Marcham (Noah's Ark 1964; Trenches MFP4, MFP6 and MF36)

Osteological notes

Ceridwen V. Boston, May–September 2026

These osteological notes describe the findings by skeleton; these notes are accompanied by a detailed paper pictorial skeletal and dental inventory, a pictorial representation of tooth wear, and an Excel spreadsheet of adult metrics and skeletal indices. Other metrics taken on immature individuals are given below, and included in metrics table.

Abbreviations;

a.s. – auricular surface

L – left

R – right

C – cervical vertebra

DEH – dental enamel hypoplasia

DP – distal phalange

GWoS – greater wing of sphenoid

L – lumbar vertebra

lb – long bone

M. – muscle

MP – middle phalange

MtC/MtC – metacarpal/metatarsal

nbd – new bone deposition

pnb – periosteal new bone deposition

PP – proximal phalange

Prox. — proximal

Ps – pubic symphysis

SN – Schmorl's nodes

T – thoracic vertebra

Articulated remains

Noah's Ark 1964

Context 41a

Context: Tightly crouched NNE–SSW orientated, unaccompanied inhumation burial placed on left side within a small sub-rectangular pit grave, which was overlaid by a deposit of small stones; corpse was possibly bound; grave was located towards northern limit of the stake circle/shrine structure at Noah's Ark Inn site.

Date: Iron Age; C14 dated (right rib) 354-283 BCE

Biochemical tests: aDNA (right petrous bone)

Condition (2): overall well preserved cortical surfaces but slight patchy chemical erosion & root etching in places; trabecular bone: slight demineralisation but overall, fairly well preserved, except vertebrae, of which many bodies are destroyed/missing; many epiphyses surviving; partial

reconstruction of the cranium and other elements by glueing is evident; some otherwise unfused lb epiphyses are probably glued to diaphyses so state of fusion could not be accurately verified.

Completeness: 70%; unaccountable absence of the mandible and lower dentition, and the L femur (?sampled and not returned); many small bones of hands and feet (carpals, tarsals & foot phalanges) were probably missed during excavation (surviving elements fairly well preserved); missing vertebral bodies and some tarsals may have been due to poor trabecular preservation.

Age: 13–15 yr (dental development: 13.5–17.5 yr; dental attrition: 10–16 yr; epiphyseal fusion: 13–15 yr; auricular and ps surfaces, youngest stage, <17 yr); see paper records for details

Sex: ?female (prominent frontal & parietal eminences; short, small mastoid process; no postzygomatic ridge or nuchal crest; sharp orbital rim); general build fairly gracile; slight M insertion definition but nil is pronounced; however, many of these features may be due to young age (not fully sexually mature)

aDNA sexing: male

Skull: largely complete cranium (incl vomer and ethmoid), except for some of base of skull and left temporal bone; moderate fragmentation of vault and facial area (partly reconstructed previously with glue); rounded, globular skull with slight parietal bossing; moderate–marked prognathism; small Wormian bones x 7 on lambdoid suture; complex denticulated sutures; no mandible present

Dentition: only maxillary sockets and teeth present; well preserved teeth x 16; slight DEH on L & R second premolar and both second molar – stress episodes in childhood (late developing teeth); otherwise, little dental pathology; UL2 & 3 had previously been sampled (?isotopes), and tooth crowns broken; Note that notes made by Paula Levick describe congenitally absent LM3 and lingual calculus on LM1, but mandible and teeth were all missing at my analysis.

Axial skeleton: most vert bodies damaged or destroyed, esp T & L; all neural arches are present, albeit some incomplete; ribs fragmented but fairly well preserved (one L sampled for C14); near complete sacrum and pelves; some L and sacral bodies appeared more porous than is usually seen, and whilst this may be pathological (e.g., brucellosis), there is no remodelling/nbd, and hence, is probably part of normal development.

Upper limb: slight 'cortical defects'/ depression in rhomboid fossa of R medial clavicle (minor costoclavicular ligament damage); M insertions poorly defined; hands bagged together with feet; siding of hand phalanges therefore unknown; ditto for some MtC with damaged proximal ends.

