## **SECTION 8. Archaeological Implications**

This thesis has been concerned with the techniques used in the study of human skeletal biology and their application to particular sites in the North-East of England. The archaeological information which this sort of data provides is implicit in the previous chapters, but it needs to be considered separately to show the implications of this type of work.

The type of information which osteoarchaeology can provide for archaeologists includes that on human variability (physical characteristics of an archaeological group - stature, head/face shape, diet/nutrition, disease), life style, and demographic data. These can be used to suggest patterns of disease in the past, cultural behaviour (burial customs related to ethnic group, sex, age), possible family relationships, and life expectancy.

There are of course problems with osteoarchaeological data, and therefore with the information it provides. Archaeological 'populations' are almost always too small and unrepresentative of the living populations from which they are derived. Long periods of use of a site, particularly one with a relatively small quantity of burials, means that conclusions are even more prone to error, particularly when attempts are made to divide a small group into even smaller sets of rough periods. As discussed at length in previous chapters, ageing and sexing techniques provide inaccurate results. The majority of diseases do not affect bone and are therefore excluded from knowledge about past epidemics, despite the fact that they probably affected a large proportion of the individuals studied, and may have been the cause of death of many. There are problems with determining the cause of many observed variations within and between groups - are they genetic or environmental? In comparative studies, the problem of inter- and intra-observer error is an added complication. On top of this, implicit assumptions are frequently made. For example, it has often been assumed that groups which have similar spatial and temporal characteristics will have other elements in common. This assumption has been made in this study when considering the use of metrical and non-metric traits as tools for distinguishing relationships between populations, and if it is incorrect then non-metric mean measures of divergence may be more useful than suggested in this respect. There is also assumed cultural knowledge, which may be reasonable in Christian Medieval and later societies, but is perhaps less reliable in earlier groups. If, for example, the Saxons were not burying in family groups, use of 'genetic' markers to indicate such groups may give a false impression.

Little can be done to remedy most of these problems given the present state of knowledge, but they cannot be ignored, and any information provided by skeletal work should be viewed, and used, with caution. Only part of the picture is presented, and some parts are blurred or incorrectly painted. The implications of this for archaeology are clear - although study of human bones is necessary to provide more complete information about a population, the actual data collected may be unreliable. However, although the type of information provided by bones is often limited, it is the <u>only</u> source of such information other than written records, and for any group of pre-Medieval bones it is likely to be all we have to go on. Grave goods might provide some information on the sex and possibly age of individuals, but who can be certain if this is any more reliable than physical evidence? Studies of physical variation cannot be based on artefactual evidence, nor can theories about health in the past (except in the rare case of the discovery of medical implements). Assumptions are necessary in many aspects of archaeological study, if only because of lack of evidence, and there are always limitations in the study of past peoples. Although this does not justify the technical problems involved in the use of skeletal data, it does suggest that there should be less demand on the data to obtain information which it cannot be expected to provide.

# 8.1. Comparisons with other sites

Up to now, very little comparison has been made with sites other than the seven under consideration. It was felt that enough error had already been introduced within these groups by the various people studying them, and that to bring in further sites and observers would only cloud the picture and provide even fewer positive conclusions. However, this section will attempt a comparison with other groups, chiefly those studied by the present author and her colleagues (the late Calvin Wells and David Birkett), but also with other groups to see if any obvious differences might be attributable to techniques used by certain observers, or whether they might in fact be genuine differences between populations.

The archaeological implications of these comparisons, and the type of information which might be recovered for the benefit of archaeological research will be considered. A few key points will be discussed under each heading, but it should be remembered that there are no certain answers to any of the problems mentioned above or subsequently.

The following 15 sites have been chosen for comparative analysis:

- 1. Trentholme Drive, York (Wenham, 1968). Roman Garrison cemetery, 2nd-4th centuries. MNI 350.
- 2. Cirencester (Wells, 1982). Roman cemetery. MNI 421.

3. <u>Bidford-on-Avon</u>, Warks. (Brash & Young, 1935). Anglo-Saxon cemetery, early 6th century. MNI 253 (inhumations).

- 4. Burwell, Cambs. (Layard & Young, 1935). ?Christian Anglo-Saxon cemetery, 7th century. MNI 125.
- 5. Brandon, Suffolk (Anderson, 1990). ?Christian Middle Saxon cemetery. MNI 153.
- 6. Nazeingbury, Essex (Putnam, 1978). ?Monastic Middle Saxon cemetery. MNI 153.
- 7. Caister-on-Sea, Norfolk (Anderson, 1991). Christian Saxon cemetery. MNI 139.
- 8. Burgh Castle, Norfolk (Anderson & Birkett, 1989). ?Christian Saxon cemetery. MNI 197.

9. North Elmham, Norfolk (Wells, 1980b). Ecclesiastical (Cathedral) cemetery, Saxon. MNI 206.

- 10. Raunds, Northants. (Powell, forthcoming). Churchyard, 6th-15th centuries. MNI 364.
- 11. St. Helen-on-the-Walls, York (Dawes & Magilton, 1980). Urban churchyard, 10th-16th centuries. MNI 1041.
- 12. St. Mark's, Lincoln (Dawes, 1986). Urban churchyard, 10th-18th centuries. MNI 248.
- 13. St. Nicholas Shambles, London (White, 1988). Urban churchyard, 11th-12th centuries. MNI 234.
- 14. Blackfriars Street, Carlisle (Henderson, 1986?). Friary churchyard, 13th-16th centuries. MNI 214.
- 15. Iona (Wells, 1981a). ?Monastic. MNI 110.

