

## Some Aspects of Pottery Quantification

A.G. Vince  
University of Southampton

There are many methods of assessing the quantities of pottery types in an archaeological assemblage, of which the most commonly used is the sherd count. In this method the number of sherds of different types are counted, and the frequency of sherds of any one type is taken to be proportional to the frequency of complete vessels of that type in the assemblage. Sherd frequencies are the most commonly used quantity in seriation studies (e.g. by Dunnell 1970), and in distributional studies (e.g. Hodder 1974). Other methods of presenting pottery assemblages are as weights of sherds or vessels (e.g. Hinton 1977), as the minimum number of vessels of each type (discovered in grouping sherds of the same vessel together, and only counting sherds as separate vessels if they cannot belong to vessels already counted) and as the number of rim or base 'equivalents' of each class of vessel (expressed as the number of degrees of rim or base circumference present). The advantages and disadvantages of these methods are discussed by Orton (Medieval Pottery Guidelines, forthcoming) but can be summarised here by stating that each method aims at giving an accurate expression of the number of pots of different classes present in an assemblage. Such methods are invaluable for studying the consumption of pottery, and therefore, also its production.

I would like to show, by reference to medieval pottery in the west of England, that in addition to quantifying the relative proportions of different pottery classes in an assemblage some measure of the degree of use of pottery in the material culture of a society is needed. One method of discovering this information would be the complete excavation of a settlement unit so that the total quantity of pottery found could be compared with the estimated population of the site and the duration of occupation. This objective can only be achieved for a few sites and is impractical for urban excavation.

An alternative is to consider the ratio of quantity of pottery recovered to some other variable such as the quantity of food bones or the size of the excavation (measured either by area or volume). Such a ratio would provide a means of studying the way in which the 'aceramic' societies of western England, Wales and Ireland adopted the use of pottery, and for the later periods would enable regional variations in the degree of pottery use to be defined.

### The Use of Pottery in the West of England in the Medieval Period

Although pottery is a common find on Romano-British settlements in Wales and England and appears in some cases to have continued in use well into the fifth century (e.g., Horizon 14, New Market Hall, Gloucester: Hassall and Rhodes 1974) it has proved extremely difficult to find pottery datable to the fifth to seventh centuries outside the area of early Saxon settlement (see Myres 1969, Maps 1 and 2). The primary reason for this concentration of evidence for pottery in East and Midland England must be the practice of cremation and the subsequent burial of cremation urns but when settlement sites are found in this area pottery is common, and there can

be little doubt that over most of the area covered by Myres' distribution map pottery was in everyday use.

There is considerable doubt over the interpretation of our lack of evidence for pottery use in the Celtic West. Two areas in which pottery can be dated to this phase are Cornwall (Thomas 1968) and Ulster (Ryan 1973). Is it merely a matter of time before similar pottery is recognised in the remaining areas outside of Saxon England, or was pottery not in everyday use over much of the area? It is quite possible that museum collections already contain pottery of this period but identified as of Iron Age or perhaps as of later medieval date. One can only discover whether or not this is true by finding pottery stratified with objects of known date or dated by independent means.

At present the evidence we possess suggests that pottery was not in everyday use, (in a number of cases) and this situation would seem to last well into the twelfth century in parts of Wales (e.g. Hen Domen, Barker 1970) and Ireland. Obviously the most convincing way to solve this problem would be to excavate settlement sites on as large a scale as possible and preferably those sites where occupation levels are stratified and therefore protected from the effects of weathering and ploughing. This however is not possible in the majority of cases. In many towns the earliest occupation levels are only exposed as small islands of stratigraphy cut away by later Saxon and medieval pitting (see Hurst 1972 for the Bell Hotel site, Gloucester). To excavate these levels on a large scale would require the removal of large quantities of stratified medieval deposits and it is quite possible that even then one would still be dealing with isolated blocks of stratigraphy.

