

# Identification of Human Remains



Do bones speak?

# Identification Process

- Check for Missing Persons Report
- Recover remains of crime scene
- Human Remains-complete autopsy required for all unidentified persons
- Clothing and personal effects (ex. Wallet with license, credit cards) are first pieces of evidence examined to establish identity

# Development of Bone

- Bones originate from osteoblasts
- They migrate to center of cartilage production and deposit minerals.
- Throughout life, bones are being broken down, deposited, and replaced.
- Osteoclasts, the 2<sup>nd</sup> type of bone cell remove cellular wastes

# How Bones Connect

- a. **cartilage**—wraps ends of bones and keeps them from scraping each other
  - b. **ligaments**—bands that connect two or more bones together.
  - c. **tendons**—connect muscle to bone.
- Until 30 years of age-bones increase in size.
  - After 30-deterioration-slowed with exercise.

# What Bones Can Tell Us

- **Osteobiography-** tells about a person through study of skeleton
- Right-handed person- right arm bones- slightly larger than bones of left arm.

# Skeletal Examination

- Forensic physical anthropologist examines postmortem skeleton
- TOD determined by feel of bones
- Green bone-feels greasy-recent find
- Stays green above ground-1 year
- Buried bones remain green longer



# Skeletal Examination

- Smell of bone marrow-stays with bone for 50 years
- If odorless-more than 50 years old
- Can determine if body has been moved-bones exposed to elements become brittle and bleached





# Skeletal Examination

- Buried bones become stained and dark
- Must determine if bones are human-different species have different shapes, markings, and densities of bone





**Atlas C1**  
**Axis C2**

**Sternum**

**Costal  
Cartilage**

**Ulna**  
**Pelvic Girdle**  
**Carpals**

**Phalanges**

**Ischiu**

**Fibula**

**Phalanges**



**Skull**

**Mandible**

**Hyoid**

**Clavicle**

**Humerus**

**Thoracic  
vertebrae**

**Lumbar  
vertebrae**

**Ilium**

**Radius**

**Sacrum**

**Metacarpals**

**Pubis**

**Femur**

**Patella**

**Tibia**

**Tarsals**

**Metatarsals**

# Osteological Structure



- Sex determination-Male skeleton is larger, thicker and longer than female
- Males have larger ridges on bone for muscle attachments

# Bone Structure

- Epiphysis-ends of bone-different angle for humans as compared to animals
- Diaphysis-shaft of bone-diameter of cortex depends on species-humans-1/4 of total diameter of bone



# DNA Evidence

- Bone contains little nuclear DNA.
- But it does contain mitochondrial DNA.
- mtDNA-inherited only from the mother
- Long after nuclear DNA is lost from tissue degeneration-mtDNA can be obtained
- Compared with living relatives on mother's side of family to identify skeletal remains.

# Skeletal Trauma Analysis

- Forensic anthropologists determine if damage to bones occurred before or after death.
- Differences between patterns on bones made by weapons and patterns created by environment after death.
- Sharp-force trauma, blunt-force trauma, gunshot wounds, and knife wounds have distinctive patterns.

