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PHYSICAL FEATURES AND DISEASE OF A MIDDLE KINGDOM OFFICIAL

ABSTRACT: *A skeleton of a 40–50 year-old male with a medium robust body build and a slight to medium muscular relief on the upper extremities, but a strongly developed one on the lower extremities, was identified in the inner coffin of Khuyankh. His cranial morphology fitted into that of two 1000 – 2000 year younger series of the same region, bearing in the same time individual peculiarities as very narrow and high orbits and a piriform aperture which could point to a Northern (Delta) origin. His reconstructed high stature (171.5 cm) was lowered to 155 cm by a strong hunch at the thoraco-lumbar transition, the result of a long-lasting spinal tuberculosis which completely healed. The disease was acquired in early childhood as evidenced by the differential adaptive growth of the remaining healthy vertebrae in a lordotic sense. A sacroiliac synostosis and several other findings on the spine could have been connected with the main pathology. Dental pathology, congenital anomalies in the first two vertebrae and an osteoma developed independently. The study of physical features and disease of Khuyankh yielded several insights into his way of life.*

KEY WORDS: *Prosopography – Middle Kingdom – Abusir (Egypt) – Anthropometry – Anthroposcopy – Spinal tuberculosis – Other pathologies.*

Skeletal remains of historically important persons, unearthed by scientific archaeological excavations, deserve meticulous anthropological and palaeopathological description and analysis, adding important knowledge to their prosopographies. This is the case of the recent finding of a Middle Kingdom burial of a till now unknown official in the area of the 5th Dynasty Temple of Raneferef at Abusir by the 15th Expedition of the Czechoslovak Institute of Egyptology, Charles University Prague, in 1984.

ARCHAEOLOGICAL BACKGROUND

In the north-east corner of the slaughterhouse hwt-nmt (Verner 1986), in the northern part of room AA-Ec, an oblong rectangular burial pit oriented

north-south was excavated, lined in its lower section by unfired bricks. The dead was protected by a double coffin. Inside the outer one of the cupboard type, carrying inscriptions and pictures, the inner one of the anthropoid type was inserted in position on its left side with the head-end towards the north. The anthropoid coffin contained a skeleton turned with face and belly towards the left flank of the coffin. It belonged to a hunchback whose deformity prevented the usual position on the back and shortened the body length to 155 cm only.

The dead was provided by a pear-shaped head of a wooden stick and two faience beads found in the inner coffin. To the south of the foot end of the outer coffin a flat wooden Canopic chest lay, containing remains of organic matter with wrappings, most probably the viscera of the deceased. In the north-east

TABLE 1. Measurements of the neurocranium.

		mm
1	Maximum length	186
5	Length of the base of the skull	107
7	Length of the foramen magnum	35
8	Maximum breadth	140
9	Minimum frontal breadth	95
10	Maximum frontal breadth	112
11	Biauricular breadth	124
13.1	Maximum bimastoid breadth	126
BC ⁺	Maximum bicristal breadth	136
16	Breadth of the foramen magnum	31
17	Basion-bregma height	135
20	Porion-bregma height	120
23	Horizontal circumference	533
24	Transverse curve	320
25	Sagittal curve	375
26	Frontal arch	135
27	Parietal arch	123
28	Occipital arch	117
29	Frontal chord	120
30	Parietal chord	111
31	Occipital chord	99
ML	Length of the mastoid process	32
MT	Thickness of the mastoid process	12

⁺ = measured between the most laterally placed points of both supramastoid crests

corner of the burial pit a hemispheric storage vessel was placed.

According to the textual evidence the dead was a man called Hwjj-Cankh (Khuyankh), whose titles were unfortunately not preserved. Both coffins were dated to early 12th Dynasty (or possibly end of 11th Dynasty) by Bareš (1990) who submitted the find to an archaeological and Egyptological analysis.

Even though the function of the deceased in the necropolis can only be guessed (a mortuary priest of the Temple of Raneferef?), the presence of a double coffin, funerary equipment and mummification of the body (to be described further) reveal that he was a member of the middle or upper middle social stratum.

STATE OF PRESERVATION

The skeleton was found in a very good state of preservation. It was complete except for the left antebrachial bones and the third cervical vertebra which were lost during manipulation with the material, previously to its handing for the anthropological investigation.

TABLE 2. Indices of the neurocranium.

