SECTION 2
The Present State of Population Evaluation

The field of human skeletal research has evolved over the last twenty years into a multidisciplinary subject, in much the same way as archaeology. Although originally composed of the two separate branches of palaeopathology and physical anthropology, the subject now involves techniques not only of medicine and human biology, but also those more often used in geology, chemistry, computing, demography, and social history. Palaeopathology itself may occasionally involve the study of art and literature to provide evidence for disease occurrence in the past.

2.1 A Short History of Human Skeletal Research

An account of the present state of research in any field must of necessity include a brief review of past methodologies. The fields of palaeopathology and physical anthropology, which are now almost always merged as one study area, both have a long history, and it is not the intention of the present work to look at this in detail. However, a short background study of the subject may provide a greater understanding of the reasons for the current state of research.

One of the first men to study human skulls was Vesalius (1513-1564). He made a comparison of the cranial forms of Genoese, Turks, Greeks and Germanic people. Little other work was done in the 16th-17th centuries, and the real beginnings of human osteological research can be dated to the late 18th and early 19th centuries.

Blumenbach (1752-1840) was the first to record the shape of the skull and face. He published a description of his large collection of skulls under the title ‘Decas collectionis suae craniorum diversarum gentium illustrata’ (1790-1820). Others followed in his footsteps. Tiedemann, for example, first determined cranial capacity in 1836 by the weighing of the amount of millet seed that a skull would hold (Haddon, 1910). Retzius (1796-1860) is credited with the invention of the methods of cranial measurement which are still in use today. He also invented the cephalic index so that skulls could be organised by form, rather than classified into race.

Grattan (1800-1871), an Irishman, believed that 'No single cranium can per se be taken to represent the true average characteristics of the variety from which it may be derived. It is only from a large deduction that the ethnologist can venture to pronounce with confidence upon the normal type of any race,' (Ulster Journal of Archaeology, 1858). This at least represented a move away from the tradition of assigning individual skulls to a race type, even if not completely away from racial classification. Grattan adopted the most useful measurements of previous workers, and devised new ones of his own.

The Hungarian, Professor V. Török advocated the use of 5000 measurements for every skull. Fortunately, most of his contemporaries did not agree with such excessive recording. Even now, with the use of electronic callipers and computer analysis, collecting such a vast quantity of data would be extremely time consuming, and would in all probability yield meaningless or incomprehensible results.

Haddon (1910) states that ‘Though for a time craniology was hailed as the magic formula by which alone all ethnological tangles could be unravelled, measurements of other parts of the body were not ignored by those who recognised that no one measurement was sufficient to determine racial affinities’. However, although he quotes a number of workers in the field of anthropometry, there is no reference to anyone involved in the measurement of the bones of the post-cranial skeleton.

At around the time of Darwin’s *Origin of the Species* (1859) a new interest was growing in establishing the antiquity of man. Although to a large extent this involved searching for artefacts, there was an interest in human bone. Skulls were collected and measured in an attempt to establish some form of racial affinity with invading groups, and this branch of anthropology became distinct from the study of human evolution. Research was confined to the skulls of prehistoric man, as can be seen from the examples above. In America, the earliest known work was Warren’s ‘Account of the Crania of some of the Aborigines of the United States’ (1822). A number of similar studies were made by other Americans and Europeans. Thurnam and Davis, for example, wrote 'Crania Britannica' in 1856. Three of the most famous physical anthropologists of the early 20th century, Hrdlicka, Morant and Pearson, also produced a vast amount of work on cranial osteology.

At around the same time, interest in mummies from Egypt was growing considerably, and mummy unwrapping sessions were even open to the general public. This in turn led to an increased interest in the pathology of these individuals, and also to an interest in pathological specimens from prehistoric skeletal material. Wood-Jones’ work in Nubia produced a large number of mummies which were studied by the anatomy professor Elliot Smith (1910).

Palaeopathological studies had been carried out previously. Perhaps one of the earliest was that of Von Walther (1825), 'Ueber das Alterthum der Knochenkrankheiten'. In America the earliest notable work in the pathology of pre-Colombian human remains was that of Jones (1876), 'Explorations of the Aboriginal Remains of Tennessee'. However, before the work of Elliot Smith, no great attention was paid to detail in recording of physical anthropological data, pathology and anomalies of the complete skeleton (or in this case, mummified remains).