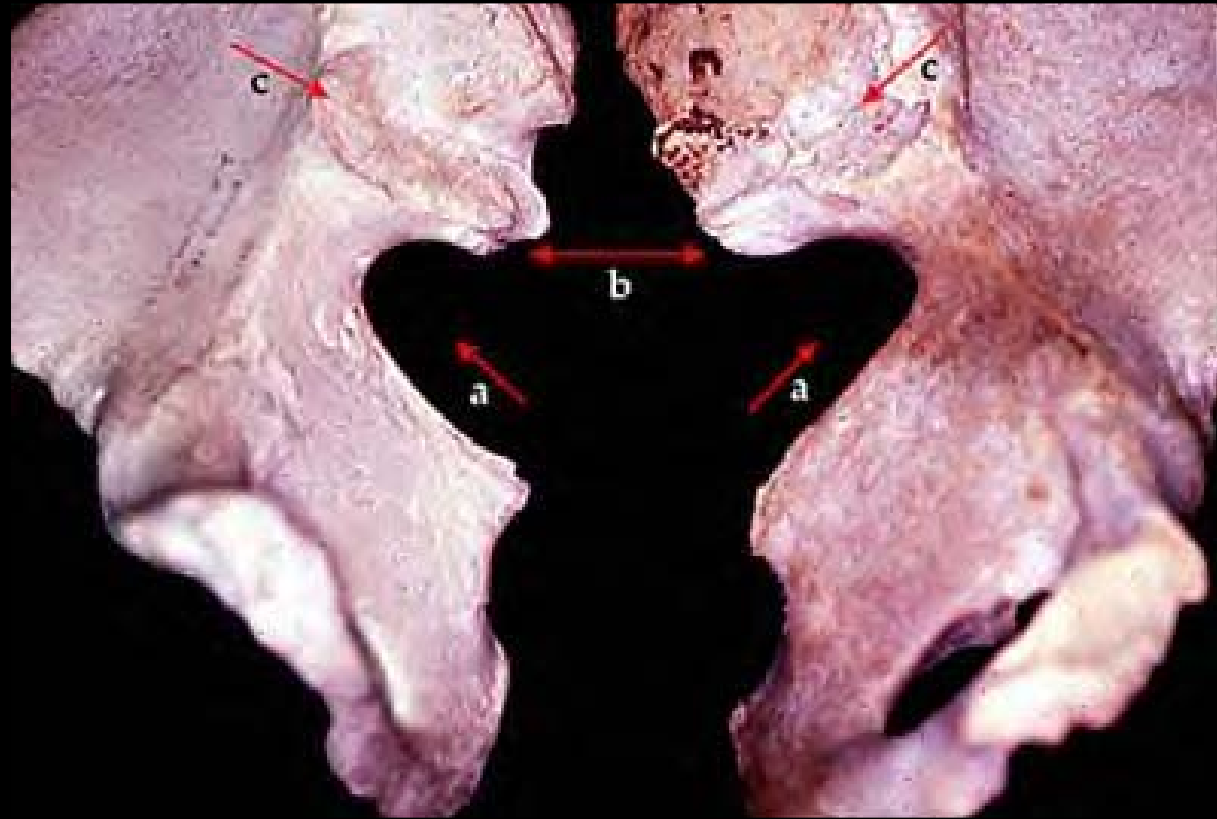
# Determining Sex from Skeleton

- Males pelvis is narrow and deep-pelvic inlet-opening in center of two pelvic halves is heart-shaped
- Female pelvis is wide and shallow-pelvic inlet is oval shaped



# Pelvis of Female and Male

- A. Sciatic notches are wide in female and narrow in male
- B. Preauricular sulci-in female-deep and in male-no indentation
- C. Auricular surfaces-in female-flat and in male-elevated