1	Cranial i. (8:1)	75.3
2	Basion height-length i. (17:1)	72.6
3	Basion height-breadth i. (17:8)	96.4
HK	Mean height i. (Hrdlička-Kočka, 17: $\frac{1+8}{2}$)	82.2
AC	Acroplatic i. (Benington, 8-17:1)	2.7
4	Porion height-length i. (20:1)	64.5
5	Porion height-breadth i. (20:8)	85.7
HH	Porion height-basion height i. (20:17)	88.9
AB	Biauricular b.-maximum breadth i. (11:8)	88.6
MB	Bimastoid b.-maximum breadth i. (13.1:8)	90.0
CB	Bicristal b.-maximum breadth i. (BC:8)	97.1
10 ⁺	Sagittal i. of skull valuting (1:25)	49.6
11	Transversal i. of skull valuting (11:24)	38.8
12	Transversal frontal i. (9:10)	84.8
13	Transversal frontoparietal i. (9:8)	67.9
16	Sagittal frontoparietal i. (27:26)	91.1
17	Sagittal frontooccipital i. (28:26)	86.7
18	Sagittal parietooccipital i. (28:27)	95.1
19	I. of frontal sagittal arch (26:25)	36.0
20	I. of parietal sagittal arch (27:25)	32.8
21	I. of occipital sagittal arch (28:25)	31.2
22	Sagittal frontal i. (29:26)	88.9
24	Sagittal parietal i. (30:27)	90.2
25	Sagittal occipital i. (31:28)	84.6
33	Foramen magnum i. (16:7)	88.6
PM	Mastoid thickness i. (MT:ML)	37.5
37	Cranial modulus ($\frac{1+8+17}{3}$)	153.7

⁺ = modification by the present author

EVIDENCE OF MUMMIFICATION

Several black spots on the skull and dark violet staining on the bones of lower extremities together with fragments of wrappings with scraps of stiffened resin prove that the dead was embalmed. In the same time, however, remnants of dried brain with partially preserved gyrification were present in the cerebral cavity and the nasal skeleton was found intact. This agrees with the supposition that during the Middle Kingdom brain removal was reserved only to persons of the highest social rank (Strouhal 1986).

DETERMINATION OF AGE

Cranial sutures were found on the outer aspect of the brain-case in a well progressed state of obliteration (C₃, S₂₋₃, L₁₋₂, Pl. 1:1-4). The completely preserved dentition was considerably abraded rang-

ing from points of exposed dentine on lower M₃ to progressed attrition of dentine with exposures of secondary dentine on upper molars and premolars, however, without pulp exposure (Pl. 1: 5-6). A deep caries penetrating the pulpar chamber was present on the left lower M₂, complicated by a great periapical cyst. Resorption of the alveolar process was of medium degree (Brothwell 1963: 150). Considerable deposits of dental calculus were accumulated on lower premolars and all molars.

All epiphyseal and apophyseal fissures of the postcranial skeleton were completely fused. Pubic symphysis disclosed phase 8 of Todd (1920). Only beginning of liping on humeral heads and slightly rugged surface of the tubercula minora humeri could be observed. Slight osteophytic outgrowths were present on the patellae and some of medium size on the calcanei. No arthritic changes were found in any joint. The grade of vertebral osteophytosis in sections not directly involved in the pathology to be described was mostly of medium degree (osteophytes longer than 3 mm but not bridging) or slight (osteophytes up to 3

mm) (Pl. 2: 1-3). The development of spondylarthrosis in joints T₆₋₇ and T₇₋₈ and of osteochondrosis of intervertebral discs between C₅₋₆ and C₆₋₇ (Pl. 3: 3-4) could have been related to the main pathological finding in the spine (see further).

According to the described features the individual died between 40 and 50 years of age.

DETERMINATION OF SEX

In spite of only slightly developed glabella (Broca 2, in Martin and Saller 1957) and supraorbital arches (Eickstedt 2, in Eickstedt 1944) as well as of nasofrontal transition in a medium curved arch, most other secondary sexual features point to the male side (Pl. 1: 1-6). There was a slightly oblique forehead, a medium protuberantia occipitalis externa (Broca 2 in Martin and Saller 1957, a medium thick and long mastoid process with a deep incisura mastoidea, a medium thick upper orbital margin, a slightly to medium developed marginal process, a well deve-



PLATE 1. Khuyankh's skull in 1. frontal, 2. left lateral, 3. occipital, 4. vertical and 5. basal norm; mandible in vertical view.

