

Anthropological analysis of human skeletal remains from graves 23 and 25 at Złota, site 6

Anthropological analysis of the individual from grave 23

The anthropological analysis was conducted following established standards (*Lovejoy 1985; Piontek 1985; Martin – Knussmann 1988; Malinowski – Bożilow 1997; White et al. 2012*), which account for ontogenetic and dimorphic skeletal variation in assessing age at death, sex, and the presence of palaeopathological and pseudopathological changes. Teeth were recorded according to the World Dental Federation (FDI) notation system (see *Van Beek 1983*). Initial anthropological observations were made by Dr hab. Wanda Kozak-Zychman; however, the osteological data presented here result from repeated and expanded analyses.

In general, the skeleton recovered from grave 23 was moderately preserved. The base of the cranium and frontal bone were damaged. The only preserved viscerocranial bones were the zygomatics and partially preserved maxillae. A fragment of the right alveolar process retained teeth 12 and 13, both with fully worn crowns. On tooth 13, only 1.5 mm of enamel remained on the labial surface. Detached upper teeth 16 and 17 were also identified. The mandible was represented by a fragment preserving teeth 33, 36, 37 and the root of tooth 35, with additional isolated teeth including 46, one incisor and one premolar. Most of the dentition exhibited advanced attrition, corresponding to levels H–I on the O.C. Lovejoy scale (*Lovejoy 1985*). Probable shallow fistulae were visible in the roots of teeth 12 and 13, as well as in the alveolus of tooth 14.

Craniometric measurements (*Tab. 1*) suggest that the skull was dolichocranic with a broad frontal region [mm]: g-op 190, b-l 114, eu-eu 127, ft-ft 93, co-co 111, ast-ast 99, mst-mst 82, horizontal circumference 504, arch po-b-po 291, arch b-l 125, zy-zy 109 (?), zm-zm 72 (?). The skull displayed postmortem lateral deformation, though the possibility of positional plagiocephaly cannot be excluded (*Lewis 2017*, p. 23). Hyperostosis parietalis, a non-specific hypertrophic change, was recorded on both parietal bones and the occipital squama. Non-metric traits included lambdoid ossicles, a coronal ossicle, parietal foramina, mastoid foramen, and a nutrient foramen on the medial part of the supraorbital margin.

The postcranial skeleton was incomplete. The following elements were preserved: vertebral bodies and processes of thoracic vertebrae; lumbar vertebrae L1 and L2; poorly preserved lumbar vertebrae L3–L5, likely showing osteoporotic changes; fragments of the sacral base. The left clavicle was preserved (M1 129?) along with the shaft and sternal end of

the right clavicle. The right scapula was represented by the acromial process and lateral border, though the glenoid cavity was damaged. Four right ribs were distinguishable among fragmentary rib material.

Table 1. Craniometric measurements of the individual from grave 23 [in mm].

Abbreviation	Measurement	Value [mm]
g-op	Maximum cranial length (glabella–opisthocranium)	190
b-l	Cranial base length (basion–lambda)	114
eu-eu	Maximum cranial breadth (euryon–euryon)	127
ft-ft	Minimum frontal breadth (frontotemporale–frontotemporale)	93
co-co	Maximum frontal breadth (coronale–coronale)	111
ast-ast	Asterionic breadth	99
mst-mst	Mastoid breadth	82
HC	Horizontal circumference	504
po-b-po	Cranial vault arch (porion–bregma–porion)	291
b-l (vault)	Cranial arch length (bregma–lambda)	125
zy-zy	Bizygomatic breadth (zygon–zygon)	109 (?)
zm-zm	Zygomaxillary breadth (zygion maxillare–zygion maxillare)	72 (?)

Both humeri were present, although their distal epiphyses were damaged (M1 R 322, L 316; M7 R 61, L 63). A supratrochlear foramen was visible in the olecranon fossa of the right humerus, and a notably robust deltoid tuberosity was observed. The right ulna was complete (M1 R 265; M2 R 231; M3 R 42) and displayed deformity of the styloid process, likely resulting from an antemortem fracture, along with pseudopathological changes to the shaft caused by plant root activity. The left ulna was preserved as a shaft fragment with its proximal epiphysis. The radii were damaged. Among the preserved carpal bones were the right scaphoid and lunate, left triquetrum and pisiform, and left trapezium, trapezoid, capitate, and hamate.

The metacarpals were mostly damaged; only metacarpal V of the left hand was absent. The phalanges included seven proximal, seven middle, and five distal hand phalanges. The pelvic bones were preserved in fragments, including parts of both ilia with greater sciatic notches and auricular surfaces. A preauricular sulcus was observed. Additionally, fragments of both ischia and part of the acetabulum of the right os coxae were preserved.

Femora were preserved as shafts with damaged epiphyses (M6 R 28, L 27; M7 R 28, L 27; M8 R 84, L 85; M9 R 34, L 32; M10 R 23, L 25). Both patellae were present but

asymmetrical and damaged. Tibiae were preserved as shafts with damaged epiphyses (M8a L 33; M9a L 26; M10 L 77). The fibulae were preserved without their proximal epiphyses. All tarsal bones of both feet were present. The right foot preserved all metatarsals, while the left included metatarsals I, II and V. Foot phalanges included eight proximal, two middle and three distal elements.

Table 2. Long bone measurements from grave 23 [in mm].

