Short contribution

A working classification of sample types for environmental archaeology

The staff of the Environmental Archaeology Unit (EAU), York, have for some years now used 'in house', and in conjunction with York Archaeological Trust and some other excavation organisations, a standardised classification of samples for biological analysis. The need for such a classification arose for two reasons: to ensure that appropriate samples were collected for the intended analyses and to facilitate control of laboratory processing, data interpretation and report preparation using a computer-based data interrogation system.

The sample types described below have been used successfully by the EAU for a good number of years. It must be remembered, however, that the treatments of samples summarised here do not represent a template for all archaeological sites. They represent the methods which have been developed in the Unit to deal with deposits which are primarily from urban sites with complex, commonly 'waterlogged' stratigraphy. They have evolved considerably and will doubtless continue to do so, and some aspects of them (for example, the typical sizes for bulk samples and the size of mesh used) are inappropriate to some kinds of sites or recovery needs.

The kinds of samples used by the EAU, together with the processing methods typically applied to them and the biological remains for which they are analysed, are discussed in turn (note that the abbreviated forms **GBA, BS,** etc. are used in computer databases containing sample catalogues and information concerning the progress of processing). It is EAU policy that sample material (other than, for example, timbers and pollen samples) is stored in plastic tubs; the use of polyethylene bags makes storage very much more precarious and increases handling time very substantially, and is to be discouraged (see Appendix for details of plastic tubs and indestructible labels). Samples usually comprise 'whole sediment', with nothing removed.

We have found it essential to follow this classification of sample types rigorously; failure to do so causes serious interpretative problems as well as administrative difficulties (especially in terms of database management).

1. **GBAs** (General Biological Analysis samples)

Nature of sample: These comprise 5-10kg of sediment from a layer, preferably with the sampling location accurately recorded. Current EAU policy is that *all* layers are sampled in this way—redundant samples can be discarded but, once excavated, unsampled sediment is lost for ever. GBAs are normally taken from some convenient or significant point(s) within a layer but may be collected as a 'column sample' traversing a series of vertically contiguous layers (for molluscs from a buried soil for example), when layer boundaries *must* be respected. GBAs furnish subsamples for a variety of other analyses as well as permitting laboratory description and investigation of the sediments themselves. *Function*: GBAs are used for analysis of plant macrofossils, invertebrates (particularly insects, molluscs, and eggs of parasitic worms) and (rarely) for small vertebrate remains. They also provide a 'voucher' of the original sediment for lithological description and long-term storage and as an insurance against unforseen requirements for analysis. *Storage*: Cool storage, preferably in the dark, is essential if samples are to be kept for more than a month or so—and they usually are! Sample material, especially of sediment rich in organic matter, commonly degrades in poor storage. *Processing methods*: GBAs are normally inspected and described in the laboratory using a standard *pro forma*. Subsamples from them are mostly processed using a minimum sieve mesh of 0.3 mm aperture, following procedures of Kenward *et al.* (1980; 1986), but small subsamples are also routinely used for analysis of parasite eggs. *Resulting physical archive*: This may comprise small vouchers of original sediment; glass or card slide mounts of various small biological remains; dried residues; residues stored wet in preservative; insect 'flots' (*sensu* Kenward *et al.* 1980) in 'alcohol' (industrial methylated spirit, IMS) in glass jars; and vials or other containers with assorted remains, dry or in various preservatives.

2. **BSs** (Bulk Sieving samples)