TABLE 3. Measurements of the splanchnocranium.

		mm
40	Length of the face	104
43	Breadth of the upper face	100
43.1	Interior biorbital breadth	92
44	Biorbital breadth	91
45	Bizygomatic breadth	133
46'	Bimalar breadth	97
47	Height of the face	118
48	Height of the upper face	75
48.1	Height of the alveolar part	18
50	Anterior interorbital breadth	19
51	Orbital breadth	41
52	Orbital height	39
54	Nasal breadth	22
55	Nasal height	57
60	Maxilloalveolar length	56
61	Maxilloalveolar breadth	62
MH	Molar height	25
UM	Upper molar length	31 (R)

46' — measured at the anterior inferior edge

loped muscular relief of the nuchal and mandibular regions, an outstanding linea temporalis but only a slight to medium supramastoid crest and a slight eversion of the mandibular angle. The chin was square (No. 4 of De Villiers 1968), pyramidal (Form 2 in Eickstedt 1944) and prominent.

The low pelvis showed wings in an open oblique position, moderately developed apophyses, a medium deep and large sciatic notch, complete absence of praeauricular sulcus, a big oval foramen obturatum, a sagittally narrow pelvic inlet, an outstanding pubic tubercle, a flaring lower aspect of the pubic bone, a high symphysis, an acute subpubic angle and a low ischiopubic index (Tab. 8). The reconstructed stature was high (see further).

The male sex, appearing unequivocally, corresponds well with the male gendre of the name Khuyankh written on the outer coffin.

CRANIAL MORPHOLOGY

Dimensions and indices of the skull, summarized in Tables 1–6, were evaluated according to means and standart deviations of males in two recently studied series from the same area, dating Ist millennium B. C. They originate from the secondary cemetery in the Mastaba of Ptahshepses at Abusir (Strouhal and Bareš 1993) and from secondary burials in the Memphite Tomb of Haremheb (Strouhal, in press). Comparative data can be found in the quoted books.

The skull of Khuyankh belonged by majority of its dimensions into the range $\bar{x} \pm s$ of one or the other comparative series, except for several features which

TABLE 4. Indices of the splanchnocranium.

38	Facial i. (Kollmann, 47:45)	88.7
38.1	Facial i. (Virchow, 47:46')	121.6
39	Upper facial i. (Kollmann, 48:45)	56.4
39.1	Upper facial i. (Virchow, 48:46')	77.3
41	Jugomolar i. (46':45)	72.9
42	Orbital i. (52:51)	95.1
46a	Interorbital (50:44)	20.9
48	Nasal i. (54:55)	38.6
51.1	I. naso-facialis transversalis (54:45)	16.5
51.2 ⁺	I. naso-facialis verticalis (55:48)	76.0
54	Maxilloalveolar i. (61:60)	110.7
60	Gnathic i. (40:5)	97.2
61	Facial modulus ($\frac{40 + 45 + 47}{(3)}$)	118.3
69	Longitudinal craniofacial i. (40:1)	55.9
70 ⁺	Vertical craniofacial i. (48:17)	55.6
71	Transversal craniofacial i. (45:8)	95.0
72	Frontobiorbital i. (9:43)	95.0
73	Jugofrontal i. (9:45)	71.4
UMI	Upper molar i. (UM:5)	29.0

⁺ = modification by the present author

will be quoted in the following description. In the measurements of the neurocranium (Tab. 1), the length of the base (5), porion-bregma height (20), frontal arch (26) and chord (29) were above the comparative ranges. In the indices of the neurocranium (Tab. 2), this was reflected in the greater values of the three porion height indices (4, 5, HH), in the smaller values of the sagittal frontoparietal (16) and frontooccipital (17) indices, and in the greater value of the index of frontal sagittal arch (19). The most important indices were mutually in harmony, being slightly mesocranic (1), orthocranic (2), metriocranic (3), intermediate (HK), hypsicranic (4), close to the upper limit of metriocrany (5), medium in forehead (12) and metriometopic/mesosemic (13). To this we may add the main descriptive features — in the lateral norm the slightly oblique forehead, the well arched vault with a slight lambdoid flatness, but outstanding bathrocephaly, in the vertical norm the ovoid outline and in the occipital norm the house shape.

In the measurements of the splanchnocranium (Tab. 3), the greater length of the face (40), the smaller biorbital breadths (43.1, 44), the extremely great orbital height (52), the very small nasal breadth (54), but outstandingly great nasal height (55) have to be stressed. This influenced the pertinent indices (Tab. 4), showing the very high hypsiconchy (42), the very low leptorrhiny (48), coupled with low transversal (51.1) but high vertical naso-facial indices (51.2). Also the facial modulus (61) and the vertical craniofacial index (70) lie above the $\bar{x} \pm s$ ranges of the comparative series. In the other main indices the face was mesoprosopic (38), orthoprosopic (38.1),

PLATE 2.