These sites have been chosen in preference to others firstly because of their size (MNI greater than 100), secondly because they allow a wide range of temporal and/or spatial comparisons with the study groups, and thirdly (in the case of six of them) the methods used in their analysis are the same as those employed on the study groups. More specifically, Raunds may be seen as a good comparison site for The Hirsel because they are both small medieval churchyards, Blackfriars Street, Carlisle, is a similar type of site to Blackfriars, Newcastle, some of the East Anglian Saxon sites represent monastic and ecclesiastical sites which are contemporary with Jarrow, Monkwearmouth and Blackgate, Bidford-on-Avon is of roughly the same date as Norton, and the Medieval urban churchyards provide a contrast for Gisborough Priory. Unfortunately it was not possible to compare them all with the study populations in all respects, due to lack of conformity in the data.

#### 8.1.1. Palaeodemographic Analysis

One of the major problems with this area of study is the lack of child remains discovered on many sites. The table of percentages of child burials at each of the seven sites in this study can be found on page 51, and it will be seen that the proportion of children varies from 8.3% at Blackfriars to 45.8% at The Hirsel. Similar figures were found at 13 of the 15 sites mentioned above (figures were not available for Burwell and Bidford-on-Avon), although one site (Iona) had only one child (0.9%) represented by a single bone only. The largest percentage of children was found at Raunds (47.1%). The average percentage for the 13 sites was 22.6% (if Iona is excluded this becomes 24.4%), which may be compared with 29.9% from the seven study groups.

A number of reasons can be suggested for differences in the proportions of child burials at different sites. Firstly, if it is assumed that children might be excluded from burial in certain areas of some cemeteries, then those cemeteries which are not completely excavated might produce a biased picture. This may be the case at Brandon, Suffolk, where two cemeteries were uncovered, one of which was completely excavated and had 20.3% children, and the other which was only partially dug and contained 64.5% children. Such exclusion might occur due to a variety of factors, such as religious belief, lack of status or money, or even time of year. This last might affect burial patterns if a certain area of the burial ground was in use when an epidemic hit the younger members of a community. Sometimes children may be excluded because of the type of site - medieval urban churchyards tend to have a slightly higher proportion than medieval monastic sites for example (the mean proportion of children at St. Nicholas Shambles, St. Helen-on-the-Walls, and St. Marks is 33.1%, compared with a mean of 18.8% from the medieval monastic group of Jarrow, Guisborough, Blackfriars and Carlisle). Preservation may also be a factor, but the large proportions of juveniles at Monkwearmouth and Brandon Cemetery 2 for example came from particularly poorly preserved groups. Finally, it might be considered that the percentages found are actually close to the original proportions of children buried, either because of burial customs, or simply due to the fact that there was a much lower child mortality in these periods than has previously been assumed. Complete excavation and analysis of many more cemeteries is needed to solve this dilemma.

As well as different proportions of juvenile burials at these sites, there are also differing proportions of burials within child age groups. In particular, the percentage of infants varies considerably from site to site. In the study groups the proportion varies from 12.1% at Norton to 48.1% at Monkwearmouth. There are similar problems with this study as with the above. Perhaps infants were not buried in churchyards at certain times or for various reasons, or maybe they were healthier in certain periods or areas than others. Once again it is difficult to be certain when the whole of a cemetery population has not been excavated.

The percentages of individuals distributed over the adult age groups were found to vary considerably in the study populations. A possible reason for this is that two sites (Jarrow and Monkwearmouth) where mortality was higher in the older age groups than in the younger, were largely aged by Calvin Wells using different techniques to the present writer. Since the two sites are closely contemporaneous and of a similar type, this may be a true reflection

of their similarity. To test this, it is necessary to consider other groups studied by Wells to see if the patterns of adult age distribution are similar at these. At both North Elmham and Cirencester, the largest proportion of adults died in the middle-aged category (in this case 38-47 years), although the proportion of old adults at Cirencester was quite high. This seems to suggest that the age distributions seen at Jarrow and Monkwearmouth are not a reflection of techniques used. Later sites and monastic sites might be expected to have older inhabitants. Monks were likely to have had better living conditions than contemporary peasants, although perhaps not as good as those of the aristocracy (who were probably buried at these sites anyway). Variations in age distributions at various sites may be due to social differences, such as burial of older people in more prestigious cemeteries or areas of a cemetery, or they may be due to biological differences between groups which make ageing difficult. Certain occupations, such as those involving strenuous labour, may give rise to degenerative changes at an earlier age than more sedentary ones. Thus a rural group (or a group of monks) might seem older overall than an urban one.

The implications of large numbers of unaged individuals at some of the study sites are difficult to assess. It might be expected that most skeletons to which an age cannot be assigned are in very poor condition, and that these are either very young or very old, with thin porous bones which are easily damaged in the ground. This does not seem to be the case at Monkwearmouth and Saxon Jarrow, where there were large proportions of children and old people despite poor preservation. As it seems unlikely that younger bone was more susceptible to decay, it can only be assumed that those individuals who could not be aged fall into similar age groups as those who could. If this is the case then unaged individuals can be disregarded since their exclusion will have little effect on the final results.

The skeletal problem with perhaps the most serious implications for archaeology is that of inaccuracy of ageing techniques. Since most methods have been shown to be so imprecise in the assessment of skeletal age, it seems that only age categories which do not involve definite figures should be used. Thus, although "young", "middle-aged" or "old" may not be entirely acceptable categories from an archaeological point of view, they are the most accurate available if expensive and destructive ageing techniques are not feasible.

