

VIKING AGE CEMETERY AT CNIP

DUNWELL et al

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HUMAN REMAINS REPORTS

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BURIAL A

The remains are those of one individual - an adult female, probably in her late thirties to early forties, about 156 cms (5'1"), range 152-159 cms (4'11"-5'3"), tall with no significant pathology, although there may have been obstetrical trauma. The skeleton is in an excellent state of preservation and is virtually intact (apart from some carpal bones from both wrists, some intermediate and terminal manual phalanges, three metatarsals and some pedal phalanges). There is an unusual anomaly of the transverse foramen in the cervical vertebral column (see below). There was crowding of the anterior teeth in both jaws, no caries, some periodontitis and heavy calculus deposits on the teeth.

Age determination - All long bone epiphyses are fused; the basi-occipital basi-sphenoid synchondrosis is closed; vertebral and rib epiphyses are closed; there is still a trace of the line of fusion of the iliac crests; the medial clavicle epiphyses are closed; the anterior ends of the ribs correspond to phase 5 (Iscan *et al* 1985); the appearance of the pubic symphyseal face is equivocal. The coronal suture is closed laterally and was closing centrally; the sagittal was closing along its length; the lambdoid suture was closing centrally; the infra-orbital suture is open; the premaxilla fused. There is some minor degenerative change in the vertebral column:- none in the cervical region; minor degenerative change at the right costal facet on the first thoracic vertebral body, some lipping on the facets on the transverse process of both sides on the eighth thoracic, a minor osteophyte on the inferior rim on the right of the ninth body; with some lipping on the ninth spine tip, and on the inferior left facet of the twelfth thoracic arch; slight degenerative change on the left superior facet of the first lumbar, on the inferior rim (right) of the body of the second lumbar; a small osteophyte on the inferior rim (right) of the third lumbar and moderate lipping on the superior and inferior margins of the body of the fifth lumbar vertebra, where there is

also reactive bony deposition on the anterior face of the body; there is "matching" lipping on the superior rim of the sacrum, more marked on the left side; there is also lipping on the anterior rim of both auricular surfaces. There is some minor lipping also at the costal facets on the sternum; the xiphoid (damaged) was at least partly fused to the body of the sternum. On the limbs there was some lipping into ligament/tendon attachment at the medial side of the ischial tuberosity (right and left); the foveal pits on the femoral heads were extensive with raised lips on the left where there was also some surface porosity; there was very minor lipping on the right patella and into the calcaneal attachment of the tendo Achilles on both sides.

This pattern suggests the age-at-death was in the late thirties/ early forties range; although the level of dental attrition (see below) suggests a somewhat younger age (30 +/- 5 years).

Sex determination - The conformation of the innominate was very typically female with marked "gouging" in the pre-auricular area, raised auricular surfaces and raised rough areas of bone behind the auricular surface at the attachment of the posterior sacro-iliac ligaments. The dorsal rim of the pubic symphysis on the right shows some breakdown inferiorly. These latter signs may be associated with obstetrical trauma.

The skull and mandible are gracile. The sacrum is rather narrow. The innominates very strongly suggest female sex.

Pathology - See above for vertebral column degenerative changes and possible obstetrical trauma.

There is some porosity in the bones from the carotid foramen to the apex of the petrous temporal on both sides; some build up of bone on the front of the right external auditory meatus; some disturbance of the normal contour at the same position on the left side; the roof of the palate shows some porosity on either side of the midline; the nasal septum is slightly deviated to the right.

There is a fissure on the auricular articular surface of each innominate at the anterior convexity, more extensive on the right side.

The bones were well mineralised; the limb bones were short though relative proportions were normal and height was below average at just over 5 feet. There was no evidence of metabolic or deficiency disease.

Congenital anomalies - The cervical vertebral column showed an unusual condition of the transverse foramina on the right side. Usually the transverse foramina accommodates the vertebral artery (and vein) from the level of the sixth vertebra upwards. In this individual the foramen on the seventh vertebra is larger (right greater than left) than usual; that on the sixth is small (right smaller than left, left normal size); no foramen on the right side; normal size on the left at the fifth vertebra; normal size foramina from the fourth level upwards, with left larger than right; the path of the vertebral artery is "tunnelled" as it passes across the arch of the atlas on the left. It is likely that this bone anomaly was associated with an anomaly of the vertebral artery which probably entered at a much higher level than usual on the right side.

There is also a more common anomaly at the sacral end of the vertebral column - the sacrum consists of six segments with the first showing some signs of lumbarisation posteriorly.

Detailed description of skeleton

Axial skeleton

Skull: complete apart from the right styloid process and some damage to the left maxilla below the orbit; no metopic suture; a supra-orbital foramen was present on the left, a notch on the right; no parietal foramina obvious; mastoid foramen sutural on left, small and sutural on the right; posterior condylar foramen present both sides, left greater than right; jugular foramina approximately equal in size; the foramen spinosum was not bridged medially on the right side; double infra-orbital foramen on the right, separated by about 1 cm, damaged on left; double zygomatico-facial foramen on the left, triple on the right.

There is some asymmetry of the occipital condyles, the left is "bulkier" than the right and projects more with a groove separating the articular surface from the foramen magnum.

The lateral pterygoid plates are well developed suggesting powerful lateral chewing muscles; the spine of the sphenoid bone is extended to a bar which may have provided extra attachment for these muscles.

There is a slight depression at lambda giving a slightly "bunned" appearance to the back of the skull. The nasal bones are prominent.

Mandible: intact apart from damage to the left condylar process and angle. The attachment area in the inner aspect of the angle for the medial pterygoid muscles is roughened.

Vertebral column: intact; see above for degenerative changes and congenital anomalies. The left occipital facet on the atlas is larger than the right and has less well defined articular margins, "matching" the asymmetry on the skull facets.

Sternum: the manubrium is slightly asymmetrical, being more extensive to the left of the midline; the xiphoid (damaged) is partly fused to the body.

Ribs: almost intact.

Laryngeal skeleton: body not fused to cornua of the hyoid.

Upper limbs: almost intact; the trapezium, pisiform, trapezoid and triquetrum are missing on both sides, the scaphoid from the right; all intermediate and distal phalanges are missing. The bones are generally gracile with the only prominent muscle markings on the lateral lip of the bicipital groove on both sides.

Lower limbs: almost intact; the femora are short but quite stout with well developed gluteal ridges and a slight pilaster posteriorly; the nutrient foramen is some 2 cms. higher on the left than on the right. The facets for the head of the talus on the calcaneus are well separated on both sides; the peroneal tubercle is well marked on both sides; left metatarsals 4 and 5 missing; proximal phalanges from fourth right and left, fifth left and some distal phalanges missing.

Green staining

Mandible: extensive staining on the body from level of the first right premolar to the second left molar from alveolar to inferior border.

Left clavicle: medial end stained.

Right clavicle: medial half stained.

Ribs: anterior ends stained.

Metric observations

SKULL

Maximum length	182 mm
Nasion-lambda	176 "
Basion-nasion	98 "
Basion-alveolare	86 "
Basion-bregma	128 "
Alveolare-nasion	65.3 "
Maximum breadth	137 "
Minimum "	91 "
Bizygomatic "	123 "
Bimaxillary "	87 "
Left orbital height	35.2 "
Left " breadth	41.0 "
Right orbital height	35.2 "
Right " breadth	43.2 "
Nasal height	45.5 "
Nasal breadth	" "
External palatal length	50.3 "
" " breadth	55.0 "
Foramen magnum length	35.8 "
" " breadth	33.0 "

Indices of shape and proportion

Cranial index (skull shape)	75 (mesocranic)
Cranial module (skull size)	149
Length/height index	70 (average)

Breadth/height index	93 (average)
Frontal/Parietal breadth index	66 (average)
Upper Face index	53 (average)
Nasal index	-
Orbital index	36 ^L (average) 81 ^R (wide)
Palatal index	91 (broad)

LIMBS

Upper limb

	Left	Right	
Humeral length	310 mm	314 mm	R>L
Humeral head diam. (max)	39.8 mm	40.0 mm	
Bicondylar width (hum.)	52.5 mm	53.4 mm	
Midshaft circumference (hum.)	61 mm	-	
Ulnar length	261 mm*	256 mm	L>R
Radial length	235 mm	235 mm	
Clavicle length	131 mm	129 mm	

*styloid trauma

Lower limb

	Left	Right
Maximum femoral length	410 mm	411 mm
Bicondylar femoral length	406 mm	409 mm
Maximum head diam. (fem.)	41.4 mm	41.4 mm
Vertical head diam. (fem.)	41.0 mm	41.3 mm
Midshaft circumference (fem.)	79 mm	79 mm
Antero-posterior diameter at midshaft (fem.)	26.0 mm	25.5 mm
Medio-lateral diameter at midshaft (fem.)	25.4 mm	25.9 mm
Subtrochanteric ant.-post. diam. (fem.)	24.8 mm	23.6 mm
Subtrochanteric med.-lat. diam. (fem.)	30.4 mm	30.4 mm
Bicondylar width	-	(75.2) mm
Head-neck angle	120 ⁰	120 ⁰
Tibial length (max.)	350 mm	348 mm
Tibial lateral condyle height	344 mm	342 mm
Tibial nutrient foramen level (NFL)	113 mm	108 mm

4: C1

Ant. post. diam. NFL	30.4 mm	30.5 mm
Med. lat. diam. NFL	21.0 mm	21.6 mm
Ant.-post. diam. 1/3 along tibial shaft	29.5 mm	29.8 mm
Med.-lat. diam. 1/3 along tibial shaft	20.8 mm	21.4 mm
Tibial circumference at NFL	89 mm	84 mm
Fibular length	(342) mm	

Height and limb proportions

Height estimation is based on femoral length of

411 mm = 156 cms (range 152-159 cms)
(5'1", range 4'11"-5'3"); (Trotter and Gleaser 1977).

	Left	Right
Brachial index (forearm/upper arm)	76	75
Crural index (leg/thigh)	85	85
Intermembral index (upper/lower limb)	72	72
Platymeric index (femoral proximal shaft shape): L>R	82 (flat)	78 (flat)
Platycnemic index (tibial NFL proximal shaft shape)	69	71
Robusticity index (femoral at midshaft)	0.13	0.13

Dental report

The facial skeleton is well preserved with an intact dentition; only the head of the left condyle is missing post-mortem. Twenty-eight teeth are present in their sockets but the upper and lower arches show considerable crowding in their anterior segments.

The upper and lower jaws have normal occlusal relationships but the jaw dimensions are at the lower end of the normal range. On the other hand, the medio-distal lengths of the teeth are nearer the middle of the range and the discrepancy between tooth and jaw relationships may account for the anterior crowding and the rather protrusive appearance of her anterior segments.

All her teeth (apart from the third molars) show evidence of marked occlusal wear (attrition), small pinpricks of secondary dentine are present on the occlusal surfaces of the upper first molars. The third molars had fully erupted but were mostly non-functional. The upper left third molar is buccally placed and had no opposing contact on its occlusal surface; the left did occlude, but only on its palatal cusp. The lower third molars are in arch alignment. No doubt because of this lack of function all four third molar occlusal surfaces are covered by supragingival calculus.

There are no apparent hypoplastic defects, suggesting an adequate diet in a childhood free of serious infectious diseases or debilitating illnesses. No dental development defects are apparent except for the suggestion of an early torus mandibularis.

All teeth are covered by heavy deposits of calculus on their buccal, lingual, palatal and incisal aspects. The teeth are free of caries but there is evidence of acute episodes of destructive periodontitis at six sites in the molar quadrants. Of these, three have furcation involvement, and it is likely these teeth would have been lost in a few years had she lived. The periodontal condition of the remaining teeth was "satisfactory", with twelve interseptal areas completely healthy and eleven showing only gingivitis. It is likely that supereruption of the teeth (consequent on attrition) was in large measure responsible for the more advanced periodontal deterioration of the molar sites.

Age-at-death estimates can be accurate to within a year or two in the maturational phases of dentition, but become less reliable as age increases, when differences in levels of attrition in the molar series provide the best age assessment. In this case the largely non-functional state of the third molars renders this more difficult. The apices of the third molars are completely formed but although the teeth were non-functional the cusps had become quite rounded. The wear on the first molars was quite severe; the second molars had only just become flattened and had lost little enamel. An age-at-death estimate of about 30 +/- 5 years is indicated.

Teeth present

8 7 6 5 4 3 2 1 / 1 2 3 4 5 6 7 8

8 7 6 5 4 3 2 1 / 1 2 3 4 5 6 7 8

Attrition scores
(Scott, 1979)

Right 1st molar (maxilla) 8, 7, 5, 6

Right 1st molar (mandib) 6, 8, 6, 8

Right 2nd molar (maxilla) 4, 4, 4, 5

Right 2nd molar (mandib) 4, 4, 4, 3

Left 1st molar (maxilla) 8, 8, 8, 8

Left 1st molar (mandib) 8, 8, 8, 6

Left 2nd molar (maxilla) 4, 4, 4, 4

Left 2nd molar (mandib) 4, 4, 4, 4

Periodontal status

(Kerr, 1989)

score

4 3 2 1 3 2 2 2 2 4 1 1 2 4 5

interspace

8 7 6 5 4 3 2 1 1 2 3 4 5 6 7 8

score

2 1 1 1 2 1 1 2 0 1 2 1 1 1 2

Furcation involvement at distal aspect of upper left 2nd molar - severe. Early furcation involvement of buccal aspects of both lower 1st molars.

Caries

No caries present.

