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Summary

After the initial report on the human skeletal remains (AML Report 27/89) had been finalised, a small amount of further material came to light. This is catalogued here and a revised and expanded discussion of the findings presented. The Anglo-Saxon cemetery contained a minimum of 167 adults (79 males and 64 females) and about 30 children.

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THE HUMAN SKELETAL REMAINS FROM BURGH CASTLE, NORFOLK, 1960.
Sue Anderson and David Birkett.

Introduction.

One hundred and sixty-three numbered inhumations were recovered from the cemetery at Burgh Castle. A large number of disarticulated bones were also collected, and this, together with the fact that several of the numbered inhumations were actually "bone dumps", made the estimation of a minimum number of individuals very difficult. An estimate was made on the basis of number of major adult long bones as follows:

Bone	Male	Female	Unsexed	Total
R. Femur	79	64	24	167
L. Femur	73	57	22	152
R. Tibia	69	48	30	147
L. Tibia	62	51	21	134
R. Humerus	71	48	34	153
L. Humerus	54	47	33	136

From this it can be suggested that there were at least 167 adult individuals buried in this cemetery, and that the minimum numbers of males and females were 79 and 64 respectively.

The children were rather more difficult to assess. Only five were numbered inhumations, although seven others were included in some of the "bone dumps". Other children were present in the disarticulated remains, and although some of these bones could have belonged to the more complete skeletons, many do not. It seems probable that there were approximately 30 children buried at Burgh Castle, although if none of the disarticulated bones belong together there may have been as many as 60.

1. Method

Measurements were taken using the methods described in Brothwell (1981), plus a few from Bass (1971) and Krogman (1978). Sexing and ageing techniques follow Brothwell, and the Workshop of European Anthropologists (1980). Sciatic notch angles were measured using the method described by Dawes (Dawes & Magilton 1980, p.22). Stature was estimated according to the regression formulae of Trotter and Gleser (Trotter 1970).

2. Condition of Material

The majority of skeletons were in fair condition, although the occasional interment in good or poor condition was also found. The majority of bones were damaged or broken post-mortem.

3. Demographic Analysis

3.1. Age at Death

Since the ageing of adult skeletons is in general extremely inaccurate, no attempt has been made to calculate the mean age at death of this population. The following table gives a possible distribution of age for all those skeletons aged more precisely than simply "adult".

Age group	Suggested age range	Male		Female	
		n	%	n	%
Young adult	18-25	8	11.3	8	15.7
Young - MA	25-35	9	12.7	13	25.5
Middle-aged	35-45	29	40.8	17	33.3
MA - Old	45-55	15	21.1	5	9.8
Old	55+	10	14.1	8	15.7

It should be noted that many of the individuals in the categories"Y-MA" and "MA-Old" were put there simply because it was impossible to decide which single category they fitted into. The suggested age range is therefore only a very rough guide.

Although proportionally more females than males fall into the"Old" category, there are more males in the "MA-Old" and "Old"combined. The majority of females fall into the "Y-MA" and "MA" groups, whereas most males are found in the "MA" and "MA-Old" categories. So although ageing is not accurate and tends towards underageing in most cases, the pattern still seems to be that there are relatively more older males than females. This could be due to some ageing bias, for example loss of older, osteoporotic female skeletons, or the fact that male skeletons tend to have more prominent muscle-markings and are therefore more affected by ageing processes.

As stated above, there were thought to be approximately thirty children buried in this cemetery. Although children can generally be aged more accurately than adults from their skeletal remains, the dispersed nature of the juvenile skeletons from this site means that the following age distribution table can only be approximate. No attempt was made to estimate an average age at death for these children.

Age group	n	%
n.b. - 2 yrs	1	3.3
2 - 6 yrs	9	30.0
6 - 12 yrs	9	30.0
12 - 18 yrs	11	36.7

Only one infant was found in this population, and this individual itself was only represented by one bone. It is possible that this lack of infant burials was caused by differential preservation, but it seems more likely that young children were generally not buried in this cemetery, or that there was a separate area set aside

for them which has not yet been discovered.

3.2. Sex distribution

As mentioned above, the minimum number of males from this cemetery was thought to be 79, and the minimum number of females 64. This is a fairly normal sex ratio for a secular site. However, based on a plot of the sexes of the numbered burials, it is possible that more of the earlier burials are male, and also that more of the disturbed remains are male. This may be evidence in favour of Green's argument for a monastic cemetery, but owing to the disturbed nature of many of the burials it would be wise to regard this as merely conjecture.

