



Bite Marks and Odontology

Introduction

- **Odontology**—the study of the anatomy and growth of teeth and diseases associated with the teeth and gums.
- Forensic Odontologist uses knowledge of the teeth to:
 - **Identify** victims of mass disasters
 - Help police in **criminal investigations**
 - Verify signs of abuse



Structure & Function of Teeth

- Digestion begins in the mouth
- Enzymes in the saliva chemically break down complex carbohydrates into simpler molecules
- Teeth mechanically grind and crush food

Structure & Function of Teeth

- Tooth is divided into three regions
 - **Crown**—above the gum line
 - **Neck**—where crown and root meet
 - **Root**—embedded in in bony socket

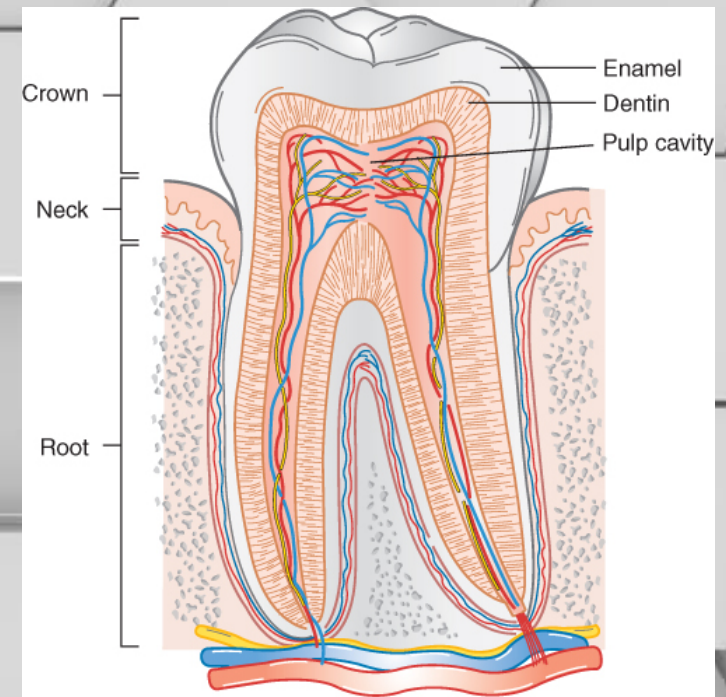


Figure 11-4. Anatomy of a typical tooth.

Structure & Function of Teeth

- **Dentin**—a connective tissue that has *calcified* and gives teeth their basic shape.
- **Pulp**—a softer connective tissue inside the tooth; contains nerves and blood vessels
- **Enamel**—calcium carbonate and calcium phosphate covering the dentin

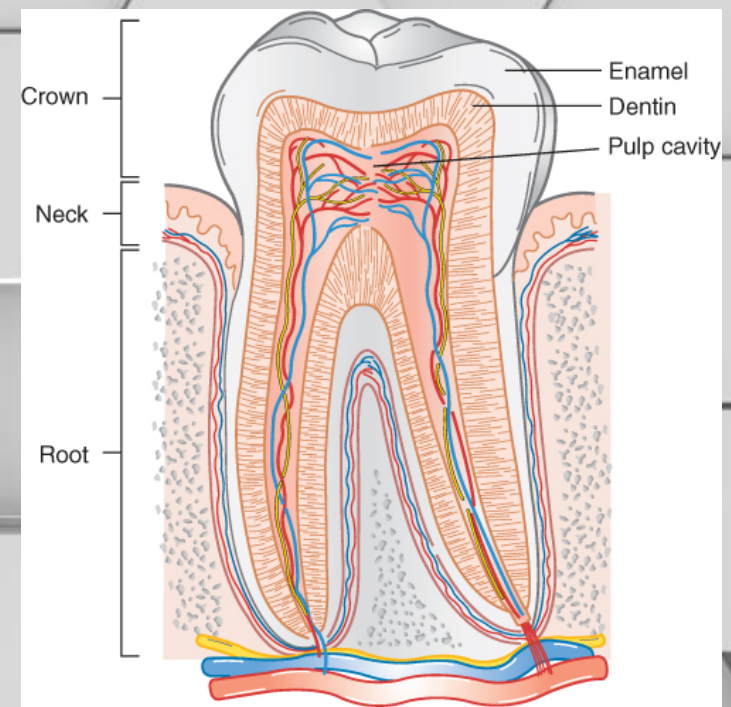
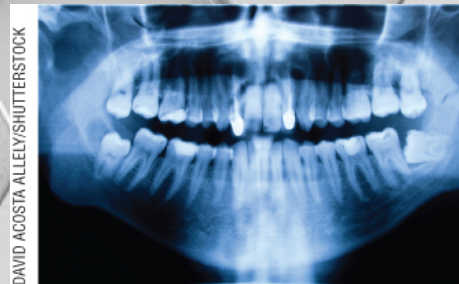


