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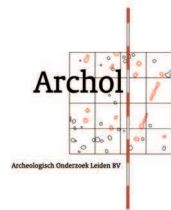
A NEOLITHIC SETTLEMENT ON THE DUTCH
NORTH SEA COAST *c.* 3500 CAL BC

EDITED BY LEENDERT P. LOUWE KOOIJMANS
AND PETER F.B. JONGSTE



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PART II

MAN AND MATERIALS

At the Schipluiden site six burials containing the remains of seven individuals were uncovered, plus 36 human bones scattered among the refuse, representing at least another eight persons. Especially older men were buried, but some children as well, and all the burials are associated with only one of the households. The tightly flexed legs of the inhumations contrast with the stretched burials of the Swifterbant culture. One man was accompanied by an exceptional strike-a-light set. The people were of modest stature, strong and healthy, and hard labour was part of their way of life. ^{13}C and ^{15}N measurements point to a diet with an important freshwater fish input.

5.1 INTRODUCTION

Six graves and a number of scattered human skeletal remains were discovered in the excavated area (figs. 5.1, 5.9). The research questions relating to these remains cover three fields:

- the physical anthropological study of the remains focused on the biological characteristics of the people. Were there males, females and children present at the site? What was their health like and what was their age at death?
- stable isotopes, especially ^{13}C and ^{15}N , of the skeletal remains can provide information on the diet,
- burial postures and grave goods provide information on social differentiation and on cultural links with communities on a supraregional level.



Figure 5.1 Survey of the burials in the western part of the dune (scales 1:500 and 1:100).

5.2 MATERIAL AND METHODS

5.2.1 Excavation and preservation

The skeletons were cleaned in the field with brushes and small wooden spatulas. The cleaned skeletons were drawn to a scale of 1:5. Photographs (general views and details) were made in the field and afterwards in the laboratory. In the field the bones were measured and preliminary age and sex diagnoses were performed. The skeletons, or parts of them, were subsequently lifted in blocks, to be transported and further excavated in the laboratory. The bones were not treated with a preservative. Samples were taken for ^{14}C , DNA and stable isotope studies.

On the whole the preservation of the skeletal remains was good. Five of the seven skeletons were very well preserved considering their age. The bones were complete and could be lifted individually. The skeletons from graves 2 and 4 were less well preserved than those from the other graves. Plant roots had penetrated the bones and remains of the roots were still present in all the bones. Especially the spongy parts of bones such as the ribs, vertebrae, pelvic girdle, metaphyseal and epiphyseal parts of the long bones had suffered such damage.

5.2.2 Physical anthropological methods

Sex diagnosis (Appendix 5.1)

The sex diagnoses of the adult individuals were based on the morphological traits of the skull and the pelvis because they show differences between males and females (WEA 1980). The male features are defined by greater robustness and more muscle attachment. The female pelvis is adapted to childbearing and is therefore different in size and shape.

The pelvis is regarded as the most reliable feature. In view of their differential reliability, the individual sex traits were accorded a value from one to three points. The morphological traits were scored on a scale of -2, -1, 0, +1 and +2, corresponding to super feminine, feminine, indifferent, masculine and super masculine. The degree of sexualization is based on the mean weighed score of all observed traits.

Age diagnosis (Appendix 5.2)

The biological or physical age can be assessed by studying the skeleton. The relation with the calendar or 'real' age grows weaker as an individual advances in age. The influences of health and lifestyle, hormonal changes and genetic factors remain largely unknown (Jackes 2000; Kemkes-Grottenthaler 2002).

The ages of the sub-adults were assessed on the basis of the level of ossification of the skeleton, the formation and eruption of the deciduous and permanent teeth and the length of the long bones (Krogman/Işcan 1986; Ubelaker 1984; Maresch 1955, 17; Scheuer/Black 2000). Of these criteria the status of the teeth is considered the most reliable.

The ages of the adults were determined on the basis of degeneration features such as suture obliteration, attrition of the teeth and degeneration of the spine (Brothwell 1980). The 'complex method' of age determination is based on four features: suture obliteration, symphysis of the os pubis, the structure of the proximal femur and the humerus head (Broca 1875, Nemeskéri et al. 1960; Sjøvold 1975; WEA 1980). The degeneration of the auricular surface of the ilium was used as an additional criterion when necessary (Lovejoy et al. 1985).

ind. no.	grave number / find number	phase	sex	age (approx.)	stature (approx.)	pathology*	non-metric traits	grave gifts
1	1	2	male	38-45 years	173 cm	hypoplasia, DDD, VOA	squatting facets	
2	1	2	male	59-65 years	168 cm	trauma? DDD, POA	squatting facets	
3	2	2	male	46-49 years	168 cm	DDD, POA	squatting facets	flint + pyrite
4	3	3	male	41-50 years	169 cm	DDD	squatting facets	
5	4	2	male	25-40 years	166 cm			
6	5	1-2a	unknown	8 years				
7	6	2	unknown	2 years				bone beads
8	5278	2a	–	adult				
9	9267	2a	male	25-35 years				
10	8037	2a	–	10-11 years				
11	8010	2b	male	adult				
12	2670	2b	female?	17-25 years				
13	6506	3	–	9 months				
14	3648	3	–	30-60 years				
15	5001 + 8008	3	male?	17-25 years				

* DDD = degenerative disc disease, VOA = vertebral osteoarthritis, POA = peripheral osteoarthritis

Table 5.1 Human remains. Characteristics of the individuals.

grave	ind.	posture	side	orient.	preserv.	sex	age	remarks
1	1	stretched	back	S-N	(+)	♂	38-45	
1	2	stretched	back	N-S	(+)	♂	59-65	violent death
2	3	str. flexed	left	W-E	+	♂	46-49	3 strike-a-lights, 1 pyrite
3	4	str. flexed	back	W-E	++	♂	41-50	
4	5	str. flexed	back	N-S	-	♂	25-40	disturbed
5	6	str. flexed	right	E-W	++	infant	8 y	
6	7	flexed	left	W-E	++	infant	2 y	2 bird bone beads

Table 5.2 Graves, basic parameters.

Stature (Appendix 5.3)

The stature was inferred from the measurements of the individual long bones and measurements of the complete skeletons *in situ* (Trotter/Gleser 1952, 1958; Trotter 1970). An individual's stature is related to the person's general health and genetic and climatic factors. Long-term trends within a specific area, such as northwest Europe, can be associated with different living conditions and health of populations (Maat 2003; Roede/Van Wieringen 1985).

Pathology (table 5.1)

Pathological features were described and interpreted to assess living conditions and health status (Ortner/Putschar 1985; Roberts/Manchester 1995). The cause of death can rarely be inferred from the skeleton. Long-term diseases can lead to bone changes. Alterations in bones can be indicative of a reaction to diseases, and hence be interpreted as evidence of a healing process.

Pathological features are classified in several categories, for instance deficiencies in the quality or quantity of the diet, infections, injuries, degeneration of the spine and the joints (Rogers/Waldron 1989, 1995). Pronounced muscle markings are a reaction to and indication of a way of life involving hard physical labour.

5.3 OBSERVATIONS

5.3.1 The graves (table 5.1)

Human burials were restricted to the southwestern part of the dune, where four (nos. 1, 2, 4, 6) were found in a small cluster, the other two in a more isolated position (fig. 5.1, see also section 3.5.2). The burials were assigned to different occupation phases on the basis of intersections with pit fills, the relation of the grave fills to the culture layer Unit 20 and, thirdly, their depths in absolute terms relative to the general rise in water level and the sedimentation. Grave 5 is assumed to be the oldest (phase 1 or early phase 2), the small cemetery was dated to phase 2 and grave 3 is the youngest, most probably dating from phase 3 (section 3.5.2).

The graves were oval or subrectangular. Their dimensions were in some cases (esp. graves 3 and 4) considerably larger than required for the burial of the tightly contracted body

(table 5.2). Either the people who buried the deceased decided on this posture only after they had dug the pit, or organic grave goods (now completely decayed) were placed in the surplus space. The graves had a moderate depth, of between 60 and 95 cm below the former surface, their bases varying in depth from -4.65 to -4.0 m, which was presumably more or less the groundwater level at the time. These depths agree with the levels estimated on the basis of the aquatic deposits during phases 1-3: between -4.5 and -3.7 m NAP. This level rose in the course of time (section 2.4), but will also have fluctuated on a seasonal and a random, weather-related, basis. For this reason the base levels of the graves were not used for relative dating or sequencing of the graves. The good preservation of the skeletons supports the assumption that the corpses were buried close to the former groundwater level and came to lie below it shortly after inhumation.

