OSTEOLOGICAL EVALUATION

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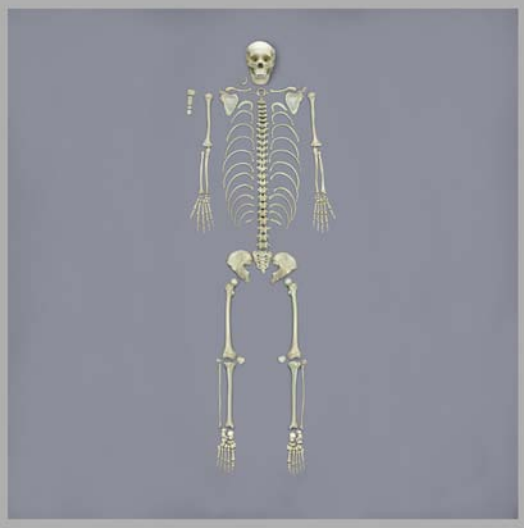

Product No. SC-301-D

Human Adolescent Disarticulated Skeleton (15-18 years)

Bone Clones, Inc.
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Human, Adolescent (15-18 years)

PRODUCT NUMBER: SC-301

SPECIMEN EVALUATED: Original specimen

SKELETAL INVENTORY: 1 Cranium with 11 maxillary teeth
1 Mandible with 13 teeth

1 Complete postcranial skeleton including major growth centers

OSTEOLOGIC OBSERVATIONS:

General shape and configuration of the individual bones is within normal limits. There are no features suggestive of acute/recent or remote trauma.

Skull:

The general shape and configuration of the skull and the individual skull bones are within normal limits. The sutural patterns are of expected configuration. Wormian (sutural) bones are absent. The foramina are of expected configuration.

Dentition:

Eleven teeth are in the maxillary dental arcade, and 13 teeth are in the mandibular dental arcade. All teeth have an adult morphology and no deciduous dentition remains. The dentition is atraumatic and lacks dental restorations or prosthetic devices/appliances. Attrition is absent.

RACE DETERMINATION:

The interocular distance is not prominently widened. The nasal root is flat, and the nasal angle is obtuse. The nasal aperture is broad both superiorly and inferiorly. The anterior nasal spine is short, and the inferior margin of the nasal aperture is predominantly smooth. The zygomatic bones retreat posteriorly from the plane of the face. The maxillary dental arcade has a somewhat rounded shape. Maxillary prognathism is absent. Maxillary incisors have a shovel-shaped configuration. An edge-on-edge bite is pronounced. A post-bregmatic depression is absent. The lambdoid suture is focally complex; other calvarial sutures are simple.

The totality of available cranial features suggests that the individual is of Asian ancestry.

SEX DETERMINATION:

Skull:

Sites for musculofascial attachment are mildly prominent; these include the mastoid processes of the temporal bone, and the supramastoidal crests. The mandibular ramus is narrow. The nasion is smooth. The supraorbital margins are not distinctively sharp or blunt (intermediate). The inferior border of the mandible is somewhat rounded.

Postcranial (pelvic):

The innominates are slightly gracile, and the sites of musculofascial attachment are not prominent. The subpubic angle is somewhat V-shaped and harshly angled. The large obturator foramina are ovoid. The slightly small greater sciatic notches have acute angles. The ischiopubic rami are thick. Preauricular sulci are absent. The ilia are somewhat vertically directed. A ventral arc is absent. The ratio of pubis to ischium is not large.

The totality of available cranial features suggests that the individual might have been of male sex, but this determination must be viewed in the context of the developmental age (see below, and EDUCATIONAL RESOURCES).

AGE DETERMINATION:

Skull:

The fontanelles are closed, and the spheno-occipital synchondrosis is fused. The calvarial sutures are all open and unfused (Meindl and Lovejoy method score of ZERO for both cranial vault and anterior cranium).

Dentition:

All teeth have an adult morphology.

Radiologic evaluation of the upper and lower jaws:

Twelve periapical radiographs are available for evaluation.

Three teeth (1.2, 3.3, and 4.3) have the incorrect morphology (likely representative of erroneous tooth replacement by the educational distributor who supplied the original skeleton for casting).