Diaphyseal lengths:

L humerus: 227 mm

R humerus: 229 mm

R radius: 176 mm

L fibula: 250 mm

R femur: 318 mm

Lower limbs: L femur missing; ditto for more distal tarsals (only calcanei and tali present) and foot phalanges; epiphyseal plates of knee joints appear glued together, rather than fusing; slight cortical depression along both Soleal lines (slight M damage/use); otherwise M insertions not defined; MtTs bagged together with hand bones; proximal ends damaged, preventing recognition of side and of MtT position/number; L & R MtT1st, 4^{th} & 5^{th} recognised; no foot phalanges

Pathology: right *orbit –?cribra orbitalia/ well healed nbd;* macroporosity (Stuart-Macadam Stage 2) in orbital roofs with min-foramina penetrating surface; no clear evidence of nbd overlying orbit, but lesions very well healed; L orbital roof not present; very well healed

Possible infantile/childhood scurvy (very well healed) but very ephemeral:

- *L & R GWoS*: macroporosity of ectocranial surface; no evidence of nbd on surface itself
- *Hard palate*: subtle increased thickness sand macroporosity on anterior 1/3
- No ectocranial changes and no nbd on postcranial skeleton

Chronic respiratory disease: left upper ribs x 4 (?2nd–5th): fine, subtle, healed nbd on visceral surfaces of vertebral ends of the shafts (slightly porous but smoothing)

Comment: Disarticulated human bone from context 4224 comprises young adult ribs frags (undoubtedly part of sk 25), and a hand phalange and cranial vault frags of a foetus/neonate; the remainder of the bone is animal; there is also pottery, slag and marine shell from this context in skeleton box.

Noah's Ark 1964

Context 6

Archaeological context: The crouched remains of a foetus were recovered within stake circle within a very shallow scoop (no obvious grave).

Condition (1): very good condition, only v occasional root etching or erosion.

Completeness: cranium incl some facial bones present but not complete (missing right petrous bone-?sampled for aDNA); L & R mandible present but no teeth (four sockets only); all limb bones missing, bar L & R scapulae; ilia present but no other axial elements; long bone diaphyses were clearly originally present as their max. lengths are given in osteo report by Shirely Jarman in Harding's (1987) publication.

Age: 36–37 w foetus/perinate (petrous length 34.3 mm, 36–38 w; scapular width 26.2 mm, 36–38 w; scapular length 33.4 mm, 38 w; iliac length 31.6 mm, 36–38 w; iliac width 29.3 mm, 38–40 w

Diaphyseal long bone lengths (mm) measured by S. Jarman (1987):

	Left	Right	Age (Scheuer *et al*. 1980)
Humerus	62.2	61.9	36 w
Radius	51.1	50.6	36–37 w
Ulna	56.7	56.9	36 w
Femur	69.3	69	36–37 w
Tibia	–	60.9	36–37 w
Fibula	–	58.1	

Sex: unsexed immature (not sexed by DNA)

Skull: cranial fragmented and incomplete but a large proportion represented; R petrous missing as well as zygomas, maxillae and some of base of skull; L & R ascending ramus of mandible present, with sockets of deciduous molars bilaterally (no teeth or tooth buds)

Axial skeleton: complete ilia only

Upper limbs: scapular blades only

Comments: Remains were found within the same skeleton box as the above adolescent; context sheet on bag is '6' – presumably this is the second inhumation burial within the roundhouse/IA shrine structure, as recorded by Harding (1987); bone unwashed, but washed by CB prior to analysis; diaphyses of all four limbs were measured by SJ but are not with the rest of the skeleton on analysis; no pathology observed.

Trench MF36

SK19 (36103)

Archaeological context:

Date: MIA; C14: 408–233 cal BC (95.4%)

Condition: 0–1 excellent to very good bone preservation; very little fragmentation present

Completeness: 85% of sk is present, as the R femoral diaphysis and whole of the mandible and teeth are missing at time of analysis (?sampled for isotopes)

Age: 12–15 yr, probably 13–15 yr (dental development 12.5–14.5 yr; epiphyseal fusion (males): 12–15 yr: triradiate complex of pelvis unfused – <16 yr; distal humerus unfused– <15 yr; calcaneus unfused – <16 yr; olecranon unfused– <16 yr; all long bone epiphyses (incl phalanges and MtC/MtTs (<15 yr), all annular rings & ribs unfused; C2 dens tip fused – >12 yr; all vertebral arches fused to bodies – >6 yr; glenoid cavity fusing – 10 yr–puberty; diaphyseal long bone length ageing: 9–11 yr:

L humerus: 220 mm (and noticeably more gracile/slighter): 9.5–10 yr

R humerus: 227 mm**:** 9.5–10 yr

L ulna: 198 mm: 11 yr

L femur: 325 mm: 9.5–10 yr

L tibia: 270 mm: 9 yr

R tibia: 270 mm: 9 yr

L fibula: 255 mm: 8.5–9 yr

R fibula: 258 mm: 9 yr

Sex: too immature to sex osteologically; DNA sexing: male

Skull: largely complete cranium with only minor fragmentation (mostly base of skull, sphenoid, facial region; endocranial fusion just commencing on lambdoid and sagittal sutures (unusually advanced for age, which is more commonly early 20s); ectocranial stage though is Stage 0 (fully open) on all suture lines; complex sutures with multiple small ossicles on lambdoid suture and ?parietal notch bone; one hyoid horn and two ear ossicles present

Dental: mandible and teeth missing (sent for isotope studies and not returned at time of analysis); very well preserved and complete permanent upper dentition; largely complete maxillary dental sockets, but slight fragmentation of the left side; M3 unerupted – in crypts; DEH note between 1–2 lines per crown, slight on 11/16 teeth; slight calculus on permanent M1s (2/16); retained UL deciduous molar 2, which has caused displacement of PM2 lingually from the dental row; distal root of deciduous molar markedly resorbed but distal root not resorbed – retained beyond normal age of shedding; frontal/ I1 incisors both show chipping of their occlusal surface towards the mesial side.

Axial skeleton: very well preserved ribs, vertebral column and pelves; manubrium and two sternal segments present; all ribs present; sacral segs x 5 present; anterior sacral surfaces appear unusually porous with large ‘pores’ through which the underlying trabecular bone can be seen; may be developmental issue as there is no reactive bone present to suggest infection, nor noticeable remodelling.

Upper limbs: all bones present but scapulae incomplete (processes and much of bodies missing); distal humeral and proximal ulnar epiphyses missing but otherwise most others are present, including of most the tiny hand bones; L humeral diaphysis is 7 mm shorter than the R, and the shaft of the left is noticeably more gracile than the R; nevertheless, the left does show defined M insertion definition

(cortical defect in the intertubercular groove), which is also found in the right humerus, but there is a subtly difference from the right upper limb where the deltoid tuberosity and *Brachialis M*. insertions are also defined (not in L); the L radial diaphysis is slightly shorter than the R but no other differences in dimensions or morphology were noted on general observation.

Lower limbs: missing R femoral diaphysis (?taken for isotope sampling), but otherwise most lower limb bones present, incl epiphyses, even of small foot bones; both tibia show defined Soleal lines, indicative of M use; the left proximal tibial epiphysis is unusual in being angled inferiorly towards the medial side, when compared with the transverse direction of the right tibial epiphysis; no noticeable difference in L & R tibial diaphyseal lengths or general dimensions

Pathology

Surface preservation is excellent across this sk, except the L humerus, so subtle changes in texture were readily observable; it is possible that some of the minor changes in density/porosity noted below are no more than growth-related changes as they are very slight and very minor, suggesting slight or transient ill health:

Cribra orbitalia (Stage 1): left orbit (but not in R): very minor increased porosity in roof; no trabecular hypertrophy, no nbd on surface

Cribra femoralis: Area of increased porosity due to exposure of trabecular bone and absence of overlaying cortical bone on anterior neck; no clearly defined boundary to the area of porosity; no trabecular hypertrophy

L & R GWoS: *??scurvy*: both ectocranial surfaces show abnormal macroporosity, possibly very fine well healed nbd, which is suggestive of extremely well healed infantile scurvy, but the porosity is not pronounced.

Increased porosity/ normal growth/development:

L & R distal humeri (anterior aspect): the area of metaphysic just proximal to the plate at the fossae showed increased macroporosity;

Sacral segments S1–5: reduction in density of anterior aspect of segments such that there appears tto be marked macroporosity, and underlying trabecular structures could be glimpsed; no remodelling or nbd to suggest pathology

L tibia: posterior proximal shaft: discrete oval depression (16 x 6 mm x *c.*3 mm deep) in the medial half of posterior aspect, with smooth walls and irregular base; probably a large cortical defect caused by M pull, but is unilateral; alternatively, it may be a discrete erosive lesion; not associated with any remodelling or nbd to suggest infection or the like.