Grave 1 (fig. 5.2)

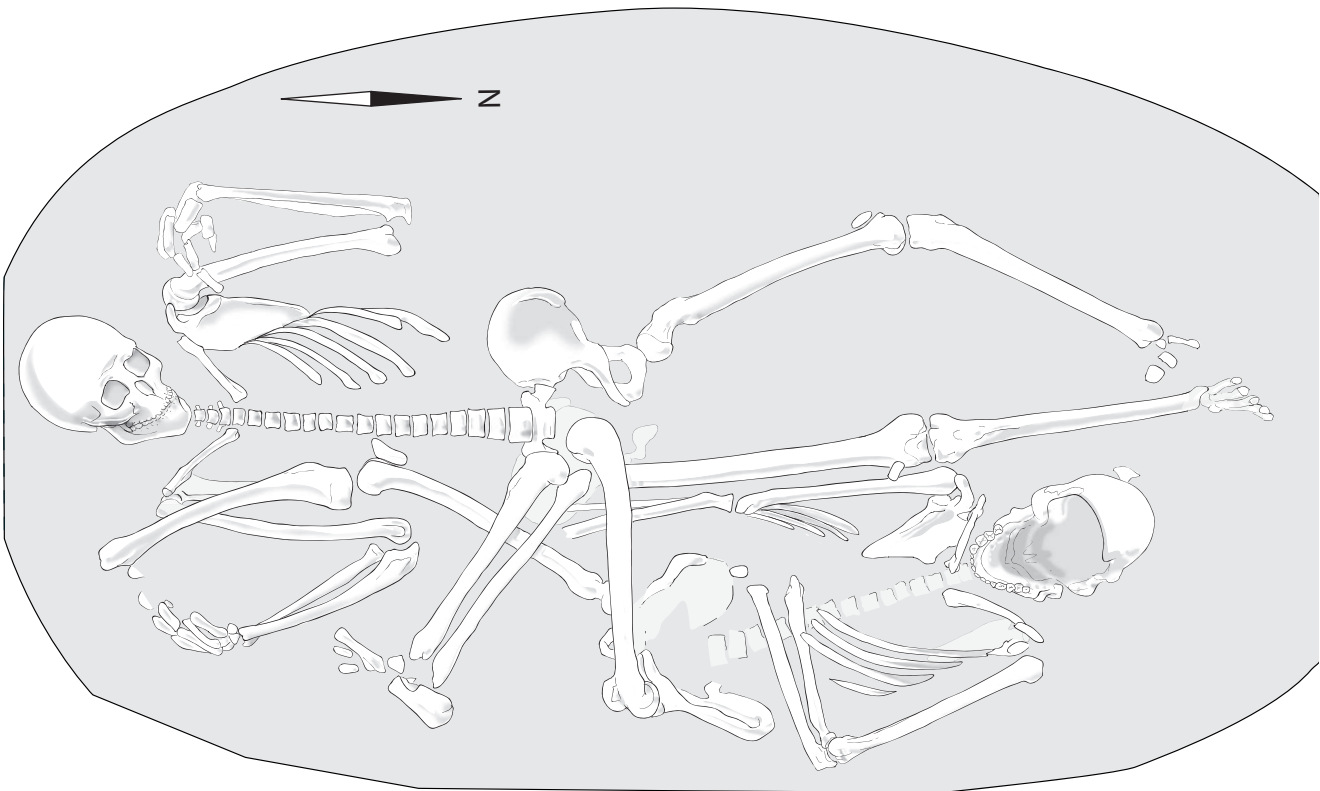
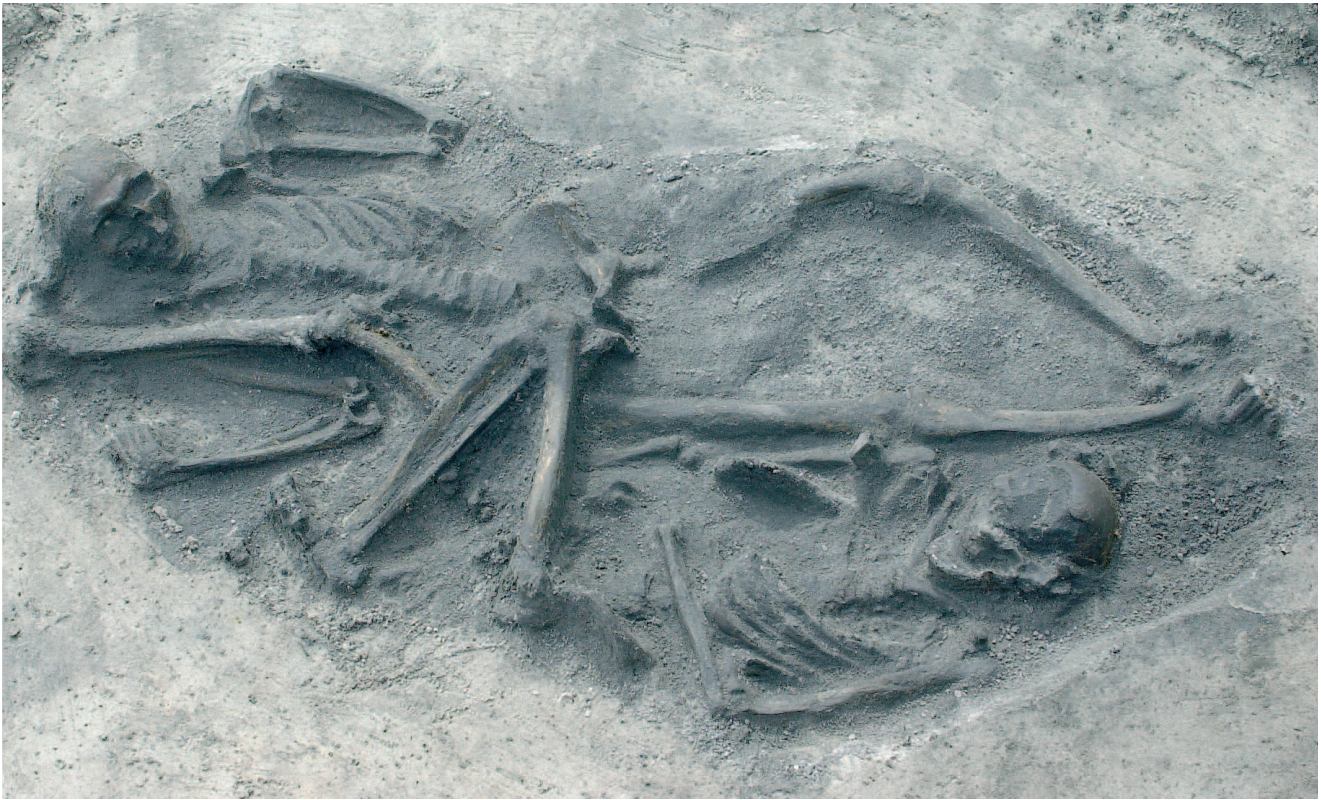
The grave, oval in shape, was orientated N-S and had a fill of dark humic sand, similar to Unit 20 in this area, implying a date well into phase 2.

The grave contained the remains of two male individuals: individuals 1 and 2. The manner in which they were buried differs from that observed in the case of the other burials in two ways. In the first place, this is the only double burial found at the site and, secondly, the postures of the skeletons differ from those in the other graves.

Both skeletons were articulated. Individual 1 was laid down in the grave first, with his head in the south and stretched on his back, with one leg straight and the other slightly bent. Both lower arms were bent back alongside the upper arms.

The second individual was buried next to individual 1, but with his head at the northern end, also on his back, but with a tilted pelvis and with bent arms and legs. Both legs overlap the body and right arm of the other person, showing that this individual was the second to be placed in the grave.

Individual 1. This skeleton is almost complete and reasonably well preserved. The spongy bones of the ribs and vertebrae are fragmented and damaged by plant roots. The skeleton



belonged to a man who died at an age of approx. 38-45. There are no injuries on the bone from which the cause of death can be inferred. This man suffered pain in his neck and lower back, possibly due to degeneration of the spine caused by physical labour. His teeth show enamel defects, pointing to health stress in early life (Hillson 2003; Schultz *et al.* 1998; Carli-Thiele 1996). Squatting facets are visible on the tibiae. The man's stature was approx. 173.8 cm and the shape of his skull is dolichocranial.

Individual 2. The skeleton of the second individual is more or less complete but the axial skeleton is fragmented as a result of the intrusion of plant roots. It is the skeleton of a man who lived to the well-advanced age of about 59-65. The vertebral column shows traces of degeneration and vertebral osteoarthritis in the thoracic and lumbar region. Both wrist joints are also affected by degeneration, the right one more so than the left one. The teeth are badly worn; chipping of several of the front teeth may be attributable to some specific use. A squatting facet was observed on both tibiae. The reconstructed stature is 168.6 cm.

There is one feature that may be related to the cause of death. Injuries observed on the skull were most probably inflicted at the time of death. Post-mortem damage to the

head is possible, but provides no satisfactory explanation for all the observations. The best explanation for the damage to the skull is a severe blow to the head that smashed the frontal bone and parts of the face. This is based on the following details. The nasal part of the facial bones was found to the left of the head; some fragments of the skull were lying to the right of the skull and inside the bottom part of the skull. The skull later became filled with soil. This is an important clue to what might have happened. The skull was crushed, and after decomposition of the brains, the bone fragments came to rest on the inner table of the underlying part of the skull. Later the skull became filled with soil from the grave fill. In the case of post-mortem damage, the skull would have become filled with soil first, and the crushed pieces would have remained visible on the outside. At the time of the injury some of the bone fragments may have adhered to soft tissues such as flaps of skin, and thus have been removed from their original positions.

No signs of bone reaction or healing were observed, implying that the injury was caused around the time of death. Post-mortem damage can therefore not be ruled out completely.

An unnatural cause of death could explain why two adult men were buried in one grave.



Figure 5.2 Grave 1, field situation, plan (scale 1:10) and detail of skull individual 2.