1. Thoracic spine with first lumbar vertebra in frontal view. 2. Thoracic spine with first lumbar vertebra in left lateral view. 3. Lower thoracic and lumbar spine in right lateral view. 4. Vertebrae Th8-L1 with deformity and fusion. 5. Radiogram of vertebrae Th8-L1 in lateral and antero-posterior views.

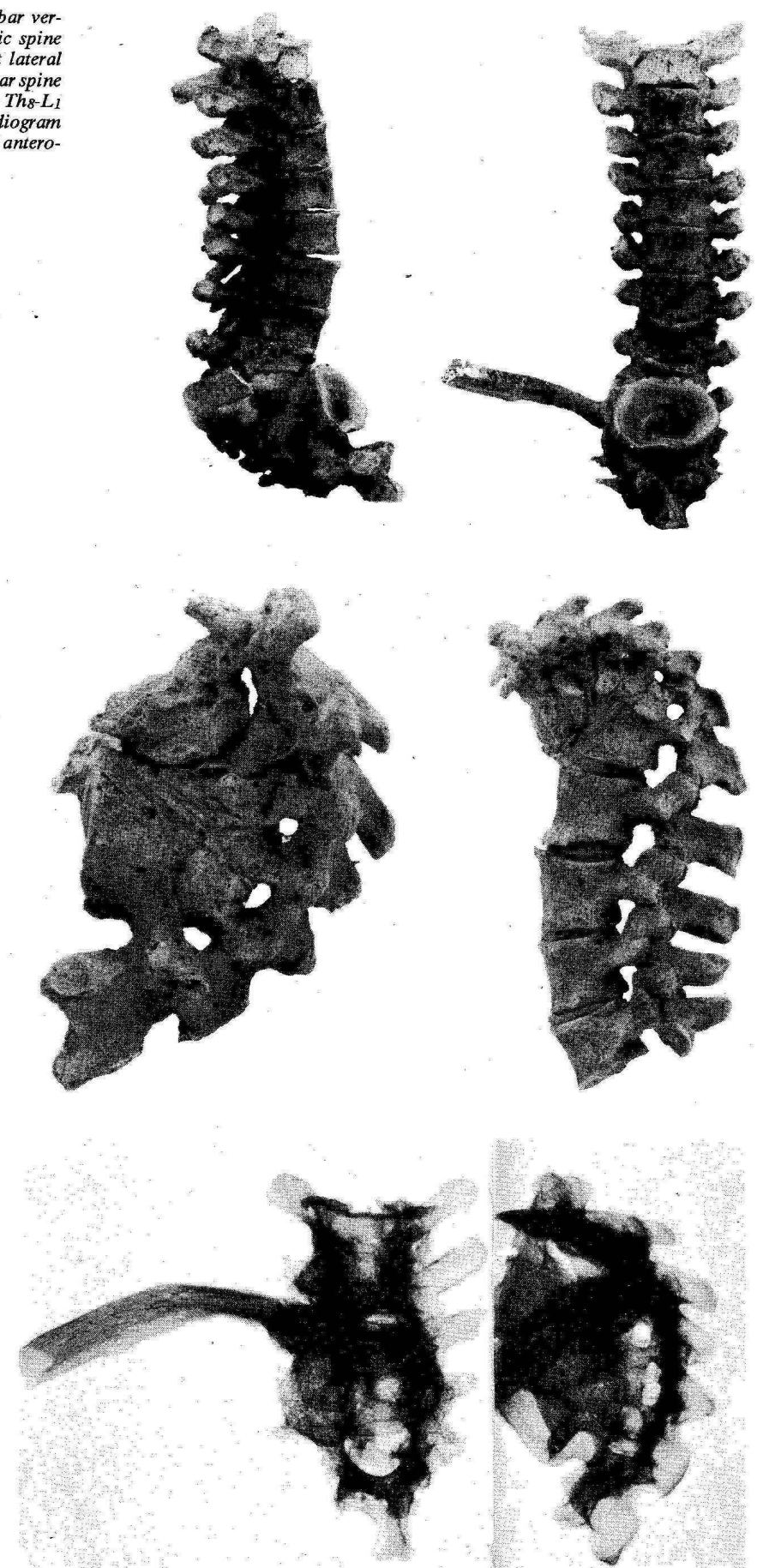


TABLE 5. Measurements and indices of facial profile.

