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CHAPTER 4. THE HUMAN SKELETAL REMAINS FROM GUILDFORD FRIARY, SURREY

by Janet D Henderson

1. Introduction

A large sample of inhumed bone was presented for examination from the Guildford Friary site in Surrey. The material came from 3 designated areas of the site: the nave of the church, Cemetery Area A and Cemetery Area B. The majority of skeletons were found as articulated, supine burials, although a very small number were listed as being either residual or not in a grave context. Pit 161 contained the remains of a number of individuals - these were included as part of Cemetery Area A. Residual material refers to all those samples listed as "either residual or not in a grave context". (Nos 159, 204, 230, 258, 296, 312 and 161). Examination of the bones showed that a minimum number of 30 individuals were present. Disturbance of earlier graves was common, in most instances where the bodies of more than one individual had become confused it was possible to sort them out - for individual reports see Catalogue. Preservation of material varied from virtually complete skeletons to very poorly preserved remains, sometimes with as little as one bone present, but in view of burial conditions, in particular in the cemetery, preservation was generally good.

Recovery of the skeletal remains from the cemetery and nave of the church was nearly 100%. Nevertheless it must be emphasised that the material could be regarded only as a sample of the population that might have used the Friary and that would in itself only have been a sample of the total population of Guildford and the surrounding area. Therefore it was assumed throughout to constitute, in demographic terms, a "sample of a sample of a sample".

An estimate of the minimum number of individuals present indicated that the sample size was 113 (42 in the cemetery, 41 in the nave of the church and 30 residual). This estimate included all the evidence for different individuals, however it did not include the material listed as from the fill of ditch 236.

The object of this report was not only to add to an understanding of the demography of Medieval British populations but also to examine possible evidence for differences (social or otherwise) between the human remains in the 3 areas of the cemetery. For the detailed study as well as basic demographic information (age, sex and stature) data on cranial and post-cranial metrical and morphological observations were collected.

Unfortunately the sample was too small for statistical analysis to be undertaken, nevertheless it was found worthwhile to compare the material from the 3 areas in general terms.

2. Demography

Data for age, sex and stature for each individual were collected for analysis of the basic population sample structure. Specific results and techniques employed in the assessment of each skeleton are listed in the Catalogue.

2.1 Age

2.1.1 Age - Techniques used

The age of each individual was estimated on the basis of a number of independent variables. Where possible more than one age estimate was made for each skeleton (ie more than one variable was used for comparison).

In each case a preliminary analysis of the status (sub-adult or adult) of a skeleton was made on the basis of completion of epiphyseal union. In a number of cases (of adults) it was not possible to proceed further but in the majority it was possible to establish an age range within a 5-year period. It was not held to be justifiable (particularly with the adults) to try to be more specific than this since not only was an outline of the age distribution of the population all that was required, but also the degree of variability found between and within human skeletal populations of known chronological age suggests that narrower macroscopic age estimates on an unknown population sample such as this would be merely misleading. (The Guildford Friary sample is "unknown" in the sense that independent data (ie not bony) were not available). Chronological age (ie age in years) was employed for analysis since it was felt that although grouping individuals by skeletal and/or dental age would preclude some of the inaccuracies inherent in extrapolating chronological age estimates for an unknown population by methods originally devised on a known population (with different genetic affinities, socio-economic background etc), chronological age would be of more value since it could be used for making comparisons with other population samples which frequently would not be practicable by means of "age groups".

Sub-Adults

Ages were assessed by means of the following variables: dental development, sequence of epiphyseal union and fusion of the spheno-occipital synchondrosis.

Of the above-mentioned dental development is generally regarded as being the most reliable because it is least affected by environmental interference (malnutrition), disease etc) which may advance or retard growth (Lewis and Garn 1960). The chart of Schour and Massler (1941) was employed for ease in assessing age in spite of its limitations (notably the size and type of sample used and the non-inclusion of sexual dimorphism, Acsadi and Nemeskeri 1970, and Stewart 1979), which, for the purposes of this report, it was decided could be ignored. (Age ranges being all that was required).

The sequence and progress of epiphyseal union, although more susceptible to interference in growth also permits of fairly reliable age estimates. The sequence, in particular, has been found to possess, with some slight variability, a highly specific order (Stewart 1934, Johnston 1961) and this, together with the actual degree of union was found to be of value in those individuals where dental development was complete (or nearly so - lacking the third molar) but the achievement of adult status was not. (Adult status may be defined as having been reached when growth and maturation of the skeleton are complete - usually by about 25 years). (Krogman 1962, McKern and Stewart 1957, McKern 1970).

Fusion of the spheno-occipital synchondrosis has been found to possess a high degree of correlation with chronological age and this, though rarely found intact in this series, was employed as a "dividing line" for individuals above or below 18 years of age.

2.1.2 Age - Results

(Details of all results are shown in Figure 43 and Table 4).

The sample from Guildford Friary included 25 individuals of less than 25 years of age (ie sub-adult).

Table 4. Results for Ages of Individuals at Guildford Friary

Age (in years)	No of Individuals
0-5	3
5-10	0
10-15	7
15-20	2
20-25	12
25-30	12
30-35	6
35-40	4
40-45	1
45-50	9
50-55	1
55+	5
Juvenile	1
Young Adult	7
Adult	37
No Data Available	6
Total:	113

Table 5. Results for Sexing of Individuals at Guildford Friary

Sex	No of Individuals	% of Total (to nearest whole figure)
Male	53	47
Probably Male	16	14
Female	10	9
Probably Female	1	1
No Data Available (includes juveniles)	33	29
Total:	113	100

There were a very few bones from S172 which probably represented the remains of a foetus or stillbirth (see Catalogue) not included in the above. There was also a fragment of infant mandible from Pit 161. The other two individuals from the 0-5 year range were juveniles rather than infants (ie older than 6 months).

The absence of any individuals in the 5-10 year period and the fact that there were only two from 15-20 years was probably in part a function of the ageing methods employed and the size of the sample (particularly in the later group). The 5-10 year gap may also reflect the fact that survival of infancy often leads to survival until adolescence. However since it was not possible to establish the cause of death of any of the individuals in the sub-adult group the size of the sample must preclude any conclusions with regard to the age distribution.

Adults

Whilst the methods for ageing sub-adults are several and offer a fair amount of accuracy, once the skeleton has reached a stage of complete dental development and epiphyseal union ageing becomes increasingly more difficult and unreliable. Thus as shown in Figure 43 there was a significant percentage of individuals from Guildford Friary classed either as young-adults or as adults only, simply because the information which might enable a closer estimate of age was not available. For the more complete skeletons the following methods were used to assess age: the pubic symphysis, dental wear and in some cases endocranial suture closure. Although the existence of degenerative joint disease (particularly osteoarthritis) has been suggested as an indicator of a mature individual it was felt that this feature is too susceptible to external factors (such as stress, work etc) and too little is known of its aetiology for it to be of value in estimating the ages of an unknown population sample. ("Stress" is defined throughout as any external excessive influence upon the individual, such as work, exercise, etc, over and above that normally encountered).

Of the above-mentioned, changes in the articular surface of the pubic symphysis (particularly in males) have been found to be one of the most reliable means for ageing of adults. For this population sample the method outlined by McKern and Stewart (1957) was employed for those individuals considered to be under 30 and for those above Todd's method (1920) was used. These methods are applicable to males only -

females were aged either by dental wear or by the pubic symphysis using Gilbert and McKern's method (1973) as a check, rather than as a primary ageing criterion.

Although the degree of dental wear has been used in the past to estimate age realisation of the number of variables involved and the differential influence of attrition and abrasion has meant that its reliability has come into question. Thus for example with this Guildford Friary sample a number of specimens have been found showing a marked asymmetry in their occlusal wear patterns, for example S133, an example that is probably a result of a large carious lesion on the right maxillary second molar, or S366 where the wear pattern may be partially caused by malocclusion of the dentition. Clearly a number of factors are involved, including a variety of diet and dental pathology. Use of the degree of dental wear therefore was confined to those individuals where either the pubic symphysis was not available and where the wear pattern was symmetrical and without anomalies or where comparison between the two was thought to be valid. For dental wear Miles' chart (1963) and Brothwell's chart (1972) were used. In a number of cases there was found to be a fairly high degree of correlation between the estimates obtained for the pubic symphysis and those obtained for dental wear, but as already stated dental wear was often asymmetrical in this sample and could only be used with confidence on those individuals where both the maxillary and mandibular dentitions were virtually complete.

The use of endocranial suture closure as a reliable means of assessing age has been shown to be inaccurate (McKern and Stewart 1957), however it was found that in those individuals where no other evidence was available or was confusing it was of some use in differentiating young and mature adults.

Results for older individuals showed that there was a fairly even spread over the age period 20-55 plus years. However in the 10-year period 20-30 years some 24 individuals were grouped by comparison with 26 in the 20-year period of 30-55 plus. (If the 20-year period 10-30 years was used then the ratio was 33:26). The size of the sample precluded any statement to the effect that mortality was high in young adulthood, particularly as such a high proportion of the sample could be aged only as "young adult" or even less conclusively as "adult". Nevertheless a similar sort of pattern was found at the Dominican Priory in Chelmsford (report Justine Bayley - sample size 138) and even at Stonar, Sandwich, Kent, the number of individuals in the 10-30 year period was roughly equal to those over 30 years. (Report John Eley and

Justine Bayley - sample size 147. (See Note on the Sites in Chapter 4, part 8.) At all 3 sites, Guildford Friary, Chelmsford Priory and Stonar the picture presented was similar: that of a fairly high mortality rate in juveniles and young adults but also a fair number of individuals surviving to 45/50 years or more. In view of the differing characters of the sites (Guildford and Chelmsford were Dominican Friaries probably with samples of both Friars and lay populations, whereas Stonar might be considered as representing a secular, urban population only), it was interesting to note that there were very few burials in the 0-10 year period at Guildford (3) and Chelmsford (7) but more at Stonar (60-26 of which could be classed as "infants"). The small size of the samples and lack of other comparative sites made it impossible to draw any conclusions from this, especially as the Stonar sample only included a small part of the expected whole. (See "Note on the Site" - Bias of the sample at Stonar possibly may be illustrated by the percentages of the sexes present: 34% of females is rather lower than might be expected from a random sample of an urban, secular population).

2.2 Sex

2.2.1 Sex - Techniques Used

The bones from Guildford Friary were sexed individually by both non-metrical (subjective) and metrical (objective) means.

Non-metrical methods principally involved sexing by visual examination of the skull and pelvis. On the pelvis the following features were observed: presence or absence of the pre-auricular sulcus; width of the greater sciatic notch; size and shape of the obturator foramen; size of the acetabulum; the ventral arc, sub-pubic concavity and the medial aspect of the ischio-pubic ramus (after Phenice 1969); and where possible the 3 elements of the pelvis were approximated (innominates and sacrum) to allow examination of the size and shape of the pelvic inlet. Note that absence of the pre-auricular sulcus does not necessarily indicate masculinity and presence to a slight degree is not conclusively a female trait (Houghton 1974).

On the skull the following general profile of the skull including prominence of the frontal eminences, supra-orbital torus and occipital protruberance; protrusion of the mastoid processes; attachment of the zygomatic arch superior to the external auditory meatus; general size and shape of the face; angle of the ascending ramus of the mandible and general robusticity of that bone.

The skeleton as a whole was also scored for degree of robusticity and size but it was generally found that an attribution of sex could be made on the pelvis and skull and that this latter feature was, for sexing purposes, somewhat superfluous.

Plates 26 and 27 illustrate the differences between a male (left) and female (right) mandible. All the features are exaggerated on the male. thus the chin is more sharply defined, the rami are higher and at a steeper angle and the width is narrower.

Metrical methods of sexual attribution were limited to the vertical diameter of the femoral head. In only a very few cases was it possible to measure the ischio-pubic index and it was decided to eliminate this procedure.

2.2.2 Sex - Results

Figure 36 and Table 5 show the results and proportions for sexing at Guildford Friary. The category of "no data available" includes all juveniles and sub-adults for whom sexing was not attempted, as well as those for whom sufficient evidence was absent.

The majority of individuals (40%) were sexed either by means of the pelvis, skull and femoral head diameter or the pelvis and femoral head diameter alone. The use of more than one parameter for sexing makes some allowance for sexual dimorphism in the population sample and acts as a check, in particular in this group where the skull was found to give rather ambiguous results; fortunately there was only one individual (214) for whom it was the only evidence available. Visual examination showed that otherwise sexual dimorphism in this sample was fairly well marked and only a few individuals (eg S259) were found difficult to sex.

Distribution by sex showed that a high proportion of the population was male, and there were actually only 10 certain females present in a sample of 113 individuals. It was also interesting to note that only two of the females came from outside the nave of the church, and one of those was from grave 288 (256). There was a possible female from Pit 161 as well.

Comparison with the findings at Chelmsford and Stonar showed a much higher percentage of females at both of those sites although it is still lower than would be expected (Chelmsford 36 per cent, Stonar 34 per cent). In a random population sample a ratio closer to 50:50 would be the predicted norm. It has been shown elsewhere (Weiss 1972) that in some cases the apparently greater number of males has been caused by a bias towards sexing as male. However the Guildford Friary sample, as mentioned above, was found to exhibit a marked degree of sexual dimorphism and it is suggested that the relative proportions of males: females reflects the character of the sample itself, particularly in view of the scattered distribution of the material. The greater emphasis on female presence in the nave of the church (7females: 28 males, tentatives included) may have been a result of a sample bias or social practice in the

cemetery as a whole.

Owing to the small sample of females present and the probable sample bias the fact that none of the females had an age assessment greater than 35 years had to be regarded as insignificant. Certainly it was likely that the mortality rate for young females was higher than that for young males but on the evidence available it was impossible to make any conclusive statement.