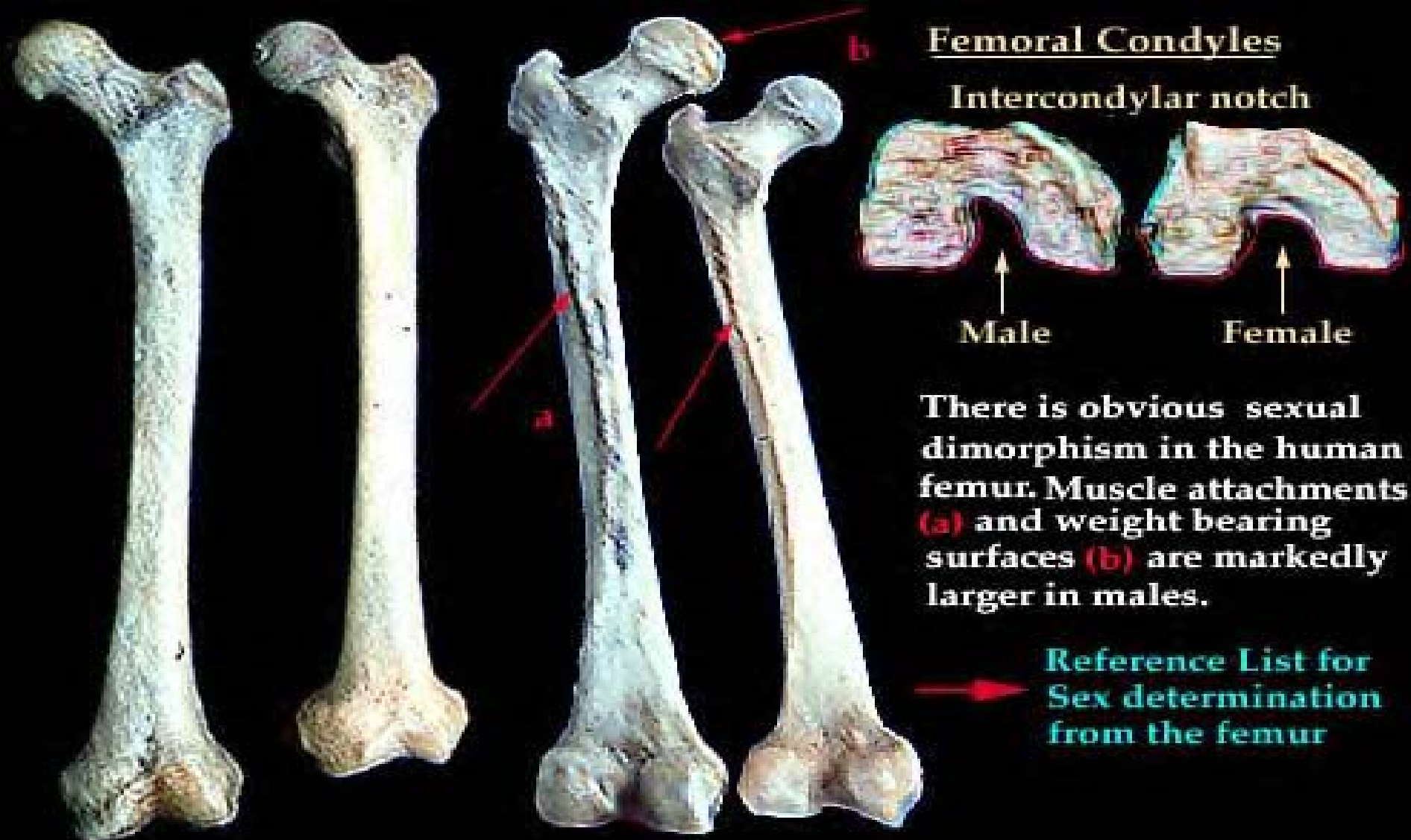


# Differences in Skulls

- Males have heavier brow ridge
- Orbits are smaller in males
- Males have heavy mandible
- Female skulls are smaller with rounder mandibles



# Differences in Femurs



Femoral Condyles

Intercondylar notch

Male

Female

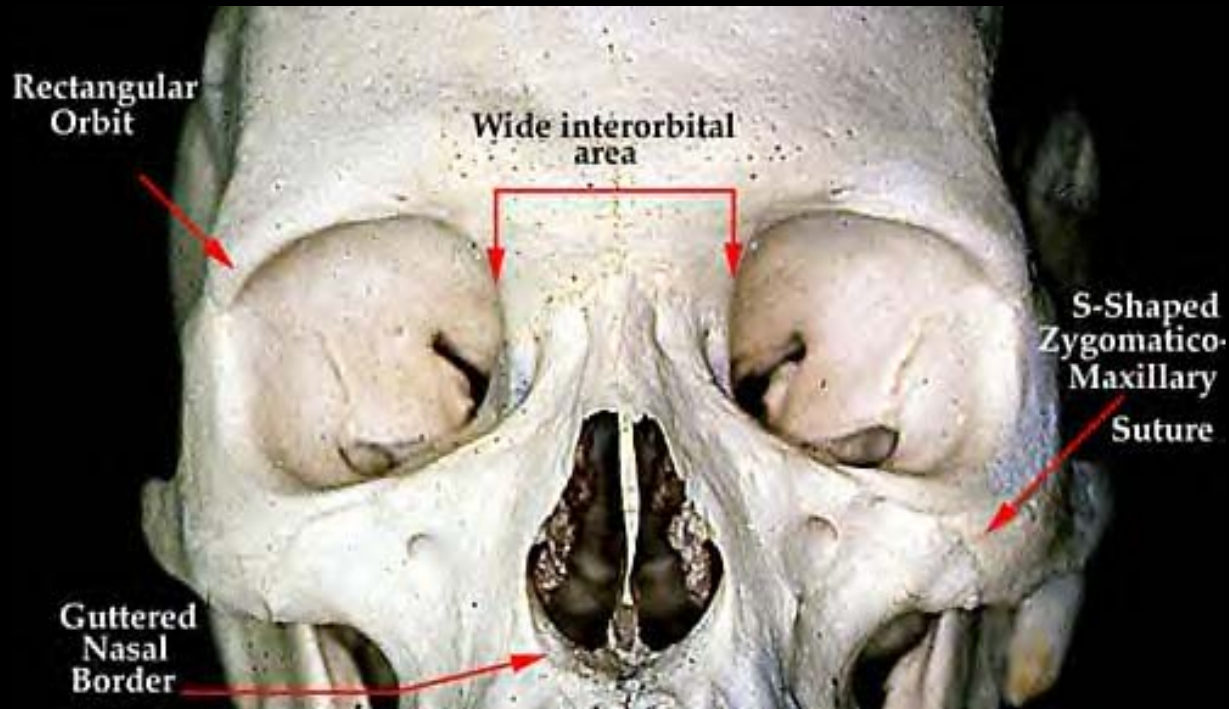
There is obvious sexual dimorphism in the human femur. Muscle attachments (a) and weight bearing surfaces (b) are markedly larger in males.

