SAM AP-5036 : A possible case of Paget's Disease in the South African prehistory

Report to the South African Heritage Resources Agency (SAHRA)

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Introduction

SAM-5036 is a Holocene human skeleton that display's gross pathological features which are consistent with Paget's disease of the bone (Hamdy, 1981). It was discovered by Q. B. Hendey and J. Adams in the vicinity of Melkbosch Strand in 1964 during the excavation of a shell midden (Morris, 1992). Although Paget's disease has been ascribed several times to specimens of archaeological bone, SAM-5036 would, to our knowledge, represent the first case of Paget's disease in a South African archaeological human skeleton, making this a very important specimen.

Application was made to the South African Heritage Resources Agency (SAHRA) to take bone samples from this skeleton for the purposes of dating as well as for isotopic and histological study. Herewith follows a report of work completed on this skeleton.

Background to disease

Paget's disease is a focal disorder initiated by excessive bone resorption and followed by excessive and disorganised new bone formation (Singer et. al., 1978). Newly formed bone is architectually abnormal. There is no consensus regarding the aetiology of the disease. The most commonly debated causes include inflammatory disorder, hereditary disorder, neoplastic disorder vascular disorder, trauma, endocrinological disorder and immunological disorder (Hamdy, 1981). Weight-bearing bones are most frequently affected by Paget's disease. They lose their rigidity, are unable to support the weight of the body and start bowing. Fractures may occur when bowing becomes excessive. Muscle insertion sites are often enlarged. The disease may not be symmetrical, and often only one side of the body would be affected. Due to mechanical stress on joints and a decrease in bone strength, osteoarthritis often occurs on the joints of affected limbs. Although the skull vault may become gradually larger, the mandible is rarely affected. Vertebral bodies may be crushed.

There are great variations in the incidence of the disease throughout the world. It is frequently seen in Great Britain, the USA, New Zealand, Germany, France, but is rarely seen in Africa. Paget's disease is known in antiquity. Prehistoric Native American skeletons discovered in Illinois River Valley and Wisconsin show the effect of Paget's disease; a parietal bone found in an ancient Egyptian tomb; the remains of a skull dating from the Gallo-Roman period and a femur dating from the neolithic period.

SAM AP 5036

Sex:

Based on the development of the mental eminence (2) (Walker in Buikstra and
Ubelaker 1994), the angle of the sciatic notch (3) (Walker in Buikstra and Ubelaker
1994) and the shape of the subpubic region (broad medial surface), this skeleton
belongs to a male.

Age:

Based on pubic symphysis Todd pubic symphysis scoring system (1920)-stage IX :
44-50 yrs.
Based on Auricular surface Lovejoy et al. (1985)-phase 6 to 7: 45 –55 yrs.

Description of skeleton and pathologies

Cranial:

The mandible is the only cranial element represented. Preservation is good with all
teeth present and in occlusion. The mandible is largely symmetrical with no signs of
pathologies. The specimen's dentition is in outstanding condition, with no sign of
dental caries or abscesses. The anterior teeth preserve a small amount of dental
calculus on both the labial and lingual sides while slightly more are present on molars.
Wear is extensive with large areas of dentine exposed in all teeth. Wear is especially
marked in the central incisors. These teeth display labial rounding, a phenomenon that
has been attributed to nonmasticatory utilisation (Hinton, 1981). All these factors are
typical of a person pursuing a hunter-gatherer lifestyle.

Post cranial:

The clavicals are assymetrical. The right **clavical** (sagittal diameter-anterior posterior:
14.1mm; vertical diameter-superior-inferior: 8.6 mm) is overall more robust than the
left (sagittal diameter: 12.5 mm; vertical diameter: 8.1mm).

The **scapulae** are symmetrical and there are very little differences in dimensions.

The humeri are asymmetrical. The right **humerus** (328mm) is longer than the left
(321mm), however the left humerus is more robust. The muscle attachment sites for
the pectoralis major and deltoid muscles as well as that for the lateral head of the
triceps muscle are extremely pronounced in the left humerus. There are minimal
development of these sites in the right humerus. The left humerus also displays an
area of erosive reaction on the medial surgical neck and lesser tubercle. Cysts are
present on the superior end of the articular surface of the proximal left humerus.
The both humeri display minimal osteophytic growth on the margins of both proximal
and distal ends.