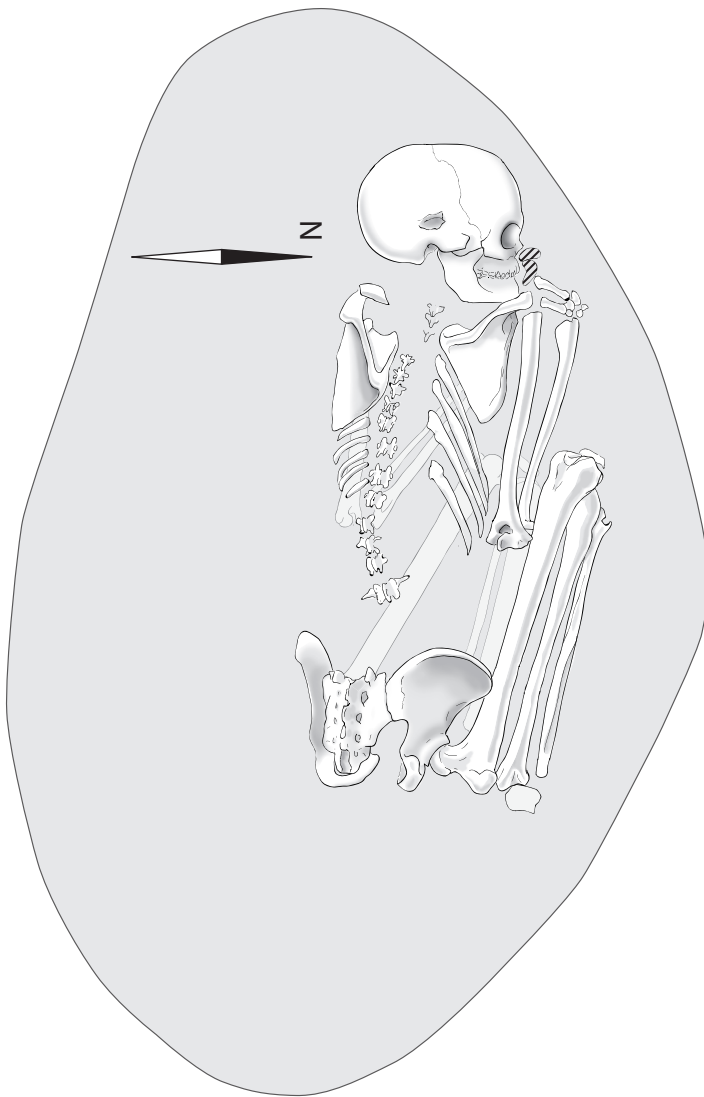


Figure 5.3 Grave 2, field situation, detail of strike-a-light burial gift and plan (scale 1:10).

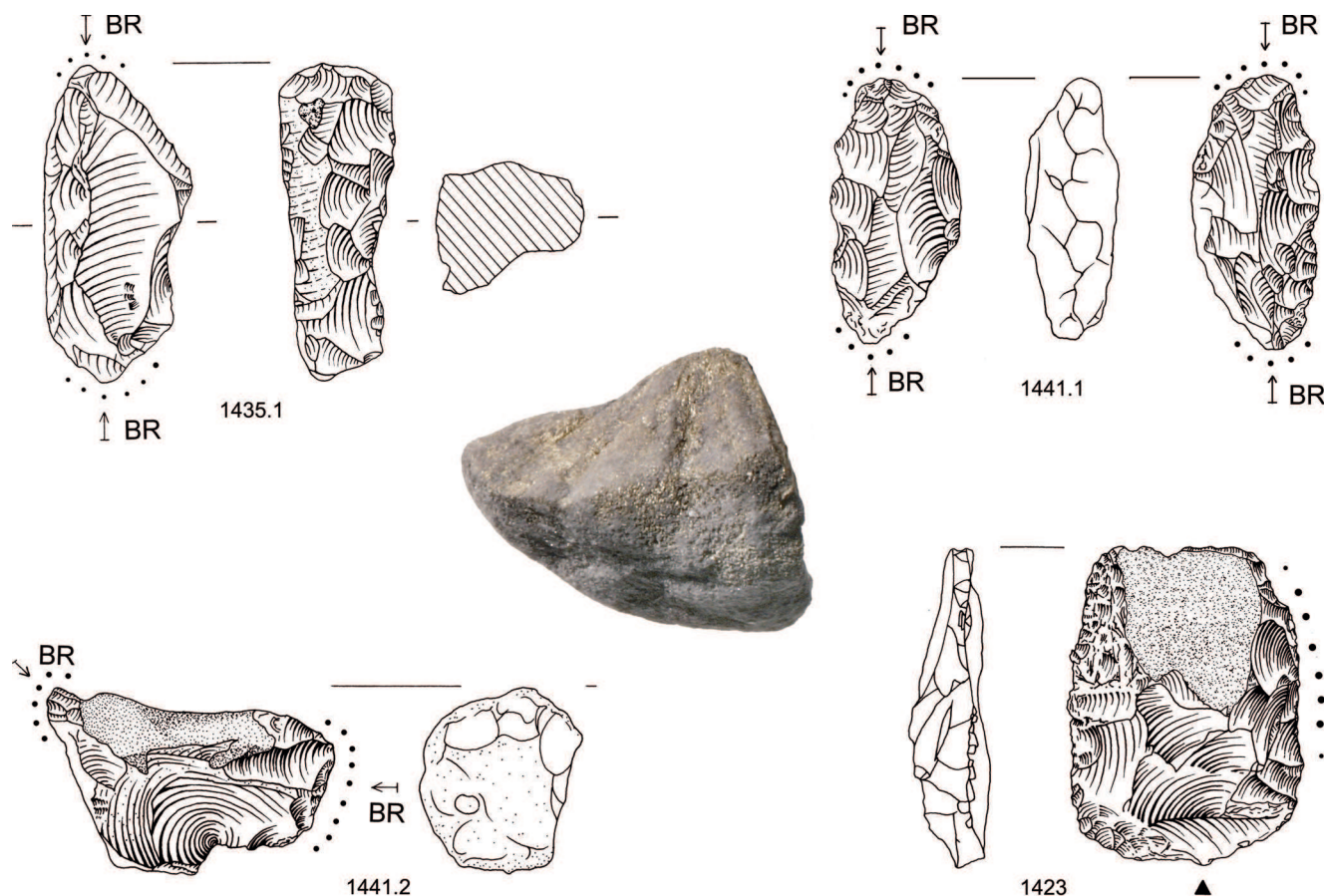


Figure 5.4 Grave 2, grave goods. Three strike-a-lights with a pyrite nodule and a retouched flake (scale 1:1)

Grave 2 (fig. 5.3)

The grave was orientated roughly W-E and irregular-oval in shape. The fill was similar to that of grave 1, indicating a similar date, well into phase 2. This grave contained the skeleton of an adult male, buried on his left side, with his head in the west, facing north. The legs were flexed so tightly as to imply that the limbs were bound together. In his hands, which were positioned in front of his face, he held three flint artefacts, identified as a strike-a-light set, and a lump of pyrite (fig. 5.4, see also chapters 7 and 8). These implements can be seen as the deceased's personal belongings. A (retouched) flint blade found near the feet can on the basis of its position and typology also be regarded as one of the grave goods. A small flake recovered from the pit fill is assumed to be an accidental find and no intentional grave gift.

The skeleton is almost complete. The condition of the bones is good; only parts of the pelvis were fragmented. This man died at an age of around 46-49. There are no indications

on the bones pointing to the cause of death. The teeth are badly worn, especially the incisors and canines, possibly due to their use as a tool. Like individual 2, the man suffered pain in his lower back, and squatting facets were again observed on the tibiae. The right wrist joint shows signs of degeneration, which may have been caused by daily fire making. The reconstructed length of this man is 168.9 cm and his skull is dolichocranial.

Grave 3 (fig. 5.5)

Grave 3 was found on top of the dune. It was orientated W-E and had an irregular oval shape. The grave was dug partly through the fill of a well that was dated to phase 2 on the basis of characteristics of its fill. Large pieces of peat found in the heterogeneous fill of the grave are indications of peat in the vicinity of the grave. These observations, together with the position of the grave, justify a date towards the end of the occupation period, in phase 3. The bottom of the grave was lined with some organic fibres, indicating that this level