These two rather narrow fields of interest ensured that the only human remains kept from archaeological excavations of the period were skulls and obvious pathological specimens. By the beginning of the 20th century, however, more interest was beginning to be shown in the potential information to be gained from the measurement of all the bones of the skeleton. American anthropologists in particular were devising new measurements and attempting to estimate living stature of individuals. Palaeopathologists began to take more notice of the evidence of disease provided by the whole skeleton. Ruffer and Moodie were the two main pioneers in the field in the early part of the century, and much of the more recent work is based on their beginnings.

The thirty years after c.1935 were fairly barren as far as osteological work in America was concerned. In 1965 a symposium was held in Washington D.C. in an attempt to bring a new vitality to human palaeopathology (Jarcho, 1966), and in 1967 Brothwell and Sandison edited Diseases in Antiquity, with the intention of 'palaeopathological stock-taking and pooling of recently collected data'.

Although little work had been done in America in these 30 years, the work of Calvin Wells, Don Brothwell and Andrew Sandison in Britain did a great deal towards advancing the science of osteology. Wells, trained in both medicine and anthropology, saw a need for co-operation between the two disciplines, although he was reluctant to accept that anthropological training was of useful in pathological diagnosis. A great romanticiser, he brought the bones to life, sometimes at the expense of pure fact (e.g. Wells and Hawkes, 1975b). However, as many archaeologists would have to agree, there are no real facts in a subject which deals in the main with artefacts created by cultures which are long dead, and interpretations are really all that can be hoped for when dealing with skeletal remains. Wells produced many papers and cemetery reports in his career, and his appearances on television helped to popularise the subject of palaeopathology in much the same way as Sir Mortimer Wheeler had done for archaeology. His book, *Bones, Bodies and Disease* (1964e) was a useful summation of methods and theories in current use.Brothwell has used various methods in his studies of skeletal material. He has produced papers on palaeodemography, statistical analysis, teeth, biological variation and palaeopathology. His book, *Digging up Bones*, now in its third edition (1981), has become the standby of the cemetery excavator.

Sandison, trained in pathology, applied his knowledge and expertise to both skeletal remains (e.g. 1968, 1980) and Egyptian mummies.The methods of both Brothwell and Wells are employed in the production of many recent skeletal reports. Brothwell's tooth wear classification is used with varying accuracy by most osteologists, and Wells' general report layout is usually followed. Since Wells' time, however, a number of new techniques have been evolved for use in forensic and physical anthropology. An attempt has been made to standardise the techniques used in ageing and sexing of human remains by the Workshop of European Anthropologists (1980), and many new books and papers on palaeopathology have been produced, particularly in America. These techniques will be covered in more detail in the relevant chapters of this thesis.

2.2 Skeletal Reports

Few osteologists have produced as many skeletal reports as Wells, who wrote a total of 40 during the period 1955-1978, the year of his death (a number of his reports and papers were published posthumously). For this reason it is probably not surprising that so many other reports follow the same general pattern of recording skeletal remains, although possibly with less emphasis on pathology. Many of his reports were lengthy and included catalogues of all the burials in the cemetery (for example, North Elmham, 1980b). It is often the case today that skeletal reports are not published in full if they are considered by the excavator to be over long. Unfortunately, in the eyes of the osteologist, pottery, stonework and other artefacts tend to get pride of place in a report, often taking up many pages with catalogues which are denied to the student of human bone. Skeletal reports are all too often pushed to the back of the report on microfiche, or even never published at all and are instead held at the Ancient Monuments Laboratory. This seems to negate the importance of skeletal material in a cemetery dig, since the only time that the full results of skeletal analysis are published is when there are few other finds on the site.

Since, as Brothwell states in the Introduction to *Digging up Bones* (1981), 'no social reconstruction can be complete without examining the physique and health of the community', the reason for the undervaluation of skeletal information is unclear. As Sir Mortimer Wheeler claims in a much quoted passage from Archaeology from the Earth (1954), 'the archaeological excavator is not digging up things, he is digging up people.' It is true that the cemetery is often analysed in great detail, and burial positions, grave goods and so on are recorded in depth (e.g. Boddington, 1987a), but although this tells us a lot about the social aspects of a society, it tells us nothing of their physical characteristics, and without that information the picture is incomplete.