		mm/—/°
NH	Height of nasion over 43.1	18
57	Minimum breadth of nasal bones	9
SS	Height of nasal bridge over 57	4
BH	Height of nasal bridge over 50	6.5
SH	Subspinal height over 46°	25.5
BI	Breadth of the incisura maxillaris	29
DI	Depth of the incisura maxillaris	6
FF	Frontal i. of facial flatness (NH:43.1)	19.6
SI	Simotic index (SS:57)	44.4
NP	I. of nasal prominence (BH:50)	34.2
ZM	Zygomaxillar i. (SH:46°)	26.3
IM	I. of the incisura maxillaris (DI:BI)	20.7
32a	Tangential angle of frontal incline	72
72	Total profile angle	86
73	Nasal profile angle	87
74	Alveolar profile angle	78
75	Profile angle of nasal bridge	53
76	Profile angle of the cheek	114
77	Transv. profile angle of upper face	139
78	Sagittal angle of orbital incline	87
NB	Nasal bones angle	95
ZM	Zygomaxillar angle	124

lepten (39), leptoprosopic (39.1), mesuranic (54) and orthognathous (60). Descriptively, the orbits were square, slightly rhomboid, the piriform aperture very narrowly oval, the nasal bridge concave, the canine fossa medium to deep, the subnasal region wavy and the nasal spine medium. An unilateral epipteric bone (34 × 18 mm) was present left.

In the measurements and indices of facial profile (Tab. 5), the incisura maxillaris was found large (BI) and shallow (DI) with a low index value (IM). Both the total (72) and nasal profile angles (73) were orthognathous, the alveolar profile angle slightly prognathous (74). Neither the face nor the nasal bridge were flattened.

From the measurements and indices of the mandible (Tab. 6), the large bicondylar breadth (65) caused the low value of the mandibular breadth index (64). The thickness of the body (69.3) and its index (66) were large. The great minimum breadth of the ascending ramus (71) influenced the high value of its index (63). The frontomandibular index (FM) was mesomandibular.

POSTCRANIAL MORPHOLOGY

In the measurements of the vertebrae (Tab. 7), Th₃₋₇ and L₂₋₄ showed higher ventral than dorsal vertical diameters. The total difference amounted to 34 mm. This anomalous situation was caused by the great hunch of the spine (Th₈—L₁, see further). Al-

TABLE 6. Measurements and indices of the mandible.

		mm/°/—
65	Bicondylar breadth	126
66	Bigonial breadth	98
68.1	Mandibular length	106
69	Symphyseal height	29
69.1	Height of the body	32
69.3	Thickness of the body	14
70	Height of the ascending ramus	64
71	Minim. breadth of ascend. ramus	40
LM	Lower molar length	25
79	Gonial (mandibular) angle	122
62+	Length-breadth i. of mand. (68.1:65)	84.1
63	Ascending ramus i. (71:70)	62.5
64	Mandibular breadth i. (66:65)	77.8
66	Thickn. of mand. body i. (69.3:69.1)	43.8
40	Jugomandibular i. (66:45)	73.7
FM	Frontomandibular i. (66:9)	103.2

+ = modification by the present author

ready during the growth period this adaptive differential growth of the healthy part of the spine compensated to some extent the kyphotic bend by an opposite, lordotic one.

Of the measurements and indices of the pelvis (Tab. 8), the sacrum was found compared with the $\bar{x} \pm s$ ranges of the comparative series longer (2) and shallower (6) with low, dolichohieric breadth-length and arch-chord indices. In the coxae, the breadth of the ilium (12) was larger, the height of the symphysis (18) greater, causing the higher value of the symphysis-pubis index. The subpubic angle (33) was conspicuously small. The pelvic inlet was slightly dolichopellic.

In the upper extremity (Tab. 9), the maximum lengths of the clavicle and humerus (1) were great. General robusticity, evaluated descriptively and by thickness-length indices, was medium, the muscular relief only slightly or medium developed and the curvature of long bones only slight. No perforations of the humeral septum were found.

In the lower extremity (Tab. 10), the maximum lengths of the femur and tibia (1) were great. There was an outstandingly great sagittal diameter of the mid-diaphysis of the femur (6) causing very high values of the index of the mid-diaphyseal section. General robusticity, followed descriptively and in robusticity or thickness-length indices, was medium. The femur was platymeric with a medium developed pilaster and a strong linea glutea. The tibia was meso-cnemio with a deeply grooved linea musculi solei. The fibula showed slight to medium canellation.

These findings elucidate the way of life of the deceased. Notwithstanding his great hunch, he moved around and often, not working extensively with his hands.

The stature of Khuyankh was reconstructed according to the tables by Trotter and Gleser (1952) for

American Negroes which were found to fit better to the proportions both of the Nubians (Strouhal and Jungwirth 1984: 119—122) and the Egyptians (Robins 1983: 17—20). The resulting value 171.5 cm contrasts with the actual body length measured in situ inside the inner coffin as low as 155 cm. The difference was caused by the spinal deformity described in the following section.

