, and black rat were noted from the scanned material.

Twenty-eight measurable bones and seven mandibles with teeth were present in the hand-collected fraction from Period 6. Additional records of rodents, fish and wild birds were made from the residues. This included the identification of a further garden dormouse (*Eliomys quercinus* L.) fragment (an ulna, from Context 7726, Sample 2226; demolition and decay of structure). This same residue also contained ten mole (*Talpa europaea* L.) fragments of variable colour, possibly representing intrusive material. Bird bones were rather scarce, with chicken, woodcock (*Scolopax rusticola* L.) and some elements identified only as Charadriidae. Flatfish, salmonid and ?gadid remains, along with a small number of unidentifiable scales, constituted the fish assemblage from the recorded residues.

Period 9

The assemblage from Period 9 was dominated by cattle horncores, with additional horncores noted from the scanned material. This may well represent waste from horn working. Also worthy of note was the occurrence of several cattle skull fragments with perforations in the nuchal region of the occipital bone. Although this phenomenon has been recorded in a large sample of late 4th Century cattle skulls from Lincoln (Dobney *et al.*, forthcoming), its aetiology is still unknown.

Small amounts of caprine, pig, and horse remains were present. Birds were represented only by the remains of chicken and goose.

The scanned SR samples added little further information. However, a goat horncore was present and a single fish bone was identified as haddock (*Melanogrammus aeglefinus* (L.)).

The presence of a rabbit (*Oryctolagus cuniculus* (L.)) atlas (in the scanned material) is interesting since this species is not thought to have been introduced to Britain until the early twelfth century. A likely implication of this identification is that this material is of mixed origin.

Bones: general comments

Deposits from Wellington Row thus yielded a moderately large assemblage of bone, important in that it represents one of the few groups of Roman date recovered using extensive sieving procedures. Unfortunately, no SR samples were taken from 1st Millennium deposits in Trench 7, the only systematically sieved material being that from BS samples.

Material from Periods 2, 3, and 5 can be tightly dated, whereas that from Period 4 represents a much broader timescale (dated between AD 200 and 1000 AD). Material from Periods 6 and 9 is as broadly dated as that from Period 4 and appears to contain some residual bone.

The nature and extent of the butchery, observed in most periods (with the exception of Periods 6 and 9), indicates the presence of commercial butchery waste. Similar characteristic assemblages have been recovered from other Roman towns, both from Britain and Europe (Levitan 1989; Dobney *et al.*, forthcoming; Lauwerier 1988 and Van Mensch 1974). In addition, scapulae showing characteristic damage to

the blade are also commonly found from these assemblages, and the Wellington Row material is no exception. Bones from the nearby site at 24-30 Tanner Row (O'Connor 1988) showed identical patterns of butchery, particularly from Contexts 2208 and 2210, both dated to the late 2nd Century. The assemblage from Wellington Row, therefore, implies a certain continuity throughout the Roman period. An alternative explanation may be that residual material is present, although there is little evidence from the bone assemblage to suggest that this is the case.

The range of species recovered from Wellington Row is limited, although the identification of garden dormouse is of some importance.

The fragmentary nature of the material is revealed by the full recovery consequent upon large-scale sieving. However, the remains were genuinely considerably fragmented; as a result, few measurable elements or mandibles with teeth were recovered, limiting the zooarchaeological potential.

This assemblage can be used to address a number of important archaeological questions.

1. Are there any significant differences between late 4th century and earlier material?
2. Is the supposed high-status nature of the *Colonia* reflected in the bone assemblage?
3. Can any specific craft/industrial activities be recognised from any period?
4. Can more detailed study of material from the more broadly dated periods better identify and quantify residual bone?
5. Can the recovery of further garden dormouse remains throw more light on

whether this species was an exotic delicacy or an accidental import? Did it become established in Roman York?

Material of late 4th Century date is poorly represented, not only from this region of England but also from the rest of the country, and thus is of national significance. Detailed studies of bone assemblages from this period may aid understanding of the decline of Roman York and, by extrapolation, of Roman Britain. The study of this period has been highlighted as one of a number of high-priority academic objectives by English Heritage (1991, 36) under the heading *Processes of change, the early medieval period (c. 350-700 AD)*.

Recommendations

Plant and invertebrate macrofossils

A selective programme of analysis and review of the GBA samples should be carried out. Recommendations for further work on these samples are given in Appendix Table A4. The strategy for work on plant and mollusc remains from BS samples should follow that outlined above.