Bone	Measurement (Martin No.)	Right side	Left side	Notes
Humerus	M1	322	316	Shaft + distal epiphysis; foramen supratrochleare present on right humerus
Humerus	M7	61	63	
Ulna	M1	265	–	Complete right ulna; left ulna fragmentary
Ulna	M2	231	–	Right ulna shaft
Ulna	M3	42	–	Right ulna shaft fragment
Femur	M6	28	27	Shaft with damaged epiphyses
Femur	M7	28	27	Shaft with damaged epiphyses
Femur	M8	84	85	Shaft with damaged epiphyses
Femur	M9	34	32	Shaft with damaged epiphyses
Femur	M10	23	25	Shaft with damaged epiphyses
Tibia	M8a	–	33	Shaft with damaged proximal epiphysis
Tibia	M9a	–	26	Shaft with damaged proximal epiphysis
Tibia	M10	–	77	Shaft with damaged proximal epiphysis

Based on the preserved elements, the remains were identified as belonging to a male, approximately 50–60 years old at the time of death (Senilis age category). His estimated stature was 163.9 cm, calculated using the maximum humeral length (*Pearson 1899*). Stable isotope analysis of carbon ($\delta^{13}\text{C} -21.3\text{‰}$) and nitrogen ($\delta^{15}\text{N} 10.2\text{‰}$) enabled partial reconstruction of the individual's diet, which—like that of the female from grave 25—corresponds to dietary patterns of Neolithic farming communities. The diet was likely diverse, including animal products and plants using the C3 photosynthetic pathway.

Anthropological analysis of the individual from grave 25

The skeleton of the individual interred in grave 25 was examined in an analogous manner to that from grave 23. However, the osteological material was only partially preserved, likely due to specific mortuary practices or taphonomic processes. The arrangement of most articulated skeletal elements indicates that the deceased had been placed in a flexed position on the left side, with the legs drawn up, the left arm extended along the torso, and the right arm flexed at the elbow. The bones of the right lower limb (femur and tibia), along with a pelvic fragment, were found in a non-anatomical arrangement in the northern and north-eastern parts of the feature. Extensive pseudopathological alterations were recorded on all preserved bones, resulting from the growth of plant roots both within and around the skeletal elements.

The cranial skeleton, including the maxilla, mandible, and all teeth, was entirely absent. The postcranial skeleton was incomplete, with several anatomical regions completely missing. The preserved elements included a fragment of the fifth lumbar vertebra (L5), the base of the sacrum with the median sacral crest, and shaft fragments of both clavicles. The scapulae were represented by a fragment of the medial border and coracoid process of the right scapula, and a portion of the acromion of the left scapula.

The left humerus was preserved with its shaft and distal epiphysis (M7 L 56), and a supratrochlear foramen was noted within the olecranon fossa (see *Tab. 3*). The right ulna consisted of a shaft with the proximal epiphysis, while the left ulna was represented by the shaft alone (M3 R 35; L 38). The right radius was preserved as a shaft fragment, and the left radius included the shaft and distal epiphysis (M3 R 39; L 42). The carpal bones were represented by the right lunate. Hand bones included a damaged right first metacarpal, four additional right metacarpal shaft fragments, and seven phalanges—three proximal, three middle, and one distal.

The pelvis was fragmentary on both sides. The right os coxae included parts of the ilium (wing and body), auricular surface, and greater sciatic notch. The left side preserved fragments of the ilium, auricular surface, greater sciatic notch, acetabulum, superior pubic ramus, and body of the ischium.

The right femur retained the shaft and slightly damaged distal epiphysis, with the trochanters also incomplete; the left femur consisted of the shaft and distal condyles (M1 R 453; M2 R 448; M6 R 25, L 25; M7 R 26, L 26; M8 R 82, L 78; M9 R 31, L 29; M10 R 23, L 24). Both tibiae were preserved as shaft fragments with damaged proximal epiphyses and medial malleoli (M1b R 349, L 353; M8a R 32, L 36; M9a R 20, L 22; M10 R 77, L 80). Fibular remains were present as undiagnostic shaft fragments. Tarsal bones from the right foot included a calcaneus with a damaged tuberosity, talus, navicular, and lateral cuneiform. Fragments of the

left calcaneus and talus were also identified. Metatarsal remains included shafts of both left and right first metatarsals, and five shaft fragments of additional metatarsals.

Table 3. Long bone measurements from grave 25 [in mm].

Bone	Measurement (Martin No.)	Right side	Left side	Notes
Humerus	M7	–	56	Shaft + distal epiphysis; supratrochlear foramen present
Ulna	M3	35	38	Proximal (R); shaft only (L)
Radius	M3	39	42	Shaft (R); shaft + distal epiphysis (L)
Femur	M1	453	–	Right femur preserved with damaged trochanters and condyles
Femur	M2	448	–	
Femur	M6	25	25	Fragment lengths
Femur	M7	26	26	Fragment lengths
Femur	M8	82	78	Fragment lengths
Femur	M9	31	29	Fragment lengths
Femur	M10	23	24	Fragment lengths
Tibia	M1b	349	353	Shaft with damaged condyles and medial malleolus
Tibia	M8a	32	36	Fragment lengths
Tibia	M9a	20	22	Fragment lengths
Tibia	M10	77	80	Fragment lengths

Based on the preserved skeletal elements, the remains were assessed as belonging to a probable female, who died at approximately 30–40 years of age (Adultus/Maturus). Stature estimation, calculated using the maximum length of the femur and Pearson’s regression formula (*Pearson 1899*, p. 186), yielded an approximate height of 161,3 cm, and Ruff et al. 165,9 cm (*Ruff et al. 2012*).

Stable isotope analysis of carbon ($\delta^{13}\text{C} = -21.9\text{‰}$) and nitrogen ($\delta^{15}\text{N} = 9.9\text{‰}$) was carried out on bone collagen. The results reflect a diet consistent with Neolithic subsistence patterns, characterised by the consumption of animal products and plants following the C_3 photosynthetic pathway. This dietary profile closely matches that of the individual buried in grave 23, suggesting continuity in alimentary practices within the community.

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