4. Metrical and Morphological Analysis
4.1. Stature

The following means and ranges of stature were calculated for the numbered inhumations from Burgh Castle.

Sex	n	Mean	Range
Male	54	1.759	1.657-1.861 (5' 6" - 6' 3")
Female	38	1.631	1.515-1.762 (5' 1" - 5' 10")

These means are higher than normal for an Anglo-Saxon population, although the difference is only one of 2-3" and may not be significant. The shortest woman and the tallest man are also taller than their counterparts from the majority of sites. This may be an indication that the people of Burgh Castle were better nourished than their contemporaries, or it may simply be a genetic phenomenon.

4.2. Cranial Indices

The three main cranial indices calculated for the Burgh Castle population were the Cephalic Index (100L/B), the Height/Length Index (100H/L) and the Height/Breadth Index (100H/B). Each is divided into three categories, with the following distributions at Burgh Castle.

Cranial Category	Range	Male		Female	
		n	%	n	%
Dolichocranial	x - 74.9	18	78.3	6	33.3
Mesocranial	75 - 79.9	4	17.4	11	61.1
Brachycranial	80 - x	1	4.3	1	5.6

Height/Length Category	Range	Male		Female	
		n	%	n	%
Chamaecranial	x - 69.9	6	31.6	9	52.9
Orthocranial	70 - 74.9	12	63.2	7	41.2
Hypsicranial	75 - x	1	5.3	1	5.9

Height/Breadth Category	Range	Male		Female	
		n	%	n	%
Tapeinocranial	x - 91.9	3	20.0	8	53.3
Metriocranial	92 - 97.9	7	46.7	5	33.3
Acrocranial	98 - x	5	33.3	2	13.3

These indices seem to suggest that there is a basic difference in the head forms of males and females at Burgh Castle. Most men fall into the long, medium high head group, whereas most females have crania of medium length and low height. Such a sex difference is often seen in Anglo-Saxon populations. The majority of populations after the Bronze Age and before the Medieval Period tend to fall into the long-headed or dolichocranial category, and in this the Burgh Castle men at least are no exception. Females at similar sites often seem to be slightly more round-headed than males.

4.5. Meric and Cnemic Indices

The Platymeric and the Platycnemic indices measure the relative flattening of the femur (anterio-posteriorly) and the tibia (medio-laterally) respectively. The actual cause of the two conditions is unknown, and it is thought unlikely that the two are related. The distributions of the two indices for both sexes (L and R sides combined), including disarticulated bones which could be reliably sexed, are presented in the following tables.

Meric Index

Category	Male		Female	
	n	%	n	%
Hyperplatymeric	23	16.5	24	24.2
Platymeric	78	56.1	60	60.6
Eumeric	37	26.6	15	15.2
Stenomeric	1	0.7	0	-

Cnemic Index

Category	Male		Female	
	n	%	n	%
Hyperplatycnemic	0	-	0	-
Platycnemic	15	13.9	8	8.1
Mesocnemic	45	41.7	43	43.4
Eurycnemic	57	52.8	48	48.5

Relatively narrow bones are common in earlier populations, and in the case of the femur this is true of Burgh Castle. However, the majority of individuals of both sexes fall into the broadest category of the cnemic index. Without a reasonable explanation of the cause of this condition, it is impossible to suggest why this should be.

4.6. Non-Metric Traits

Non-metric, discontinuous or discrete traits are anomalies seen in many bones of the skeleton, although they are most frequently scored in the skull. Most are at least partly genetically determined (although the genetic components of single traits are unknown at present). They are scored on a present/absent basis. The percentage of each trait noted at Burgh Castle is recorded in the following table.