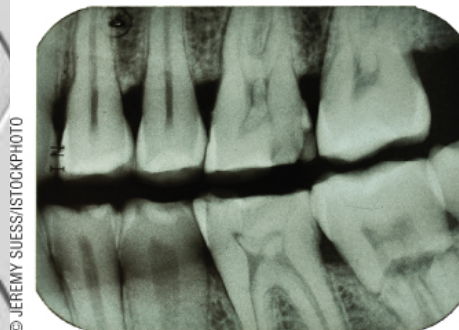
Figure 11-4. Anatomy of a typical tooth.

Structure & Function of Teeth

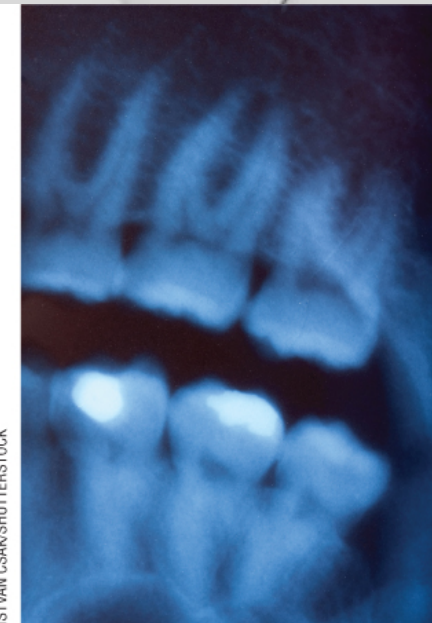
- **Cementum**—a bonelike substance that covers the dentin in the root
- **Periodontal ligament**—anchors the tooth to the bone, keeps teeth in alignment, and acts as shock absorber



(A) Panoramic X-ray.



(B) Bitewing X-ray.



(C) Periapical X-ray.

Figure 11-3. Typical dental X-rays.

Structure and Function of Teeth

- 20 deciduous (baby) teeth
- 32 permanent (adult) teeth
- Incisors
- Canines
- Molars

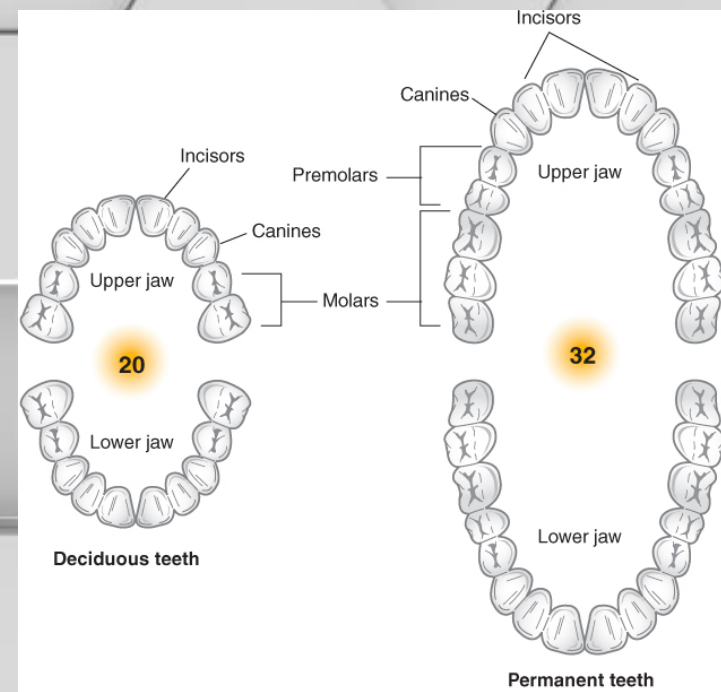


Figure 11-5. Full sets of deciduous and permanent teeth.

Estimating Physical Characteristics

- A forensic odontologist compares dentals records with the victim's remains
- Dental alterations—fillings, caps, bridgework, and dentures
- Teeth—size, shape, gaps, cracks, alignment, missing or extra one, wears, stains
- Dentition—the pattern made by a particular set of teeth



4000 year old Dental Work
Found On An Egyptian Mummy !!