2.3 Stature

2.3.1 Stature - Technique used

Stature was assessed for each individual by means of the maximum lengths of the long bones. Regression equations as outlined by Trotter (1970) were used, lower limbs being worked in preference to upper owing to the higher degree of correlation with stature. Thus where possible measurements of the femur and tibia together were used. One equation only was calculated for each individual (this is quite adequate for the purpose), the lengths of the left side being employed where possible for consistency.

Table 6. Methods for Assessing Stature, Guildford Friary

Method	No. of Individuals Assessed by this Means	% of Total
Left Femur and Tibia	25	45
Right Femur and Tibia	5	9
Left Femur	15	27
Right Femur	3	5
Right Fibula	1	1.75
Right Tibia	2	3.5
Left Humerus	1	1.75
Right Humerus	1	1.75
Right Radius	2	3.5
Right Ulna	1	1.75
	56	100

Since stature decreases beyond approximately 30 years of age correction was made for older individuals according to the equation: 0.06 (age in years - 30) cm (Trotter 1970). All measurements were corrected to round figures (centimetres) or 2 decimal places (metres) which was felt to be adequate for this sample. Stature was only assessed for those individuals that a) could be sexed, and b) had at least one intact long limb bone. Juveniles were excluded.

2.3.2 Results - Stature

The distribution of stature by sex is illustrated in Figure 37. Note that of the total population sample only 56 (52%) could actually be given stature estimates. However a high proportion of those (54 per cent) were assessed by means of the femur and tibia and only 5 (8.75 per cent) had to be calculated by maximum lengths of the upper, as opposed to lower extremity. Thus a fairly high degree of consistency of method in those assessed was obtained.

The range of heights was from a minimum of 157 cm (c. 5 ft 2 ins) for 159 (a female) to a maximum of 181 cm (c. 5 ft 11 ins) for S133 (a male). Figure 37 shows the range of heights for this population sample. In view of the small number actually measured for height (see above) the distribution could not be considered as conclusive but even so it emphasised both the greater number of males present at Guildford Friary and the probable distribution of height ratios by sex. Thus the males appeared to be taller, the females shorter with only a small amount of overlap between the two. Modal height for the males was 170 cm (c. 5 ft 7 ins) and for the females was 158 cm (c. 5 ft 2 ins). Mean height for males was 173 cm and for females was 161 cms. As can be seen on Figure 37 although there was a fair range of heights obtained from the Friary material the majority of individuals were grouped at or close to the modal values. (The mode of a range is defined as the most commonly occurring value (ie the most fashionable). The mean is the sum of all the values in the set divided by the total number of items).

Comparison with the findings at Chelmsford and Stonar showed similar results. At Chelmsford the minimum height was 149 cm (c. 4 ft 11 ins) for HB100 (a female) and the maximum was 181 cm (c. 5 ft 11 ins) for HB102 (a male). Modal values were 150-154 cm for females and 165-169 cm for males (ie slightly shorter than Guildford but note that as at Guildford more individuals were grouped above the mode than below it). At Stonar the maximum height was 183 cm (c. 6 ft) for burial No 6 (a male) and minimum height was 147 cm (c. 4 ft 10 ins) for burial 52 (a female). The modal values were 175-179 cm for males and 155-160 cm for females. However although the modes at Stonar were slightly higher than at Chelmsford or Guildford the majority of males were grouped below that level; for the females the mode seemed to approximate very closely to the mean value.

The overlap between the sexes was similar at Chelmsford to Guildford: ie it was slight and there was a fair margin of disparity between males and females whereas at Stonar the overlap was much greater: nearly half of the males were in the same range as three-quarters of the females (ie all grouped between 155-170 cms).

None of the samples were large enough for any significant conclusions to be deduced but it was of interest to note that similar height ranges and frequencies were to be found at all 3 sites, further that as regards height sexual dimorphism was marked both at Guildford and Chelmsford.

Note that the dimorphism remarked at these ? sites was not a function of sexing on the size of the bones (hence longer bones = male, shorter = female) since in most cases sexing was possible on the pelvis, skull and femoral head diameter (see under "sexing").

3. The Dentition

Of all the parts of the human anatomy the teeth are usually among those which remain best preserved and survive for the longest period; they are often, therefore, the only pieces of information available and even where they are not, frequently they constitute the best evidence with regard to the general health status and environment of the individual to whom they belonged. For these reasons the teeth of the Guildford Friary burials were recorded in a fair amount of detail.

First an inventory was made of those teeth present or absent. Distinction was made between permanent, mixed and deciduous dentitions, then teeth were recorded for: post-mortem loss, ante-mortem loss with the socket still present, ante-mortem loss with complete resorption of the socket, tooth present but socket missing, tooth not yet erupted, tooth probably erupting (difficult to establish when the gingival margins are no longer present), tooth erupting but not fully occluded and no data available.

A record was then made of dental wear, caries, abscesses, occlusion, rotation or crowding, tooth absence, supernumerary teeth and cusps (Carabelli's cusps and paramolar cusps), cusp pattern, periodontal disease, enamel hypoplasia, calculus deposits, any odontomes, tumours or other anomalies. These features yield information not only on health and diet but also may be of note in comparing genetic relationships within and between populations.

3.1 Dental Wear

Dental wear was observed for two reasons: as a sympton of ageing (see above) and as an

indicator of the rate of wear, hence use of the teeth (diet). Essentially wear may be divided between two causes: attrition, or the wearing away of the tooth surface by rubbing against another; and abrasion, caused by the presence of hard materials in food. Both factors may vary, attrition because the occlusion of the teeth may be abnormal and abrasion by means of differences in diet (thus it is found in modern populations that wear is very slight when compared with past peoples). Wear was recorded on a scale of very slight (enamel polished), slight (some islands of dentin exposed), moderate (some islands of dentin coalesced), severe (coalition over the whole surface, perhaps with unequal wear), very severe (pulp exposure, the outer rim has gone and wear is down to the neck of the tooth), extreme (root fragments only remain.)

Observations were made of the symmetry/asymmetry between right and left sides of the dentition and between maxillary and mandibular teeth. All teeth were scored. In many cases complete ante-mortem loss of a tooth could be associated with an apical abscess or caries and it could be suggested that tooth loss was due to the presence of an infection rather than to attrition or abrasion. In such cases it is almost impossible to establish cause and effect, whether the caries-caused-the-abscess-caused-the-destruction-of-the-tooth or whether the-high-rate-of-wear-rendered-the-tooth-susceptible-to-infection, led-to-the-caries/abscess-led-to-eventual-loss-of-the-tooth.

Asymmetry could often be attributed (tentatively, since again it is not possible to be conclusive) to the presence of a carious lesion on one side of the mouth (pain would lead to chewing on one side only, hence asymmetry), but in some cases an abnormal occlusion of the dentition could be the cause. Unfortunately for most of the individuals from Guildford Friary it was not possible to score for occlusion so this point must remain as conjecture.

Results: The Cemetery

Area B

Only 4 of the 7 individuals could be scored for dental wear. Two of the 4 had only one part of the dentition (maxilla or mandible) present (S102 and S105). On 3 of the 4 (S102, S103, S167) wear showed a high degree of correlation with age, but on the fourth (S105) the pattern was one of very slight wear on the molars but severe wear of the incisors. Whether this was the result of a malocclusion of the dentition or dietary habit it was impossible to tell. There was no evidence for asymmetry in the wear pattern of any of the 4 individuals.

Area A

Information was only available for 13 of the 27 individuals present (161 excluded, grave 288 considered separately). Of these 8 could be classified as having slight dental wear, all being young individuals (less than 25 years) and none having been

assessed for age on dental wear. None exhibited any evidence for asymmetry, except S124 where calculus deposits on the right side precluded observation of the occlusal surfaces. 253 (like S105 above) showed an unusual pattern of the incisors being more worn than any of the other teeth. One individual (S259) was borderline in age at c.25 years with slight-to-moderate wear of the teeth. Wear was greatest on the incisors and molars and was more on the right than on the left, although there was no apparent reason for this. Two individuals could be classed as slightly older (25-35 years) with moderate wear and 2 as mature (one: 35-40, one: 45-50 years) with severe wear. The former 2 constituted a rather subjective assessment since age was based principally upon the degree of dental wear. Of the latter, one was aged by means of dental wear and the other by the pubic symphysis. Of these last 4,3 could be observed for asymmetry: all showed it and on all of them there appeared to be associated ante-mortem loss of teeth and carious lesions. One (S133) showed a pattern of greater wear on the incisors and molar teeth. S166 demonstrated this on the mandible but not on the maxilla where all teeth were worn except the incisors. It was suggested that in the case of S133 this pattern reflected dietary habits and on S166 there was a possible combination of diet and malocclusion of the teeth.

In summary although data were lacking for the older age group it was suggested that, as would have been expected, dental wear showed correlation with age (in terms of the charts used) in Cemetery Areas A and B. No distinctive patterns of wear emerged until past the age of 25 years (ie until there was a moderate amount of wear present) and then there was evidence for i) asymmetry between right and left, in most cases here probably the result of carious infection; ii) greater wear of incisors and molars. There was insufficient evidence available for definitive analysis of the causes of the asymmetry observed or of the greater wear of the incisors and molars over the canines and premolars.

In none of the cases in Cemetery Areas A and B was it possible to assess to what extent (particularly in the older individuals) wear patterns were masked by ante-mortem loss of teeth, caries, abscesses etc.

Grave 288

Three individuals were available for analysis: 2 were young with slight wear and the third was aged 45-50 on the pubic symphysis and demonstrated moderate wear.

The Nave of the Church

Just over half of the individuals from the nave of the church (23 out of 44 plus a further 9 'residual' cases) could be scored for dental wear pattern. A greater age range could be assessed from the nave than from either area of the Cemetery thus older individuals could be examined more closely.

There was one case of no wear visible in a juvenile of about 10 years, and 2 of very slight wear, both aged less than 20 years. Three could be classified as slight one aged less than 25 years and 2 at 25-30 years. Of the last 2 mentioned one was aged by the pubic symphysis and the other by dental wear. The former was noted as being at the lower end of the scale (ie probably c.25 rather than c.30). It was feasible that the age estimate on dental wear for the latter was too high but in an unknown population sample it was impossible to check this.

Four individuals showed moderate dental wear patterns and could be aged between 30 and 40 years. Three were aged 30-35 years, methods used being: dental wear; pubic symphysis; epiphyseal union and cranial sutures respectively. One aged at 35-40 years on the basis of dental wear, again as with the earlier group this was possibly too high an estimate but it is impossible to be sure. A further individual in the 35-40 group had moderate-to-severe wear (age assessed on the pubic symphysis).

In the group showing severe wear patterning the age range was from 30 years onwards. One individual only had severe dental wear (S362) at age 30-35 years (aged on the pubic symphysis). One could be placed in the 40-45 group (aged on dental wear), 2 at 45-50 years (one aged on the pubic symphysis and one on dental wear), and 2 at 50-55 years (both assessed on dental wear). Three individuals (A, B and C from grave 297) showed severe patterns of wear on their teeth, age was not established for any of them.

There were no apparent differences between the sexes (3 females only could be included, all young with slight wear of the teeth). Only 2 individuals were recorded as showing asymmetrical wear: B from grave 297 and S305, with no apparent reason for either finding. Four individuals exhibited the pattern whereby the incisors and molars showed increased wear over the canines and premolars; the examples came from cases with slight-severe patterns of wear.

In summary, like cemetery areas A and B the picture of dental wear in the nave of the church was one of a probable fair degree of correlation with age. However on such a small sample it was impossible to establish rates of wear, particularly in those instances where dental wear was the only means for ageing an individual and the results showed a mixture of agreement and differentiation with ages derived by other methods. Nevertheless it was remarked in using charts of dental wear for assessing age that in particular with Miles' chart (1963) based on Anglo-Saxon skulls from Breedon-on-the-Hill, severe wear in the Anglo-Saxons correlated with lower ages than at Guildford Friary (ie although the relationship was one of increasing wear with age in both cases the onset of severe wear seemed earlier at Breedon-on-the-Hill). (See Discussion).

Comparison of cemetery areas A and B with the nave of the church showed similar results in both: wear increased with age, and there was some evidence for asymmetry both of right: left and of incisors and molars: canines and premolars. It was interesting to note that both anomalous cases (S362 with severe wear at 30-35 years and S149 with moderate wear at 45-50) were aged by means of the pubic symphysis, generally to be considered among the most reliable of the macroscopic methods of ageing and this clearly illustrated that, not only is dental wear a variable influenced by a wide range of factors but also that its use as an ageing method on its own must be regarded with suspicion.

3.2 Incidence of Caries and Abscesses

Caries were observed and recorded as present or absent, small or large and their position in the dentition (occlusal, buccal, interstitial etc) was noted. Abscesses were recorded as present/absent and by position.

The incidence of caries in the Guildford Friary sample was assessed in terms of distribution by age and by area. Since no allowance could be made for those teeth which were missing post mortem (whether carious or not) the number of caries present was expressed as a percentage of the total number of teeth rather than as the number of teeth carious per mouth. The DM rate: $\frac{\text{Decayed and Missing antemortem}}{\text{Total teeth at risk}} \times 100$ is a generalised statistic which has the principle limitation that the inclusion of "teeth lost ante-mortem" does not allow for loss of teeth for some other reason than a carious infection.