Possible penetrating trauma/ more probably taphonomy (old post-mortem breakage, possibly soil pressure: right parietal bone: The anteromedial part of the parietal bone was broken in four fragments, with a small, irregular area of vault at the confluence of these breaks being missing; although this hole is irregular with sharp ectocranial margins, it is possibly perimortem trauma with radiating fractures extending to the coronal and sagittal sutures; the irregular shape of the lesion makes it less probable to be made by a spear/sword tip or arrow head, but in such a young, thin cranium, deformation on impact should be considered; the linear but slightly undulating 'radiating fractures'/ breaks are old, in that the patina on the break surfaces is pale yellow-brown, like the rest of the cranial surface. The endocranial surface around the 'lesion' is very bevelled, which suggests a blow of considerable force. This bevelling extends along one 'radiating fracture' closest to the lesion. The exposed diploe also has a brown patina of old damage. However, it remains unclear if this is taphonomic damage, possibly from soil pressure when the cranium still contained considerable collagen; however, the irregularity of the lesion's margin and the undulation of the radiating fractures suggest post-mortem damage.

Comments: Above needs a second opinion.

Trench MFP4

SK21 (4079)

Archaeological context: MFP10 Trench 4

Date: MIA; C14 date (right rib): 360–150 cal BC

Condition (1–4, 3): bone condition is poorer in this individual than in the rest of the articulated assemblage; greater cracking and splitting of bones (appears like splintered wood), esp on radii/ulnae; whilst this might suggest weathering from exposure, it has more the appearance of bone immersed in an organic-rich, wet, slightly acidic burial environment; most damage to upper limb forearms and hands, whilst other skeletal parts were well preserved; some root etching throughout skeleton; cranial vault incomplete and very fragmented; fragmentation of rest of skeleton minor.

Completeness: 70%; all body parts present; missing many small bones of hands and feet, and parts of cranial vault; L femur and mandible (bar three loose teeth) missing – taken for isotopes and not returned (if present, the completeness would be 85%)

Age: 17–19 yr (some epiphyses of major long bones recently fused (e.g. tibiae, radial and femoral heads), but spheno-occcipital synchondrosis, proximal humeri, distal femora, distal MtC, some hand phalanges, ribs unfused; sacral segments, annular rings fusing: overall age 17–19 yr; youthful costal rib ends; pubic symphysis Stage 1 (male): 15–23 yr; auricular surface: <24 yr (Lovejoy, 1st stage), 16–19 yr (Buckberry and Chamberlain Stage 1); dental attrition: M1 28–38 yr, M2 16–20 yr, 3 <20 yr); M3 development Ac, >22.5 yr; ectocranial sutures open but endocranial sutures are beginning to fuse (young adult)

Sex: male (although not fully mature, this individual is undoubtedly male from his cranium and pelvis: prominent supraorbital ridge and glabella, long straight mastoid; fairly defined post-zygomatic arch and nuchal line; intermediate GSN; auricular surface flat; no pre-auricular sulcus or ventral ridge or sub-pubic concavity; sacral ali narrow, but sacrum is fairly flat; fairly large and robust for an IA individual.

aDNA (R ear ossicle sampled): male

Skull: very fragmented and incomplete vault (?left medial part missing to taphonomy) but is so fragmented that much could not reconstructed of the parietal bones; facial region well represented; very prominent and high bridged nose; mandible missing – sent for isotope studies and not returned, but three loose teeth LL1–3 found with maxillary teeth

Dentition: all maxillary teeth and sockets present; mandible not returned from isotope studies but three anterior L teeth present with maxillary teeth (LL1–3); DEH – two slight lines on two canines (TPR = 2/19); flecks – slight calculus (TPR = 6/19); dental crowding and slight rotation of both upper I2s; extramasticatory wear of the UL1, where a deep U-shape groove or cup had been eroded from the occlusal surface and upper crown, with exposure of dentine, slightly angled downwards and posteriorly on lingual aspect of crown; occlusal surface of UR1 angled slightly downwards mesially but in a straight line of wear (in contrast to curved one of other upper I1) and not as marked as the left; adjacent teeth appear unaffected.