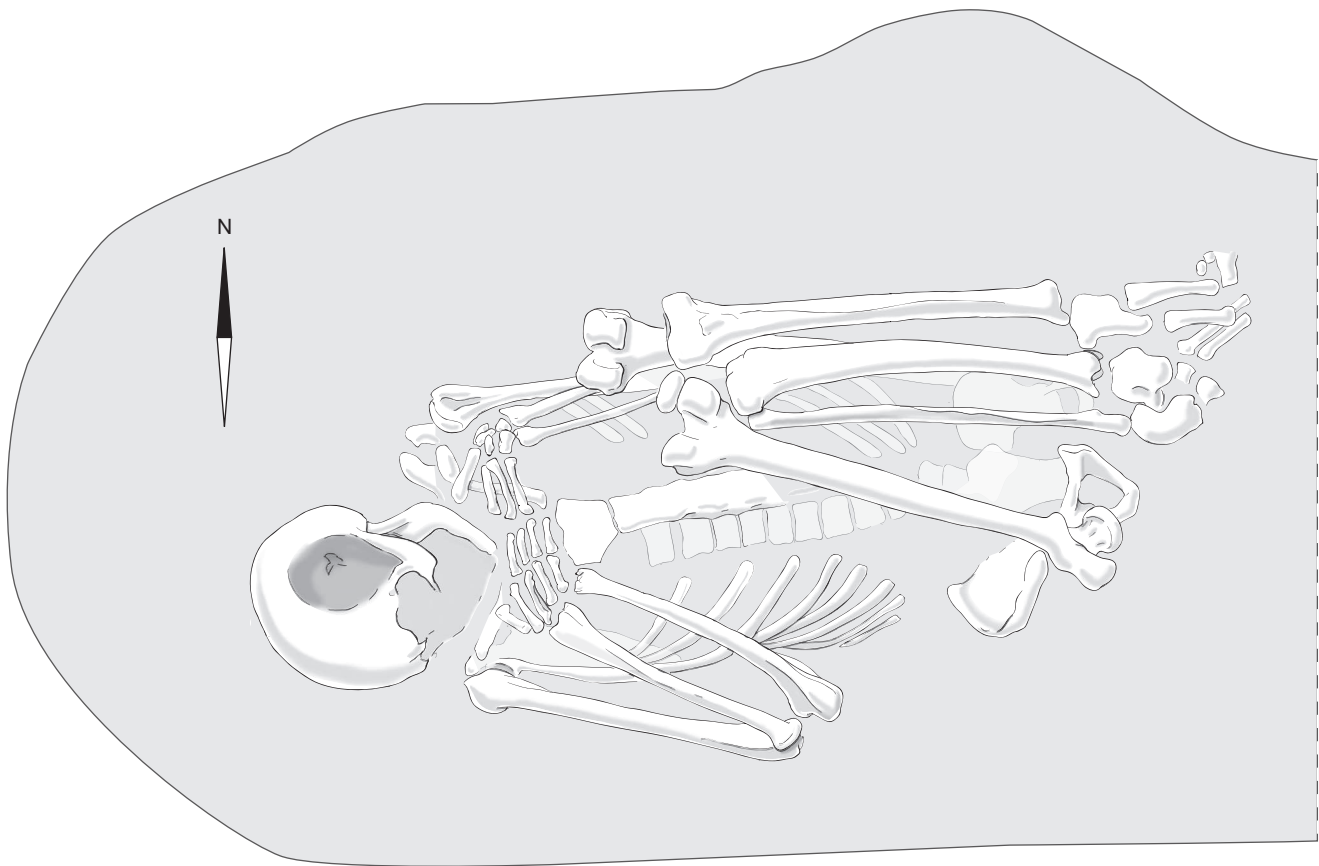


Figure 5.5 Grave 3 (scale 1:10).

(-4.15 m NAP) must have been below the groundwater already at the time of digging.

This grave contained the very well-preserved skeleton of an adult male. He was buried on his back, with his head in the west and his legs in a very tightly flexed position. The arms were bent close to the body, with both hands positioned on the chest below the chin. The man lived to an age of approximately 41-50. There are no indications of the cause of death. Degeneration of the lower spine is evident, as is dental disease. The teeth were badly worn and some were lost during the man's life due to decay. Squatting facets were observed on the tibiae. The man's stature was approx. 169.2 cm and the shape of his skull is dolichocranial.

Grave 4 (fig. 5.6)

This burial was found in the dark humic sand of the 'occupation layer' (Unit 20) on the northwestern slope of the dune, without any visible traces of a grave. The articulated body parts suggest that the individual was interred in a

shallow grave in the late occupation phase. The grave must have been disturbed after the time of burial and it was also touched by the machine that dug the trench. These disturbances led to the disappearance of the upper parts of the skeleton (head, right hand and feet) and severe damage to the remaining bones. The disturbances may have been caused during the later occupation of the site; being so shallow, the grave will have been particularly susceptible to damage. The preserved remains indicate that the grave was orientated N-S and that the person was buried on its back, with its head in the north and with tightly flexed legs. The right lower arm was bent back, alongside the upper arm, the left hand rested in the lap.

Parts of the pelvis indicate that this is the skeleton of a man. His age at death was approximately 25-40. The bones show no indications of the cause of death. No pathological traits were observed on the vertebral column because of the fragmented and incomplete condition of this part of the skeleton. The reconstructed stature is approx. 165.6 cm.

Grave 5 (fig. 5.7)

Grave 5 was situated at the southeastern edge of the dune. It was orientated roughly W-E, relatively large, round-oval in form and had a light-coloured homogeneous fill and a darker coloured outline. The grave was intersected by a well, which had however not disturbed the inhumation itself. The well was dated to phase 2 on the basis of characteristics of its fill along with its position low down the dune, making an early date in the occupation sequence most likely for this grave.

In the grave a child was buried on its right side, with its head in the east, facing north, and its legs tightly flexed. The right arm was bent in front of the body and the chin was laid to rest on the right hand; the left arm was stretched down. The skeleton is complete and the bones are very well preserved. The age at death was around eight years. The cause of death is unknown.

Grave 6 (fig. 5.8)

Grave 6 was found when a number of large features – pits and wells dating from the early phases of occupation – were sectioned, and the skeleton was slightly damaged during this sectioning. The subrectangular grave was orientated SW-NE and its fill was very similar to the peaty sand of the pit fills into which the grave was dug. The local stratigraphy and the grave's depth imply that it dates from phase 2.

An infant was buried in this grave orientated W-E, with its head in the west, on its left side and with its legs in a tightly flexed position. The arms were bent, with the hands in front of the face. Two tubular beads made of bird bone were recovered from the dug-out fill of the grave. These finds, which are assumed to be grave goods, will be discussed in chapter 9.

The skeleton found in this grave is almost complete and the preservation of the bones is very good. The bones are those of an infant that was around two years old when it died. The cause of death is again unknown.

5.3.2 The scattered remains

Fragments of human bone were found in 33 find numbers, amounting to a total of 36 skeletal parts, which were discovered as isolated finds scattered across the entire excavation area.

The majority of the remains derive from the refuse zone along the dune's edge. Only five fragments were found in pit fills. No concentrations could be made out in the refuse zone – quite the contrary: the remains appeared to be randomly distributed along the dune's edge, without any relation to the graves. The remains date from all the occupation phases, with higher concentrations from phase 2a on the southeastern slope, and phase 3 on the northwestern side and at the eastern end. In view of the small quantities and the small minimum number of individuals involved, little significance should be attached to this differentiation.



Figure 5.6 Grave 4 (scale 1:10).

The remains are predominantly teeth and skull fragments; only a few fragments of long bones from the limbs and only one vertebra were recovered (table 5.3). There is a relation between the compact nature of the bones and the state of preservation. Compact bones – such as those of the crania and the shafts of the long bones (diaphysis) – are more likely to be preserved than the spongy bones of the axial skeleton. The teeth, however, are the strongest, so it is not surprising that they constitute the majority of the isolated finds.

There are several possible explanations for these isolated bones. In the first place, graves may have been accidentally or deliberately disturbed; this was for example the case with grave 4, individual 5, whose bones were scattered across the surrounding area. Another possibility is that other funerary rites besides burial in a grave were practised, for example excarnation. This could explain why bone

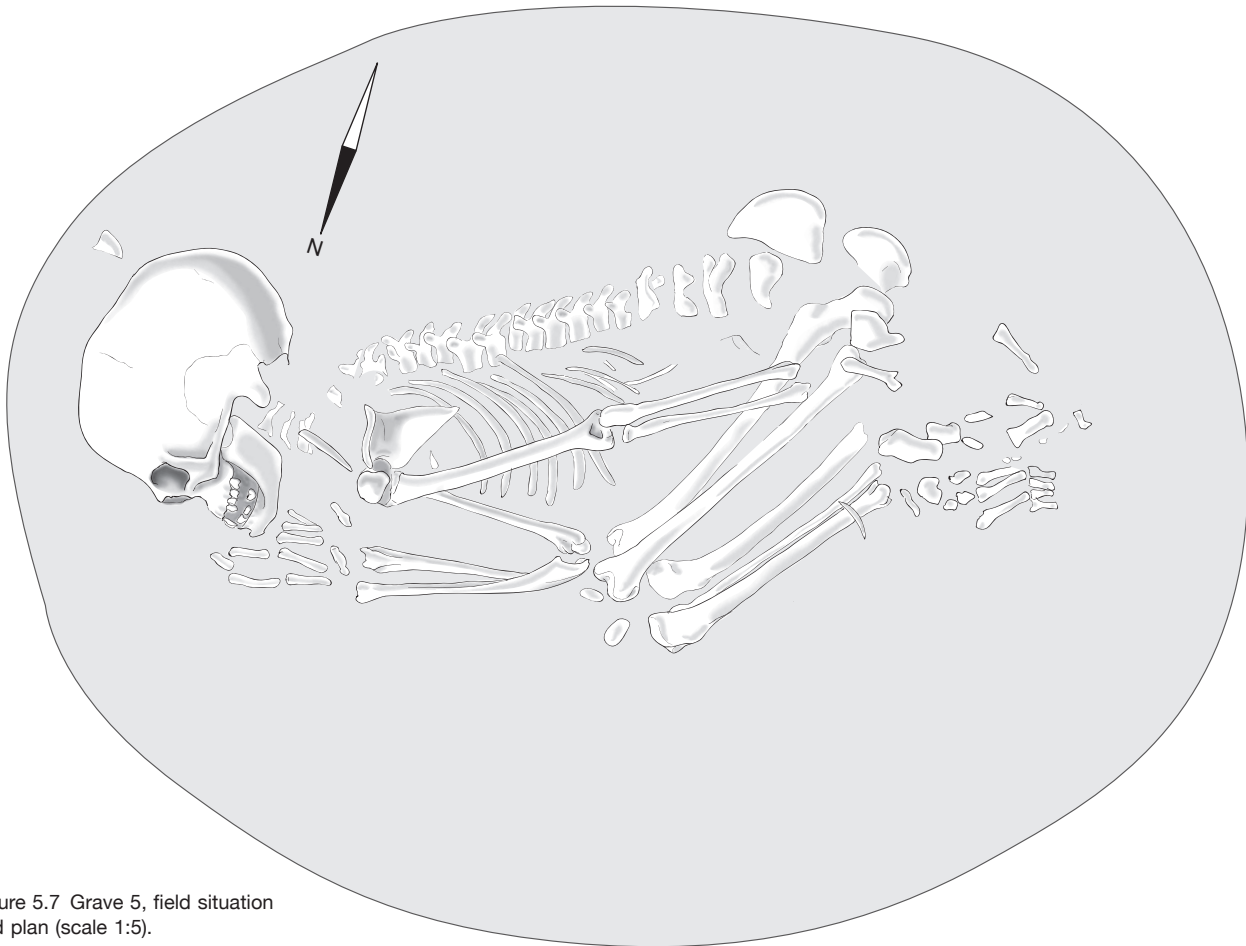


Figure 5.7 Grave 5, field situation and plan (scale 1:5).

