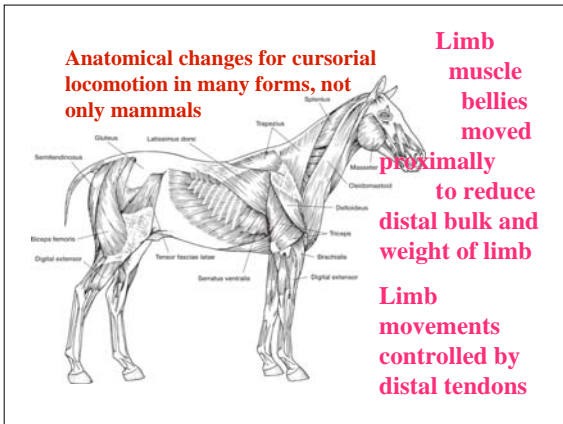
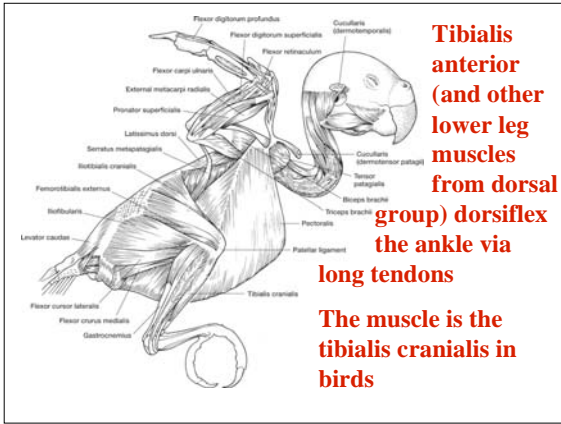


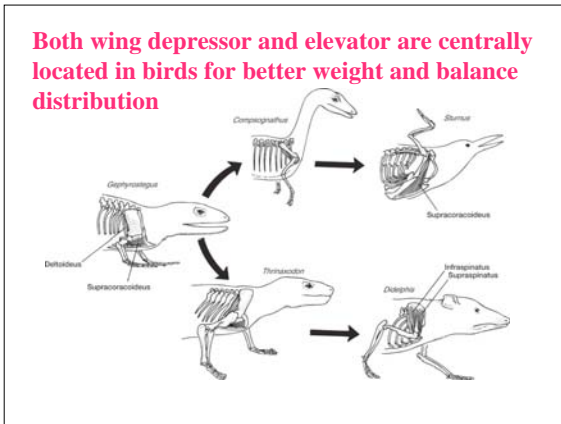
Anuran locomotion is saltatorial
Hindlimbs act simultaneously to propel animal initiating leap
Forelimbs and girdles absorb shock of landing
This locomotor specialization explains the relatively complex musculature of frogs when compared to salamanders



Anatomical changes for cursorial locomotion in many forms, not only mammals
Limb muscle bellies moved proximally to reduce distal bulk and weight of limb
Limb movements controlled by distal tendons

- Bird appendicular muscles increase
- Axial muscles decrease
- Synsacral fusion for stability allows lumbar region axial musculature reduction
- Appendicular muscles increase in complexity with specializations for flight and landing
- Cervical muscles and long vertebral chains allow great head control precision and neck flexibility
- Long tendons to toes give precise toe positioning and control for landing and gripping supports





Both wing depressor and elevator are centrally located in birds for better weight and balance distribution

- Patagialis muscle inside leading edge of skin of wing
- Arises from clavicle and extends to wrist metacarpals
- Maintains aerodynamic shape of leading edge of wing and can be modified to enhance flight capabilities
- Similarly tensile patagium occurs in bat wings and probably in pterosaurs
- Gliding squirrels have similarly structured patagial reinforcements as well

Pectoral muscles specialized for flight
Pectoralis large and muscle belly near midline to control position of center of mass
Supracoracoideus deep to pectoralis and also lifts wing in birds
Modified by tendon that runs through foramen triosseum in shoulder to alter line of action
Supracoracoideus was a limb adductor in reptiles

Cranial musculature

- **Both branchiomic and hypobranchial jaw muscles arose from paraxial mesoderm**
- **Branchiomic muscles from from cranial paraxial mesoderm (somitomeres)**
- **Hypobranchial muscles from trunk paraxial mesoderm (somites)**
- **LEARN TABLE 10.3, P. 402**

Cranial nerves supply the branchial arches.
III, VII, IX and X-XI supply branchial arches 1-3 and 4-7 respectively
Each arch has levator and constructor muscles that elevate and close articulated elements

- Each arch has a constrictor that extends laterally within the gill and may extend laterally onto the body under the skin
- The medial part of this specializes to become the adductor
- Constrictors squeeze water through the pharynx and adductors bend the gill arch
- Dorsal and ventral branchial muscles attach to the arch ends and help shape the arch by altering the relationship of individual elements

Mandibular arch

- In sharks both adductor and constrictor are near the surface and the jaw is closed by the enlarged adductor mandibulae
- Preorbitalis assists in sharks
- Bony fishes adductor is composite from many smaller muscles and correlate with skull kinetic elements
- Adductor mandibulae is strong jaw adductor
- Mammal temporalis, masseter and pterygoids arise from this muscle

