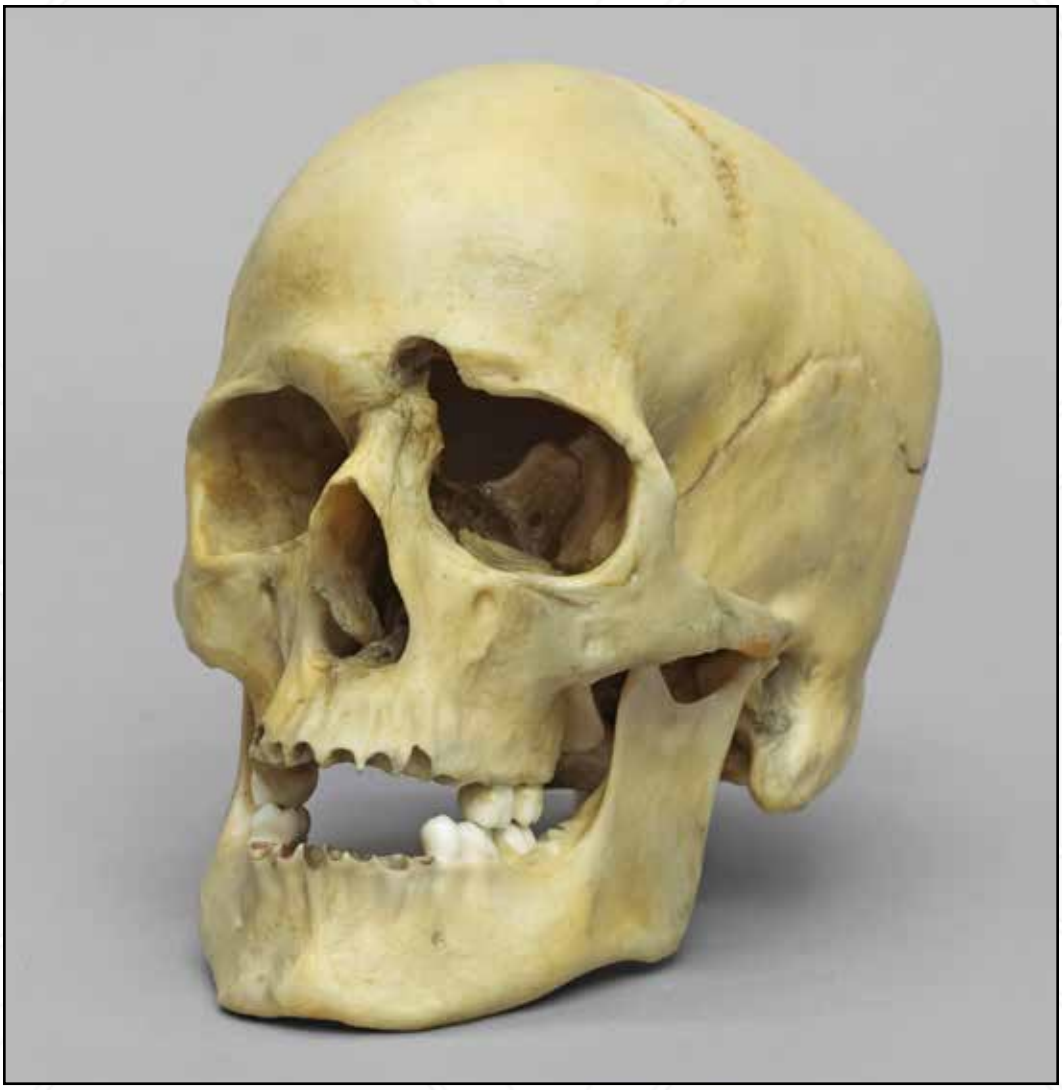
Bone Clones®

OSTEOLOGICAL REPRODUCTIONS

Human Skull, Medium Caliber Gunshot Wound
BC-152



Osteological Evaluation Report

Prepared by

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Human, Male, Single gunshot wound

Product Number: BC-152

Specimen Evaluated: Bone Clones® replica

Skeletal Inventory: 1 intact cranium
- left inferior nasal concha absent
- middle nasal conchae absent

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 is a small right epipteric bone. The foramina are of expected configuration.

Dentition:

There are 5 teeth in the maxillary arcade and 7 teeth in the mandibular arcade. All teeth have an adult morphology and no deciduous dentition remains. There is no significant attrition.

