The University of
Montana

Department of Anthropology
Social Science Building
The University of Montana
Missoula, Montana 59812-5112

Phone: (406) 243-2693
FAX: (406) 243-4918

Robert Beers, D-ABMDI
Bonner County Coroner
127 S. First Ave.
Sandpoint, Id. 83864

August 25, 2021

RE: BCC #20-100

On October 8, 2020 one box containing human remains was received by the Bonner County Coroner in Idaho from an individual associated with the Fraternal Order of the Eagles. The coroner was told that the remains had been used in initiation ceremonies years ago. The remains were then brought to the University of Montana Forensic Anthropology Laboratory (UMFAL) on March 13, 2021. The case was assigned to graduate student Megan Copeland, BS. Analysis began on March 13, 2021. The purpose of this analysis is to perform a full inventory of present elements, as well as perform an analysis of taphonomy and pathology, and estimate a biological profile, if possible. This report is 13 pages in length.

Skeletal Remains

The remains came to the UMFAL in a large cardboard box. The remains consist of a mostly complete skeleton. The minimum number of individuals is MNI=1. Missing elements include the hyoid, left 5th distal phalanx, and the right 4th distal phalanx.

Taphonomic Change/Postmortem Damage

The maxilla and mandible shows postmortem cracking and plaster from attempts to fix the damage (Photo 1). The sternal ends of both clavicles both show post-mortem damage consistent with normal wear from use as an anatomical specimen. Typical wear patterns of the cranium include damaged styloid processes, alveolar process, nasals, and vomer. Common post-cranial usage wear includes generalized joint damage where the articulation hardware is located (Pokines 2015). The right and left ribs 2-6 have vertical cracks rib shafts. Both of the ischial tuberosities are missing due to post-mortem damage, and the sacrum is damaged along the left lateral edge (Photo 2). A crack is present on the left os coxa posterior to the iliac crest. The posterior wall of the pubic symphyses broke off during disarticulation of the skeleton (Photo 3). All other post-mortem damage is from the skeleton being articulated, including the hanging hole at the top of the cranium and bolt holes on the ossa coxae.

Trauma and Pathology

Evidence of fracture healing is present on the left 11th rib as exhibited by the presence of a bony callus (Photo 4). No pathologies were observed.

Biological Profile

Sex: Probable Male

Sex was assessed by scoring the morphological characteristics of the cranium based on Buikstra & Ubelaker (1994). Morphological characteristics observed include a rugged nuchal region, relatively large mastoid processes that extend past the external auditory meatus, a prominent mental eminence, moderate supraorbital ridges, and sharp supraorbital margins. These characteristics show a collection of features commonly observed in males. Scores were then analyzed in the Walker (2008) Sex Regression spreadsheet found below (Attachment A). This analysis categorized the individual as male.

Sex was further assessed by scoring the morphological characteristics of the pelvis based on Phenice (1969). Morphological characteristics observed include a narrow pelvic arc, absence of ventral arc, a broad ischiopubic ramus. All of these traits are most commonly observed in males. Scores were then analyzed in the Klales et al. (2012) Sex Regression spreadsheet found below (Attachment B). This analysis categorized the individual as male with a 98% probability.

Additionally, the distal end of both humeri were used to estimate sex (Rogers 1999). The left and right humerus exhibited a roughly triangular olecranon fossa, a medial epicondyle that extends parallel/almost parallel to a table surface, and a medial trochlear edge that extends further than the lateral edge. All three traits are presented most often in males. Based on the results from each analysis, it is our educated assessment that individual was a probable male.

Age: 25-40

Age was assessed using dental wear. Dental wear was assessed using the Lovejoy 1985 chart and the Brothwell (1981) chart. Slight dentin exposure can be seen on the first and second mandibular molars on the left and right. The maxillary first and second molars show signs of worn enamel and polishing some dentin exposure on both sides. Based the Lovejoy 1985 chart, the maxillary dental wear patterns associated the closest with phases E, and the mandibular dental wear patterns associated the closest with phases G. This indicates an age range of 24-40. Based on the Brothwell (1981) chart, maxillary and mandibular wear patterns most closely matched with phase 2 suggesting an age range of 25-35.

Age was further assessed by examining the epiphyseal fusion of the medial end of the clavicle (McKern and Stewart 1957) and basilar suture fusion (Buikstra and Ubelaker's 1994). The medial ends of both clavicles are completely fused indicating an individual of

at least 23 years of age. The basilar suture is also completely fused, suggesting a minimum age of 22 years.

The sternal ends of the 4th ribs were used to estimate age based on the Iscan and Loth samples and the Maricopa County Forensic Science Center (FSC) samples (Harnett 2010). The left and right 4th rib both scored at a phase 2. This indicates an age range of 18-25 based on the Iscan and Loth samples and 21-28 based on the FSC samples.

