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## PRINCESS KHEKERETNEBTY AND TISETHOR: ANTHROPOLOGICAL ANALYSIS

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**ABSTRACT.** — A full description of the human remains found by the Czechoslovak Institute of Egyptology in the Mastaba of Princess Khekeretnebtý at Abusir (Egypt) is presented. They belong to two persons, in accord with the textual evidence found in the Mastaba. The female sex determined according to the anthropological material agrees with the names of the Princess Khekeretnebtý and of another woman Tisethor. The proprietor of the Mastaba, Princess Khekeretnebtý, was 30–35 year-old, the other woman, buried later, was a 15–16 year-old girl. Metric, epigenetic and descriptive features show morphological and genetic similarity of both persons, strengthened by finding of identical blood group A. Both skeletons are of a strikingly gracile body build with only the slightest muscular development. A hypothesis of their blood-relationship fits well to the scarce textual as well as to the iconographic evidence.

**KEY WORDS:** Egypt — Fifth Dynasty — Demography — Anthropology — Palaeopathology — Palaeohistology — Blood groups — Titles — Iconography.

### INTRODUCTION

In 1976, the expedition of the Czechoslovak Institute of Egyptology, Charles University, Prague, excavated a mastaba of the Late Fifth Dynasty in the eastern zone of the Southern Field at Abusir, about 100 m south of the point where the causeway of Nyuserre bends (Verner, 1978). Several inscriptions, including a limestone false door stela, show that it was built for “the King’s daughter of his body”, “the beloved by (Djedkare) Isesi”, the Princess Khekeretnebtý. Later, but apparently not very long after the burial of the Princess, the mastaba was rebuilt in its northern part. (For details see *fig. 1* and its legend.) This second building stage contained another shaft and burial chamber. According to the additional limestone false door stela fixed in the west wall of the offering room 3, this adaptation

was intended for the “King’s ornament, his beloved one, Tisethor”. Unfortunately, the inscriptions on the false door contain no further data to elucidate the origin of this woman or her relation to the Princess Khekeretnebtý (Verner, 1978: 158) and there are no further textual sources that provide information about Tisethor.

We may compare the two persons carved on their false door stelae and frames rather crudely in the case of Khekeretnebtý (*fig. 2*) and more elaborately in the case of Tisethor (*fig. 3*). On the stelae they sit in exactly the same position in front of an offering table, each with her left arm bent over her chest and her right arm extended towards the offering table. Both women are dressed in a long tunic hanging from straps over their shoulders and reaching almost to their ankles, and they wear a simple circular necklace. The iconographic differences be-



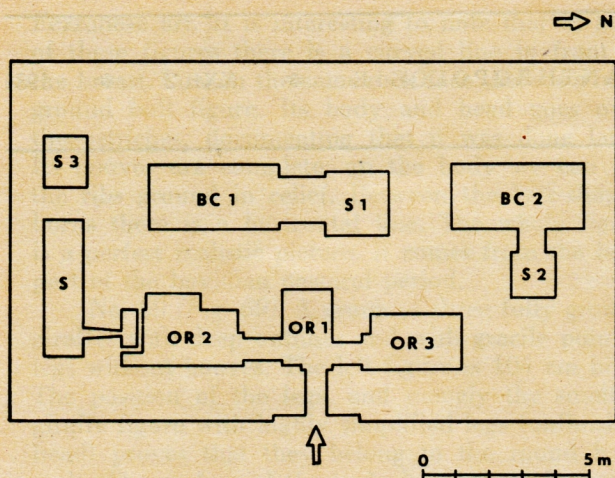


FIGURE 1. Schematic plan of the Mastaba of Princess Khekeretnebtu  
Explanations:

- BC 1 = burial chamber 1 (of Princess Khekeretnebtu)
- BC 2 = burial chamber 2 (of Tisethor)
- OR 1 = offering room 1 (with fresco painting of Khekeretnebtu)
- OR 2 = offering room 2 (with false door stela of Khekeretnebtu)
- OR 3 = offering room 3 (with false door stela of Tisethor)
- S = serdab (closed room for statues of the deceased)
- S 1 = shaft 1
- S 2 = shaft 2
- S 3 = shaft 3 (unfinished).

tween the women are in the depiction of their heads. Details of the facial structure (eye, nose and lips) are engraved for Tisethor, while there is only a profile on the face of Khekeretnebtu. This is an artistic convention connected with the grade of execution of both pictures. Another difference, in the headdress, appears more significant. The Princess wears a wig of the three-portion long hair form which was during Old Kingdom the headdress of queens and goddesses, especially on reliefs; it can be, however, found also with villagers (Staehelin, 1966: 181). Tisethor is shown with shortly-cut adherent natural hair with uncovered right ear. This headdress was worn by women of various social strata (Staehelin, 1966: 178). This difference in headdresses of the two person can be found consistently also in other pictures in the mastaba. A possible explanation of it according to the anthropological results will be offered in the "Conclusions".

#### LOCATION OF ANTHROPOLOGICAL FINDS

Although the mastaba was damaged by robbers, they fortunately did not entirely destroyed the human skeletal remains. Therefore, it is possible to use anthropological methods for the study of characteristics of the two women and of their possible relationship.



FIGURE 2. Princess Khekeretnebtu carved on her false door stela.





FIGURE 3. *Tisethor carved on her false door frame.*

The remains found in the main burial chamber and at the bottom of the adjoining shaft (No. 1) can logically be attributed to the proprietor of the mastaba, Princess Khekeretnebt. Her mummy was originally placed in a huge roughly carved limestone sarcophagus. However, the robbers chiselled out a round hole in its southern end, pulled out the mummy, and having torn it to pieces in robbing it, they threw the remains aside. Thus the long bones of both arms were found on the southern end of the sarcophagus lid; the skull, mandible, cervical and thoracic vertebrae and the small hand bones were lying on the floor of the burial chamber near the hole in the sarcophagus. Fragments of scapulae, two lumbar vertebrae and the bones of the right leg were drawn by the robbers to the bottom of the shaft, near the entrance of the short corridor leading to the burial chamber. Some of the bones still retained tiny remains of soft tissues. It appears that the body has been well dried by the embalmers, however, the absence of resinous preservative layer explains why the mummy pieces decayed into a skeletonized state. The body had originally been richly

wrapped: many stripes of bandage were found scattered around the sarcophagus and at the bottom of the shaft. Some were inscribed with semi-hieratic signs containing the name and title of the man responsible for the production of the bandages, but not the name of the Princess.