2.3 Skeletal Remains and Archaeology

It may now be pertinent to consider the information which can be obtained from a study of the skeletal remains of a population. Firstly, there is population demography, which involves the assignment of an age and sex to each skeleton whenever possible. Provided that the population is large enough, such information can be used for the construction of life tables and estimations of the size of population which the cemetery served, as well as life expectancy at various ages, average age at death of adults of each sex, and sex ratios can be calculated. Such analysis does of course have its problems, and these will be considered in the appropriate section.

Skeletons also provide the only non-artistic information we have about the physical appearance of people in the past. Stature can be calculated for most adult skeletons, and the various cranial and post-cranial measurements can be used for comparison between sites. They are still used, with slightly more reservation, in attempts to assign a racial type to a population, although this is a rather more complicated and dangerous occupation than perhaps some archaeologists would like to think. It is possible to suggest some degree of distance between populations based on their cranial measurements using multivariate statistics, however, and this may yield some useful information when comparing a number of large groups within a small area.

The three other main areas of study in archaeological osteology are non-metric traits, the dentition, and pathological changes. The first can provide possible information on genetic variation and relationships within and between cemeteries, and the second can give some idea of eating habits, age and disease. The third is useful for studying the prevalence of a particular disease in a population, or its occurrence in a particular individual.

A number of factors may reduce the amount of information which can be gleaned from the bones. Henderson (1987) has made a study of these, suggesting that they include the treatment of the body immediately after death, the method of burial, the burial environment, the method of excavation, and post-excavation treatment. After each stage it is almost certain that some information will be lost, and that the sample will be biased as a result of this. If the osteologist is not involved from the start of an excavation, there is very little that he or she can do about this, since osteological analysis is at the very end of the chain of destruction. The careful excavation and labelling of each burial is of vital importance if the archaeologist hopes to gain any worthwhile knowledge from the employment of a human bone specialist. Of course, some sites, in particular medieval churchyards, are often in such a state of chaos before the archaeologist even puts his trowel to the ground, that there is really very little he can do to remedy the situation, other than careful recording of the position of each bone if possible.

2.4 British Skeletal Reports before Wells

There have been a number of reviews of American work in this field (e.g. Buikstra and Cook, 1980; Jarcho, 1966), although mainly based on pathological reports and papers. In Britain, it is difficult to find osteological reports written before or around the time of Wells, without an extensive search through past journals. Those which are available are generally of poor quality by today's standards.

Duckworth, in whose memory the Cambridge skeletal collection was named, produced a number of reports (for example, Duckworth, 1906 and 1927; Duckworth and Pocock, 1909), which although claiming to be studies of human bones are generally concerned only with the skulls of the skeletons excavated. Martin produced *Prehistoric Man in Ireland* in 1935, a racial classification of skulls found in Ireland and dating from the early prehistoric to the Norse periods. Other contemporary specialists, such as Myers (1896), produced similar work.

One of the best reports written during the time of Wells' dominance in this field was that on the Romano-British cemetery at Trentholme Drive, York (Wenham, 1968). The skeletal remains were reported on by Warwick, Professor of Anatomy at Guy's Medical School. Although perhaps not of quite the same standard as Wells' reports, it covered all aspects of skeletal morphology which are considered today, but with slightly more emphasis on racial affinities than is usual in modern reports. The pathological report was not particularly detailed, but the large dental report, including both dental variation and pathology (Cooke and Rowbotham), and the photographic plates compensate for this to some extent.

2.5 Skeletal Reports by Wells

As mentioned above, Wells produced a vast number of reports in his career, both on inhumations and on cremations, the latter being a field in which little work had been done previously. Much of his work was done on populations in Norfolk, where he lived. The sites of North Elmham (Wells & Cayton, 1980), Red Castle, Thetford (1967e), Caistor-by-Norwich (1973h) and Burgh Castle (unpublished; Anderson and Birkett 1989) were the main ones from that area. Other major cemetery sites included Portway Down, Andover (Wells & Henderson, 1985), Cirencester (1982), Skeleton Green (1981b), Iona (1981b) and Kingsworthy (Wells & Hawkes, 1983). The two sites of Monkwearmouth and Jarrow which are to be considered here were also seen by Wells, but were unfinished and are still awaiting publication (but see Wells et al, forthcoming; Anderson and Birkett, 1988). Whenever sites yielded interesting pathological specimens, Wells usually published them in medical or archaeological journals, thus ensuring that this information at least could be used by other workers. (A full list of Wells' publications can be found in Hart, 1983.)

