

Bone Clones[®]

OSTEOLOGICAL REPRODUCTIONS

Human Skull with Shotgun Wounds BC-196



Osteological Evaluation Report

Prepared by

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Human, Female, Black, Shotgun wound

Product Number: BC-196

Specimen Evaluated: Bone Clones® replica

Skeletal Inventory:

- 1 intact cranium
- 2 fragments of mandible:
 - portion of left body, ramus, coronoid process and condyle
 - fragment of right ramus with condyle and coronoid process

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 no sutural bones (Wormian ossicles). The foramina are of expected configuration.

Dentition

There are 12 teeth in the maxillary arcade and 5 teeth in the mandibular arcade. All teeth have an adult morphology and no deciduous dentition remains. The remaining dentition is atraumatic. There are no dental restorations or prostheses. There is a mild degree of attrition.

The following maxillary dentition is present: 1.8 [#1], 1.7 [#2], 1.6 [#3], 1.5 [#4], 1.4 [#5], 1.3 [#6], 1.2 [#7], 2.4 [#12], 2.5 [#13], 2.6 [#14], 2.7 [#15], and 2.8 [#16].

The following mandibular dentition is present: 3.8 [#17], 3.7 [#18], 3.6 [#19], 3.5 [#20], and 3.4 [#21].

The roots of 2.1 [#9] and 2.2 [#10] remain in their intact gomphoses.

The buccal plate of the empty gomphosis for 1.1 [#8] is fractured off.

The atraumatic gomphosis of 2.3 [#11] is empty and is without signs of healing.

Features of Race:

The interocular distance is somewhat broad. The nasal root is somewhat depressed and the nasal angle is obtuse. The zygomatic bones retreat posteriorly from the plane of the face. The nasal aperture is narrow superiorly and broader inferiorly. The anterior nasal spine is short, and the inferior margin of the nasal aperture is smooth with the vague impression of bilateral gutters; there is no (nasal) sill. The maxillary dental arcade has a somewhat rectangular-shape. Although it is difficult to assess, there appears to be at least a moderate degree of alveolar prognathism. The one remaining (1.2 [#7]) incisor has a prominent shovel shape. It is not possible to assess for an edge-on-edge incisal bite. It is not possible to assess for a post-bregmatic depression. The calvarial sutures are predominantly simple. The skull is slightly elongated in the anteroposterior plane.

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

Features of Sex:

There is no prominence of the cranial sites for musculofascial attachment. There is a broad ascending mandibular ramus. The nasion is smooth, and the supraorbital margins are sharp. It is not possible to assess the inferior border of the mandible.

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

Features of Age:

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

It is not possible to assess the ectocranial osteologic landmarks for degree of suture closure according to the Meindl and Lovejoy method*.[1]

Trauma:

A gaping defect on the occiput involves the lambda. The edges of the defect are irregularly scalloped. Three fractures radiate from the superior border of the defect and a possible diastatic fracture is through the left side of the lambdoid suture. Internal beveling is palpable along portions of the edges of the defect.

A second gaping defect is along the sagittal suture just posterior to the coronal suture. This defect involves more of the left parietal bone than the right parietal bone. Subtle scalloping is along the edges of this defect, and shallow internal beveling is palpable. A fracture extends inferiorly from the left posterior border of the defect and terminates at the left side of the lambdoid suture. There is a diastatic fracture along the coronal suture bilaterally.

The 2 gaping defects are consistent with shotgun wounds.

The mandible is fragmented into at least 3 pieces; only 2 are present. More than half of the mandibular dentition is absent.

The posterior portion of the left zygomatic bone, including the temporal process, is fractured and absent.

The mandibular and zygomatic bone fractures are not obviously directly related to the shotgun wounds.

SUMMARY:

1. Black.
2. Female.
3. Adult.
 - a. Spheno-occipital synchondrosis is closed.
 - b. Wisdom teeth in quadrants 1, 2, and 3 have erupted.
 - c. At least focal evidence of ectocranial suture closure.
4. Shotgun wounds of head.
 - a. Unable to definitively differentiate entrance and exit wounds. It is possible that these 2 defects represent entrance and exit wounds of a single shot; it is also possible that these 2 wounds represent 2 separate shotgun blasts.
 - b. Assessment of the endocranial aspect of the skull base, as well as radiographs of the specimen, would be fundamental in further studies of this skull.
5. Blunt trauma.
 - a. Fracture of left zygomatic bone with loss of zygomaticotemporal process.
 - b. Fragmented mandible.
 - i. As stated above, additional studies are warranted and include radiography of the mandible.
6. No evidence of significant osteologic variations or primary pathology.

EDUCATIONAL RESOURCES:

1. This is a very complex specimen.
2. Evaluation of race is most suggestive of Black ancestry; however, a discussion of the evaluation of race in the context of significant cranial trauma may be warranted.
 - 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 typical wounding patterns of shotguns differ from those of other firearms (handguns and rifles). It would be appropriate to discuss these and to contrast the features of the wounds present in this specimen with those of other firearms (for example, see BC-152).
4. The spectrum of findings attributable to blunt trauma is broad; it may be appropriate to discuss classical fracture patterns.
5. It may be appropriate to discuss the rather critical role of radiography (including computed tomography) in the evaluation of traumatized human remains.

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).

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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Bone Clones Disclaimer on Ancestry Assessment

The assessment of ancestry from human skeletal remains, particularly the skull, is a component historically included in the creation of a biological profile for forensic purposes. This practice involves the analysis of morphoscopic traits and metric variables that may exhibit population-specific patterns of variation. However, it is important to recognize the significant scientific and ethical limitations of this practice.

Race is not a biologically valid concept. Contemporary biological anthropology holds that race is a social construct with no discrete biological basis. Human variation exists on a continuum, shaped by complex interactions between genetics, environment, and culture—not distinct “racial” categories. Therefore, the identification of “race” or “ancestry” based solely on skeletal features is scientifically problematic and cannot be performed with high accuracy or precision.

Although some morphological traits of the cranium may reflect broad population-level patterns due to shared evolutionary history, these traits do not map neatly onto socially defined racial categories. Furthermore, categories such as “Asian,” “European,” or “African” are socially constructed labels that do not fully capture genetic or phenotypic diversity, and they should not be interpreted as exact or absolute identifiers. As such, ancestry estimation based on skeletal features should not be interpreted as the identification of race, and results should be presented with appropriate caution and clear communication of limitations.

Historically, law enforcement agencies have requested ancestry estimations as part of forensic reports. However, many biological anthropologists today are increasingly hesitant to include this component, as doing so may inadvertently reinforce outdated and harmful typological thinking—the idea that humans can be classified into discrete biological “types” based on physical features. Such typologies have a long and problematic history and are not supported by modern science.

In cases where ancestry estimation is included, it is done with the understanding that it is a probabilistic assessment—not a definitive classification—and it must be contextualized within a broader ethical framework that prioritizes scientific integrity, individual dignity, and the avoidance of reinforcing racial stereotypes.