The skeletal remains of the person buried in the additional northern part of the mastaba were found still more widely dispersed. Parts of legs, the distal third of the right radius and the proximal epiphysis of the left humerus were buried in the sand deposits of the offering rooms Nos. 1 and 3. Fragments of skull and other parts of the postcranial skeleton, together with remnants of wrappings, were lying at the bottom of shaft No. 2, to where they had been pulled out by robbers from the adjoining burial chamber No. 2, devoid of human remains.

#### STATE OF PRESERVATION

*Khekeretnebt.* The cranium (fig. 4) is slightly damaged. The left zygomatic bridge is broken off (5 mm), the tip of the left mastoid process is missing, the surface of the occipital bone laterally of condyles is abraded, the alveolar border of the maxilla between the right teeth  $I_1$  and  $C$  is broken off, the right mandibular condyle is missing, a part of the left mandibular condyle is broken off, and the left mandibular angle is slightly abraded.

From the vertebral column, slightly damaged or partially defective vertebrae  $C_{1,2,4,6,7}$ ,  $Th_{1,2}$  and  $L_{1,3}$  are preserved. Also some rib fragments were gathered.

There are fragments of the right scapula from the region of the cavitas glenoidalis, and of the left scapula from the acromion. The left clavicle is entirely preserved. About two thirds of the right humerus are available, lacking the proximal end and the distal third apart from a fragment of the distal end. The left humerus is represented only by the distal third of the diaphysis, without the distal end. There are both right antebrachial bones, but only the diaphysis of the left ulna with missing distal sixth. Of the right hand bones are preserved the lunatum, triquetrum, capitatum, hamatum, metacarpalia I—V, phalanges proximales I—V, medii II—V and distales II and IV, of the left hand bones only the phalanges proximales II, III and V.

From the pelvis, only the upper anterior section of the left acetabulum was found. There are also the right femur, with slightly defective head and condyles, the right tibia without its distal quarter, and the right fibula in two fragments which do not join. Furthermore, of the right foot the talus, calcaneus, naviculare, cuneiforme intermedium, metatarsale I and IV (the head of the later broken off) and phalanx proximalis V are preserved. There is a conspicuous lack of the left leg bones, which were, presumably, completely destroyed by the robbers.

The bones are of ochre colour. Some dark brown spots, caused by the adhering soft tissue, are preserved only in places on the forehead and base



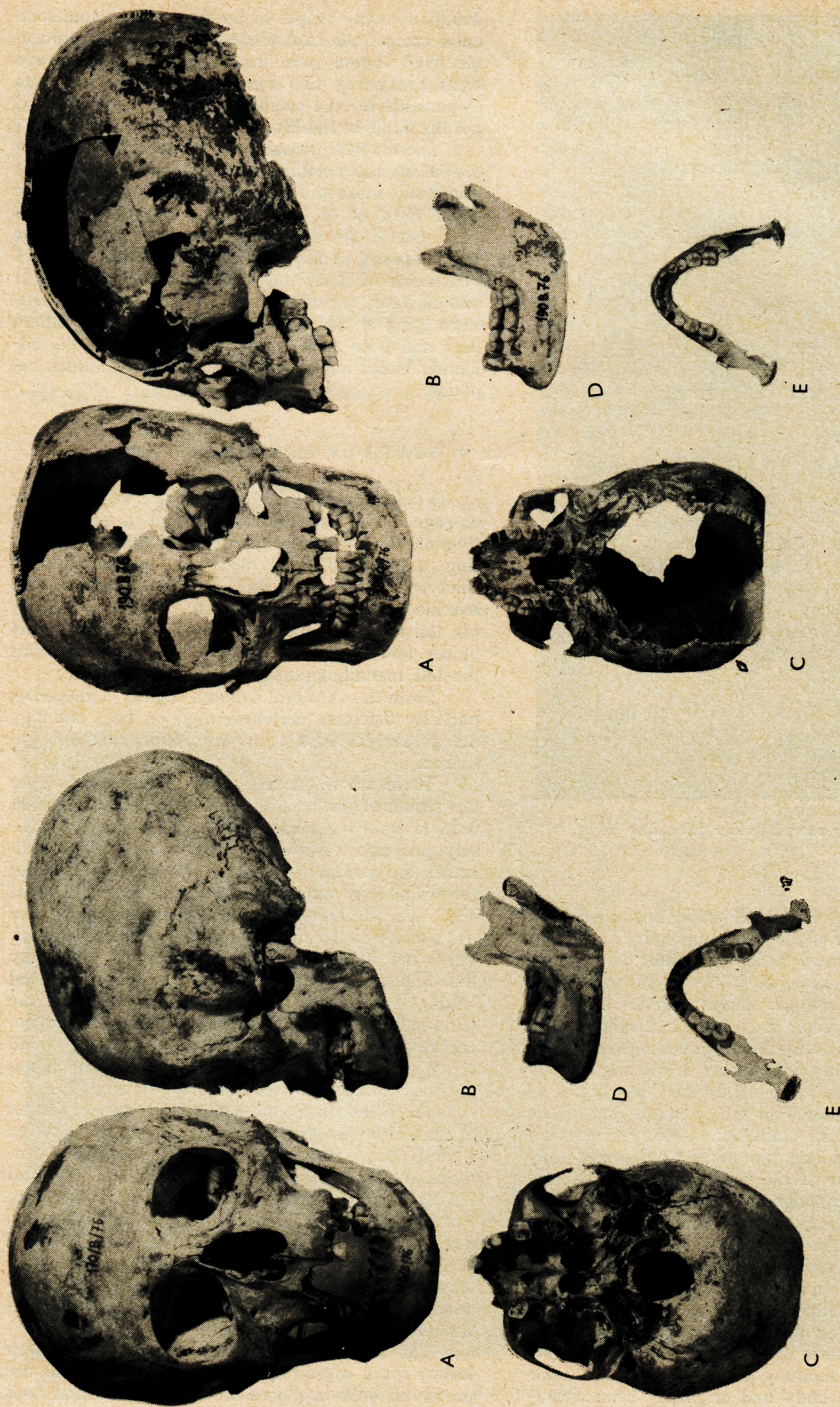


FIGURE 4. Skull and mandible of *Khekeretneby* in: A — frontal view, B — lateral view, C — basal view, D — lateral view, E — vertical view.