The result for the whole site was approximately 23%. However when the cemetery and the nave were considered separately the results were approximately 18% and 28% respectively. A chi-squared test showed that this result was highly significant ($p = 0.01$) but the reasons for this could be found in the nature of the samples. Thus when the incidence of caries alone was tested the result for chi-square was $p = 0.7$ (possibly significant but not proven so) which suggested that the degree of ante-mortem tooth loss was the important factor between the two areas. Since it is to be expected that antemortem loss will increase with age the proportions of individuals aged over 30 years in the cemetery and in the nave were next examined. The result was probably significant ($p = 0.1-0.2$) which therefore led to the conclusion that the samples were biased as a result of the age difference between the two areas. The difference in the DM rate between the cemetery and the nave could not therefore be regarded as significant.

On only one individual were caries present in the anterior teeth (in the central

incisors of S334); on all others caries were found either in the premolars or the molar teeth, more commonly in the second premolar and the first and second molars. The commonest sites of caries were at the interstitial or buccal margins, often at the cemento-enamel junction There were very few occlusal caries present.

Most caries observed were small, there were only a few so large that their point of origin could not be determined. There were at least 5 cases of teeth where only the roots were left in an otherwise relatively healthy dentition, these were mostly associated with apical abscesses and could reasonably be attributed to carious lesions.

Abscesses generally were uncommon and were confined to apical abscesses which in most cases could be associated, probably, with caries in the teeth. There were no instances of isolated abscesses.

Clearly in a sample such as the one from Guildford Friary there was a very limited amount of information that could be deduced, particularly where it was impossible to tell to what extent wear and the loss of teeth (whether ante or post mortem) masked the true incidence of caries and/or abscesses. The occurrence of some older individuals showing no caries or abscesses further suggested that an inherited susceptibility might be of importance but there was too little evidence for discussion of this.

It should be added that, limited though they were, the findings were similar to those recorded by Moore and Corbett (1971 and 1973) who noted that at this period the commonest site for caries was in the interstitial or buccal margins at the cemento-enamel junction, which they associated with poor dental hygiene, wear and diet, unlike today where occlusal caries are by far the most common.

3.3 Occlusion

Although the material was examined for evidence of occlusion in only 4 cases out of the whole population sample was information available. In 3 of these occlusion could be classed as normal and in one there was slight overbite present. There were not sufficient data to justify further comment.

3.4 Rotation/Crowding

As with occlusion although a record was made data were lacking for analysis of the degree of rotation or crowding present. In the cemetery (Areas A and B) 8 individuals were included, and in the nave of the church: 17. For the most part the commonest feature was crowding; only 2 individuals 337B/A and S166) showed actual 'rotation' of a tooth.

Of the 8 individuals recorded from the cemetery 3 showed no evidence of crowding and of the other 5 in 2 the incisors were crowded, in 1 the right canines (maxillary and mandibular) and in the other 2 there was slight crowding of a premolar tooth in each case. There were no instances of severe impaction or crowding of third molar teeth, but one or two individuals had slightly impacted third molars.

In the nave of the church 10 cases showed no signs of rotation or crowding. In the remainder the anterior teeth were those which were involved in all cases.

The distribution of material in the cemetery was too random for any conclusion to be drawn as to the incidence of rotation or crowding. With regard to the nave it was of interest to note that 5 of the 7 cases came from the south-west end of that area and that for the remaining individuals in that location data were not available (except for B in grave 297), rather than that rotation or crowding was absent. Clearly too little is known of the causes of rotation or crowding for any conclusions to be reached. Nevertheless it should be noted that there was no apparent correlation with absence or presence of third molars and in the absence of any severe impaction of those teeth or crowding of molars it was tentatively suggested that the causes were more likely to be genetically based than environmentally (ie as a functional result of third molar impaction). (See Discussion).

3.5 Absence of Teeth

This observation was confined to those teeth considered to be missing congenitally from the dentition, rather than those lost ante or post mortem. The only instances of teeth found to be congenitally absent were third molars: 3 cases in Cemetery Area A (S124, S155, 119), none in area B and 2 in the nave of the church (282 and S305). The reduction in size of the third molars (S162 - Area A) could not definitely be associated with agenesis of the teeth (Le Bot and Salmon 1977). Of the 5 individuals listed above, 4 involved the mandibular teeth only - cf. Le Bot and Salmon (1977) who also found that agenesis of the third molars is more common in the mandible than in the maxilla. Further analysis of this feature was not considered justifiable. (See Discussion).

3.6 Supernumerary Cusps and Teeth, Cusp Patterning

The recording of the incidence of these features is of value in studying between and within population affinities. Thus the purpose of observing them at Guildford Friary was not only for comparison with other populations but also, for any marked differences or similarities between the cemetery and the nave of the church as a possible indicator of genetic affinities.

Therefore observations were made for the presence of supernumerary teeth, Carabelli's cusp and paramolar cusps.

There were no cases of supernumerary teeth present at Guildford Friary (34 individuals observed). There were 2 cases of Carabelli's cusp being present as a tubercle (119 and S340) but no other instances were recorded (26 individuals tested). There were no instances of paramolar cusps (in particular the protostylid trait) being present (34 individuals noted).

Obviously these results are limited in the light of the data available (cf. small sample size - only 60 individuals observed).

Although some observation of the number of cusps present on the molar teeth was undertaken the number of individuals for whom a complete set of molar teeth was available was so small that analysis was not considered worthwhile.

3.7 Periodontal Disease

Periodontal disease is an infection of the soft tissues surrounding the teeth and the alveolar bone. The disease causes recession of that bone and eventually results in loosening of the teeth and their evulsion. Its exact aetiology is not known but it is thought to include nutritional imbalance, poor hygiene, calculus deposits and dental wear, either singly or together (El-Najjar and McWilliams 1978).

Observation at Guildford Friary showed that periodontal disease was present in all those individuals for whom data were available (40). On one case only could it be classified as slight/moderate (S241 a young adult male); on 7 it was found to be moderate (ie just below the cemento-enamel junction); on 4 it was moderate-severe and on the rest it was listed as severe (ie most of the tooth roots exposed). There appeared to be no correlation with age or sex in the incidence of periodontal disease, nor with the distribution (cemetery: nave).

Plate 26 provides an illustration of: on the left a severe case and on the right a more moderately afflicted individual. The finding that nearly all individuals (23/40) had severe periodontal disease is in keeping with those of Rachel Reader on some human remains from another part of the site (See note on those remains in Chapter 4 part 7.5.). As stated above the cause cannot be diagnosed precisely but was most probably a combination of factors.

3.8 Enamel Hypoplasia

This condition may be defined as an incomplete or defective formation of the organic

enamel matrix of teeth (Shafer, Hine and Levy 1974). Distinction was made between hereditary enamel aplasia (amelogenesis imperfecta) and environmentally induced enamel hypoplasia (El-Najjar, Desanti and Ozebek, 1978). There were no cases of the hereditary type at Guildford Friary and of those observed, expression of the feature was confined to lines on the teeth (pits and grooves have also been reported).

Results

None of the "residual" bones nor those from Pit 161 were observed for this feature but of the remaining 80 individuals. 10 showed no traces of enamel hypoplasia, 13 had slight lines present and 6 had a marked expression of the trait. For the remaining 51 individuals no data were available.

Clearly on the 29 for whom there was information enamel hypoplasia was common, even if only to a slight degree. A similar finding was made on the 2 skeletons examined by Rachel Reader.

The incidence of enamel hypoplasia was random throughout the site, occurring in both areas of the cemetery and the nave of the church.

On the basis that the effect of enamel hypoplasia can only be produced if the disturbance (however caused) occurs during the period of active enamel matrix formation it is possible to estimate the age at which it occurred. At Guildford Friary the range seemed to be from c. 2 years to c. 6 years with the vast majority (11 cases) occurring between 3 and 4 years. That the age incidence of enamel hypoplasia varies significantly was demonstrated by Schulz and McHenry (1975) who showed that in modern Americans enamel hypoplasia occurs most frequently in the first 2 months of life (which corresponds to the period of greatest physical vulnerability of the growing child) but that in prehistoric Californian Indians enamel hypoplasia was most common at 4-5 years.

It was difficult to assess the significance of the age occurrence at Guildford Friary particularly since the aetiology of the disease is as yet unknown. Many causes have been suggested ranging from pre-natal disturbance to dietary deficiency and childhood diseases. These were illustrated by El-Najjar, Desanti and Ozebeck, (1978) who concluded that:

> "1. the prevalence shows highly significant sex and racial differences in time and space; 2. it has no specific aetiology; 3. it is a nutritionally and/or disease-dependant condition that may be present in any segment of human populations; and 4. in the groups studied it has significantly declined in both white and

black groups probably as a result of improved nutritional conditions and the elimination of common childhood diseases". Since the age incidence of enamel hypoplasia at Guildford Friary was centred on 3-4 years it was suggested that the cause of it here was more likely to be post-weaning dietary deficiency and disease than pre-natal disturbance.

It was not justifiable to make any further analysis with such small numbers but the presence of this feature was important from the consideration that for whatever cause there was interference in childhood growth and development in these individuals. Moreover, from the standpoint of ageing - viz that the teeth tend to reflect disturbance in the skeleton as a whole but to a lesser extent - the presence of enamel hypoplasia implies interruption in growth of an unknown quantity which will be reflected in inaccurate ageing estimates made on the skeleton, a point for which it is impossible to make allowance but which nevertheless should be taken into account.

3.9 Calculus Deposits

Calculus deposits are concretions which form on the teeth, particularly near the gingival margins. Their presence is often missed because the deposits are accidentally flaked off, therefore any record of the amount of calculus present on the dentitions of any population sample must always be slightly suspect.

Results

At Guildford Friary 11 individuals had no deposits present, 6 had very slight deposits, 10 had slight calculus, 9 could be scored as moderate and 5 had heavy or marked calculus deposits present. 39 cases were recorded as having no data available.

Table 17. Presence of Calculus Deposits on the Teeth

Degree of Deposit	No of Individuals
None	11
Very slight	8
Slight	7
Moderate	10
Heavy	5
No Data Available (includes 21 from Pit 161)	72
Total:	113

Although calculus does not seem to have a high margin of correlation with the production of caries (Brothwell, 1972) it is often associated with periodontal disease and irritation of the gums. Thus it was not surprising (in view of the severe periodontitis recorded above) that of 41 individuals for whom data were available, 30 had calculus deposits present in some form and it would be expected that the rate for the population sample as a whole would have been high. Plate 26, mandible of S214 shows a marked degree of calculus present in particular on the labial surfaces of the incisors.

3.10 Other Anomalies

There were no odontomes or tumours or such anomalies recorded for any of the individuals from this population sample.

Although, as already mentioned, there were virtually no cases of third molar impaction, there was an unusual case in S214 where the maxillary left central incisor was apparently impacted far back in the midline of the palate and the socket resorbed. (See Plate 28). X-ray failed to elucidate just how the tooth was impacted or in what direction it lay but there was little doubt that in spite of its odd position it was the central incisor.

3.11 Discussion

Of the dental evidence available there were few conclusions that might be reached but one or two aspects of the results (notably genetic affinities and diet) did merit consideration.

3.11.1 Genetic Affinities

The problem of trying to evaluate genetic affinities within and between any population samples is that the actual genetic causation of certain dental traits is unclear and the degree to which environment plays a part in their occurrence is unquantified. Therefore any statements with regard to the possibility of inherited traits a) being present, b) demonstrating relationships in a sample cannot be accepted as conclusive or final. Nevertheless it seems that many of these traits do have a high genetic component and at Guildford Friary it was decided to examine their distribution to see if any patterns emerged.

Rotation/Crowding

This feature, when it occurred, was present in the anterior teeth only with no

apparent correlation with any evidence for crowding or impaction of posterior teeth, and therefore it was postulated that there was a probable genetic basis for its occurrence; further its presence in the south-west area of the nave was noted. Closer analysis of these points shows that in the nave of the church crowding of anterior teeth was present in the following individuals: S340, S321, S333, 337A/B, 337B/A, S334, S362 (slight only) and S356. There was no crowding present in 297B, S214, 282, 339, 205A, 305B, S172, S366, S364, S376 or S359. No data were available for any of the other burials in the nave of the church. With the exception of S362 and S356 all of the individuals with crowding came from the south-west corner and were adjacent burials. No conclusion could be reached on the basis of this evidence alone but it could be considered with other information. Data from the cemetery were insufficient for analysis to be justified.

Absence of Teeth

There was very little evidence available for this feature but it was of interest to note that the 2 cases in the nave of the church, 282 and S305, were adjacent burials.

There were insufficient data available for discussion of occlusion or supernumerary cusps or teeth, both of which traits do have a genetic component.

3.11.2 Dietary and Hygienic Considerations

Evidence for diet in the dentition may be obtained from the following features: dental wear, caries and/or abscesses, periodontal disease, and enamel hypoplasia. It was only possible on the data available to consider the results in general terms.

Dental Wear

Dental wear at Guildford Friary was present from slight to severe degree, as would be expected in a population sample with this age distribution. The main point of interest was that when compared to the chart based on Anglo-Saxon skulls by Miles (1963) wear seemed to be more severe at an earlier age in that sample, suggesting a lower rate of wear at Guildford Friary. It was tentatively suggested that this might have been in part the result of less abrasion of the teeth, ie. less hard material in food, presumably as a result of a softer diet and better methods of food preparation. The asymmetry of wear (greater in incisors and molars) may also in part have been indicative of a softer diet, the wear of the incisors in particular possibly suggested a relatively high meat content.

Caries and/or Abscesses

The DM rate and the position of caries on the teeth were of interest. Occlusal caries

were uncommon, as found elsewhere in Medieval populations by Moore and Corbett (1971 and 1973) and they suggested that this might be linked a) to periodontal disease at the necks of the teeth causing caries in those areas and b) the general absence of sucrose (cane sugar) from the diet (sugar was available at this period but not in quantity until the 17th century). This evidence therefore possibly suggested a diet relatively low in sugar and other similar caries - predispositive foods. (Note that this makes no allowance for an inherited susceptibility to caries).