If we can assume, as a working hypothesis, that pottery was not in daily use in the greater part of the Celtic West how might its use have begun? There is the possibility of re-invasion. The well-fired structure of a pair of eighth or ninth century corn-drying ovens found at Hereford shows that knowledge of the properties of clay when fired were known and yet no pottery is known from these levels (Rahtz 1968 for the corn-drying ovens). Pottery is first regularly found at Gloucester and Hereford in deposits of the second half of the tenth century or first half of the eleventh century. Both the techniques of manufacture and the shapes of the vessels produced suggest contacts with an area or areas using the potter's wheel and permanent kilns. This suggests that pottery use could have spread by diffusion (a discussion of various processes by which new techniques and forms can spread is given by Nicklin 1971, who emphasises the complex motives which affect the adoption or rejection of new techniques of pottery manufacture. None of Nicklin's examples, however, concern the adoption of pottery use by aceramic groups).

There are many aspects of this early pottery use about which we are ignorant. Amongst other questions the following stand out as being important in any attempt to explain why pottery use spread when it did. First, how widespread was the use of pottery and did it extend to all classes of society and all types of settlement? Secondly, was pottery used as much in the West of England as it was in the East and was there any increase in the amount of use of pottery from this period to the later eleventh century? Finally, was pottery being made at a domestic level or by more specialised producers? This is the only question at present that we have the means of answering using petrological analysis, although even here Nicklin shows us that occasional long-distance transportation of pottery on a non-commercial basis might be expected (1971, 14).

By the end of the eleventh century, pottery was in use at Chepstow in South Wales and in Dublin, and during the twelfth century pottery manufacture in the Dublin area began. At the end of the twelfth century, however, Ireland was conquered by the Normans and pottery, both locally produced and imported, was common on military and monastic sites founded at this time and later. Once again differences in the frequency of pottery finds can be interpreted in two ways, either as signs of an increase in the amount of pottery in use or as an illustration of the lack of early occupation sites.

Alongside this spread in the area adopting pottery there was an increase in the range of vessel types in use, during the eleventh century spouted pitchers appeared but pitchers were not common until well into the twelfth century when glazed tripod pitchers were to be found. The proportion of glazed wares in assemblages increased from about ten per cent in the early thirteenth century to over seventy per cent in the fourteenth century.

From the tenth through to the fourteenth century there is evidence for the spread of pottery use and also for the diversification of pottery forms. Obviously for an understanding of the social and economic role of the potter and his (her?) products during this period we need to know what demand there was for these products. Any increase in demand would be bound to have an effect on the status of the potter (i.e. the amount of his time actually spent producing and marketing pots), and on the number of potters a region could support. Similarly any study of the functions of pottery vessels would not be able to show whether there was a decrease in the use of a particular vessel type at the expense of a new type, or whether the new type was used in addition to those types already in use. Here we have two situations in which we need to know the quantity of pottery used per person (per year) or at least some index of whether this quantity was varying either regionally or chronologically.

#### The Construction of the Archaeological Record

There is now a considerable literature concerning the relationship between archaeological levels and the societies whose structures and artefacts form them. The most useful of these studies for the present purposes are those which take data from present day societies and compare the conclusions which would be drawn from the archaeological record left by these societies with the observed facts.

Three studies concerning the life-expectancy of pottery vessels in different cultures (David 1972; Deboer 1974; Foster 1960). Deboer's study of the Conibo of Peru involved a census of the pottery of four settlements which enabled him to calculate the median life-span of various vessel types. These ranged from 0.25 years (for beer mugs) to 2.25 years (for small jars). He was then able to calculate the observed frequency of different pottery types and the frequency which would be found in a midden deposition. Naturally with vessels of different longevity the proportions of vessels in the midden would be significantly different from those found in use. However, for his particular example Deboer was able to calculate a correction factor,  $K$ , which when multiplied by the number of pots found in a midden would give the number to be found in use. This factor ranged from 0.35 (for beer mugs) to 3.13 (for small jars). It is interesting that the average life-span of the Conibo pots was less than one year.

A similar life-span is estimated by Foster for the pottery of Tzintzuntzan, Mexico, a potting community living in a peasant society very similar in many details to that found in medieval England. The pottery traditions