Trait	n	Assessable	%
Metopism	4	87	4.6
Parietal foramina	48	95	50.5
Coronal Wormian bones	2	89	2.3
Sagittal Wormian bones	6	96	6.3
Lambdoid Wormians	42	88	47.7
Epipteric bones	12	50	24.0
Parietal notch bones	5	68	7.4
Inca bone	7	80	8.8
Asterionic bones	2	70	2.9
Torus palatinus	13	54	24.1
Tori maxillares	6	57	10.5
Torus mandibulares	7	68	10.3
Tori auditives	1	86	1.2
Double hypoglossal canal	9	69	13.0
Post-condylar canal	11	68	16.2
Pre-condylar tubercle	3	69	4.3
Triple mental foramina	1	68	1.5
Double condylar facet	3	69	4.3
Squame-parietal ossicle	3	40	7.5
Septal aperture (Hum)	7	74	9.5
Third trochanter (Fem)	8	109	7.3
Atlas double facet	3	31	9.7

Acetabular crease	24	82	29.3

This table includes the main adult skeletons only. Two children (Sk. 53 and Sk. 130) also had extra sutural ossicles. Sk. 53 (aged 12-15) had lambdoid Wormian bones, an ossicle at the lambda, and asterionic bones. Sk. 130 (c.4 years) had large lambdoid Wormian bones and an Inca bone. The presence of sutural bones in one suture is often linked with the occurrence of one or more in other parts of the cranium, and it is possible that these traits are linked to environmental factors affecting growth, although there may still be a genetic predisposition for them. The fact that the rare squame-parietal ossicle occurred in three individuals from this site might suggest some genetic component for this trait at least. Percentage scores of most traits are similar to those found in other Saxon groups. The figures produced by the present author for the monastic cemetery of Monkwearmouth, Tyne and Wear (Wells, Anderson and Birkett, forthcoming) are extremely close, for example, whereas medieval groups such as Guisborough Priory and Blackfriars, Newcastle (Anderson, forthcoming) seem more distant in this respect.

Non-metric traits can be used tentatively to suggest relationships between individuals buried in a cemetery. Some of the rarer traits at Burgh Castle were plotted on the site plan to see if any occurred in neighbouring individuals. The squame-parietal suture occurred in skeletons 69a, 81 and 83, all buried in the middle of the southern half of the cemetery. This does suggest a possible relationship between the three individuals. Metopic sutures were noted in skeletons 61 and 159, which were almost adjacent to each other, and in skeletons 45 and 69b, which were also fairly close together. This trait has been found to occur in distinct groupings at other sites, suggesting that it is not a chance occurrence. Other traits at Burgh Castle show less clear-cut relationships, and it would be unwise to infer anything from them. There does, however, seem to be a high probability that the individuals mentioned above have some genetic affinity with each other. It must always be remembered when assessing this kind of information that married women were most likely to be buried with their husbands' family than with their own blood relations, and that there is usually a long period of burial activity in large cemeteries, often with hundreds of years separating the first and last interments. This obviously means that establishing familial relationships between skeletal individuals is more difficult than may at first appear.

5. Dental Study

This study involves only the more completely articulated skeletons, since in many cases the disarticulated bones could not be confidently sexed. The following table presents the numbers of dental remains available for study.

Number of:	Male	Female
Individuals	49	32
Maxillae	40	23
Mandibles	42	31

Position:		
Expected	1312	864
Missing	171	39
Observable	1141	825
Post-Mortem Loss	246	209
Ante-Mortem Loss	84	40
Unerupted/absent	18	22
Remaining teeth	793	554

Ante-mortem loss of one or more teeth had occurred in 18 males and 14 females, 37.5% and 45.2% respectively, 40.5% overall. Of these, 11 males and 5 females had caries and/or abscesses.

Ante-mortem tooth loss

Sex	Jaw	Places	Lost	%
Male	Max	537	37	6.9
	Mand	604	47	7.8
Female	Max	347	15	4.3
	Mand	478	25	5.2
M + F	Max	884	52	5.9
	Mand	1082	72	6.7
M + F	Both	1966	124	6.3

The table shows that ante-mortem tooth loss was greater in the mandible than the maxilla, and in males than in females. This may be because men were living longer than women, and therefore had longer to lose their teeth. The overall rate of loss for the whole site is average for the period.

The greatest ante-mortem tooth loss occurred in the molar area of each quadrant of the jaw, and this was also the most common area to be affected by tooth decay. Most lesions were located in the approximal region, as is normally found in early populations. Fourteen males and 5 females had carious lesions, and these were distributed as follows:

Caries

Sex	Jaw	Teeth	Caries	%
Male	Max	352	14	4.0
	Mand	441	4	0.9
Female	Max	210	2	1.0
	Mand	344	5	1.5
M + F	Max	562	16	2.9
	Mand	785	9	1.2
M + F	Both	1347	25	1.9

The overall male caries rate was greater than that of females, and the maxilla was affected to a greater extent than the mandible. It may be that the greater AM tooth loss seen in the mandibles was a result of the presence of carious lesions, which would account for the smaller numbers of affected teeth in the lower jaw.