Measurements

Mandibular

Width of condylar head

left - missing

right - 21.2 mm

Bi-condylar width - 113 mm

(to nearest 2 mm)

Mandibular angle - 109 degrees

Projected length of

body - 69 mm

Height at symphysis - 28.4 mm

Height at ramus - 59 mm

Minimum antero-posterior

width of the ramus - 27.2 mm

Lingula related to occlusal plane - above
 Mental foramen, below 2nd premolar.
 Direction, postero-superior.

Maxillary (mm)	Buccal	Lingual	Average
7 - 7	62.0	40.0	51.0
6 - 6	54.9	33.2	44.1
5 - 5	46.0	29.0	37.5
width 4 - 4	41.3	23.8	32.6
3 - 3	35.5	20.5	28.0
2 - 2	26.5	9.5	18.0
1 - 1	19.5	11.0	16.5

	Left	Right
1 - 6	43.2	41.3
1 - 3	21.6	20.2
3 - 6	30.8	30.8

Mid-point of fissures of 1st premolars - 32.5 mm
 Central fossa of 1st molars - 43.0 mm
 Inner alveolar margins 2nd molars - 40.2 mm
 Spina nasalis to mid-line alveolar margins of central incisors - 41.5 mm

Odontometric measurements (all right side)

Max	9.1	9.6	10.2	6.5	6.5	7.8	6.5	8.0
Mesio-distal	8	7	6	5	4	3	2	1
Mand	10.6	10.6	10.6	6.7	6.7	7.0	5.5	4.9
Max	11.2	11.8	12.4	9.2	9.2	8.2	6.8	7.7
Bucco-lingual	8	7	6	5	4	3	2	1
Mand	10.0	10.1	10.9	8.3	8.0	8.2	7.3	6.4

Occlusion

Marked crowding in both upper and lower anterior segments. Normal molar relationships. Due to severe attrition an edge to edge incisal relationship developed with no overbite or overjet.

BURIAL B

The remains are those of a single individual, a child of about 6 years of age. Most parts of the skeleton are represented; the skull is in fragments but the vault and the petrous temporal portion of the base are well represented; the mandible with complete dentition (partly deciduous/party permanent) is well preserved. The vertebral column is very poorly represented, with only some vertebral arches surviving. Both upper and lower limb bones are present, although the extremities of the diaphyses (shafts) are damaged and the outer cortex of the bones is eroded. No epiphyses were recovered. The pelvis is represented by right and left ilia which appear to have been unfused at the acetabulum.

The colour of the right half of the skull is different (bleached white) from that of the rest of the skull and skeleton, suggesting the right part of the skull has been exposed to the elements for some time.

The skull was somewhat compressed from side to side but this is relatively common in immature skulls, the individual bones of which are thin and easily deformable.

A fairly reliable estimate of the age-at-death can be made because of the very good preservation of teeth *in situ* in the mandible in particular. Less reliable but confirmatory evidence of age can be gained from the lengths of the femur and tibia and the general state of development of the skeleton.

Sex determination is not reliable from immature skeletons.

Health Status

The child appears to have been well-nourished with apparently 'good quality' bone and teeth enamel. There is no good evidence of infection or of the cause of death. Unfortunately the bone shafts have become filled with sand and there is general destruction of the internal cancellous bone, so that X-rays are unlikely to be helpful in determining whether lines of growth arrest were present. The concordance between dental and skeletal age points to normal growth patterns.

Detailed description of skeleton

Skull: Most of the vault, the central part of the base and the left side of the face are present (but fragmented); the mandible is intact except for the coronoid and condylar processes which are damaged.

Bleaching due to exposure has occurred on the right frontal parietal and zygomatic bones.

The vault bones are thin but diploe¹ is present between the outer and inner tables; sutures are unfused apart from metopic²; the foramina of Huschke are closed³; the frontal sinuses have formed⁴; mastoid air cells are present.

Both right and left malleus were recovered from the middle ear.

The various skull fragments could be fitted together and clearly belonged to the same individual.

Vertebral column: Unfortunately little of the column was recovered. No vertebral bodies survived and only fragments of the neural arches in the cervical and lumbar regions remained. The arches had fused in the midline posteriorly⁵.

Upper limbs: The diaphyses (shafts) of all the long bones including the clavicles were represented: no epiphyses were recovered; fragments of the densest part of the scapulae were also present and fragments of phalanges were recovered. The shafts were well-formed, with no bowing or other obvious pathology.

Lower limbs: Right and left iliac blades were identified: the ilia do not appear to have fused with the pubis at the acetabulum⁶; the diaphyses of the long bones were present: no epiphyses were recovered; fragments of metatarsals and phalanges were present. The shafts were well-formed with no bowing or other obvious pathology.

The bones of the right and left sides 'match' in size and shape and stage of development.

Estimates of diaphyseal length were made for the clavicle, humerus, ulna, tibia and femur⁷.

	Estimated lengths*	
	Loft	Right
Clavicle	-	87 mm
Humerus	-	185 mm
Ulna	-	110 mm
Femur	245 mm	245 mm
Tibia	210 mm	-

* Diaphyseal lengths as found plus up to 5mm

Note: Factors 1 - 7 were used in age estimates.

Dental report

The dental evidence suggests the remains to be that of a child aged approximately 6 years. The deciduous incisors have recently been shed. The central incisors and first permanent molars have erupted and made initial occlusal contact. The lateral incisors are just about to erupt.

The degree of the attrition of the deciduous teeth and absence of caries suggests the diet was of an abrasive nature and with few carbohydrates.

The well formed tooth enamel suggests the youngster enjoyed a relatively healthy childhood and did not suffer from any severe infections or debilitating illnesses.

The odontometric measurements of the permanent molars conform to the expected norms.

Mandible

Complete apart from the condylar heads.

Teeth present

-----/-----
6 E D C / 1 C D E 6

17 - missing post-mortem.

B / B recently exfoliated, lateral
incisors not yet erupted.

Attrition

Early attrition facet on the mesio-
buccal cusp of the right first
permanent molar. No evidence of
attrition of the left first
permanent molar.

Attrition of the deciduous molars
has resulted in the cusps being
flattened and dentine being
exposed.

Enamel structure

No evidence of enamel hypoplastic
defects of the permanent dentition.

The permanent teeth are of normal
morphology. Fissures rather than
grooves are present.

Odontometrics

Left permanent molar -
Mesio-distal diameter 11.8mm
Bucco-lingual diameter 10.6mm.

Pathology

No evidence of carious lesions or
bone defects.

Radiographs No pathology identified. Unerupted teeth present -

7 5 4 3 2 / 2 3 4 5 7

Maxilla

Fragment of left maxilla from the first permanent molar to the mid-line

Teeth present ----- / C D E 6

Separate teeth 5 4 3 2 / 1 7

Enamel structure The enamel of the permanent dentition is well formed. Prominent cusp of Caribelli. Presence of fissures rather than grooves.

Odontometrics Left permanent molar
 Mesio-distal diameter 10.7mm
 Bucco-lingual diameter 11.6mm.

Pathology No evidence of carious lesions or bone defects.

Radiographs No pathology identified. Unerupted teeth present -

3 4 5

Summary

The remains are those of a well-nourished child of about 6 years, with an apparently normal pattern of growth.

Finally mention may be made of the following items recovered from the deposits of sand accompanying the skeletal remains:-

(a) animal bone (femur) from the tray containing the skull; however, the excavator notes that as the skull was recovered from the area disturbed by erosion and/or the finders prior to the excavation, the association of this animal bone with the burial is almost certainly spurious.

(b) an adult human molar tooth was recovered from the bag containing the immature teeth; once again, the fact that these were all recovered from the area disturbed by erosion and/or the finders prior to the excavation, makes it unlikely that the adult tooth is associated with the child burial.

(c) a metal fragment from below/at side of the trunk on the right just above pelvic level. This is one of three iron nails found in the fill of the grave (as mentioned in the report).

(d) fragments of stone were recovered from under the left humerus which was recovered from the single block containing the backbone. The significance of these fragments is referred to in the report on the site.

BURIAL C

The remains are those of one individual - an adult male, probably 35-45 years old, about 167 cms (5'6") tall, with a well-healed fracture of the left humerus. There is no evidence as to the cause of death. Root caries and dental abscesses associated with advanced attrition were present; the latter may also have led to chronic sinusitis.

Although the skeleton is almost complete, there is some damage to the skull and mandible; the facial skeleton has become detached, there is a break across the cranial base through the occipital condyles, the right styloid process is broken, and the mandible is in three fragments.

Age determination - All long bone epiphyses fused; basi-occipital basi-sphenoid synchondrosis closed; vertebral, rib, and innominate epiphyses are fused; medial clavicular epiphyses closed; the anterior ends of the ribs correspond to phase 5 (Iscan *et al* 1984); the appearance of the pubic symphyseal face corresponds to phase 8 (Todd 1920). All skull sutures are open ectocranially; the infra-orbital suture is open on both sides. Some degenerative change was present at the costal facets on the manubrium (more marked on the left) with lipping at the xiphoid and lower rib articulations; some lipping also at the anterior ends of ribs on both sides; no degenerative change on the cervical vertebrae; little or no degenerative change on thoracic vertebrae; slight lipping on the superior and inferior rims of the body of the fourth lumbar and moderately developed osteophytes on the inferior rim (both sides) of the fifth lumbar vertebra.

There is some widening but little lipping of the foveal pits on the femoral heads; some minor lipping at the quadriceps attachment on both tibiae and on both patellae and at the attachment of the Achilles tendon on both calcanei. The cornua of the hyoid had not fused to the body of the bone.

These factors suggest an age-at-death in the range 35-45 years (dental age estimate, 40-45 years).

Sex determination - The conformation of the innominates and of the sacrum was very typically male. The supra-orbital ridges on the skull, the mastoid processes and the nuchal muscle markings were only moderately well developed; the chin region of

the mandible was squared. The bones of the upper limb were robust from clavicles to metacarpals. The muscle markings on the femur were well developed.

The pelvic evidence very strongly suggests male sex.

Pathology - This individual had a well-healed fracture of the lower end of his left humerus; the position of the injury indicates a supracondylar fracture, which is probably the most common type of humeral fracture in children and adolescents, sustained usually in falling from a height e.g. from a tree. The injury had healed well with no deformity and no evidence of wasting of muscles of that limb. It is likely the limb was immobilised after the injury. There is a small spur of bone on the lateral border of the humerus just above the elbow joint, which is probably associated with the fracture.

There was evidence of some minor trauma at the right knee where there is a bony spur on the postero-inferior surface of the fibular head.

There is pitting on the surface of the bone on the underhang of the scapular spine on both sides. This is an unusual site for pitting and the significance is not clear.

There are discontinuities on the surfaces of several vertebral bodies:- on the inferior surface of the sixth thoracic vertebrae is a midline groove extending to the posterior rim from about the middle of the body; the upper surface of the seventh thoracic body is roughened as is most of the inferior surface; a midline groove (see above) extends on the upper surface of the eighth and on the lower surface of ninth thoracic vertebra; irregular depressions are present on the inferior surface of the body of the tenth thoracic and on the upper surface of the twelfth thoracic vertebrae. These grooves/depressions may all be variants of Schmorl's nodes, lesions thought to be caused by physical "insult" to the immature spine in adolescence. On the eleventh thoracic vertebral body is another type of surface disturbance, in this case an arc just inside and parallel to the rim. This may be an example of intervertebral osteochondritis, also associated with physical injury to the spine. Unfortunately the lower thoracic vertebral bodies are damaged.

There is an irregular depression on the surface of both femoral heads around the **foveae**.

There are deep pits in the medial clavicular articular surfaces on both sides and some erosive degenerative changes on the right clavicle at the attachment of the costo-clavicular ligament.

On the proximal phalanges of both big toes there are pits on the proximal articular surfaces.

The bones were generally well mineralised and the height (about 5'6") and limb proportions were normal, indicating normal growth processes. There was no evidence of metabolic or deficiency disease.

Detailed description of skeleton

Axial skeleton

Skull: all sutures open ectocranially, no metopic suture; a small ossicle was present at lambda just to the left of the midline and possibly there had also been a bregma ossicle since the sagittal suture deviates sharply to the right just before bregma; no apparent parietal foramina; the mastoid foramina are sutural on the left and right; there is a small posterior condylar foramen on the left (right side damaged); the left jugular foramen is larger than the right; the left foramen ovale is larger than the right; the supra-orbital foramen is present on the left, notched on the right; the infra-orbital foramina are single; no zygo-matico facial foramina were noted; the maxillary sinus was exposed and was normal in size; there was no marked asymmetry.

Mandible: broken post-mortem; angle between ramus and body markedly right-angled.

Sternum and ribs: the body and manubrium of the sternum had not fused; the manubrium was slightly asymmetrical with the left costal facet showing more degeneration than the right; see above. All twelve ribs on both sides were represented, though damaged; see above.

Vertebrae: All vertebrae were identified, although there was some damage particularly to the lower thoracic bodies. The spine of the second cervical vertebra was very robust; see above for pathology; the inferior articular facet on the right was larger than the left on the third thoracic vertebra; there was a spur of bone, on the

posterior aspect of the fifth thoracic body, into the vertebral canal, although it probably did not have any effect on the spinal cord; the sacrum had six segments (see also Burial A).

Larynx: The cornua and body of the hyoid had not fused.