SPINAL PATHOLOGY

The most striking finding in the skeleton of Khuyankh was the deformity localized at the thoraco-

lumbar transition (Pl. 2: 1—5). The bodies of five vertebrae — Th₉ to L₁ — completely merged and their neural arches, intervertebral joints and ventral portions of the interspinous ligaments also fused. While the body L₁ retained its individual shape, bodies of the last four thoracic vertebrae almost disappeared and their remnants joined into a uniform, wedge-shaped formation merging with the body of L₁. Right side of this formation was covered by a thin layer of newly formed bone (Pl. 2: 4), on the left the lateral longitudinal ligament thickly ossified encompassing also the 10th costovertebral joint (Pl. 2: 2). The radiogram revealed a regular, strain-conditioned trabecular structure without remnants of residual

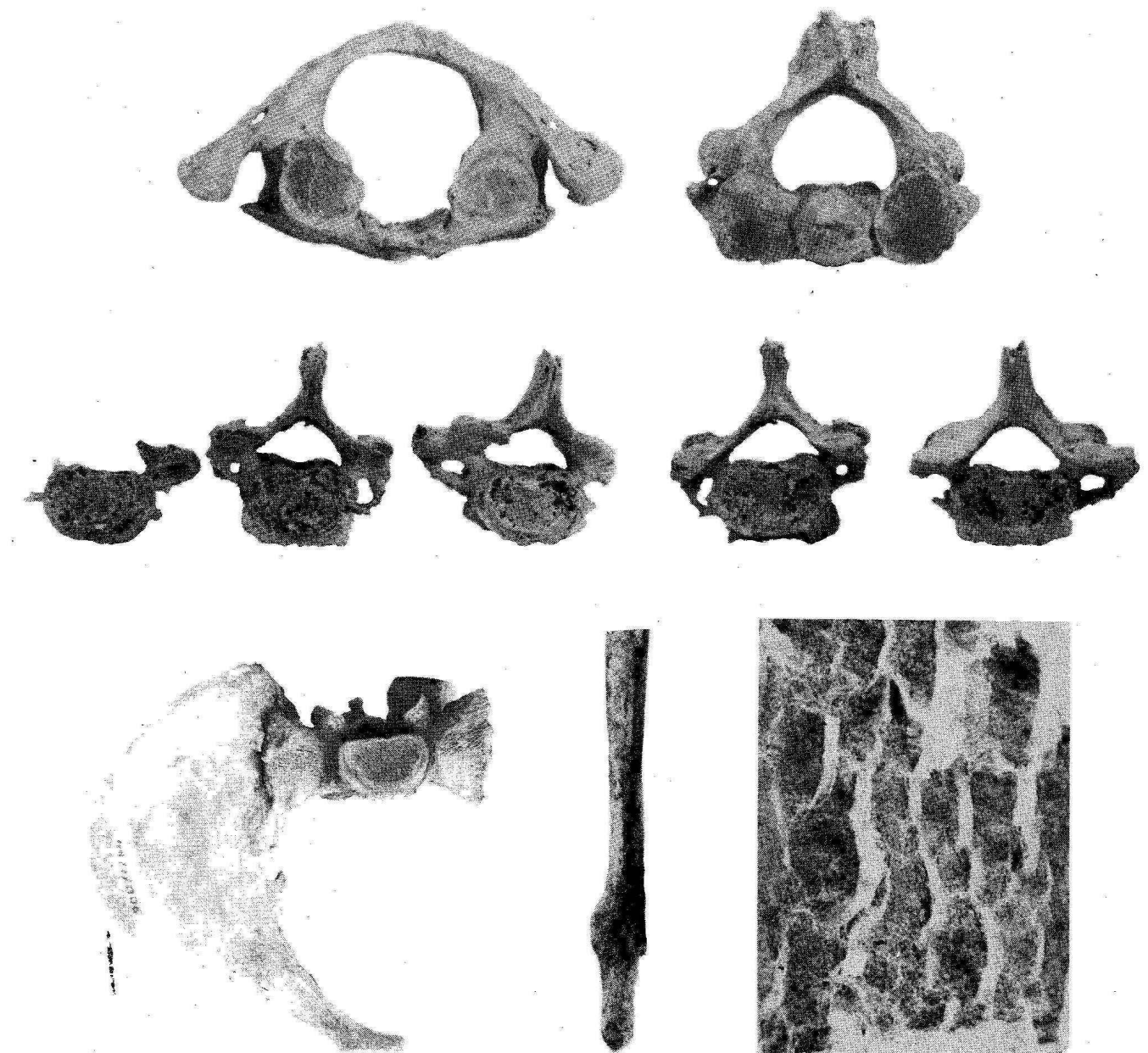


PLATE 3. 1. Atlas with bilateral foramen arcuatum and open foramina transversalia. 2. Epistropheus with anomalous foramina transversalia. 3. Vertebrae C₅₋₇ in basal view showing osteochondrosis of intervertebral discs. 4. Vertebrae C₆₋₇ with the same finding in vertical view. 5. Ankylosed right sacroiliac joint. 6. Medial side of the distal end of the right fibula with an osteoma. 7. Section of the brain tissue (75 x).

