

Environmental Sampling: Some Guide Lines for Beginners

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INTRODUCTION

There are no general rules regarding environmental sampling on sites. No two sites are the same, and the necessary approach on two apparently identical sites may be completely different. The safest thing is to contact the appropriate specialist, and to let him or her spend a day on the site to see the situation, and to take the samples. That, of course, is an ideal, and is seldom possible. Excavations are numerous, and well trained environmentalists are scarce, and usually busy. The aim of this paper, therefore, is to provide some simple guidelines which may enable the field archaeologist to assess the environmental potential of a site, and to take soil samples with a definite end in view—an essential if time is not to be wasted.

The first part will deal with different methods of sampling, both individual layers, and sections. Comment will then be made regarding the preservation in different soils, and the sample size needed for different classes of environmental material.

SAMPLING METHODS

1 Serial sampling

Where a deep, homogeneous layer of material has been laid down over a site, or where an ancient topsoil has been buried beneath an earthwork, it can be very informative to divide the layer into convenient arbitrary units, each representing a small part of the process of deposition. For example, the foot or so thickness of a buried soil may span a period of five hundred years from bottom to top. If a number of samples are taken at narrow intervals through the soil, it may be possible to reconstruct quite accurately changes in the environment during that time.

A part of a section is chosen which shows least disturbance by roots or burrowing animals, and is as near as possible to being an 'average' part of the section. A tape is hung down the section, and a series of equal samples of from one to ten cm thickness, depending on the depth of the deposit, is removed. A good rule of thumb is to aim to get at least ten samples out of the profile. The narrower the sampling interval, the more detailed is the final information. A deep peat, or hillwash, deposit, spanning several millennia, may require fifty or more samples at very close inter-

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vals. It is important that gaps should not be left between individual samples, otherwise 'a bit of history' has been omitted. On the other hand, of course, samples are never taken across stratigraphic boundaries.

There are three essential rules for serial sampling, or, indeed, any environmental sampling.

- a) Clean the section thoroughly (take off an inch or two to be on the safe side), and clean from the top downwards, as one would sweep a flight of stairs.
- b) Take the samples from the bottom upwards, so that material loosened during sampling cannot fall down onto a previously unsampled area.
- c) Clean the sampling tool (e.g. trowel) thoroughly between each sample.

2 Soil monolith

Where it is difficult to decide on the required sampling interval, and time cannot be spent waiting for a specialist to be available, then the removal of a soil monolith is a good substitute for serial sampling. The idea is simple. Instead of taking a series of samples from a deposit, a solid pillar of soil is removed. This can then be examined, and sliced up as appropriate by the specialist. The monolith is not excavated from the section. Rather, the section is excavated from around the monolith, so as to minimise damage to the monolith. Once isolated, a soil monolith can be conveniently stored in a length of plastic piping, or in a series of bakers' loaf tins. Ideally, the monolith should be 4 to 6 ins square.

3 Spot sampling

Where deposits suitable for serial sampling are not available, such as on ploughed settlement sites on the chalk, then a series of dated levels from various pits and ditches all over the site may be strung together to build up a sequence of environmental development. Ditches very often contain humic horizons representing a period when deposition was slow, or even ceased, and a build-up of humic material could occur. Such horizons are often rich in environmental information, and, where datable artifacts can be associated, provide links in a chain which can be extended to cover a very considerable period of time. Samples are taken of each one of a range of stratigraphic layers on the site, such that the whole period of occupation is covered. The precautions mentioned above need to be taken to prevent undue contamination.

4 Bulk sampling

This term is taken to cover those circumstances where an extensive spread of occupation debris is found, containing, perhaps, animal bones, snails and charcoal, all thoroughly mixed up together. In such instances, it is rarely possible to process the entire layer, unless a flotation chamber is available

on the site. Sampling is therefore required in order to obtain a representative part of the whole. The aim is to remove any element of human selectiveness. Therefore, a small area of the spread, for example a couple of square metres, is outlined at random, and the whole mass, soil and all, is bagged up.

From this, animal bones can be sieved out, and suitable sized samples of the accompanying soil can be reserved for extraction of snails, seeds, charcoal, or whatever. The mass required depends upon the contained material, and will be discussed under the separate headings below.

POLLEN

The main problem with pollen is deciding how it came to be where it is. Ditch fills are of no use for pollen analysis, unless it is known exactly where the fill came from. Buried soils are mostly used, as the pollen of many centuries lies stratified, just as it fell from the tree. Pollen will only be preserved in acid soils, i.e. not on chalk. The sample size is small—about a matchbox-full. Unless the material is going to be worked on immediately, it is a good idea to dry the samples. This should not be done in the open air, as the samples will pick up stray aerial pollen grains. The ideal is an electric oven at about 40-60 degrees C. A gas oven is no use, as gas produces moisture as it burns. Pollen samples should always be taken by the serial method, as it is change with time which is primarily of interest. Thus, something in the nature of a buried soil is required, or the turf-stack of some heathland barrow. One word of warning—the extraction and counting of pollen grains is a long (not to mention dangerous) process. Results take time, but are often well worth waiting for.

