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SHELL WEIGHTS OR NUMBERS - REPLY TO ROWLAND

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In the preceding paper criticising our recently expressed views (Nichol and Williams, 1981), Rowland makes several points in defence of the use of weights in midden analysis. I want to take up some of these.

The first concerns the use of weights in general. Rowland gives some reasons why weights are a useful descriptive device, which of course they are, but he has got us wrong. We were talking about sorting shells among species. We thought we had made this clear, and we did not expect to be understood as saying that archaeologists should never weigh site components. In fact, we have explicitly suggested the use of platform scales in the field (Nichol and Williams, 1980:146). But there is a world of difference between weighing a shell midden for descriptive purposes or for the sake of establishing sampling levels, and weighing the material that can be assigned to each of the species present in the midden or samples of it. That is a very expensive and a very inaccurate method, which we proved, and it is notable that Bowdler's paper in press, as quoted by Rowland, provides strong support for this position.

Second, although I have myself pointed to the difficulty of making allowance for 'uneconomic' shells (Nichol, 1980:96), this is irrelevant when assessing the relative merits of weights and numbers. The question of artefacts among the undiagnostic material is also irrelevant. Asking the question 'is this an artefact?' of even every single fragment is one thing, as most can be quickly dismissed as 'not an artefact', but when a species sort is being done only numbers provide this easy out. 'Not a species' is not an option, but fortunately 'not a diagnostic element' is.

Third, though there may be no harm in sorting and weighing "at least the largest pieces ... of undiagnostic shell", the significance of their weights is the crucial issue, and it is not clear just what their significance can be. And if the aim is just to get this material "out of the way", as Rowland says, that can be done without sorting by species or weighing.

The fourth point concerns the arithmetical difficulties of converting a size-frequency distribution into an appropriate overall meat weight/shell weight ratio. Apart from the fact that a size-frequency distribution entails a study of shell

numbers anyway, the calculation of meat weight from shell weight requires an extra piece of information for each size of shell present. For numbers, weight of meat per individual is sufficient; for weights, meat weight/shell weight ratio and weight of shell per individual are required. This is clearly less efficient.

Much more complicated is the problem of making allowance for shell carbonate dissolved in carbonic acid in rainwater. While we acknowledged that it can be possible to do this, Shawcross (1967) only did it for intact shells, and we emphasised this (Nichol and Williams, 1981:90). But when fragmented shell is present allowance has to be made there too. The problem is, the only way of knowing how heavy the fragments were before being partly dissolved is by way of very complicated calculations involving area/volume ratios for those that survive, then adding a bit for those that have completely disappeared.

There are also two other issues raised by Rowland which need to be dealt with in more detail. These are the notion of objectivity in midden analysis, and the problem of species that are hard to count.

Objectivity in midden analysis

Rowland's doubts about just which elements of gastropods should be counted can be easily resolved, as he concedes, simply by making a consistent choice for each species, and making it explicit. Where operculae are present, their use would be practically automatic, because of the possibility of using these usually robust elements in establishing size-frequency distributions. Where there are no operculae, the choice is basically between whorls and columellae. We chose whorls because of difficulties with broken columellae.

Again, when Rowland writes that we gave ourselves "an easy job distinguishing between whorls of Amphibola and hinges of Chione" he seriously misrepresents our argument. It was also easy enough to distinguish between the undiagnostic fragments (in the sense of not being whorls or hinges) of the two, but it still took very much longer to do so. And as we emphasised, adding diagnostic and undiagnostic fragments of other bivalves and other gastropods will make sorting harder, both by weights and by numbers, but the effect on sorting by weights will be much more serious. If, say, I had a fragmented mixture of Paphies australis and Mactra ovata, two species I have worked with before, I think that I could sort out most of the pieces - that is, if I was feeling on form, and had lots of time - but this is not necessary when the hinges of the two species are so much less alike than are the rest of the shells. If objectivity is the intention, numbers are clearly preferable.

On the other hand, though weights might seem to be firmly anchored in absolute international standards, the reality is rather different. One gram might be exactly like another in the abstract, but the problem always comes back to the question of the significance of a particular weight. When this is affected by unmeasurable loss of shell carbonate in solution, variation due to size-frequency distributions, greater screening losses due to fragmentation, and reduced reliability of species recognition, the apparent solidity of weight is a mirage.

Species that are hard to count

The fact that some species really are hard to count must be a problem with the approach I am advocating. It is not insuperable, however, and though the suggestion offered does involve 'weight of shell', my basic position has not changed.

It seems to me that a useful approach here would be to sort out all the fragments that can be identified as coming from the species (I do not know about Pinctada, but fragments of Cellana denticulata are reasonably distinctive), and to use the weight to make an estimate of the number of shells present, much as Rowland (1977) did for Cellana, (and then perhaps doubling it?). Where this material cannot be reliably recognised getting a measure of weight is harder than ever, of course, and apart from the possibility of making an educated guess at the frequency of the species, all that can be done is to record it as 'present'.

This is probably a situation where weights are a useful check on numbers, as Rowland suggests. I would be very reluctant to extrapolate from this example, however. Weights are expensive and fundamentally unreliable and except in rare cases, which I am happy to help identify, such checks would be neither practical nor legitimate.

Somewhat similar is Rowland's suggestion that the weight of shell of a species might be a guide to the average size of badly fragmented individuals. There is a wide range of alternatives here, including measuring the resilifer on bivalves (Nichol, 1978:117-123; Wallace, 1976), or the diameter of operculae, or of some position on the columellae, or by fitting portions of shell margins to outlines of shells of known size. Also, the use of weights would need to take account of the various causes of loss of weight, and as shells of different sizes have different size/weight ratios, it would really be useful to know how big the shells were, before working out how big they must have been. It looks as though shell weight is not going to be of much use in this situation but it is still worth considering, and it just might be a useful way of proceed.

Estimating either the number of shells or the size of shells by considering the weight of shell is not the same as 'quantifying shell by weight' in the sense we intended, however. That would involve finding the weights of all the material from each of the species present, as an end in itself, rather than as a means to one or two of the results among a set of species frequencies.

For convenience and consistency, all species should be quantified in the same units, and numbers are the obvious choice. To prefer weights because of a very few species, which can be more or less accommodated anyway, would be a case of a very small tail wagging a very big dog.

Finally, I think Rowland is wrong when he interprets the lack of agreement on this basic methodological issue as evidence that there is real uncertainty over how the methods are to be evaluated; my view is that most archaeologists simply have not evaluated the methods at all. The fact is, some habits are very hard to break, but if all the hopeful avenues in midden analysis are to be explored, wasteful practices should be eliminated, and when very expensive methods are also less accurate, it really has to be time to think again.

I am glad to have had the opportunity to discuss some of these issues in more detail, but the original conclusion stands: 'weight of shell' should be abandoned as a method of quantifying shell midden.

Acknowledgement

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References

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