Bone Clones®

OSTEOLOGICAL REPRODUCTIONS

Human 7 piece Color-Coded Study Skull
BC-224

Osteological Evaluation Report

Prepared by

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Human, Female, White,
7-piece color-coded study skull

Product Number: BC-224

Specimen Evaluated: Bone Clones® replica

Skeletal Inventory: 1 intact cranium
1 intact mandible

General observations:

***NOTE – Evaluation of demographic features was performed on BC-133, the non-"exploded" version of this skull.*

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 the suggestion of a subtly persistent mendosal suture line at the lateralmost extents of the occipital bone. There is the suggestion of a small sutural bone (Wormian ossicle) at the right asterion. The foramina are of expected configuration. The skull is atraumatic.

Dentition:

There are 16 teeth in the maxillary arcade and 16 teeth in the mandibular arcade. All teeth have an adult morphology and no deciduous dentition remains. The dentition is atraumatic. There are no dental restorations or prostheses. There is a moderate degree of attrition.

Features of Race:

The interocular distance is not prominently widened. The nasal root is 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 broader inferiorly. The anterior nasal spine is somewhat prominent, and the inferior margin of the nasal aperture has a sharp (nasal) sill. The maxillary dental arcade is somewhat V-shaped. There is no alveolar prognathism. The maxillary incisors are blade-like. There is no edge-on-edge incisal bite. There is a slight post-bregmatic depression. The calvarial sutures are predominantly simple.

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

Features of Sex:

There is no significant prominence of the cranial sites for musculofascial attachment. There is very slight prominence of:

- the nuchal lines
- the external occipital protuberance
- the supraorbital tori

There is a somewhat broad ascending mandibular ramus. The nasion is smooth, and the supraorbital margins are blunted. The inferior border of the mandible is rounded.

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.

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

* 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 10. 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 11. This corresponds to an estimated age of 56.2 +/- 8.5 years.

All 32 teeth are fully erupted, and no deciduous dentition remains. There is a moderate degree of attrition on the occlusal surfaces of the dentition.

SUMMARY:

1. White.
2. Female.
3. 47.7 – 48.5 years; range 30.3 – 64.7 years.
    a. The very narrow age estimate should not be interpreted as being precise; it is a mathematical artifact subsequent to the fact only one method of age evaluation was utilized, and the limitations of that method itself.
4. No evidence of trauma.
5. No evidence of significant osteologic variations or primary pathology.

EDUCATIONAL RESOURCES:

1. This specimen is complex; the totality of features is most suggestive that the individual was White; however, a reasonable differential diagnosis would include Hispanic individuals, and some Asians (including especially an individual from India).
    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.
2. Although generally gracile, the specimen is not definitively female. For this reason, it may serve as a good discussion piece in a classroom setting for the diagnostic limitations in 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.
3. It is important to emphasize that in the evaluation of skeletal remains, investigators must never provide narrow age ranges, and rather, are much safer to provide the broadest range mathematically supported by their studies.
4. 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**.
5. The exploded (partially disarticulated) versions of this skull (BC-219 and BC-224) provide an excellent opportunity for junior osteologists to learn the complex anatomy of the facial bones, sphenoid bone, ethmoid bone, and their intricate relationships.

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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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.