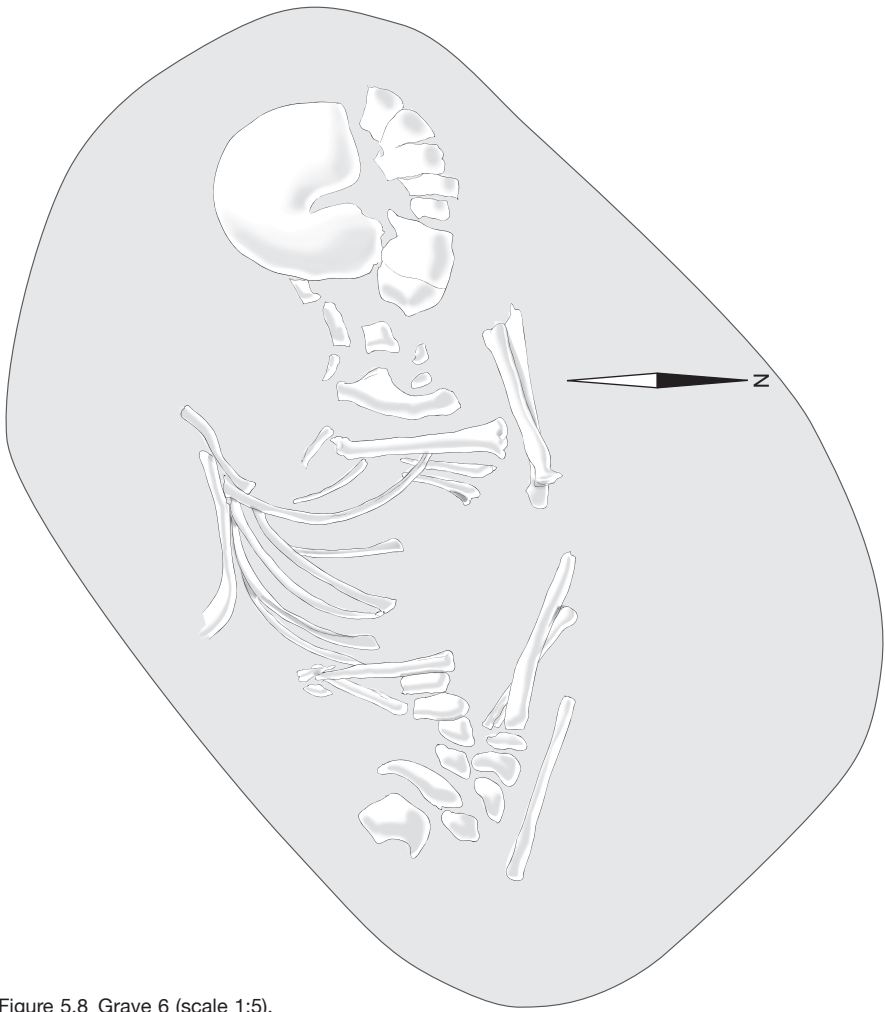


Figure 5.8 Grave 6 (scale 1:5).

fragments were found all over the site. The diaphyseal parts of a left and right femur (nos. 5525 and 8008) that were found 75 metres apart both show signs of periostitis and may very well derive from the same individual.

The minimum number of individuals represented by the human remains found at the site was estimated on the basis of the distribution and phasing of specific bones and their age differences (see table 5.4 and fig. 5.9). The scattered remains represent at least eight individuals: three from phase 2a, two from phase 2b and three from phase 3. The individuals concerned are six adults and two children. Cranial traits of two adults are indicative of men; the femur of another individual probably also belonged to a man. The gracile nature of the cranial vault thickness and the teeth suggest one female. The sex of the other two adults cannot be established.

5.3.3 *Stable isotope analysis* (table 5.5, fig. 5.10)

The stable isotopes of carbon and nitrogen can provide information on the consumption of animal and plant proteins, especially on the marine or aquatic versus the terrestrial component of the diet. In addition to the radiocarbon dating, the ¹³C and ¹⁵N ratios were also determined, using the same bone samples, with a view to assessing any reservoir effects

	N=
teeth	16
cranium	11
diaphysis + phalanges	8
axial	1
total	36

Table 5.3 Isolated human bones according to skeletal parts.

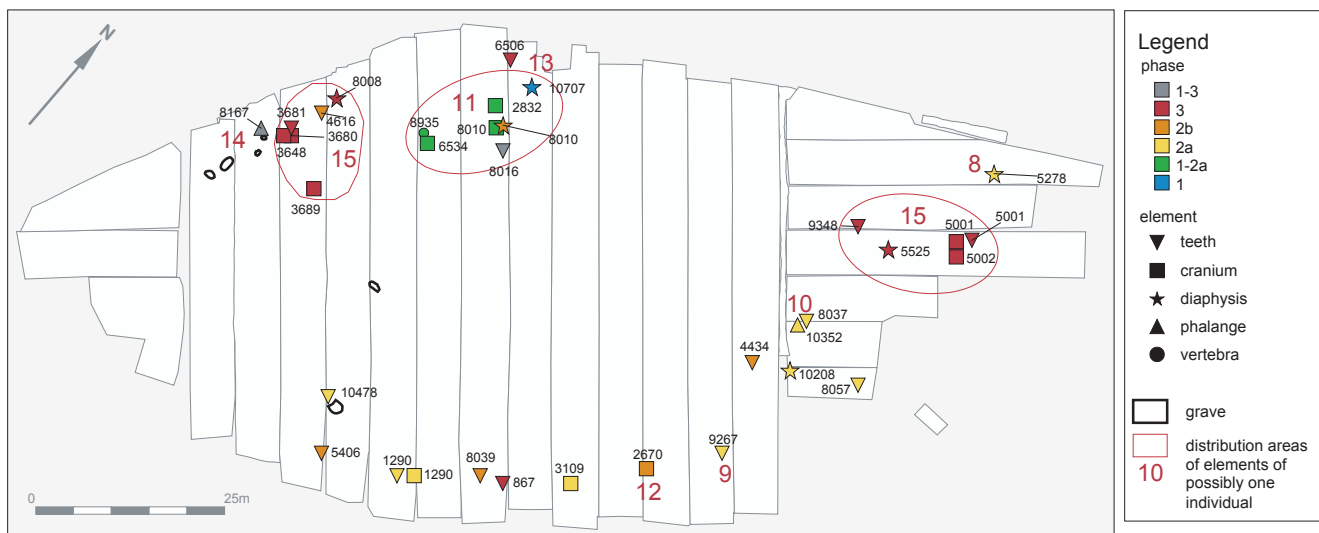


Figure 5.9 Position of isolated human remains classified per phase and skeletal element. Some distinct clusters of elements from the same phase – indicated by a thin red line – may derive from the same individual.

and gaining insight into the people's diet (Van der Merwe 1982; DeNiro 1987).¹ The results of this analysis (table 5.4) indeed reveal a reservoir effect, as ^{15}N values higher than 10‰ are usually regarded as indicative of a marine component, which is confirmed by the high ^{13}C values. This is in full agreement with all but one of the ^{14}C dates, which were systematically about 300 years older than those of botanical remains. There is one remarkable exception: the sample of individual 5 (grave 4) does not reveal a reservoir effect in the ^{14}C and ^{15}N values. The bone sample of individual 6 moreover contained insufficient material for ^{15}N detection, but on the whole the high ^{15}N values obtained for Schipluiden are in agreement with a marine food regime, implying a diet that contained freshwater fish.

In comparison with the carbon/nitrogen ratios obtained for various diets associated with coastal and inland popu-

lations and their subsistence strategies, the Schipluiden ratios form a distinctive group, with very high ^{15}N values combined with heavy loads on the ^{13}C scale (fig.5.10; Schulting 1998, 206). Inland hunter-gatherer groups and farmers are characterised by relatively low ^{15}N values in comparison with coastal fisher-hunter-gatherers. Isotope analysis of skeletal remains from the Iron Gates in the Danube region revealed a diet rich in fish characterised by a $^{13}\text{C}/^{15}\text{N}$ ratio comparable with that of the Schipluiden individuals (Bonsall *et al.* 1997). So the apparent reservoir effect of all but one of the dates can be considered a freshwater effect.

Apart from the high ^{15}N values there is an additional feature indicating a diet rich in fish, namely considerable amounts of calculus or tartar formed on the individuals' teeth. Calculus formation is enhanced in an alkaline environment, which is in agreement with the consumption of fish (Hillson 1979; Lillie 2000). Although high ^{15}N values are not fully understood, as the process of fractionation of this isotope is very complicated, both the isotope ratio and the calculus formation on the teeth are indicative of a diet that contained freshwater fish.

A possible explanation for the aberrant values of individual 5 (grave 4) could be that this person did not eat fish. The person may have been raised in a different food regime, outside the region, and for example have died shortly after marrying into this coastal group.

A second series of samples of human and animal bone and soil was analysed at Durham University (Millard/Smits/Budd, in prep.). Nitrogen and carbon isotopes were measured for the reconstruction of the diet. Soil samples and the

find no.	phase	element	sex	age
5278	2a	ulna (left)	–	adult
9267	2a	mandible + molars	male	25-35 years
8037	2a	molar	–	10-11 years
8010	2b	cranial fragment	male	adult
2670	2b	cranial fragments + molars	female?	17-25 years
6506	3	molar		9 months (±3 months)
3648	3	cranial fragment	–	30-60 years
5001+ 8008	3	femur and molars	male?	17-25 years

Table 5.4 Isolated human remains. Minimum number of individuals based on sex and age indicators and phasing.