Age Estimation

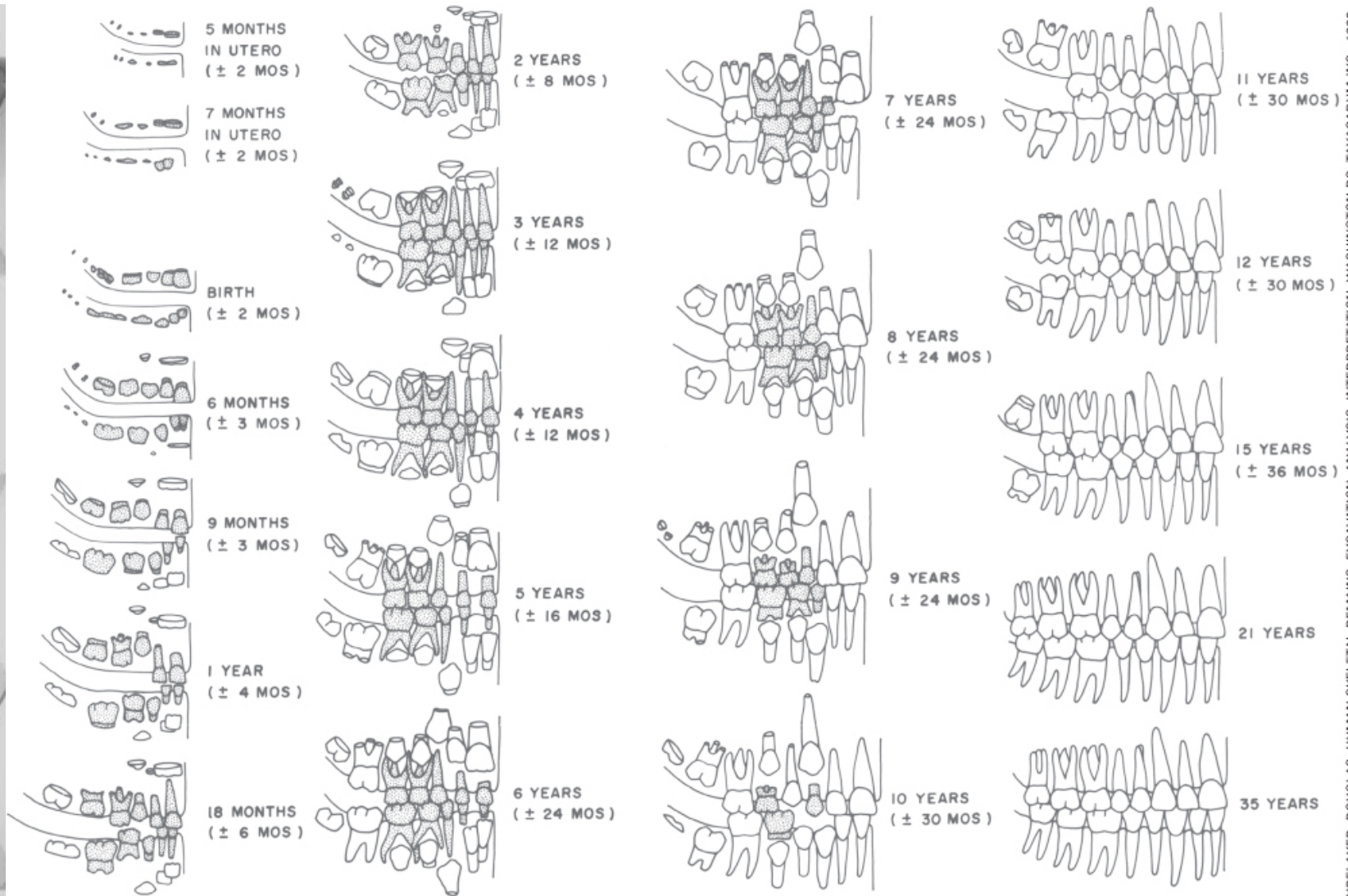


Figure 11-7. Ubelaker's Chart of Dental Development shows the emergence pattern of human teeth.

Color the Teeth/Color the Tooth

- Use the colored pencils provided and the directions on the Color handout.