Limb skeleton

Upper limb: Clavicles were robust, the right more so than the left; the left damaged laterally; see above, the scapulae were damaged and in each case the main fragment consists of the lateral border, the glenoid fossa, coracoid and at least part of the spine; both were robust; see above. Despite the injury to the left humerus there was little difference in the size or proportions of the right and left bones; both were robust with well developed lesser tuberosities and deltoid tuberosities; the forearm bones were robust on both sides; the right radius and left ulna are damaged distally while the left radius is broken about two-thirds along the shaft; the markings on the ulnae for the brachialis attachment, the supinator ridge on both ulnae and the grooves for the extensor muscles on the back of the distal radius are well marked; all the carpal and metacarpal bones and all but one of the digital phalanges were identified; the metacarpals are robust.

Lower limb: Both innomates are very characteristically male in form; the right is damaged posteriorly; a preauricular groove of the male type is present on the right innominate; there is a slight discontinuity in the acetabular articular rim with a circular facet about 1 cm in diameter at the anterior edge of the articular surface separated by a triangular gap from the rest of the articular surface; the condition of the pubic symphyseal facet approximates to that of phase 8 (Iscan *et al* 1984); both femora are fairly robust; the gluteal ridge was so well developed on both femora as to approximate a third trochanter; the abductor attachments at the greater trochanter were well developed on both sides; apart from the lipping referred to above there were no features of note on the tibiae; the right fibula showed evidence of some minor trauma (see above); all the tarsal and metatarsal bones were present; some missing; there was a well developed peroneal tubercle on both calcanei which also had a "crease" across the posterior surface about one third down from the upper surface.

Metric observations

SKULL

Maximum length	184 mm
Nasion-lambda	182 mm
Basion-nasion	(94) * estimate
Basion-Alveolare	-
Basion-Bregma	(139) "
Alveolare-Nasion	-
Maximum breadth	149 "
Minimum breadth	97 "
Bizygomatic breadth	-
Bimaxillary breadth	-
Left orbital height	-
" " breadth	-
Right " height	36.1 mm
" " breadth	43.0 mm
Nasal height	-
" breadth	-
External palatal length	-
" " breadth	-
Foramen magnum length	37.2 mm (Est.)
" " breadth	28.3 (")

Indices of shape and proportion

Cranial index (skull shape)	81 (broad, brachycranial)
Cranial module (" size)	157
Length/height index	76 (high)
Breadth/height index	93 (high)
Frontal/parietal breadth index	65 (narrow anteriorly)
Orbital index (right only)	84 (average)

LIMBS

Upper limb

	Left	Right	
Humeral length	305 mm	313 mm	R>L
Humeral head diam. (max.)	46.2 mm	47.7 mm	R>L
Bicondylar width (hum.)	67.5 mm	67.5 mm	
Midshaft circumference (hum.)	68 mm	69 mm	
Ulnar length	-	261 mm	
Radial length	242 mm	-	
Clavicle length	150 mm	-	

Lower limb

Maximum femoral length	435 mm	439 mm	R>L
Bicondylar femoral length	435 mm	436 mm	
Maximum head diameter (fem.)	45.9 mm	45.5 mm	
Vertical head diam. (fem.)	45.2 mm	44.9 mm	
Midshaft circumference (fem.)	79 mm	85 mm	R>L
Antero-posterior diameter at midshaft (fem.)	26.4 mm	26.6 mm	
Medio-lateral diameter at midshaft (fem.)	26.8 mm	27.7 mm	
Subtrochanteric ant.-post. diam. (fem.)	24.1 mm	25.4 mm	R>L
Subtrochanteric med.-lat. diam. (fem.)	33.1 mm	32.3 mm	L>R
Bicondylar width (fem.)	82.7 mm	81.1 mm	L>R
Head-neck angle	134 ⁰	130 ⁰	
Tibial length (max.)	358 mm	359 mm	
Tibial lateral condyle length	350 mm	353 mm	
Tibial nutrient foramen level (NFL)	113 mm	112 mm	
Ant. post. diam. NFL	33.9 mm	34.1 mm	
Med. lat. diam. NFL	25.6 mm	26.1 mm	
Ant.-post. diam. 1/3 along tibial shaft	32.0 mm	34.9	R>L
Tibial circumference at NFL	92 mm	96 mm	R>L
Fibular length	-	-	

Height and limb proportions

Height estimate is based on femoral length of

439 mm = 167 cms (range 163.5 - 171 cms)

5'6" (range 5'4" - 5'7 1/2"); (Trotter and Gleser 1977).

	Left	Right
Brachial index (forearm/upper arm)	81	-
Crunal index (leg/thigh)	82	82
Intermembral index (upper limb/lower limb)	69	-
Platymeric index (femoral proximal shaft shape)	73 (flat)	79 (flat)
Platycnemic index (tibial proximal shaft shape at NFL)	76	76
Robusticity index (at femoral midshaft)	0.12	0.12

Dental report

The facial structures of this skeleton have suffered quite severe post-mortem damage. The maxilla is detached from the base of the skull and the mandible is broken into three fragments. Despite this damage there are twenty-five teeth present in their sockets; five teeth were missing ante-mortem. The two upper third molars are unaccounted for, but from the degree of wear on the lower third molars it is likely these two teeth were congenitally absent. The upper and lower teeth are in two well-formed arches with no evidence of crowding. There is a six millimetre gap (diastema) between the upper central incisors, with a much smaller gap between the lower central incisors.

All the teeth show evidence of severe occlusal wear (attrition). This is so severe that little enamel remained on most teeth. Loss of the upper posterior teeth meant that the main masticatory forces fell on the incisor, canine and premolar teeth, and this resulted in an edge to edge bite with a flat occlusal plane being formed in the incisor, canine and premolar region.

Early caries has affected the distal root of the lower left first molar and the mesial root (at the amelob-cemental junction) of the second molar. The site of these lesions is typical of dentitions with severe attrition, and differs from modern caries which affects

contact points, pits and fissures. The carious lesions at this site probably resulted from the uneven attrition forces (following loss of the upper left first molar) producing inclined planes and forcing food impaction into the intermolar embrasure.

Considerable root exposure is present. It is likely that this is due largely to supereruption of the teeth occurring as a compensatory mechanism for the severe attrition and is not evidence of inflammatory alveolar bone loss as a consequence of advanced periodontitis. The interseptal bone shows changes consistent with early periodontitis. Of the twenty-one septa available for study none were healthy, eight show evidence of gingivitis, nine show evidence of an acute burst of periodontitis, while one septal region was in a quiescent state. Three septa show evidence of angular bone loss and the furcation area of the lower right first molar tooth is exposed.

Two dental cysts or chronic abscesses are present, related to the upper right and lower left first molar teeth. These lesions are likely to be a consequence of the severe attrition outpacing the ability of secondary dentine to form and with the resulting pulp exposure leading to pulpitis and eventual apical infection. The area involving the palatal root of the upper molar had penetrated the maxillary sinus and it is possible that this individual suffered from chronic sinusitis as a consequence of dental infection.

The naso-palatine foramen is expanded beyond the range of normal and indicates the presence of a naso-palatine cyst or, less likely, the follicle of a supernumerary mid-line tooth. Neither is likely to have been particularly troublesome to the individual.

A small area of erosion affected the inner pole of the right condylar head and this is likely to have caused considerable pain and discomfort during masticatory movements.

Little information can be gleaned on hypoplastic defects on the remaining enamel surfaces, although the enamel that remains appears to have been of reasonable quality.

From the degree of wear and deterioration of the dentition it is likely that this individual was approximately 40-45 years at death.

Teeth present

6 3 2 1 / 1 2 3 4 7
8 7 6 5 4 3 2 1 / 1 2 3 4 5 6 7 8

*Teeth missing
ante-mortem*

(8) 7 5 4 / 5 6 (8)
/

*Attrition scores
(Scott, 1979)*

- Right 1st molar (maxilla) 10, 10, 10, 10
- Right 1st molar (mandib) 8, 9, 9, 9
- Right 2nd molar (mandib) 8, 9, 9, 9
- Left 1st molar (mandib) 9, 9, 10, 10
- Left 2nd molar (maxilla) 10, 10, 9, 9
- Left 2nd molar (mandib) 10, 10, 9, 9

*Periodontal status
(Kerr, 1989)*

score
interspace
score

0 0 0 0 0 3 2 2 4 3 3 0 0 0 0
8 7 6 5 4 3 2 1 1 2 3 4 5 6 7 8
3 3 3 5 5 2 2 2 3 3 3 2 2 5 2

Caries

Root caries distal aspect of lower left 1st molar and mesial aspect of lower second molar at the amelo-cemental junction.

Mandibular measurements

Width of condylar head
left - 21.5 mm
right - 21.0 mm
Bi-condylar width - 120 mm
Mandibular angle - 130 degrees
Projected length of body - 75 mm
Height at symphysis - 33.8 mm
Height of ramus - 56 mm
Minimum antero-posterior width of the ramus - 32.1 mm

Occlusion

Upper mid-line diastema - 6 mm.
Edge to edge incisor bite, no overbite or overjet.

BURIAL D

The skeleton is almost completely intact and the bones are in an excellent state of preservation. One individual is represented - an adult male of short stature (5'4") aged at least 40 years at death, but robust build with a healed fracture of the right pelvis, and some vertebral and scapular developmental anomalies. The upper incisors had been lost during life as a result of trauma. The lower incisors were markedly proclined. There is no evidence as to the cause of death.

Age determination - All long bone epiphyses are closed; the basi-occipital basi-sphenoid synchondrosis is closed; vertebral, rib and innominate epiphyses are closed; medial clavicular epiphyses are fused. The appearance of the anterior ends of the ribs corresponds to phase 6 (Iscan et al 1984); the pubic symphyseal face corresponds to phase 8 (Todd 1920). The coronal suture is closed in its lateral third ectocranially on both sides; the sagittal suture is closed ectocranially over most of its extent; the lambdoid suture was closing medially; the spheno-parietal sutures at pterion were closing; the premaxilla was fused, the infra-orbital suture was closed on the left, open on the right. There was ossification of the laryngeal cartilages (thyroid and cricoid) and some ossification into the lower costal cartilages adjacent to the xiphoid process. No degenerative change was observed in the cervical vertebrae; minor degenerative change was seen in the thoracic, lumbar and sacral vertebrae (see below). There was some lipping into the hamstring attachment on the innominate, on the margins of the foveal pits on the femoral heads and on the medial lip of the linea aspera (particularly on the left), at the distal tibio-fibular joint margin on both fibulae, on both patellae, and into the attachments of the Achilles tendon on the calcaneus.

This pattern suggests that the age-at-death was probably at least 40 years, although dental attrition estimates suggest a younger age (30-35 years).

Sex determination - The innominate bones were very clearly male in form. The rest of the skeleton was robust, with muscle markings on the skull and limbs well developed. The supra-orbital ridges, superior nuchal line and external occipital protuberance were prominent, the mastoid process though short was broad, the gonial angle of the mandible was squared. The neural arch of the fifth lumbar vertebra was detached.

This complex of skeletal features is typically male.

Pathology - This individual had sustained an unusual fracture of the anterior third of the right iliac blade. The injury had healed well and had occurred some time before death. It was most likely due to some form of direct violence and would probably have meant the individual had to rest for some time since it occurred at the site of attachment of the abductor muscles used in walking. There is some disturbance of bone contour and texture at the ilio-pubic eminence which may be related to the fracture episode.

The neural arch of the last lumbar vertebra was detached (spondylolysis). This condition occurs more frequently in males and may be associated with arduous physical activity.

The tips of the acromial processes of the scapulae have not fused and there is some break-down of the normal bone texture on the opposing surfaces of the acromion and the detached ossa acromialia. This condition has also been associated with strenuous physical activity involving the upper limbs, starting early in life and 'preventing' normal fusion.

Both these conditions may be considered as failure of normal fusion.

A further developmental anomaly occurred in the first cervical vertebra where the posterior bony arch has not formed on the left side across to just right of the midline. No doubt this gap had been bridged in life by a fibrous band. There is a build up of bone on the second cervical vertebra on the right posteriorly which is probably compensatory for the deficit on the bone above.

There is evidence of some slight (healed) trauma on the right of the vertebral column affecting the twelfth thoracic vertebra where bony deposition from the margin of the lower articular facet to the neural arch has led to the formation of a foramen. There is also some degenerative change at the rib articulation on the body of this vertebra. Degenerative change in the rest of the vertebral column is minor and is situated as follows: none on the cervical region; very slight lipping on the margins of the bodies of the third to fifth thoracic vertebrae; slight lipping in the transverse process facets of the sixth to eighth thoracic vertebrae on the right; small osteophytes on lower body

(right) of the first lumbar and moderate osteophytes on both sides of the upper rim of the third lumbar body and on both upper and lower (left) margins of the fourth lumbar body; midline osteophyte and right and left sides of the inferior margin of the fifth lumbar body; a similar level of osteophyte development on the adjacent sacral body.

On the face a small bony spicule is present over the infra-orbital foramen, possibly the sequel of some minor trauma. There was some slight disturbance of the normal bone surface texture at the anterior margin of both external auditory meatuses.

On the sternum there was some evidence of degenerative change at the first left costal articulation, mirrored by similar change on the left first rib; however the right first rib showed more marked degenerative change at its sternal end. There was slight lipping on some middle ribs on the articular facets for the transverse processes.

On both humeri, the medial lip of the bicipital groove was slightly roughened, there was some lipping into the triceps attachment on both ulnae; the brachialis attachment on both ulnae was marked as was the line of attachment of the interosseous membrane. The attachment for the biceps muscles on both radii were prominent, as well as the tendon grooves on the distal dorsal surface of both radii.

The pattern of lipping in the lower limb is described above.

The bones appear well mineralised, although overall stature is short.

