CHAPTER 8

INTRASITE VARIATIONS IN OYSTER SHELLS FROM SITES IN EAST ANGLIA

This chapter is concerned with the presentation of data relating to oyster shells from sites in East Anglia but, unlike the previous chapters relating to intrasite variation, only the data from Bury St Edmunds Abbey has been analysed in detail. Information on oyster shells from the other sites in Suffolk and Essex was recorded for the sole purpose of making intersite comparisons. The details are tabulated for the oyster shells from excavations at Burrow Hill, Leiston Abbey, Colchester and North Shoebury. Additional data are given for samples of modern oyster shells derived from the 1971 Colchester Oyster Feast and from the Rivers Colne and Roach in 1960 - 1961.

THE MARINE MOLLUSC SHELLS FROM BURY ST EDMUNDS ABBEY

Several species of marine mollusc shell were recovered from the excavations at Bury St Edmunds Abbey. These shells included whelks, winkles, mussels, razor shells and oysters. Oyster shells occurred in the greatest numbers. The largest sample of measurable oyster shells came from the late Saxon group 5A. This group was compared with the oysters from the medieval group, and with all the remaining phased groups (including the medieval group) to determine whether there were any intrasite variations.

Numbers

Initially all samples from the site were examined. There was a total of 1447 oyster valves and smaller quantities of other species. Samples which could not be dated or placed in phased groups, and those from the post-medieval phase were not included in the analyses. The following species were recorded and Table 8.1 shows their distribution according to group.

Buccinum undatum L.	Whelk
Cerastoderma edule (L.)	Cockle
Littorina littorea (L.)	Winkle
Mytilus edulis L.	Mussel
Nassarius reticulatus (L.)	Netted whelk
Nucella lapillus (L.)	Dog whelk
Ostrea edulis L.	Oyster
Solenidae family	Razor shell

All the shells represent common species which would be edible. The whelks were second in importance to oysters. They were all small ones but would probably have contributed more meat than the mussels. It is not possible to say from which locality most of the molluscs were collected because their present distributions are too general. It is possible to say that they were probably collected both by digging in softer beach sediments for the cockles and razor shells; and by detatching specimens of the remaining species from intertidal rocks and stones. Seven of the eight species recorded were recovered from group 5A which also had the highest numbers of shells.

The oyster shells were sorted into left and right valves and unmeasurable shells were put aside. Table 8.2 gives the distribution of oyster shells by context. There were 679 left and 768 right oyster valves overall with 50% of left and 47% of right valves having sustained damage making measurement and detailed recording impossible. The majority of contexts yielded only a few shells but larger numbers were noted in several contexts such as 316 and 592. Context 316 belongs to Group 5A, containing 621 oyster shells, comprising domestic occupation material dated by pottery to the 11th century and by radiocarbon dating to late 6th - early 11th century. This sample contained enough measurable left valves to permit it to be compared with samples from other sites. The other large group of 326 oyster shells in context 592 belong to a post-medieval group and was excluded from analyses.

The results from Table 8.2 are summarised in Table 8.3 and 8.3a which show the distribution of oyster shells by group. The figures are an indication of the poor condition of the shells. Almost without exception, the groups contained very worn and damaged shells with a greater proportion of broken and unmeasurable shells than measurable ones. In group 5A approximately 61% of left valves and 52% of right valves were reduced to less than a third of the original size. The left valves were particularly prone to damage. Excluding group 5A, instances of severe flakiness were the highest recorded for east-coast archaeological samples (19.8%); and occurrences of severe wear accounted for 14.6% or the second highest level in comparisons. Details of wear and other qualitative characters are given later in Table 8.7.

Size of oysters

The size of the oysters was examined in several ways. The dimension used for making comparisons was the left valve maximum diameter (LVMD), that is whichever of the length and width was the greatest. The percentage frequencies with which shells of different sizes occurred in each of the samples are presented as histograms in Figure 8.1. The distribution of sizes for Bury St Edmunds Abbey group 5A (1) is approximately normal.

The number in the sample, the mean of the LVMD measurements and the standard deviation were calculated as a preliminary to undertaking simple statistical tests to compare samples. The results for the Bury St Edmunds Abbey samples are given in Table 8.4. Bury St Edmunds Abbey shells are at the lower end of the range of recorded sizes with a mean of 67.8mm for group 5A, 63.6mm for all the other groups, and 60.9mm for the medieval group alone.