FIGURE 5. Skull and mandible of *Tisetor* in: A — frontal view, B — lateral view, C — basal view, D — lateral view, E — vertical view.



of the skull. The surface of both the right humerus and femur is mouldy and peeling off.

*Tisethor*. A defective calvaria and a facial skeleton could be reconstructed from the collected fragments (fig. 5). Because of the post-mortem deformation of some fragments, the reconstruction of the face is not precise on the left side, where it protrudes about 5 mm anteriorly. The occipital scale, the posterior lateral quarter of the left parietal bone, the middle left quarter of the frontal scale, as well as the lateral borders and distal halves of the nasal bones are missing. There is a defect in the left processus zygomaticus of the maxilla, and both zygomatic bridges are broken off. On the contrary, the mandible is preserved perfectly.

From the vertebral column, slightly damaged or partially defective vertebrae  $C_{1,2,4,6}$ ,  $Th_{2(?)}$ ,  $6(?)$  and  $L_{2(?)}$ , together with an arch of some lower thoracic vertebra, are at the disposal. The still unconnected segments of the sacrum ( $S_{3-5}$ ) and the manubrium sterni supplement the axial skeleton.

There are fragments from the region of cavitas glenoidalis of both scapulae, with roots of the acromial and coracoid processes. On the left side, also the region of spina scapulae survived. The left clavicle has the lateral end broken off. The proximal end of the diaphysis of the right humerus is missing; the left one shows the still unconnected proximal epiphysis and the distal epiphysis partly broken off. From the right radius there are fragments of the proximal and distal thirds, from the right ulna there is the proximal half.

From the pelvis only the right defective ilium including acetabulum is available. The diaphyses of the left femur as well as of both the tibiae lack the unconnected epiphyses. Two small fragments of compactae belong to one of the fibulae. Both calcanei are preserved, but defective.

All the bones are ochre coloured, smooth and without any traces of soft tissues. They were found in the same chronological stage of development, and no bone was preserved twice, so there can be no doubt that they all belonged to one individual. Their accumulation at the bottom of the shaft no. 2, adjoining the additional burial chamber no. 2, clearly indicate that they represent the second occupant of the tomb — *Tisethor*.

## DEMOGRAPHIC DATA

### *Khekeretnebtj*

As concerns age, all epiphyses and apophyses are fused with the respective diaphyses without trace of suture. The synchondrosis speno-occipitalis is closed. All cranial sutures are open except the lateral thirds of the coronal suture ( $C_3$ ). Third molars are erupted and show incipient abrasion of dentine (except the upper left one lost post-mortem and the lower left one lost ante-mortem). Both upper second molars were lost post-mortem and both lower ones show deep abrasion of dentine with remnants of

enamel. All first molars were abraded to the same grade. Both upper second premolars were lost ante-mortem and their sockets are closed. The left upper first incisor shows a moderate abrasion of dentine. Other teeth are missing post-mortem. There is a slight retraction of the alveolar processes. An incipient osteoporosis can be detected on the radiograms of the postcranial bones. We may conclude the skeleton was that of an adult who died between 30 and 35 years of age.

As concerns sex, the whole skeleton, especially the arm bones, are extremely gracile, almost without muscular relief (tab. 8) and their circumferences and diameters show low values (tab. 5). Also the skull is gracile and its secondary sexual features (tab. 7) are clearly feminine (upper margin of the orbits, processus marginalis, nasofrontal transition, arcus superciliaris, glabella, profile of the forehead, protuberantia occipitalis externa, lineae temporales, supramastoid crest, muscular relief on the nuchal plane, robusticity of the mandible, muscular relief of the mandible, mandibular angle, shape of the chin and prominence of the chin). In spite of the lack of pelvic features, the female sex of the skeleton seems evident.

### *Tisethor*

Concerning age, the development of the skeletal and dental systems was not yet finished. The synchondrosis speno-occipitalis remains wide open. The permanent dentition did erupt including the second molars: they reach occlusal level, but their roots are still open not attaining the final length. The developing third molars are still embedded inside the alveolar processes and visible through originally small openings (enlarged post-mortem); only the right lower third molar shows the very incipient stage of eruption. The roots of the third molars are widely open and only 3 mm long. The abrasion of the preserved teeth is very slight, touching the enamel only. None of the epiphyses and apophyses of the postcranial bones were yet unified with their respective diaphyses except for the medial and lateral epicondyles of the humeri, the distal epiphyses of the humeri, and the proximal epiphyses of the antebrachial bones. There are no traces of sutures except for the medial epicondyles. The three pelvic bones were already fused in the acetabulum, but the sacral segments ( $S_{3-5}$ ) are still free. The age of the skeleton, therefore, falls into the adolescent period; for a female (see below) it can be determined as 15–16 years.

Concerning sex, the whole skeleton is very gracile and the muscular relief only incipient (tab. 8). The values of circumferences and diameters are low (tab. 5). The pelvic apophyses are feeble, the incisura ischiadica has the form of a medium-large vaulted arch, the sulcus praeauricularis is, however, not yet developed showing that the individual had not borne a child. The secondary sexual features of the gracile skull are feminine (tab. 7). In spite of the adolescent age of the subject the sex seems to be most probably female.



*Skull — neurocranium (tab. 1).* The absolute dimensions as well as the indices of *Khekeretnebt* (*Kh.*) and *Tisethor* (*T.*) show values within the female range for Egypt. For the purpose of our analysis, most interesting is the comparison of the values between the individuals. In spite of her younger age, *T.* shows a larger cerebral skull, both in length and breadth, than *Kh.*, but the cranial index of both individuals is exactly the same and mesocranic. Other absolute dimensions of the neurocranium of the two individuals are mostly identical or similar, and the values of indices are very close. There is, nevertheless, an important difference in the porion-bregma height, lower in *T.*, because of unfinished growth, than in *Kh.* The derived indices therefore differ, both the length-height index (slightly orthocranic in *T.*, slightly hypsicranic in *Kh.*) and the breadth-height index (tapeinocranic in *T.*, slightly metriocranic in *Kh.*). A difference shows also in the sagittal frontal index, since in both individuals the length of the frontal sagittal arch was the same, but the frontal subtense was longer in *T.* than in *Kh.* While the length of the mastoid process was almost identical in both persons, the mastoid breadth was still smaller in *T.* than in *Kh.*