Detailed description of skeleton

Axial skeleton

Skull: intact; skull suture closure is described above; metopic suture closed; very small parietal foramina on both sides; mastoid foramina are extrasutural on both sides; posterior condylar foramina are present on both sides; the jugular foramen is larger on the right than on the left; both right and left infra-orbital foramina are single as are the zygomatico-facial foramina; supraorbital notch on both sides; no marked asymmetries; ridged palate.

Sternum and ribs: see above; the body, manubrium and xiphoid process were identified; these elements of the sternum were not fused; all ribs were present.

Vertebrae: see above; the vertebral column was almost completely intact; no degenerative change on any cervical vertebra; divided vertebral transverse foramen on the left on the sixth cervical vertebra and very small transverse foramina in the seventh cervical vertebra.

Larynx: see above. Ossification had occurred into the cricoid as well as the thyroid cartilage. It is rare for an ossified cricoid to be recovered.

Limb skeleton

Upper limb: All bones of both limbs were recovered intact with the exception of one trapezium and one trapezoid of the carpal bones; ossa acromalia - see above; the bones were generally robust; the suprascapular notch was bridged; the left clavicle was more robust than the right.

Lower limb: All the bones of both sides were recovered; the left fibular head was damaged; the right femur in particular, had a marked medial flange in the proximal third of the shaft; the adductor tubercles were well developed; on the right tibia the soleal line was pronounced.

Metric observations

SKULL

Maximum length	192 mm
Nasion-lambda	183 "
Basion-nasion	99 "
Basion-alveolare	96 "
Basion-bregma	128 "
Alveolare-nasion	70 "
Maximum breadth	129 "
Minimum breadth	88 "
Bizygomatic breadth	128 "
Bimaxillary breadth	97 "
Left orbital height	41 "
Left orbital breadth	32 "
Right orbital height	41 "

Right orbital breadth	31 "
Nasal height	49 "
Nasal breadth	24 "
External palatal length	52 "
" " breadth	61 "
Foramen magnum length	33 "
" " breadth	32 "

Indices of shape and proportion

Cranial index (skull shape)	67 (long-dolichocranic)
Cranial module (skull size)	150
Length/height index	66 (relatively low)
Breadth/height index	99 (relatively high)
Frontal/Parietal breadth index	65 (narrow anteriorly)
Upper face index	55 (narrow face)
Nasal index	49 (average breadth)
Orbital index	78 ^L (wide orbits) 77 ^R
Palatal index	85 (broad palate)

LIMBS

<i>Upper limb</i>	Left	Right	
Humeral length	299 mm	303 mm	R>L
Humeral head, diam.(max.)	48.1 mm	50.2 mm	R>L
Bicondylar width (hum.)	62.0 mm	62.1 mm	
Midshaft circumference (hum.)	60.1 mm	70.0 mm	
Ulnar length	263 mm	267 mm	R>L
Radial length	239 mm	240 mm	
Clavicle length	130 mm	136 mm	R>L

<i>Lower limb</i>	Left	Right	
Maximum femoral length	415 mm	414 mm	
Bicondylar femoral length	410 mm	412 mm	R>L
Maximum head diam. (fem.)	48.3 mm	47.7 mm	L>R
Vertical head diam. (fem.)	46.1 mm	47.2 mm	R>L
Midshaft circumference (fem.)	101 mm	89 mm	L>R
Antero-posterior diameter at midshaft (fem.)	31.5 mm	31.3 mm	
Medio-lateral diameter at midshaft (fem.)	28.5 mm	27.4 mm	L>R
Subtrochanteric ant-post. diam. (fem.)	28.3 mm	29.1 mm	R>L
Subtrochanteric med. lat. diam. (fem.)	32.8 mm	37.0 mm*	R>>L
Bicondylar width	82.2 mm	82.4 mm	
Head-neck angle	126°	128°	
Tibial length (max.)	340 mm	341 mm	
Tibial lateral condyle height	329 mm	332 mm	R>L
Tibial nutrient foramen level (NFL)	110 mm	111 mm	
Ant. post. diam. NFL	34.4 mm	33.0 mm	L>R
Med. lat. diam. NFL	26.1 mm	26.0 mm	
Ant. post. diam. 1/3 along tibial shaft	.	.	
Med. lat. diam. 1/3 along tibial shaft	.	.	
Tibial circumference at NFL	96 mm	97 mm	
Fibular length	332 mm	334 mm	

(*same as NFL in this case)

Height and limb proportions

Height estimation is based on femoral length (3) of

415 mm = 162 cms (range 158-166 cms)
(5'4", range 5'2"-5'5"); (Trotter and Gleser 1977).

	Left	Right
Brachial index (forearm/upper arm)	80	79
Crural index (leg/thigh)	82	82
Intermembral index (upper/lower limb)	71	72
Platymeric index (femoral proximal shaft shape)	86 (norm.)	79* (flat)
Platycnemic index (tibial proximal shaft shape)	76 (norm.)	74 (norm.)
Robusticity index (femoral) at	0.15	0.14 L>R

*due to presence of medial flange on right side

Dental report

This skeleton has well preserved facial and dental structures. Noteworthy features in this individual are flared mandibular angles, the ante-mortem loss of three upper incisor teeth and extremely proclined lower incisor teeth. Twenty-six teeth are present in their sockets; the left maxillary canine is missing post-mortem, the lower right and upper left third molars are unaccounted for, but from the wear on the opposing molars it is likely that these teeth were congenitally absent.

Loss of the three upper incisor teeth (two central incisors and the right lateral incisor) has undoubtedly been the result of traumatic injury as there is evidence of additional alveolar bone loss. There is also evidence of further trauma in the vertical fracture seen in the lower right first molar. This fracture has occurred some considerable time before death as the fracture edges have become worn and rounded.

The lower six front teeth are proclined forward and, because these incisors had no functional antagonists, heavy deposits of supragingival calculus had formed. From the wear patterns on the incisal edges of these teeth it is likely that the upper front teeth were also markedly proclined.

There is slight crowding in the lower incisor region but the posterior segments are well formed with no evidence of crowding.

The teeth show evidence of severe occlusal wear (attrition); the degree of differential wear on the molar teeth suggests an approximate age-at-death of about 30-35 years.

The dentition was free of caries but there had been an abscess related to the lower right first molar tooth, probably associated with the fracture of this tooth.

A hypoplastic line is present on the remaining maxillary lateral incisor. Little can be read into a single hypoplastic defect and the enamel on the remaining teeth appears to be of good quality.

There was a considerable degree of root exposure, mostly due to compensatory supraeruption of the teeth but also linked no doubt to some inflammatory alveolar bone loss. Of the twenty-five interdental septa available for periodontal assessment, one was healthy, seven showed evidence of gingivitis, five showed evidence of an acute burst of periodontitis while two were in a quiescent state. Ten septa showed evidence of angular bone loss which indicates a more aggressive form of adult periodontitis than that observed in Burial C. Individual D had been more susceptible to periodontitis and it is likely that the lower incisors, canines and three or four molar teeth would have been soon lost had this individual survived.

Apart from the abscesses related to the lower right molar, no other oral pathology was evident.

<i>Teeth present</i>	<u>8 7 6 5 4 3 / 2 4 5 6 7</u> <u>. 7 6 5 4 3 2 1 / 1 2 3 4 5 6 7 8</u>
<i>Teeth missing ante-mortem</i>	<u>..... 2 1 / 1 (8)</u> (8) /
<i>Teeth missing post-mortem</i>	<u>..... / . 3</u> /
<i>Attrition scores (Scott, 1979)</i>	Right 1st molar (maxilla) 8, 9, 9, 10 Right 1st molar (mandib) 8, 8, 9, 9 Right 2nd molar (maxilla) 4, 4, 5, 5 Right 2nd molar (mandib) 7, 7, 8, 8 Left 1st molar (maxilla) 9, 9, 9, 10 Left 1st molar (mandib) 8, 8, 9, 9 Left 2nd molar (maxilla) 4, 7, 8, 9 Left 2nd molar (mandib) 4, 6, 7, 8

Periodontal status

(Kerr, 1989)	score	<u>4 5 4 1 5 5 0 0 0 3 5 2 2 2 0</u>
	interspace	<u>8 7 6 5 4 3 2 1 1 2 3 4 5 6 7 8</u>
	score	0 5 5 2 5 3 3 3 3 5 5 2 2 2 5

Caries

No caries was present.

Measurements

Mandibular

Width of condylar head

left - 20.5 mm

right - 20.4 mm

Bi-condylar width - 116 mm

Mandibular angle - 133 degrees

Projected length of body - 73 mm

Height at symphysis - 29.5 mm

Height at ramus - 48.5 mm

Minimum antero-posterior width of the ramus - 33.8 mm

Maxillary

Mid-point of fissures of 1st

premolars - 39.0 mm

Palatal alveolar crest

2nd molar tooth - 40.6 mm

Central fossa of 1st

molars - 50.0 mm

Spina nasalis to line joining alveolar crest

central incisors - 51.5 mm

Occlusion

Crowding in lower incisor segment.

BURIAL E

The skeleton is almost completely intact and the bones are in an excellent state of preservation. One individual is represented - an adult female about 5'3" tall with significant pathology. Dental abscesses associated with severe attrition were present and there was evidence of a benign gum tumour. There is no evidence as to the cause of death.

Age determination - All long bone epiphyses are fused; the basi-occipital basi-sphenoid synchondrosis is closed; vertebral, rib and innominate epiphyses are fused; the medial clavicular epiphyses are fused. The appearance of the anterior ends of the ribs corresponds to phase 5 (Iscan et al 1985); the appearance of the pubic symphyseal face corresponds to phase 7 (Todd 1920). All skull sutures are open exocranially. There is some probably degenerative change in the cervical, thoracic, lumbar and sacral vertebrae. Slight lipping was observed on the femoral foveal pit and on the margin of the lateral humeral epicondyles. Some ossification into the lateral edges of the thyroid laminae had occurred. The cornua of the hyoid had not fused to the body of the bone.

These factors suggest an age of at least 35 years and probably not more than 45 years, which is consistent with the dental attrition age estimate of 35-40 years.

Sex determination - The innominates and the sacrum were very clearly female in form. The rest of the skeleton including the skull and mandible was gracile. The evidence very strongly suggests female sex.

Pathology - There was no evidence of significant skeletal pathology.

The vertebral column showed the following signs of degenerative change:- the articular facets between the second and third cervical vertebrae on the left; round the margin of the fourth left superior facet of the fourth cervical, where there was also a small bony projection into the left intervertebral foramen between the third and fourth vertebrae; on the facets between the third and fourth and fourth and fifth thoracic vertebrae; slight osteophytic development on the inferior rim of the body of the fifth, sixth, eighth and ninth vertebrae; some lipping round the facets on the left transverse processes on the sixth through ninth thoracic vertebrae and on the fifth, eighth and ninth on the right side; slight lipping on the upper and lower margins of the body of

the second lumbar vertebra and on the rim of the bodies of the third through fifth lumbar, mainly on the right side and most marked on the fifth vertebra; moderate lipping on the margin of the upper sacral body.

There was some evidence of minor trauma to the third left finger (nodules on the dorsal surface of the head of the intermediate phalange).

There was some bony deposition at the capsular attachment of the shoulder joint of the left humerus, posteriorly with a small spur of bone just below the head and some roughening of the surface just above the elbow joint on both right and left humeri. The former may have been the result of some trauma to the shoulder joint, the latter may be the result of frequent or powerful use of the extensor muscles of the wrist.

Pre-auricular sulci are evident on both right and left innominates, slight dorsal pitting is present on the right pubic bone. Some authorities consider that these features are associated with obstetric trauma.

The bones appear well mineralised and there is no evidence of metabolic or growth disorders. Limb proportions and size are normal.

Detailed description of skeleton

Axial skeleton

Skull. Intact apart from the right styloid process and slight damage to the right orbital roof. All vault sutures are open ectocranially; no metopic suture, infra-orbital suture is open; basi-sphenoid basi-occipital synchondrosis closed; several small Wormian bones present on both sides; no parietal foramina identified; mastoid foramina are extrasutural; posterior condylar foramina present on both sides and are in the base of excavations or pits, suggesting a 'locking' mechanism for the skull in extension (head held back); jugular foramina approximately equal in size with bridging of the anterior compartment on the right side; double infra-orbital foramina with about 1 cm between foramina on the left side; double zygomatico-facial foramina on the right, single on the left side; supra-orbital foramen on the right, notch on the left; supraorbital ridges poorly developed; moderate to slight mastoid processes; poorly developed nuchal markings; external occipital protuberance slight; some slight erosion of surface on the left occipital condyle which may be due to post-mortem processes; the nasal

septum is deviated to the left; otherwise no marked asymmetry although the right frontal and the left occipital pole project slightly.

Mandible: gracile.

Sternum and ribs: The body and manubrium of the sternum had not fused; there was some degenerative(?) change at the second costal facet on the right side of the body; the manubrium showed some asymmetry with the clavicular articular area more extensive and lower on the left than on the right.

Twelve pairs of ribs were identified, slender in form and with no features of note; the anterior ends were considered to be in phase 5 of development (Iscan *et al* 1984).

Vertebrae: The vertebral column was almost intact. All seven cervical vertebrae are present and very well preserved; on the first the vertebral (transverse) foramen was incomplete on the left, complete on the right; on the seventh the vertebral foramina were as large as on the sixth vertebra; the degenerative changes in the neck region are detailed above. All twelve thoracic vertebrae and five lumbar are also present with some minor degenerative change (see above). The sacrum is typically female in form with wide alae; the left auricular surface is deeply indented on its lower third; there is degenerative lipping on the anterior margin of first segment, corresponding to that on the last lumbar vertebra.

