Jaws and Teeth

Comparative structure

Reading: Benton, Chapter 10
Branchial basket of lamprey (agnathan)

Fig. 6.9. The skeleton of a lamprey. A, the anterior end, to show the small, poorly developed vertebral elements lying along the large notochord (after Jollie 1962 [Chordate morphology. New York: Reinhold]). B, enlargement of the transitional region to show separation of vertebral elements (after Remane 1936). C, the tail region to show fusion of bases of fin supports around notochord (after Remane 1936).
Shark jaws (Chondrichthyes)

Fig. 8.3. A, diagram of the chondrocranium, vertebral column, and gill arches of an elasmobranch to show the parts and relations of the seven gill arches. B, C, skull of an advanced hyostylic shark (*Carcharhinus*) to show the freely movable palatoquadrate (after Moss 1972). B, with the jaws closed, and C, with the jaws maximally opened and palatoquadrate fully protracted and de-
Teleost protrusible jaws
Comparative jaw muscles in mammal and reptile
Jaw suspension in vertebrates

Amphistylic (ancestral condition)

Hyostylic (condrichthyes)

Autostylic (Sarcopterygians and tetrapods)

Barghusen and Hopson, 1979, The Endoskeleton
Structures associated with jaw movements in mammals

**Temporal Fossa:** area for muscle attachment and movement of the mandible, site of muscle attachment

**Zygomatic Arch:** composed of the jugal (or zygomatic) and squamosal bones, muscle attachment along lower margin

**Coronoid process of the mandible:** site of muscle attachment

**Angular process of the mandible:** site of muscle attachment

**Masseteric fossa of the mandible:** site of muscle attachment

**Joint:** condyle of the mandible fits into the glenoid fossa of the squamosal (note same name as glenoid fossa of the pectoral girdle)
Muscles that move the mandible

**Temporalis** - originates on the side of the braincase, inserts on the coronoid process, pulls the mandible upward and backward.

**Masseter** - originates on the zygomatic arch, inserts in the masseteric fossa and on the lateral angle of the mandible, pulls the mandible upward, laterally, and forward.

**Pterygoideus** - originates on the pterygoid plates, inserts on the medial angle of the mandible, pulls the mandible upward, medially, and forward.
Muscle action to elevate (close) the mammalian mandible

- Temporalis
- Masseter

Dog skull (P. David Polly)
Dorsal and medio-lateral action of the muscles

- **temporalis**
- **masseter**
- **pterygoideus**
Animated model of teeth in action

Note how tall trigonid of lower molars passes between upper teeth and how the protocone of the upper molars slides across low talonid basin of lowers in mortar-and-pestle fashion.
Anatomical directions for the dentition

- **Mesial**
- **Distal**
- **Lingual (or Palatal)**
- **Labial (or Buccal)**
Human jaws and dentition

Coronoid process

Alveolar bone

Condylar process

Angular process

Homo sapiens. P. D. Polly
Tooth eruption in humans

Dental Age 9
Tooth development schematic view
Tooth structure, development, and attachment

Pleurodont  Acrodont  Thecodont

Barghusen and Hopson, 1979, The Endoskeleton
Scales and teeth - developmentally homologous structures

- Composed of bone, dentine, and enamel (or variants)
- Develop from interaction between surface ectoderm layer and deeper mesoderm layer
- Mouth of deuterostomes is formed by invagination of ectoderm to connect with gut tube

**Gar scales**

**Shark teeth**
Splanchnocranium in humans
Innervation of the teeth and mandible

Root of trigeminal nerve (V)

Maxillary division of trigeminal (V3)

Mandibular division of trigeminal (V3)