Insect remains from Annetwell Street, Carlisle - introductory and general material

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[This undated document was prepared during the 1990s for a publication report which failed to materialise. The text is reproduced here unchanged as an introduction to the series of *Technical Reports* and the data archive (Kenward 1999). Some more recent references relevant to the site have been added. HK 18-3-2008]

This was one of the earliest large-scale studies of insect remains from an archaeological site to be completed, 219 subsamples being examined, using 'detail' or 'test/scan' methods (Kenward *et al.* 1986), or a hybrid of the two. Of these samples, 178 gave at least a few remains of adult beetles and/or bugs (Coleoptera and Hemiptera), and 124 gave 20 or more individuals. Thus meaningful comparisons can be made with other major groups of Roman material - Castle Street, Carlisle (with 56 samples examined, mostly giving substantial assemblage, Kenward and Morgan, forthcoming) and Tanner Row, York (303 samples examined, mostly Roman and giving modest to large groups of insects, Hall and Kenward, 1990). The only other comparably large group of assemblages is that from 16-22 Coppergate, York (nearly 600 samples examined, almost all giving modest to large assemblages, mostly Anglo-Scandinavian, Kenward and Hall forthcoming). A range of 'unpromising' material as well as samples from deposits in which preservation was predictable was examined, and this proved worthwhile, as it has at other sites (e.g. at Tanner Row and Coppergate).

Samples were collected from the deposits by the excavators and stored double-bagged in polythene in cardboard boxes. The material was assigned priorities early in the post-excavation stage; initially all Priority 1 samples were examined, but it proved possible to process a good proportion of the lower-priority samples as well. The samples were transported to York, where the sediment was described and subsamples removed for insect extraction. The sediment descriptions made in the laboratory are given in the archive reports.

Two broad methodologies were employed for the insect analyses, usefully referred to as (1) 'full processing' with 'detailed listing' and (2) 'test processing' with 'scan recording'. The evolution of methods for processing and recording insect remains in the EAU is documented by Kenward et al. (1986). In summary, the traditional method, employed by the author and his mentors at the University of Birmingham involved sieving to 300 microns, the retent being submitted to paraffin flotation using three (or more) treatments with paraffin, each with three (or more) flotations. The resultant flot was stored in industrial methylated spirit (IMS). Insects were picked out under the binocular microscope and adult beetles and bugs mounted on card slides for identification (see Kenward et al. 1980 for a detailed account), then identified as far as possible, taking difficult material to museum collections for comparison if necessary. This approach is very time consuming; it is realistic for one person to deal with only 20-30 moderately large assemblages per year using it.

In order to examine the large numbers of samples needed to give a useful sample of assemblages from many types of feature in many phases of a complex urban site, a more rapid methodology was clearly required. 'Test' processing involves fairly vigorous sieving, followed (generally) by a single treatment with paraffin and three flotations. 'Scan' recording can be carried out under IMS, or remains can be picked out and placed on damp filter paper in petridishes - a mixture of the two techniques often being applied, common or easily-identified species being left in IMS and rarer or more difficult ones being picked out for closer examination. A time limit is placed on identification, and odd individuals of rare species are not named if it would take more than a few minutes (unless it is likely that important archaeological information would result). Recording can be semi-quantitative, on the following scale: 1, 2, 3 - estimated number of individuals; 's' (several) - probably 4-9 individuals; 'm' (many) - probably 10 or more. Very large numbers can be estimated approximately. In practice, most assemblages are now listed by scan-recording, but usually fully quantitatively. These methods and their effectiveness will be discussed further by Kenward (forthcoming).

A second major change in methodology has been a greater concentration on insects other than adult beetles and the more easily named groups of bugs. Fly puparia, fleas, lice, scale insects and beetle larvae, for example, can all give very useful information, and experience in their identification is gradually being acquired.

The present study was carried out during the development of 'test' and 'scan' methods, and the samples received a variety of treatments, the results being essentially comparable, however. In the early stages, a good number of subsamples were fully processed and recorded in detail; later some were recorded semi-quantitatively; others were test processed and scan-recorded fully quantitatively. Some of the non-beetles were examined (many puparia were named by Professor J. Phipps, for example), while other groups were given scant attention. Fleas and lice, for example, were almost certainly under-recorded, and no beetle larvae were identified.

Identified insects were listed on standard sheets and the lists entered to the University of York mainframe computer using a PASCAL program written by HK (ref). Entry was in shorthand form and the program processed records to give ranked and taxonomic order species lists together with some statistics concerned with the composition and structure of the assemblages of adult beetles and bugs. At the same time, databases of species recorded, notes and main statistics were produced. The output from the program is included in the site archive, while the raw data are stored on the UoY computer system.

The main properties of the assemblages employed in determining their archaeological implications were:

1. Population structure, using the index of diversity 'alpha' of Fisher *et al.* (1943) and, for some assemblages, rank order and cumulative frequency curves;

2. The concentration and relative proportions of a number of ecological groups;

3. The species lists themselves. Reliance was placed on groups of taxa likely to occur together in related habitats rather than on single species.