there are a mixture of Mexican and Spanish techniques and a proportion of the pottery was glazed. This pottery lasted longer than the unglazed cooking pots. Foster lists five factors which influence the life-expectancy of the pottery vessels. The first is the basic strength which, says Foster, is improved by glazing (perhaps because in Mexico this involves a second firing of the vessel). Second, is the function of the vessel. Cooking vessels last least time, water storage vessels next and finally festive cooking ware. Third, the mode of use of the vessels. In Tzintzuntzan the breakage rate was lower in households with raised platforms for cooking, probably as a result of greater ease of movement by the housewife and also because the platform protects vessels from children and animals (both of which received a large proportion of blame for pottery breakage). The final factor, also suggested for medieval England, is that pottery in Tzintzuntzan was cheap, which leads to carelessness. The Conibo had on average three to four pots per person, whereas the Mexicans had on average fifty to seventy-five per kitchen. The first conclusion which one can draw from this group of studies is that, as one might expect, the frequency of breakage varies significantly for vessels of different functions and fabrics. Alongside these variations there are differences caused by mode of use, the number of children and animals with access to the kitchen area and the cost of replacement. One can see how these factors might vary from household to household in medieval Britain. Separate kitchens are found mainly on castle and monastic sites and one would therefore expect a lower rate of breakage on these sites. The cost of replacement varies mostly with the distance from the pottery source and there are several areas which at some time in the medieval period were using pottery solely from distant sources, for example Hereford, which in the twelfth century drew pottery from three sources over twenty-five miles away. Evidence for greater care taken over pottery vessels might be found at these places although evidence of repair, by the use of a lead plug or binding, seems to be equally rare at all sites. Thus there are likely to be biases in comparing the quantities of pottery from different areas, some of which could be accounted for by comparing material from like sites (castles with castles, villages with villages and so on). In the case of the Conibo and Tzintzuntzan, two very different societies, the average pot life is very similar and it may be that for our purposes we can ignore the cost of replacement as a significant factor in pottery breakage.

Another group of studies concerns refuse disposal and the relationship between the location of various activities and the location of refuse from these activities (Schiffer 1972; 1976). Schiffer emphasises that a number of processes intervene between the discarding of an article and its eventual discovery on an archaeological site. These he groups into four; processes of refuse disposal; processes of re-use of archaeological materials; processes of post-depositional change, and processes of re-use of materials within a society. All must be considered in connection with medieval pottery. Schiffer recognises three main classes of refuse which he terms primary, secondary and de facto refuse (Schiffer 1972). Primary and secondary refuse are the products of the normal conduct of a society; objects which are worn out, broken or an unwanted by-product of some activity. The relationship between the location of last use and the location of burial varies with the type of waste involved, the size of the settlement and the intensity of occupation. When location of last use is the same as the location of discard this is termed primary refuse whereas when there is some element of transport between the location of last use and location of discard this is termed secondary refuse. De facto refuse refers to material which has entered the archaeological record without being discarded,

in other words complete, useable artefacts that are found in the archaeological record. All three types of refuse are recognisable on medieval sites although the occurrence of secondary refuse is by far the most common. Primary refuse may best be sought on the surfaces of floors, especially when these floors were composed of organic material and were replaced by overlying new organic material. In these cases the location of vessels of a particular function might be expected to relate to the location of the activity involved; food preparation, storage, cooking, serving or whatever. In such deposits the location of pottery sherds and other debris may be significant (see Schmid 1972, for reconstruction of the processes carried out in a Roman military kitchen). Secondary refuse seems to have been deposited wherever a suitable hole in the ground existed and the relationship between the location of last use and the location of discard is often difficult to establish. It is likely that the material in a rubbish pit is derived mainly from areas within the same property boundary and thus differences between the activities carried out in different properties can be examined by comparing such material. In addition long-distance transport of waste is evidenced from the late medieval period onwards, mainly in towns, and in those areas where communal dumping took place the material found can only be related to the settlement (or settlements) contributing rubbish. De facto refuse is perhaps the most useful when found. Small objects can easily be lost or dropped in a location where the effort of recovery is not worthwhile. The most common examples of these locations are beneath floorboards and in wells and cess-pits. Similarly drains and cellars can become 'artefact traps'. Another type of de facto refuse occurs when for some reason activity ceases. The abandonment of a settlement is an obvious example. A number of objects may be discarded whilst in working order depending on their portability and the means of transport available. Another situation occurs when the settlement is destroyed; by fire, attack or 'act of God'. These situations of course are few and far between but are invaluable for the information that can be gleaned from them (Carter 1975).