*Skull — facial skeleton (tab. 2).* Both females are identical or similar in most breadth dimensions of the face and in nasal and malar heights (both biorbital, mid-facial, orbital, nasal and maxillar. On the other hand, most probably due to the unfinished growth of the face and development of the dentition, the bizygomatic breadth, the height of the face and upper face, the height of the alveolar part and the maxilloalveolar length are still smaller in *T.* than in *Kh.* This results in differences of most of the facial indices, being in *T.* mesoprosopic, chamaeprosopic, mesene and brachyuranic, in *Kh.* leptoprosopic, orthoprosopic, slightly leptene and mesuranic. The slight, but opposite deviations in nasal dimensions cause the differences between mesorrhiny in *T.* and leptorrhiny in *Kh.* Strikingly enough, two absolute dimensions were found greater in *T.* than in *Kh.*: the interorbital breadth and the orbital height. This can probably be connected with the larger braincase of *T.* These differences cause the higher value of the interorbital index in *T.* compared with *Kh.*, and the bigger hypsiconchy of *T.* than of *Kh.* The great difference between both individuals in the transversal craniofacial index originates in the small but opposite differences in the maximum breadth of the skull and in the bizygomatic breadth.

*Skull — facial profilation (tab. 3).* The absolute dimensions are similar in both females except for the bigger subspinal height of *T.* than of *Kh.*, showing more protruding mid-face, and the still undeveloped breadth of the incisura maxillae in *T.* compared with *Kh.* Of the indices only the frontal index of facial flatness shows similarity. The slight, but opposite deviations in the breadth of nasal bones and in the simotic subtense cause the lower value of the simotic index in *T.* compared with *Kh.* The higher zygomaxillar index of *T.* than of *Kh.* ex-

TABLE 1. *Measurements and indices of the neurocranium*

No.	Measurement or index	Khekeretnebt	Tisethor
1	Maximum length of the cerebral skull	172	177?
5	Length of the base of the skull	92	—
7	Length of the foramen magnum	35	—
8	Maximum breadth of the cerebral skull	135	139
9	Minimum frontal breadth	91	91?
10	Maximum frontal breadth	109	110?
11	Biauricular breadth	118	116?
13(1)	Maximum bimastoid breadth	117	119?
BC	Maximum breadth between the cristae supramastoideae	124	126?
16	Breadth of the foramen magnum	27	—
17	Basion-bregma height	130	—
20	Porion-bregma height	109	104?
23	Horizontal circumference	504	—
24	Transverse curve	295	295?
25	Sagittal curve	356	—
26	Frontal curve	126	127
27	Parietal curve	120	—
28	Occipital curve	110	—
29	Frontal subtense	110	115
30	Parietal subtense	107	—
31	Occipital subtense	96	—
PML	Length of the mastoid process	29 R	28
PMT	Thickness of the mastoid process	13 R	10
1	Cranial <i>i.</i> (Breadth-length <i>i.</i> ) (8 : 1)	78.5	78.5?
2	Basion height-length <i>i.</i> (17 : 1)	75.6	—
3	Basion height-breadth <i>i.</i> (17 : 8)	96.3	—
HK	Hrdlička—Kóčka <i>i.</i> $\left(17 : \frac{1+8}{(2)}\right)$	84.7	—
AC	Acroplatic <i>i.</i> (8—17 : 1)	2.9	—
4	Porion height-length <i>i.</i> (20 : 1)	63.4	58.8?
5	Porion height-breadth <i>i.</i> (20 : 8)	80.7	74.8?
HH	Porion height-basion height <i>i.</i> (20 : 17)	83.8	—
BB	Biauricular breadth-maximum breadth <i>i.</i> (11 : 8)	87.4	83.5?
10+	Sagittal <i>i.</i> of skull vaulting (1 : 25)	48.3	—
11	Transversal <i>i.</i> of skull vaulting (11 : 24)	40.0	39.3?
12	Transversal frontal <i>i.</i> (9 : 10)	83.5	82.7?
13	Transversal frontoparietal <i>i.</i> (9 : 8)	67.4	65.5?
16	Sagittal frontoparietal <i>i.</i> (27 : 26)	95.2	—
17	Sagittal frontooccipital <i>i.</i> (28 : 26)	87.3	—
18	Sagittal parietooccipital <i>i.</i> (28 : 27)	91.7	—
19	I. of frontal sagittal arch (26 : 25)	35.4	—
20	I. of parietal sagittal arch (27 : 25)	33.7	—
21	I. of occipital sagittal arch (28 : 25)	30.9	—
22	Sagittal frontal <i>i.</i> (29 : 26)	87.3	90.6
24	Sagittal parietal <i>i.</i> (30 : 27)	89.2	—
25	Sagittal occipital <i>i.</i> (31 : 28)	87.3	—



Table 1 cont.

No.	Measurement or index	Khekeret- neby	Tisethor
33	Foramen magnum <i>i.</i> (16 : 7)	77.1	—
37	Cranial modulus $\left(\frac{1 + 8 + 17}{(3)}\right)$	131.0	—
PM	Thickness of mastoid process <i>i.</i> (PMT : PML)	44.8	35.7

Explanations to tables 1—5.

No. = Number of measurement or index according to Martin and Saller (1957) (postcranial indices are not numbered), alphabetic symbol according to the present author  
*i.* = index  
46' = breadth of the middle face was taken not at the lowest point of the zygomaxillar suture but at the edge of the lower and anterior side  
+ = modification of the index  
R = measured on the right side instead of left  
( ) = values in brackets are diaphyseal lengths  
All measurements are in mm.