Periodontal Disease

The precise aetiology of periodontal disease is unknown but it is fairly well established that there are a number of factors involved, including soft diet and poor dental hygiene. The severity of periodontal infection at Guildford Friary (28 out of 40 individuals scored as severe) suggested both a fairly soft diet and poor dental hygiene.

Enamel Hypoplasia

This feature does not provide evidence for adult individuals since it only affects teeth during the active period of enamel matrix formation but it was suggested that the preponderance of enamel hypoplasia at 3-4 years in the Guildford Friary sample indicated dietary deficiency or disease in childhood rather than maternal nutritional imbalance or some such factor. This is further substantiated by the evidence, in American children, for decline in incidence of enamel hypoplasia with improving environmental conditions. (El-Najjar, Desanti and Ozebek 1978).

Evidence for diet was limited at Guildford Friary but it does seem to have indicated a relatively soft diet (possibly involving more meat and better preparation of food than at ealier periods) but with poor dental hygiene. The only evidence for inadequacy of diet (deficiency malnutrition) in the dentitions came from the incidence of enamel hypoplasia outlined above.

4. Population Variability

It was one of the aims of this report to study the material from Guildford Friary in an attempt to establish what similarities or differences could be found between the burials from areas A and B of the cemetery and the nave of the church. For this purpose the material was examined for metric and non-metric traits of the skeleton.

The value of using metric traits for analysis is that they provide objective statements concerning continuous variables (eg cranial size and shape). This is of itself a disadvantage since it is an attempt to express in discontinuous, two-dimensional terms features of the skeleton which are neither discontinuous nor two-dimensional. This fact tends to become obscured in describing metric traits. However it is felt that this method is justified since it enables comparison within and between populations of normal skeletal variability.

Non-metric traits of the skeleton are generally of 2 categories: discontinuous, expressed as present or absent (eg. accessory infraorbital foramina) and continuous, scored by degree (eg. gonial eversion, mandibular torus). These are all assessed subjectively but whilst scoring for the former is relatively simple and less open to observer error the latter are the reverse (Corruccini 1974). However the advantage of non-metric traits is that to some extent more is known about the mode of their inheritance and genetic/environmental influences upon their expression. Many non-metric traits seem to have a strong genetic link (eg mandibular tori and wormian bones have been found in juveniles and infants) which cannot be stated of metric traits. Nevertheless it is extremely difficult to reach conclusions concerning the genotype from phenotypic observations. Therefore for the Guildford Friary sample both metric and non-metric observations of the skeleton were employed in an attempt to analyse population relationships within the site but allowance was made for possible observer error and the inconsistencies of the methods involved. Clearly any conclusions could only be tentative and the lack of precise knowledge with regard to possible genetic and environmental influences should be noted.

4.1 Metric Observations

4.1.1 Metric Observations: Cranial

Examination of the material from Guildford Friary showed that unfortunately very few individuals were sufficiently well preserved for cranial measurements to be possible. As a result analysis was confined to the relationship between maximum cranial length and breadth as expressed in the cranial index (maximum breadth/maximum length x 100) which may be useful in describing the general shape of the skull. Only 17 complete adult crania were available for study: it is not clear to what extent, if any, these skulls had become warped by post-mortem compression (weight of soil etc), certainly a number of skulls which had to be excluded showed clear signs of warping; however none of those used for this analysis were obviously damaged and it was decided that the effects of warping, if present, would not be such as to effect the overall result.

Table 18. Cranial Metrics (all measurements are in mm).

Burial No	Sex	Length (L)	Breadth (B)	Cranial Index
S102	M	186.0	141.0	76.0
S259	M	181.0	140.0	77.35
S166	M	187.0	142.0	75.94
282	F	188.0	141.0	75.0
S305	M	181.0	148.0	81.78
340I	F	161.0	148.0	91.93
S321	F	213.0	180.0	84.51
S333	M	181.0	158.0	86.34
263	?M	183.0	137.0	75.69
337A/B	M	206.0	184.0	89.32
S214	M	186.0	141.0	75.81
S172	F	163.0	134.0	82.21
S362	M	188.00	140.0	74.5
S366	M	196.0	144.0	73.47
S364	M	188.0	158.0	84.04
S376	??M	189.0	156.0	82.59
S359	M	185.0	136.0	73.51

Range of Results Obtained

	Total Range	Modal Value	Modal Range
Maximum Length	161.0-213.0	(181.0 (188.0	180.0-189.0
Maximum Breadth	134.0-184.0	141.0	140.0-150.0

Range of The Cranial Index

Cranial Index (%)	No of Individuals
Dolichocephalic $\leq$ 74.99	3
Mesocephalic 75-79.99	6
Brachycephalic 80-84.99	5
Hyperbrachycephalic $\geq$ 85.00	3
	Total: 17

Total Range: 73.47 - 91.93%

Plate 29 shows the range of variability as seen from above, and Plate 30 is the frontal view.

There was no apparent sexual dimorphism with regard to either of the cranial measurements or the cranial index, although the few females did seem generally to be smaller. Note that a high value for, for example length, correlated with a high value for breadth; this would not be the case if warping were present. It was interesting to note that the 3 examples of dolichocephaly all came from the same area of the nave of the church and that those exhibiting hyperbrachycephaly were also fairly closely grouped.

These findings were similar to those from Chelmsford Priory in terms of the range of measurements (no data available for the index). Unfortunately the sample is too small and the number of individuals available for measuring too limited for these findings to be of much comparative use with other population samples, however the results do serve to emphasize the range of normal variability that may be found in one small population sample.

4.1.2 Metric Observations: Post-Cranial

Apart from the maximum lengths of the limb bones which were taken for estimating stature and the diameters of the femur and humerus (for sexing) a number of other post-cranial measurements were made for comparative purposes. These included maximum length of the clavicle, epicondylar width of the humerus, maximum diameter of the radial head, and bicondylar breadth of the tibia. Of these the epicondylar width of the humerus was the only one present in sufficient quantity to justify further analysis. A number of indices were also calculated to assess the relative proportions of the limbs. The maximum lengths of the humerus, femur and tibia were compared for each individual where possible to assess degree of asymmetry.

The epicondylar width of the humerus could be measured in 32 individuals from the whole site. The range of values was from 5.2 cm to 7.3 cm with the majority placed between 5.5 cm and 7.0 cm. Distribution of different results for this measurement was similar at all 3 areas (cemetery A and B, and the nave of the church) and the only significant point that can be deduced from such a small sample was that the 4 females for whom measurements were available clearly occupied the lower end of the scale (2 were below 5.5 cm and 2 were 5.7 cm - note that only 2 individuals were below 5.5 cm anyway).

The platymeric and platycnemic indices of the femur and tibia may be used to describe the degree of antero-posterior flattening (femur) or transverse flattening (tibia).

Table 19. The Platymeric Index - Results at Guildford Friary

	No of Individuals				
	Cemetery			Nave	Total
	Area A	Pit 161	Area B		
Hyperplatymeric ≤ 74.99%	3	-	-	2	5
Platymeric 75.00-84.99%	4	14	3	9	30
Eurymeric 85.00-99.99%	3	2	1	10	16
Stenomeric ≥ 100.00%	1	-	-	2	3
Asymmetrical	2	-	-	7	9
Total:	13	16	4	30	63
		33			

In some cases only one side was available for measurement therefore there may be more cases of asymmetry than were actually recorded here.

Overall the results indicated that the majority of individuals were either platymeric or eurymeric with no clear cut difference between the nave of the church and the cemetery.

Table 20: The Platycnemic Index - Results at Guildford Friary

	No of Individuals				
	Cemetery			Nave	Total
	Area A	Pit 161	Area B		
Hyperplatycnemic ≤ 54.9%	-	-	-	-	0
Platycnemic 55.0-62.9%	-	-	-	-	0
Mesocnemic 63.0-69.9%	-	1	-	2	3
Eurycnemic ≥ 70.0%	8	9	3	21	41
Asymmetrical	2	-	1	1	4
Total:	10	10	4	24	48
		24			

Clearly therefore there was a remarkable degree of homogeneity in this population sample with regard to the shape of the tibiae. Further the femora although not so concentrated were mostly limited to the middle ranges of the platymeric index. However the small size and hence possible bias of the samples must be emphasized.

The brachial index provides a measure of the relative proportions of the arms, the higher the index the longer the forearms.

Table 21: Results for the Brachial Index

Index (%)	No of Individuals
65-70	1
70-75	18
75+	4
Asymmetrical	1
Total:	24

The crural index measures the ratios of the lower extremity, the higher the index the longer are the forelegs.

Table 22: Results for the Crural Index

Index (%)	No of Individuals
75-79	16
80-85	11
75-85) Asymmetrical	2
80-90)	1
Total:	30

There was no significant difference between the findings for either area of the cemetery or the nave of the church. Comparison of the results for the crural index to the brachial index showed that the population had relatively shorter forearms than it did forelegs.

The intermembral index may be used to assess the relative proportions of the lengths of the arms to the lengths of the legs $\frac{\text{humerus + radius}}{\text{femur + tibia}} \times 100$

Table 23: Results for the Intermembral Index

Index (%)	No of Individuals
65-69.99	12
70-74.99	5
Asymmetrical	1
Total:	18

It could be stated that this feature for this population sample was relatively homogeneous in expression.

The maximum lengths of the humerus, femur and tibia were compared to assess the degree of asymmetry.

Although the sample size was small the results, for the humerus at least, were consistent:

Table 24: Asymmetry of the Humeri

	No of Pairs		
	Cemetery	Nave	Total
Right > Left	6	13	19
Left > Right	1	1	2
Symmetrical	-	1	1
Total:	7	15	22

Range: Right > Left: 1-10mm (1cm)
Left > Right: 2-5mm

Whole site: Mean difference in length: 5mm
Modal difference in length: 6mm

Where data were available it appeared that the finding was relevant for the whole arm: thus for S356 the right humerus was longer by 7 mm, the right radius by 4 mm and the right ulna by 9 mm. There were no examples of individuals with humeri of the same length.

The data for the femur and tibia were not as clear cut as that for the humerus.

Table 25: Asymmetry of the Femora

	No of Pairs		
	Cemetery	Nave	Total
Right > Left	2	10	12
Left > Right	4	10	14
Symmetrical	1	1	2
Total:	7	21	28

Range: Right Left: 1-8mm
Left Right: 1-12mm (1.2cm)

Whole site: Mean difference in length: 4mm
Modal difference in length: 1mm)
2mm)

Table 26: Asymmetry of the Tibiae

	No of Pairs		
	Cemetery	Nave	Total
Right > Left	2	5	7
Left > Right	4	9	13
Symmetrical	3	3	6
Total:	9	17	26

Range: Right > Left: 2-11mm (1.1 cm)
Left > Right: 1-10mm (1.0 cm)

Whole Site: Mean difference in length: 3mm
Modal difference in length: 0mm (Symmetry)

However comparison of these figures showed that correlation of asymmetry was fairly high. Thus where the left femur was longer than the right there were 4 cases of the same being true of the tibia but only one of the tibia showing the reverse result, and in this case (S357) it was not sufficient to compensate (left femur greater by 1.2 cm, right tibia greater by 2 mm). Where the right femur was the longer of the pair there were 4 cases of the tibia producing the same result, but this time there were 3 cases of the left tibia being longer (although again not sufficient to compensate). There were 2 cases of the femora being of different lengths but the tibiae being the same. There were no instances in the nave of the church of the femora being of the same length but the tibiae different (one case only in the cemetery).

Assessment for any degree of sexual dimorphism could only be made on the material in the nave of the church where data from 4 females showed a similar symmetric pattern to males (and therefore was included in the above results).

Clearly the amount of data available was small, however the results, particularly for the humeri were unambiguous. It may therefore be stated that of those pairs of humeri, femora and tibiae available for measurement nearly all were asymmetric to some degree: the humeri showed the most consistent pattern in that in virtually all individuals the right was longer than the left, this was repeated, in reverse, in the femora and tibiae but although overall left femora and tibiae were longer than right there were more individuals present with right longer than left than there were for the humeri. Further the modal value for the humeri was much higher than for either the femora or the tibiae.

This asymmetric pattern has been noted elsewhere (Caffey, 1978) where it was reported as being a part of normal variability. Stewart (1979) suggested that the feature might be indicative of handedness. Whether or not this was the case with the

Guildford Friary material was not conclusively shown on this amount of material, it was merely possible to say that in general the right upper extremities were longer than the left and the left lower extremities were longer than the right (which suggests more right than left-handed people).

4.2 Morphological Observations

4.2.1 Morphological Observations: Cranial

Skulls from Guildford Friary were scored for the following non-metric features (for detailed descriptions see Berry and Berry 1967, El-Najjar and McWilliams 1978 and Brothwell 1972):

Metopism: Plate 30- S364 was an example of this condition.
It was found to be present in 4 of 26 individuals available for examination.

Supraorbital Notch/Foramen: At Guildford Friary 10 individuals had a notch only present on both sides, 2 had data for one side only where a notch was present, 2 had a notch on one side and foramen on the other (one of the foramina was found to be blind), one had a notch on one side and notch with foramen on the other, one had a foramen on one side and notch with foramen on the other, 3 had a single foramen present on both sides, 2 had a notch with foramen present on both sides and one had a notch with foramen on one side and 2 foramina on the other.

Frontal Foramina: At Guildford Friary a total of 22 individuals were examined: 9 had no foramina present, 6 had a single foramen on one side and nothing on the other, 3 had single foramina present on both sides, one had a single foramen on one side but no data for the other and 3 had multiple (2 in all cases) foramina on one side and a single on the other. There were no instances of multiple foramina being present on both sides.