The assumption that there should be a 1:1 ratio of men to women in a "normal" society is more or less confirmed by the analysis of many groups. Those which differ from this norm are often known to be monastic sites, but others may have no obvious explanation. In these latter cases the usual hypothesis is that warfare separated the burial places of men and women. At Cirencester and Trentholme Drive, York, the sex ratios are heavily biased in favour of males (69:31 and 82:18 respectively) and this has been explained by the fact that they are cemeteries for legionary garrisons. Iona (27:73) and Nazeingbury (28:72) show the opposite picture, with greater proportions of women than men, perhaps as a result of religious segregation in the form of nunneries. Of the monastic sites, friaries seem to show the most sexual divergence. Blackfriars, Newcastle, and Blackfriars, Carlisle, have similar ratios (63:37 and 64:36 respectively), and other friary sites have also produced more men than women. The most nearly normal site in terms of sex distribution seems to be Caister, where there were 49 men and 50 women, but other Saxon and Medieval sites vary between 49-60% men. Norton, at the top end of the scale, may have some warrior burials which could explain the high proportion of men. The other sites do not appear to show any particular groupings, with Saxon and Medieval Monastic and Ecclesiastical sites having a wide variety of ratios. Unless the divergence is significant, or there are distinct groupings of the sexes in a burial ground, the use of sex ratios to provide information on the type of site is hazardous, particularly if the whole cemetery has not been excavated, or there is a large number of unsexable adults, or the cemetery has not been closely phased.

At many sites greater percentages of women have been found to die in the younger age groups than men. In the past it has been suggested that this was caused by difficulties in childbirth, or by different nutritional standards for men and women (Wells, 1980b). There is very little supporting evidence for either of these claims, unless we are dealing with post-medieval populations. The assumption that poor medical knowledge increases the risk of death in childbirth may be true of the 19th century slums, but it does not necessarily apply to pre-industrial societies. Except in cases where a woman has a markedly android pelvis, or there is some other complication with the birth, there is no reason why the majority of women in a rural society should not survive labour. Differences in eating habits between the sexes as young children might have some effect, particularly if girls were less well fed than their brothers in times of hardship, but there is no skeletal evidence to suggest that women were any more affected by avitaminosis or malnutrition than men. It seems that, except in a few cases where death in childbirth is evident from the presence of a foetal skeleton in the grave, the majority of women probably had healthy pregnancies. Large numbers of pregnancies might drain a woman and cause an early death simply because she was "worn out", possibly helped by malnutrition and reduced immunity to infection, but since it is not at present possible to judge the number of children carried by a woman from her skeletal remains there is no support for this theory either. One possible cause of differing life expectancy between men and women on pre-industrial sites seems to be the problem of inaccurate ageing techniques. Many ageing techniques rely on bony changes which may be greater on the more robust bones of men. This might have the effect of overageing men and underageing women, which would produce the observed discrepancies. If women were eating softer food than men (although there is no proof that they were) there would also be a difference in the amount of tooth wear seen, which would serve to enhance the problem.

The archaeological implications of unreliable ageing methods would seem to be that it is impossible to construct valid life tables for cemetery populations (although there are of course many other problems with this branch of palaeodemography, as related in Section 3), and it is by no means certain that differences in age at death between men and women are as great as the analysis of many groups has suggested. Suggestions of biological age, in the form of categories (young, middle-aged, old), seem to be the only solution at present. This kind of information should not be treated as inferior to chronological age, however, since it is the biological age and appearance of a person which affects his or her status in society and the contribution he or she is able to make. Since this is the kind of information which is required to make an archaeological reconstruction, perhaps it is unnecessary (as well as unrealistic) to expect more from skeletal remains.

## 8.1.2. Metrical Analysis

Although it might be expected that mean heights of populations should increase through time, due to such factors as better nutrition and standards of living, there was no real evidence for this in the study groups (p.108). However, other Medieval groups in the North, such as Wharram Percy, St. Helen-on-the-Walls and Rothwell Charnal House (quoted by White, 1988) are much shorter on average than those seen by the present writer. This may be due to a difference in the regression formulae used in two cases, but it is certainly not in the case of St. Helen's. If the mean male statures from six Northern Medieval populations (the three mentioned above plus JA, BF and GP) are averaged, and compared with the average of four Northern Saxon groups (JA, MK, NEM and BG), the Saxon group is found to have a greater mean (172.3cm compared with 169.7cm for the Medieval group). This would imply that men were actually shorter in the later period. The results for the women of these groups (excluding Wharram Percy for which figures were not available) were 160.4cm for the Medieval group and 160.3cm for the Saxon group, which suggests almost no change in the female population of stature is genetic this might suggest that the women of these groups were more genetically stable through time than the men. The slight differences in male and female craniometric indices might also be evidence for this.

It has also been suggested (p.118) that Northern populations might be shorter on average than Southern groups. Although there are no obvious groupings when male means are plotted on a map of the British Isles, the averages of groups of means suggest a slight difference between the north and the south in the Saxon and Medieval periods. The mean stature for three sites in the south (St. Nicholas Shambles, Guildford Friary and St. Leonard's Hythe) was 172.7cm for the males and 157.7cm for the females. This suggests that men were taller but women were shorter on average than their northern contemporaries (figures given above) in the Medieval period. In the Saxon period, only one site was available for study in the south (Kings Worthy), so a group of five sites from East Anglia (North Elmham, Burgh Castle, Caister, Brandon and Nazeingbury) will be used instead. These suggest a slightly higher stature in the eastern group for both males and females (173.2 and 162.0cm respectively). Further confirmation of the theoretical greater height of Southerners can be obtained from the two Scottish sites available for study (Iona and The Hirsel) which provide average statures of 165.5 and 158.0cm for men and women respectively. This split might suggest a larger component of indigenous peoples in the north, with a greater proportion of Germanic peoples in the south and east.

This kind of study may prove useful if comparisons are made with some Germanic groups in the homelands and they are found to be taller than the northern British. It has already been shown (p.116) that the Alamanns had longer limb bones than the Hirsel men, but a number of large groups would need to be studied before this could be any more than a theory. Unfortunately, as with all osteological studies, most cemetery sites have only yielded small groups of individuals for whom stature could be calculated, so it is difficult to compare means with any confidence.