The processes of re-use of archaeological materials include 'scavenging' through abandoned settlements and the removal of objects, as curios or for their intrinsic values. This is relatively unlikely to affect pottery although it has been suggested that Roman pottery (and in particular Samian Ware) arrived in medieval contexts through scavenging (Rahtz 1974,97). Other examples of such processes are pot-hunting and archaeological investigation itself. Although these processes should not affect stratified material there is a possibility that they might affect studies based on field-scatters, particularly when collection is selective, in favour of fine or decorated sherds. Ian Hodder found that in a study of Romano-British pottery (Hodder 1974) that if undecorated coarse-ware bodysherds were present in a collection he could assume that the collection was suitably representative for the calculation of pottery frequencies. The processes of post-depositional change are those most widely recognised and include weathering, erosion and other natural processes. In addition they include the disturbance of archaeological levels by subsequent activity. The digging out of a feature, whether it be a defensive ditch or a post-hole, produces a quantity of soil, possibly containing archaeological material. In some cases it is obvious that the material has been placed as a bank or mound but in others it is not so clear; the raising of floor-levels and use as road metalling are two possibilities. Material may also be thrown back into the excavated feature (for instance in drain laying or the filling of rubbish pits).

Processes of re-use of pottery within a society are difficult to document although one could include hoard-containers in this category, if there was evidence that the vessel had served some other earlier function (Thompson 1956). The sale of secondhand pottery, or its secondary exchange as a gift would be an example of this process but both are very difficult processes to document archaeologically. How can these studies help to give us some measure of the degree of use of pottery in the material culture of a society and in particular medieval society? First, let us take the quantification methods briefly described above. Most of these methods show us the relative proportions of different pottery classes present in the archaeological record. In some cases they also tell us the number of pots represented in the archaeological record. The degree of use of pottery can be expressed as the number of pots per person and as stated above the simplest method of producing this figure from the archaeological record is to divide the total number of pots by the duration of occupation and the population (assuming this to be constant). We would also have to divide this term by the average breakage rate (which one might be able to estimate given more studies similar to those of Deboer, David and Foster). Schiffer's studies show us that we would also have to be sure that the material we were using was the result of normal refuse disposal and had not been subjected to any post-depositional changes. Such a calculation could be made but would require knowledge of the population and duration of occupation of a site which can only be sufficiently accurate when detailed documentary records exist. For practical purposes it may be better to look at the problem from a slightly different angle, by examining the ratio of pottery to bone in the archaeological record.

#### The Ratio of Pottery to Bone

It has been shown above that attempts to calculate the number of vessels in use during a given period on a medieval settlement require a number of pieces of evidence which at present are not available. One problem found in interpretation the excavations carried out on sites with little or no pottery is concerned with deciding whether or not the absence of pottery from a particular context is significant. Three factors, subjectively, would seem to be related to the presence or absence of pottery fragments. First the size of the feature or extent of the level that was excavated, secondly the presence or absence of other occupation debris and thirdly the function of the feature or layer. This sort of information is often used quantitatively to suggest that the absence of pottery is significant and I would suggest that by quantifying both the size of the excavation and the presence of occupation debris we can distinguish between excavations which because of their size cannot be used as evidence for an aceramic occupation and those which can be used as evidence for an aceramic occupation because of the quantity of occupation debris found. The reason for not simply using the size of the excavated area to judge the significance of absence of pottery is that in many cases intensification of activity, will produce greater densities of pottery finds.

The only material which is found in the same sort of quantity to pottery on medieval sites is animal bone. The interpretation of archaeological animal bone not only has those problems associated with pottery but also several others. Whereas, except in cases of long-distance secondary refuse, pottery can be assumed to have arrived on the site complete, there is a distinct possibility that animal bone arrived already butchered. This will affect not only type of bone present but also whether bone is present at all. If meat is sold already boned, all the bone will be discarded at the butchery or transported from there to a communal dump. There is also

evidence for the recycling of bone, for use in the manufacture of artefacts and in glue production. The extent to which these processes were in operation may be shown by examining the relative proportions of different bones for each species (Maltby forthcoming). Once the bone reached the site however it probably underwent the same disposal processes as pottery. Primary refuse, however, one would expect to be scarcer (since it would attract flies, dogs etc., and would smell). For the same reasons one would expect a greater tendency to burial, especially in inhabited areas. On the other hand both pottery and bone would be found in areas of food preparation and/or consumption and if discarded together would tend to enter the archaeological record together. To investigate this relationship it would be interesting to excavate a site where the proportions of pottery and bone could be compared in different areas known to have been in use contemporaneously.