Superior Nasal Junction: Of 16 individuals that could be examined 3 had an angled junction, 2 were square and 11 were rounded.

Supraorbital Torus: Degree of expression of the trait was ignored here but form was examined. Data was available for 23 individuals all of whom were found to have a divided - V shape in this region.

Infraorbital Suture: 9 individuals only were available for examination: 2 had no suture present on one side and no data for the other, 2 had no suture present on

either side, 3 had a suture present on one side and no data on the other and 2 had a suture present on both sides.

Accessory infraorbital foramina: 16 individuals could be examined: one had no foramina on one side and no data on the other, 2 had one foramen present on one side and no data on the other, 2 had one foramen on one side and none on the other, 2 had a single foramen present on each side, 2 had a single foramen on one side and multiple foramina on the other, 2 had multiple foramina on one side and no data on the other and 5 had multiple foramina on both sides.

Inferior Nasal Margin: 17 individuals were examined: 11 had a sharp inferior nasal margin, 2 were blurred and 4 were grooved.

Wormian bones: All sutures and sutural junctions were examined in the Guildford Friary skulls. Of 26 individuals only one was found to have an ossicle present at bregma. Of 27 individuals only one had a wormian bone present in the coronal suture (one present on one side only). In the sagittal suture only one out of 19 had wormian bones present (4 bones). Three of 31 individuals had a lambdoid bone present at lambda. Of 34 individuals examined for lambdoid suture wormian bones 17 had none present, 3 had one present on one side only, one had several present on one side and none on the other, 2 had a single bone on each side, one had several present on one side but no data for the other, 3 had several on one side with a single on the other, and 7 had multiple wormian bones present on both sides.

Of 15 individuals only one had a wormian bone present in the occipito-temporal suture (on the right side only). Of 18 individuals one had an asterionic bone present on one side but no data available for the other, and 4 had a bone present on one side only. No individuals (of 9 available) had an os japonicum present. In the region of the incisura parietalis 18 individuals had data available: of these 9 had notches present on both sides, 2 had bones present on both sides, one had a notch on one side and bone on the other, one had neither present, one had a bone on one side and nothing on the other, 3 had a bone present on one side but no data on the other, and one had absence of the trait on one side and no data on the other.

Pterion Form: At Guildford Friary only 8 individuals could be examined: 6 had what is known as a H-pattern on one side (no data on the other), one had an H-pattern present on both sides and one had an epipteric bone present on one side (H-pattern on the other).

Mastoid Foramina: 22 individuals were examined: 5 had no foramen present at all, 4 had a foramen present on the temporal bone on one side but no data for the other, 2 had a foramen present suturally on one side (no data on the other), one had a foramen present on the temporal bone on one side but absent on the other, 2 had a single foramen on the suture on one side, absence of the trait on the other, one was simply recorded as single foramen present on one side but absent on the other, one had a temporal foramen present on one side and a sutural on the other, one had 2 temporal foramina on one side with a single sutural on the other, 2 had single sutural foramina on each side, one had single temporal foramina on each side, one had a sutural and a temporal foramen on one side and a temporal on the other and one had a sutural and an occipital foramen present on one side but no data available for the other. The most common locus for the mastoid foramen in this sample was on the mastoid portion of the temporal bone, followed by the sutural region. Mastoid foramina on the occipital bone were exceedingly rare.

Posterior Condylar Canal: 12 individuals could be examined, of these 2 had a foramen present on one side but no data on the other, 2 had absence of the trait on one side (no data on the other), 4 had a fossa present on one side (no data on the other), 3 had fossae present on both sides and one had a foramen present on one side and a fossa on the other. Therefore the condition existed whereby a fossa was the most common expression of the trait.

Foramen Hypoglossi (Anterior condylar canal): of a total of 21 individuals, 13 had single foramina present on both sides, 2 had a single foramen on one side (no data for the other), one had a single foramen on one side and a single foramen with spurs on the other, 3 had double foramina on one side and single on the other, one had double foramina present on both sides, and one had foramina present on both sides but they were closed. The most frequent expression was therefore one of single foramen on both sides.

Occipital Condyle: 22 individuals were examined, of these 11 had single condyles on both sides, 5 had single condyles on one side (but no data available on the other), 3 had a single facet on one side and a waisted on the other, 3 had waisted condyles present on both sides. There were no instances of double condyles in this sample.

Shape of External auditory meatus: In 25 cases it was found to be ovoid and in 5 it was round.

Mandibular Foramen: Of 31 cases examined all had single mandibular foramina present.

Mylohyoid Groove: Of 31 individuals examined 20 had open grooves on both sides, 5 had an open groove on one side but no data available for the other, one had a spur on one side but no data on the other, one had a bridge on one side and no data available on the other, 2 had a bridge on one side and an open groove on the other, and 2 had bridged grooves on both sides.

Mandibular Coronoid/Condylar Height: Of 24 individuals observed 14 were found to have the condyle higher than the coronoid and 9 were found to be the opposite. One individual was found with these 2 features of equal height.

Mandibular Torus: Of 36 individuals examined a torus was present - slight in 2 individuals and present in more definitive form in one. (S214 see Plate 27).

Gonial Eversion: Of 31 individuals for whom data were available eversion was found to be absent in 6, very slight in 2, slight in 7, moderate in 9 and marked in 7. This distribution did not appear to be affected by the age of the subjects, viz individuals of 45-50 years with very slight eversion and with marked eversion. The same applied to young adults. It was not really possible to test for sexual dimorphism as there were only 2 females present in the sample, one with none and one with moderate eversion.

Mental Foramina - Number: Of 35 individuals, 32 had single foramina present on both sides, one had one side single and the other side closed and 2 were double on one side and single on the other.

Mental Foramina - Position: 33 individuals available. In one individual it was at the first premolar, in 7 between the first and second premolars, in 16 at the second premolar, in 6 between the second premolar and the first molar and in one at the level of the first molar. In only 2 individuals was the positioning of the foramen found to be asymmetric and they were placed at, on the one side, the second premolar and on the other between the 2 premolars.

Chin Form: Observed on 35 individuals: 2 of these had pointed chins, all the rest were found to be bilateral.

4.2.2 Morphological Observations: Post-Cranial

A limited number of features were scored in this population sample.

Suprascapular Area (Scapula): In no cases was there complete absence of a notch among those examined. Of a total of 22 individuals, 4 had a notch present on

on both sides, 6 had a notch on one side (no data available for the other), 3 had a notch on one side and a deep notch on the other, 4 had a deep notch present on both sides, 3 had a deep notch present on one side (no data for the other) and 2 had a foramen present on one side (no data for the other). The commonest occurrence was of a simple notch.

Superior Condyle of the Atlas: Of a total of 21 individuals examined 5 had single condyles present on both sides, 6 had a single condyle on one side (no data available on the other), 4 had waisted condyles on both sides, one had a waisted condyle on one side (no data for the other), 3 had a waisted condyle on one side and a double on the other and 2 had double condyles on both sides. In general there was found to be a fairly high degree of correlation between the atlas and the occipital condyles with the exception that double atlas condyles corresponded with 'waisted' occipital condyles, not with single.

Transverse Foramen Bridging: Each cervical vertebra was scored on both sides for this trait. Of 22 atlas vertebrae none were bridged and the same applied to 24 axis vertebrae and 20 third cervical vertebrae. 19 fourth cervical vertebrae were examined, 2 of which had spurs on one side (no data on the other) all the rest were single. Of 22 fifth cervical vertebrae 13 had single foramen present on both sides, 2 had a single foramen on one side (no data available on the other), one had a spur on one side (no data on the other) one had a spur on one side and a single foramen on the other, one had spurs present on both sides, 3 were bridged on one side and single on the other and one was bridged on both sides.

Among the sixth cervical vertebrae 20 could be examined, 8 had single foramen on both sides, one had a single foramen on one side (no data for the other), 2 had a spur on one side and bridge on the other, 4 were single on one side and bridged on the other, 2 were bridged on both sides and 3 had a bridge on one side (no data for the other).

Seventeen seventh cervical vertebrae could be examined: of these 10 had single foramen present on both sides, 4 had a single foramen present on one side (no data for the other), one had a single foramen on one side and a spur on the other, one was bridged on one side (no data for the other) and one was bridged on both sides. Therefore it was concluded that the incidence of bridging of the transverse foramen of the cervical vertebrae was highest in the sixth cervical vertebrae, followed by the fifth; that the trait was present in the fourth and seventh vertebrae but that it was absent in the first 3 cervical vertebrae.

Humerus - Septal Aperture: In 44 individuals examined from Guildford Friary

none were found with this trait.

Feet - Os Trigonum: Of 30 cases this was found to be present in 2 individuals (on one side only).

Other Anomalies

Anterior Femoral Curvature

Plate 33 illustrates the right femora of 282 and S172 in profile to show the variability of degree of anterior femoral curvature present. Although these 2 individuals were both females this kind of variability was noticed in the males of this population sample as well. However it was not a trait that was scored for each individual. This variability in anterior femoral curvature has been suggested to be indicative of race (Stewart 1979). However the cause of this trait is unknown, thus it is not clear whether there are genetic predisposing factors towards curvature or whether the feature is a response to environmental stress of some kind. With regard to this population sample, in the light of its probable archaeology (ie that the sample is probably all Caucasian), this degree of difference may best be viewed as reflecting normal variability within a population sample, part genetically, part environmentally caused.

Lumbosacralisation of Vertebrae

The burials were not scored individually for the presence of anomalous numbers of pre-sacral vertebrae however in 3 individuals this feature was noted.

Plate 34 illustrates S333 which had a complete lumbosacralisation of a sixth lumbar vertebrae. In S196 a transitional lumbo-sacral vertebra was present ie there was partial sacralisation of the last lumber vertebra. This vertebra may be L5/L6: the vertebra which numerically should be L1 has the appearance of a thoracic vertebra which suggests that there were 13 thoracic vertebrae instead of 12, rather than 6 lumbar vertebrae instead of 5. Unfortunately this could not be confirmed because the necessary identification marks on L1/Th 13 were missing. Fusion of the last lumbar vertebra to the sacrum was complete laterally but centrally and anteriorly there was non-union of the bone.

Reduction in the Medial Epicondyle of the Humerus

Reduction in the size of the medial epicodyle of the humerus was found in 3 individuals from Guildford Friary (S356, S364, and 337A - see Plate 32).

In all occurrence was unilateral: on the right in S356 and on the left in S364 and 337A. The aetiology of this trait is unknown, whether it be a genetic or developmental defect (eg as a result of injury), and the effect that it would have on the elbow joint and forearm is unclear. (The sulcus for the ulnar nerve crosses the posterior surface of the medial epicondyle and the superficial group of forearm flexor muscles are attached to the lower part of the anterior surface - Gray's Anatomy 1973).

4.3 Discussion

Although a fair number of metric and non-metric features of the skeleton were recorded for the site it was one of the unfortunate features of the sample that the actual amount of data available for individual variables was small. This applied particularly to the cemetery where preservation of material was not as good as in the nave of the church. This small size of the samples must be emphasized in any examination of the data. However a certain number of broad observations could be made.

The data showed that there was a remarkable degree of homogeneity throughout the site. This was particularly illustrated by the results for post-cranial metrics in the cemetery and the nave of the church. The post-cranial metrics constituted the only data for the cemetery but in the nave results for cranial metrics showed that the middle ranges for the cranial index were randomly distributed and this applied also to the morphological form of the supra-orbital region. These findings do not imply that there were no differences to be observed (obviously, since no two individuals are alike), but rather reflects the origins of this population sample and similarity in results is therefore all that would have been expected for the site as a whole.

More detailed analysis showed some slight evidence for grouping in the nave of the church (for the most part there were insufficient data available for any analysis of the cemetery). Thus in the nave of the church it could be shown that the metric extremes of cranial shape were confined as follows: dolichocephaly to the north-west corner and hyperbrachycephaly at the south-west end. Morphologically on the skulls there was some evidence for grouping in four traits: Metopism, frontal foramina, wormian bones and bridging of the mylohyoid groove of the mandible. These also apparently separated the north and south ends of the church, and possibly the east, but note the limited nature of the evidence.

Post-cranial metrics showed some evidence for grouping in one feature only. The suprascapular area of the scapula was found to be deeply notched on individuals

mainly from the north-west corner of the nave (with the exception of 282 and S333), S196, S104 and S105 from area B of the cemetery were also found either to have deep notches or foramina present which might have suggested some biological affinity between them.

The results for metric and non-metric observations were clearly restricted in terms of analysis for population variability, particularly in comparison of the cemetery and the nave of the church. Nevertheless there were certain conclusions which could be reached: the samples (cemetery and nave) most probably came from one population sample overall, which is what might be expected of the data. However there was some limited evidence for grouping hence genetic relationships between individuals, largely confined to the nave of the church which in the absence of further osteological data could not be taken as conclusive.

5. Pathology

"Pathology" in the sense employed at Guildford Friary was defined as covering the general health of the population sample. Thus evidence for trauma and injury, fractures, stress, deformity, (degenerative joint disease) and human interference (medicine) were all considered.

5.1 "Accidental" Injury

5.1.1 Fractures

There were no fractured bones present in any of the individuals examined from Guildford Friary (except a possible hairline fracture of a rib on S110 - see below 5.1.2). This was unusual since in a population sample of 113 some healed fractures might well be expected. Possibly fractures were conspicuous by their absence and therefore this finding reflects the status of the whole sample. Comparison with the material from Chelmsford and Stonar showed that although some healed fractures were found at both of these sites these were not numerous.

5.1.2 Injury and Trauma

The evidence for injury and trauma was obviously confined to individual cases, as outlined below.

