

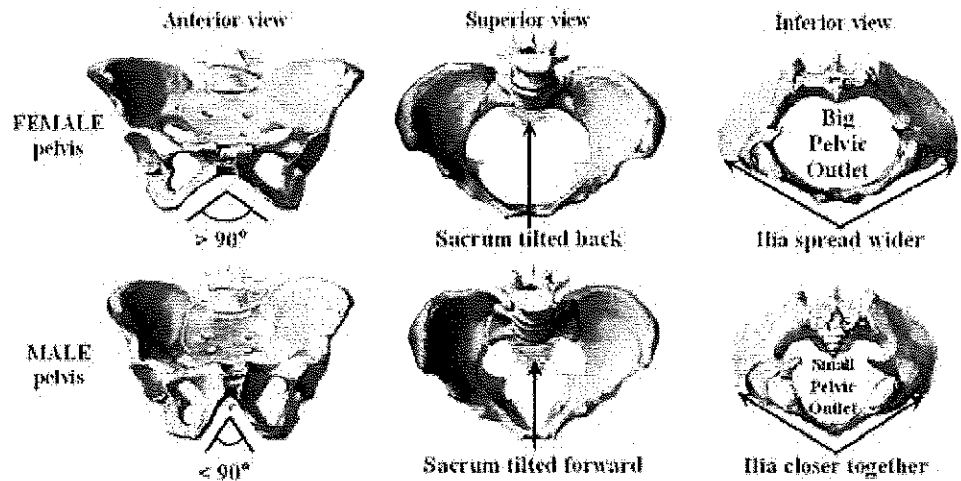
# Forensic Anthropology

## Background

The study of bones can tell us a lot about a person who is no longer living. Bones often survive the process of decay and can say a lot about who a human was. For example, a skull provides information about the structure of a person's face, including key distances like those used for face recognition.

**Did you know that the gender and ethnicity of a person can be determined from their bones?**

Determining the gender of discovered remains is very important in figuring out who the person is. Females are, on average, shorter than males. However, just because a skeleton or particular bone is short, that does not automatically mean that the remains are those of a female. The gender of remains can be most accurately identified by analyzing the pelvis. The image to the right illustrates some of the main differences between male and female pelvises.



Skulls can also accurately identify the gender of remains between 85% and 90% of the time. If a skull is incomplete, then, of course, there is less to work from. Some of the distinguishing characteristics, such as larger bone landmarks for muscle attachments in males, can be easily confused with the landmarks of more athletic females. To put it simply, the landmarks that signify the area where a muscle attached will be larger if the muscles were larger or used more often.

Forensic anthropologists examine the following special characteristics that are commonly male or female:

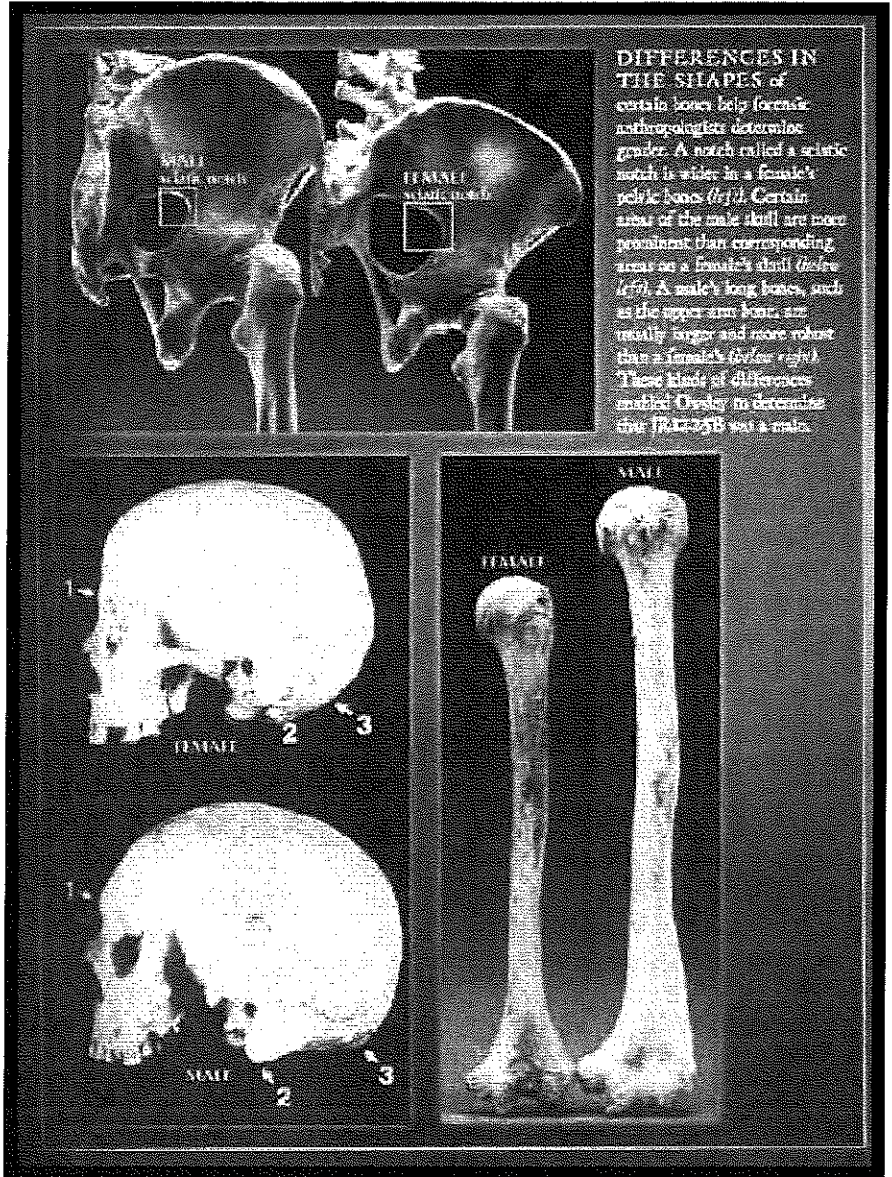
Landmarks	Female	Male
<b>Chin</b>	Rounded	Square
<b>Mastoid Process</b> (Behind Ear)	Small	Large
<b>External Occipital Protuberance</b> (Back of Skull)	Small (Not Prominent)	Large (Prominent)
<b>General Anatomy</b>	Gracile (i.e., Graceful)	Robust
<b>Forehead</b>	Vertical	Receding
<b>Brow Ridges</b> (Location of Eyebrows)	Slightly Developed	Prominent
<b>Muscle Lines</b>	Slightly Developed	Prominent
<b>Orbital Margins</b> (Edge of Eye Socket)	Sharp	Rounded
<b>Angle of Ascending Ramus</b> (Back Corner of the Jaw)	Obtuse	Close to 90 degrees