Larynx: The body of the hyoid and unfused cornua were identified together with some ossified fragments of the thyroid cartilage.

Limb skeleton

Upper limb: Both scapulae and clavicles were present; the left clavicle was longer than the right. All the long bones were present and were slender; there was no apparent torsion of the humeral shafts; minor (?degenerative, ?traumatic) changes are noted above at the shoulder and elbow; the lesser tuberosity (the site of attachment of the subscapularis muscle) is larger on the right than on the left humerus; the deltoid muscle attachment is moderately to well developed. The right humerus is noticeably longer than the left. There are no features of note on the radii or ulnae. Of the bones of the wrist and hands only one pisiform bone was not identified. Slight trauma to the third finger of the left hand is referred to above.

Lower limb: The innominates are in an excellent state of preservation. The form and proportions of the pubic bone are very typically female. There is a line visible at the site of fusion of the ischial tuberosity but in the light of the evidence from the rest of the skeleton this is not considered to indicate young/early adulthood. There is a groove remaining at the site of fusion of the three constituent bones of the acetabular floor on both sides. There is some disturbance of the normal bone surface on the inner articular rim of the acetabulum on both sides. Pre-auricular sulci can be identified on both sides while there is some minor dorsal pitting on the right pubic body. On the right side there is some minor lipping on the margin of the ischio-pubic ramus. All the long bones are present and intact; all are slender. On both femora the site of attachment of the hip abductors is prominent. The foveal pit on the femoral heads is small with only very slight lipping. All the bones of the tarsus, all the metatarsals and almost all of the phalanges and the sesamoids of the feet were recovered but present no features of note.

Metric observations

SKULL

Maximum length	174 mm
Nasion-Lambda	171 mm
Basion-Nasion	96 mm
Basion Alveolare	93 mm
Basion-bregma	124 mm
Alveolare-nasion	71 mm
Maximum breadth	134 mm
Minimum breadth	92 mm
Bizygomatic breadth	123 mm
Bimaxillary breadth	90 mm
Left orbital height	37.1 mm
Left orbital breadth	41.1 mm
Right orbital height	38.5 mm
Right orbital breadth	43.9 mm
Nasal height	55.0 mm
Nasal breadth	22.0 mm
External palatal length	52.8 mm
" " breadth	59.4 mm
Foramen magnum length	33.0 mm
" " breadth	27.5 mm

Indices of shape and proportion

Cranial index (skull shape)	77 (mesocranic)
Cranial module (skull size)	144
Length/height index	71 (average)
Breadth/height index	93 (high)
Frontal/parietal breadth index	67 (average)
Upper Face index	58 (narrow)
Nasal index	40 (narrow)
Orbital index	90 ^L (narrow)
Palatal index	88 ^R
	89 (broad)

LIMBS

<i>Upper limb</i>	Left	Right	
Humeral length	312 mm	328 mm	R>L
Humeral head diam. (max)	43.3 mm	42.5 mm	
Bicondylar width (hum.)	60.0 mm	57.7 mm	L>R
Midshaft circumference (hum.)	61 mm	60 mm	
Ulnar length	262 mm	265 mm	R>L
Radial length	243 mm	244 mm	
Clavicle length	143 mm	136 mm	L>R

<i>Lower limb</i>	Left	Right	
Maximum femoral length	426 mm	422 mm	L>R
Bicondylar femoral length	422 mm	420 mm	
Maximum head diam. (fem.)	41.9 mm	42.2 mm	
Vertical head diam. (fem.)	41.4 mm	41.0 mm	
Midshaft circumference (fem.)	84 mm	85 mm	
Antero-posterior diameter at midshaft (fem.)	28.4 mm	27.3 mm	L>R
Medio-lateral diameter at midshaft (fem.)	26.3 mm	25.0 mm	L>R
Subtrochanteric ant-post. diam. (fem.)	22.5 mm	23.3 mm	R>L
Subtrochanteric med. lat. diam. (fem.)	33.6 mm	31.1 mm	L>R

	Left	Right	
Bicondylar width	73.4 mm	74.5 mm	R>L
Head-neck angle	120°	120°	
Tibial length (max.)	362 mm	351 mm	L>R
Tibial lateral condylar length	356 mm	344 mm	L>R
Tibial nutrient foramen level NFL	121 mm	115 mm	
Ant.-post. diam. NFL	31.1 mm	30.1 mm	L>R
Med. lat. diam. NFL	21.8 mm	21.2 mm	
Ant. post. diam. 1/3 along tibial shaft	*	*	
Med. lat. diam. 1/3 along tibial shaft	*	*	
Tibial circumference at NFL	85 mm	84 mm	
Fibular length	351 mm	353 mm	

* virtually same level as NFL

Height and limb proportion

Height estimation is based on femoral length (3) of

426 mm = 159.4 cms (range 156-163 cms)
(5'3", range 5'1"-5'4"); (Trotter and Gleser 1977).

	L	R
Brachial index (forearm/upperarm)	78	74
Crural index (leg/thigh)	85	83
Intermembral index (upper limb/lower limb)	70	74
Platymeric index (femoral proximal shaft shape)	67 (flat)	75 (flat)
Platycnemic index (tibial proximal shaft NFL shape)	70	70
Robusticity Index (femoral) at midshaft	0.13	0.12

Dental report

The skull, mandible and facial features of this skeleton are well preserved. The dentition shows evidence of severe wear (attrition) of the occlusal surfaces of the teeth with much secondary dentine visible. Little enamel remained on the molar teeth.

The dental arches were not crowded but a cross bite existed in the molar regions with the lower right first and second molars and lower left first molar buccally placed. The relationship of the incisor teeth was normal.

Twenty-five teeth were present in their sockets; five were missing post-mortem and two upper third molars are unaccounted for. From the wear patterns on the lowers it is likely that these teeth were congenitally absent.

What little enamel that can be observed appears to be well formed and suggests a childhood free from serious illnesses. There are heavy deposits of supragingival calculus around all teeth and there is no evidence of any oral hygiene measures having been undertaken.

Two approximal surfaces, the distal aspect of the lower left second molar and the mesial aspect of the third molar have early carious lesions. These are situated on the root surface immediately below the amelo-cemental junction (a typical site for caries in dentitions showing severe attrition). A small area of arrested caries is present on the mesial aspect of the lower right third molar tooth.

Considerable root exposure was present, with furcation involvement in both lower first molars. It is likely that compensatory supereruption of the teeth following severe attrition was responsible for most of this root exposure. No septal area was healthy, but of the twenty-eight septal areas available for study twelve showed evidence of gingivitis, nine had evidence of an early acute burst of periodontitis, while six were in a quiescent phase. Only one septal area had evidence of an angular defect.

There were dental abscesses related to the buccal roots of both the left and right upper first molars, and there had been resorption of the buccal plate. It is likely that these abscesses were secondary to pulp exposure occurring as a result of severe attrition and the inability of secondary dentine formation to keep pace with the loss of tooth substance.

The interspace between the lower left first and second molar teeth shows evidence of a tumour of the gum tissue. It is likely that this was a benign tumour of longstanding, but its presence could well account for an accumulation of plaque in this quadrant and for caries being present in the interspace distal to this lesion.

The degree of attrition suggests that this individual was about 35-40 years at the time of death.

<i>Teeth present</i>	<u>7 6 5 4 2 1 . 3 4 5 6</u>
	8 7 6 5 4 3 2 1 1 2 3 4 5 6 7 8

<i>Teeth missing ante-mortem</i>	<u>(8) / (9)</u>
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<i>Teeth missing post-mortem</i>	<u>. . . . 3 . 1 / 1 2 7 .</u>
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<i>Attrition scores</i>	Right 1st molar (maxilla) - 9, 9, 10, 10
(Scott, 1979)	Right 1st molar (mandib) 10, 9, 9, 9
	Right 2nd molar (maxilla) 9, 9, 7, 8
	Right 2nd molar (mandib) 6, 7, 7, 8
	Left 1st molar (maxilla) 9, 9, 9, 10
	Left 1st molar (mandib) 9, 9, 8, 8
	Left 2nd molar (maxilla)
	Left 2nd molar (mandib) 4, 7, 4, 7

<i>Periodontal status</i>	
(Kørr, 1989)	score <u>0 5 2 4 3 2 2 4 4 2 4 4 3 3 0</u>
	interspace <u>8 7 6 5 4 3 2 1 1 2 3 4 5 6 7 8</u>
	score <u>3 3 2 2 4 2 2 3 3 3 2 2 2 4 3</u>

Caries	Early root caries at amelo-cemental junction of mesial aspect of lower left third molar and distal aspect of lower left second molar.
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Measurements

Mandibular

Bi-condylar width	-	112 mm
Mandibular angle	-	
Projected length of body	-	80 mm
Height at symphysis	-	21.0 mm
Height at ramus	-	42.7 mm
Minimum antero-posterior width of the ramus	-	31.0 mm

Maxillary

Mid-point of fissures of 1st premolars	-	38.6 mm
Palatal alveolar crest of 2nd molars	-	41.4 mm
Central fossa of 1st molars	-	46.7 mm
Spina nasalis to line joining alveolar crest central incisors	-	43.7 mm

Occlusion

Cross bite present on left and right molar segments.

Pathology

Apical abscesses associated with upper 1st molar teeth. Presence of epulis in interdental area between lower left 1st and 2nd molar teeth.

BURIALS F AND G

The bones from Burials F and G were both in a remarkably good state of preservation, given their small size and gracility. In each case a single individual was represented. Both individuals were infants - burial F was that of an infant of several months while burial G was that of a younger infant, probably a neonate. In neither case was there any evidence of a congenital or developmental anomaly or of any pathological feature or process which could shed light on the cause of death.

Burial F

Only one individual was represented. An infant of several months (probably between 6-9 months). There was no evidence of congenital or developmental anomaly or any pathological process to indicate the cause of death.

Skull - the vault, base and external facial skeleton were almost intact, though disarticulated at the sutures; the deeper facial bones were missing/fragmented.

Frontal - right and left; frontal boss present on each side with a few fine striations radiating from it; nasal area ossified; supra-orbital foramina on both sides; central markings visible endocranially; no cribra orbitala.

Parietal - right and left; some post-mortem distortion; meningeal impressions visible endocranially.

Temporal - right and left; squamous portion fused to petrous; slight post-mortem damage to left squamous portion; styloid process 'sheathed'; foramen of Huschke forming; mastoid process just discernible; stylo-mastoid foramen still facing laterally rather than basally placed; all ossicles in situ.

Occipital - a. squamous portion disarticulated, external occipital protuberance prominent; some post-mortem damage at the periphery.

- b. basal portion disarticulated

- c. right and left lateral portions, disarticulated.

Sphenoid - body, lesser wings and greater wings fused; left lesser wing damaged post-mortem.

Zygomatic - right and left; some post-mortem damage.

Maxilla - right and left (and see dental report).

Ethmoid and lacrimal - fragments.

Fontanelles - anterior and posterior gaps or fontanelles would have been present.

Mandible - single bone (and see dental report).

The state of development of the skull and mandible suggests that death occurred at the age of about six to twelve months.

Vertebral column and ribs - some 18, unfused (across midline) neural arches were recovered together with 3 fused arches and some 10 unfused vertebral bodies, on the second of which the upper border of the dens was still deeply cleft. More ribs from the left side survived than from the right.

Upper limbs - the right clavicle, left-scapula (medial border missing/damaged), left humerus, radius and ulna with some metacarpals and phalanges were identified. The following lengths were estimated, taking account of some erosion at the ends of the diaphyseal shafts.

Left humerus length 92 mm

Left radius length 75mm

Left ulna length 80 mm

Right-clavicle length 57 mm

Lower limbs - no long bones survived; only a fragment of the left-iliac was present.

Other - the body and one wing (unfused) of the hyoid was identified.

- the fragment U.S. St.2 could be from this burial.

Dental report

Intact mandible and maxilla (maxilla separated at the mid-line suture). The only teeth that are erupted are the lower left deciduous central incisor and the two upper incisors, and it is likely that they had only just pierced the oral mucosa. The lower right incisor is missing post-mortem.

All other deciduous teeth are present but unerupted. The crowns of the deciduous molar teeth are completely calcified, the canines almost two thirds calcified. There is no evidence of hypoplastic defects of the crown enamel and the inference must be that the infant was well-nourished and enjoyed reasonable health until his or her death.

The occlusal surfaces of the first four molar teeth are not completely calcified, a central area being deficient in the lower and a small central and larger distal area still to be calcified in the lower teeth.

The dates of calcification of the teeth would suggest that the infant was aged about seven or eight months at the time of death.

Unerupted teeth present - 6 E D C B / B C D E 6

Missing post-mortem - 6 E D C B / B C D E 6

Erupted - -----
A/

A/A

Erupted - -----
/A

Burlal G

Only one individual was represented - an infant who had died at or around birth or in the very first few weeks thereafter. There is no skeletal or dental evidence of congenital or developmental abnormality or of any other pathological process to suggest the cause of death.

Skull - the vault, base and external facial skeleton were virtually intact but disarticulated at all sutures; only the small bones of the nasal region were fragmented/missing.

Frontal - right and left; some post-mortem defect on the right metopic margin; supra-orbital notch on left; supra-orbital foramen on right side; fine striations radiate away from a prominent frontal 'boss'; no cribra orbitalia.

Parietal - right and left; some post-mortem distortion; parietal bossing less prominent than frontal; fine striations radiating away from boss; the left parietal is in two fragments.

Temporal - right and left; squamous portion fused to petrous both sides; tympanic ring fused both sides; mastoid processes not developed; right and left malleus and incus recovered.