Nature of sample: BSs are collected once the GBA sample has been taken. Optimal size varies according to the nature of the site and layer, but generally a minimum of around 50 kg (approximately 30-50 litres) is taken. The maximum practicable size is, perhaps, 100 kg. Small contexts may of course produce less than the optimum quantity, in which case all the material remaining after the GBA sample has been collected will normally be bulk sieved. If it is desirable to process very large quantities of material from a single layer, a series of separately numbered samples is taken; the location of each sample *should* be accurately

recorded! *Function*: BSs are taken to allow a general assessment of the coarser component of the layer, to recover small artefacts, and for analysis of larger plant remains, large insects, molluscs and vertebrates (primarily fish, birds and small mammals). *Storage*: Unprocessed samples are too bulky for easy storage, so sieving normally takes place on site. The resultant residues and washovers (*sensu* Hall and Kenward 1990, 296) are best stored in tubs. Whether they are stored wet or after drying will depend on their nature, the research objectives of the project and, more fundamentally, on the practicability of large-scale drying. Dry material can be stored almost anywhere; organic material (and, of course, certain artefacts such as iron objects!) in wet residues/washovers will eventually degrade unless kept cool and preferably also in the dark. *Processing methods* (see Kenward *et al.* 1980): BSs are normally sieved in water using mesh of 1 mm apertures, whether plastic mesh or conventional metal sieves. Mesh of 300 µm is sometimes substituted where smaller remains—e.g. charred cereal chaff or, exceptionally, insect fragments—are to be recovered. Sieved material is normally dried, and often re-sieved using mesh of 2 mm aperture before sorting. *Resulting physical archive*: Wet (subsequently usually dry) residues and washovers, preferably stored in tubs, and a variety of different kinds of biological remains recovered from the samples (usually stored dry in vials, polyethylene bags or boxes).

3. **SR**s (Site Riddled samples)

Nature of sample: Ideally, whatever remains of the layer after the above sampling procedures have been carried out; this may be only a few tens of kilogrammes or as much as a tonne or more of sediment. If the layer is very large, it should be divided into a series of separately numbered samples (perhaps using 10–50 buckets as a maximum according to the nature of the deposit). Each of these samples should be separately located to allow analysis of variation through the layer. *Function*: SRs are processed to recover a wide variety of medium-sized artefacts and to provide the principal vertebrate assemblages. *Storage*: Since SRs are normally riddled and sorted on site; typically only dry bone is retained for analysis by the environmental archaeologist. Cool, dry conditions are preferable. *Processing methods*: SRs are sieved using a coarse mesh, usually 10-12 mm aperture and normally on a riddling frame incorporating a powerful water spray. Bone, artefacts and any other components required are sorted on site, the residues being discarded after recording. *Resulting physical archive*: Normally dry bone, often in very large quantities.

4. Hand-collected Material

Although traditionally the principal method of recovering bones (as well as artefacts), hand collection has repeatedly been shown to provide a biased sample and ideally should be avoided. If it is desirable to collect particular bone material, for example articulated elements, whole skeletons, or especially poorly preserved material, it is preferred that a SPOT sample (below) should be taken and appropriately cross-referenced in the record. Routine hand collection of other material such as mollusc shell or nutshell is similarly undesirable and a source of confusion in subsequent analysis since it represents an unknown proportion of what was in a particular layer.

5. **SPOT**s (Spot samples)

Nature of sample: SPOTs are taken to represent unusual or interesting material observed during excavation. Typical subjects for spot samples are caches of fly puparia or large seeds, articulated or otherwise obviously associated bones, or small patches of charcoal. They *cannot* substitute for other sample types. *Function*: Although SPOTs may be taken for a variety of purposes, they are usually intended to provide material simply for identification. *Storage*: As for GBAs; SPOTs are often of very delicate material and many need to be treated at least as well as artefacts composed of organic substances. *Processing methods*: Extremely variable, from visual inspection and immediate identification to complex analysis. *Resulting physical archive*: Depends on nature of samples; sometimes biological specimens stored as for those sorted from GBAs and BSs, but often requiring special conservation techniques.

6. **POL**s (Pollen samples)

Nature of sample: Pollen analysis might be carried out on subsamples from GBA or SPOT samples, but more conventionally a series of separate samples is collected using special techniques, e.g. by coring or from monoliths or open sections. *Function*: For analysis of pollen and—as appropriate—other microfossils. *Storage*: Samples for pollen analysis must be stored in cool, dark, anoxic conditions (cf. Moore and Webb 1978, 21). *Processing methods*: There are standard preparation techniques (ibid.). *Resulting physical archive*: Pollen 'count' slides, residues from preparations. These may require appropriate museum curation in the long term but are usually stored without detriment under normal laboratory conditions.

