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F A R C

Physical anthropological analysis of juvenile skeletal remains recovered from Boikarabelo

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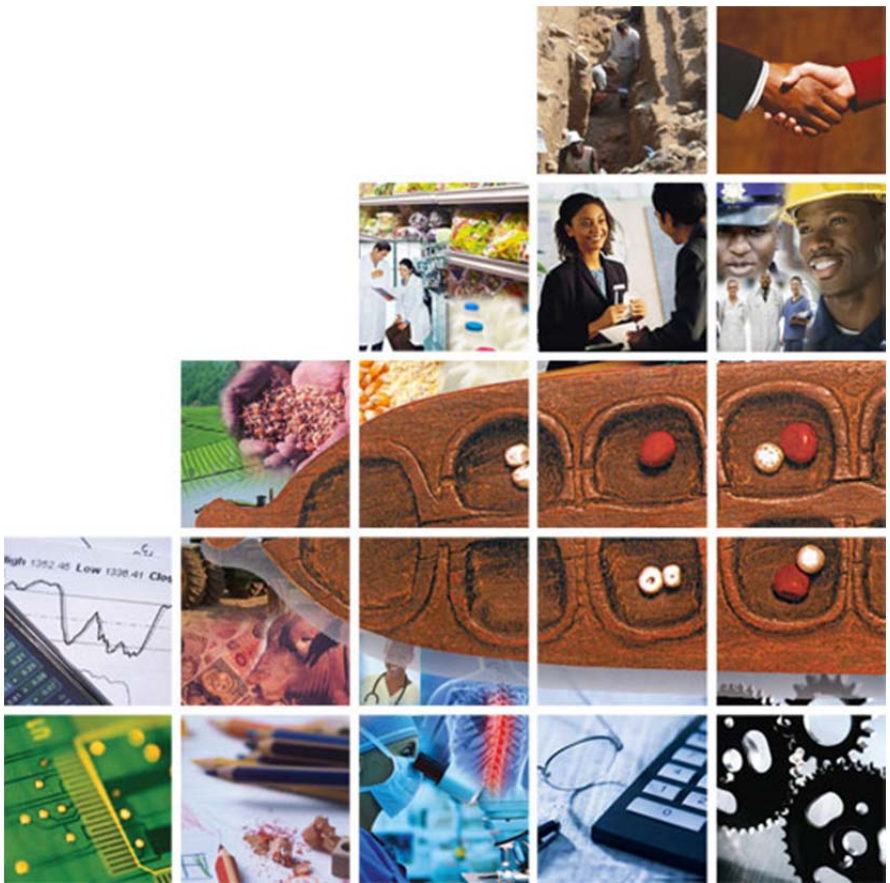

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1. Human skeletal remains

The remains presented that of one juvenile individual. The remains were fully skeletonized, and preservation was fair. The remains were cleaned with soft brushes to remove any excess soil. Areas of more visual importance, such as bones indicating pathology or trauma, as well as the teeth, were cleaned with water and brushes. Overall the cleaning process was performed in such a way as to prevent any damage to the skeletal remains. Partial reconstruction of the skull was undertaken using non-destructive reversible techniques.

The analysis of the remains entailed a standard physical anthropological analysis and the "*Standards for data collection from human skeletal remains"* by Buikstra and Ubelaker (1994) was used as a basis for this analytical procedure. Standardised osteometric measurements of the cranial and postcranial elements were taken where possible. These measurements are provided in table 1.

2. Analytical methods

The remains were cleaned and analysed using standard physical anthropological techniques (Buikstra and Ubelaker, 1994). Age at death was estimated by the degree of epiphyseal closure (Krogman and Íşcan, 1986; Scheuer and Black, 2004; Schaefer *et al.,* 2009) and the degree of tooth development (Scheuer and Black, 2004; Schaefer *et al.,* 2009).

Due to the young age of the individual sex, ancestry and stature could not be determined by using the usual morphometric techniques. Ancestry can however be inferred from the archaeological context of the remains which would suggest that the individual is most probably of African ancestry.

Several sources were referred to for any possible pathology observed on the skeleton and teeth (Aufderheide and Rodríguez-Martin, 1998; Hillson, 1998; Ortner, 2003).

3. Results

3.1. Preservation and inventory

The remains were in a fair to poor state of preservation. Most of the skeleton was represented, however, many skeletal elements presented with post-mortem damage (Fig. 1). The skull was fragmented but almost complete except for some post-mortem damage to the sphenoid, zygomatic bone, maxilla and portions of the mandible. The post-cranial remains were almost complete except for the sternum, two left ribs and five right ribs, three cervical vertebrae and seven thoracic vertebrae, the left and right ischium and pubis, portions of the sacral segments, 15 carpals, five metacarpals, 20 hand phalanges, all 14 tarsals, three metatarsals and all the foot phalanges.