$^{87}\text{Sr}/^{86}\text{Sr}$ ratio of the enamel of domestic and wild animal remains were determined as references. In addition, human tooth enamel was subjected to combined Pb, Sr and O isotope analyses to identify any possible immigrants in the population and their place of origin.

The results confirm those of the previous analyses and point to a significant marine protein input in the diet, and hence the exploitation of marine resources by the site's inhabitants. The soil strontium values are more varied than the values obtained for the animals and humans, implying that not all zones of the landscape were used for food procurement. The additional analyses showed that most individuals, especially those who were buried in the graves, were of local origin. Two individuals, represented by only a few loose teeth in the dune sediment, were identified as immigrants. One of them came from the east and the other from somewhere to the south of Schipluiden.

5.4 ANTHROPOLOGICAL INTERPRETATIONS

5.4.1 Group size and composition

(table 5.2, Appendix 5.1)

The group of people who were buried in this area consists of five men and two children. Another eight individuals are represented by the scattered remains. There is evidence of three

grave	ind.	age	phase	^{14}C date BP		$\delta^{13}\text{C}$	$\delta^{15}\text{N}$
1	1	38-45	2	GrA-26650	5005 $\pm$ 40	-18,67	15,77
1	2	59-65	2	GrA-26652	5080 $\pm$ 40	-19,02	15,95
2	3	46-49	2	GrA-26653	5055 $\pm$ 40	-18,81	15,55
3*	4	41-50	3	GrA-26670	5055 $\pm$ 40	-21,52	12,79
				GrA-28037	5010 $\pm$ 40	-21,56	–
4*	5	25-40	2	GrA-26671	4650 $\pm$ 40	-20,50	10,07
				GrA-28150	5120 $\pm$ 45	-19,34	–
5	6	8	1-2a	GrA-26672	5170 $\pm$ 40	-18,50	–
6	7	2	2	GrA-26737	5070 $\pm$ 40	-21,05	16,36

* For two individuals an extra ^{14}C date is available. There is no explanation for the difference in outcome.

Table 5.5 Human remains, ^{13}C and ^{15}N values.

men, one woman, two adults and two children. So the total number of individuals represented by the human skeletal remains is at least 15: eight men, one woman, two adults and four children (see table 5.3). The mean age of the adult men in the graves is about 46. The ages of the children and infants vary. There are two very young infants of nine months and two years old, and two children of around eight and ten years old.

There is only one, uncertain, indication of a female, which means that this group of individuals is not representative of a natural population. Women are evidently underrepresented,

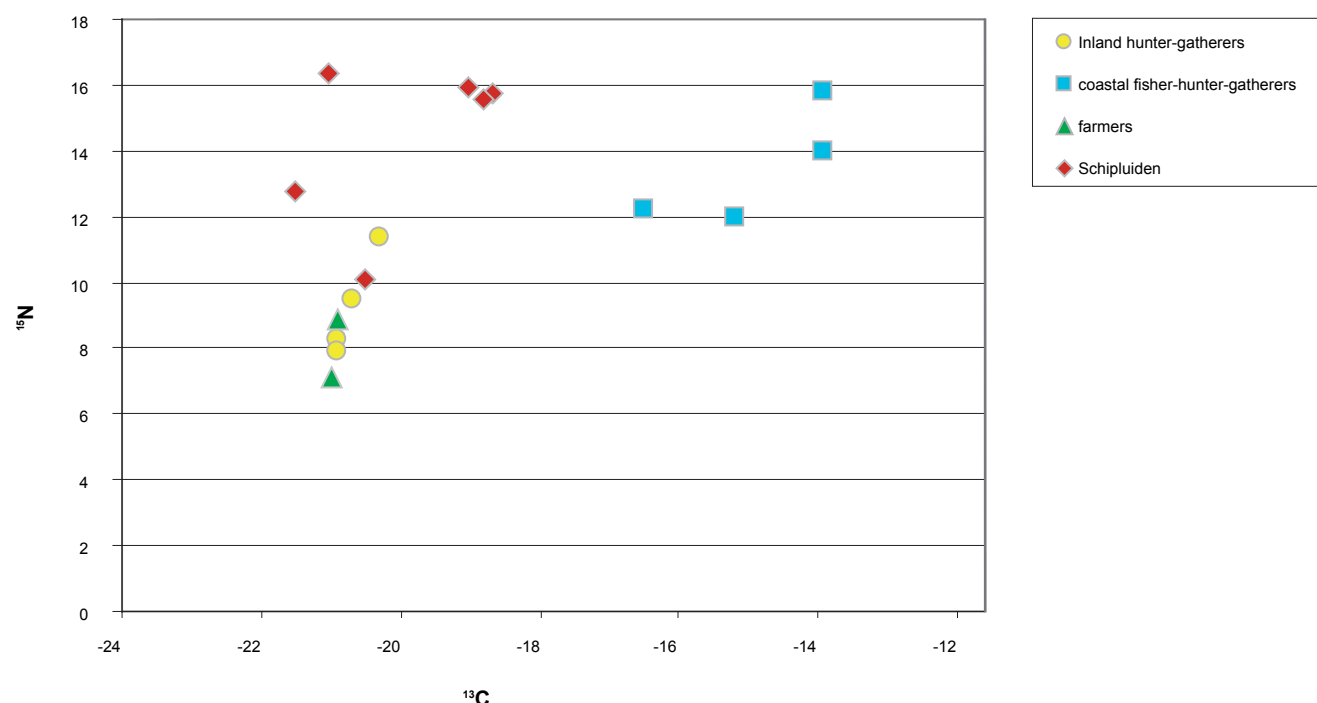


Figure 5.10 The $^{13}\text{C}/^{15}\text{N}$ ratios of human skeletal remains from Schipluiden in relation to those of populations with different forms of subsistence (data from Schulting 1998, 206).

although the burials of two young children suggest the presence of complete households. Deceased women were presumably usually disposed of in a different manner that is not evident in the archaeological record.

5.4.2 *Health and living conditions* (table 5.1)

The age at death varies from nine months to approximately 60 years. The mean age of the adult men is considerable. The stature of the adult men varied from 165.6 to 173.1, with a mean of 168.9 cm (Appendix 5.3). Muscle marks, degeneration of the joints and the vertebral column of most individuals indicate that physical strain and hard labour were characteristic of their way of life. A cortical defect at the site of a muscle attachment on a humerus – one of the individual bones, no. 8010 – is in agreement with this. Enamel defects are indicative of at least some spells of bad health during the youth of individual 1. Due to tartar formation and severe attrition, such defects could not be studied on the teeth of the other adults (fig. 5.11).

The age at death of the adults, the stature and the degeneration of the skeletons due to physical labour indicate a group of people who were strong and healthy. It should however be borne in mind that this small group is not necessarily representative of the larger population to which it belonged.

5.4.3 *Diet*

The conclusion of a diet with a considerable freshwater fish component does not seem to be well in agreement with the archaeozoological evidence (chapters 22-23), especially not with the evidence relating to fish (chapter 25). It should however be added that the ratio of terrestrial and aquatic protein inputs is hard to assess on the basis of archaeozoological data because of the great differences in the archaeological formation processes of mammal and fish remains. Fish might be underrepresented. The same holds for the ratios of widely differing fish species such as eel and sturgeon, which (along with flounders) were both dominant among the remains. Eel, although catadromous, is essentially fished in fresh water, as was confirmed by sample 898. And, last but not least, it is difficult to assess at this stage of the research what the effect of sturgeon on the isotope ratio will have been. The reservoir effect of the ^{14}C dates of all the measured charred food crusts indicates that many fish found their way into the cooking pots.

5.4.4 *Conclusion*

The physical-anthropological study has shown that the group of people whose remains were discovered at this site comprised at least 15 individuals, mostly men and children. Only one (possible) female could be identified. The health

and living conditions were favourable, though hard physical labour was probably part of everyday life. Metric and non-metric traits of the adult men in the graves show some similarities: the dolichocephalic shape of the skull and the squatting facets on the tibia.

The dead were buried in a formalised manner, that is, in single burials in a flexed posture. An exception is the double burial in grave 1. Damage to the skull of individual 2 points to some kind of violent conflict. This, and the associated unnatural death, could have been the reason for this variation in the burial practice.

The scattered skeletal remains may indicate a different – aboveground – treatment of the deceased, for example in the open air, which led to the subsequent dispersion of the bones all over the site.

5.5 *ARCHAEOLOGICAL INTERPRETATION*

5.5.1 *The burial tradition*

During the period of occupation some of the deceased were buried at the site. The continuity of occupation, the high probability of year-round use of the site and the occurrence of both formal inhumations and isolated skeletal remains dating from all phases (except phase 1) make burial in an occupied settlement extremely likely and exclude the possibility of burial at a (temporarily) deserted settlement – a realistic option in many other cases.

Only a few individuals were granted a formal burial. Assuming that the dune was divided into a number of farmyards we may conclude that burial was practised by only one of the households – the southwestern one of ‘cluster A’ (section 3.8.3; fig. 4.5) – in all the phases, but within this household this form of treatment of the dead was used selectively, and reserved for (some) adult men of different ages and – more incidentally – also children. This led to the formation of a small ‘cemetery’ at the edge of the farmyard, on top of the dune. If we accept the assumption of a fixed farmyard layout we have to abandon the interpretation of there having been a ritual area in the west of the site, but in a more restricted sense there does seem to have been such an area associated with the southwestern farmyard, which also included the ‘deposition pit’ (section 3.5.3).