Moreover, age was estimated by examining the auricular surface of the left os coxa (Lovejoy et al. 1985). Both demi-faces showed a reduction of transverse organization, and the inferior demi-face has coarse granularity with some microporosity present. Minimal signs of apical changes and retro-auricular activity were present. These characteristics place the individual at a phase 3, correlating with an age range of 30-34 years of age. Based on available information, 25-35 is the best estimated narrow age range, and 25-40 is the best estimated broad age range.

Stature: 5'1"-5'6"

Stature was estimated using the Trotter and Gleser (1952) equations and the Fordisc 2.0 program. Measurements from the radius, femur, and fibula were input into the Trotter and Gleser equations for European and East Asian males. Combining the ranges from the two population references, this gives an overall estimated stature of 154.9-169.3 cm, which is equivalent to a height range of 5'1"-5'5". Long bone measurements were inputted into Fordisc and results were analyzed using a 95% confidence level. Results using measurements from femur and fibula indicate an estimated stature range of 5'1"-5'6". Considering the available information and formulas, 5'1"-5'6" is the best estimated height range.

Ancestry: European-Asian Ancestry

Mitochondrial DNA was used to trace ancestry through the individual's maternal lineage. A bone sample was taken from the right petrous portion of the temporal bone by drilling through the external auditory meatus. Analysis was performed using a modified version of the Dabney protocol. Results indicated the individual belonged to the haplotype J1c3f, which falls under haplogroup J. Although haplogroup J has been shown to have some frequency in the Near East, it is most frequently found in Western Europe (Fernandes et al. 2015; Attachment C).

Cranial measurements were analyzed in Fordisc using the FDB dataset. The data was processed using all male populations available, and results were based on 21 measurements. Results indicated the individual was dissimilar from all cases. Measurements with high deviations and were removed, and results were processed again. Based on 17 measurements, results indicated the individual was most similar to Chinese males with a posterior probability of .785 and typicality of .013 (Attachment D).

Non-metric cranial variation was assessed using the osteomics site based on Hefner (2009) and the Gill (1986) chart. Traits that were damaged or too ambiguous and did not

match with any of the descriptions provided in there chart were not used. Some of the traits observed include a medium nasal spine, moderate nasal aperture width, absence of a post-bregmatic depression, an angles zygomaticomaxillary suture, and wide mastoid form. In reference to the Gill (1986) chart, the individual matched the most with trait descriptions of Eastern Asians, Polynesians, and American Indians. Cranial trait scores analyzed based on the Hefner (2009) method showed a higher probability of American Indian ancestry followed closely by Asian and then European (Attachment E). All analyses indicate a possible mixed European and Asian ancestry, but this result should be considered with caution in consideration of the highly variable nature of ancestry related skeletal markers and inconsistency of reference samples. Additionally, based on the this data and the known origins of anatomical specimens, the individual could potentially be from India (Hefner 2016). A potential Indian ancestry coincides with the combination of European and Asian characteristics.

Summary of Findings

The MNI = 1 for this case. Postmortem articulation and presence of a hanging loop indicate the remains were used as an anatomical specimen. The individual represented is a probably male, an adult between the ages of 25-40 years, and has an estimated stature of 5'1" to 5'6". The individual exhibits a combination of European and Asian characteristics and could potentially be from India. The only observed antemortem trauma is on the left 11th rib which is evident by the presence of a bony callus.

Signatures

Katie Baca, PhD
Adjunct Professor
University of Montana

Megan Copeland, B.S., B.A.
MA Student, Forensic Anthropology
University of Montana

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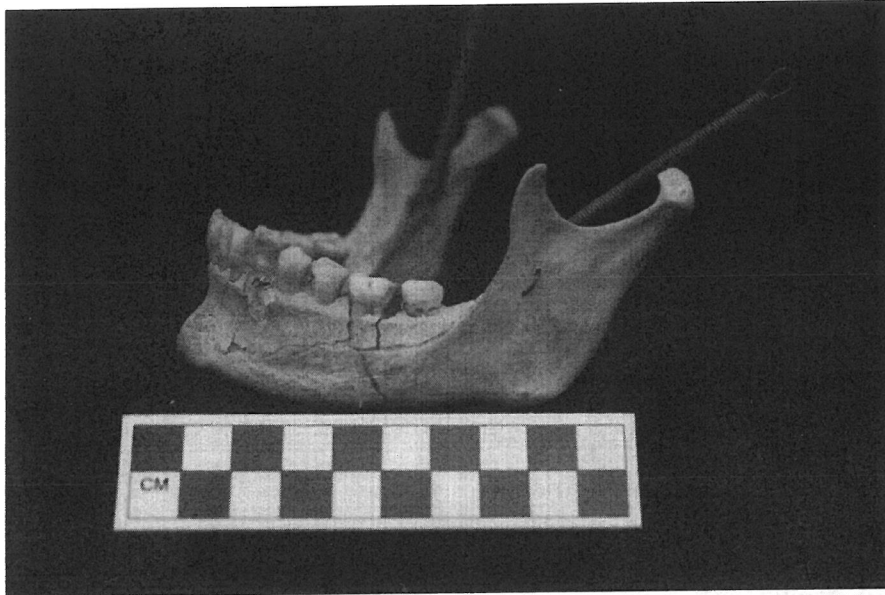
Photos