The second lumbar vertebra of S333 had a cleft with very slight displacement between the superior and inferior articular processes of the right side possibly representing a spondylolysis (Plate 35). This was recorded by both Paul and Juhl

(1967) and Grant (1972) as a common occurrence in the lumbo-sacral region but as being rare in any higher than the fourth lumbar vertebra. However there was no doubt that this was the second lumbar vertebra nor was the condition present in any of the other vertebrae. Therefore the diagnosis of spondylolysis could not be taken as positive and the likelihodd of an unhealed stress fracture or traumatic injury had to be included.

There was an ossified haematoma on the linea aspera in the area of attachment for the adductor longus muscle on the right femur of S128 (Plate 36). This was an example of a traumatic myositis ossificans which usually occurs as the result of a repeated injury or a single trauma, (Boyd 1947, Illingworth and Dick 1979, Paul and Juhl 1967). Which was the cause of the injury in this case was unknown. There were no other examples of traumatic myositis ossificans at Guildford Friary.

There was evidence for the presence of an exostosis antero-laterally on the inferior half of the right femoral shaft of S334 (Plate 37). There was no evidence for other bony changes in the femur, or indeed, the right lower extremity. Simon (1973) has pointed out that information concerning exostosis is uncertain except that they may follow periosteal damage or trauma. In this case there was no evidence for a fracture, therefore the exostosis was probably caused by a localised injury to the surface tissue and periosteum.

S110 had a similar exostosis on the broken shaft of one of the ribs. Unfortunately the ribs were very fragmentary, but none of the others present showed any pathological changes. There was no obvious fracture although the possibility of a hairline break could not be excluded.

The anterior surface of the right tibia of S366 had an area of ossified bone in the inferior third (Plate 42). There was no evidence for any other pathological changes in the lower extremities of this individual. Radiography of the bone showed that it was clearly periosteal, the edge of the cortex being well - outlined with the shadow of the periosteal bone adjacent. There was no evidence for any fracture to the bone and it was suggested that this represented a late stage in the ossification of an haematoma and its absorption into the cortex after an injury or trauma of some kind.

The proximal femora of S335 are illustrated in Plate 23. The right femoral head had become displaced in a posterior direction, as a consequence of which the anatomical neck had been shortened. The head and its corresponding acetabulum were both slightly distorted also. However there was apparently only a partial dysplasia

of the hip. It was not possible to establish the cause of this condition but likely possibilities included a congenital hip dysplasia, an avulsion fracture of the femoral head epiphysis or a fracture of the femoral neck. However it may be noted that whatever its cause examination of the whole of the right lower extremity showed an unilateral presence of osteoarthritic changes at the knee and the foot, thus there was probably some disability present in that limb.

There was some evidence for dislocation or other injury to the knee joint of 297II, with extensive osteoarthritic lipping on the distal femoral margins and patella but as the bones of the knee joint were badly damaged no further analysis could be made.

5.1.3 Stress

A number of tibiae showed some evidence for thickening of the shaft and alteration to the bony structure. In nearly all the cases listed there was no apparent pathology and radiographs showed no obvious injury or infection. On some individuals the increased bone thickness was confined to the cortex, in some to the periosteum and in some to both.

Table 27 Increase in Cortical Bone Thickness

No	Bones Involved
S124:	Tibiae (Plate 43); Femora, Fibulae
S196:	Left tibia - very marked
161:	Right tibia 7 (Plate 45) and 1
S199:	Left femur
S305:	Tibiae and Fibulae
282:	Femora, Left Tibia (Slight only)

In one of the above individuals was there any apparent alteration to the medullary cavity and the increase in thickness was predominantly confined to the medial borders ot the tibiae (exceptions to this were S124, S199, S305).

An increase in cortical bone thickness by periosteal bone deposition was found in pit 161 left tibia 4 only.

Table 28 Increase in Bone Thickness by Cortical and Periosteal Bone Deposition

No	Bone(s) affected
Pit 161:	Right tibia 1, 4 5
S130:	Tibiae and Tibulae
S199:	Tibiae and Fibulae

There was an unspecified increase in thickness in the following (but probably cortical rather than periosteal): S102, S103, S162, S166, 174, S333, S334, S335, S359, S371, S372.

None of the above cases showed evidence for associated pathology elsewhere in the skeleton which might suggest the presence of a particular disease. There was no evidence for any fracture or injury on any of these individuals. It is suggested that the cause of the increase in bone thickness might have represented a bony response to repeated trauma or stress. Certainly the apparent absence of periosteal deposition of bone excluded local lesions or infections. There was no evidence to suggest that this condition caused any debilitating illness or was itself disabling and therefore in a strict sense must not be regarded as pathology as such but as a physiological response to environmental (including social) conditions.

5.1.4 Deformity

A number of individuals, for whom the feet were present, showed slight or moderate lateral deviation of the hallux (great toe - 1st metatarsal, proximal, medial and terminal 1st phalanges). Further there were bony osteophytic growths present on nearly all the toes affected and in particular on the terminal phalanges. Results for 19 individuals are shown in Table 29.

Table 29 Deviation of the Hallux

Presence/Absence	No of Individuals
Present Left/Right only: Slight	3
Present Left/Right only: Moderate	2
Present Left and Right: Slight	4
Present Left and Right: Moderate	5
Absent Left/Right (no data for one side)	1
Possible presence (lack terminal phalanges)	4
	19

Grading of this feature was confined to presence or absence and an estimate of severity since with bony material only it was impossible to measure the actual degree of deviation of the hallux.

Hallux Valgus is the condition described as lateral deviation of the great toe at the metatarso - phalangeal joint. As well as bony osteophytes, narrowing of the joint spaces as a result of osteoarthritis is common to hallux valgus but again

obviously is not visible in skeletal material. It should be added that the precise cause-and-effect relationship of hallux valgus and arthritis is not clear.

The aetiology of this condition is unknown but badly fitting shoes have been suggested as causative (Simon 1973). Sexual dimorphism with increased involvement of women has also been noted (Simon 1973) but in the present sample analysis for division by sex was not feasible. In this sample in those cases where both sides could be scored a fair degree of asymmetry was noted between right and left feet. However there was only one case with marked osteoarthritis present in the feet (S335) and it was suggested that the arthritis in that individual might have been associated with the hip dysplasia and consequent disability in the right lower limb. It should be stressed that there were no severe cases of hallux valgus at Guildford Friary and that the condition is not in itself disabling.

Hallux valgus was found in individuals from all areas of the site with a marginally increased severity in those from the nave of the church. In the apparent absence of marked osteoarthritic changes (which might have reflected the ages of those involved), and the general lack of severity of the condition it was suggested that it represented a physiological response to stress possibly as a result of the type of footwear worn.

5.2 Degenerative Joint Disease

Observations were made for the presence of osteoarthritis: subdivided into osteoarthritis in the joints of the limbs and chest, and the spine. Incidence by anatomy and area of the site is shown below in Table 30.

Table 30 Incidence of Degenerative Joint Disease by Anatomy and Area
(no account taken of severity)

Anatomy	Cemetery	Nave
Sterno - clavicular junction	1	0
Shoulder	3	1
Elbow	4	5
Wrist	2	1
Hip	6	5
Knee	3	5
Ankle	3	2
Spine	9	9

5.2.1 Osteoarthritis in the Joints of the Limbs (and chest)

The degree of incidence of osteoarthritis in the joints of the limbs was slight in nearly all cases but more marked osteoarthritis was found in S105 at the

shoulder and sterno - clavicular junction, and in S333 at the shoulder (Plate 38).

The sample was too small for analysis of any age or sex correlation of incidence but it was apparent that the occurence of osteoarthritis in the joints of the limbs and chest was virtually nil below the age of 30 years in males and symptoms were only slight up to 40 years. The most commonly affected areas were the hip, knee and elbow.

The total sample of females amounted only to 3 individuals: in one osteoarthritis was present in very mild form in the femoral heads only; in the other two, one had very slight lipping at the sacro-iliac junction and some slight involvement in the spine (osteophytosis) and the last had slight vertebral osteophytosis only. It was noticeable in the females that the incidence of arthritis was at a younger age than in the males (two were aged 20-25 years and one as a young adult). This difference may, of course, have been the result of a sample bias since so few individuals were available for analysis but it was also the case that in the females osteoarthritis was confined to the lower spine and pelvis which might well have been correlated with stress in pregnancy and childbirth which also might have accounted for the disparity in age incidence between males and females.

There were insufficient data available for analysis of the distribution of osteoarthritis in the joints of the limbs and chest on the site.

5.2.2 Vertebral Osteoarthritis and Osteophytosis

As shown in Table 30 the spine was the area most commonly affected by degenerative joint disease at Guildford Friary.

Table 31 Incidence of Vertebral Osteoarthritis and Osteophytosis by Area

	No of Individuals		
	Cemetery	Nave	Total
Osteophytosis	7	7	14
Osteoarthritis	0	1	1
Osteoarthritis and Osteophytosis	2	1	3
Total	9	9	18

The above table shows that the distribution of vertebral osteophytosis and osteoarthritis was approximately equal between the cemetery and the nave of the church.

There were no severe cases of vertabral osteophytosis present and bony ankylosis had only occurred in one (fusion of 8th-9th thoracic vertebrae in S105). The commonest positioning of osteophytosis was in the lower thoracic vertebrae (nos 6-11) followed by the lumbar vertebrae. The significance of this was unclear since the precise aetiology of the condition is unknown (Jurmain 1977), however it was suggested that environmentally induced stress was probably a relatively important factor (viz the weight - bearing function of this area of the skeleton) and that genetics, age and sex must also be considered. The findings were similar to those of Roche (1957) in that osteophytosis was found commonly without osteoarthritis; Roche proposed that osteophytosis is necessary before osteoarthritis can occur and that it has an earlier age incidence, (however note the case of S359 where osteoarthritis of the vertebral articular facets only was present).

Examination of the data by age showed that there was an observable increase in incidence in direct relation to age such that below 30 years there were a greater number of individuals without osteoarthritis or osteophytosis but above 35 years almost all individuals showed some sign of the condition (between 30-35 years the numbers were equal).

Thus the overall incidence of degenerative joint disease at Guildford Friary appeared to show a number of points: the condition increased with age being largely absent in those under 30 years; there was no apparent difference in distribution between the cemetery and nave areas; finally the most affected area was the lower thoracic and lumbar region of the spine. It was suggested that most probably a combination of factors were causative including stress, in particular on the spine as a weight - bearing area, and age. The small size of the sample examined must be emphasized since it was of a size relative to the total sample to be totally misleading: thus, for example, the observed mildness of the condition might not have been true of the population nor even of the whole sample and absence in younger individuals may merely have been the result of those in whom it was present in youth having survived to a greater age.

5.2.3 Vertebral Hyperostosis (Hypertrophic arthritis, Forestier's Disease)

This condition occurs with ossification of the anterior ligaments of the spine and often uneven bony bridging of the intervertebral articular facets. It is generally found amongst the elderly as part of the ageing process and is asymptomatic (Paul and Juhl 1967). It may be distinguished from ankylosing spondylitis by the absence of the affection in the lumbosacral spine and sacroiliac joints and by the unilateral occurrence of ligamentous ossification where a classic ankylosing spondylitis is bilateral. There were two possible cases at

Guildford Friary: 338 (Plates 39 and 40) and S103.

In 338 there was ossification of the anterior spinal ligaments from the 4th-11th thoracic vertebrae. Plate 39 illustrates this and also the involvement of two ribs and Plate 40 shows the total absence in the left side, the narrowing of the intervertebral disc spaces and slight compression of the 10th and 11th centra. There was no evidence for the condition in the lumbar vertebrae or the pelvis.

S103 had only two vertebrae actually fused (Thoracic 10 and 11) but there was evidence for the condition in the 4th-12th thoracic vertebrae. A tentative diagnosis of vertebral hyperostosis was made on the basis of unilateral ossification of the anterior spinal ligaments and the absence of the condition in the lumbar and pelvic regions.

Both 338 and S103 were X-rayed and showed some evidence for bone decalcification (commonly found in vertebral hyperostosis). S103 was aged 45-50 years and 338: 25-30 years. Thus the diagnosis of 338 as a case of vertebral hyperostosis must be regarded as dubious in view of the age of that individual (with the proviso that age may have been mistakenly assessed).

5.3. Disease Presence

5.3.1 S110 - A possible Case of Leprosy

S110 came from Cemetery Area A; bone preservation was generally poor and only approximately two-thirds of the skeleton was present. However there was substantial evidence for antemortem pathological changes to the skeleton which may be described as follows:

Head, Arms and Chest: No evidence for any changes to the skull, ribs, left scapula, left clavicle, proximal ulna and left humerus.

Hands; 5 metacarpals and 3 phalanges only were present. The metacarpals were largely unaltered but two of them showed signs of osteoporosis. The proximal phalanx was normal but the two distal phalanges both had clefting of the distal tufts. This was marked on one but on the other the tuft had been almost completely resorbed and the distal surface flattened. The proximal articulations of these bones were normal.

Pelvis: Only a sacral fragment and part of the left innominate were present. The sacral bone showed no alteration but the innominate had some subperiosteal

deposition of bone between the greater sciatic notch and the ischial spine which was itself enlarged and darker in colour than the surrounding area. The periosteal bone showed up on X-ray as did some evidence for bone decalcification. The pubic symphysis had an enlarged, porotic surface.

Femora: Neither femur manifested bone changes but there was some subperiosteal depositioning of bone on the left distal extremity.

Tibiae: The right tibia which was only present in the proximal third had marked subperiosteal bone deposits on the medial border and to a lesser extent on the lateral. The left tibia was worse affected than the right with most of the bone present and subperiosteal bone deposits on both the lateral and medial borders (but more marked on the lateral border where it had a prominent margin, especially round the fibular notch). Both bones showed some evidence for thickening of the shaft.