TABLE 7. Measurements of the vertebrae.

	Maximum transversal diameter mm	Ventral vertical diameter mm	Dorsal vertical diameter mm
C ₁	76	—	—
C ₂	—	40	15
C ₃	—	—	—
C ₄	—	14	14
C ₅	—	14	14
C ₆	—	13	13
C ₇	—	15	15
Th ₁	—	18	19
Th ₂	—	20	20
Th ₃	—	21	19
Th ₄	—	20	18
Th ₅	—	22	20
Th ₆	—	23	20
Th ₇	—	22	21
Th ₈	—	—	—
Th ₉	—	—	—
Th ₁₀	—	—	—
Th ₁₁	—	—	—
Th ₁₂	—	—	—
L ₁	—	—	—
L ₂	—	36	26
L ₃	—	34	30
L ₄	—	32	28
L ₅	—	32	26

abcess cavities or intervertebral spaces. This corresponds to a completely healed stabilized process (Pl. 2: 5).

Also vertebra Th₈ had a wedge-shaped body and was firmly attached to the described formation in intervertebral joints as well as by ossification of the interspinal ligament (Pl. 2: 3–4). The intervertebral space Th₈–₉ was preserved and there was also a chink dividing the ossified left lateral longitudinal ligament (Pl. 2: 2).

The course of the spine was changed. There was a slight S-shaped scoliosis, sinistroconvex in the lumbar and lower thoracic sections, dextroconvex in the upper thoracic part (Pl. 2: 1). Far more expressive was the kyphotic bend between Th₈ and L₁ reaching together 130°. Because of development of together five wedge-shaped vertebrae there was not an angular, but a fluently arched curvature (Pl. 2: 2–3). Even with the compensatory adaptations in the upper thoracic and lumbar spine, the thorax was deformed causing pressure on internal organs. The described hump also explains the difference of 16.5 cm between the stature calculated according to lengths of long bones and the body length measured in situ.

The right sacroiliac joint was ankylosed by a thick layer of newly formed bone covering the anterior half of the upper margin and the upper half of the anterior margin of the facies auricularis (Pl. 3: 5). Osteophytic lipping was present in the same loca-

TABLE 8. Measurements and indices of the pelvis.

Sacrum		mm/—	
2	Anterior direct length	110	
5	Anterior upper direct breadth	102	
6	Maximum height of the arch	10	
(7)	Cranial transversal diam. of body S ₁	44	
—	Breadth-length i. (5:2)	92.7	
—	Arch-cord height i. (6:2)	9.1	
—	Body S ₁ — sacrum breadth i. (7:5)	43.1	
Coxae		left	right
		mm/°/—	mm/°/—
1	Pelvic height	207	206
2	Maximum pelvic breadth	285	
5	Anterior upper spinal breadth	246	
9	Height of the ilium	127	128
12	Breadth of the ilium	163	163
15'	Height of the ischium	103	106
17'	Length of the pubis	67	65
18	Height of the symphysis	45	47
22	Maximum diam. of the acetabulum	53	55
23	Sagittal diam. of pelvic inlet	111	
24	Transversal diam. of pelvic inlet	116	
33	Subpubic angle	50	
—	Breadth-height i. of the pelvis (2:1)	137.7	138.3
—	Breadth-height i. of the ilium (12:9)	128.3	127.3
—	I. ischio-iliacus (15:1)	49.8	51.5
—	I. ischio-pubicus (17:15')	65.0	61.3
—	I. of the pelvic inlet (23:24)	95.7	
—	Symphysis-pubis i. (18:17')	67.2	72.3

15' — including acetabulum according to Thieme and Schull (1957: 244)

17' — without acetabulum according to Thieme and Schull (1957: 244)

lisation also in the left side but still without a synostosis. These changes could have been adaptive, too, strengthening the basis of the deviated spine.

Also deep oval depressions on terminal plates of the neighbouring vertebrae L₁+₂ (Pl. 2) and L₂+₃, evidence of the prolapse of the nucleus pulposus of the intervertebral discs, could have been connected with the extreme twist of the spine.