Table 8.1 lists the mean lengths (together with numbers of bones involved) of right and left femora, tibiae, humeri, radii and ulnae for males and females from a number of sites in four groups. These consist of mean lengths from a collection of Saxon bones from all over Britain (Munter, 1936), four North-Eastern Saxon sites, three East Anglian Saxon groups, and five North-Eastern Medieval populations. A few points may be considered with regard to this data. Firstly, within the north-eastern Saxon group, Norton tends to have the greatest mean bone lengths. This is particularly true of the females, who in every case have the longest bones in this group, and also, with the exception of the left femur, have the greatest mean lengths overall. The shortest male bones are spread between the other three groups in the Saxon North-East, but the shortest female bones generally belonged to the women from Blackgate. In the eastern group, the Burgh Castle males have the longest bone lengths in every case, whereas the females have the longest leg bones in their group, but the shortest forearms (except the right ulna). Brandon tends to have the shortest bones for both sexes. The patterns are less clear-cut in the Medieval group, with Blackfriars men having the longest legs and Gisborough men the longest arms, whilst the females of both groups have the longest bones but in a less distinctive configuration. The shortest bones in this group are widely spread amongst the male populations, but seem more concentrated on St. Helen-on-the-Walls for the females. The means collected by Munter fall within the ranges of means for every bone, which is perhaps not surprising given the wide dispersal of the sites he studied. He

felt that pooling of the measurements was justified because there was no significant difference between maximum lengths of the right femur for Angles, West and South Saxons and Jutes.

Much of this is reflected in the mean statures of these groups, which were discussed above, although this is perhaps more influenced by the leg bone measurements. It is interesting, therefore, to note differences between the arm and leg bones of a population, and the discrepancies between the males and females from a single site when compared with those of others. Patterns like these might suggest a lack of homogeneity between the sexes at some sites, although it is difficult to ascertain whether similar or opposite patterns have the greatest significance in reaching such conclusions. For example, if the women of a group have very long bones but the men have rather short bones, they might have greater homogeneity than a group in which both sexes have consistently long or short bones. The interpretation of this type of data is thus difficult because of the problems of comparing large quantities of numbers without complicated multivariate statistics, and again because of small sample size in many groups. Probably the best use of long bone lengths is to calculate stature, one figure which can be easily compared between populations and which actually has some meaning in archaeological studies. It is unlikely that a relatively shorter arm or leg length would affect the daily life of a group of people, but with large samples of measurements, precise questions and the appropriate statistical tests it may be possible to use such measurements to form at least the basis of a genetic study.

The difficulty of interpretation of the two most commonly calculated post-cranial indices, Platymeria and Platycnemia, has already been discussed (Section 4.2, p.119ff). Similar patterns to those seen in the study populations were observed in other groups for which figures were available, these being that later sites had higher Meric indices (although Burgh Castle had rather high means of 81.1 for the males and 79.2 for the females), the females had relatively thinner femora, and the female Cnemic index was greater than that of the male in most cases but there was no correlation of this index with time. The differences between males and females might suggest some kind of functional factor is the cause of these conditions, perhaps due to the need for carrying a wider pelvis in women. This would have to be tested by searching for a correlation between wide pelves and wide tibiae in individuals, a study which is beyond the scope of the present work. However, if the women from these sites are of a different geographical background to the men, it may be that the difference seen is a racial one, although this does seem to be any immediate use of these indices for archaeological interpretation, and perhaps it is time for more detailed anatomical study, in the hope of a more reasonable explanation for their cause. Thus, perhaps for the present they should be excluded from archaeological reports.

The major problem with craniometry is that of small sample size. This has made it difficult to use anything other than the simplest statistical studies on the skulls included in this work and the same is true of most other groups. Complicated statistical tests have been applied to combined groups in the past, but it is difficult to prove the validity of such studies when the sample sizes of the individual collections concerned are such that the differences between them cannot be adequately explored.

Although the sample sizes for complete crania are small in all the groups looked at in this study (p.142), the largest group, The Hirsel, may be compared with other sites. Table 8.2 below presents the mean cranial indices and their categories for men and women at those sites for which the appropriate figures are readily available.

Site	Period	Male	Female
Wetwang	Iron Age	73.6 D	74.0 D
Trentholme Drive	Roman	76.5 M	75.8 M
Bidford	Middle Saxon	73.5 D	73.8 D
Burgh Castle	Saxon	73.1 D	75.5 M
Burwell	Middle Saxon	74.8 D	75.8 M
Caister	Saxon	75.0 M	75.1 M
THE HIRSEL	Medieval	79.0 M	77.9 M
St. Helen, York	Medieval	79.4 M	81.2 B
Table 8.2			

This suggests an increase in the cranial index from the Iron Age to the Roman period, followed by a reduction in the earlier Saxon groups and a gradual increase as the Medieval period is approached. It also seems to suggest that changes in the shape of the head affect the females of a population first. In most cases (the exceptions being Trentholme Drive and The Hirsel) the mean is slightly higher for the females than the males. The same trends were seen in the study groups (p. 143), and this might suggest a lack of environmental influence in this particular change since the trend seems to apply irrespective of the type of site or its geographic location.