Occipital - a. single intact squamous portion with small but well-defined external occipital protuberance; sagittal superiorly and partial separation of the upper and lower portions laterally;

b. disarticulated basilar portion

c. disarticulated right and left lateral portions.

Sphenoid - a. body and lesser wings fused

b. disarticulated right and left postphenoid portions (greater wings).

Zygomatic - right and left.

Maxilla - right and left (see dental report).

Palatine and ethmoid - fragments.

Fontanelles - when the bones of the vault were articulated, it can be appreciated that substantial anterior, posterior and lateral fontanelles would have been present.

Mandibles - right and left halves (and see dental report)

The state of the development of the skull and mandible suggests that death occurred at or around birth or soon afterwards.

Vertebral column and ribs - virtually all of the bony vertebral column survived; none of the neural arches had fused across the midline and none of the centra had fused to the arches. Most of the ribs (at least eleven on the right and twelve on the left) were present at least in fragmentary form.

Upper limb - all of the long bone diaphyses (clavicle, humerus, radius, ulna) and the scapula and many metacarpal and phalangeal elements survived; although the ends of the bones were somewhat eroded, the following estimates of length are probably within a millimetre or so of length at death.

Left clavicle length	46mm	Right clavicle length	46mm
Left humerus length	73mm	Right humerus length	70mm
Left radius length	55mm	Right radius length	58mm
Left ulna length	68mm	Right ulna length	68mm

Lower limb - of the pelvic bones the right and left ilium and part of the right ischium (tuberosity) were identified; the right and left femoral, tibial and fibular were sufficiently intact to permit the following estimates of length to be made.

Left femur length	80mm	Right femur length	82mm
Left tibia length	73mm	Right tibia length	73mm

Left fibula length 70mm Right fibula length 70mm

Other - one small bone was tentatively identified as a distal femoral epiphysis and another as a capitate from the wrist.

The size and state of development of the post cranial skeleton is consistent with the age estimate derived from the skull.

Dental report

Mandible and maxilla of an infant who is likely to have died at birth or very soon after.

The mandible is complete but separated at the mid line suture; the maxilla is divided at the mid palatal suture. It is complete on the right but the incisal area is missing on the left.

There are no erupted teeth. The deciduous dentition is partially formed with almost half the crown height of the incisors present but only the occlusal surfaces of the molars and the tips of the cusps of the canines calcified. The first permanent molar crypts are present but there is no evidence of any tooth formation.

The degree of calcification of the dentition suggests that the infant dies at birth or soon after.

Un erupted teeth [present - E D C B A / C D E

E D C B A / A B C D E

Fragment US within 0/10 layer brown patch is a fragment of scapula, probably non-human.

CATALOGUE OF STRAY FINDS

General

A substantial assemblage has been collected as stray finds in recent years by Margaret and Ron Curtis from the floor of the same blow-out as the current excavations, as well as further material from adjacent blow-outs. The assemblage includes objects of flaked stone, pottery, copper alloy, iron, iron slag, and animal and human bone, and can be added to previous collections published by Lacaille (1937) and Close-Brooks (in press). These artefacts were kindly loaned to CFA for further analysis. The following sections present a summary of the nature and, where possible, date of the various components of the assemblage, and include contributions on the pottery by Richard Strachan, the stone by Bill Finlayson and the bone by Nicola Murray. The absence of secure context for the artefacts precludes meaningful analysis of their spatial distribution. Numbers in parentheses in text refer to catalogue entries detailed on fiche.

Two items within the list provided by Mr and Mrs Curtis were not available for examination (K26, K27; human bones). A collection of shells (K301) has not been catalogued.

The precise positions of catalogue entries K1-K41 within the blow-out containing Burials C-E were recorded. Details of these are held by Mr and Mrs Curtis, and CFA. K101-106 derived from unspecified positions within the same blow-out, K201-4 are from the adjacent blow-out to the west, and K301-5 are recorded as from 'two adjacent blow-outs'.

The majority of the finds were examined following the 1992 fieldwork season. A much smaller assemblage was assessed following the 1994 season: time did not permit these to be subjected to the same level of analysis as the 1992 assemblage. In addition, a different numerical referencing system had been employed by Mr and Mrs Curtis for the later assemblage, which presented some problems of integration of the two. For each material in the following sections the 1994 finds are therefore catalogued separately, although where possible an integrated discussion is presented.

COPPER ALLOY

Discussion

An assemblage of 32 copper alloy pieces has been recovered as stray finds on Cnip headland. These were sorted into visibly similar groups (A-D) and submitted to Mr Peter Davidson, of the National Museums of Scotland, who subjected a representative sample to X-ray fluorescence analysis. This analytical technique can be used to detect elements with atomic numbers between sodium (Na) and Uranium (U). Within these constraints the technique indicated the elemental composition of each example. The results indicate on metallurgical content that five of the artefacts are diagnostically modern and that a further four are probably modern. No detailed contextual information was available, due to the circumstances of recovery, with which the stratigraphic position and taphonomy of these artefacts could be assessed. The more readily identifiable artefacts were examined by Trevor Cowie and David Caldwell, both of National Museums of Scotland, who concluded that none was diagnostic to period.

Four pieces (*Group A*) appeared to be modern, mass-produced pins. The pieces tested were of brass with some lead content. The quantity of zinc in the alloy (roughly 30%) places these objects after AD1750, when methods of brass production changed. A proportion of zinc greater than about 24% was practically impossible to achieve before this date (Davidson pers. comm.).

One piece (*Group B*) was a slender, slightly tapering hollow tube with an octagonal cross-section. Two small slits are cut through the sides at the fatter end. Analysis showed this to be of brass with a low proportion of zinc (5-10%). Its light corrosion, rather than its metallurgy, may indicate a relatively recent origin. Its function is unclear.

The 17 pieces of *Group C* comprised roughly 97% copper and 3% zinc with traces of lead. Lead is commonly used as a flux. This assemblage contains some interesting artefacts. A collection of nine sheet metal offcuts (K105) are paralleled by material retrieved from an Iron Age context at Cnip site 3 (Armit and Dunwell 1993), and may be associated with craft activity. The inference that these pieces are also Iron Age cannot, however, be made. Other sheet scraps were located (K3, K20, K42), although these are not necessarily related to the same activity. A possible 'leaf-

shaped' brooch mount (K24) was recovered from the southern side of the blow-out containing Burials C-E. A whole bracket or mounting (K25), and fragments of two others (K25, K105), were recovered. A further example of this type was found c.20m west of the Bronze Age cairn during its excavation (Close-Brooks this volume, no. 8). The remaining artefacts are parts of a pin (K105) and an unidentifiable object (K14). Neither of these are diagnostic to age.

One piece (*Group D*) was of such a high proportion of zinc (46%) that it must be modern.

Catalogue (all measurements in mm)

Group A

K13 Brass pin, circular flat head (30x1 dia); relatively uncorroded; modern.

Part of fine pin shaft (15 x 1 diam).

K31 Brass pin, spherical head, broken (30 x 1 dia); heavily corroded; modern.

K34 Brass pin with flattened circular head (25 x 1 dia), point missing; very similar to K31; modern.

Group B

K13 A slender, tapering hollow tube made from a rolled and creased sheet, with an octagonal cross-section and two small slits cut through the sides at the fatter end (32 x 1-3 diam); robust, with fairly light corrosion; possibly relatively modern; function unclear, although possibly decorative.

Group C

K03 Part of strip of sheet (20 x 7 x 1), slightly warped; long sides smoothed and original, short sides appear missing continuations. Undiagnostic.

K14 Length of sub-rectangular object, with irregular slightly curved profile (25 x 7 x 1); very robust and not heavily corroded; possibly relatively modern. Both long

sides and one short side are smoothed and appear to be original; other short side broken off. Undiagnostic.

K20 Sub-rectangular sheet fragment, with possibly deliberate curved profile (8 x 4 x 1); long sides appear original, but short sides appear broken or cut, one irregularly; possibly part of triangular offcut similar to examples from Cnip site 3 (Armit and Dunwell 1993).

K24 Sub-oval, 'leaf-shaped', sheet object (15 x 10 x 1); roughly symmetrical with central rectangular perforation (4 x 0.75) and smoothed edges; outer face has darker green corrosion, indicative of lengthier exposure; this object has been applied to another object as a mount - a rounded contact outline can be seen on its rear face.

K25 Brass sheet bent to form three sides of a square, two opposite sides have opposing 2mm dia. drilled perforations; regularly spaced, lightly incised, pattern of curvilinear lines on inner face; dimensions for "straightened" strip 45 x 5 x 1; this object is complete and appears to be some form of bracket or mounting.

Broken fragment of bracket or mounting, as above and with same patterning on inside face (12 x 5 x 1).

K42 Brass scrap (4 x 2 x 1) - identification not possible.

K105 Nine sheet fragments, some folded and one with distinct triangular form (8 x 8 x 1 to 20 x 15 x 3). This material is very similar in form to the bronze waste offcuts from Cnip site 3 (Armit and Dunwell 1993). This collection, however, does not cover the range of types present at that site, where 'paper-clip' rivets associated with the patching of bronze cauldrons were found in some quantity. This material may indicate some form of craft activity.

Warped sheet fragment with c.2mm diameter perforation, through which a sharp object has been forced, displacing the perforated material outwards in an irregular circular mount (10 x 5 x 1); this object may be part of a bracket or mounting (cf. K25).

Fragment of pin with a rectangular cross-section (26 x 2 x 1); slightly warped present, although head broken off. This pin may be of a type associated with ring-brooches (Caldwell, pers. comm.)

Group D

K40 A flat and slightly curving brass fragment (23 x 4 x 3), broken at both ends, with a small notch cut in one side and five 1mm thick diagonal raised stripes running across on one side. The material is composed of 52% copper, 46% zinc and 1.5% iron, within the range of elements detectable by XRF, which is indicative of a modern origin.

Ungrouped

K43 Brass or copper wire (48 x 1 diam.): received too late for X-Ray Fluorescence analysis to be organised; fine, pointed at one end and broken off at other; twisted and warped; possibly a pin; robust, pliable and not heavily corroded; modern.

The finds detailed below were received following the 1994 fieldwork, and were not submitted for X-ray fluorescence analysis. All were collected in the blow-out in which Burials C-G were excavated.

- 58 Small copper alloy strip (9 x 6 x 0.5); received too late for X-Ray Fluorescence analysis to be organised.
- 59 Small copper alloy strip (5 x 3 x 0.5); received too late for X-Ray Fluorescence analysis to be organised.
- 60 Copper alloy pin (25 long); round head (2 diam); probably modern.
- 61 Copper alloy pin (25 long); round head (2 diam); probably modern.
- 64 Curved, pointed copper alloy strip (30 x 9 x 0.5); slight arc removed from the inner curve of the strip at the blunt end.

Unnumbered copper objects

Copper alloy fragment (30 x 15 x 0.5); bent in middle; possible fragment of cartridge case.

Copper alloy strip, heavily folded (30 x 8 x 6); purpose unknown.

FERROUS OBJECTS

Discussion

Most of the pieces are heavily corroded, and identification and date cannot be assigned. X-rays or careful cleaning would be required for this to be carried out. X-Ray Fluorescence analysis revealed little about the date of manufacture of the objects (Davidson, pers. comm.).

Most of the recognisable pieces are nails, tacks and wire or pin fragments. The wire, including a fragment of barbed wire, is probably relatively modern in origin. The boat rivet is of potential interest (K304). These artefacts are broadly similar to the iron rivet found in Burial A (Welandar, Batey and Cowie 1987, 158, illus 8, No.11). Other possible boat nails are present within the assemblage; these need not be Viking in origin, and may be derived from driftwood. A small iron alloy spiral strip (K304) was clearly of deliberate design, although its function is unclear.

Catalogue

- K19 Length of wire or pin stem (15 x 1 dia); corroded; undiagnostic.
- K28 Length of wire or pin stem (28 x 2 x 2); corroded and undiagnostic.
- K29 Heavily corroded wire or pin stem fragment, with a rectangular cross-section (21 x 3 x 2); undiagnostic.
- K30 5 tacks or small nails (24-27 x 2 diam), four with heads absent.
3 wire fragments (54 x 2 diam, 47 x 2 diam, 64 x 2 diam).
Fragment of object (22 x 20 x 3) with a square depression (9 x 8); possibly the head of a tack (cf K50).
Fragment of barbed wire (30 x 16 x 12).

- K33 Thin fragment (10 x 7 x 1); unidentifiable.
Small lump (5 x 3 x 2); probably the head of a tack (cf K30).
- K38 Tack or nail stem fragment; head not preserved (28 x 2 x 2).
Wire fragment (18 x 2 x 2).
- K40 Wire fragment (22 x 1 x 1).
- K44 Tack/rivet - shaft square in cross-section; head rectangular in plan (22 x 10 x 15); very similar to K50.
- K45 Heavily corroded nail - shaft square in cross-section; head rectangular in plan (63 long x 10 x 9 at head).
- K48 Bent nail - heavily corroded, with none of the head visible (35 x 6 x 8); shaft rectangular in cross-section.
- K49 Tack/nail - shaft square in cross-section; head square in plan (25 x 8 x 8).
Possibly a boat nail.
- K50 Tack/rivet - shaft oval in cross-section; head large, sub-rectangular and warped (20 long x 7 diam. shaft; 17 x 15 head).
- K57 Sub-rectangular piece of sheet iron (16 x 14 x 1). Too fragmentary for identification.
- K106 Heavily corroded and dense ferrous lump, possibly an object (26 x 18 x 15); unidentifiable.
- K203 Broken iron nail; head mostly absent (40 x 6 x 7); heavily corroded.
Broken iron nail or bolt, with a square head and rectangular cross-section (26 x 5 x 6).
3 iron fragments (8-20 x 5 x 2); possibly shafts of nails.
Flat strip of iron, broken and slightly curved (24 x 15 x 5); function unclear.
- K304 7 flat strips of iron (20-31 x 15-21 x 3)
Unidentified iron strip (46 x 21 x 8)

2 iron nails/boils with squared heads and rectangular cross-sections (26 x 10 x 8)

2 broken iron nails with round heads and square cross-sections (14 x 6 x 6; 21 x 4 x 4)

Boat rivet; pyramidal head 22 x 15; shaft 8 x 8; rectangular plate at base 10 x 10

Flat iron strip, broken (48 x 10 x 2); heavily corroded

Thin flat iron strip, twisted into a short spiral, nearly all iron with trace calcium, presumably the residue of a limestone flux from smelting (47 x 6 x 2, dia 11); function unclear.