Since such information was not available the feasibility of using the ratio of pottery to bone to discover variations in pottery use was tested on material from two sites in Hereford, excavated by Ron Shoesmith for the City of Hereford Archaeological Committee. The first site, Berrington Street Site 1 was excavated in 1972 and the bone had been examined by B. Noddle (report forthcoming in Shoesmith), but not retained. The number of bone fragments however had been recorded. It was thus decided to compare fragments of bone to sherds of pottery in the hope that the processes affecting fragmentation and recovery would be similar for the two materials. Those parts of the site which were excavated fell into five chronological phases and were represented by different types of deposit. The first two phases probably represent soil formation at the rear of a timber and soil rampart. In the eleventh or twelfth century these levels were buried below a gravel rampart (not excavated in this area) through which were dug pits refilled with refuse. For some reason there was a gap in this pitting sequence between the mid-thirteenth century and the mid-fourteenth century. Contexts later than the early fifteenth century were rare and included pits and levels associated with a stone-walled building cut into the rampart.

Table 1

<u>Phase</u>	<u>Pot</u>	<u>Bone</u>	<u>Total</u>	<u>Ratio</u>	<u>Approximate dating</u>
Soil	1	205	206	0.00	up to 10th C.
Soil	40	604	644	0.06	late 10th-early 11th C.
Pits	344	718	1062	0.48	late 12th-early 13th C.
Pits	160	362	522	0.44	late 14th-early 15th C.
Pits, soil	76	219	295	0.35	15th-16th C.

The bias of excavation at this time is likely to have resulted in a better recovery of pottery than of bone so it is possible that the ratios are too high. Nevertheless, interpreted as chronological differences, there are three separate phases represented here. In the first phase pottery is very rare. In fact the single sherd found is of a type still current in the next phase and might be intrusive in the lower soil. In the second phase pottery is moderately common (approximately twelve times as common, relative to bone, as in the first phase). In the third phase there is another sharp increase (pottery is eight times as common, relative to bone, as in the second phase). It is doubtful whether the slight increase in the ratio

from the late twelfth century to the sixteenth century is significant. I would suggest that the increases in the pottery to bone ratio are due to the increase in use of pottery but discussion of the results of this study will follow the presentation of data from the second site, Bewell House.

The sequence of occupation at Bewell House is to be published by Shoesmith (forthcoming). I have divided the excavated contexts into soil levels (which in the main consist of garden soils incorporating a high quantity of residual pottery sherds) and features. In period 1 these features were a series of parallel ditches, either property divisions or associated with agriculture. In period 3 they are a mixture of rubbish-filled pits and post-holes. In period 4 they are occupation levels associated with a metal-working furnace, while in periods 5 and 6, they are mainly rubbish-filled pits. Period 7 features consisted of paths and flower beds in the garden of an eighteenth century mansion and in period 8 they are soakaways and drain-pipe trenches associated with a brewery.

Table 2

<u>Phase</u>	<u>Pot</u>	<u>Bone</u>	<u>Total</u>	<u>Ratio</u>	<u>Approximate date</u>
Soil levels:-					
1	18	279	297	0.06	up to late 12th C.
3	202	1784	1986	0.11	up to early 13th C.
4	333	1751	2084	0.19	early 13th-mid-13th C.
5	832	3201	4033	0.26	late 13th-late 14th C.
6	163	626	789	0.48	late 14th-late 17th C.
7	198	178	376	1.11	early 18th- early 19th C.
8	1182	799	1981	1.48	mid- 19th C.
Features:-					
1	4	174	178	0.02	up to 12th C.
3	187	1892	2079	0.09	up to early 13th C.
4	431	1752	2183	0.25	early 13th-mid- 13th C.
5	383	1530	1913	0.25	late 13th - late 14th C.
6	142	673	815	0.21	late 14th- late 17th C.
7	749	1026	1775	0.73	early 18th- early 19th C.
8	306	215	521	1.42	mid-19th C.