Table 8.3 lists the means of some of the more common cranial and facial measurements from sites in a number of distinct areas, as well as the pooled means of Saxons from various parts of Britain collected by Morant (1926). Like Munter (mentioned above in connection with long bone measurements) he found little difference between the Saxon, Jutish and Anglian groups in his study. This is consistent with the information obtained from study of Table 8.3, in which no real difference was seen between the Saxon East and North-East, although the minimum figures for each measurement are slightly higher in the east, perhaps due to larger sample sizes. A few other points may be noted about the data given here. The least variable means between groups are nasal breadth and height, and minimum frontal breadth. Nasal breadth is remarkably similar at all sites and also between the sexes, presumably because it is the smallest measurement and therefore has the least scope for variability. The greatest difference between Saxon and Medieval male populations is in cranial length, with the Saxon range being 187-196 and the Medieval 182-187 (in females it is 182-186 and 172-183 respectively). There is slightly greater overlap in cranial breadth between the two time periods (male Saxon 136-143 and Medieval 141-147; female Saxon 132-139 and Medieval 134-142). This presumably reflects the change to brachycephaly over time, but the actual reason for the shortening and broadening of the cranial vault is unknown, although it is suggestive of either gradual genetic drift or new genetic input. Cranial height shows less change through time in the males, but in the females there is a slight decrease from 125-134 to 125-127. The main difference between the populations in the East and North-East can be seen in the width of the female face, which is greater in the East (91-95) than in the North-East in either the Saxon (81-90) or the Medieval period (83-92). The length of the facial part of the skull (LB) is greater in the Saxon females from all areas than those of the Medieval period in the North-East. Monkwearmouth has the longest skulls of all for both males and females, whilst the shortest skulls in both sexes are from Blackfriars. Cranial length appears to be the most constantly similar measurement between the sexes at Saxon sites at least, and for example Brandon has the shortest and Burwell the longest skulls in the East Saxon group for both sexes. Other measurements often show opposite patterns when the sexes are compared, so that Brandon males have the shortest skulls (H') in their group but Brandon females have the tallest, and Monkwearmouth males have the narrowest faces but Monkwearmouth females have the widest in their group. These patterns could reflect greater homogeneity in these characteristics between the sexes, although they might be a result of small sample size.

Although grouping together of data (as used by Morant and others) is useful in providing a larger sample for statistical purposes and might provide general racial traits (for example between Saxons and Jutes), it is of little use for comparison of single populations. If the groups in Table 8.3 had been pooled the differences within them would not have been seen, and those between them may have been obscured. So whilst pooling, and the access it allows to complicated statistical tests, is of great value in generalised studies of large groups of people over whole geographical areas, it is of little use in the context of a single site.

Unfortunately this type of study is limited by the small numbers of complete crania excavated from most sites, so it has not been possible to include a number of the sites listed in Section 8.1. Problems may also arise when using material from a single cemetery with a long period of use, since changes through time at a single site are difficult to study unless preservation is exceptional. This might obscure any sharp changes in metrical traits by smoothing the data. However, that there is a definite change through time seems to be indisputable, and it only remains to find a plausible explanation. For this, much larger samples of skulls which are more closely datable and which allow comparisons both within and between sites are necessary. It does seem from the evidence available that cranial shape change is more genetically than environ-mentally determined, since it occurs in so many different areas (see p.138). It may represent a demographic change through time, in which case it may be possible to link it with observed cultural changes, or it may simply be a gradual fluctuation within a fairly homogeneous population.

In general, metrical comparisons are difficult due to inter- and intra-observer error, a problem which is magnified by increasingly complicated statistical studies. Then there is the added complication of genetic versus environmental factors as causes of observed change through time and differences between groups. From an archaeological viewpoint, differences in osteological measurements might be of little use in a social reconstruction of past populations, but where they can be shown to be significant in demographic and biological terms, they might suggest possible lines of research into cultural changes.

#### 8.1.3. Non-Metric Traits

The major problem with this field of study is the difficulty of comparison between sites due to the different lists of traits used by various observers. The archaeological implications of this would seem to be that the specialist will only be able to produce full comparisons with sites he or she has previously studied, which may not necessarily be those which are archaeologically most useful. For example, a comparison of certain types of sites or sites within a particular area may be possible in almost every other particular, but unless the specialist has worked on other sites in the chosen category it may not be possible to produce a meaningful comparison of genetic traits. However, although suggestions of possible genetic links between population groups would be helpful in archaeology, this may be another case of expecting too much of the evidence. The problem of lack of knowledge concerning genetic

components of non-metric traits means that possible relationships both within and between sites must remain speculation for the present. If this knowledge were available it would obviously be extremely frustrating if comparisons between sites were impossible because of the different traits chosen by various workers. At present it is not, except possibly in the case of metopism which does appear to be genetic in origin.

A number of solutions might be suggested for the current state of affairs. Firstly, it would be helpful if all specialists used the same list of traits, preferably that described by Berry and Berry (1967), so that comparisons are possible at least on a very basic level. Secondly, studies of these traits in at least two (and preferably many more) documented populations with large groups of related individuals are necessary to make a start on solving the genetic content of some of the traits. Finally, studies on specific traits are necessary, perhaps in living populations, to determine their genetics in more detail. This last is unlikely to be achieved until well into the future, but it is to be hoped that standardisation of trait observation might make present results useful to future workers in this field.

### 8.1.4. Dental Study

The state of a individual's dentition can provide information about his/her health in childhood, nutritional standards, age at death, and oral hygiene. All these categories of information, when taken from a large group of individuals, shed light on living standards in the past and are therefore of great use to the general archaeologist.

It might be expected that the study of third molar agenesis would produce data to suggest an increase of the condition through time. There was a slight suggestion of this in the study groups (p.197-198), but other groups do not seem to show a time-related change. Where figures were available, the women always had a greater prevalence of the condition than the men, as is usually the case. The overall figures for East Anglian Saxon groups were very similar (Brandon 11.8%; Caister 17.6%; Burgh Castle 17.2%; North Elmham 16.1%), and there seems to be a temporal difference in York (Trentholme Drive 12.2%; St. Helen-on-the-Walls 23.4%, although this may be due to the relatively large number of males at the former). The two Scottish groups show similar prevalences (Iona 18.2%; The Hirsel 19.6%), but so do St. Mark's Lincoln (20%) and St. Nicholas Shambles (19.2%). From this evidence it is possible to tentatively suggest a temporal change within regions (if the two anomalies of Saxon Jarrow and Gisborough are ignored), with the regions showing some autonomy from each other. However more sites in each area need to be studied for confirmation of this idea. Differences between groups are presumably determined by the genetic make-up of a population, and third molar agenesis is probably most useful to archaeology as a genetic marker if used in connection with other non-metric traits.