Ancestry Estimation

- Examining physical characteristics **CANNOT** absolutely determine an unidentified person's ancestry.
- Certain characteristics are more common within certain population groups

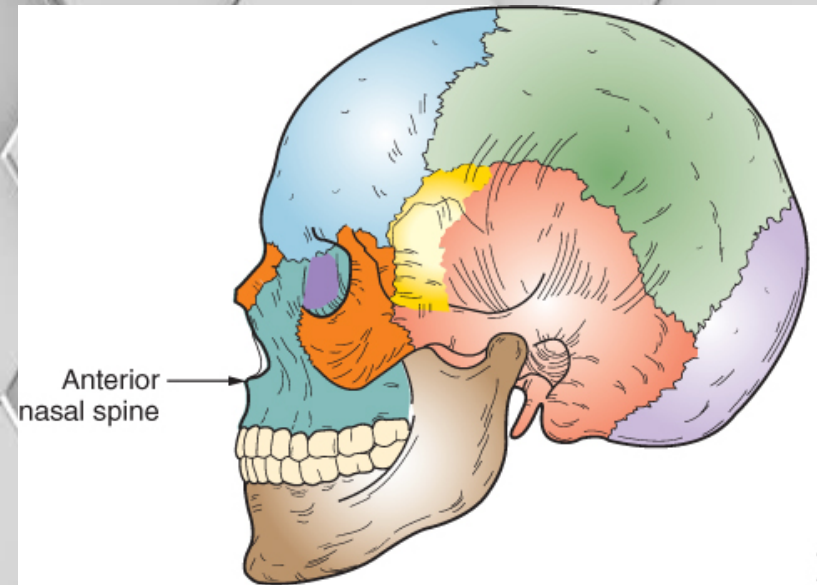


Figure 11-8. The nasal spine is usually much more prominent in people of European descent than in people of African descent.

Ancestry Estimation

- The shape of the decedent's incisors can be a useful feature
- Fewer than 10% of European and African decent have this feature

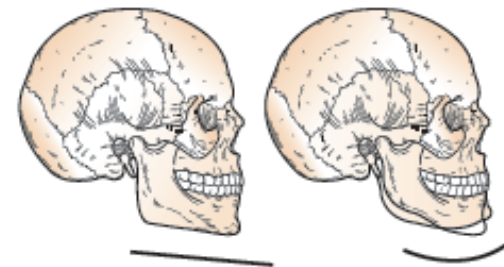


Figure 11-9. Australian aborigines and some South Pacific islanders often exhibit rocker jaw.

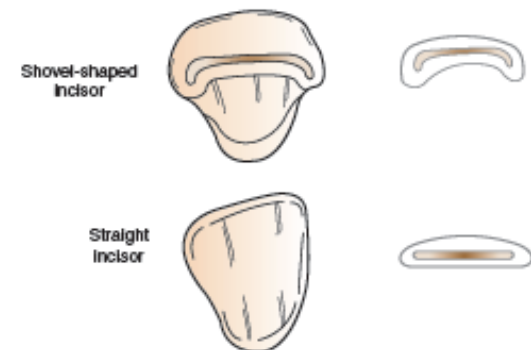


Figure 11-10. Forensic odontologists are able to use the shape of the decedent's incisors to estimate ancestry.

Sex Estimation

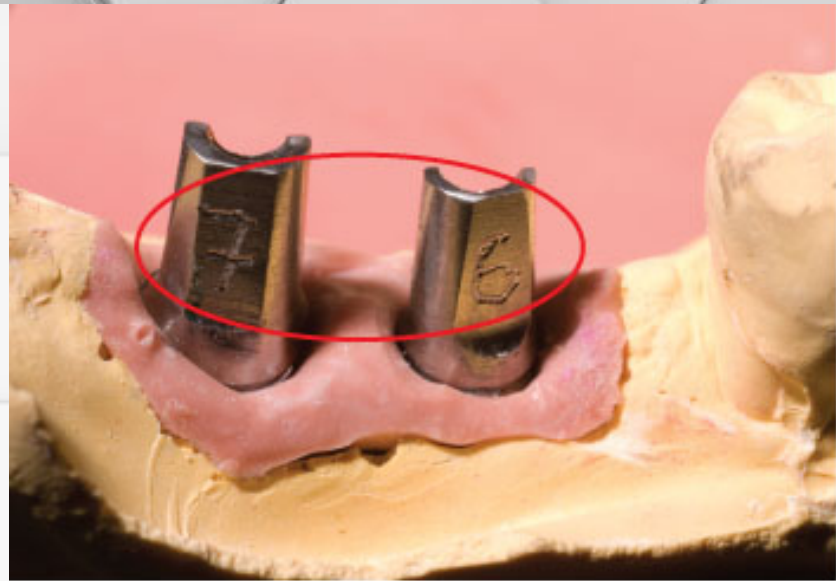
- Difficult to determine with teeth
- Male teeth—generally larger
- Female teeth—canines tend to be more pointed
- Craniofacial differences make sex determination more accurate