Fibulae: Observations were confined mostly to the left leg since there were only two fragments present from the right. The left fibula had very marked chronic inflammatory periostitis with deposition of new bone (Plate 22), which was greatest on the medial border. There was some evidence for thickening of the proximal shaft but not for any lateral striations on the bone.

Feet: The right foot was represented by fragments of tarsals and metatarsals. The tarsals showed some very slight periostitis and new bone formation but evidence was scanty as the bones were very broken. Parts of four metatarsals were present: the proximal surfaces were normal but the distal extremities showed signs of marked bone resorption and remodelling, as a result of which most of the heads of the bones had been lost. The left foot was very similar to the right except that the calcaneus had marked osteophytic growths on the inferior surface and the fifth metatarsal was flattened with gross osteophytes along its lateral margin. The head of the bone had been entirely lost. Note that the proximal facets of the metatarsals were unaltered.

Clearance 110: There were three bones from the bay marked "Clearance round S110" which were included with S110 on the basis of the pathology. Thus there was a distal ulna fragment with some evidence for osteoporosis, a damaged proximal and a terminal phalanx both from the hand, of which the distal tuft of the terminal phalanx had been totally resorbed such that the bone had a "needle" extremity.

Diagnosis

With such fragmentary representation of a skeleton certain diagnosis was obviously

impossible. However on the following grounds it may tentatively be suggested that this individual represented a possible case of leprosy.

The bone changes listed above were similar to those described for lepromatous leprosy by Moller - Christensen (1961) and Manson - Bahr (1966). In particular the following areas: the terminal phalanges of the hands, the metatarso - phalangeal joints of the feet and the tibiae and fibulae; note also the absence of changes in the humerus, clavicle and scapula. The pathological changes observed were all bilateral. It was suggested that the changes noted in the pelvic region represented a secondary infection.

On the basis of lack of involvement of the joints the possibility of arthritis was ruled out (with the possible exception of gout). However in the absence of evidence, in particular of facies leprosa of the skull, the diagnosis of leprosy cannot be accepted as final for this individual and the conclusion must remain tentative.

5.3.2 Individual Indications of Disease in the Long Bones

Pit 161 Proximal left Femur no 6

This femur manifested pathological changes in the distal half of its shaft (Plate 41). The appearance of the bone was very similar to that of a left femur from Hereford, Castle Green (HE 731 L36 - report J Bayley and Dr Price) which was described as follows:

"Dr Price: There are irregular erosive cortical changes on the lower lateral margin of the femur. There is some reactive sclerosis present. The changes are probably infective and could result from soft tissue infection rather than primary bone infection".

Possible diagnoses in this case included Paget's disease or treponemal infection. However descriptions of Paget's disease (Illingworth and Dick 1979, Boyd 1947, Simon 1973, Paul and Juhl 1967) all include outward bowing of the femoral shaft as a symptom together with resorption and re-alignment of the trabeculae; pathological fracture post-bone softening is also common, all of which were absent in this individual. In a treponemal infection (eg syphilis) there is narrowing of the medullary cavity whereas the opposite was true in this instance. Clearly therefore, without the rest of the skeleton only tentative suggestions could be made as to the nature of the infection.

Pit 161 Proximal Left Tibia No 6)
Distal Left Tibia No 4) Plates 44 and 24.
Proximal Right Ulna No 3)

The above listed fragments of long bones were all marked by prominent pathological changes: There was an increase in thickness of the shaft with an irregular outline with virtual obliteration of the medullary cavity. The bone in the medullary cavity and in the cortex was spongy in character and the distinction between medulla and cortex was blurred. There was some slight evidence for subperiosteal deposition of bone along the borders of the shafts.

In all three cases in the absence of the rest of the skeleton no diagnosis could be made and it was merely possible to state that there was evidence for severe osteitis and osteomyelitis and that this was possibly the result of a soft tissue infection rather than a primary bone infection.

S124

The tibiae were the bones involved in this individual (Plate 50). The main nutrient foramen of the tibia is normally situated in the proximal third of the posterior surface immediately inferior to the soleus line. However in this individual although the right tibia was normal the left nutrient foramen was smaller and placed in the distal third of the shaft. Whether this represented a congenital or developmental defect in the left tibia was unclear. However comparison of the two tibiae showed that the left was much shorter by 1.1 cm) and the shaft much narrower. This might have been the result of a poor blood supply for the nutrient foramen, leading to diminished growth, but it has been stated (Gray's Anatomy 1973) that: "Simple growth considerations, however, do not account for the numerous exceptions to this pattern (ie that of nutrient foramina generally pointing away from the main growing end of a bone) found in various species and sites". The difference in size of the two tibiae might have been the result of a childhood illness or disease but there was no other evidence in this individual for such a diagnosis and the precise cause of the difference between the two tibiae must remain unexplained. The femora were of the same size but the fibulae differed by 1.2 cm, thus the whole of the lower leg would appear to have been affected, which suggested that more was involved than simply an opposed nutrient foramen.

S101

The bones from this individual were in very poor condition so that analysis in detail was not practicable, but on some of the fragments marked osteophytes were

present which on X-ray showed with a generalised reduction in the density of the bone (particularly in the fibulae). No assessment of the cause of this was possible.

5.3.3 Individual Indications of Disease - The Pelvis

S172 and S363

The whole of the pelvic region (including lumbar vertebrae) of this individual (S172) was in a very fragmentary state compared with the rest of the skeleton. However there was evidence for a lesion in the sacro-iliac articulation of the left innominate to which area it was restricted. There were also one or two possible rib fragments from a foetus present amongst the vertebrae. Possibly therefore this individual had an infection associated with a pregnancy but on the evidence available it was not possible to be conclusive. A similar example was found on S363.

5.4 Lesion in the Skull of 375

The left parietal bone of the skull had a hole of about 2.5 cm diameter by 2.2 cm (two diameters taken perpendicular to one another), immediately superior and anterior to the lambdoid suture. The hole was regular in both shape and size although endocranially there was some evidence for damage to its edges. There was no evidence for healing of the bone but the sides of the hole had been smoothed such that the diploe was no longer visible and there were "ripple" or "chatter" marks, possibly caused by the instrument used for this. There was some suggestion that the general appearance resembled a fresh break but there was insufficient evidence to prove or disprove this.

There are a number of possible explanations which may be put forward for holes in skulls, these include: trephination, post-mortem erosion, rodent or insect damage, enlarged parietal foramina, (fenestrae parietalis symmetricae), bilateral osteoporosis or artificial (human) interference.

The condition of the rest of the skull suggested that post-mortem erosion was not the cause. The absence of any gnaw or teeth marks ruled out rodent or insect damage. Fenestrae parietalis symmetricae and osteoporosis are both conditions that most commonly occur bilaterally and for this reason they were excluded. Therefore trephination or other interference remained as possibilities.

If this individual's skull represented an instance of trephination then the following features might be found: evidence for surgery (cut marks) and bevelling

of the edge of the trephine hole or bone repair following ante-mortem healing. On 375 there was no evidence for surgery, no bevelling of the hole as is commonly seen in those caused by trephination and no bony activity such as would indicate healing. The nature of the whole and the endocranial damage suggest rather that the hole was made by an instrument being pushed through the skull with some force such that on the outside it left a clean break but on the inside caused small fragments of bone to separate from the skull. Turning such an instrument in the hole to remove it would smooth the edges and leave the "chatter" marks that were observed. This is most likely to have occurred post-mortem.

In conclusion it is suggested that although trephination cannot be ruled out the fresh appearance of the hole and its morphology were more likely caused by some post-mortem damage, either at the time of excavation or when the burial was originally disturbed (the skull came from grave 365).

5.5 Discussion

Analysis of the observable pathology from any human skeletal population sample is always restricted by the amount to which disease and illness affect the skeletons of the individuals concerned. Thus there is an immediate exclusion of all the major diseases whose duration is too short for the bony skeleton to have been included in the illness (eg plague, smallpox, typhoid, cholera). This exemption also applies to those individuals where death occurred prior to skeletal involvement (a completely unknown quantity) and this category may also be extended to include those diseases which affect the skeletal system but which do not do so immediately they are contracted (eg syphilis) for which, therefore, there is not necessarily a skeletal record.

Guildford Friary was no exception in the amount and type of data that were available and it could clearly be seen from the results that the pathological observations made were confined to a very few possibilities: "accidental" injury (including fractures, trauma, stress and deformity), degenerative joint disease, disease (including infection) and human interference. Further most of the findings related to individual instances of pathology, there was only very limited information for the sample as a whole.

The evidence could be summarized as follows. The incidence of fractured bones was virtually non-existent which might have been a function of the sample size or possibly indicative of the social and environmental conditions of the people involved. There were several cases of individual trauma, almost entirely confined to the lower extremity and none of great severity. There was a certain

amount of evidence for deposition of cortical bone in a number of individuals possibly as a result of stress, in particular on the tibiae. Some individuals exhibited a fairly mild form of hallux valgus, possibly following badly fitting footwear; these occurred both in the cemetery and the nave of the church. Degenerative joint disease most commonly affected the lower spine; it was not severe in any cases but was found to demonstrate on increase with age. Among the bones with clear evidence for disease a tentative diagnosis was feasible only in one as a possible leper. Finally two of the females showed some evidence for infection in the pelvic region.

Any evidence for diet was largely confined to the dentition (see Section 3). There was no major skeletal evidence for malnutrition (eg scurvy, rickets) although as already stated this cannot be regarded as proof positive of absence.

It could therefore be concluded that the evidence for pathology from Guildford Friary was very limited in scope and although such features as trauma, hallux valgus, and degenerative joint disease gave some indication of the stress undergone by the population sample overall results were rather restricted to individual cases.

6. Summary

A large sample of inhumed bone from the nave and cemetery of Guildford Friary was examined. 113 individuals were found to be present, the remains generally being well preserved although the material from the nave was in markedly better condition than that from the cemetery. The analysis of the bones included study of the palaeodemography (age and sex), morphological and metrical variables and evidence for the health status of the population sample.

The population sample structure (demography) was assessed by means of estimating age and sex of individuals. Results showed that the sample might be described as consisting predominantly of adult males. There were very few juveniles present (10 below 15 years only). Sample size was too small for any detailed conclusions to be drawn about adult age distribution except that individuals of all ages were represented with slightly higher numbers in the "young adult" group. There were very few females present at Guildford Friary (9%) and of these the majority came from the nave of the church. Owing to the fact that the whole cemetery was excavated it was felt that the sex distribution might well be indicative of differential burial practice, the cemetery being primarily reserved for The Friary (ie non-secular) whilst the nave included

secular burials. The results for Guildford Friary were compared to those for Chelmsford Priory (also Dominican) and Stonar (a secular urban site). These showed that for age, Chelmsford produced very similar figures whereas Stonar had a greater proportion of juveniles (thus reflecting its secular character). Both Chelmsford and Stonar had higher percentages of females present although even at Stonar this was lower than might be expected for a random, secular, population sample. No detailed conclusions could be drawn from this without analysis of burial distribution at Chelmsford and Stonar and this was not available.

The material was further examined for information on the size and shape of individuals and any similarities or differences to be observed between the nave of the church and the cemetery. Owing to the poorer preservation of the bones from the cemetery it was not feasible to assess this area separately - merely to make general comparisons with the nave of the church. Evidence was obtained from results for stature and dental, cranial and post-cranial metrics and morphology. It was possible to show that there was a marked degree of sexual dimorphism present (stature and general morphology of the bones) but tha there was also evidence for homogeneity in the sample, in particular in the post-cranial metric figures. In detail there were data available to suggest that the nave might be divided between north and south although there was insufficient evidence to show conclusively that this reflected genetic (familial) relationships between individuals.

The asymmetry of the major bones of the arms and legs was discussed and it was apparent that right arms and left legs were generally longer. A number of causes have been suggested for this including handedness. The degree of asymmetry was especially interesting in the case of the humeri where a modal difference between right and left (6 mm) was considerably greater than might be expected. Whether this actually represented an abnormal feature would require a large, comparative sample for discussion.

Evidence for the health of the sample was limited but certain data were available. The teeth yielded comparable results to those of Moore and Corbett (1973) as regards caries and abscess incidence and there was some indication of poor dental hygiene and soft diet from the degree of periodontal disease found. In general there was very little evidence for pathology at Guildford Friary, there being a very small occurrence of trauma, but no fractures present. The only evidence for a major disease came from S110 - a possible case of leprosy, otherwise only isolated instances of infection were found. (For a more detailed discussion of the implications of the pathology findings see section 5.5).

7. CATALOGUE OF INDIVIDUAL BURIALS FROM GUILDFORD FRIARY, SURREY

7.1 Burials in the Nave of the Church

Burial No	Sex	Method[1]	Age	Method[2]	Stature Method[3]
S172	F	Pelvis, skull Femoral Head Diameter	20-25	Sphenooccipital Synchondrosis Dental Development Epiphyseal Union	1.61 m Left femur and 5' 4" tibia
174	?M	Pelvis	30-35	Dental Wear	-
S214	M	Pelvis, skull, Femoral Head Diameter	40-45	Dental Wear	1.77 m Left femur and 5' 10" tibia
214	?M	Skull, Femoral Head Diameter	Adult	Epiphyseal Union Cranial sutures	-
263	?M	Pelvis, skull Femoral Head Diameter	55+	Dental Wear Cranial Sutures	1.68 m Left femur 5' 6"
	(+ 263I which was assumed to be from another individual but not from an extra one).				
282	F	Pelvis, skull, Femoral Head Diameter	20-25	Dental Wear Epiphyseal Union	1.58 m Right femur and 5' 2" tibia
S297	F	Pelvis, Femoral Head Diameter	25-30	Pubic symphysis Epiphyseal Union	1.58 m Left femur and 5' 2" tibia
297A	M	Femoral Head	Adult	Epiphyseal Union	1.70 m Right femur 5' 7"
297B	M	Pelvis, Femoral Head Diameter	45-50	Pubic symphysis	1.65 m Left femur 5' 4"
297C	M	Femoral Head Diameter	Adult	Epiphyseal Union	1.70 m Right femur 5' 7"
Skull D) Skull E) Skull F)	Grave 297 - Dental Information available only.				
S305	M	Pelvis, Skull, Femoral Head Diameter	30-35	Pubic symphysis Dental Wear	1.70 m Left femur

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1. Sex Method: Sex with method used to attribute given for each individual.
2. Age Method: All ages given in chronological years with method used for each individual.
3. Stature Method: Heights given are all approximate, given first in metres, second in feet and inches*. Relevant long bones used also given.
*ie rounded up or down to nearest whole figure (2 decimal places in metres).