The right **radius** is overall more robust than the left. Besides being longer (249mm)
than the left (241mm), the right radius (anterior-posterior: 11.4mm; medio-lateral:
14.1mm) is also thicker than the left (anterior-posterior: 10mm; medio-lateral:

13.3mm) at midshaft. While no osteophytic growth occurs on either the proximal or distal ends of the left radius, the right radius displays a slight border on the proximal end and extensive osteophytic formation on the anterior and posterior distal end.

The right **ulna** (258mm) is slightly longer than the left (255mm). The distal end of the right ulna is slightly enlarged and shows slight osteophytic growth. The triceps muscle attachment sites are enlarged on both left and right ulnae. Slight borders occur on the proximal and distal ends of both ulnae.

The acetabulum of the right **os coxae** is enlarged compared to the left acetabulum. There are also extensive osteophytic growth around the margins of the right acetabulum. The right os coxae also displays evidence of *protrusio acetabuli*. The left acetabulum also displays some osteophytic growth around its margin.
Both **femurs** are bowed laterally. The head of the right femur is distorted (fovea capitis not visible) and the femoral neck is shortened. Massive osteophytic growth occurs around the margins of the right femoral head. Ebernation is present on the medial articular surface of the right femoral head. Areas of bone resorption occurs across the proximal end, especially at the inferior medial part of the head. The attachment sites for the adductor muscles are enlarged. The neck of the left femur is also shortened. Although osteophytic growth occurs on the margins of the head, growth is not as prolific as seen in the right femur. Unlike the right femur, the head of the left still maintains its shape and the fovea capitis is visible. The attachment sites for the abductor muscles, vastus intermedius, vastus medialus and the short head of the biceps, are enlarged and display signs of muscle pull. There is slight lipping on the border of the distal articular surface.

The left **tibia** is bowed anteriorly. There are slight osteophytic growth on the borders of the proximal and distal epiphyseal ends. The attachment site for the soleus muscle is pronounced. The left tibia on the other hand displays no bowing. However, it is anteriorly narrowed. The proximal end displays minor osteophytic growth.

The left **fibula** displays slight bowing. The right tibia displays no bowing.

The sacrum displays osteophytic growth around the periphery of the body. Areas of bone resorption are present on the sacroiliac joint. The lumbar, thoracic and cervical vertebrae display signs of osteophytosis as well as osteoarthritis on apophyseal joints. The second and third thoracic vertabrae are fused at the facets and unilateral spondylolysis is present on the third thoracic vertebrae.

There is minimal osteophytic growth on the articular surfaces of both **calcanea**. The tendo calcaneus (achilles tendon) and abductor hallucis sites are enlarged.

Both talus display minimal osteophytic growth on articular surfaces.

There is osteophytic growth on articular surfaces of both the left and right patellae. The attachment site for the rectus femoris of the quadroceps tendon on both patellae. The attachment site on the left patella is however bigger.

The sternum is present but preservation of the surface is bad.

Most rib ends display osteophytic growth on their articular surfaces.

A few carpals display osteophytic growth.

Both first metatarsals display extensive osteophytic growth on the distal ends. The first and second phalanges of the great toe display enlarged proximal ends with osteophytic growth.

Dating and microscopic study

We have received a date for this skeleton and isotopic work has been completed. A date of 2960 +/- 60 (Pta – 8445) is very exciting, since it places this individual amongst the earliest known cases of Paget's disease in the world. Isotopic readings of d 13C: -12.5 and d 15N: +15.2 indicate a diet with a large marine component, typical of skeletons dating to the 3rd millennium B. P. Radiographs of this skeleton indicate that bone is very dense. The structure of the bone (resembling crushed glass) is typical of Paget's disease. Unfortunately hystological work has not progressed as desired. Two sets of samples have been taken and are under study by Prof. A. Chinsamy-Turin of UCT and Iziko Museums of Cape Town (Natural History Museum), and scientists at the Anatomical Pathology Department at UCT. Since these individuals are not specialists in human palaeopathology, study is progressing slowly and in some cases not at all. It is hoped that some result would be forthcoming sometime soon since hystological study is the only way to confirm the presence of Paget's disease in this skeleton.

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Re.: <u>Report to the South African Heritage Resources Agency</u>

Dear Mary,

This is the report on the Paget's diseased skeleton for which I requested permission to take samples for dating, isotopic and histological study. As you can see from the report, we have a date for the skeleton and have isotopic results. Unfortunately we have no histological results because of various reasons. The samples are still with the experts though and I am still hoping for results. In the meantime, I thought that I should send you a report on what I have got so far. Sorry it's late, but I wanted to send you all the results at once. I will send you the histological results as soon as I receive them however.

Keep well.

Yours truly,
Deano Stynder