The diagnosis of the described spinal pathology points unequivocally to vertebral tuberculosis (malum Potti, Strouhal 1987, 1989). The tuberculous infection must have begun very early in childhood including the destruction of the afflicted vertebrae as evidenced by mentioned adaptive differential growth of the healthy vertebrae, which was possible only during the growth period. Thanks to the high resistance of the organism, the process completely healed except for preservation

TABLE 9. Measurements and indices of upper extremity.

		left mm/—	right mm/—
Clavicula			
1	Maximum length	—	166
6	Circumf. of the mid-diaphysis	39	39
—	Thickness-length i. (6:1)	—	23.5
Humerus			
1	Maximum length	331	337
2	Total length	326	333
4	Lower epiphyseal breadth	59	61
7	Min. circumf. of the diaphysis	63	63
8	Circumf. of the caput	138	141
9	Max. transv. diam. of the caput	40	42
10	Max. sagit. diam. of the caput	45	45
—	Thickness-length i. (7:1)	19.0	18.7
—	Robusticity i. of the caput (8:2)	42.3	42.3
Radius			
1	Maximum length	—	259
1b	Parallel length	—	256
2	Functional length	—	245
3	Minimum circumference	—	42
—	Thickness-length i. (3:2)	—	17.1
Ulna			
1	Maximum length	—	274
2	Functional length	—	239
3	Minimum circumference	—	36
—	Thickness-length i. (3:2)	—	15.1

of the spinal deformity. The immunity response succeeded in subduing also other very possible manifestations of bacillus Kochi in Khuyankh's internal organs.

The patient must have been probably nursed during the initial acute or subacute phase of the disease. After it entered into the chronic stage and gradually healed, he became self-sufficient and for about 30–45 years lead a normal way of life. As a hunchback he probably walked with the help of a stick, whose head was actually found besides his body in his inner coffin. He never exerted any physically heavy manual work. It could have been precisely because of his curious external appearance that Khuyankh was considered a "sacred" person and appointed to some important religious office. This would also explain the fact that he was buried in a grave built for him in the area of the Temple of Raneferf. Whatever was the cause of his death, we may be sure that it was not tuberculosis.

OTHER PATHOLOGICAL FINDINGS

Congenital anomalies were present on both first and second vertebrae. There was a bilateral small narrowly oval foramen arcuatum atlantis combined with bilaterally anteriorly open foramina transversalia

TABLE 10. Measurements and indices of lower extremity.

		left mm/—	right mm/—
Femur			
1	Maximum length	483	486
2	Total length	479	483
6	Sagitt. diam. of the mid-diaphysis	33	34
7	Transv. diam. of the mid-diaphysis	26	24
9	Upper transv. diam. of the diaph.	32	30
10	Upper sagitt. diam. of the diaph.	26	25
18	Vertical diam. of the caput	45	47
19	Transversal diam. of the caput	45	46
20	Circumference of the caput	148	150
—	Robusticity index (6+7:2)	12.3	12.0
—	I. of mid-diaphyseal section (6:7)	126.9	141.7
—	I. of the upper diaph. section (10:9)	81.3	83.3
—	Robusticity i. of the caput (20:2)	30.9	31.1
Tibia			
1	Total length	402	409
1b	Medial length	400	404
8a	Max. diam. at foramen nutricium	37	36
9a	Transv. diam. at foramen nutricium	25	24
10b	Minimum circumference	76	74
—	Thickness-length index (10b:1)	18.9	18.1
—	Index cnicus (9a:8a)	67.6	66.7
Fibula			
1	Maximum length	—	—
4a	Minimum circumference	38	37
—	Thickness-length index (4a:1)	—	—

atlantis (Pl. 3: 1). The left foramen transversale epistrophei was open laterally, too, and there was an anomalously small round aperture bordered laterally by a thin osseous bridge in the place of the right foramen transversale epistrophei (Pl. 3: 2).

A longitudinally oriented oval roundish protrusion (18 × 10 mm, prominence 4 mm) was situated on the medial aspect of the distal end of the right fibula (10 mm above the upper limit of the articular surface, the distal end of the bone being broken off). It consisted of solid compact bone with a smooth or slightly uneven surface with no traces of fracture or nidus on the radiogram. We may consider it an osseous benign tumour called osteoma (Pl. 3: 6).

Dental and other spinal pathology were already described in the section dealing with the determination of age.

HISTOLOGICAL COMMENT (Alena Němečková)

With the help of staining techniques of section of the submitted brain tissue it was proved to have been

human. Cellular structures have not survived. Remnants of ligament tissue reacted positively upon staining the trichrome method (Pl. 3: 7).

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