In period 1 both soil levels and features have the same order of pot:bone ratio as contemporary levels at Berrington Street. The ratio then rises



to the mid-thirteenth century (period 4) but in both soil and features the ratio is about half that found at contemporary levels at Berrington Street. There then follows a phase in which the ratios for soil levels diverge from those for features, the soil levels having a rising pot:bone ratio and the features having a slightly falling ratio (as at Berrington Street). For the eighteenth and nineteenth centuries the pot:bone ratio in both soil and features is much higher than that found in earlier levels.

The higher ratios found in soil levels suggests either that bone was preferentially buried or that unburied bone is not so well preserved. It is possible that scavenging animals would contribute to this and it is worth noting that there is a higher incidence of cat and dog bones in medieval Southampton than in Saxon Hamwih (pers. comm. Mrs. J. Bourdillon) and thus similarly exposed contexts from Saxon and medieval sites in Southampton would tend to have higher pot:bone ratios in the medieval period even if the preservation and the actual rates of deposition were the same. There are a number of variables which might affect these ratios which ideally we would need to isolate and account for. Another difference between Saxon and medieval bone from Southampton is the relative infrequency of skull and mandible fragments from the medieval town (pers. comm. Mrs. J. Bourdillon, see also Chaplin 1971, 101). This is possibly a reflection of the nucleation of butchery in the town and would again result in higher pot:bone ratios for certain medieval sites in Southampton. In this case one could correct the bias by calculating all ratios with skull fragments excluded. Whether or not any of these processes affect the Hereford samples cannot be observed.

We have seen that there are sizeable differences between the number of bone fragments and the number of pot sherds from two sites in Hereford. These differences are both chronological and related to the context in which the material was found. Because of the effect of differential preservation of pot and bone it is best to consider the ratios solely of material from contexts filled with secondary refuse and presumably deposited relatively quickly. Unfortunately this discounts all the material of Late Saxon date from Berrington Street Site 1 and the earliest occupation at Bewell House, precisely the contexts where the use of pottery is of most interest. The contexts we are left with span the late twelfth and early thirteenth century through to the seventeenth century. The major difference between these contexts is not chronological (although there is a slight decrease in the pot:bone ratios with time at both sites) but between the sites. The ratios from Berrington Street Site 1 being roughly twice as high as those from Bewell House. Before attempting to explain this difference it would be necessary to try different methods of quantification, for instance pot and bone weights as well as looking for qualitative differences between the pot and bone from either site. It might also be necessary to question the recovery procedures used.

We can attempt to use our data again. This time to examine the proportions of vessels of different function. At Berrington Street Site 1 the early soil levels contain solely soot-blackened cooking pots. The two groups of pits however contain a proportion of glazed sherds from tripod pitchers and jugs. These vessels were probably used for storage and short-distance transportation of liquids. In the earlier pits there were twenty-one glazed sherds which formed 6.1 per cent of the ceramic assemblage and in the later pits one hundred and eight sherds formed 67.5 per cent of the ceramic assemblage. Thus there is a relative increase in the proportion of jug sherds by a factor of eleven. There is a corresponding relative decrease

in the proportion of cooking pots by a factor of 2.9. To examine which of these variables is actually changing we can calculate the ratio of cooking pots and glazed vessels to bone fragments.

Table 3

<u>Phase</u>	<u>Cooking pots</u>	<u>Glazed vessels</u>	<u>Bone fragments</u>
Soil	1 (0.00)	-	205
Soil	40 (0.06)	-	604
Pits	323 (0.45)	21 (0.03)	718
Pits	52 (0.14)	108 (0.30)	362

The ratios are practically identical to the relative frequencies showing that there was an actual decrease in the use (or at least breakage) of cooking pots and an increase in the use (or breakage) of glazed vessels, (assuming that bone disposal was constant).

More detailed analyses of bone and pot sherd frequencies have been made for excavations in Gloucester (Heighway, forthcoming) using figures for the number of bone fragments with and without skull and mandible fragments supplied by Mark Maltby of the University of Sheffield. Data for three sites in different parts of the town confirm the initial increase in the ratio of potsherds to bone fragments and thus show that the low quantities of pottery in early medieval contexts is a real phenomenon and not a function of the small size of the excavated areas. In Gloucester as at Hereford there are major variations between the sites and in particular the ratio of pottery to bone fragments is much lower in the berm and ditch levels outside the east wall of the town. This, together with analysis by Mark Maltby of the proportions of different bones represented, shows that this area outside the town wall was used for dumping and food debris and butcher's waste. These preliminary experiments at Hereford and Gloucester show that although animal bone is not a constant indicator of occupation, even when the preservation of the bone is good, general trends can be discovered by using the ratio of potsherds to bone fragments. Ratios can only be roughly compared between sites because of the effect of site function on the quantity of animal bone. Since there are no other objects found in the required quantities on archaeological sites to compare with these ratios we must measure the size of the excavated area and the amount of soil excavated.