Changes with time are observed more readily in studies of dental pathology. Carious lesions, for example, are more frequent in Roman and Medieval teeth than Saxon dentitions. Trentholme Drive and Cirencester both showed relatively high prevalences of the disease (4.6% and 5.1% respectively), whereas the prevalences seen in the Saxon study groups (p. 219) and in most of the East Anglian Saxon groups (Brandon 1.0%; Caister 1.8%; Burgh Castle 1.9%; Raunds and Nazeingbury exact figures unknown but caries "rare") are much reduced. North Elmham is an exception, having a caries frequency of 6.4%, presumably related to the fairly high status of its incumbents. In later groups there is again an increase (St. Helen's 6.1%; St. Mark's 4.0%; St. Nicholas' 5.5%), but there are of course exceptions (Blackfriars Carlisle 2.7%; Iona 0.4%). Wells (1981a) suggested that Iona was anomalous because the population was likely to have had a diet rich in sea food and therefore fluorine, and presumably it would also have been lacking in carbohydrates. The Carlisle group may have had a quite humble diet compared with their contemporaries, particularly if most of the burial population consisted of friars, but the higher caries rate found at Blackfriars Newcastle (6.0%) might suggest that this was not the case.

Abscesses generally do not appear to change in prevalence a great deal through time. In the study groups they ranged from 0.2% prevalence at The Hirsel to 2.3% at Blackfriars Newcastle, and other groups are also more or less within this range (Cirencester 1.2%; Brandon 2.5%; Burgh Castle and North Elmham 2.0%; St. Helen's 1.2%; Carlisle 1.8%; St. Mark's 0.7%; Iona 0.4%). As with all things, there was an exception. At Caister-on-Sea the abscess frequency was found to be 5.4%, and many abscesses seemed to have been formed following severe attrition of the tooth concerned, but unfortunately the reason for this wearing (which was often much greater on the affected tooth than on those surrounding it) is unknown. In general, whereas caries is found to increase through time and is related to the increase of carbohydrates in the diet, abscesses have a different aetiology and are found increasingly in older individuals (see p. 232). They might be expected to increase through time as life expectancy increased, and also due to greater exposure of the pulp cavity due to greater frequencies of carious attack, but this does not appear to be the case. The best method of comparison for periodontal abscesses is to compare frequencies for each age category, but unfortunately these figures are not easily accessible in most skeletal reports, and in many cases the sample sizes would be reduced so much that the results would be unreliable.

Ante-mortem tooth loss in the study populations appeared to be fairly steady in the Saxon groups at around 4% (with the exception of Monkwearmouth), and increased through the Medieval groups (p. 220). Other groups do not seem to suggest this pattern. The East Anglian Saxon groups of Brandon (7.1%), Caister (6.5%) and Burgh Castle

(6.3%) show similar frequencies but at North Elmham the prevalence is much greater (11.1%), suggesting that, as with caries, it is more like a Medieval group. However, eastern and southern Medieval groups have similar prevalences to the other Saxon groups (St. Mark's 6.3%; St. Nicholas' 7.6%). The St. Helen's population have the greatest frequency at 17.5%. Ante-mortem loss ought to be greater in populations with higher life expectancy, and should therefore increase in later populations.

As with all aspects of skeletal analysis, there are many factors involved in the production of patterns of dental disease found by the osteologist. The food consumed (hard?, soft?, rich in sugars?, etc.), medical aid/interference (such as tooth extractions), occupational use of the teeth, oral hygiene, genetic susceptibility to disease and the taphonomic process (for example loss of the areas of dentition most affected by disease) will all affect the frequencies of oral pathology recorded by the analyst. It is not always easy to make assumptions which might explain how these factors will affect the results, as for example at Iona where large amounts of calculus might imply poor oral hygiene, but very little dental pathology was seen. In this last case it is perhaps possible to suggest that one of the other factors listed above had a greater effect than the lack of a toothbrush, but in this and other groups it is not possible to assess the contribution made by each component.

Nevertheless, the dentition holds a great deal of information about particular individuals, which when combined with data from other skeletons can provide an insight into lifestyles in the past. Some suggestions can be made about health in childhood from the presence or absence of enamel hypoplasia, and if a comparison is made between Saxon and Medieval groups in Newcastle (Blackgate and Blackfriars) and Cleveland (Norton and Gisborough), it can be seen that overall the condition is more prevalent at the two Medieval sites. This seems to suggest a difference in living conditions, perhaps reflecting a greater chance of contracting contagious diseases in childhood in an urban environment, even though the people buried at Medieval monastic sites are assumed to have higher status than those buried in earlier community cemeteries.

Nutritional standards might also be inferred from odontological study. Susceptibility to tooth decay may be determined by genetics, but it may also be affected by environmental factors, so that additional fluorine and/or calcium in the diet might strengthen the teeth and the possibility of carious attack may be reduced. However, even this would not protect the individual from decay if large amounts of sugar were present in the mouth for long periods which may be the case in Medieval groups who paid little attention to the state of their mouths. This might explain the increase in caries at Jarrow through time, despite the possibility (suggested by Wells in the Jarrow report MS) that seafood would have introduced reasonable amounts of fluorine to the diet of the people of Jarrow and Monkwearmouth.

The importance of dental study for the reconstruction of past lives should not be underestimated, despite the difficulties involved. There is little doubt that tooth eruption and attrition can provide an idea of age at death, which in turn provides the archaeologist with demographic information. Genetic studies can be made based on non-metric traits found in the teeth, although only third molar agenesis has been discussed here, and can add to osteological information in the same field. An idea of standards of nutrition can be obtained from the teeth, especially as they are the only part of the digestive system to survive in most cases, but microscopic study probably provides the most reliable information in this respect. They can also provide a gauge of health in childhood, especially when used in conjunction with other aspects of palaeopathology outside the scope of this work.