Periodontal abscesses were most common in the premolar and molar regions of the jaws, although they were also present around the anterior teeth.

Abscesses

Sex	Jaw	Places	Abscess	%
Male	Max	537	15	2.8
	Mand	604	9	1.5
Female	Max	347	5	1.4
	Mand	478	10	2.1
M + F	Max	884	20	2.3
	Mand	1082	19	1.8
M + F	Both	1966	39	2.0

The male maxillae and female mandibles were most affected by abscesses. The reason for the difference is unknown. The overall greater prevalence in the maxilla could be due to the greater AM loss in the mandible causing abscesses to heal over in the lower jaw. These abscesses were present in the jaws of 13 men and 9 women. The overall prevalence of abscesses is average for the period.

Most unerupted teeth were third molars, although one male (Sk. 9) had an unerupted left mandibular canine. The percentages of unerupted third molars were as follows:

Sex	Jaw	Places	Unerupted	%
Male	Max	57	9	15.8
	Mand	72	8	11.1
Female	Max	39	10	25.6
	Mand	58	12	20.7

A greater prevalence of third molar agenesis is usually expected to occur in females, and Burgh Castle is no exception. The evolutionary trend is towards smaller jaws with corresponding reduction in the number of teeth, and therefore the third molars, being the last teeth to erupt, often remain in the jaw and are resorbed, or else do not develop at all. If the tooth germ fails to develop beyond a certain size, it will be reabsorbed before it is due to erupt. This is particularly common in females, since their teeth and jaws are generally smaller than those of males. The figures for unerupted third molars at Burgh Castle are consistent with those found at other contemporary sites.

Dentitions were also assessed for the presence or absence of calculus (tartar), enamel hypoplasia, and alveolar resorption, with the following results:

	Male					Female				
	S	M	H	All	%	S	M	H	All	%
Calculus	23	17	3	43	93.5	13	9	3	25	80.6
Hypoplasia	32	3	0	35	76.1	19	1	0	20	64.5
Resorption	13	26	5	44	95.7	14	8	4	26	83.9

Each is divided into 'slight', 'medium' and 'heavy' categories, and the total percentage is calculated from all the assessable dentitions (46 male, 31 female). High percentages of all three conditions were found at Burgh Castle. Calculus was only slight in the majority of cases, but a large number of medium examples were also recorded. The condition is usually associated with lack of dental hygiene, particularly when soft foods are common in the diet. Vigorous chewing of meat, for example, would remove the greater part of such deposits. It is probable that the people of Burgh Castle were not eating excessively soft foods, but that their dental hygiene was poor. Percentages of enamel hypoplasia were average when compared with contemporary populations. This condition has been correlated with malnutrition, physical stress and disease, but the link is not well established in modern groups. None of the Burgh Castle individuals have the extremely gross hypoplastic lesions which can be encountered in very poor populations. Alveolar resorption is linked to old age, and at Burgh Castle it was generally most advanced in older individuals, although if periodontal disease was present alveolar resorption could be expected to occur at a faster rate.

A few dental abnormalities were noted at Burgh Castle. The lower left canine of Sk. 9 was lying horizontally in the alveolar bone and was unerupted. The left upper M3 of Sk. 23 was rotated in the alveolus, and was partially erupting through the buccal wall of the maxilla. A lack of occlusion of the upper left teeth with the lower of Sk. 62 was caused by uneven wear of the upper teeth, possibly due to

some occupational use. An odontome had formed in the incisive foramen of Sk. 70, which is a fairly common position in which to find this type of benign neoplasm.

The dental health of the individuals buried in this cemetery was not good when compared with the present (although they were less afflicted with tooth decay than we are today), but it was normal for the period. Caries, abscesses, tooth loss, calculus and alveolar resorption all increased through life, and this age factor should be taken into consideration when comparing prevalences of these lesions between males and females. If women did not survive into old age they are less likely to have been affected by gross lesions, and this seems to be the case in the Burgh Castle group.

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THE HUMAN SKELETAL REMAINS FROM BURGH CASTLE, NORFOLK, 1960.