#### Methods of measuring soil volume

On sites with shallow stratigraphy an approximation to the pottery/soil ratio can be obtained by recording finds per unit area and multiplying the area by the average depth. On such sites the rate of soil accumulation might well vary and the composition of the context is likely to be unsuited to quantification by volume. Recording of finds per unit area is becoming standard practice on shallow stratified sites and it would be possible to compare such sites with each other in terms of pot per square metre.

Comparison with a deeply stratified site would be more difficult as occupation is likely to have been more intensive. Comparison of different areas of the Berrington Street excavations showed that a four-fold increase

in potsherds per unit area between postulated 'back garden' areas and floor levels of timber buildings but it would not have been possible to compare the areas by volume because in the 'back garden' areas it is suggested that there was no vertical build-up during the period (the late tenth to early eleventh century). Instead pottery was found in the top disturbed, part of essentially earlier levels.

On deeply stratified sites a measurement of volume could be made by counting the number of buckets excavated from each context. A rough guide to the quantity of unexcavated soil per bucket could be found by dividing the number of buckets of soil by the total excavated volume. This method is bound to be inaccurate since volume per bucket would vary with the texture of the soil, with the weather conditions, with the degree of soil compression and with the accuracy of the excavator. However the advantages of the method are that it is simple to operate and would not impose too heavy a burden on site recorders.

### Sieving and Sampling

The effect of soil conditions on recovery are probably well appreciated. Recovery by eye varies in efficiency with the colour and texture of the soil, the moisture content and the characteristics of the objects being recovered. Variations in the observed pot:spoil ratio (or pot:bone ratio) might be caused by variable recovery. This factor would be most significant when comparing sites on different soil types. It is impossible that a stratified sampling strategy for both animal bone and pottery could be devised and for pottery at least mesh sizes could be quite large (0.5 cm. to 1.0 cms.) if a measure of pottery based on weight of sherds was used. Also the larger the mesh size the quicker sieving and sorting would become.

### Conclusions

I have attempted to show how a consideration of the degree of pottery use might be valuable in studying the Saxon and medieval periods in the west of England and that a measure of this use can only be obtained by comparing the occurrence of pottery on a site with some other material. I have concentrated on showing why such a study might be important rather than on the methods of measurement since the discovery of practical technique must be a matter for experiment. Nevertheless I hope that the question of pottery use will be borne in mind both by those archaeologists planning to excavate medieval sites and those involved in interpreting pottery found during such excavations.

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L'auteur essaie de montrer qu'en ce qui concerne la poterie médiévale de l'ouest de l'Angleterre, il faut non seulement calculer les proportions respectives dans lesquelles les différents types de poterie présents dans un assemblage se regroupent, mais il faut aussi déterminer dans quelle mesure une société donnée faisait usage de cette poterie. Un moyen de résoudre ce problème serait de faire des fouilles exhaustives d'un site d'occupation de sorte qu'on pourrait comparer la quantité totale de poterie trouvée au chiffre auquel on estime la population de ce site ou à la durée d'occupation. Peu de chantiers permettraient d'atteindre cet objectif et cette méthode est impraticable lorsqu'il s'agit de fouilles en milieu urbain. Une autre démarche suggérée par l'auteur consiste à étudier le rapport qui existe entre la quantité de poterie retrouvée et une autre donnée variable telle la quantité d'os provenant des résidus alimentaires ou la taille des fouilles (mesurées selon la surface ou le volume). Un tel rapport permettrait d'étudier comment les sociétés de l'ouest de la Grande Bretagne, de l'Ecosse, du Pays de Galles et de l'Irlande, qui ne faisaient aucun usage de la poterie, finirent par l'adopter, et, pour les périodes qui suivirent, permettrait aussi de définir des variations régionales quant au rôle et à l'importance de la poterie.