Photo 1. Left view of postmortem cracking and plaster on mandible.
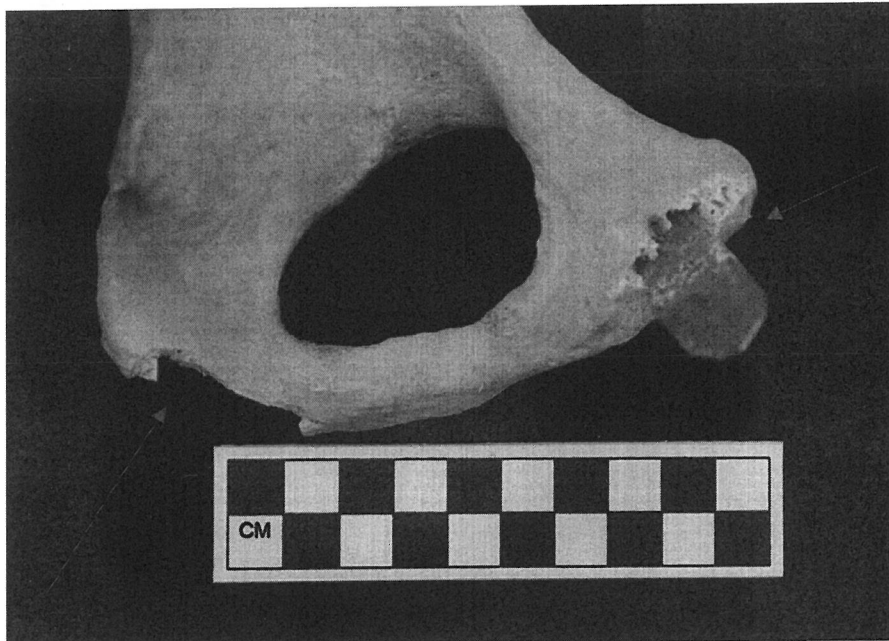
Photo 2. Post-mortem damage on the left ischial tuberosity (red arrow) and pubic symphyses (blue arrow).

Photo 3. Posterior wall of pubic symphyses.

Photo 4. Bony callus from antemortem trauma on left 11th rib.

Sex estimation from Walker (2008)
Table 9. Logistic Regression Equations

Scores:

nuchal	mastoid	orbit	glabella	mental	
3	3	4	3	4	

Sex estimations:

score	sex	prob Male	prob F	accuracy	vars
-3.152	MALE	0.96	0.04	88 / 86	gl-ma-me
-1.647	MALE	0.84	0.16	85 / 83	gl-ma
-3.143	MALE	0.96	0.04	87 / 82	gl-me
-3.379	MALE	0.97	0.03	70 / 84	me-ma
-5.41	MALE	1.00	0.00	78 /78	or-me
-1.448	MALE	0.81	0.19	77 / 83	nu-ma

Klales Pelvic Sex Estimation Results

Scores:

Sub-Pub Conc	Med Isch Pub Ram	Vent Arc
4	4	4

Linear Discriminant Functions (unpublished)

score	sex	prob M	prob F	accuracy	vars
-5.182	**MALE**	0.99	0.01	92 / 97	MV
-6.811	**MALE**	1.00	0.00	89 / 98	SMV
-6.376	**MALE**	1.00	0.00	88 / 98	SV
-5.1	**MALE**	0.99	0.01	87 / 96	SM