The more commonly applied treatment of the deceased is much more puzzling, as the only surviving evidence of that treatment comprises the scattered human bones that were found in the refuse zones around the site. The rite concerned was practised in all phases and by all the households. Again the deceased seem to have been mainly men and children, though we should not attach too much significance to this as women are difficult to identify in fragmentary bones. The individuals concerned are all represented by only a few fragments, and we must assume that many deceased elude us in an archaeological respect. There may moreover have been



Figure 5.11 Mandible of individual 2 showing dental wear; the detail shows tartar formation.

a third form of treatment of the deceased that left behind no evidence whatsoever at the site. Viewed from the perspective of permanent occupation of at least two centuries by around 25 persons, the minimum number of individuals whose remains have been found is indeed exceptionally small: around 10% on the assumption of an average life expectancy of 35 years.

In spite of the small number of formal burials we may nevertheless – with some reservation – speak of a ‘tradition’.

There is a certain preference for a W-E orientation and a remarkable tightly flexed burial posture. The double burial differs from the other burials in several respects: its orientation is at right angles to that of ‘the tradition’ and the postures of the deceased are also entirely different. This could indeed be associated with the exceptional disaster suggested by the fractured skull of one of the two men. Exceptional causes of death often lead to special rites (Binford 1972).

5.5.2 *Comparison with Ypenburg*

The treatment of the deceased as attested at Schipluiden differs substantially from that observed at Ypenburg – a site that is otherwise in many respects comparable with Schipluiden (Koot/Van der Have 2001, 21-29). The latter site was found to contain a formal cemetery comprising two clusters of burials – in total 31 burials containing the remains of 42 individuals: men, women and children, many of which were less than 6 years old. As at Schipluiden, the cemetery lay directly next to a house site, identifiable as a cluster of postholes, but at Ypenburg all the deceased, possibly of two households, were evidently formally buried for a period of time. Another nine human skeletal remains, including deciduous infant molars, were found mixed with faunal remains in excavation trenches dug on the (much larger) dune (De Vries 2004). So this is something the two sites do have in common.

No indisputable preferred orientation was observed at Ypenburg, but most of the deceased were buried in a flexed posture, some with their legs ‘bound close together’. A few were found lying on their backs with their legs bent sideways (like individual 2 at Schipluiden) and only two in a fully stretched posture (like individual 1). There were seven multiple burials, but none of them contained the remains of two adult men. Most of them moreover comprised secondary inhumations whose burials had disturbed the older inhumations. Only one double burial contained the remains of two simultaneously buried individuals – two infants. So the ‘standard’ form of inhumation in a strongly flexed posture was practised at both Schipluiden and Ypenburg, and the postures of the deceased buried in the Schipluiden grave 1 were indeed (special) alternatives, and exceptional for double burials in general.

Grave goods were scarce at Ypenburg, too: all the graves together yielded only ten amber beads, three jet beads and a bone ring. There were no counterparts for the ‘personal belongings’ found in the Schipluiden grave 2. The grave goods suggest a socially fairly undifferentiated community at both sites.

Remarkable are the differences in ages observable between Schipluiden and Ypenburg: the ten Ypenburg women were at most 35-44 years old at death and the same holds for seven of the eight men; only one man was older, *i.e.* more than 54 years of age. This age distribution is in good agreement with that generally observed for Neolithic sites, but on the other hand it also confirms that formal inhumation was at Schipluiden mainly the privilege of ‘wise old men’, possibly lineage heads.

5.5.3 *The burial rite in a wider context*

In a wider context we see points of agreement and contrasts with what is known about the burial tradition of the Swifterbant culture and the preceding Late Mesolithic. Small

cemeteries and independent, incidental inhumations at settlement sites, burial of men, women and children, scarce grave goods restricted to beads/body ornaments, human remains among settlement refuse – they are all points of agreement with sites such as Hardinxveld-Polderweg and Haradinxveld-De Bruin, Swifterbant S2 and Urk (Smits/Louwe Kooijmans 2003; Louwe Kooijmans/Smits 2003; Meiklejohn/Constandse-Westermann 1978; Peters/Peeters 2001). The most conspicuous difference is the strongly flexed position as the dominant burial posture as opposed to burial stretched out on the back as observed not only at the Swifterbant sites, but indeed all over northern Europe. The double cultural relations of the Hazendonk communities make it likely that the source of inspiration for this aspect of the burial rite lay in the south, in the Belgian branch of the Michelsberg culture, but we have no burial data for that branch. Interestingly, two Michelsberg burials discovered in the large-scale French Neolithic project conducted in the Aisne valley show exactly the same burial posture. Until this discovery, the only known example of an individual buried in this posture was a burial at Cuiry-lès-Chaudardes that was found within a dense scatter of Michelsberg features. It has recently been ^{14}C dated to 4980 ± 50 BP. It is a tightly flexed adult burial in a shallow oval pit, the body resting on its left side with the head facing west accompanied by two stone beads as grave goods (Ilett/Coudart 1983). In April 2005 a similar burial came to light at Beurieux. As at Schipluiden, isolated human remains were found in ditch fills at nearby sites, one of which is Bazoches.² We therefore believe that this aspect of the Hazendonk burial rite was inspired by a southern Neolithic tradition.

5.5.4 *Strike-a-lights as grave goods*

Strike-a-lights are exceptional grave goods in the Low Countries. Objects found in six burials of the *Bandkeramik* cemetery of Aldenhoven-Niedermerz are on the basis of southern German examples assumed to be strike-a-light sets (Nieszery 1992, 367). A few strike-a-lights are known from *hunebedden*, some of which were accompanied by a lump of pyrite. A strike-a-light accompanied by pyrite for example came to light in a TRB stone cist found at Diever (Bakker 1979, 110, 186). The remarkably rich bell beaker burial of an adult male found near Lunteren yielded a strike-a-light and a piece of ‘iron stone’ (Bloemers *et al.* 1982, 49). A recently (2005) uncovered Beaker grave near Loxstedt (near Bremerhaven, Germany) contained an ‘epimaritime’ bell beaker, a K-type battle axe and a flint strike-a-light (pers. comm. Dr Erwin Strahl, Wilhelmshaven).

Nieszery (1992) has discussed the occurrence of strike-a-lights as grave goods in *Bandkeramik* cemeteries in southern Germany. Several artefact combinations have been

interpreted as strike-a-lights. They were all found in relatively rich burials of fairly old men, and in many cases the various components lay close together, suggesting that they were contained in a pouch. The objects had in most cases been placed near the bent arms, and in one case in front of the face. The components are a lump of pyrite or marcasite, of which usually only traces remain, a flint nodule, one or more flint blades and a bone awl. The blades show little retouch and few or no use-wear traces. The men concerned are assumed to have had a special role in the community. The interpretation that the objects were contained in a leather pouch was inspired by the pouch that was found near 'Ötzi', 'the man in the ice', which contained a piece of punk with traces of pyrite dust on it (Egg 1993). No lump of pyrite was however found near him, nor a flint strike-a-light.

An entirely different cultural context is the cemetery of Ostorf near Schwerin, of a non-agricultural community at the periphery of the TRB culture from the second half

of the 4th millennium – only a few centuries younger than Schipluiden – which was excavated in phases, in 1904, 1935 and 1961 (Bastian 1961; Schuldt 1961). Forty graves were found here. The deceased were buried stretched on their backs, usually orientated east-west. A few relatively well-equipped men's graves yielded a *Feuerschlagbesteck*. The objects in question are large, 8-12-cm-long flint percussion stones with a triangular cross-section and a point rounded through use, which are quite a bit larger than the specimens of the Dutch TRB and those of Schipluiden. They were sometimes accompanied by a bone awl and in one case by a flat stone encrusted with a 'rust-coloured metal-like substance'. Recent research has shown that the substance is the mineral goethite, one of the products formed in the decomposition of pyrite.³

The grave goods of the Schipluiden grave 2 belong in a widespread but rare Neolithic tradition, which has possibly often not been identified as such. In view of the other grave goods in the quoted examples it would seem that only men with a special position were buried accompanied by a strike-a-light. In the Dutch Swifterbant-Hazendonk situation, and at Schipluiden in particular, formal burial itself was already a privilege, and social differences were not expressed via grave goods, excluding the odd pendant or bead. The strike-a-light was a prestigious artefact in a class of its own.

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notes

1 The analysis was performed by Dr Hans van der Plicht, Centre for Isotopic Research, Groningen.

2 Personal information, Dr Michael Ilett.

3 Research by Tosca Friedrich, Archäologisches Institut der Universität Hamburg, Germany.

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Appendices

grave	ind.	pelvis*	cranium*	mandible*	total cranium	robustness	sex
1	1	+1.74 (19)	+1.79 (24)	+0.88 (8)	+1.59 (32)		male
1	2	+1.81 (11)	+1.29 (21)	+0.25 (8)	+1 (29)		male
2	3	+1.58 (12)	+0.83 (24)	+0.88 (8)	+0.84 (32)		male
3	4	+1.58 (19)	+0.13 (24)	+0.13 (8)	+0.13 (32)		male
4	5	+1.75 (8)	–	–	–		male
	9	–	–	+1 (6)			male
	11	–	+2 (2)	–			male
	12					cranium + molars	female?
	15	–	–	–	–	femur	male?