Determining Positive Identification

- **Presumptive identification**
 - Personal effects
 - Family ID
 - Location of the body
- **Positive identification**
 - Fingerprints
 - DNA
 - Medical and dental records

Dental Records

- Forensic Odontologist compares
 - The antemortem records (take during life)
 - The postmortem records (recorded after death)
- Especially helpful
 - Fillings
 - Bridgework
 - Dental implants

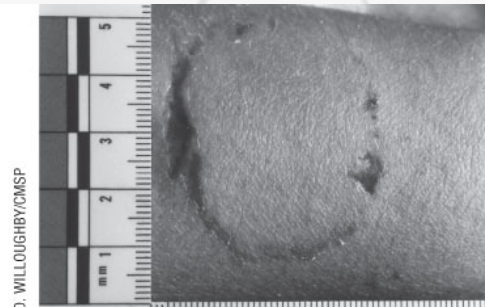


PHOTOFUN/SHUTTERSTOCK

Figure 11-12. The serial numbers of the dental implants are circled in red.

Human Bite Marks

- Bite marks look different in soft and stretchy substances like skin versus hard substances like cheese or a pencil
- When the bite occurs antemortem
 - The area bruises and swells
- When the bite occurs postmortem
 - The area does not bruise or swell
- Typical bite has a double horseshoe pattern



Human Bite Marks

- Swelling and inflammation can deform the bite mark
- Trace bite marks
- Cast deep bites
- Compare casts or traces with impressions from a suspect



Figure 11-14. A casting of human teeth that can be compared to a bite mark.

FORENSIC DENTISTRY ONLINE, DR. JOHN KENNEY.
GRAPHIC: CHICAGO TRIBUNE. MCT/NEWS.COM



Figure 11-15. A transparent overlay of a suspect's teeth.

Animal Bite Marks

- Very different dentition patterns
- Compare DNA and bite patterns just like with humans

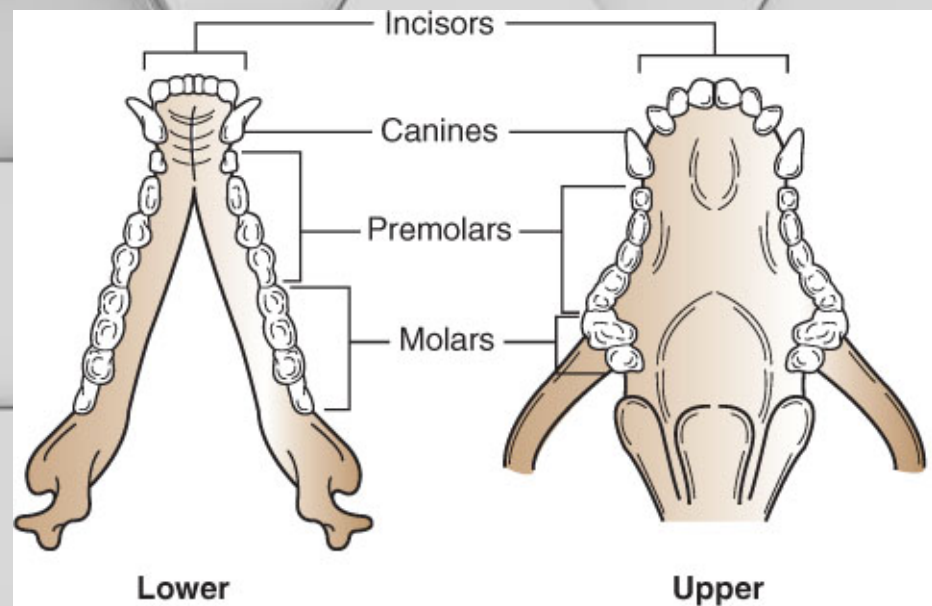


Figure 11-16. A dog's jaws have a long, narrow arch.