Inquiry 4: Forensic identification

NAME: **Drew Eklund**

In this inquiry assignment, you will use skeletal evidence to attempt to establish whether a series of skeletal remains belong to the famous aviator, Amelia Earhart, or her navigator Fred Noonan.

1. Ancestry from the skull

Determining ancestry using features of the skull is one of the most difficult aspects of forensic anthropology. Humans vary extensively within populations, even the largest-scale populations found on different continents. It is rarely possible to arrive at a uniform assessment of all traits that vary, and indeed, the best determinations of ancestry must take into account a combination of features that may tell different stories. And of course, humans often have a mixture of ancestry from different populations.

For this inquiry, use the features of the skull in the inquiry description in comparison with the laboratory materials on "Cranial features and ancestry". Assess the skull for each of the following criteria, which are illustrated in that laboratory.

a. Zygomatic form: Anteriorly facing projecting or laterally receding?

Laterally receding

b. Nasal bridge: High nasal bones with a peaked angle, low nasal bones with slight angulation, or arched, regularly curving ("Quonset hut") shape?

High nasal bones with a peaked angle

c. Nasal aperture: Wide, medium or narrow?

Medium

d. Nasal sill: Sharp angulation dividing internal nasal aperture from anterior surface of maxilla, or lacking any sharp angulation?

Lacks sharp angulation

e. Subnasal (alveolar) prognathism: Maxilla projects anteriorly below the nose, or less projecting?

Some subnasal prognathism

f. Shape of the eye orbits: Rectangular, circular, or "aviator glasses" shape?

More “aviator glasses” shape

Based on these cranial characters, do they point to a consistent picture of ancestry for the skull in the inquiry? What is your best assessment of the ancestry of this individual? Which characters lead most strongly to your conclusion?

The skull exhibits a mix of traits consistent with different ancestries, but my best assessment would be that of a European. The most distinguished features of the skull are the narrow nasal ridge and the laterally receding Zygomatic form.

2. Assessment of sex from the skull and mandible
Consider the traits that vary by sex in the skull and mandible. One trait is very difficult to assess from photos: the sharpness of the lower border of the eye orbits. We will omit that character from your assessment. Otherwise, consider the following traits and give an assessment of each of them:
Cranial characters:
a. Superciliary arch development: Prominent, or weak?

Weak

b. Temporal lines development: Prominent, or weakly developed?

More or less Prominent

c. Mastoid process: Projecting and prominent, or weakly developed?

Weakly Developed

d. External occipital protuberance: Visible and projecting from lateral view, or smoothly curved occipital bone?

Smoothly curved

Mandibular characters:
a. Gonial angle: Near 90 degrees, or near 120 degrees?

Closer to 120 degrees

b. Gonial eversion: Everted or non-everted?

Non-everted

c. Mental trigon: Large and prominent, or smaller and less prominent?

Very hard to see, but looks smaller

In your assessment, do this skull and mandible belong to a male or female individual? Which characters lead most strongly to your conclusion?

The skull and mandible suggest a female individual. Overall much of the skull is fairly smooth, the gonial angle is not very sharp, but most telling, the mastoid process is quite small.

3. Assessment of sex from the pelvis
Consider the os coxa in the inquiry in comparison with the criteria for determining sex from the pelvis on the laboratory. Several of the comparisons used on the pelvis as a whole (for example, the subpubic angle) are more difficult in cases where the forensic anthropologist has access to only a part of the pelvis.
What can you assess on this pelvis in relation to sex? List the features and your assessment of them. Does this os coxa belong to a male or a female individual?

A smaller sciatic notch and large acetabulum suggest this os coxa belongs to a male.

4. Assessment of sex and stature from the femur
The femur is the single bone most indicative of the stature of an individual. Examine the measurements provided in the inquiry for the femur, and use the information in the laboratory on femur and stature estimation to provide an estimate of sex and stature for this individual.

a. What is the femur head diameter provided for this femur? Do you estimate that this is a male or female individual?

The diameter is 40 mm suggesting a female individual

b. What is the maximum length of the femur provided? Using the regression equation provided for either males or females, depending on your assessment of sex, what is your estimate of stature for this individual?

44.5 mm indicating a female stature of 164.7 Cm

5. Conclusion
Looking across the skeletal remains provided in this inquiry, consider the following questions:

a. Are all these remains consistent with a single individual? Or could they be the remains of multiple individuals commingled with each other?

They actually *appear* to be the remains of multiple individuals. The main indication of this is the mismatch between the os coxa which appears to be male and the feminine femur, in fact the femur head appears much too small for the acetabulum in the os coxa.

b. Do your conclusions lead to any single assessment of sex for the remains represented here? Considering what you have found regarding sex, could these be the remains of either Earhart or Noonan?

Disregarding other reasons for it being unlikely that it is Earhart or Noonan, the remains would suggest Earhart, although the os coxa seems to be from a different individual, possibly Noonan given it's male.

c. Considering what you have found regarding ancestry, could these be the remains of either Earhart or Noonan?

The ancestry has mixed evidence, but it is very possible the remains are European and I would assess them to be.

d. Considering what you have found regarding stature, could these be the remains of either Earhart or Noonan?

The stature (from the femur) suggests these remains would be Earhart, but again the os coxa doesn't match the pattern found in the rest of the skeleton.

e. Considering everything you have found, what is your conclusion? Can you eliminate these remains from representing either Earhart or Noonan? Or does the case remain open?

Considering all the evidence. These remains could certainly represent Earhart or Noonan, although the former appears much more likely, but given the os coxa - femur mismatch, this evidence is far from conclusive. I say the case remains open.