# 8.2. Conclusions

## 8.2.1. General Implications for the Study Groups

A few general conclusions can be made about the seven study groups with reference to some of the implications listed above.

Firstly, The Hirsel is thought to be a rural "British" population, and as such should show physical differences to "Saxon" groups further south. The findings suggest that the people of The Hirsel were slightly shorter on average than their North-Eastern English contemporaries, they tended to have a lower life expectancy, and they were more brachycephalic. Unlike the other groups it has not been possible to make direct comparisons with a close neighbour, and this has made it difficult to ascertain how typical The Hirsel is of a Border population, or whether there has been any change through time except by comparison with the groups from further south. In connection with this, it would be interesting to know whether The Hirsel population is more brachycephalic because it is a Medieval group or because it is British.

This question is raised again by the findings at the two Cleveland sites, Anglian Norton and Medieval Gisborough. The Norton group ought to show more Germanic characteristics than later groups in the area, such as Gisborough, who were presumably a mixture of the settlers and the indigenous population. The people of Norton were quite tall with long limb bones (comparable to the Saxon population at Burgh Castle), and were generally dolichocephalic. The Gisborough Priory people in contrast were shorter and more brachycephalic, and in these respects resemble the British group at The Hirsel. This might suggest that the greater numbers of the British population was able to swamp out any genetic input from the Germanic groups, although this assumes that the British characteristics were genetically dominant.

Blackgate and Blackfriars, within a mile of each other in the city of Newcastle, ought to show similar patterns to the Cleveland sites if the theory is to stand. As usual there is a change from long narrow skulls to short broad ones from the Saxon to the Medieval period, but the Blackgate population is shorter than the Blackfriars group. More people died young at Blackfriars than at Blackgate, perhaps because the Friary may have had a role as a hospital, but the Cleveland sites show the opposite picture with Norton containing more young people than Gisborough, perhaps because of the status required for burial in a Priory, or because of the famed longevity of monks. The two Newcastle populations are also very different with respect to their non-metric traits. The problem with the Blackfriars men is that there is no way of telling if they are drawn from the local population, or whether they are friars from other parts of the country.

Blackfriars and Gisborough Priory, being two different types of Medieval religious houses, are also good subjects for a comparison. Blackfriars, in common with other contemporary friaries in Carlisle and Guildford, has more men than women buried in its graveyard, but Gisborough has an equal number of men and women. Presumably this reflects something about the different roles of Friaries and Priories in Medieval society.

Jarrow and Monkwearmouth, also monastic houses, present different palaeodemographic patterns to the later Medieval monastic cemeteries mentioned above. Blackfriars and Gisborough both had very few juvenile skeletons, but at Monkwearmouth and Jarrow the percentages are quite high, and in fact correspond with the numbers seen at The Hirsel. This might suggest that Jarrow and Monkwearmouth were being used like a parish church by the local people and perhaps burial there was not quite as prestigious as at Blackfriars and Gisborough. Jarrow and Monkwearmouth both had large numbers of old individuals in their cemeteries, which may reflect the benevolence of the monasteries to the surrounding people producing an increased life expectancy, or may be a result of large proportions of old monks. Blackgate and Norton also had small numbers of children, presumably for different reasons. At Blackgate only a selective sample was kept for analysis, and bones from Norton were poorly preserved, although it may have been a prestigious burial site and seems to have had a number of warrior burials. If, however, these cemeteries had been completely excavated it would be possible to make more positive suggestions.

At Jarrow, there was the opportunity of comparing two different phases of burial, but little difference was seen between the two in any category, perhaps because the Saxon group was rather small. It was not possible to separate the monks from the laity, although this could prove an interesting study if it were feasible elsewhere. Monkwearmouth, spatially and temporally close to Jarrow, had very similar patterns of age and sex distribution and stature to the latter, unlike Caister and Burgh Castle in Norfolk which were remarkably different despite their geographical proximity.

## 8.2.2. Problems and Solutions

A number of problems concerning the implications of osteological work for archaeology have been outlined in this discussion. Some of the most fundamental appear to be the lack of conformity of skeletal reports making comparisons difficult in many aspects of the study, the lack of availability of European data for comparison with "immigrant" populations in Britain, the difficulties inherent in studying small "groups" of people buried over long periods of time in a single cemetery, and the inability of osteological data to live up to the expectations of archaeologists.

Some solutions can be offered for these problems. Two obvious responses to the first difficulty, of lack of conformity in reports, are to publish data in full whenever possible so that it can be used as required by other analysts, or else to agree on some degree of consistency in what is published. The main problem with the former is the cost of publishing complete "Level III" reports, but this can be overcome if the data is made available in microfiche form by bodies such as the Ancient Monuments Laboratory (a policy which is already in operation, assuming that the work is commissioned by English Heritage). The difficulties with the latter are much greater since it involves getting all osteologists, without exception, to follow a standard pattern of report writing, which would involve much discussion to ensure that nothing was omitted, and would probably produce reports longer and more expensive to publish than is already the case!

The second problem, which involves a lack of dissemination of data from the Continent to Britain, might be overcome by making mainland European reports available on fiche in the same way that AML reports are produced at present, or failing that by encouraging libraries and other purchasers of journals to become less insular in their buying policies. Both require some organisation, and are probably unlikely to occur within the near future.