* total weight of recorded traits

5.1 SEX DIAGNOSIS OF ADULT INDIVIDUALS.

grave	ind.	dentition + epiphysis + fragment size	external sutures	internal sutures phase	femur phase	humerus phase	symphysis phase	auricular surface	dental attrition	age years
1	1		35-44	II-IV	III	–	II	–	33-45	38-45
1	2		55-75	IV	II	–	IV	–	33-45	59-65
2	3		–	IV	I	I-II	III	–	33-45	46-49
3	4		38-44	IV	–	–	II	–	<45	41-50
4	5		–	–	I-II	I-II	–	25-40		25-40
5	6	± 8								±8
6	7	± 2								±2
	8	cranium								adult
	9	cranium + molars							25-35	25-35
	10	± 10-11								± 10-11
	11	cranium								adult
	12								17-25	17-25
	13	± 9 months								± 9 months
	14		30-60							30-60
	15								17-25	17-25

5.2 CRITERIA USED IN THE AGE DIAGNOSIS OF THE INDIVIDUALS.

grave	ind.	humerus	ulna	radius	femur	tibia	fibula	stature
1	1	34.2	29.3	26.3	46.4	38.1	37.4	173
1	2	34.2	–	25.8	44.8	36	36.6	168
2	3	31.1	–	–	43.7	37.2	–	169
3	4	33	26.5	24.5	45	36.4	35.4	169
4	5	30.3	–	–	–	34.5	–	166
5	6*	17.8	14.7	12.9	25	20.2	20.4	–
6	7*	11.9	10.6	9.1	15.1	12	11.6	–

* = diaphyseal length

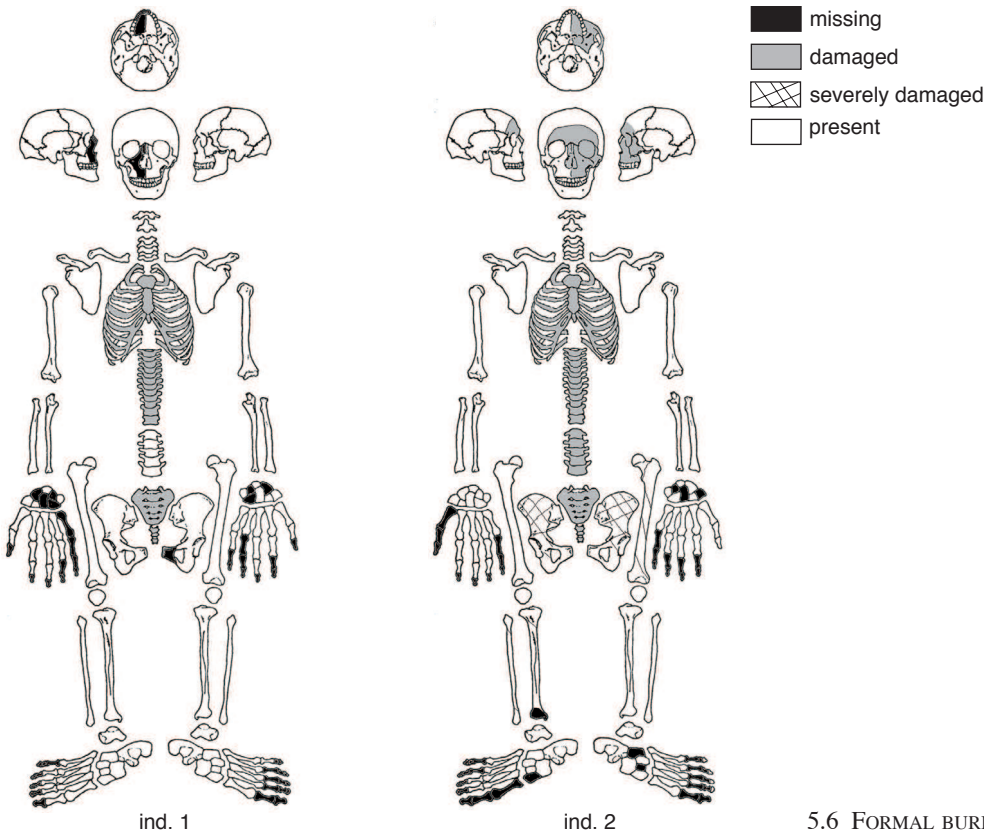
5.3 MEASUREMENTS OF LONG BONES IN CM (MEAN VALUES OF LEFT AND RIGHT SIDES) AND CALCULATED STATURES OF ADULT INDIVIDUALS.

grave	ind.	L = greatest length	B = greatest width	cranial index (Bx100)/L	cranial index	squatting facet tibia
1	1	19,1	14,3	74,87	dolichocranial	present
1	2	–	–	–	–	present
2	3	19,7	13,5	68,53	dolichocranial	present
3	4	19,2	14,1	73,44	dolichocranial	present

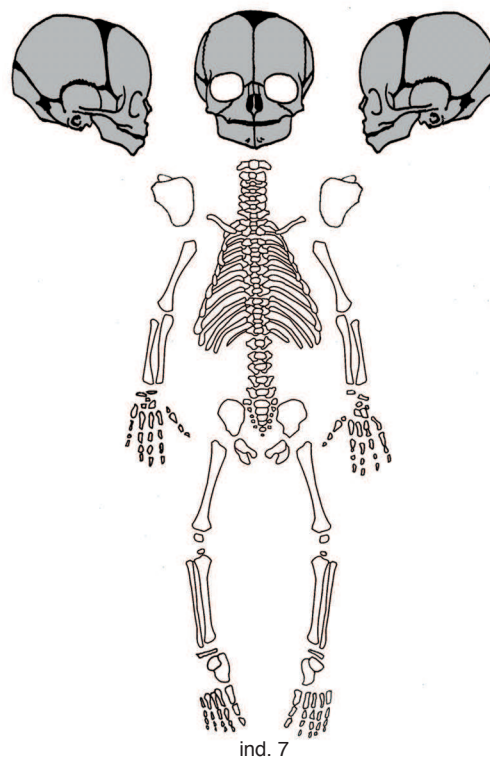
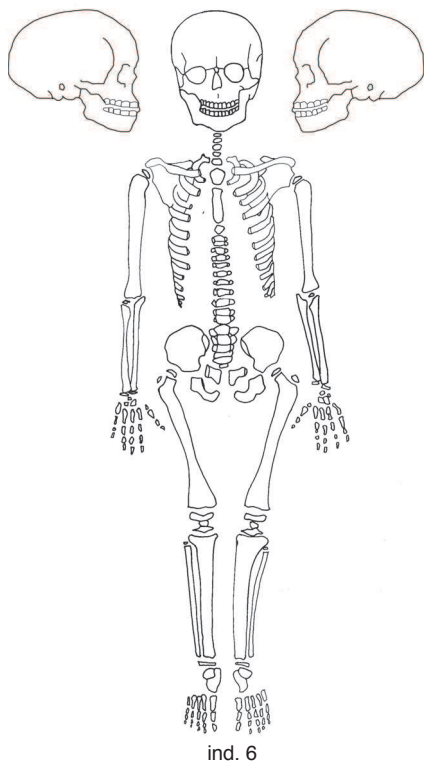
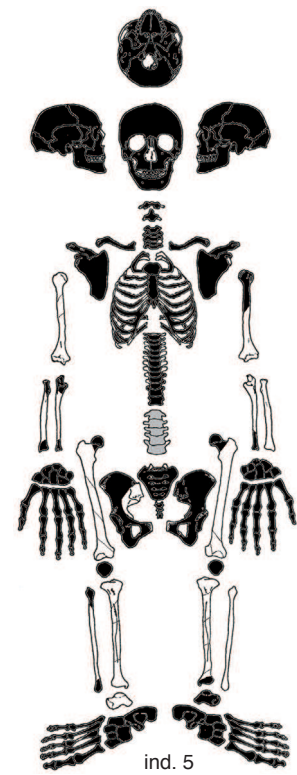
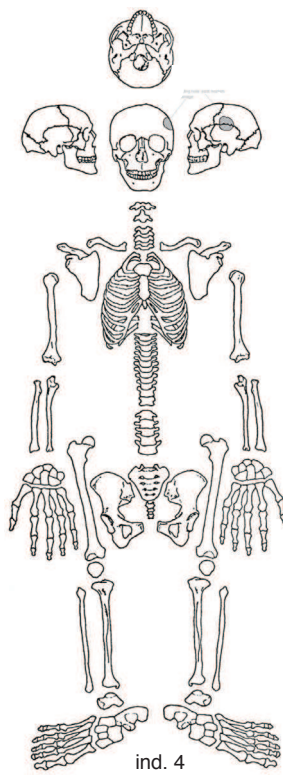
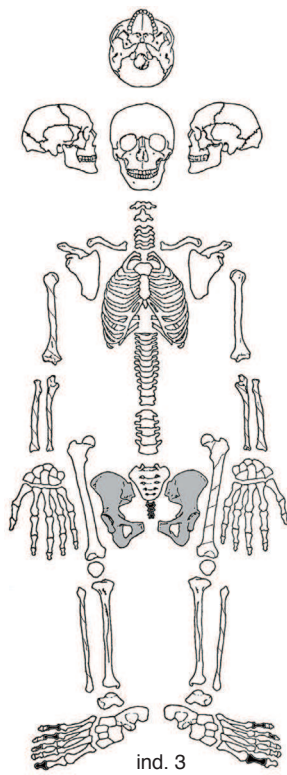
5.4 METRIC AND NON-METRIC TRAITS OF FOUR ADULTS BURIED IN FORMAL BURIALS.

grave	ind.	inspected positions	elements present	ante mortem loss	post mortem loss	caries	agenesis
1	1	27	22	–	7	–	3
1	2	32	30	–	2	–	–
2	3	32	32	–	–	–	–
3	4	32	30	2	–	–	–

5.5 DENTAL OBSERVATIONS ON FOUR ADULTS BURIED IN FORMAL BURIALS.



5.6 FORMAL BURIALS, PRESERVED SKELETAL PARTS.



■ missing
 ■ damaged
 □ present