OSTEOLOGICAL EVALUATION

Prepared by

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Product No. FM-501-SET

Human Fracture Set

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Product Number: FM-501-SET

Known Information:

These remains are from a 62-year-old European American male who died due to alcoholism. This information was documented at the time of the individual's death.

Maxwell Museum of Anthropology:

The Maxwell Museum of Anthropology's Laboratory of Human Osteology, at the University of New Mexico, specializes in numerous facets of physical anthropology. The laboratory serves as a repository of human remains and includes prehistoric, historic, documented, and forensic remains.

Established in 1984 by Dr. J. Stanley Rhine, the Maxwell Museum's Documented Skeletal Collection has grown to include 237 individuals (as of July 2005) encompassing both sexes, all ages, and many population groups. The skeletal remains are obtained by donation, either by the individual before death, or by the family of a deceased loved one. Information on the sex, age, population affinity, and cause of death is available for the majority of these individuals, allowing students and visiting researchers to develop and test new techniques and theories.

Since 1995, prospective donors or their families have been asked to provide health and occupational data as well. With this information, researchers are able to examine the skeletal manifestations of particular diseases including degenerative joint and disc diseases, lymphoma, and osteoporosis, as well as the reaction of bone to repetitive motions and trauma. Recent research has included efforts towards the identification of handedness in individuals, determination of body mass from the skeleton, and variation in cranial damage from various projectiles. The importance of the Documented Collection cannot be overstated. No other institution in the American West has as large a collection of human skeletal remains with such extensive demographic data.

Bone Clones is grateful to the Maxwell Museum for allowing us to select specimens for reproduction from their valuable collection and granting us exclusive casting rights to these pieces.

Human, Male, Remote lower extremity fractures

PRODUCT NUMBER: FM-501-SET

SPECIMEN EVALUATED: Bone Clones® replica

SKELETAL INVENTORY: Right and left innominates
Right and left femora
Right and left tibiae
Right and left fibulae

GENERAL OBSERVATIONS:

In general, the molding process has preserved significant details necessary for evaluation. The remains are totally skeletonized.

OSTEOLOGIC OBSERVATIONS:

The head of the left femur is separate from the trochanter, and the femoral neck is absent. The femoral head is hemispheric instead of spherical, its articlar surface is rough and irregular, and the opposite surface is flattened. The acetabulum of the left innominate bone is shallow and is lined by a layer of new bone growth.

There is an irregular bony callus at the distal end of the left femur, proximal to the condyles.

The left tibia has an oblique irregularity in the proximal shaft. The irregularity consists of mild medial, and slight posterior displacement of the distal shaft relative to the proximal shaft, and bony outgrowths along the oblique lesion. The shaft of the tibia has resultant mild media bowing associated with the proximal irregularity.

The oblique irregularity in the left tibia represents a callus from an old healed oblique fracture, which was not optimally aligned.

The left fibula has an oblique irregularity in the proximal shaft with bony outgrowth along the lateral aspect of the proximal border of the irregularity. The fibula has gentle medial bowing of the entire shaft.

The right tibia has an obvious irregularity in the proximal shaft with prominent anterior displacement of the proximal plateau relative to the distal shaft. Some bony outgrowth is associated with this irregularity, which is oblique from anterior to posterior.

The right fibula has a gross deformity in the proximal third of the shaft with marked anterior and moderate inferior displacement of the proximal end. The deformity results in shortening of the fibula.

There are generalized osteophytic irregularities beyond the healing fractures.

SEX DETERMINATION:

Pelvic morphology:

The innominate bones are somewhat rugged, and have prominent sites for musculofascial attachment. The ilium is somewhat prominent in the superoinferior plane (i.e., extends vertically). There are slight bilateral preauricular sulci. The greater sciatic notch is narrow. The subpubic angle is acute. The pubis is not significantly widened. There are no ventral arcs. There is no subpubic concavity. The ischiopubic ramus is thick and its medial aspect is broad and flat. The obturator foramen is large and somewhat ovoid.

The totality of pelvic features is most in keeping with male sex.[1-4]

Femoral head diameter:

The diameter of the femoral head is 49 mm. This is suggestive but not diagnostic of male sex.[5, 6]

The totality of features is most in keeping with male sex.

AGE DETERMINATION:

Epiphyseal Union:

All of the epiphyseal growth plates are fused. This suggests that the individual was older than 20 years at the time of death.[7]

Todd Pubic Symphysis Scoring System:

Degenerative features on the pubic symphyseal surface are in keeping with Todd phase 10. This suggests that the individual was older than 50 years at the time of death.[8, 9]

Suchey-Brooks Pubic Symphyseal Phase:

Degenerative features on the pubic symphyseal surface are in keeping with a Suchey-Brooks phase VI. This suggests that the individual was 61.2 years +/- 12.2 years (95% confidence interval 34 – 86 years) at the time of death.[10]

The totality of features is most in keeping with an adult older than 50 years at the time of death.

DETERMINATION OF STATURE:

Measurements were taken from RIGHT-sided elements.

Femur 45.3 cm
Estimated height = 169 cm +/- 3.27 cm

The totality of data produced by regression equation calculations suggests that the individual stood between 166 cm and 172 cm tall.[8]

SUMMARY:

1. Male.

2. Most likely greater than 50 years.

3. Approximately 166 to 172 cm (estimation limited to measurement of right [atraumatic] femur).

4. Multiple remote (healed/healing) fractures.

   FEMUR: [Left] These fractures would be consistent with a remote fracture that was not surgically repaired and that failed to heal by normal union. The changes in the distal femur are consistent with an old healed fracture. The configuration of the callus suggests that the fracture was oblique.

   TIBIA: [Left] Callus from mal-aligned oblique fracture. [Right] The oblique irregularity in the proximal shaft of the right tibia represents a callus from an old healed fracture that was poorly aligned.

   FIBULA: [Left] The irregularity in the proximal fibular shaft represents a callus from an old healed fracture that was not optimally aligned. [Right] The proximal right fibular deformity is an old healed fracture that was grossly malaligned. The fracture splintered the distal end and the splinter has united with the proximal end.

EDUCATIONAL RESOURCES:

1. This is an excellent example of an adult skeleton with extensive remote trauma.
2. Age assessment of skeletal remains is best done in the context of the entire skeleton. Integration of data from a broad set of studies is optimal. Investigators should offer the age range most safely suggested by the totality of studies. Students must be cautioned that statistical data is based on **populations**, and may not necessarily be reflective of reality in an **individual**.
3. Assessment of sex is best done through an evaluation of all available skeletal elements. That said, the pelvis is the most reliably sexually dimorphic element. Many other bones (including, especially, some of the long bones) can be used with some degree of reliability to determine sex. Many resources exist to assist students with such endeavors.[6]

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DISCLAIMERS:

This report is meant only as a teaching tool for introductory level students of the anatomical, anthropology or forensic sciences who might be using this specimen to learn human and forensic osteology. Evaluation of osteologic material is best done with original specimens. My evaluation was based solely upon studies of a Bone Clones® replica. My opinions are based solely upon the material presented to me. This is somewhat artificial as in real forensic investigations additional studies would be undertaken prior to the formulation of diagnoses, and the production of a report. These studies might include plain film radiography, computed tomography (CT) studies, histology, etc.

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