Assignment 4

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1. A skull with the following characteristics is found: broad chin, large, projecting mastoid processes, pronounced brow ridges, and a sloping forehead. It has the following measurements (in mm):

   BaPr: 96 ML: 178 MB: 156 BaBr: 141 BaNa: 102 BB: 120

   NaPr: 103 NB: 25

   What is the **sex** and **ancestry** of this individual? Please show your work.

Determining sex: Before determining ancestry, it is necessary to determine sex. This is because the functions used to determine ancestry assume that sex has already been determined. We can discover sex in this situation by examining the characteristics of the skull. Broad chin, large, projecting mastoid processes and pronounced brow ridges are all characteristics of a **male skull.**

Determining ancestry: We can use the following table to determine ancestry:

TABLE 7.4 Discriminant Functions for Distinguishing Whites, Blacks, and Native Americans[1]

	Males		Females	
	Whites versus:		Whites versus:	
Cranial Measurement	Blacks	Native Americans	Blacks	Native Americans
BaPr	3.06	0.10	1.74	3.05
Maximum length (ML)	1.60	–0.25	1.28	–1.04
Maximum breadth (MB)	–1.90	–1.56	–1.18	–5.41
BaBr	–1.79	0.73	–0.14	4.29
BaNa	–4.41	–0.29	–2.34	–4.02
Bizygomatic Br (BB)	–0.10	1.75	0.38	5.62
NaPr	2.59	–0.16	–0.01	–1.00
Nasal breadth (NB)	10.56	–0.88	2.45	–2.19
Sectioning points	62.89[2]	22.28	92.20	130.10

[1]After Table 26 of Ubelaker (1999). Courtesy of Taraxacum Press.

[2]From text on page 121 of Ubelaker (1999).

Now that we know we are dealing with a Male, let's calculate the Male function for Blacks.

Y = 3.06 * BaPr + 1.6 * ML - 1.9 * MB -1.79 * BaBr - 4.41 * BaNa - 0.1 * BB + 2.59 * NaPr + 10.56 * NB

Substituting, that results in 98.7199999999999. This is above the sectioning point of 62.89 and indicates that the skull is likely from a Black individual.

Let’s calculate the Male function for Native Americans.

. Y = 0.1 * BaPr -0.25 * ML - 1.56 * MB + 0.73 * BaBr - 0.29 * BaNa + 1.75 * BB -0.16 * NaPr +-0.88 * NB

Substituting, that results in -33.39. This is below the sectioning point of 22.28 and indicates that the skull is likely White.

Because there is some controversy in the results, let's take a look at the following table:

TABLE 7.5 Rules for the Application of Discriminant Functions

Result of White versus Black	Result of White versus Native American	Ancestral Group
Males		
White	White	White
White	Native American	Native American
Black	White	Black
Black	Native American	Black if $W - B > (3.99 \times W - NA)$

We have the result of white versus black = Black, and the result of white versus native american = White. **Thus, the ancestral group is Black.**

2. A skeleton with the following measurements (in mm) is found:

maxillofrontal width: 25 naso-maxillo frontal subtense: 9

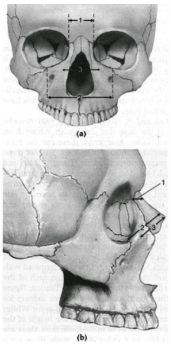
mid-orbital width: 129 naso-zygoorbital subtense: 38

alpha chord: 41 naso-alpha subtense: 24

femur subtrochanteric anterior-posterior diameter: 27.5

femur subtrochanteric medial-lateral diameter: 30.6

What is the ancestry of this individual? Please show your work.

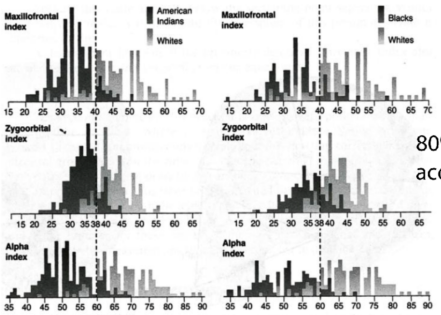


indexes:

maxillofrontal
(height 1b/width 1a) x 100

zygoorbital
(height 2b/width 2a) x 100

alpha
(height 3b/width 3a) x 100



80% accuracy

mfi – White > 40%, Black & Native American/Asian <40%.
zoi – White > 38%, Black & Native American/Asian < 38%
ai – White > 60%, Black & Native American/Asian < 60%

We can use the following formulas to calculate the indexes for the measurements we have.

This is how:

Maxillofrontal :
maxillo frontal height (subtense) = 9
maxillo frontal width = 25
formula = 9/25 * 100 = 36

Because the result is <40% : Black & Native American/Asian

Zygo Orbital:
Zygo Orbital height = 38
Zygo Orbital width (mid orbital width)= 129
formula = 38/129 * 100 = 29.45

Because the result is <38%: Black & Native American/Asian

Alpha:
Alpha height (subtense) = 24
Alpha width (alpha cord) = 41
formula = 24/41* 100 = 58.53

Because the result is <60%: Black & Native American/Asian

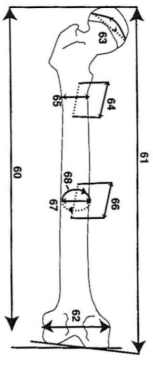
All 3 indices indicates that the individual is either Black or Native American/Asian. Now we can use the measurements of the femur to decide between native american/asian and black:

platymeric index

sub-trochanteric anterior- posterior (a-p) measurement (#64) & subtrochanteric medial-lateral (m-l) measurement (#65).

pi = (a-p/m-l) x 100

Native American/Asian < 84.3%
White/Black > 84.3%



Where:

a-p = 27.5
m-l = 30.6

formula = 27.5 / 30.6 * 100 = **89.86%.**

Because this result is above 84.3%, we conclude that the individual is Black.