Axial skeleton: Very well preserved vertebrae, but unaccountably missing three C vertebrae (probably C5–7), and L4 (only 4 Ls and lowest two do not 'fit' together – clearly missing one; S x 5 and separate 1st coccygeal segment 1 present and near complete; morphology of neural arch of S1 suggests sacralisation, but vertebral numbers don't tally – definitely missing T4 and there are only S x 5; annular rings unfused and fusing; pelves largely complete; ribs also largely present but missing some costal ends missing; Schmorl's nodes; increased porosity of anterior bodies noted (see also elbow and sacrum) – probably foramina for small blood vessels entry/exit to trabecular bone

Upper limbs: L clavicle missing and most of R hand (?taphonomic – ?truncated as with head and lower Cs); fairly robust humeri, heads unfused; defined M insertions in conoid of distal right clavicle

and in intertubercular groove of both humeri and also more medial on L proximal humerus at insertion of *Teres major* M.; these cortical defects/entheseal changes were active at time of death (porous, ragged edges still remodelling); only pisiforms of carpals are present, whilst most of R hand bones are also missing.

Lower limbs: L femur missing except distal epiphysis, which is unfused; fairly robust long bones but M definition not v marked (perhaps due his youth); emarginated patellae (large); some definition of both Soleal lines on posterior tibiae; most foot bone present, bar phalanges

Pathology:

Healed and incomplete unilateral spondylolysis: L1: There is partial separation of the right neural arch from the rest of the vertebrae at the *pars interarticularis* the medial half is separate but is fused laterally but this bony bridge is very slim, and most of the arch is separate. There is no pseudo-articular surface or other remodelling so it is clear that there was no instability as one finds in completely separated bilateral examples. The left side is morphologically normal, bar a large foramen just inferior to the s.a.f., which may be unrelated; difficult to determine if this spondylolysis is traumatic or developmental, or a combination of the two; probably negligible to health of this individual as it was clearly stable.

Cribra femoralis – right femur: area of loss of cortical bone exposing the underlying the trabecular bone of the anterior neck of the R femur; L missing so unknown if bilateral; not marked; no *cribra orbitalia* present

?nbd – right ribs 2-4th: very subtle changes in texture on the visceral surfaces of the vertebral ends of these three ribs; under low magnification, it appears that a very small amount of nbd was laid down on these surfaces, but smoothing indicates healing was fairly advanced by the time of death; not altogether convincing that this is real pathology and not growth-related.

Possible tuberculosis/brucellosis (very tentative diagnosis!): The bodies of most of the thoracic vertebrae, especially the lower half, are penetrated by an increased number of smooth-walled foramina – probably for the entry of blood vessels to the underlying trabecular bone; this may be part of normal growth but may also be indicative of hypervascularity due to infection, particularly as there is very subtle new bone deposition on the midline of the anterior bodies of T9 and 10; under low magnification this appears a s a thin layer of porous but healing new bone overlaying the normal bone surface; however, the lack of other definitive indicators of chronic disease, such as TB or brucellosis make this diagnosis highly tenuous, although there are very subtle signs on nbd on the visceral surfaces of lungs, but in upper ribs, not in the lower (i.e., if lung TB the vertebrae affected do not marry with the ribs affected – i.e., suggest lower lobe TB in one and apex infection in the other); with regards brucellosis diagnosis: the vertebral end plate margins are intact, there are no path changes to the auricular surfaces, and the lumbar spine is unaffected, so this diagnosis is improbable; it is much more likely that these changes are quite normal developmental changes.

Schmorl's nodes: T6–9: moderate to slight depressions in end plates

Comments: animal bone ++ and pottery recovered with skeleton

Trench MFP6

SK24

Archaeological context:

Date: 398–266 cal BC (68.3% probability)

Condition (1): very good cortical preservation incl numerous epiphyseal plates; slight root etching on some elements; cranium very fragmented

Completeness (80%): largely complete except for a missing right mandibular ramus and teeth and L femoral shaft (presumably taken for biochemical studies and not returned before analysis.