305A		-	10-15	Dental Development Epiphyseal Union	-
305B	M	Pelvis, skull Femoral Head Diameter	30-35	Pubic Symphysis Dental Wear	1.77 m Left femur and 5' 10" tibia
305C		-		-	-
S321	F	Skull, Pelvis Femoral Head Diameter	20-25	Dental Wear Epiphyseal Union	1.70 m Left femur and 5' 7" tibia
321A		-	10-15	Epiphyseal Union	-
321B		-		-	-
S333	M	Pelvis, skull, Femoral Head Diameter	25-30	Pubic Symphysis Dental Wear	1.71 m Left femur and 5' 7" tibia
S334	M	Pelvis, skull Femoral Head Diameter	45-50	Pubic symphysis Dental Wear	1.70 m Left femur and 5' 7" tibia
S335	M	Pelvis, Femoral Head Diameter	45-50	Pubic symphysis	1.76 m Left femur and 5' 9" tibia
S336	M	Pelvis, skull Femoral Head Diameter	25-30	Dental Wear	1.76 m Right femur and 5' 9" tibia
337A	M	Pelvis, Femoral Head Diameter	Adult	Epiphyseal Union	1.77 m Left femur 5' 10"
(337 A/B	?M	Skull	50-55	Dental Wear	-)
337B	M	Pelvis, Femur	25-30	Pubic Symphysis Epiphyseal Union	1.78 m Left humerus
(337 B/A	?M	Mandible	20-25	Dental Wear	-)

For the purposes of the report 337A and 337B were taken to represent the 2 extra individuals in grave 336. It was assumed that 337A/B and 337B/A were parts of these individuals. 337A and 337B were used for post-cranial and demographic results. 337A/B and 337B/A were used for cranial results. Any relevant pathologies were noted as appropriate.

S339		-	0-5 (c.3)	Dental Development	-
339		-	0-5 (c.2)	-	-
S340		-	10-15	Dental Development Epiphyseal Union	-
340I	F	Pelvis, skull, Femoral Head Diameter	Adult	Degenerative Joint Disease	1.58 m Right femur and 5' 2" tibia

354	?M	Size of bones	Adult	Epiphyseal Union	-
S356	M	Pelvis, skull	35-40	Dental Wear	1.80 m Left femur and 5' 11" tibia
S357	M	Pelvis, Femoral Head Diameter	55+	Suture Closure	1.79 m Left femur and 5' 11" tibia
S359	M	Pelvis, skull Femoral Head Diameter	35-40	Pubic Symphysis	1.71 m Left femur and 5' 7" tibia
S362	M	Pelvis, skull	30-35	Pubic Symphysis Dental Wear	1.67 m Left femur and 5' 6" tibia
S363	F	Pelvis, Femoral Head Diameter	Adult	Epiphyseal Union	1.62 m Right femur 5' 4"
S364	M	Pelvis, skull Femoral Head Diameter	55+	Dental Wear Cranial Sutures	1.77 m Left femur 5' 10"
S366	M	Pelvis, skull Femoral Head Diameter	45-50	Dental Wear	1.76 m Left femur and 5' 9" tibia
S371	?M	Pelvis, Femoral Head Diameter	Adult	Epiphyseal Union	1.70 m Left femur 5' 7"
S372	F	Pelvis, Femoral Head Diameter	Adult	Epiphyseal Union	1.60 m Left femur and 5' 3" tibia
375	?M	General size of bones	Adult	Epiphyseal Union	-
S376	?M	Pelvis, skull, Femoral Head Diameter	30-35	Dental Wear Suture Closure	1.65 m Left femur and 5' 5" tibia
S377	M	Pelvis, Femoral Head Diameter	50-55	Pubic Symphysis	1.65 m Left femur and 5' 5" tibia
378A 378B	M M	Femoral Head Diameter	25-30 50+	Dental Wear	1.72 m (5' 8") Left 1.71 m (5' 7") femur

Total: 42 Individuals.

7.2 Cemetery Area A

S110	M	Pelvis, Femoral Head Diameter	Young Adult	Epiphyseal Union, Suture Closure	1.69m Left femur 5' 6"
Clearance 110		-	Adult	-	-
S116	F	Pelvis, Femoral Head Diameter	Young Adult	Epiphyseal Union	1.67 m Right radius 5' 6"
119		-	15-20	Dental Development Epiphyseal Union	-

S124	M	Pelvis, skull, Femoral Head Diameter	25-30	Dental Wear Pubic Symphysis Epiphyseal Union	1.64 m Right femur 5' 4" and tibia
S128	M	Femoral Head Diameter	Adult	Epiphyseal Union	-
S129	M	Femoral Head Diameter	Adult	Epiphyseal Union	-
S130	?M	General size of bones	Adult	-	1.76 m Right tibia 5' 9"
S133	M	Pelvis, skull Femoral Head Diameter	30-35	Dental Wear	1.81 m Left femur 5' 11" and tibia
S141	M	Pelvis, Femoral Head Diameter	20-25	Pubic Symphysis Epiphyseal Union, Dental Wear	1.69 m Left femur 5' 7"
S162	?M	General size of bones	25-30	Dental Development, Dental Wear	1.68 m Right fibula 5' 6"
S166	M	Pelvis, skull Femoral Head Diameter	35-40	Pubic Symphysis Dental Wear	1.68 m Left femur 5' 6" and tibia
S177		-	10-15	Dental Development	-
S199	M	Pelvis	45-50	Pubic Symphysis	1.70 m Left femur 5' 7" and tibia
S241	M	Pelvis, Femoral Head Diameter	25-30	Dental Wear	1.73 m Right tibia 5' 8"
253	?M	Juvenile	15-20	Dental Development Dental Wear Epiphyseal Union	-
254		-	20-25	Epiphyseal Union, Dental Wear	-
S255	M	Pelvis, Femoral Head Diameter	Adult	Epiphyseal Union	-
S257	-		Adult	Epiphyseal Union	-
S259	M	Pelvis, Femoral Head Diameter	25-30	Pubic Symphysis Dental Wear	1.61 m Right femur 5' 4" and tibia
S283	M	Pelvis, Femoral Head Diameter	25-30	Dental Wear	1.76 m Right femur 5' 10" and tibia
284		-	Young Adult	Cranial Sutures	-

287		-	Adult	Cranial Sutures	-
S355	M	Pelvis, skull	45-50	Dental Wear	1.66 m Right femur 5' 5" and tibia

Bones listed as part of Cemetery A but not marked on Plan

S109	?M	General bone size	Adult	-	-
S111	?M	General bone size	Adult	Bone size and Development	-
252	M	Sacrum, Femoral Head Diameter	Young Adult	Epiphyseal Union	-
260		-		-	-

Grave 288

S142	?M	Pelvis, Femoral Head Diameter	20-25	Dental Wear Epiphyseal Union, Pubic Symphysis	-
S143	M	Pelvis, Femoral Head Diameter	20-25	Pubic Symphysis Epiphyseal Union	-
S149	M	Pelvis, Femoral Head Diameter	45-50	Pubic Symphysis	1.80 m Left femur 5' 11"
S150	M	Femoral Head Diameter	20-25	Pubic Symphysis Epiphyseal Union	-
S249	M	Pelvis Femoral Head Diameter	20-25	Pubic Symphysis Epiphyseal Union	-
256	F	Pelvis, Femoral Head Diameter	Adult	Epiphyseal Union	-

7.3 Cemetery Area B

S101	?M	General size of bones	Adult	-	1.73 m Right Ulna 5' 8"
S102	M	Pelvis, Femoral Head Diameter	20-25	Pubic Symphysis	1.72 m Left femur 5' 8" and tibia
S103	M	Pelvis, skull Femoral Head Diameter	45-50	Epiphyseal Union, Dental Wear	1.71 m Right Humerus 5' 7"
S105	M	Pelvis, Femoral Femoral, Head Diameter	35-40	Pubic Symphysis	1.67 m Left femur 5' 6" and tibia
121		-	55+	Suture Closure	-
S167	M	Pelvis, skull Femoral, Head Diameter	45-50	Dental Wear Pubic Symphysis	1.74 m Left femur 5' 9" and tibia
S196	M	Pelvis, Femoral Head Diameter	25-30	Pubic Symphysis	1.77 m Left femur 5' 10" and tibia

Data on 100 and 104 are not included since these bones were found not to present the remains of separate individuals.

Total for Cemetery: 41

7.4 Residual Material

159	F	Humerus	Adult	Epiphyseal Union	1.57 m Right radius 5' 2"
204 1)		-	-		-
2)		-	-		-
3)		-	-		-
230		-	Adult	Epiphyseal Union	-
236	?M	General Bone Size	Adult	Epiphyseal Union	-
258	M	Humeral Head Diameter	20-25	Epiphyseal Union	-
312	-		25-30	Dental Wear Epiphyseal Union	-
312I	-		Juvenile	General Bone size	-

Pit 161 Min No of individuals based on max no of a single bone = 21 Left femora and Infant mandible)

Pit 161

All individuals from Pit 161 were assessed on the left femur, therefore sexing was by means of the femoral head diameter, ageing by epiphyseal union and stature on the maximum length of that bone.

1.	M	Adult	1.70m. 5' 7"
2.	M	20-25	1.69m. 5'6"
3.	M	Adult	1.70m. 5'7"
4.	?M	Young Adult	1.68m. 5'6"
5.	M	Young Adult	-
6.	M	Adult	-
7.	M	Adult	-
8.	M	Adult	-
9.	?F	Young Adult	-
10.	M	Adult	-
11.	-	10-15	-
12.	-	10-15	-
13.	-	Adult	-
14.	-	Adult	-
15.	-	10-15	-
16.	-	Adult	-
17.	-	Adult	-
18.	-	Adult	-
19.	-	Adult	-
20.	-	Adult	-
21	-	Infant (Infant Mandible)	-

Total: 30

7.5 OTHER FINDS OF HUMAN SKELETAL REMAINS AT GUILDFORD FRIARY

Further finds of human skeletal remains at Guildford Friary came from the 1974 excavations and from a chance find in 1980. Two skeletons were found in 1974 (nos 93 and 94) and reported by Rachel Reader; the data summarised here comes from her report, (Ancient Monuments Laboratory, (unpublished)). The finds from 1980 were found to represent the remains of 2 individuals (nos S379 and 379A) there was also a fragment of sheep metatarsal.

The results for age, sex, stature and dental disease are summarised in the tables below. It was not considered justifiable to do other than record data for dental, cranial and post-cranial metrics and morphology. There was no evidence for any pathology on any of the individuals except where 93 and 94 demonstrated some slight generalized degenerative joint disease. This was absent on S379 and 397A but the reason may most probably be attributed to the respective ages of the individuals.

It was interesting to note that all of the skeletons produced similar results to the main sample from the Friary.

Table o' Results for Age, sex and Stature

No	Bone Condition	Age	Method	Sex	Method	Stature	Method
93	Fair	35-40	-	M	-	1.71 m C 5'7"	Right femur and tibia
94	Fair	30-35	-	M	-	1.72 m C 5'8"	Right femur and tibia
S379	Fair	20-25	Pubic Symphysis	M	Pelvis, Femoral Head Diameter	1.81 m C 5'11"	Left femur
379A	Poor	17-23	Pubic Symphysis Epiphyseal Union	?M	Humerus head Diameter and Epicondylar width	1.70 m C 5'7"	Left Humerus

TABLE OF RESULTS FOR DENTAL DISEASE OBSERVATIONS

No	No of Teeth With Caries	Abscesses	Periodontal Disease	Enamel Hypoplasia	Calculus Deposits
93	8	?Abscess/ ?Dental cyst	Severe	Slight	-
94	3	0	moderate	Slight	Slight
S379	3	0	moderate	lines, 4-5 years	Slight
379A	-	-	-	-	-

8. NOTE ON THE SITES USED FOR COMPARISON WITH GUILDFORD FRIARY

8.1 Chelmsford Priory, Essex (Bayley 1975)

This was a very similar site to Guildford Friary: ie. a Dominican Friary of comparative date (late C13th to *c.* 1537). The human bone sample came from both the nave of the church and cemetery and probably includes a lay as well as friar population sample. Unfortunately it is not clear to what extent the distribution of the bones is similar to that found at Guildford.

8.2 Stonar, Sandwich, Kent (Bayley and Eley, 1975)

The human bone sample came from the cemetery of the church of St Nicholas-at-Stonar. Use of the church and cemetery probably dates to C13-C14th but this is by no means certain. The remains apparently represent an urban, secular population: the floruit of Stonar as a port-town came at this time. Note that approximately three-quarters of the church and cemetery was destroyed by World War I and post-war industrial activity therefore the human bone sample must be treated with caution in any comparison (sample bias).