The oyster shells from the Saxon group 5A at Bury St Edmunds Abbey were compared with the medieval group and the remaining dated or grouped shells from the site first by two sample *t*-tests and after by Kolmogorov-Smirnov tests. The results are presented in Tables 8.5.

When group 5A shells were compared with the rest of the securely phased left valves from the site (n = 45) in two sample t-tests, a value of 1.94 was obtained, indicating that there was no significant difference in size between the 5A group and the rest of the shells at the 0.01 level of confidence. When the 31 left valves of the medieval group were separated out from the rest and compared by t-test with the 5A group, a t-value of 3.16 was obtained - showing that there was a significant difference in size with this group. The medieval shells were smaller than the others with a mean of 60.9mm and a standard deviation of 10.68mm.

Infestation

In the Bury St Edmunds group 5A sample infestation was slight overall. The burrows of Polydora ciliata were the most common, occurring in 16.8% of shells. Sponge holes, barnacles, boreholes and sand tubes were each found in less than 1.5% of shells. Polydora hoplura and calcareous tubes were absent (see Table 8.6).

Shape and other characters

Table 8.7 gives the actual numbers of shells affected by various descriptive characters and Table 8.8 the percentage of shells (left and right) for which these characters were noted.

Linear regressions of length and width of left valves were calculated for the BSEA samples. The scattergram for the group 5A sample can be seen in Figure 8.3a, for all the remaining shells from BSEA in Figure 8.3b, and for the medieval group in Figure 8.3c; the slopes calculated were 39°, 28°, and 40.8° respectively; the correlation coefficients were 0.83, 0.84, and 0.82 respectively. These results mean that the length and widths were well correlated. There was a wide range of sizes but most were still in a rapidly growing phase indicating young specimens. The majority of shells were round or slightly elongated. Only 3.2%, 11% and 7% tended to be broad in the three samples.

Thickness can also be an indicator of age although there is a condition called stunting which leads to very thick small oysters. The Bury St Edmunds Abbey samples were noted as being small but thick. Approximately 8% of shells were very thick and quite a few had deep shells that would have been well filled with meat.

10.2% of group 5A and 15.6% of the rest were irregular in shape, particularly on the heel of the shell where the oyster first attached itself. An abnormal lateral extension or wing of shell was frequently associated with this kind of irregularity near the hinge. Two of the medieval shells were pear-shaped. The right valve of oysters is typically flat but in young deep water oysters (e.g. as in modern Poole Bay) it has been noted that the small flesh is reflected in the concave shape of the inset right valve. This compares with the convex right valve of a well-filled, slightly older relaid oyster from shallower waters (e.g. Poole Harbour). In the BSEA samples 5 concave and 9 convex right valves were noted. Young oysters, spat and oyster shell debris were attached to some of the shells. This evidence, in addition to the shape irregularities, indicates that the oysters came from an actively breeding natural bed.

The number of chambered shells from BSEA was small (around 3% or less). 10.2% of the Saxon group 5A sample had chalky deposits. This indicates a shallow water environment subject to variations in salinity.

Oyster shells become worn smooth either by usage as scrapers and the like, or by being exposed to the elements and moved around over a considerable time. This eventually leads to the complete decomposition of the organic elements of the shell and its subsequent delamination - the shells become flaky, powdery and broken. The large numbers of badly damaged shells have already been mentioned. Between 10% and 20% of the measured shells were worn and flaky. It is most likely that the shells had been moved around the site and subjected to wear and tear by both natural and other processes.

Some colour occurs naturally in shells. Purple or pink patches often occur. These are related to the diet of the oyster and are thought to be typical of different locations. However, there is not yet any firm evidence for this theory. Shells become "stained" in various ways. Shells can be blackened by fire or by burial in deeply organic silts. "Rusty" marks and encrustations are probably caused by minerals leaching out of the soil or even by burial in cess. Only the group 5A shells were noted as having natural colour or staining. Purple patches were seen on five shells and twenty-one were covered by a rustlike encrustation. The fact that only some of the shells were rusty suggests that originally these oysters occupied a different position on site to the others.

Clear V- or W-shaped notches on the margin of the shells, and cuts across the smooth inner surface, reveal the way the oysters were opened. Curved parallel cut marks on the inner surface of one shell and V-shaped notches on the margins of a small percentage of shells shows that at least some were eaten alive and raw. The condition of most of the shells was so poor that this kind of evidence, if present, would quickly disappear. Surprisingly, the organic ligament which tends only to survive in very favourable conditions, possibly primary deposits, was noted in a few instances.