TABLE 2. Measurements and indices of the facial skeleton

No.	Measurement or index	Khe- retneby	Tisethor
40	Length of the face	87	—
43	Breadth of the upper face	96	—
43(1)	Interior biorbital breadth	91	91?
44	Biorbital breadth	93	93?
45	Bizygomatic breadth	123	117?
46'	Breadth of the middle face	90	90
47	Height of the face	113	102?
48	Height of the upper face	68	62
48(1)	Height of the alveolar part	19	14
50	Anterior interorbital breadth	17	19
51	Orbital breadth	39	40
52	Orbital height	34	36
54	Nasal breadth	22	23
55	Nasal height	49	48
60	Maxilloalveolar length	51	47
61	Maxilloalveolar breadth	58	59
MH	Malar height	20	21
38	Facial <i>i.</i> (Kollmann) (47 : 45)	91.9	87.2
38(1)	Facial <i>i.</i> (Virchow) (47 : 46')	125.6	113.3
39	Upper facial <i>i.</i> (Kollmann) (48 : 45)	55.3	53.0
39(1)	Upper facial <i>i.</i> (Virchow) (48 : 46')	75.6	68.9
41	Jugomalar <i>i.</i> (46' : 45)	73.2	76.9
42	Orbital <i>i.</i> (52 : 51)	87.2	90.0
46a	Interorbital <i>i.</i> (50 : 44)	17.7	20.4
48	Nasal <i>i.</i> (54 : 55)	44.9	47.9
51(1)	I. naso-facialis transversalis (54 : 45)	17.9	19.7
51(2)	I. naso-facialis verticalis (55 : 48)	72.1	77.4
54	Maxilloalveolar <i>i.</i> (61 : 60)	113.7	125.5
60	Gnathic <i>i.</i> (40 : 5)	94.6	—
61	Facial modulus $\left(\frac{40 + 45 + 47}{(3)}\right)$	107.7	—
69	Longitudinal craniofacial <i>i.</i> (40 : 1)	50.6	—
70+	Vertical craniofacial <i>i.</i> (48 : 17)	52.3	—
71	Transversal craniofacial <i>i.</i> (45 : 8)	91.1	84.2

TABLE 3. Measurements and indices of facial profilation

No.	Measurement or index	Khe- retneby	Tisethor
NH	Height of nasion over 43(1)	13	14?
57	Minimum breadth of nasal bones	8.5	9.5
SS	Height of nasal bridge over 57 (simotic subtense)	5	4.5?
NP	Height of nasal bridge over 50	9	—
SH	Subspinal height over 46'	19.5	22?
BI	Breadth of the incisura maxillaris	31	24 R
DI	Depth of the incisura maxillaris	7	6 R
FF	Frontal <i>i.</i> of facial flatness (NH : 43(1))	14.3	15.4?
SI	Simotic <i>i.</i> (SS : 57)	58.8	47.4?
NP	I. of nasal prominence (NP : 50)	52.9	—
ZM	Zygomaxillar <i>i.</i> (SH : 46')	21.7	24.4?
IM	I. of the incisura maxillaris (DI : BI)	22.6	25.0?

TABLE 4. Measurements and indices of the mandible

No.	Measurement or index	Khe- retneby	Tisethor
65	Bicondylar breadth	112?	104
66	Bigonial breadth	86	87
68(1)	Mandibular length	98?	99
69	Symphyseal height	30	25
69(1)	Height of the body	29	23
69(3)	Thickness of the body	9	10
70	Height of the ascending ramus	57?	55
71	Minimum breadth of the ascending ramus	28	30
79	Gonial (mandibular) angle	122	121
62	Breadth-length <i>i.</i> (68(1) : 65)	87.5?	95.2
63	Ascending ramus <i>i.</i> (71 : 70)	49.1?	54.5
64	Breadth <i>i.</i> (66 : 65)	76.8	83.7
66	Thickness of the mandibular body <i>i.</i> (69(3) : 69(1))	31.0	43.5
40	Jugomandibular <i>i.</i> (66 : 45)	69.9	74.4
FM	Frontomandibular <i>i.</i> (66 : 9)	94.5	95.6?

presses the protrusion of the mid-face, and the difference in the index of the incisura maxillaris hangs together with its undeveloped breadth.

*Mandible (tab. 4).* In spite of the fact that the bigonial breadth, mandibular length, body thickness and gonial angle are identical or similar in both individuals, several other dimensions are still smaller in *T.* than in *Kh.* due to the unfinished growth and development of the dentition. In contrast, the breadth of the ascending ramus is larger in *T.* than in *Kh.* We may consider it as a peculiar individual feature.

*Postcranial skeleton (tab. 5).* The dimension of the vertebrate of both individuals are small, mostly at the lower limit of the female range for Egypt, and rather similar to each other.

Of the upper extremity bones, the length of both left clavicles is medium, but their circumferences are small, resulting in low length-thickness indices. The length of the right antebrachial bones



TABLE 5. *Measurements and indices of the postcranial skeleton*

Bone	No.	Measurement or index	Khekeretnebt		Tisethor	
			left	right	left	right
Vertebra	C <sub>1</sub>	Maximum transversal diameter	—	—	70	—
	C <sub>2</sub>	Ventral vertical diameter (with the dens)	34	—	35	—
	C <sub>4</sub>	Ventral vertical diameter	9	—	—	—
	C <sub>6</sub>	Ventral vertical diameter	11	—	10	—
	C <sub>7</sub>	Ventral vertical diameter	11	—	—	—
	Th <sub>1</sub>	Ventral vertical diameter	13	—	—	—
	Th <sub>2</sub>	Ventral vertical diameter	14	—	12	—
	Th <sub>6</sub>	Ventral vertical diameter	—	—	15	—
	L <sub>1</sub>	Ventral vertical diameter	21	—	—	—
	L <sub>2</sub>	Ventral vertical diameter	—	—	23	—
	L <sub>3</sub>	Ventral vertical diameter	23	—	—	—
Clavicle	1	Maximum length	129	—	(122)	—
	6	Circumference in the middle of the bone	28	—	27	—
	—	Length-thickness <i>i.</i>	21.7	—	(22.1)	—
Humerus	7	Minimum circumference of the diaphysis	41	43	43	43
	8	Circumference of the caput	—	—	112?	—
Radius	1	Maximum length	—	226	—	—
	3	Minimum circumference	—	28	—	27
	—	Length-thickness <i>i.</i> (3 : 1)	—	12.4	—	—
Ulna	1	Maximum length	—	240	—	—
	3	Minimum circumference	—	24	—	—
	—	Length-thickness <i>i.</i> (3 : 1)	—	10.0	—	—
Os coxae	12	Breadth of the ilium	—	—	—	(113?)
Femur	1	Maximum length	—	422	(341)	—
	2	Whole length in natural position	—	417	—	—
	6	Sagittal diameter in the middle of the diaphysis	—	24	22	—
	7	Transversal diameter in the middle of the diaphysis	—	22	19	—
	9	Upper transversal diameter of the diaphysis	—	29	25	—
	10	Upper sagittal diameter of the diaphysis	—	21	18	—
	20	Circumference of the caput	—	126	—	—
	—	Robusticity <i>i.</i> (6 + 7 : 2)	—	10.9	—	—
	—	I. of the middle diaphyseal section (6 : 7)	—	109.1	115.8	—
	—	I. of the upper diaphyseal section (10 : 9)	—	72.4	72.0	—
	—	Robusticity <i>i.</i> of the caput (20 : 2)	—	29.9	—	—
Tibia	1	Whole length	—	—	(275)	(274)
	8a	Maximum diameter at the foramen nutritium	—	31	25	26
	9a	Transversal diameter at the foramen nutritium	—	16	17	18
	10b	Minimum circumference of the diaphysis	—	63	54	55
	—	Length-thickness <i>i.</i> (10b : 1)	—	—	(20.1)	(19.6)
	—	Cnemic <i>i.</i> (9a : 8a)	—	51.6	69.2	68.0
Fibula	4a	Minimum circumference	—	27	—	—
Talus	1	Length	—	48	—	—
Calcaneus	1	Maximum length	—	70	(61)	(62)