Age: juvenile 8–10 yr (dental development age: 8.5–9.5 yr; diaphyseal long bone length: 5.5–6 yr; epiphyseal fusion: all lb unfused, except proximal MtTs and distal MtT1 (head); vert arches fused to bodies; carpals and tarsals ossified but some are not differentiated into final forms, and thus, not recognisable

Diaphyseal long bone lengths:

Left radius: 14 cm: 5.5–6 yr

Right radius: 14 cm: 5.5–6 yr

Right fibula: 20.7 cm: 5.5 yr

Sex: unsexed immature; aDNA: female

Skull: largely complete but very fragmented and could only be partly reconstructed; right mandibular ramus missing; mixed deciduous and permanent dentition; good dental health; shovelled I2 incisors; I1 shovelling very minor (not enough to be diagnostic)

Axial skeleton: all vert present; L ribs x 12, R x 11; pelves largely complete; sternum: manubrium and three sternal body segments present; one anomalous incomplete segment comprising three small round 'segments' fused together

Upper limbs: missing prox ulna & MtC 1 & 2; and some epiphyseal plates; carpals incomplete and some not differentiated/recognisable to elements; right distal clavicle shows ridging on inferior surface associated with muscle pull/ activity involving shoulder and *Pectoralis major M*.

Lower limbs: missing L femur (sampled) but otherwise most present

Pathology: *Occiput: largely healed endocranial nbd*: fine new bone overlies the cruciate eminence on at least two 'arms'; nbd is smoothed (remodelled) but still more porous that surrounding normal bone; multiple undulating linear indentations in surface indicate blood vessel tracts (hypervascularity); there also appears to be small islands of similar nbd across the occiput, possibly from bleeding from terminal blood vessels; however, not observed elsewhere on endocranium; healing much more advanced than rib nbd and probably unrelated.

Orbital nbd: Both roofs of the orbits are very incomplete, and thus, the full area could not be observed; however, there appears to be brown nbd just within the rim of the right orbit – still very porous but showing the beginnings of remodelling; this active nbd is not present in the left orbit, but more laterally in the roof there appears to be abnormal porosity of the otherwise smooth, dense surface, suggesting well healed nbd; possibly indicative of deficiency diseases, such as scurvy or rickets, but lacks other cranial and postcranial indicators – possibly transient episodes.

Unnumbered right left shaft (mid-thoracic): probable chronic chest infection: active fine, grey-brown woven nbd on visceral surface of two joining fragment of rib shaft; location on rib not clear; very early remodelling indicates early healing in progress at time of death, but mostly unhealed; some root etching of nbd.

Growth stunting: dental development indicates an age of 8.5–9.5 years, yet lb diaphyseal length is that of a 5.5–6 year old, suggesting chronic ill health; however, there is no DEH but there is endocranial nbd and chronic respiratory disease to suggest at least two episodes of ill health.

Trench MFP4

SK25 (4224)

Archaeological context: Inhumation burial placed within upper fill of pit in Trench 4; arms and legs splayed, i.e. not in usual crouched position; non-local from S isotopes

Disarticulated remains of two non-adults bagged with animal bone from 4424: one older child-sized-adolescent; other one PP hand of *c*. perinate/young infant.

Date: C14: 361–176 cal BC (95.4%)

Condition (1): very good preservation and little fragmentation with little surface erosion and most elements complete; only slight patchy erosion and minimal root etching; fragmentation is recent dry bone breakage (probably excavation damage), but many elements intact.

Completeness: 75%; missing mandible, L femur (?sampled), & L radius and hand (?truncated), and R MtC1–3

Age: 18–22 yr; auricular surface: 20–29 yr (Lovejoy), 16–19 yr (Buckberry and Chamberlain); pubic symphysis: 15–23 yr; dental attrition: M1, 16–26 yr; 16–22 yr; M3, <22 yr ; dental development: M3 Ac, >21.5 yr; costal rib end - youngest stage; epiphyseal fusion: SIC (14-21 yr), ischial tuberosity (14-19 yr), annular rings (14–23 yr), vertebral rib ends (17–22 yr), S1 and 2 fusing (14–30+ yr); medial clavicle unfused (<23 yr); all major lb fused but clear fusion lines on femur and tibiae

Sex: DNA: female

but

Osteologically male (orbital rim (intermediate); slightly raised glabella (?M); no supraorbital ridge (F); mastoid v long and straight (M); prominent post-zygomatic ridge (M); nuchal crest not defined (F); defined temporal line (M); sacrum: narrow ali (M), anterior curvature flat (F); auricular surface slightly raised (?F); no pre-auricular sulcus (M); GSN U-shaped but narrow (?M); obturator foramen (M); no subpubic concavity or ventral arch (M); generally moderate build; is probably not fully sexually mature