Reference List for Sex determination from the femur

# Race Determination

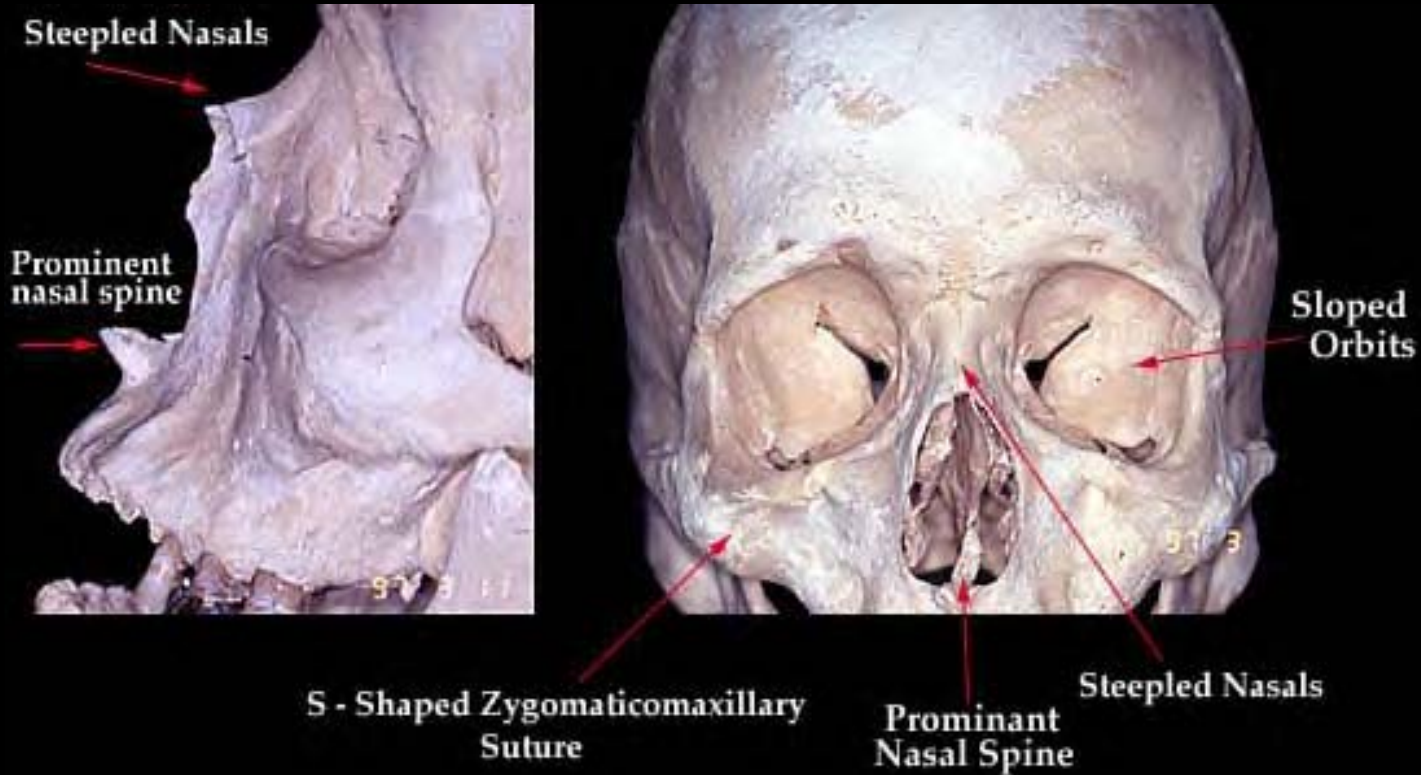
- Racial variations exist predominantly in skull
- Three basic skeletal groups
- Negroid-black
- Caucasoid-white
- Mongoloid-yellow