of *Kh.* is clearly within the feminine range for Egypt, near the mean. At the same time, the values of the circumferences of the individual arm bones are extremely small, resulting in extremely low length-thickness indices of the antebrachial bones in *Kh.* Such low values could possibly be expected in the juvenile *T.*, but they appear rather striking in the adult *Kh.* Together with the underdevelopment of her muscular relief (*tab.* 8) this finding could be explained both genetically and/or as the result of way of life of a Princess.

Of the lower extremity bones, the length of the right femur of *Kh.* shows a value of the feminine range for Egypt, near the mean. The diaphyseal lengths of the left femur and both tibiae of *T.* are still clearly low, in accordance with her age and taking into account the possibility that the growth

period could be prolonged and maturation delayed in the Ancient Egyptians. (Similar observation was made in young Nubian males [Strouhal 1970] and in Nubian school-children [Harris et al. 1980: 331]). In spite of the fact that the absolute diameters of the left femur of *T.* are still clearly smaller than those of the right femur of *Kh.*, their indices are identical or similar: the index of the upper diaphyseal section is hyperplatymy in both persons, the index of the middle diaphyseal section revealing a pilaster by its values above 100.0. While the maximal diameter at the foramen nutritium and the minimal circumference of the diaphysis of tibia are, for *Kh.*, in the feminine range for Egypt, the transversal diameter is extremely low, causing the extremely hyperplatycnemic value of the cnemic index. The same absolute measurements for *T.* are



still all small and her index mesocnemic, most probably in harmony with her juvenile age. The same applies to her length-thickness index. The minimum circumference of the right fibula of *Kh.* lies at the lower limit of the Egyptian female range, while the lengths of both talus and calcaneus are within the range.

The stature of *Kh.*, reconstructed from the length of her right antebrachial bones and femur according to the tables of Trotter and Gleser (1952) for white females, was found to be 160 cm. When tables for black females were used, the stature was 155.8 cm only, near the average for Ancient Egyptian females. The stature of *T.*, assessed by means of the length of diaphysis of the left femur with the help of the table of Stewart (Olivier 1960: 259), was determined as 151.3 cm, a value below the female average, but in accord with her juvenile age and supposition of the growth prolongation.

TABLE 6. *Epigenetic features of the skull and postcranial skeleton*

No.	Feature	Khekeret-nebty	Tisethor
2	Ossicle at the lambda	0	0
3	Lambdoid ossicle	+	+
4	Parietal foramen	0	+
5	Bregmatic bone	0	0
6	Metopism	0	0
7	Coronal ossicle	0	0
8	Epipteric bone	0(L) +(R)	—
9	Frontotemporal articulation	0	—
10	Parietal notch bone	0(L) +(R)	0
11	Ossicle at asterion	+	+
12	Auditori tori	0	0
13	Foramen of Hushke	0	0
14	Mastoid foramen exsutural	+	+
18	Precondylar tubercle	0	0
23	Palatine torus	0	0
24	Maxillary torus	0	0
26	Supraorbital foramen complete	0	—(L) 0(R)
27	Frontal foramen accessorium	0(L) +(R)	—(L) 0(R)
—	Os japonicum	0	0
—	Os incae	0	0
—	Remnants of glabellar suture	+	0
—	Bifidity of cervical vertebrae (C <sub>2,4,6</sub> )	+	+(C <sub>2</sub> ) —(C <sub>4,6</sub> )
—	Accessory opening at foramen transversarium of C <sub>2</sub>	0	0
—	Accessory opening at foramen transversarium of C <sub>4</sub>	0	+(L) —(R)
—	Accessory opening at foramen transversarium of C <sub>6</sub>	+	+(L) —(R)
—	Perforation at the lower metaphyses of humeri	+	+
—	Squatting facettes of tibiae	—	+

No. = number of the feature according to Berry and Berry (1967);  
 additional features are not numbered  
 0 = feature absent  
 + = feature present  
 — = feature undeterminable  
 (L) = left side  
 (R) = right side  
 (Features without side indication are either single or identical on both sides)

TABLE 7. *Descriptive features of the skull*

Feature	Khekeretnebty	Tisethor
Robusticity of the skull	gracile	gracile
Tubera frontalia	medium	slight
Shape of the orbits	rectangular	rectangular
Axis of the orbits	very oblique	very oblique
Upper margin of the orbits	thin and sharp	thin and sharp
Shape of the nasal bones (Martin and Saller 1959)	2nd form	2nd form
Lower margin of the piriform aperture (Hovorka, in Martin and Saller 1959)	anthropin form	anthropin form
Fossa canina	slight	medium
Processus marginalis Sömmeringi	missing	slight
Spina nasalis (Broca, in Martin and Saller 1959)	3rd degree	2nd degree
Profile of the nasal back	slightly concave	—
Nasofrontal transition	widely open angle	—
Prominence of zygomatic bones	none	none
Arcus superciliares (Eickstedt 1944)	1st—2nd degree	1st—2nd degree
Glabella (Broca, in Martin and Saller 1959)	2nd degree	2nd degree
Alveolar prognathism	medium	medium
Profile of the forehead	slightly oblique	slightly oblique
Profile of the parietal region	drawn up and back	drawn up and back
Flatness of the lambda region	medium	slight
Bulging of the occipital scale	slight	—
Protuberantia occipitalis externa (Broca, in Martin and Saller 1959)	degree zero	—
Lineae temporales	slight	slight
Supramastoid crest	slight	slight
Outline of the skull in vertical norm (Sergi, in Martin and Saller 1959)	ovoid	ovoid
Tubera parietalia	rhomboid	rhomboid
Outline of the skull in occipital norm (Eickstedt 1944)	slight	medium
Muscular relief at the nuchal plane	bomb form	house form
Shape of the upper dental arch	very slight	—
Depth of the palate	ellipsoid	ellipsoid
Robusticity of the mandible	medium	slight
Muscular relief of the mandible	gracile	gracile
Mandibular angle	moderate everted and inverted	moderate slightly everted and inverted
Shape of the lower dental arch	paraboid	paraboid
Shape of the chin (De Villiers 1968)	round chin (A)	round chin (A)
Prominence of the chin	expressive	expressive