Skull: vault largely intact, some reconstruction with glue present; facial bones largely intact and complete; slight prognathism; pronounced occipital bun; medium-sized ossicle at lambda, mostly involving sagittal suture and right parietal bone; multiple small Wormian bones in lambdoid suture; high bridged, fairly prominent nose

Dentition: mandible and lower dentition missing (?isotope sample); all 12 maxillary teeth and sockets present; M3s fully erupted, Ac; generally healthy dentition with minimal disease

Axial skeleton: all vert complete or near complete and intact; ditto for pelves; slight rib fragmentation, but most are present (R x 12; L x 11); vestigial 12th ribs

Upper limbs: R upper limb largely complete bar some hand bones missing, esp. pollux; M/ligament insertions not very defined, although costoclavicular insertions in medial clavicles were slightly ridged; slight longitudinal ridging on R hand PP and DPs (*Flexor digitorum* Ms), suggesting activities involving maintaining grip; left distal ulna, all but radial head and L hand missing, ?truncated.

Lower limbs: lower limbs, incl feet, are largely complete (bar L femur- missing, ?isotopic sampled); M insertions not very defined

Pathology: *Depressed cranial fracture with associated ectocranial nbd – left parietal bone (5 mm lateral to sagittal suture, 48 mm posterior to coronal suture on crown of head;* : a small oval depression (10.6 x 5 mm; 1-2 mm depth) involving the outer table and probably the diploe, but is not a full thickness injury; the edges and base of the lesion are dense and smooth (v well healed); the fairly small depth and circular shape suggests the individual was injured by a pointed ‘weapon’, such as a slim blade, arrow or pointed stick (blunt or projectile trauma) to the top of the head; a halo of well healed, smooth but still slightly porous nbd (50 x 60 mm) suggests a fairly widespread associated scalp infection.

Chronic respiratory disease: Right ribs 3–10th: woven grey pnb on visceral surfaces of the vertebral ends of these shafts; most extensive on Ribs 7th and 8th where pnb overlay the full length (to costal ends, where it appeared more remodelled (smoother and denser); nil on L ribs

Active and healing new bone deposition (nbd): Dark grey, porous, woven nbd, with the beginnings of striation/lamellar reorganisation, and slight smoothing in places, indicates active ongoing disease at time of death.

- *L tibia*: nbd on anteromedial and anterolateral aspects of mid and distal shaft; on lateral distal shaft/metaphysis nr fibular js
- *R tibia*: anteromedial midshaft; 2/3 the length of anterolateral shaft; patches on distal posterior shaft; thickest pnb of all elements
- *L fibula*: on lateral and medial aspects of proximal and midshaft; on distal anterior shaft, particularly anterior aspect
- *R fibula*: large irregular patches on mid- and distal shaft, especially anterior and medially on distal shaft; also covering anterior aspect of proximal shaft
- *L calcaneus*: on medial and inferior aspect of the *sustentaculum tali* (not including peroneal groove); increased porosity/reduced density at Achilles' insertion, but no nbd here
- *R calcaneus*: ditto
- *L Metatarsals 1st, 3–5th*: nbd largely overlaying the dorsal aspect of the shafts (mostly proximal and mid-shafts), but smaller patches of pnb also present on the inferior aspects of the proximal shafts, esp. MtT5
- *R metatarsals MtT1, 3–5:* Not identical location of pnb but generally occupying similar parts of the shafts.

Differential diagnosis: The bilaterality of the lesions suggests a systemic disease but is too thick for scurvy (also no cranial lesions). Other diagnoses to consider:

1. Bilateral localised infection, secondary to an unknown traumatic event, involving extensive bilateral soft tissue damage with secondary infection (e.g. severe burns to both legs)
2. Hypertrophic Pulmonary Osteoarthropathy (HPOA), commonly linked to lung cancer and sarcoidosis, and less commonly chronic chest infections. The first is unlikely given his young age.
3. Reiter's disease considered due to MtT involvement, although phalanges are normal and it is typically asymmetrical, and no evidence of sacroiliitis or other joint disease, although multiple joints do have slight lipping, which is unusual in one so young. Increased porosity on posterior calcaneal tubercle may suggest enthesitis involving Achilles' ligaments (common in Reiter's; but no evidence of plantar fasciitis on calcaneal spur.
4. Systemic vasculitis: may cause bilateral lower limb pnb, but is unlikely in one so young

Comments: Isotopes indicate non-local residence in childhood; very short stature; not buried in traditional crouched position- ?disrespectful burial, ?slave, but no childhood indicators of deficiency diseases.