Thirdly, there is the problem of analysing cemetery populations by phase or by type of burial. As Carver states (1987:95), 'The experience of one age is not going to be the experience of the next, so a cemetery in which more than twenty generations are buried, such as St. Helen's, can hardly be treated as a single population'. With large cemeteries phasing can be used to attempt to emphasise changes in the population through time, although in general the groups produced by close phasing are so small as to be unusable statistically. It seems likely, on present evidence, that any change occurred gradually, as with increase or decrease in height through time, or the shift towards brachycephaly, but in any case the nature of the dating evidence, particularly in Christian cemeteries, is such that there is unlikely to be any distinct physical change noticeable even if it exists. A study of this sort requires the total cemetery population if it is to produce meaningful results, and unfortunately the opportunities for excavating complete cemeteries are very rare. Similar problems exist in attempting to compare groups of, for example, monks with laity, where there might be expected to be some difference since the former are likely to be a non-local heterogeneous group, and the latter should be drawn from a fairly small, if not selective, local catchment area.

An important factor for consideration in this kind of study is that, even if fully excavated, cemetery populations are not representative of the living population from which they are drawn. Any fluctuations with time in the latter might be blurred by discriminatory burial practices, so that in a poor cemetery, for example, an influx of Norman nobility might not be as noticeable as it could be in a rich cemetery, assuming that cemetery continuity could be demonstrated between Saxon and Medieval times. Until all the cemeteries in an area under study are excavated in full it is difficult to say anything definitive about the people living in that area during the period in question, but the same problem is present in all aspects of archaeology and should not be allowed to detract from the information which can be gleaned from even an incomplete skeletal population.

The fourth problem mentioned above can be summarised as "What does the archaeologist really want to know about the population he/she has excavated?". A general archaeologist cannot be expected to show an interest in the minutiae of osteometric differences between individual skeletons, but on the other hand it is necessary to produce such data for the benefit of other workers in osteology and to allow conclusions about the physique of a group of people to be made. Archaeologists in general, although they are grateful for demographic information, and to a certain extent information about the physical appearance of the people they are studying, are more interested in cultural and social aspects of daily life. At the extreme, this is illustrated by archaeologists who might use osteological demographic data simply to confirm (or not!) their own conclusions from the analysis of grave goods.

Social status may be reflected in grave furniture or method of burial in rich pagan cemeteries, but it is difficult to demonstrate if no grave goods are present. In this case there may be some indications from the skeletal remains, particularly if pathological changes are found. Generally, although the aetiologies of some bone diseases are not fully understood, certain diseases affect certain types of individual. For example, deficiency diseases affect those most vulnerable to fluctuations in food production, which might suggest they were poorer. Dental caries is more likely to affect the rich, at least at the start of the middle ages. Osteoarthritis, although not definitely associated with physical stress, may affect certain parts of the body more often with certain types of occupation, and at the very least might indicate manual labour. Infectious and contagious diseases would have affected rich and poor alike, and unfortunately only the chronic type can be seen in the archaeological record since acute infections would either kill or be cured before the bone was involved. Specific infections, such as leprosy, tuberculosis, poliomyelitis and syphilis, although they do not reflect social status, would presumably affect the social relationships of the individual concerned, and how he or she was treated by others.

Physical aspects of cemetery populations are important in the reconstruction of past societies because the outward appearances and physical compositions of people affect how they react to situations and how others see them. Their status and function would change through life as they matured, so it is important to know the relative proportions of males, females, infants, teenagers, young women, old men, etc. that are present within the cemetery population. As stated previously, the osteologist can only be expected to provide estimates of biological age, since the chronological age of an individual is not necessarily reflected by his or her physical appearance, but in the past it was this appearance, perhaps coupled with productiveness, which would have affected the person's role in society.

It may be that there is a fundamental lack of communication between the excavator of a site and the specialists employed to study the finds. Very often the analyst is commissioned to "write a report" on a particular category of finds without being informed of the questions which the excavator would like to answer about his or her site. The excavator is then presented with a large report containing vast amounts of technical information which mean little to him and which he has to be able to understand to answer his questions. This is perhaps entering the realms of the problem which is concerned with who the specialist should be aiming the report at, and is beyond the scope of this work, but the point has to be made that communication is a two-way thing and the lines are severed in both directions. The osteologist needs information from the archaeologist to help with the interpretation of the former's results, and there really needs to be constant dialogue between the two so that the implications of the site for both

are not lost. For example, the osteologist needs information about possible groupings in the cemetery, or skeletons buried in an unusual fashion, so that physical differences can be looked for rather than lost in the general picture. Conditions in towns or villages might be suggested by archaeological study, and this would be of use to the osteologist in picking out patterns which might reflect certain lifestyles within the buried population. Urban squalor might produce signs of deficiency diseases which would not be expected to occur in a rural group (such as rickets), but rural famine might produce smaller (but more robust) individuals with high frequencies of enamel hypoplasia and other indicators of physical stress. The osteologist cannot be expected to be an expert in all aspects of life in the past (particularly as human skeletal biology is a multi-period discipline), and he or she needs the archaeologist to answer questions, for example, concerning the conditions of peasants during the Saxon and Medieval periods, or the possible change in the nobility after the Conquest. Information about social conditions at the period in question would be of great use in helping the osteologist to produce conclusions which will be of help in reconstructing the way of life of ordinary people in the past.

The physical remains of an individual can tell the archaeologist little of that individual's hopes, aspirations, and religious beliefs *per se*, although the way the body was laid out in the grave might suggest the way he or she was regarded by others or the funerary practices of the survivors. However, the bones can provide information about age, sex, physical appearance, and possibly pathological conditions. They might suggest ill-treatment, or poor nutrition, or evidence of violence, all of which are just as necessary to help complete the picture of our ancestors' way of life as are the type of pots they used, or the exchange mechanisms they had, or the way they produced their food. Carver (1987:93) sums this up neatly: 'The greater the number of burials examined, the more clearly human conditions can be observed, and the more evocative become the individual aberrations from the norm', the point being, of course, that if we did not study physical remains we would not spot the deviations from the norm, or indeed know what the "norm" was.