# EPIGENETIC FEATURES (TAB. 6)

Of the 27 features recorded from the skull and postcranial skeleton, 24 could be compared in both individuals. Of these 19 (79.2 %) were found to be identical, five (20.8 %) being different. These are the parietal foramen, present only with *T.*, two tiny parietal notch bones, inserted only on the right side of *Kh.*, the accessory frontal foramen developed solely on the right side of *Kh.*, a remnant of glabellar suture present only with *Kh.*, and an accessory opening at foramen transversarium of vertebra *C*<sub>4</sub>, found only with *T.*

## DESCRIPTIVE FEATURES

Of the 35 cranial descriptive features (*tab. 7, plates I, II*), 30 can be compared in both indi-

viduals. Of them 22 (73.3 %) are identical. Of the rest, 7 (23.3 %) are similar, differing a single degree, and most probably connected with the age difference of the two persons. These are the tubera frontalia, fossa canina, processus marginalis, spina nasalis, flatness of the lambdoid region, tubera parietalia, and depth of the palate. A significant difference was found only in a single feature (3.3 %), in the occipital outline of the skull, showing a bomb shape with some assymetric bulging of the right parietal bone above the notch bone with *Kh.*, but a classical house form with a low vault with *T.*

Of the 22 postcranial descriptive features recorded (*tab. 8*), 18 can be compared in both persons. Of these 16 (88.9 %) were identical, 2 (11.1 %) different, viz. an expressive linea trapezoidea of the left clavicle in *Kh.*, but only slightly developed in *T.*, and a slight pilaster with *Kh.*, but a more pronounced one with *T.*

TABLE 8. Descriptive features of the postcranial skeleton

Bone	Feature	Khekeretnebt	Tisetthor
Clavicle	Impressio ligamenti costoclavicularis	slight (L)	slight (L)
	Linea trapezoidea	expressive (L)	slight (L)
Humerus	Robusticity	extremely gracile	extremely gracile
	Crista tuberculi maioris	slight and smooth (R)	slight and smooth
	Crista tuberculi minoris	slight and smooth (R)	slight and smooth
	Tuberositas deltoidea	very slight (R)	very slight
Radius	Robusticity	extremely gracile (R)	extremely gracile (R)
	Muscular relief	slight (R)	slight (R)
Ulna	Robusticity	extremely gracile	extremely gracile (R)
	Muscular relief	slight	slight (R)
Femur	Robusticity	gracile (R)	gracile (L)
	Tuberositas glutea	slight (R)	slight (L)
	Trochanter tertius	none (R)	none (L)
	Fossa hypotrochanterica	none (R)	none (L)
	Tuberculum adductorium	none (R)	none (L)
	Pilaster (Martin and Saller 1959)	1st degree (R)	2nd degree (L)
Tibia	Robusticity	gracile (R)	gracile
	Linea musculi solei	slight and rough (R)	slight and rough
Fibula	Robusticity	gracile (R)	—
	Vertical grooves	slight (R)	—
	Curvature	great (R)	—
	Shape of the section	very flat (R)	—

## PATHOLOGICAL FINDINGS

*Khekeretnebt*. An incipient diffuse osteoporosis of the postcranial skeleton (*figs. 6, 7*), but not of the cranial bones (*fig. 8*) was detected by means of X-rays. Both first upper premolars and left lower third molar were lost ante-mortem. In spite of the fact that no tooth decay was found in the preserved teeth, the cause of the loss was most probably caries, because abrasion did not yet reach the extreme degree with pulp exposure, and there were no signs of a paradontopathy. On the other hand, tartar was present on the buccal sides of both upper first molars and on both sides of the lower molars and left



FIGURES 6, 7. Radiograms of long bones of extremities of *Khekeretnebt*. Conf. their very gracile structure.



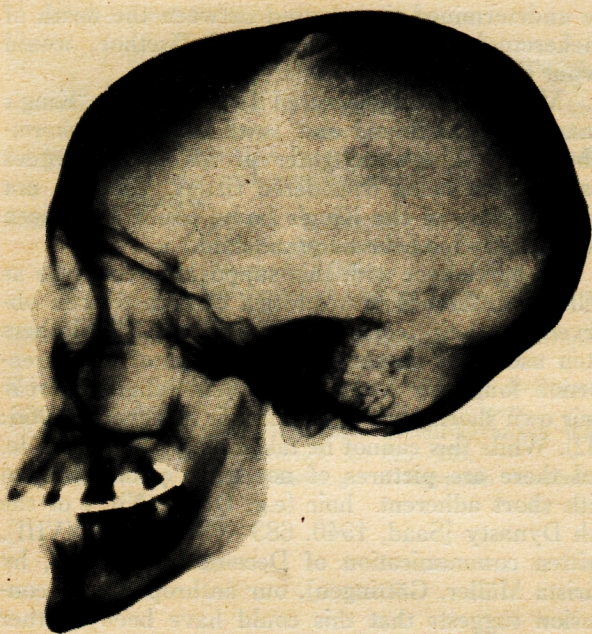


FIGURE 8. Radiogramm of skull of Khekeretnebt in lateral view.

second premolar, always being located only supra-gingivally.

*Tisethor.* No pathological changes were encountered in the skull and skeleton except for signs of a slightly narrow position of the lower frontal teeth.