Trench MFP4

SK26 (4273)

Archaeological context:

Date: C14 dated to 403–211 cal BC (95.4%)

Biochemistry: isotopes; aDNA (R petrous)

Condition (1–2): very good condition of cortical bone; occasional root etching; trabecular bone damage limited to vertebral bodies, which are very friable and incomplete; even many tiny epiphyses and phalanges have been recovered.

Completeness: 80% (missing most of mandible and diaphysis of L femur – ?still retained by isotope lab; if these elements were present the sk would be >95% complete); even includes many carpals, epiphyses and phalanges

Age: juvenile 8–10 yr (dental development age: 7.5–11.5 yr, probably 8.5–9.5 yr; epiphyseal fusion: neural arches fused to centrum, except in C1 (<3–9 yr); carpals ossifying but not identifiable, >5–7 yr; glenoid cavity & coracoid process unfused, <10 yr; diaphyseal long bone length: 5–5.5 yr:

L & R humerus: 178 mm; 180 mm: 5–5.5 yr

L & R radius: 132 mm; 131 mm: 5–5.5 yr

L ulna: 152 mm: 5.5 yr

R fibula: 196 mm: 5.5 yr

Sex: unsexed immature; aDNA: female

Skull: near complete but fragmented, and with slight soil pressure distortion; was already partly glued together; complex lambdoid suture with multiple ossicles laterally on suture line/ Wormian bones; mandible missing, except for L gonial angle and ascending ramus fragment; one hyoid horn and one ear ossicle present; left zygomatic foramen triple but L is normal.

Dentition: mandible largely missing (?isotope testing), so only maxillary teeth recorded, except the loose LR deciduous canine; mixed deciduous and permanent teeth, most in sockets but some fragmentation present in maxillary sockets and arcade; permanent canines seen in crypts but are much less advanced in erupting than is usual for this age; may be due to 'blocking' by retained deciduous c,d and e teeth; M2 and PM also in crypt but as expected at this stage; minimal calculus on deciduous teeth; one caries noted o mesial surface of crown of the right first molar (TPR = 1/7 dec. teeth present); shovelled permanent incisors x 4, most marked on I2, slight on I1); eve taking into consideration that the upper front incisors were newly erupted/erupting, the saw-like corrugations x 3 on the occlusal surface are unusually pronounced; no DEH present

Axial skeleton: 11 left and 12 right ribs present; all vert present but bodies of some lower Ts and Ls poorly preserved; slight fragmentation present; ditto for pelves, which remained unfused; sternum largely complete

Upper limbs: largely complete; distal clavicles showed angulation and M pull at insertion of *Pectoralis major Ms*; no other defined M insertions elsewhere on upper limb; carpals ossifying but not identifiable to element; many epiphyseal plates and MtC heads also present; R humerus slightly longer than L.

Lower limbs: recent/?excavation damage to the knee region of both limbs (dry bone breaks), otherwise fairly low fragmentation; L femoral diaphysis missing (?isotope studies), but head and partial femoral condyle epiphysis present; some demineralisation and damage to tarsals but other bones of the feet well preserved; MtT heads fused to shafts; some mixing of L & R tarsals, esp calcanei

Pathology: C*ribra orbitalia* Stage 2: L & R orbits: slight healed sieve-like lesions with no trabecular hypertrophy in roof of both obits; however, both roofs are incomplete; concretions on R roof partly obscured bone surface, but no nbd noted.

?Metabolic deficiency: lesser wing of sphenoid (base of skull): increased porosity and healed nbd on ectocranial surface; also possible increased porosity of anterior hard palate, but not pronounced; no other cranial or postcranial lesions to suggest scurvy or rickets, so this may just be normal bone growth.

Growth stunting: dental and epiphyseal age is *c*. 8–10 yrs, but diaphyseal age is 5–5.5 yr, indicating marked stunting; no other indicator of chronic childhood ill-health (no DEH, or only vv faint; no convincing metabolic changes bar minor anaemia)

Comments: bears considerable similarity to sk 24 in being same age, small for age, and for having shovelled incisors I and I2; MtT head is fused to shaft bilaterally.