7. **WOODs** (Timber or other wood samples, including 'waterlogged' wood and larger charcoal fragments)

Nature of sample: The sampling and storage of waterlogged wood has been considered by, for example, Coles *et al.* (1990); the handling of wood samples is very inconsistent between sites and requires particular attention during project planning. In general, small charcoal is recovered from sieved samples (GBAs, BSs, SRs), but patches of charcoal or large pieces are frequently collected as SPOTs and very fine particulate charcoal may be recorded from POLs. *Function*: Samples of wood may be collected for purposes of identification or for information concerning woodland management or timber conversion. In addition, identifications of large structural timbers and wooden artefacts may be required. *Storage*: The storage of timber samples in both the short and long term presents special problems with resultant cost implications, not least because waterlogged timber must be kept wet and cold. *Processing methods*: Work on biological aspects of waterlogged wood and charcoal is usually inextricably linked to the needs of conservators, finds researchers and dendrochronologists and poses particular problems of organisation and communication. In the EAU the normal action taken is identification of tree species and recording of insect damage but, where appropriate, ring counts and measurements may also be made. *Resulting physical archive*: Organisation of long-term storage of wet wood is not normally the responsibility of the environmental archaeologist.

8. **OTHERs** (Other kinds of samples)

Samples may be collected for various other specific purposes, for example block samples to represent a buried soil horizon or a series of small samples for diatom or phytolith analysis. As such, samples in this category may have almost any form and have very varied requirements for processing and storage.

It is also our experience that what have been termed 'context' samples, usually a small quantity of deposit collected for no clearly defined reason, are normally of little value; a GBA sample would be appropriate, providing enough material for a wide range of analyses.

References

Coles, J. M., Coles, B. J. and Dobson, M. J. (1990). Waterlogged wood. *WARP Occasional Paper* **3**. Exeter: WARP.

Hall, A. R. and Kenward, H. K. (1990). Environmental evidence from the Colonia: General Accident and Rougier Street. *The Archaeology of York* **14**, 289–434 + pls. II-IX + microfiche 3–11. London: Council for British Archaeology.

Kenward H. K., Hall A. R. and Jones A. K. G. (1980). A tested set of techniques for the extraction of plant and animal macrofossils from waterlogged archaeological deposits. *Science and Archaeology* **22**, 3-15.

Kenward H. K., Engleman C., Robertson A. and Large F. (1986). Rapid scanning of urban archaeological deposits for insect remains. *Circaea* **3**, 163-72.

Moore, P. D. and Webb, J. A. (1978). *An illustrated guide to pollen analysis*. London: Hodder and Stoughton.

Appendix

The following addresses may prove useful:

(1) **Thurgar Bolle**, *Telford Way, Kettering, Northamptonshire NN16 8UY, U.K. (0536 410111)*

Suppliers of 10 l. **plastic tubs** (manufacturer's code: PO200); minimum order is 600; price per 100 at time of writing: £95.25+VAT (i.e. approximately £1 each).

(2) **IML Ltd.**, *6 Thorncliffe Distribution Centre, Brookdale Road, Thorncliffe Park Estate, Chapeltown, Sheffield S30 4PH, U.K. (0742 465771)*

Suppliers of 'Tyvek' white woven **plastic labels** (prices on request); these can be supplied pre-printed with site names/codes and so forth, and with washered or punched holes. They are effectively indestructible and can be almost indelibly marked with waterproof, spirit-based black markers.

Although the outlay per sample is higher with tubs than polyethylene bags, they are re-usable and only one is needed per sample. They are also very much easier to handle and store than bags!

Keith Dobney, Allan Hall, Harry Kenward and Annie Milles
Environmental Archaeology Unit, University of York, Heslington, York YO1 5DD, U.K.