OSTEOLOGICAL EVALUATION

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Product No. BC-197

Human Masculinized Female Skull

Human, "Masculinized Female"

Product Number: BC-197

Specimen Evaluated: Bone Clones® replica

Skeletal Inventory: 1 cranium (see general observations below)
1 intact mandible

General observations:

In general, the molding process has preserved significant details necessary for evaluation. The general shape and configuration of the skull is within normal limits. The ectocranial morphology of the individual cranial bones is within normal limits. The sutural patterns are of expected configuration. There are Wormian ossicles at lambda, and at the right proximal limb of the lambdoid suture. The foramina are of expected configuration; there are small accessory supraorbital foramina bilaterally.

The distal two thirds of both right and left nasal bones, as well as the (medialmost) nasal portion of the right maxillae, are absent. The edges of these fractures are crisp, and there are no signs of healing.

Dentition

There are 8 teeth in the maxillary arcade and 3 teeth in the mandibular arcade. All teeth have an adult morphology and no deciduous dentition remains. There are no dental restorations or prostheses. There is a mild degree of attrition.

The following maxillary dentition is present: 1.7 [#2], 1.6 [#3], 1.5 [#4], 1.4 [#5], 2.3 [#11], 2.4 [#12], 2.5 [#13], and 2.6 [#14].

The following mandibular dentition is present: 3.8 [#17], 3.7 [#18], and 4.3 [#27].

The atraumatic maxillary gomphoses of 1.8 [#1], 1.3 [#6], 1.2 [#7], 2.2 [#10], 2.7 [#15], and 2.8 [#16] are empty and are without signs of healing.

The atraumatic mandibular gomphoses of 3.3 [#22], 3.2 [#23], and 4.2 [#26] are empty and are without signs of healing.

Healed maxillary gomphoses: 1.1 [#8] and 2.1 [#9].

Healed mandibular sockets: 3.6 [#19], 3.5 [#20], 3.4 [#21], 3.1 [#24], 4.1 [#25], 4.4 [#28], 4.5 [#29], 4.6 [#30], 4.7 [#31], and 4.8 [#32].

There are fractures of the 1.4 [#5] mesiobuccal axial wall and 2.3 [#11] distobuccal axial wall.

There is moderate-to-severe generalized periodontal disease (bone loss).

Features of Race:

The interocular distance is slightly widened. The nasal root is slightly prominent and the nasal angle appears to be acute. The zygomatic bones retreat posteriorly from the plane of the face. The nasal aperture is narrow superiorly and slightly broader inferiorly. The anterior nasal spine is short but sharp, and the inferior margin of the nasal aperture has a sharp (nasal) sill. The maxillary dental arcade has a somewhat rectangular-shape. There is no alveolar prognathism. There is no post-bregmatic depression. The calvarial sutures are focally slightly complex.

The totality of features is most in keeping with those of a White individual.

Features of Sex:

There is moderate prominence of the cranial sites for musculofascial attachment including especially:

- the nuchal lines
- the mastoid processes of the temporal bones
- the temporal lines
- the supraorbital tori
- the masseteric tuberosities of the mandible, and prominent gonion angles - the supramastoidal crests

There is a narrow ascending mandibular ramus. The nasion is somewhat rough, and the supraorbital margins are blunted. The inferior border of the mandible is rounded to pointed.

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

Features of Age:

There are no identifiable fontanelles. The spheno-occipital synchondrosis is fused.

Ten ectocranial osteologic landmarks are evaluated for degree of suture closure according to the Meindl and Lovejoy method*.[1] Scores are assigned as follows:

1	1
2	1
3	1
4	1
5	1
6	1
7	1
8	1
9	2
10	1

* As is always the case with casting, there is a tendency towards overscoring.

The sum of scores for the cranial vault (landmarks 1 through 7) is 7. This corresponds to an estimated age of 39.4 +/- 9.1 years.

The sum of scores for the anterior cranium (landmarks 6 through 10) is 6. This corresponds to an estimated age of 43.4 +/- 10.7 years.

 SUMMARY:

1.	White.

2.	Male.

3.	32.7 – 48.5 years; range 30.3 – 54.1 years.

4.	Probable postmortem loss of distal two-thirds of nasal bones and the right nasal portion of the maxilla.

5.   No evidence of significant osteologic variations or primary pathology.

EDUCATIONAL RESOURCES:
1.   This is a very complex specimen.
2.   Assessment of race is very difficult; the features are not overwhelmingly typical of a White individual.
   a.   The concept of race assessment is controversial. It may be worthwhile to review the varying schools of thought on this issue. Short summaries from the perspective of the forensic anthropologist[2] and forensic pathologist[3] are readily available.
3.   The preponderance of evidence suggests the decedent was male; however, the skull was known to belong to a female. For this reason, the skull may serve as a good discussion piece for the limitations of osteologic evaluation for the determination of sex.
   a.   In many circumstances, the skull alone will allow an investigator to correctly determine sex.[4] However, the findings in the skull should never be treated in isolation; rather, they should be incorporated into your 'whole case' database. This database should include information obtained from all other aspects of the case. From an osteologic perspective, this includes (importantly) the bones of the pelvis.
4.   Consider the differential diagnosis of disorders that may masculinize a female. These may include non-neoplastic (Cushing syndrome, congenital adrenal hyperplasia, polycystic ovarian syndrome, etc.) and neoplastic (gonadoblastoma, dysgerminoma, granulosa cell tumors, etc.).
5.   This specimen may also serve as a good discussion piece for the limitations of age assessment by an evaluation of calvarial suture closure; the known age (68 or 69 years) of this individual is well outside the maximum range estimated by the Meindl and Lovejoy method as applied to this cast.
6.   It may be appropriate to use this specimen a discussion piece around the topic of 'sutural bones' (Wormian ossicles).
   a.   It may be appropriate to discuss the concept of sutural (Wormian) bones and what role they may play in the forensic evaluation of cranial remains. It is most important that students understand they are normal variants present with somewhat increased frequency in some racial groups, and that they not be misdiagnosed as fractures.

REFERENCES:

1.   Meindl, R.S. and Lovejoy, C.O. (1985). Ectocranial suture closure: a revised method for the determination of skeletal age at death based on the lateral-anterior sutures. *American Journal of Physical Anthropology,* 68(1): 57-66.
2.   Gill, G. (1998). Craniofacial criteria in the skeletal attribution of race. In *Forensic Osteology: Advances in the Identification of Human Remains*, K. Reichs, Editor. Springfield, IL: Charles C. Thomas.

3.   Matshes, E. and Lew, E. (2006). Forensic osteology. In *Forensic Pathology: Principles and Practice*, D. Dolinak, E. Matshes, and E. Lew, Editors. San Diego, CA: Elsevier (Academic Press).

4.   Krogman, W. and Iscan, M. (1986). *The Human Skeleton in Forensic Medicine*. 2 ed. Springfield, IL: Charles C. Thomas.

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. My opinions regarding race and sex are based only upon non-metric analyses. Evaluation of cranial suture closure is most accurately assessed endocranially as the sutures are known to close from the endocranial table towards the ectocranium. My opinions regarding this skull were made without access to the postcranial skeleton.

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