Logistic regression equation

score	sex	prob M	prob F	accuracy	vars
3.74	**MALE**	0.98	0.02	98 / 74	SMV

Haplogroup Migration Routes (Mancuso et al. 2008)
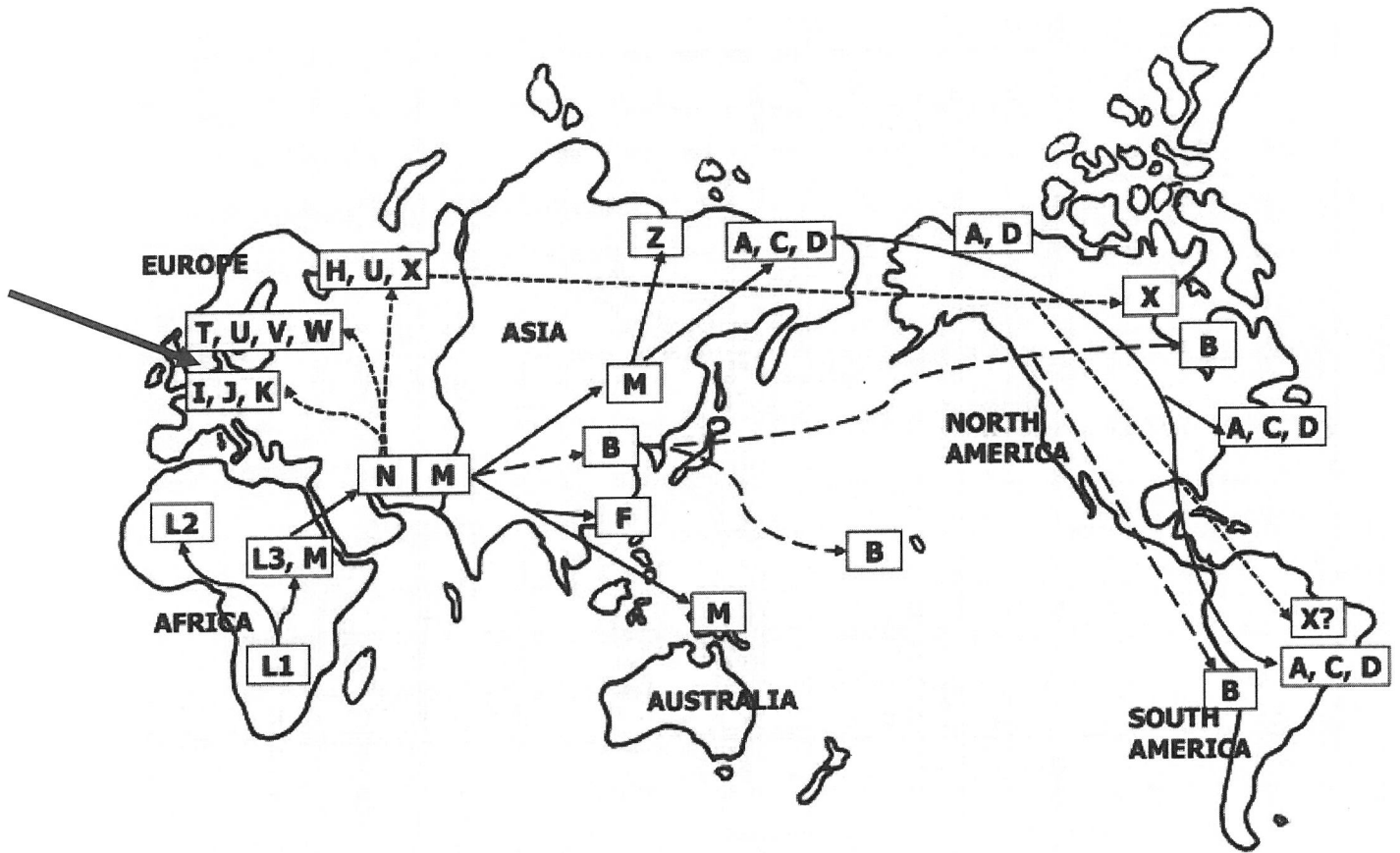
```
Natural Log of VCVM Determinant =  40.1236
------------------------------------------------------------------
Classification Table
------------------------------------------------------------------
From     Total              Into Group (counts)
Group    Number    BM    CHM    GTM    VM     WM     Correct
------------------------------------------------------------------
  BM      110      83     6      9      2      10     75.5 %
  CHM      74       5    54      1     10       4     73.0 %
  GTM      74       3     2     62      7       0     83.8 %
  VM       48       0     4      4     40       0     83.3 %
  WM      297      19    15      4      5     254     85.5 %
------------------------------------------------------------------
Total Correct:  493 out of 603 (81.8 %) *** CROSS-VALIDATED ***
------------------------------------------------------------------


Multigroup Classification of Current Case


---------------------------------------------------------------------
  Group    Classified    Distance        Probabilities
             into         from     Posterior  Typ F   Typ Chi   Typ R
---------------------------------------------------------------------

   CHM       **CHM**       34.4       0.785    0.013    0.007    0.013 (74/75)
   WM                      37.8       0.148    0.005    0.003    0.007 (296/298)
   VM                      40.5       0.037    0.003    0.001    0.020 (48/49)
   BM                      41.1       0.028    0.002    0.001    0.009 (110/111)
   GTM                     46.2       0.002    0.000    0.000    0.013 (74/75)
---------------------------------------------------------------------
 Current Case is closest to CHMs
---------------------------------------------------------------------
```

Output

The individual Enter ID... was diagnosed by our classification model as having 39.6 % chance of being an American Indian

African	American Indian	Asian	European
0.0661	0.3960	0.3190	0.2188

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