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What else can we tell from studying bones? Certain diseases can give information about *diet* or *age*. A vitamin deficiency can cause rickets, or a softening of the bone. Osteoporosis is common in older women, and a spinal condition called DISH (diffuse idiopathic skeletal hyperostosis) is more common in older men. Eating certain foods or smoking a pipe can wear down teeth, and older people may be missing teeth. The presence of teeth such as baby teeth and molars can also be used to estimate the age of younger people.

The length of some bones also helps us predict a person's height. This type of identification is useful when identifying human remains from wars or airline disasters, for instance.

Forensic anthropologists are the professionals who analyze human remains. Through their review of bones they are able to provide important details about the identity of an unidentified body as well as how and when the person died. If this sounds like something you might be interested in, you will need to take courses to learn about human osteology (skeletal biology) and other anthropology courses. Outside of anthropology courses, coursework in the fields of chemistry, anatomy, biology, statistics, and criminology, would provide training you will need to become a forensic anthropologist.

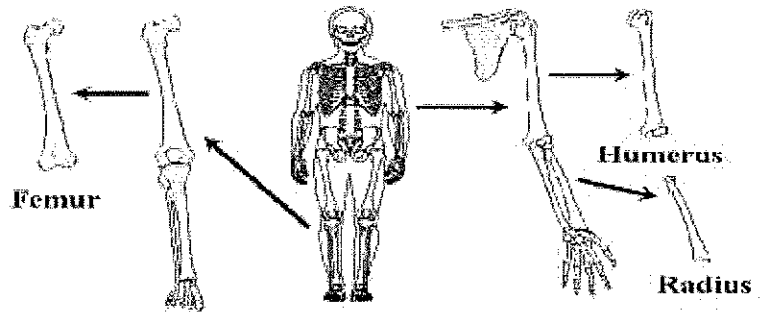


## Objective

Gain experience with bone analysis.

## Equipment

- Piece of string
- Rulers, pencils
- Calculator



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4. Add 59.41 to your result from the equation in #3. This final number is the approximate height of the male based on his humerus length.

Result from #3 \_\_\_\_\_ cm + 59.41 = \_\_\_\_\_ cm

4. Add 64.26 to your result from the equation in #3. This final number is the approximate height of the female based on her humerus length.

Result from #3 \_\_\_\_\_ cm + 64.26 = \_\_\_\_\_ cm

My partner's height is \_\_\_\_\_ cm

Convert to meters: \_\_\_\_\_ m Convert to inches: \_\_\_\_\_ in Convert to feet: \_\_\_\_\_ ft

5. Switch roles and do steps 1-4 again so that both of you have the measurements for each other.

## Analyzing Your Results

How accurate were you at inferring height from humerus length? Explain.