3. What is the most likely ancestry of a skull with the following characteristics?

   low nasal bridge; large jaws; small brow ridges; small nasal spine; narrow face shape; simple vault sutures; spatulate upper incisors; and receding lower eye border.

We can construct a decision table to decide:

Black	**White**	**Asian**
Low Nasal Bridge	High Nasal Bridge	Low Nasal Bridge
Large Jaws	Small Jaws	Large Jaws
Small Brow Ridges	Heavy Brow Ridges	Small Brow Ridges
Small Nasal Spine	Pronounced Nasal Spine	Small Nasal Spine
Narrow Face Shape	Narrow Face Shape	Wide Face Shape
Simple Vault Sutures	Simple Vault Sutures	Complex Vault Sutures
Stapulate Upper Incisors	Stapulate Upper Incisors	Shoveled Upper Incisors
Receding Lower Eye Border	Receding Lower Eye Border	Projecting Lower Eye Border

We can conclude, thus, that the individual is likely a Black individual.

4. The police believe they have found the postcranial remains of Ren Kobayashi, a 5ft 9in, 42-year-old Asian male. The remains consist of some incomplete, broken metacarpals, some complete ribs - 2-6, some broken vertebral fragments, a complete right tibia and femur, and a few tarsal bones. Based on the bones present, describe one method that can be used to determine the: a) sex; b) stature; c) age; and d) ancestry of this individual.

a) Determining sex:

- To determine sex, we can utilize the following measure from the femur:

TABLE 8.9 Sexing from the Femoral Head Diameter

Ancestral Group	Female	Probable Female	Indeterminate Sex	Probable Male	Male
White[1]	Under 42	42–44	45	46–47	Over 47
Black[2]	Under 40	40–43	43–44	44–47	Over 47

b) Determining Stature:

Asian Males	
St = 2.68 * Hum + 83.19	4.25
St = 3.54 * Rad + 82.00	4.60
St = 3.48 * Uln + 77.45	4.66
St = 2.15 * Fem + 72.57	3.80
St = 2.40 * Fib + 80.56	3.24

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- We can use the functions above to determine height of an individual. We would use the measurements of either the tibia or the femur.

c) Determining Age:

TABLE 9.7 *Age Changes in the Sternal Rib Ends (White Males and Females)*[1]

Age Range	*Surface Bone*	*Surface Contour*	*Rim Edge*	*Rim Contour*
19 and under	Smooth	Flat/indented with billows	Rounded	Regular to slightly wavy
20–29	Smooth	Indented; U- to V-shaped	Rounded	Wavy to irregular
30–39	More porous	V- to U-shaped	Sharp	Irregular
40–49	More porous	U-shaped with flaring	Sharp	Irregular with projections
50–59	Light and porous	U-shaped and deeper	Sharp	Irregular with projections
60–69	Lighter and more porous	U-shaped and deeper	Sharp	Irregular with projections
70+	Deteriorating	U-shaped	Sharp with thin walls	Same but with "windows"

[1]Condensed from data in Işcan et al. (1984, 1985).

- To determine age, we can use the table above. Although it is more precise for White individuals, from the bones found it is hard to come to a precise conclusion. Other things that can also be examined are the fusion and development of epiphyses in the long bones that can still offer some insights into age. Additionally, the presence of degenerative changes in the bones, especially in the vertebral column, can provide clues about age.

d) Determining Ancestry:

- We can use the femur to understand the ancestry.
- We can utilize the platymeric index, or we can look at the angle of the femur head.
- For platymeric index, if (a-p)/(m-l)*100 > 84.3 then the individual is White or Black. If < 84.3, then the individual is Asian/Native American.
- For the femur head, if there is a strong torsion in the femoral head, then individual is likely Native American/Asian, if not, then Black/White.

5. Another skull with the following characteristics is found: large mastoid processes, high, narrow nasal root, complex vault sutures, and a projecting face.

   It has the following measurements (mm):

   BaPr : 83 ML: 175 MB: 157 BaBr: 133 BaNa: 102 BB: 125

   NB: 26

   What is the ancestry of this individual? If possible, please show your work.

There are a few things we could calculate/use to determine the ancestry of this individual. The first one is we could use the following discriminant functions to calculate whether the individual is white or not in comparison to black or asian. However, to utilize this function, it is necessary to have all the measurements in hand, and we don't have the measurement of NaPr. Thus, we can't utilize this.

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Alternatively, we can look at the qualitative characteristics and try to determine what the ancestry is based on each one of them. Let's examine:

Large Mastoid Processes: Not an indicator of ancestry

High, narrow nasal root: White

Complex Vault Sutures: Asian/Native American

Projecting Face: Black

Thus, **we can't conclude the ancestry** of the individual from the information provided.