Assemblages were analysed using (1) and (2) before and after subtraction of the grain pest component, which was often sufficiently large to obscure the significance of other ecological groups.

Most archaeological insect assemblages are believed to contain a 'background' component (randomly accumulated) as well as any autochthones (see Kenward 1978 for a full discussion). At the present site, such background fauna probably accounted for the whole of many assemblages, which thus have rather limited interpretative value. However, using deviations from the bland 'norm', as revealed by the methods summarised above, significant components of assemblages can be recognised.

The work was originally recorded in a series of nine archive reports (Kenward and Large 1986-8). These are now rather out-of-date, and the accounts of sample assemblages have been revised (1990) using current ecological codings.

The weight of sample material processed for each sample is given on the 'main statistics' sheets in the archive, but was 1kg unless otherwise stated in the microfiche text. A full list of invertebrate taxa recorded during investigation of insect remains is given in Table 00.

For the samples containing any of the insects used in preparing sample main statistics, the mean estimated minimum number of individuals (N) was 55 (with 28 species on average); a moderate number of samples gave counts well in excess of 100. These numbers are quite low when compared with some other sites. For samples with N greater than zero, the average number of individuals at Castle Street was 118, for example. This is partly a reflection of the nature of the deposits at Annetwell Street, but at least as much a result of the policy of speculative examination of 'less promising' samples; the Castle Street material, for example, was almost all selected as especially likely to contain abundant insect remains.

Main statistics for the site as a whole, and for those periods giving a useful number of substantial assemblages, are given in Table 00.

There was a broad similarity between the Annetwell Street material and the assemblages from Castle Street (Kenward and Morgan forthcoming) and Tanner Row, York (Hall and Kenward 1990), and smaller groups of assemblages from other sites in York and London (Allison and Kenward 1987, Hall *et al.* 1980, Kenward 1990, Kenward *et al.* 1986). The similarity extended beyond simple species lists, for similar communities of species occurred, and (subjectively) varied in numbers together. There was also a broad resemblance in the main statistics. Clearly the Roman settlement - whether civilian or military - produced an essentially similar suite of habitats. Particularly striking is the abundance of grain pests at almost all Roman sites in Britain studied for insect remains; the constant presence at Roman

Annetwell Street of modest numbers of a suite of insects seen in larger numbers at Tanner Row and Castle Street and perhaps best interpreted as indicating cut vegetation used as animal feed and bedding; and the repeated observation of a small fauna (and a larger flora) from moorland or heathland, probably imported in peat used for fuel or animal bedding. It would be very difficult to distinguish insect assemblages from Roman York and Carlisle - even some unexpected rarities such as *Helophorus tuberculatus* have been noted at both towns (Kenward 1984; 1988). It appears that the effects of human activity over-rode climatic, topographic, edaphic and vegatational differences to a large extent, something previously observed for the 9th to 12th centuries in other European towns.

The site gave a small number of taxa which were to the north of their present known range - *Platystethus nitens*, *P. nodifrons* and *Aphodius ?equestris*. Assuming that these have not been simply overlooked in the northern parts of their ranges at the present day, they fit into a pattern of higher temperatures in the Roman period and 9th-11th centuries indicated by sites in other English towns.

A good number of the samples gave no insects or only small or very small assemblages by comparison with other phases or areas of the present site, or with some broadly similar layers of the Castle Street and Tanner Row sites (although of course there was more selectivity in samples examined from Castle Street). This may indicate a generally higher level of cleanliness and Annetwell Street, or a subtle difference in preservational conditions. Insect remains were mostly quite well preserved, so post-depositional loss through decay appears unlikely to have occurred to any great extent - a contrast to some medieval deposits at York (Blake street and the Bedern, for example). Low input of insects - and thus probably of organic matter generally - thus seems likely. Many layers analysed were probably made floors into which a few insects were trampled, or had even been present during construction.

Reconstruction of conditions on external surfaces around the site is made difficult by the probable importation of materials containing some or many insects. A few samples gave remains suggesting some weedy vegetation nearby, but generally only decomposer habitats (and of course grain) seem to have been present, indicating an extreme level of disturbance (or very thorough cleaning, not always the case in view of other evidence).

The records of 'bed bugs', *Cimex* sp., are of considerable interest. The specimens are almost certainly *C. lectularius*, a species including two so-called 'subspecies', *C. l. lectularius*, associated with humans, and *C. l. columbarius*, found mainly in dove cotes (Southwood and Leston 1959). Unfortunately these forms can only be separated with certainty on antennal characters, absent from fossil material. We are thus left to speculate whether the 'mahogany flats' so notorious in the medieval period onwards were endemic in Roman Britain. There are few records of bedbugs from archaeological sites. Osborne (1971) gives *Cimex* sp. from Roman Alcester and there is an unpublished record for The Bedern, York (probably Victorian). The absence of records from many hundreds of samples from the intervening periods had lead the writer to speculate that the species had been introduced twice, at first in the Roman period and then again in the medieval, having become extinct in the meantime. A very recent record from a sample dated to the Anglo-Scandinavian period at Coppergate,

York, throws such ideas into question, however.

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