SNAILS

Snail shells tend to be best preserved in soils where pollen is not preserved, i.e. dry and chalky soils. Serial sampling of a deep sediment is ideal, but spot-sampling has been used to good effect. It should be stressed that there is no point in asking one's trowellers to collect all the shells they see during the excavation of a feature, and calling the collection a random sample. This will sample the four or five large species, but will miss the thirty or so others, which will have to be soaked and coaxed out of a soil sample. Samples need to be fairly big. About three kilograms is on the safe side (3 kg = two 8 × 11 ins poly-bags full). Snail shells have the advantage over pollen in that they do not blow around, and thus tend to represent the immediate environment of a small area.

INSECTS

The conditions necessary for the preservation of insect remains are rare. The deposit needs to be thoroughly waterlogged, and thus oxygen deficient, and preferably mildly acid. Wells and sewers are a good source of insect

remains, although these tend to represent the inhabitants of the sewer, rather than the surrounding land. The samples required for the thorough examination of an insect fauna are huge. There is no point in considering samples of less than 10 kg mass, and samples of up to 50 kg (about 1 cwt) may be needed. These samples should be packed in several layers of polythene in a damp state, and with all the air excluded. Insects can be very informative, but their use is restricted to sites where unusual conditions prevail.

SEEDS

Carbonised grain will be preserved in almost any type of soil, and can be extracted coincidentally with snails. Alternatively, deposits suspected of containing grain, e.g. in a storage pit, can be processed on site by sieving one or two kilograms of soil through a sieve of $\frac{1}{2}$ mm mesh size. The sediment left in the sieve can then be sent to a specialist for identification of any grain present.

Uncarbonised seeds tend to be preserved in waterlogged deposits. Wet, black, and smelly layers may often contain seeds. Spot-samples of about 5 kg are needed, and should be packed wet in polythene with air squeezed out. Seeds can occasionally be extracted from dry chalk soils, but these tend to be very sparse, and are only retrievable in sufficient numbers by the use of a flotation chamber.

ANIMAL BONES

When a mass of animal bones is encountered, and information is required regarding the suite of animals being kept on the site at a particular time, it is important not to collect just large and intact bones. Archaeologists have done this for generations, with the result that we have an over-inflated view of the importance of ox and deer, we underestimate sheep and pigs, and we have not a clue about the economic value of fish and fowl. The collection of small bones is best accomplished by sieving the mass of bones through a large garden sieve of 1 cm mesh, or smaller. If the mass of bones is too large to be dealt with in its entirety, then an area of several square metres should be picked at random, and treated as above. If what is obviously a complete skeleton, or even one complete limb, is found, the bones should be packed together, and labelled accordingly. In this way, preferential selection is minimised, and there is some hope of accurately reconstructing the past economy of the site.

CHARCOAL

Charcoal analysis also suffers from the selecting of 'big bits'. Different woods, it must be realised, disintegrate to different extents. When gathering charcoal for identification, it is generally best to take a bulk sample of charcoal-bearing soil, out of which the charcoal can be sieved. If a flotation

chamber is available, this device is excellent for producing a clean, random sample of charcoal from a large volume of soil. When a mass of charcoal is found which was evidently once all one piece, it is important to package and label the sample accordingly. Otherwise, the specialist may spend many infuriating days identifying fragments which are all of the same species. This biases the result, and does not make for good interdisciplinary relations.

When collecting charcoal for C14 dates, a number of additional points should be borne in mind. The amount required is quite large. 50 grams may not sound very much, but charcoal is not very dense, and a surprisingly large volume is needed. Contact with skin, sweat, and paper labels should be minimised. Do not smoke in the vicinity of a C14 sample. The sample should be wrapped in aluminium foil, *not* cardboard or paper, and preferably not polythene, as this will encourage mould growth.

SUMMARY

To sum up, it must be stressed again that there is no substitute for having a well-trained environmentalist on the site. The assessment of whether or not a deposit is worth sampling, and if so for what, is sometimes remarkably difficult. However, it is hoped that the remarks made above will serve to provide some guidelines for archaeologists finding themselves in the position of needing to make a quick decision, and having no-one to whom to turn. Whatever samples are taken, it can be a very great help to the specialist to provide him or her with sketch plans and sections of the site, in order to describe as far as possible the position of the samples relative to each other and to the rest of the site. Labels should be lucid, and should not require a site notebook to enable them to be deciphered. Little or no extraction can be done on the site, with the exception of the simple sieving jobs mentioned above, or flotation. However, taking the right samples with a definite series of questions in mind, and providing the specialist with thorough records of the whereabouts of the sampling point can greatly reduce the time necessary for the analysis of the samples, and can help to maximise the information obtainable.

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