Ventral parts of constrictor separated by jaws and is the intermandibularis

It gives rise to the mylohyoid and digastric

The dorsal derivative of the mandibular constrictor in sharks is the levator palatoquadrate

Hyoid arch

In primitive fishes and still chimaeras this arises as a gill arch

Then, becomes involved in reinforcing the jaw in other jawed fishes

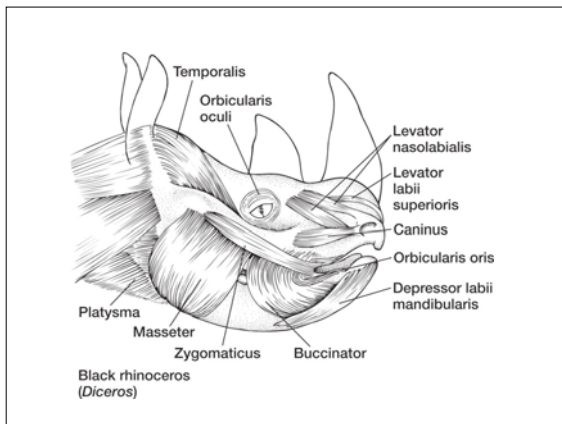
Becomes a separate hyoid apparatus in tetrapods

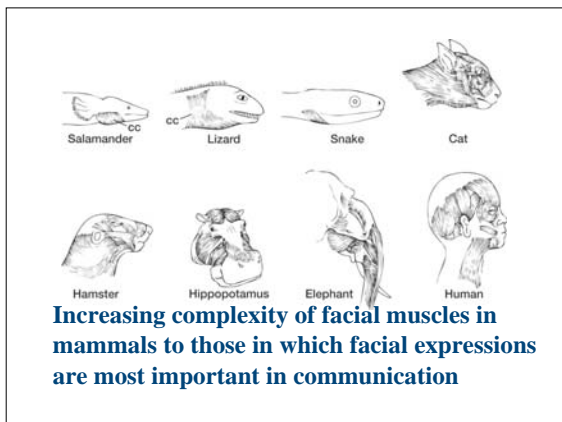
Hyoidean constrictores important in fish where they form water-breathing pump but are reduced or lost in tetrapods

- In sharks the largest hyoidean constrictor is the levator hyomandibulae
- The second often fused to the first is the epihyoidean also inserting on the jaw
- In bony fishes the epihyoidean becomes the levator operculi, inserting on the operculum
- The depressor mandibular of tetrapods is homologous to levator operculi and epihyoidean
- In mammals the depressor mandibulae becomes the stapedius, that protects the inner ear from too loud sounds

- The digastric opens the jaw and arises from two areas
- Posterior digastric comes from interhyoideus, which was the ventral part of the hyoidean constrictor
- Anterior part of the digastric is from the mandibular arch, the intermandibularis muscle
- This muscle has also a composite innervation, from Cranial nerves V and VII that confirms this evolutionary pathway and homologies

- In tetrapods the interhyoideus becomes thin sheets that form the constrictor colli and become facial muscles in mammals
- The platysma myoides is from the hyoid arch. It is thin and covers the throat superficially
- Others have become very specialized for controlling the position and function of the special sensory features of the face, eyes, ears, nose and mouth



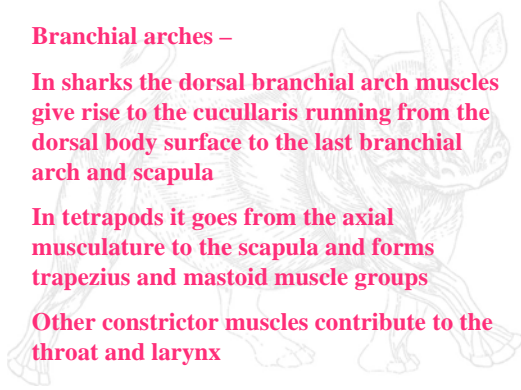


Branchial arches –

In sharks the dorsal branchial arch muscles give rise to the cucullaris running from the dorsal body surface to the last branchial arch and scapula

In tetrapods it goes from the axial musculature to the scapula and forms trapezius and mastoid muscle groups

Other constrictor muscles contribute to the throat and larynx



Hypobranchial musculature

Arise from cervical somites with ventral ends that migrated to the pharyngeal floor

Supplied by spinal nerves

Run anteroposteriorly

Arise from coracoid region of shoulder girdle in fishes

Coracomandibularis and sternohyoideus

In sharks the sternohyoideus is divided into anterior coracohyoideus and a posterior coracoarcualis

- **Jaw openers and buccal cavity expanders**
- **In tetrapods they accompany branchial arches contributing muscles to the throat, hyoid apparatus, larynx and tongue**
- **Other muscles that arise from cervical somites include cervical muscles (epaxial myotomes) that may insert on the neurocranium and lift it during jaw opening in sharks**
- **Also, only in sharks cervical somites contribute to interpharyngobranchials which join the branchial arches in the pharynx**

**Assorted end-of-chapter
(I-don't-know-what else-
to-do-with-them) topics**