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How might the accuracy of this calculation be improved?

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## Part 3 - Inferring the victim's height from femur length

1. Use a piece of string to determine the approximate length of this bone and then use your ruler to measure the string (in centimeters). The length of the victim's femur is \_\_\_\_\_ cm

2. Using your calculator, multiply the length of the femur by 2.6. Length \_\_\_\_\_ cm X 2.6 = \_\_\_\_\_ cm

3. Add 65 to this number to arrive at the approximate height of the victim in centimeters.

Result from #2 \_\_\_\_\_ cm + 65 = \_\_\_\_\_ cm

The victim's height was \_\_\_\_\_ cm

Convert to meters: \_\_\_\_\_ m Convert to inches: \_\_\_\_\_ in Convert to feet: \_\_\_\_\_ ft

## Part 4 - Inferring the victim's height from humerus length

1. Use a piece of string to determine the approximate length of this bone and then use your ruler to measure the string (in centimeters). The length of the victim's humerus is \_\_\_\_\_ cm

If the victim was male...

If the victim was female...

2. Multiply the measured length of the humerus (in cm) by 3.27.

Length of humerus \_\_\_\_\_ cm X 3.27 = \_\_\_\_\_ cm

2. Multiply the measured length of the humerus (in cm) by 3.06.

Length of humerus \_\_\_\_\_ cm X 3.06 = \_\_\_\_\_ cm

3. Add 59.41 to your result from the equation in #2. This final number is the approximate height of the male based on his humerus length.

Result from #3 \_\_\_\_\_ cm + 59.41 = \_\_\_\_\_ cm

3. Add 64.26 to your result from the equation in #2. This final number is the approximate height of the female based on her humerus length.

Result from #3 \_\_\_\_\_ cm + 64.26 = \_\_\_\_\_ cm

The victim's height was \_\_\_\_\_ cm

Convert to meters: \_\_\_\_\_ m Convert to inches: \_\_\_\_\_ in Convert to feet: \_\_\_\_\_ ft

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## Activity

1 Meter (m) = 100 Centimeters (cm)

1 Foot (ft) = 12 Inches (in)

### Part 1-Inferring your partner's height from femur length

1. Work with a partner. Identify the placement of your partner's femur bone. It is the single large bone that extends from the hip socket to the kneecap.
2. Use a piece of string to determine the approximate length of this bone, then use your ruler to measure the string (in centimeters). The length of my partner's femur is \_\_\_\_\_ cm.
3. Multiply the length of your partner's femur by 2.6: Femur length \_\_\_\_\_ X 2.6 = \_\_\_\_\_
4. Add 65 to this number to arrive at the approximate height of your partner in centimeters.
  - a. **My partner's calculated height is:** Answer from #3 \_\_\_\_\_ + 65 = \_\_\_\_\_ cm.
  - b. Convert to meters: Answer from #4 \_\_\_\_\_ cm ÷ 100 = \_\_\_\_\_ m
5. Use the piece of string to obtain the actual height of your partner in centimeters.
  - a. **My partner's actual height is** \_\_\_\_\_ cm.
  - b. Convert to meters: Partner's actual height ÷ 100 = \_\_\_\_\_ m
6. If you would like to see your partner's height in inches, divide your results (in cm) by 2.54.
  - a. Convert calculated height to inches: Answer in #4 \_\_\_\_\_ cm ÷ 2.54 = \_\_\_\_\_ in
  - b. Convert calculated height to feet: Answer in #6a \_\_\_\_\_ in ÷ 12 = \_\_\_\_\_ ft
  - c. Convert actual height to inches: Answer in #5 \_\_\_\_\_ cm ÷ 2.54 = \_\_\_\_\_ in
  - d. Convert actual height to feet: Answer in #6c \_\_\_\_\_ in ÷ 12 = \_\_\_\_\_ ft
7. Switch roles and do steps 1-6 again so that both of you have the measurements for each other.

### Analyzing Your Results

How accurate were you at inferring height from femur length? Explain.

How do you think the accuracy of this calculation can be improved?

### Part 2-Inferring your partner's height from humerus length

1. Work with a partner. Identify the placement of your partner's humerus bone. It is the single large bone that goes from the elbow to the shoulder socket.
2. Use a piece of string to determine the approximate length of this bone and then use your ruler to measure the string (in centimeters). The length of my partner's humerus is \_\_\_\_\_ cm

**If your partner is male...**

3. Multiply the measured length of the humerus (in cm) by 3.27.

Length of humerus \_\_\_\_\_ cm X 3.27 = \_\_\_\_\_ cm

**If your partner is female...**

3. Multiply the measured length of the humerus (in cm) by 3.06.

Length of humerus \_\_\_\_\_ cm X 3.06 = \_\_\_\_\_ cm