Figure 1: Skeletal remains present

3.2. Age at death

Dental eruption suggested an age range of 3 years ± 12 months as suggested by the complete eruption of all the deciduous teeth. The skull presented with a closed anterior fontanel indicating an age older than 2 years. Vertebral fusion suggests and age older than 2 but younger than 6. C1 and C2 were almost completely fused, except for slight fusions lines still visible between the neural arches and the centrum which would suggest an age older than 2 years. The centrum and neural arches of the thoracic and lumbar vertebrae were, however, still unfused suggesting an age younger than 6 years. The presence of a carpal bone, specifically the ossification center of the lunate, suggests an age of between 3 to 4 years. The anterior border of the ilium was bent forward in the vertical plane and presented with clear demarcation of the iliac and ischial articular sites further indicative of an age of between 3 and 4 years. Finally the presence of the

femoral head epiphyses (hemispherical and clearly recognizable) similarly suggested and age range of between 3 and 4 years. This individual was therefore estimated to have been between 3 and 4 years at the time of death.

3.3. Sex

Due to the young age of this individual sex could not be determined as secondary sexual characteristics have not yet developed.

3.4. Ancestry

Due to the young age of this individual ancestry could not be determined. The archaeological Iron Age context of the remains however suggests a possible African ancestry for this individual.

3.5. Stature

Stature was not calculated due to the fact that epiphyseal union of long bones has yet to take place.

3.6. Dentition

Almost all the deciduous teeth were present except for the upper left and right lateral incisors which were lost post-mortem. No dental pathology could be observed.

3.7. Trauma and pathology

No trauma or pathology could be observed.

4. Conclusion

The remains are that of a juvenile with an estimated age of 3 to 4 years at the time of death. No signs of trauma or pathology, which may indicate the cause of death, could be observed.

5. Recommendations

To date the skeletonized remains of four individuals have been accidentally uncovered during mining activities at the Boikarabelo Coal Mine. (Refer to Meyer (2014) for the physical anthropological report of the three previously uncovered individuals). The rescue excavation report (Nel, 2014) indicates the presence of archaeological deposits and low visibility surface scatter associated with a possible Iron Age settlement. It is therefore recommended that a follow up site visit be done to try and establish the archaeological context of the human remains recovered, as well as to explore the necessity of mitigation before further mining activities takes place in this area.

6. References

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Table 1: Cranial and postcranial measurements

All measurements in mm

-: skeletal element was absent or damaged and therefore measurements could not be obtained

n/a: not applicable

Skeletal dimension	Left	Middle	Right
Cranial dimensions	-	n/a	-
Length of sphenoid lesser wing	-	n/a	-
Width of sphenoid lesser wing	-	n/a	-
Length of sphenoid greater wing	-	n/a	-
Width of sphenoid greater wing	-	n/a	-
Length of sphenoid body	-	n/a	-
Width of sphenoid body	-	n/a	-
Length of temporal bone (petrous and mastoid)	68.36	n/a	68.39
Width of temporal bone (petrous and mastoid)	40.87	n/a	37.71
Length of occipital basilar part	n/a	14.72	n/a
Width of occipital basilar part	n/a	25.93	n/a
Length of zygomatic	-	n/a	-
Width of zygomatic	-	n/a	-
Length of maxilla	-	n/a	-

Height of maxilla	-	n/a	-
Width of maxilla	-	n/a	-
Length of mandible body	57	n/a	-
Width of mandible arc	-	n/a	-
Full length of half mandible	n/a	-	n/a
Postcranial dimensions			
Clavicle length	-	n/a	-
Clavicle diameter	6.00	n/a	5.97
Scapula height	-	n/a	-
Scapula width	-	n/a	-
Scapula spine length	-	n/a	-
Ilium length	53.21	n/a	-
Ilium width	53.58	n/a	-
Ischium length	-	n/a	-
Ischium width	-	n/a	-
Pubis length	-	n/a	-
Humerus length	-	n/a	-
Humerus width	-	n/a	-
Humerus diameter	10.91	n/a	11.08
Ulna length	-	n/a	-
Ulna diameter	7.62	n/a	-
Radius length	-	n/a	-
Radius diameter	7.25	n/a	7.85

Femur length	-	n/a	-
Femur width	-	n/a	-
Femur diameter	13.13	n/a	13.05
Tibia length	-	n/a	-
Tibia diameter	11.34	n/a	11.47
Fibula length	-	n/a	-
Fibula diameter	5.86	n/a	-