The 1.7, 2.7, 3.7 and 4.6 teeth, and possibly the 1.8 tooth are absent. The 3.8 and 4.8 teeth are impacted. The roots of the 3.8 and 4.8 teeth are only one third to one half formed.

Epiphyseal Union:

The anterior arch of C1 is complete.

The posterior arch of C1 is complete.

The inferior surface of C2 is smooth.

The arches of all vertebrae are fused to their corresponding vertebral bodies.

Fusion of the sacral vertebral bodies is incomplete. The sacral lateral joints and auricular surfaces are completely developed. The coccyx is not fused to the sacrum.

The scapular coracoid epiphysis is fused. The glenoid cavity has a mature morphology. The inferior and lateral scapular epiphyses are not fused. The acromion epiphysis is not fused. The rib heads are immature, and the sternal margins are absent. The manubriosternal joint is unfused; the gladiolus is in three unfused segments.

The medial epiphysis of the clavicle is not fused.

The ischiopubic ramus is fused. The tripartate cartilage within the acetabulum is fused. The epiphyses of the iliac crest and pubic tuberosity are not fused. The ischial tuberosity epiphysis is partially fused.

The femoral head, greater and lesser trochanteric epiphyses are nearly fused to the diaphysis. The distal femoral epiphysis is partly fused to the diaphysis.

The proximal tibial epiphysis is partially fused to the diaphysis, and the distal tibial diaphysis is fused to the diaphysis. The patella is mature.

The proximal fibular diaphysis is not fused to the diaphysis, and the distal fibular epiphysis is nearly fused to the diaphysis.

The epiphyses of the distal radius and ulna, and the proximal and distal epiphyses of the hand phalanges are partially fused. The calcaneal epiphysis, as well as the epiphyses of the metatarsals and foot phalanges, is fused.

Albert Method for Evaluation of Vertebral Centra Epiphyseal Union:

The pattern and stage of vertebral centra epiphyseal union are in keeping with an Albert score of 0 “early” to 0 “late”. This suggests that the individual was 14 to 17-years-old (if they were female), or 16 to 20-years-old (if they were male).[1]

Todd Pubic Symphysis Scoring System:

There are no degenerative features on the pubic symphyseal surface. This is in keeping with a Todd phase of 1.[2, 3]

Suchey-Brooks Pubic Symphyseal Phase:

There are no degenerative features on the pubic symphyseal surface. This is in keeping with a Suchey-Brooks phase I.[4]

Bone Length [5]:

The femur (including the epiphyses) is 43.6 cm long. This corresponds with 14 years of age (male) and 16 years of age (female).

The tibia is 37 cm long. This corresponds with 16 years of age.

The totality of features is most in keeping with a sub-adult (adolescent) between 15 and 18 years of age at the time of death.

SUMMARY:

1. Sex

   Features suggestive but not diagnostic of male sex.

   Evaluation limited by the developmental age (maturational stage) of the individual at the time of their demise.

2. Age

   Most likely 15 to 18 years of age at the time of their demise.

3. Race

   Most likely of Asian ancestry.

4. Trauma

   None.

EDUCATIONAL RESOURCES:

1. This is an excellent example of an adolescent skeleton.
   a. Educators may want to use these remains as a launching point for the discussion of skeletal development on the whole. The anatomy and histology of the developing skeleton is a complex, but worthwhile topic for those requiring advanced knowledge of the human skeleton.
   b. Bone Clones, Inc. offers numerous examples of the human skeleton across the spectrum from very early development to old age. Access to reference materials of this variety makes teaching (and learning) about osseous development that much easier (and fun).

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. Race and sex cannot be reliably determined on subadult remains.[6]
   a. In this case, features of race are overwhelmingly Asian, and thus such an opinion is somewhat easy to offer. Furthermore, the individual was nearly an adult (or a young adult) at the time of their demise, and thus may have had nearly fully developed osteologic features of race.
   b. Sex can be impossible to determine from the non-metric analysis of subadult remains. In this circumstance, the totality of features is most in keeping with those of a slightly gracile young male who has not yet fully developed his sexual characteristics (osteologically speaking). Alternatively, the features might be those of a slightly robust female.

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4. Brooks, S. and Suchey, J. (1990). Skeletal age determination based on the os pubis: a comparison of the Acsadi-Nemeskeri and Suchey-Brooks methods. *Human Evolution, 5*(3): pp. 227-238.
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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. 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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