Wells' work has served as an inspiration to many recent osteologists, and his sites are often used for comparison in modern reports, despite recent changes in methodology. Pathology, for example, is more usually described than diagnosed now. This is partly because many osteologists come from an anthropological or archaeological background and accept that they do not have the medical knowledge necessary for in-depth discussion of differential diagnosis, and partly because medically-trained palaeopathologists are recognising that diagnosis of disease from skeletal changes alone cannot be justified when it is often difficult enough to diagnose disease in the living patient.

Despite this, the descriptions of pathological conditions in Wells' papers and reports often bring a feeling of vitality and realisation of individual suffering, thus adding to our picture of the daily life of our forebears. Such description is lacking in many recent reports, due to the lack of space allowed for publication, and also due to the wish of many archaeologists and osteologists for the report to appear less fanciful and more factual than is perhaps the case with Wells.

2.6 Recent British Skeletal Reports

Many reports in the last ten years have been short, and confined to microfiche, giving little detail of individual skeletons (e.g. Dawes, 1986). Admittedly, a catalogue of skeletons does not make interesting reading, but such work should perhaps be more easily available to the specialist for whom a simple summary is not enough. The main report (i.e. everything except the catalogue) should be published in full in any archaeological report for which skeletons have been analysed, in order that the data may be compared with other sites.

Only two British cemetery sites have been given volumes almost entirely dedicated to the skeletal remains in recent years. The better known of the two is that of Dawes and Magilton (1980) on St. Helen-on-the-Walls, York. This report does not follow the usual layout made popular by Wells, and it can be very difficult to extract information from it. Much of the information is given in the form of pie charts, which although useful for comparison, do make it more time consuming to find the actual figures required. However, once the appropriate section is located, there is a vast amount of useful information included in the report, and the size of the cemetery makes it a useful comparison site. The pathological report is rather limited, however.

The other large report is that by White (1988) on St. Nicholas Shambles, London. This follows a more conventional layout and provides much information on all aspects of the population, although in less detail than Dawes' report.

Other fairly large sites to have been analysed recently include Guildford Dominican Friary (Henderson, 1984), Blackfriars Street, Carlisle (Henderson, 1986?), Great Chesterford, Cambridgeshire (Waldron, 1988), the skeletons from the Mary Rose (Stirland, forthcoming), and Fishergate, York (Stroud, forthcoming).

However, none of the recent skeletal reports is comparable in size and detail to many German publications, one of the best being the complete volume dedicated to the human remains from Manching (Lange, 1983). This covers a wide range of subjects within human skeletal biology, and includes large amounts of data, even down to the recording of individual skulls in photographs. It is apparent from this that more funding is available to German osteologists, and that consequently the impetus is provided for more detailed consideration of skeletal remains.

2.7 Possible Future Developments

Osteologists and palaeopathologists are beginning to question the assumptions made by past and indeed present workers in this field. As Ann Stirland and Janet Henderson have claimed in recent meetings of the Palaeopathology Association, the usefulness of disarticulated and incomplete skeletons is fairly limited. Ageing techniques have had to be reviewed in the light of the work done on the Spitalfields population, and the use of single bones in both ageing and sexing is, and should be, discouraged. Stirland feels that archaeological skeletal populations are

probably not in general representative of the population of England at the period, and should not be seen as such. She has also questioned the use of lifetables and demographic analysis of such populations, and disagrees with the use of any statistical analysis on populations smaller than 50 individuals (Meeting of the Palaeopathology Association British Section, May 1989). Techniques used on populations from different sites need some kind of standardisation if these groups are to be compared. Palaeopathological reports should be based on current clinical terminology, and descriptions should be made under broad categories of change. All statements must be consistent with the available evidence.

A meeting is planned for the end of 1989 so that some form of standardisation of techniques can be agreed upon. The use of cranial and post-cranial measurements, for example, will be discussed, with a view to cutting down on the number of measurements which are taken at present, and which are considered by many workers to provide us with little more than large lists of numbers. The publication of the Spitalfields report should provide some impetus for the reviewing of ageing techniques. The use and misuse of presently available methodologies will be discussed under the relevant sections of this thesis.

2.8 Subdivisions in this Thesis

As stated above, Wells divided his reports into sections based on age, sex, physical characteristics, teeth and pathology. These sections, with the exception of the last, will be used in this thesis as a convenient way of presenting the data, so that it can be compared with the work of other osteologists. It is felt that, although all the subjects are inter-related to varying extents, these are probably the best subdivisions which can be made given the current state of research.