S.M. Anderson and D.A. Birkett

Addendum (Sue Anderson, Jan. 1991)

Introduction

Whilst working on a group of skeletons from Caister on Sea, the current author was sent some bones from this site which had been kept by the late Dr. Birkett in Middlesbrough. The collection included some skeletons from Burgh Castle which had not been included in the original report. These have now been analysed and the results are presented here.

Int. 28
Large R. tibia (condyles missing), with a small exostosis on the medial surface of the medial malleolus.

Bag 230 (scatter of bones around Int. 28)
Rib frags, pair of clavicles, large R. calcaneus, R. scapula, frag of ulna, frag of fibula, proximal half of R. radius, lower T vertebra with large Schmorl's nodes, L. patella, and frags of animal bone. One or two individuals.

Int. 29
Large L. tibia, belonging with the individual seen in the original analysis.

Int. 30
Gracile R. tibia (condyles missing) of sub-adult ?female (distal end just fusing, c.16-20 years).

Int. 31
Fragmentary skull with eroded surface, ?female.
Pathology: Porotic cribra orbitalia in both orbits.

Int. 32
Frags of skull, mandible, L. scapula, L. innominate, etc. Not necessarily one individual. The femoral condyles and proximal fibula may be male, the rest is probably female.
Teeth (mandible):

O 7 6 5 / 3 2 / / 2 3 4 5 6 7 O

Molar attrition:

- 2+ 3- 3- 2+ -

Pathology: Bony deposits on endocranial surface of occipital inferior to sagittal sinus canal, similar appearance to hyperostosis frontalis interna.
Extra: R. radius shaft of juvenile, 10+ years.

Int. 33
Long bones of large adult male in fair condition. Stature from L. humerus was 178.3cm.
Non-metric traits: Plaque formation L. femoral head.

Int. 48
Parts of post-cranial skeleton of adult female. Sciatic notch wide, bones gracile. Stature was estimated from the R. femur and tibia at 161.5cm.

Int. 49
Skull and some long bones of old ?male in fair-poor condition. The skull is robust with an extremely sloping forehead and wide nose.
Cranial measurements:

L	186	NH'	53	B'	100	100(B/L)	74.2
B	138	NB	28	S1	124	100(H'/L)	67.7
H'	126	L.O'1	39	S2	114	100(H'/B)	91.3
LB	104	L.O2	37	S'1	111	Nasal	52.8
GL	96	G'1	50	S'2	105	L. Orbital	94.9
G'H	73	G2	35			Palatal	70.0

Teeth: A
XX6X43/ / / / 345XXX
/ / X5 / 3/ / / / 3/ / - - -
Heavy wear on all teeth.
Pathology: Thinning of the skull in the granular foveolae, probably due to degenerative processes.

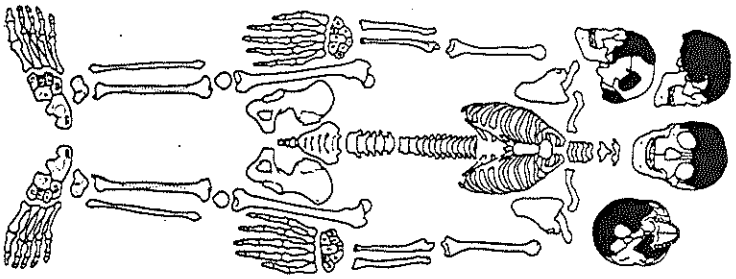
Discussion
This changes the minimum number of individuals slightly, but some of the interments listed above have already been included in part. The new MNI's are 79 males and 64 females (167 adults including unsexed), based on presence of R. femora. Adult age distributions have changed very little since only two individuals could be aged, a young female (Int. 32) and an old ?male (Int. 49). The sex ratio is also little altered. The stature means do not change at all.