The following maxillary teeth are present: 1.8 [#1], 1.7 [#2], 1.6 [#3], 2.6 [#14], and 2.7 [#15]. The following mandibular teeth are present: 3.8 [#17], 3.7 [#18], 3.6 [#19], 3.5 [#20], 4.6 [#30], 4.7 [#31], and 4.8 [#32]. The 1.8 [#1], 3.8 [#17], and 4.8 [#32] teeth are partially erupted.

The following empty maxillary gomphoses show no signs of healing: 1.5 [#4], 1.4 [#5], 1.3 [#5], 1.2 [#7], 1.1 [#8], 2.1 [#9], 2.2 [#10], 2.3 [#11], 2.4 [#12], 2.5 [#13], and 2.8 [#16]. The following empty mandibular gomphoses show no signs of healing: 3.4 [#21], 3.3 [#22], 3.2 [#23]. 3.1 [#24]. 4.1 [#25], 4.2 [#26], 4.3 [#27], 4.4 [#28], and 4.5 [#29].

Amalgam material is embedded on the occlusal surfaces of 1.7 [#2], 1.6 [#3], 2.6 [14], 2.7 [#15], 3.7 [#18], and 3.5 [#20]; on the occlusobuccal surface of 3.6 [#19], 4.6 [#30], and 4.7 [#31].

The distal marginal ridge and wall is irregularly fractured off of 3.6 [#19].

Features of Race:

The interocular distance is not prominently widened. The nasal root is moderately prominent and the nasal angle is acute. The zygomatic bones retreat posteriorly from the plane of the face. The nasal aperture is narrow superiorly and inferiorly. The anterior nasal spine is somewhat prominent, and the inferior margin of the nasal aperture has a sharp (nasal) sill, but there is also the vague impression of a slight gutter. The maxillary dental arcade is somewhat V-shaped. There is no alveolar prognathism. There is no post-bregmatic depression. The calvarial sutures are 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 external occipital protuberance
- the mastoid processes of the temporal bones
- the supraorbital tori

There is a broad ascending mandibular ramus. The nasion is markedly rough, and the supraorbital margins are blunt, but thin. The inferior border of the mandible is somewhat square.

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	0
2	0
3	1
4	0
5	0
6	0
7	1
8	1
9	1
10	0

* 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 2. This corresponds to an estimated age of 30.5 +/- 9.6 years.

The sum of scores for the anterior cranium (landmarks 6 through 10) is 3. This corresponds to an estimated age of 41.1 +/- 10.0 years.

Trauma:

A sharply circumscribed, semicircular defect is in the left side of the frontal bone, along the superomedial border of the left orbit, immediately superior to the nasion. A minute fracture radiates superiorly from the superior border of the defect. A larger, more irregular defect in the left side of the occipital bone is along and immediately inferior to the left lambdoid suture. Note that the edges of this defect are externally beveled. A single fracture radiates from the occipital defect at approximately the 10:30 o'clock position and extends across the left parietal bone, terminating at the left squamous temporal suture. The left frontal bone defect aligns with the left occipital bone defect.

The circumscribed left frontal bone defect is characteristic of an entrance gunshot wound. The larger, externally beveled left occipital bone defect is characteristic of an exit gunshot wound. The pathway is directly front-to-back and horizontal.

SUMMARY:

1. White.

2. Male.

3. 31.1 – 40.1 years of age; range of 20.9 – 51.1 years.

4. Medium caliber gunshot wound of head; pathway is directly front-to-back.

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

EDUCATIONAL RESOURCES:

1. This is an excellent example of a medium caliber gunshot wound to the head. Critical points of discussion should include typical wounding patterns identified in bones. It should also be pointed out that in many cases of gunshot wounds to the head, the orbital plates may be fractured not by direct contact with the projectile, but secondary to the rapid downward displacement of the frontal lobes of the brain against the orbital shelf.[2]
2. Without consideration of other evidence, it is dangerous to hypothesize about whether this wound was self-inflicted or inflicted by another person.
3. This skull demonstrates many features characteristic of White individuals; however, the degree of sutural complexity may also be seen in people described as Hispanic. This skull was known to belong to a White male.
    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[3] and forensic pathologist[2] are readily available.
    b. 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.
    c. Age assessment of skeletal remains is best done in the context of the entire skeleton. Assessment of the degree of suture closure can be used with some degree of success[1]; however, there is tremendous variability in the degree of closure process. Students must be cautioned that statistical data is based on **populations**, and may not necessarily be reflective of reality in an **individual**.
    d. 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. 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).
3. 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.
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. 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.