#### HISTOLOGICAL ANALYSIS

(By Alena Němečková)

Two different samples of soft tissues of the Princess Khekeretnebt were submitted for histological analysis to the Department of Histology and

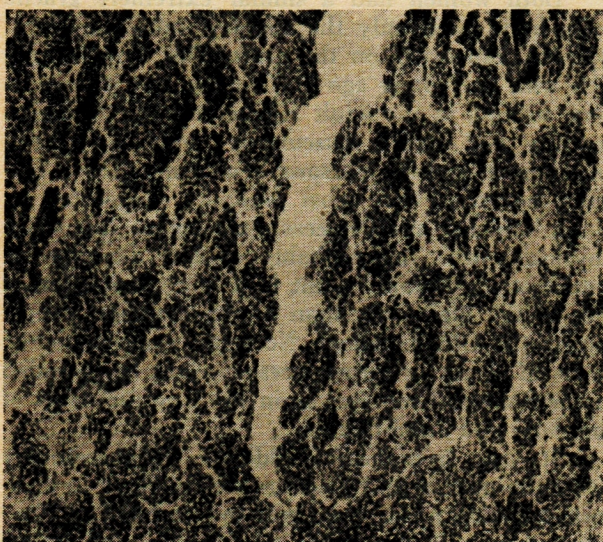


FIGURE 9. Thin section of muscular tissue of Khekeretnebt ( $\times$ ).

Embryology of the Medical Faculty of Charles University in Plzeň, where histological work on naturally and artificially mummified material had already been performed on several occasions (Němečková, 1976).

The material examined was dry, very brittle and of dark brown colour. Before actual processing the tissues had to be saturated with water-steam. Then softening fluid modified after Ruffer (1910) was used. The following fixation was performed with picroacetic-sulphuric acid over 24 hours and the material was then embedded into paraffin. The thickness of thin sections varied between  $7-10\ \mu$ . The following staining methods were tried: hematoxylin-eosin, orcein, Alcian blue, nuclear red and the modification of Golgi's impregnation method according to Bubeinat. The test for amyloid by Congo red was negative. (Amyloid is a substance composed of proteins and polysaccharides, depositing in organs during disintegration of the tissues.) In spite of the same staining time, each this section accepted a different amount of colour.

The first sample (fig. 9) gave evidence suited to muscular tissue with relics of blood vessel walls. The structure did not show any abnormality that might point to pathologically dystrophic tissue.



FIGURE 10. Thin section of brain tissue of Khekeretnebt ( $75\times$ ).



It was not possible to cut the sample in longitudinal sections because of the very small size of the fragments.

The second sample showed structures characteristic of brain tissue, similar to the pictures illustrating the previous study on histology of Egyptian mummies (Němečková, 1977). Blood vessels were preserved with small remnants of vessel walls. Inside the vessel some formation are visible which suggest the blood elements. However, we have not succeeded in staining them. Neither erythrocytes have been proved (*fig. 10*).

## BLOOD GROUPS

(By Jaromír Tesař and Přemysl Klír)

The blood group of Princess Khekeretneby was determined from samples of brain and bone tissue, and from fabric which had been in very close contact with her body tissues. For Tisethor, two bone samples, cranial and postcranial, were analysed.

The examination was performed by the absorption elution method, using sera anti-B and anti-A, over 48 hours. The presence of the serum in eluates was detected by a suspension of erythrocytes of appropriate group in beef serumalbumin.

The tissues of both individuals showed consistently blood group A on repeated analyses. The fabric showed these results in a single case, which indicates that the piece of fabric was contaminated with the antigen substance from the body tissues rather than that the reaction was non-specific.

## CONCLUSIONS

The described demographic data show the sex of both deceased persons to accord with the gender of their names. From the location of the anthropological finds there cannot be doubt that we have the remains of the original occupants of the mastaba. (No other, alien anthropological material, e.g. from secondary burials, was found inside the mastaba.) The first of them, Princess Khekeretneby, for whom the tomb was built, died aged 30–35 years. The second occupant, Tisethor, for whom it was adapted some time after the burial of Khekeretneby, was 15–16 years old.

The comparative analysis of the metric, epigenetic and descriptive features of the skull, mandible and postcranial skeleton shows the morphological and genetic similarity of both persons. This result has been further strengthened by the finding of identical blood groups. We may therefore conclude that Princess Khekeretneby and the girl Tisethor were closely related. Tisethor could have been either a younger sister or a daughter of Khekeretneby. Their 14–20 years difference in age at death, plus

the undetermined time lapsed between the death of Khekeretneby and the death of Tisethor, would favour the second possibility.

Moreover, comparison of Tisethor's title "King's ornament, his beloved one" with that of Khekeretneby "the King's daughter of his body" argues against them being considered sisters. Tisethor, not being directly of the King's body, could have been conveniently his beloved grandchild.

In agreement with this supposition could be as well the difference in headdress of both women observed in their iconography (*figs. 2–3*). Mothers often use to be depicted carrying wigs of the threeportion long hair form, while their daughters wear their own shortly cut adherent hair (Stachelin, 1966: 182). While this cannot be taken as an absolute rule, and there are pictures of not quite young women with short adherent hair (e.g. Queen Nb. t of the Vth Dynasty [Saad, 1940, 683–684, pl. LXXVIII], written communication of December 10, 1981, by Christa Müller, Göttingen), our anthropological conclusion suggests that this could have been another example of a mother and daughter distinguished by their headdress forms.

The facts that Tisethor was buried in the same mastaba as Princess Khekeretneby — in a specially built area (her shaft and burial chamber were, none the less, of somewhat smaller dimensions (*fig. 1*), depicted in the same fashion before a similar offering table, and related as the Princess of the king by a title, rule out the previously discussed possibility that the younger lady could have been an attendant or courtier without a blood-relationship to the Princess.

As concerns the embalming techniques, the body of Princess Khekeretneby was dried and wrapped in bandages without the use of resin. The untouched skeleton of the nasal passage as well as the results of the histological study indicate clearly that the brain was not removed. No details of this kind could be, unfortunately, observed in the more damaged and defective remains of Tisethor.

Both women had a similar extremely gracile body build with only the slightest muscular development, especially on the arms. This would agree well with the young age of Tisethor, but it appears very striking in the adult Khekeretneby. Although gracility and feeble muscularity could have been determined in both persons genetically, these features, however, were most probably exaggerated by living habits of the Princess, exerting no important physical work. The probably curious dentition of Khekeretneby would point to a more sophisticated diet of the high class than of the common people during the Old Kingdom. No signs pointing to the cause of death of either person could be revealed in their skeletal remains or in the tiny remnants of muscular and brain tissues.

If our hypothesis holds — Khekeretneby being the mother and Tisethor the daughter — a natural question arises: who was the husband of Khekeretneby and the father of Tisethor and where was he buried?



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