BURGH CASTLE: POST-CRANIAL MEASUREMENTS (ADDENDUM)

Sk. No.		28	29	33	48	49
FeL1	R				426	
	L				425	
FeL2	R				423	
	L				424	
FeHd	R				40	
	L				39	
FeE1	R				72	
	L				73	
FeD1	R				25	
	L			26	25	28
FeD2	R				32	
	L			35	32	38
TiL1	R				356	
	L		418			
TiL2	R				349	
	L		411			
TiL3	R				353	
	L		412			
TiE1	R				70	
	L		79			
TiD1	R	36		35	29	36
	L		37			35
TiD2	R	27		25	24	28
	L		27			28
HuL1	R				309	
	L			350		
HuHd	R				41	
	L			51		
HuE1	R				59	
	L			65		
RaL1	R					
	L				231	
Meric	R				78.1	
	L			74.3	78.1	73.7
Cnemic	R	75.0		71.4	82.8	77.8
	L		73.0			80.0
Stature			1.82	1.78	1.61	

BURGH CASTLE EXTRAS

31



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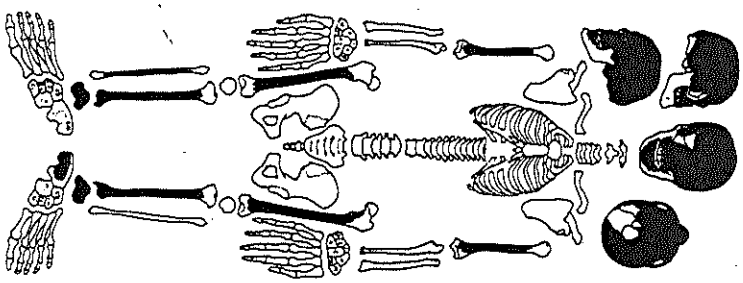

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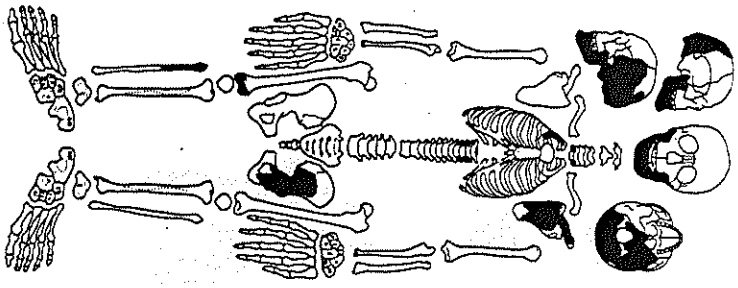

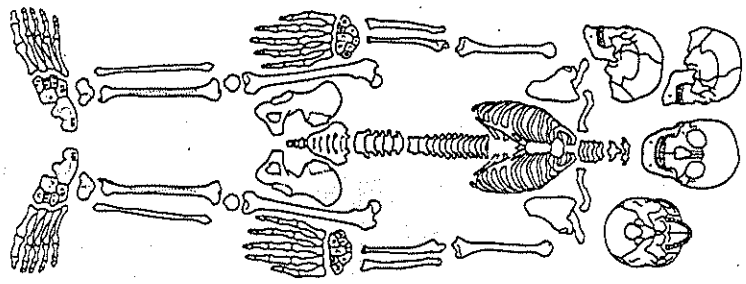

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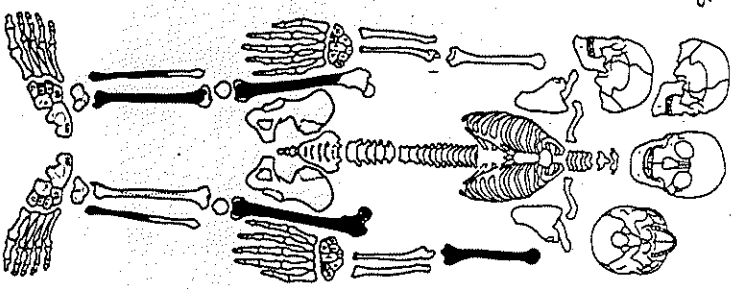

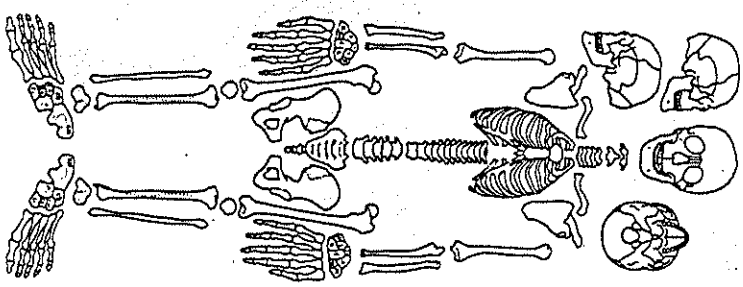

48