Round iron nail head (3 x 10 dia).

Miscellaneous iron fragments.

K401 Large rod, complete: 300 long; shaft 18 diam. and rounded head 20 diam; relatively light corrosion. Probably a relatively modern tethering post.

Unnumbered ferrous objects (analysed following 1994 fieldwork)

c. 20 chunks of ferrous material (from 30 x 12 x 6 to 50 x 50 x 8), none of diagnostic artefacts; relatively little corrosion probably implies modern origin.

IRON SLAG

Discussion

X-Ray Fluorescence analysis was carried out on the assemblage of slag collected from Chip Headland. This technique can provide an accurate guide to the ratios of several key elements within a given sample of slag, accurate to around 0.5%. Trace elements can be recorded as either present or absent.

The pieces of iron slag catalogued below all have an iron and calcium content. Calcium carbonate is commonly used as a flux in the iron-smelting process. Silicon is often found within smelting by-products, again from flux. Titanium and manganese are common trace elements in materials with a high iron content. The pieces vary in their elemental composition, and more detailed work with relevant background analysis could possibly distinguish between the provenance of the ore, manufacture technique and possibly even dating. Most are very high in iron content, over 80%

(K203(ii) and K303); some pieces have roughly equal proportions of iron, calcium and silicon (K37, K104); some have iron and calcium in equal proportions (K104); and K203 has three times as much calcium as iron.

K36 comprises four pieces of limestone derivative, probably a smelting by-product.

The larger piece from K104 had small copper alloy nodules visible on its surface. These are probably from post-smelting, pre-cooling contamination.

Catalogue

- K36** 4 pieces of limestone derivative. Limestone itself is fairly homogenous, but microscopic analysis proved this material to consist of fairly discrete grains stuck together with a glassy material; either the by-product of manufacturing process, or mortar (11-20 x 7-12 x 4-5).
- K37** Iron slag, with roughly equal proportions of iron and silicon and a higher proportion of calcium; traces of titanium and potassium (15 x 16 x 9).
- K40** Piece of iron slag (15 x 8 x 4).
- K46** Small piece of light grey, probably ferrous, slag (30 x 15 x 10). Two small fragments of dark grey ferrous slag, less dense than light grey example (12 x 12 x 8; 10 x 6 x 5).
- K53** Piece of dark grey, probably ferrous, slag (30 x 25 x 12).
- K104** Iron slag, with slightly less calcium than iron and a small proportion of silicon. Two small (3 dia) copper alloy nodules are visible within the surface of the material, possibly contamination after the smelting process. It proved impossible to analyse the copper alloy (74 x 60 x 23).
Two pieces of iron slag, with iron, calcium and silicon in more or less equal proportions and traces of potassium and titanium (37 x 22 x 24, 21 x 10 x 14).
- K203** (i) 8 pieces of dark brown friable material, definitely anthropogenic in origin and probably a smelting by-product. Consists of calcium and iron in the approximate ratio 3:1, with traces of sulphur and silicon (12-32 x 15-22 x 8-11).

(ii) Ferrous slag consisting of about 85% iron, some calcium and traces of manganese and silicon (32 x 21 x 15).

(iii) Ferrous slag, similar to that described above, but with a higher manganese content, making this piece less red (89 x 52 x 54).

K303 (i) 4 pieces of iron slag, about 90% iron, with traces of calcium and silicon (34-56 x 16-49 x 13-39).

(ii) 7 pieces of iron slag, equivalent proportions of iron, silicon, and calcium (31-17 x 21-12 x 8).

(iii) 8 pieces of slag, similar to (ii), but with traces of titanium and potassium (38-15 x 23-12 x 26-15).

(iv) 7 pieces of iron slag, about 85% iron with some calcium and manganese. Similar material to the smaller piece from K203(ii) (32-17 x 18-10 x 17-8).

K304 2 pieces of iron slag, not analysed (29 x 17 x 10; 16 x 15 x 11).

Unnumbered slag (analysed following 1994 fieldwork)

4 pieces of ferrous slag (from 10 x 8 x 5 to 30 x 20 x 8); received too late for X-Ray Fluorescence analysis.

POTTERY

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Discussion

Taphonomy

A total of 611 sherds collected by Mr and Mrs Curtis from sand blow-outs on Cnip Headland were made available for inspection. Such collections are typical in the Hebridean context of eroding settlement sites and their associated midden spreads (cf Lane 1990, 108). Only 105 of these sherds (17%) were recovered from the blow-out in which recent excavations took place, with the rest deriving from the two adjacent blow-outs to the west and north. However, no precise information on the context of recovery is available for the assemblage, which presents serious problems for their interpretation within the framework of the excavated sites.

The condition of the pottery assemblage is consistent with the circumstances of its retrieval from exposed sand surfaces. The majority of the sherds are small in size (61%) and heavily abraded, with only 1% classified as large. The motifs on many of the decorated sherds are heavily abraded, and some are scarcely visible. This is perhaps illustrated best in two joining sherds from K305 in which the external faces are noticeably different in colour and degree of abrasion.

Typology

Identification of chronological range within assemblages of pottery stray finds is very difficult, as Hebridean pottery appears to have been manufactured by the same methods and materials over at least 2000 years from the Iron Age until the 19th century AD (Lane 1990, 109). Only rim-sherds, basal sherds and decorated pottery can be classified with any clarity. The 40 sherds which fall into these categories form only 6.55% of the total assemblage, and only 10 of these (a rim sherd and nine decorated body sherds) derive from the blow-out in which current excavation took place.

Within this assemblage the rim and basal forms and decorative motifs are mostly of types consistent with the later Iron Age and pre-Norse context. The decoration is mainly in the form of incised single line, or fingertip impression, with a complete absence of applied cordons or bosses. These types can be dated to the first millenium AD, the incised form demonstrated by Topping (1987) to be particularly enduring. An everted rim (within K305) is a typically late Iron Age form. A rimsherd containing a stab-mark on the rim surface (K305) is paralleled by material recovered from the latest structural phase at Eilean Olabhat, North Uist (I. Armit pers. comm.), which is pre-Norse but later than the 6th century AD.

A small number of sherds, including two from K204 (Lane 1990, 123), are grassed-marked, which may indicate a Viking origin.

Quantification

REF	SHERD	RIM	BASE	DEC	%DEC	RANGE large/med/small	% RANGE
K21	15					1/5/9	7/33/60
K23	1			1	100	1/0/0	100/0/0
K41	7					0/2/5	0/29/71
K55	1					0/1/0	0/100/0
K56	1					0/0/1	0/0/100
K107	5	2	2	1	20	0/3/2	0/60/40
K204	29	1		4	24	1/20/8	3/69/28
K305	472	13	1	9	1.5	2/167/303	1/35/64
101	3			1	33	0/1/2	67/33/0
Stray	3			1	33	0/3/0	0/100/0
General*74		1		6	8	0/33/41	0/45/55
*Blowout containing Burials C-G							
TOTAL	611	17	3	23	3.76	5/235/371	1/38/61

Selective catalogue

All the rimsherds, basal sherds and decorated sherds from the pottery assemblage are included within this catalogue. The uncatalogued undecorated bodysherds, which comprise 93.45% of the assemblage, are of little use in the diagnosis of the date or form of the vessels from which they derive, and are omitted. Colour descriptions were established by use of Munsell charts. Rim typology follows Topping (1987).

Stratified sherds recovered during 1994 fieldwork

These three sherds were recovered from the dark brown sand layer (C.101), through which Burials C-G had been cut.

C.101 Decorated body sherd (16 x 21x 6); very abraded; medium fabric with moderate <2mm inclusions: colour - internal brown (10YR/5/3), core yellowish red (5YR/5/6), external yellowish red (5YR/5/6); decoration - very faint traces of jab marks on exterior.

C.101 Plain body sherd (24 x 25 x 7); abraded; fine fabric with moderate <1mm inclusions; colour - internal grey (5YR/5/1), core very dark grey (2.5YR/3/0), brown (10YR/5/3).

C.101 Plain body sherd (32 x 36 x 12); abraded; fabric coarse with very common <2mm inclusions; colour - internal dark greyish brown (10YR/4/2), core brown (10YR/5/3), external black (2.5YR/2/0); other - may be slight rilling on interior.

Stray finds examined following 1992 fieldwork

K23/1 Decorated body sherd (60 x 44 x 11); abraded, particularly on external face; coarse fabric with common 3-5mm inclusions; colour - internal dark grey (7.5YR/4/0), core grey 10YR/5/1), external reddish-yellow (5YR/6/6) and dark grey (7.5YR/4/0); decoration - two probable, heavily abraded, fingertip impressions.

K107/1 Plain, basal fragment (26 x 19 x 8); abraded; fabric medium with frequent <1mm quartz inclusions; colour - internal dark grey (5YR/4/1), core greyish-brown (10YR/5/2), external dark grey (5YR/4/1).

K107/2 Plain, everted rim fragment (36 x 6-14 x 7); abraded; fabric medium-fine with frequent <1mm inclusions and occasional 1-2mm inclusions; colour - internal dark grey (10YR/4/1), core light yellowish-brown (10YR/6/4), external reddish-yellow (5YR/6/6).

K107/3 Decorated, rim fragment (19 x 17 x 7); abraded; fabric fine with few 1mm inclusions; colour - internal, external, core reddish-yellow (7.5YR/6/6); form - upright with slight rolling of external lip; decoration - three and a half incised lines 4mm in-length on top of rim.

K107/4 Plain basal fragment (19 x 18 x 7); abraded; fabric medium with few <1mm inclusions and one >3mm inclusion; poorly fired; colour - internal light brown (7.5YR/6/4), core dark grey (2.5YR/4/0), external reddish-yellow (5YR/6/8); form - indistinguishable due to fragmentary state of sherd.

K204/1 Plain, abraded upright rim fragment (14 x 12 x 7); fabric medium-coarse with moderate 2mm> inclusions; colour - internal pale brown (10YR/6/3), core greyish-brown (10YR/5/2), external brownish-yellow (10YR/6/4).

K204/2 Decorated body sherd (38 x 23-36 x 8); abraded; medium-fine, poorly fired fabric with few 2mm> inclusions; colour - internal black (5Y/2.5/1), core black (5Y/2.5/1), external brownish-yellow (10YR/6/4); decoration - single incised horizontal line with a second branching from it at an angle of c.80 degrees.

K204/3 Decorated body sherd (34 x 20 x 12); relatively unabraded, although surface flaking; medium fabric with common 3-5mm inclusions; colour - internal and core light brownish grey (2.5YR/6/2), external very dark greyish brown (2.5YR/3/2); decoration - single incised horizontal line.

K204/4 Body sherd with grass-marked exterior - appears to be deliberate decoration; colour - internal light brownish grey (10YR/6/2), external light brown (7.5YR/6/4), core dark grey (10YR/4/1).

K305/1 Decorated body sherd (25 x 24 x 8); relatively unabraded; medium fabric with common inclusions up to 5mm; colour - internal grey (10YR/5/1), core grey (10YR/6/1), external dark grey (10YR/4/1); decoration - single arrowhead-shaped jab present on exterior surface.

K305/2 Decorated everted rimsherd (16 x 14-36 x 5); very abraded; fine fabric with few 2mm> inclusions; colour - internal light brownish grey (10YR/6/2), core grey (10YR/5/1), external light brown (7.5YR/6/4); decoration - traces of fingerprint on external face, beneath lip.

K305/3.1 Decorated incurving rimsherd (38 x 32 x 10); external surface very abraded; fabric coarse with very common 3-5mm inclusions; colour - internal red (2.5YR/5/6), core greyish-brown (2.5YR/5/2), external greyish brown (10YR/5/2); decoration - incised line or impression on interior face, fingernail or incised vertical notches on external face.

K305/3.2 Plain incurving rimsherd adjoining above sherd (27 x 22 x 10); abraded; fabric as above; colour - internal as above, core brown (10YR/5/3), external brown (7.5YR/5/4).

K305/4 Decorated upright rimsherd (21 x 21 x 9); abraded; fabric medium with common <2mm inclusions; colour - internal reddish brown (5YR/5/3), core light brownish grey (2.5Y/6/2), external reddish brown (2.5YR/5/4); decoration - single incised line on top of rim.

K305/5 Plain everted rim (30 x 29 x 4); relatively unabraded; fabric fine with moderate <2mm inclusions; colour - internal and external light brown (7.5YR/6/4), core grey (7.5YR/NS/0).

K305/6 Plain rim fragment (21 x 14 x 4); abraded; fabric fine with rare <2mm inclusions; colour - pink throughout (7.5YR/7/4); possibly part of an everted form, although fragment too small to be certain.