# Negroid skeletal group



- Smooth, elongated cranium
- Wide nasal opening
- Wide distance between orbits
- Alveolar process (bone between bottom of nose and upper teeth) projects outward

# Caucasoid Skeletal Group

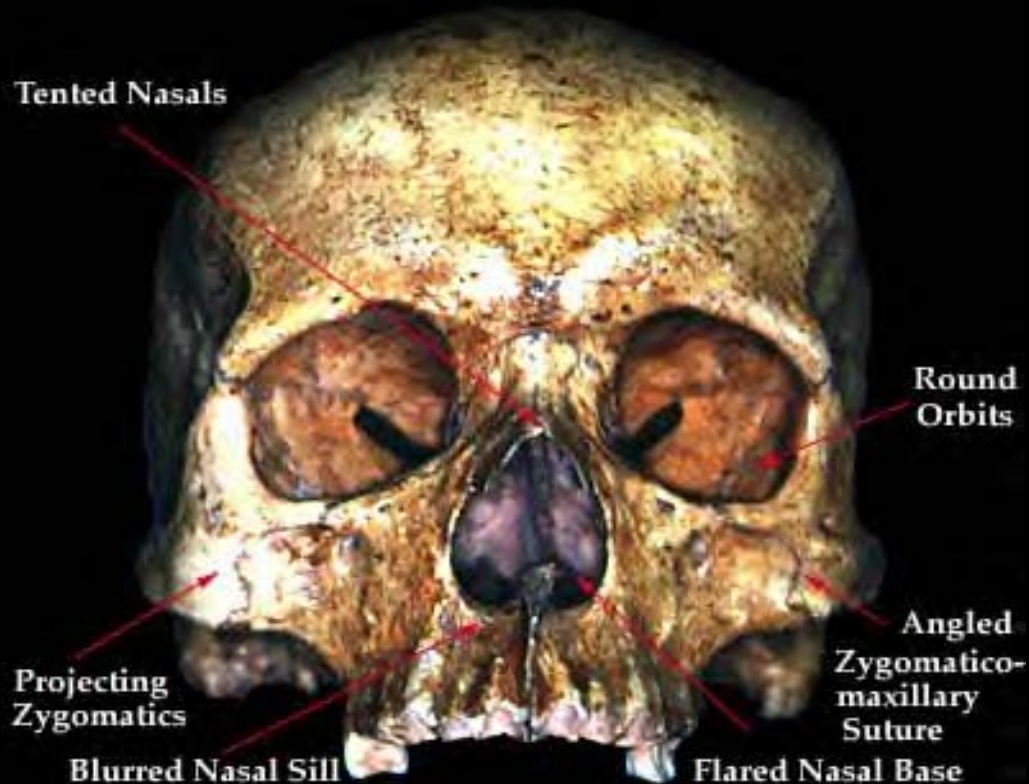


- Elongated skull
- Long, narrow nasal openings
- In some cases, projected mandible

# Mongoloid Skeletal Group



Shoveled Incisors



- Rounded cranium
- Flat cheekbones and nasal openings
- Shovel-shaped incisor teeth

# Age Determination

- Infant has 300 bones
- Some fuse together at predictable rates
- Adult human has 206 bones
- Ossification-process whereby cartilage changes into bone-results in bones fusing
- Epiphysis and Diaphysis fuse together
- Age 14-humerus
- Age 21-pelvis