Bone

It is recommended that all hand-collected, SR samples and BS residues listed as priority 1 or 2 be subject to further, detailed study. Additional (priority 3) BS residues should be sorted for further small mammal species. Detailed recording of more broadly dated material, integrated with other finds categories, should be undertaken in order to address the question of residuality.

Text Table 1 presents estimates for the time required to carry out the work recommended here. Consumables and other items which will be required are listed in text Table 2.

Retention/disposal

All material should be retained for the present.

Archive

All samples from these excavations are stored by York Archaeological Trust. Residues, flots and washovers from 'test' subsamples, together with the paper and electronic archives pertaining to the work described here are stored at the EAU, University of York.

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Table 1. Time estimates for investigation of biological remains other than plant and invertebrate macrofossils from GBA samples from 1st millennium deposits at Wellington Row. Recording includes data entry.

	Staff	Time required	Cost
General laboratory tasks, sample movement, etc.	Tech.	20	
Maintain databases	Tech. RA x 2 (plants, insects)	15 2 x 1.5	
Administration, project meetings, obtaining and organising archaeological information	Tech. RA plants RF plants RA insects RF insects (including project management) RF molluscs RA bones RF bones	5 5 2 5 5 2 5 2	
Further work on GBA samples chosen on the basis of assessment			
- Describe and select samples	Tech. RA x 2 (plants, insects) RF x 3 (ditto, plus molluscs)	4 2 x 1 3 x 1	
- Process further subsamples	Tech.	54	
- Record plant remains	RA plants RF plants	30 12	
- Survey parasite eggs	Tech.	5	
- Record insect remains	RA insects RF insects	30 9	
- Record mollusc remains	RF molluscs	5	
GBA Review			
- Describe and select samples	Tech. RA x 2 (plants, insects) RF x 3 (ditto, plus molluscs)	6 2 x 1.5 3 x 1.5	
- Process samples	Tech.	92	
- Review plant remains	RA plants	17	
- Survey parasite eggs	Tech.	5	

	Staff	Time required	Cost
- Review insect remains	RA insects	12	
- Review mollusc remains	RF molluscs	5	
Contingency for additional analyses following review	Tech. RA plants RF plants RA insects RF insects RF molluscs	5 10 2 8 2 3	
Pollen preparations	Tech.	4	
Contingency for pollen analysis of selected samples (for peats, turves and overbank deposits)	RF plants	11	
Assessment of diatoms	Tech. Specialist	4 1	
Contingency for diatom analysis	Tech. Specialist	5 10	
BS samples			
Sort 50 selected BS residues for bone	Tech.	15	
Record plant remains from approx. 30 selected residues	RA plants RF plants	12 4	
Record molluscs from selected residues	RF molluscs	7	
Record vertebrate remains from 50 selected BS residues	RA bones RF bones	15 5	
Record SR and hand-collected bone (approx. 40 boxes)	RA bones RF bones	30 10	
Spot samples			
Inspect and record spot samples	RF plants RF molluscs RF bones	4 1 1	

	Staff	Time required	Cost
Data analysis and Technical Report preparation	Tech. RA plants RF plants RA insects RF insects RF molluscs RA bones RF bones	5 20 5 15 5 5 30 30	
Preparation of publication report, including graphics, etc.	Tech. RF plants RF insects RF molluscs RF bones	5 15 15 5 15	
Contingency	Tech. RA plants RF plants RA insects RF insects RF molluscs RA bones RF bones RF soils/sediments	10 5 5 5 5 10 5 5 10	
Totals (converted to weeks, after allowing for leave and rounded to nearest 0.5 weeks)	Tech. RA plants RF plants RA insects RF insects RF molluscs RA bones RF bones RF soils/sediments Specialist (diatoms)	259 (60) 103 (24) 62.5 (14.5) 79 (18.5) 43.5 (10) 45.5 (10.5) 85 (20) 68 (16) 10 (2.5) 11 (2)	

Table 2. Consumables required for work on biological remains from 1st Millennium deposits from excavations at Wellington Row.

Item	Cost (£)
Reagents	
Glass specimen tubes	
Microscope slides and cover slips	
Computer consumables and maintenance	
Beatson jars	
Stationery	
Postage	
Telephones/faxes	
Polyethylene bags	
Labels and markers	
Miscellaneous, including repairs to equipment	
Photographic materials and processing costs	