Conclusions

A variety of common edible mollusc shells including cockles, dog whelks, mussels, netted whelks, oysters, razor shells, whelks and winkles were found during excavations at Bury St Edmunds Abbey. Only mussels, oysters and whelks occurred in significant quantities. Most shells belonged to Saxon group 5A and the most abundant species throughout was the oyster. The molluscs occupy different littoral habitats and so it is possible to deduce that both digging in softer substrates and detatching shells from rocks and stones between tide levels was carried out.

Although nearly 1500 oyster shells were recovered from various periods of the site, most shells belonged to group 5A and to the

post-medieval phase. The latter were not be used for analysis. Many of the shells were in a very poor condition. However, a large enough number survived from the 5a group to permit detailed records to be made. This allowed limited intrasite comparisons to be made. It was also possible to compare the one good sample with oysters collected at other sites in the later stages of intersite comparison.

Comparisons were made of the sizes of oysters and their distribution in the samples. On an intrasite level, it was discovered that there was no significant difference in size between the 5A group and the rest of the dated oysters when considered as a single group. However, there was a significant difference between the 5A group and the medieval sub-group which was composed of smaller oysters. Unfortunately, the small number of shells in the medieval sample (31 left valves) means that no great significance can be attached to this fact.

The evidence from shape and other characters of the Bury oyster shells indicates that the oysters were probably collected from a natural, self-propagating bed of oysters growing in shallow water in an area prone to changes of salinity. It can be seen that at least some of them were opened with a knife to be eaten raw because of the cut marks and notches on the shell. No knife would be needed for oysters opened by heat, as in boiling or roasting in ashes. The extensive damage to the shells, their poor condition, and the rustlike encrustations on some of them, suggest that the shells were originally deposited in other areas of the site and had been man-handled and subjected to various natural degrading processes.

OYSTER SHELLS FROM SITES IN SUFFOLK AND ESSEX

Oyster shells from archaeological sites along the Suffolk and Essex coast of East Anglia were made available from various sources which are listed in Table 8.9. The material included Saxon shells from Burrow Hill and late medieval shells from nearby Leiston Abbey in Suffolk; Roman shells from Colchester, and Roman and medieval shells

Suffolk; Roman shells from Colchester, and Roman and medieval shells from North Shoebury in Essex.

The information about modern oyster shells was obtained from several sources and differed from that recorded for archaeological shells in some instances. On live specimens, only the linear dimensions of the left valve can be measured accurately (the right valve is normally inset in the left valve (Winder, 1980). On live oyster samples recorded from Poole Bay and Poole Harbour in Dorset (Horsey and Winder, 1991; Winder, 1992) and Sowley Ground and Newtown Beds in the West Solent (Winder 1989b) length and width of left valves, infestation and other characters were recorded. However, some organisms are likely to have been under-recorded because observation is often obscured by the two valves being tightly shut and covered in soft- bodied organisms.

Unpublished measurements of live oysters recorded by Dennis Key of the Fisheries Laboratory of the Ministry of Agriculture Fisheries and Food (MAFF) at Lowestoft for native oysters from the Rivers Roach and Colne in 1960 - 61 were for width and length overall; infestation records were insufficiently detailed to be used. Data from the 1988 MAFF Solent oyster survey (Key and Walker, 1988) comprised frequencies of maximum diameter (left valve) only.

For the empty shells of modern oysters from the 1971 Colchester Oyster Feast, measurements of individual left valves for the whole sample were provided by Jeremy Heath, Keeper of Natural History at Colchester and Essex Museum; and infestation was recorded in detail for a subsample of these shells by Winder.

The implications for analysis of the restraints imposed by the varying nature of the data for modern oysters was resolved as follows. In order to compare the size of archaeological shell samples with modern live samples, maximum diameter of the left valves was used throughout, i.e. the greater of the length and width measurement. Where only grouped size frequencies were available,

comparisons were made by Kolmogorov-Smirnov test alone. Where individual measurements were available, both two sample *t*-tests and Kolmogorov-Smirnov tests were used.

Results

The information relating to size and infestation of oyster shells from these east-coast locations can be found in Figures 8.1 and 8.2 which show size frequency histograms, Table 8.4 for basic size data, Table 8.6 for infestation frequency and Tables 8.7 and 8.8 for the occurrence of other characters in the shells. The data will be used in Chapters 9 and 10 to compare and contrast size and infestation, respectively, in samples of oyster shells within the region of East Anglia and also with the other regions previously considered: namely Poole and Southampton (on the south coast) and north Wessex and London.