Sutures open



Sutures obliterated

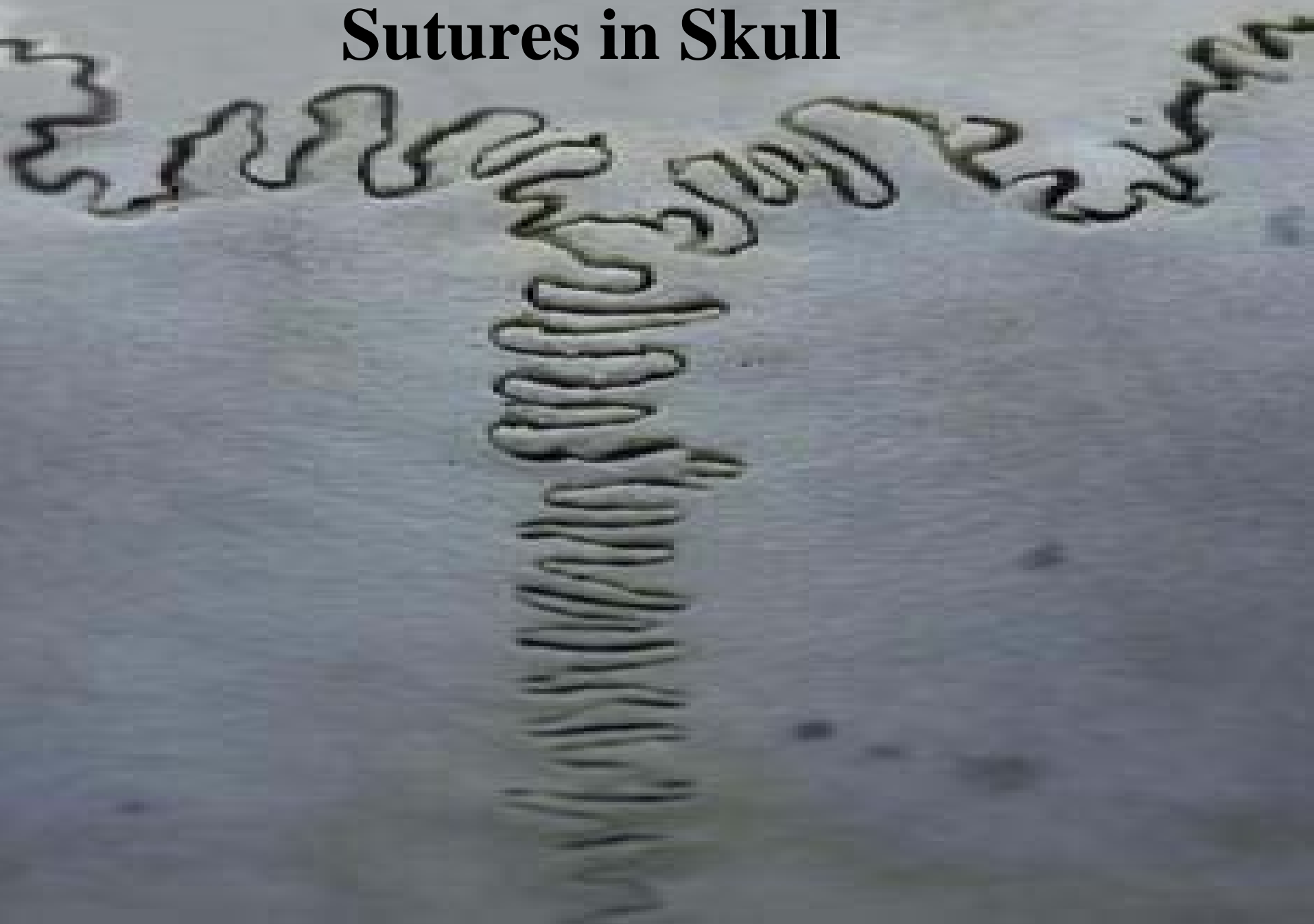


# Age

- By age 30-suture at back of skull will have closed.
- By age 32-suture running across top of skull, back to front, will have closed.
- By age 50-suture running side to side over the top of the skull, near the front, will have closed.
- Born with 450 bones, which fuse to form 206 bones.
- As cartilage between them is replaced-epiphysis line is visible.
- When cartilage is fully replaced-line no longer visible.



# Sutures in Skull



# Determining the Height from Skeletal Remains

- Approximate height can be calculated from one of the long bones
- Gender and race will need to be taken into consideration in making estimate.

# Stature Determination

- Mildred Trotter and GC Gleser (1948) developed mathematical equation to determine height from measurement of long bones
- Developed a chart for obtaining measurements



# The End