K305/7 Decorated rim fragment (16 x 10 x 6); abraded; fabric medium with rare <2mm inclusions; colour - internal light red (2.5YR/6/6), core grey (2.5YR/NS/0), external reddish brown (2.5YR/5/4); form - possibly everted, although too small to be certain; decoration - possible single incised line or impression on internal face.

K305/8 Plain rim (18 x 12 x 8); relatively unabraded; fabric medium-fine; colour - internal and external light brown (7.5YR/6/4), core pinkish grey (7.5YR/6/2); form - upright with slight rolling of external lip.

K305/9 Decorated rimsherd (19 x 34 x 11); very abraded; fabric very coarse with very common 3-6mm inclusions; colour - internal light brown (7.5YR/6/4), core light brownish grey (2.5YR/6/2), external light reddish brown (2.5YR/6/4); form - incurving, with slight rolling on internal lip; decoration - one, possibly two sub-circular jabs on top of rim.

K305/10 Plain, possibly upright, rimsherd (21 x 20 x 8); relatively unabraded; fabric medium with moderate <2mm inclusions; colour - internal dark grey (10YR/4/1), core grey (10YR/5/1), external very dark grey (10YR/3/1).

K305/11 Decorated rimsherd (31 x 36 x 6); relatively unabraded; fabric medium-fine; colour - internal and external very pale brown (10YR/7/4), core grey (10YR/5/1); form - everted and flattened; decoration - incised on top of rim.

K305/12 Plain incurving rimsherd (26 x 34 x 8); external surface very abraded; fabric very coarse with common 3.5-6mm inclusions; colour - internal light reddish brown (2.5YR/6/4), core and external grey (10YR/5/1).

K305/13 Decorated bodysherd (48 x 45 x 11); abraded; fabric coarse with very common <5mm inclusions; colour - internal light brownish grey (10YR/6/2), core dark

grey, external yellowish brown (10YR/5/4); decoration - two vertical straight bands, possibly slip or paint which has prevented these areas being reduced on firing.

K305/14 Decorated bodysherd (27 x 15 x 7); abraded; fabric medium with common <2mm inclusions; colour - internal and core dark grey (7.5YR/4/0), external pale brown (10YR/6/3); decoration - possible grass impressions which may be unintentional.

K305/15 Plain everted rimsherd (23 x 34 x 5); relatively unabraded; fabric fine with rare <2mm inclusions; colour - internal grey (10YR/5/1), core very dark grey (10YR/3/1), external black (10YR/2/1) and light reddish brown (5YR/6/4).

K305/16 Plain basal angle of a footed base (23 x 32 x 6); abraded; fabric coarse with very common <5mm inclusions; colour - internal and core brown (7.5YR/5/4), external black (5YR/2.5/1).

K305/17 Plain carinated shoulder (26 x 23 x 6); relatively unabraded; fabric medium with moderate <2mm inclusions; grass-tempered.

Sherds examined following 1994 fieldwork

Stray Decorated body sherd (36 x 34 x 4); abraded; fabric fine with rare <1mm inclusions; colour - internal very dark grey (2.5YR/3/0), core grey (10YR/5/1), external light brownish grey (10YR/6/2)-light reddish brown (5YR/6/4); decoration - faint and distinct incised lines on exterior; incised tool marks on interior face; possible slight rilling visible.

General Blowout Plain straight rim fragment with slight rolling of external lip and flat on top (18 x 14 x 7); abraded; fabric - medium with moderate <2mm inclusions; colour - internal light brown (7.5YR/6/4), core dark grey (7.5YR/4/0), light reddish brown (5YR/6/3).

General Blowout Decorated body sherd (29 x 34 x 5mm), abraded; fabric medium with common <2mm inclusions; colour - internal grey (5YR/5/1), core very dark grey (7.5YR/3/0), external reddish brown (5YR/5/4); decoration - very faint trace of incised line/tail of stab and drag.

General Blowout Decorated body sherd (27 x 22 x 3); very abraded with internal surface removed; fabric fine with rare <2mm inclusions; colour internal n/a, core very dark grey (7.5YR/3/0), external reddish yellow (5YR/6/6); decoration - faint trace of grass-impressions which may be unintentional; possible faint trace of an incised line.

General Blowout Decorated shoulder of probable upright rim (37 x 34 x 4); fabric fine with rare <1mm inclusions; colour - internal grey (10YR/5/1), core grey (10YR/5/1), external light reddish brown (5YR/6/4); decoration - grass-impressions with a single vertical incised line, and possible faint trace of two fingertip impressions.

General Blowout Decorated shoulder of probable upright rim (25 x 12 x 4); abraded; fine fabric with moderate <1mm inclusions; colour - internal dark grey (5YR/4/1), core very dark grey (7.5YR/3/0), external grey (10YR/5/1); decoration - faint incised line on internal shoulder of sherd.

General Blowout Decorated body sherd (17 x 26 x 4); abraded; medium fabric with moderate <2mm inclusions; colour - internal dark grey (7.5YR/4/0), core dark grey (7.5YR/4/0), external light red (2.5YR/6/6); decoration - single stab mark visible.

General Blowout Decorated body sherd (16 x 25 x 6); very abraded; medium fabric with moderate <2mm inclusions; colour - internal light brown (7.5YR/6/4), core dark grey (7.5YR/4/0), external light reddish brown (5YR/6/4)-light red (2.5YR 6/6); decoration - single incised stroke visible on internal face of sherd 1mm wide by 13mm long.

STONE

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Discussion

General

This collection of 64 pieces comprises pieces of flint, chalcedony, quartz of varying quality, gneissic stone and some unidentified material. They are detailed in the catalogue below. Most of the pieces are worked, some retouched, although only one

flint scraper (K22) can be classified as a formal tool. Previous collections from this area have been made by Lacaille (1937) and Close-Brooks (this volume), where Lacaille's work is briefly evaluated. As Close-Brooks (*ibid*) has pointed out, Lacaille's 'hut circle', illustrated as Fig.3 and described as the principal 'floor' due to the greater density of finds in this area (1937, 281), may in fact be the cairn excavated by Close-Brooks. This would indicate that Lacaille recovered much of his material from the same area as the recent excavations.

Assemblage composition

Four pieces of flint are present, all worked and comprising a scraper, two inner flakes and a secondary flake. Lacaille (1937, 282) had found no flint. 42 pieces of quartz are present; of the 34 pieces examined following 1992 fieldwork, 28 had been clearly worked. These worked examples include twelve inner flakes, nine secondary flakes, two undifferentiated flakes, an inner blade, a flaked chunk and three deliberately split pebbles. The dominance of quartz within the assemblage mirrors Lacaille's findings and discussion of the quartz industry (1937, 282-5).

The assemblage also contains four flakes of what appears to be a volcanic chalcedony, one agate flake and four pieces of gneissic stone, including a flaked chunk, two flakes, and a chunk which is not obviously worked. The chalcedony flakes are superficially similar to quartz, and it is possible that absence of mention of them in Lacaille's report reflects misidentification as quartz. The gneissic flakes appear to be of the material described by Lacaille (1937, 286) as 'dark mylonite', although the generic term is adopted as confirmation by petrological analysis was not undertaken for this sample. Although detailed by Lacaille (*ibid*) as artefacts, these gneissic flakes may be the result of masonry work, rather than tool manufacture (cf. Close-Brooks this volume). The sample size makes this impossible to determine. Finally, the assemblage includes two unidentified pieces, one flaked and seven pieces which were provisionally identified by the finders as 'baked shale'. None of these latter pieces has been worked, and no attempt to identify the petrology of the stone was undertaken.

Location

16 worked pieces were retrieved from the blow-out within which current excavations took place (K1 - K103). These include all the flint artefacts, the agate flake, two chalcedony flakes, and nine quartz flakes and a split pebble. Much of the quartz material and the four gneissic pieces were recovered from adjacent blow-outs (K202, K302). No detailed information on the context of recovery was provided, and so it is

not possible to establish whether any of the material was *in situ* or to relate the artefacts to the stratigraphic sequence established by the various excavations within the blow-out.

Interpretation

The flake technology which characterises this assemblage is typical of Late Neolithic and Early Bronze Age contexts. The assemblage would therefore appear to be at least broadly contemporary with the multi-phase cairn, from beneath which quartz flakes were recovered (Close-Brooks this volume), and short cist present within the blow-out (Dunwell and neighbour, this volume), and also possibly with the putatively Bronze Age hut circle (Armit 1992, 14), which had been identified by Lacaille (1937, fig.2).

All the materials with the exception of the flint are locally available. Even the flint may be available as occasional beach pebbles. Quartz, which forms the bulk of the assemblage, is commonly used in much of northern and western Scotland as the mainstay of chipped stone industries. It is often under-represented in collections as it can be hard to identify whether it has been worked or not. The quartz appears to have been knapped on-site, as various stages in knapping are present, from split pebbles to inner flakes. Although no retouched tools are present, it is probable that quartz flakes were often used unretouched.

Flint, as a more rare material with better knapping properties, appears to have generally been treated as a material of greater value than quartz, with higher incidences of secondary modification. There is no indication that it was knapped at this site, and it is possible that all the pieces found were imported onto the site as implement components.

Catalogue

- K1 (shale): unworked
- K2 Flint, inner flake
- K4 Quartz, inner flake with soret fracture, very pure
- K5 (shale): unworked

- K6 (shale): unworked
- K7 (shale): unworked
- K8 Quartz, inner flake
- K9 Quartz, inner flake
- K11 (shale): unworked
- K12 Quartz, inner flake (x3)
Quartz, split pebble
- K15 Quartz, regular inner blade
- K16 Chalcedony, inner flake, large red inclusion suggests not flint, possibly volcanic
- K17 Quartz chunk: not obviously worked
- K18 Quartz, flake
- K22 Flint, secondary flake, scraper, with a bifacially scarred edge apparently produced by a bipolar technique
- K35 (shale): unworked
- K42 flint, inner flake
- K102 Chalcedony, secondary flake
Quartz, secondary flake
- K103 Flint, secondary flake from beach pebble.
Agate, inner flake, fragment of retouched tool
- K202 (shale): unworked
Quartz, 3 inner flakes, one very pure
Quartz, split pebble: possibly deliberate

Quartz, 3 secondary flakes
Quartz, chunk: not obviously worked
Quartz, chunk with flakes removed

K302 Gneiss, primary flake
Gneiss, chunk with flakes removed
Gneiss, flake
Gneiss chunk: not obviously worked

Quartz, rolled pebble
Quartz, 4 secondary flakes, one very pure
Quartz, secondary flake with possible secondary modification
Quartz, split pebble
Quartz, 2 chunks: not obviously worked
Quartz, flake with possible secondary modification
Quartz chunk with flakes removed
Quartz, angular pebble: unworked
Quartz, 2 inner flakes, very pure

Chalcedony, white patinated flake fragment, with secondary modification
Chalcedony flake

? (volcanic material with vesicles), flaked
(shale) pebble
Unidentified rock pebble: unworked

Note: Chunk here refers to any piece that appears as a broken block that has been formed by splintering, rather than by conchoidal fracture.

Eight additional pieces of quartz were present in the small assemblage examined following 1994 fieldwork.

BONE

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Discussion

The collection of bones from Cnip Headland examined following 1992 fieldwork includes mammal, fish and bird bones. A single human bone is present. The mammal and human bones have been identified to element and species wherever possible. Fish and bird bones have been identified to element but not to species.

Catalogue

Ref.	Species	Element	Side
K10	Sheep	Middle phalanx	
K20P.01	Cattle	Lower 4th premolar	Right
K20P	Unidentified	12 fragments	
K21	Unidentified	3 fragments	
K30P.01	Sheep	Epistropheus	
K30P.02	Cattle	Lower 3rd molar	Right
K30P.03	Cattle	Upper 1st/2nd molar	Right
K30P.04	Cattle	Lower 1st/2nd molar	Left
K30P.05	Sheep	Upper 1st/2nd molar	Right
K30P.06	Otter?	Mandible with p2-m1	Right
K30P.07	Cattle	Distal fragment of metapodial	
K30P.08	Cattle	Lower 3rd premolar	Left
K30P.09	Sheep	Lower 1st/2nd molar	Right
K30P.10	Cattle	Incisor	Left
K30P.11	Red deer	Lower 2nd premolar	Left
K30P.12	Large herbivore	Fragment of lower premolar	
K30P.13	Large herbivore	Fragment of lower cheek tooth	

K30P.14	Medium-sized carnivore	Lower canine	Right
K30P.15	Fish	Vertebra	
K30P.16	Fish	Premaxilla	
K30P.17	Bird	Ulna	Right
K30P.18	Large herbivore	Fragment of radius	
K30P	Unidentified	22+ fragments	
K32	Cattle	Middle phalanx (very young animal)	
K39	Unidentified		
Ref.	Species	Element	Side
K41.01	Sheep	Mandible with p2-p3	Left
K41.02	Sheep	Talus	Right
K41.03	Sheep	Sacrum	
K41.04	Human	Middle phalanx of manus	
K41	Unidentified	3 fragments	
K51	Sheep	Lower 3rd premolar	Right
K54	Sheep	Lower 3rd premolar	Left
K101.01	Cattle?	Fragment of lower cheek tooth	
K101.02	Horse	Lower 2nd premolar	Right
K101.03	Sheep	Middle phalanx	
K101.04	Sheep	13th thoracic vertebra	
K101	Unidentified	2 fragments	

Note

The nine bone items within the small assemblage examined following 1994 fieldwork were not identified to species by Nicola Murray. One of the items was a possible heavily abraded pin. The nine items were recovered as stray finds from the blow-out in which Burials C-G were located.