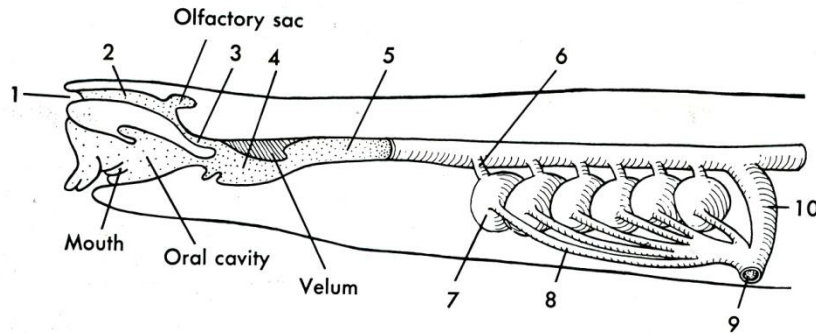
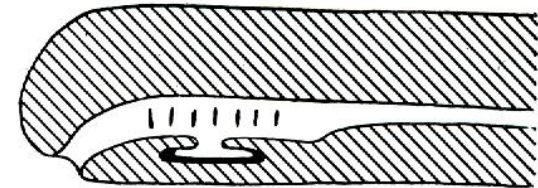


**SOLUNUM sistemi**

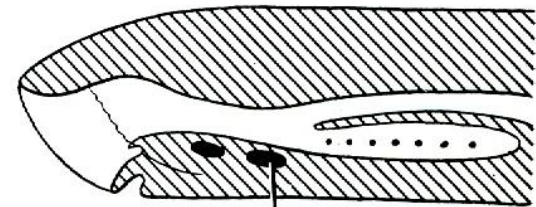


**Fig. 12-4.** Respiratory pathway in the hagfish *Myxine glutinosa*, lateral view. 1, Naris; 2, nasal duct; 3, nasopharyngeal duct; 4, velar chamber; 5, pharynx; 6, afferent branchial duct; 7, gill pouch; 8, efferent branchial duct; 9, common external gill aperture; 10, pharyngocutaneous duct. The gill pouches and ducts are paired, but only the left side is shown.

## Myxinae'de solunum yolu



LARVAL LAMPREY



Thyroid

ADULT LAMPREY

**Fig. 12-5.** Location of gill slits in larval and adult lampreys. A subpharyngeal gland, shown in black, is open to the pharynx in the ammocoete and isolated as a ductless thyroid gland in the adult lamprey.

## Larval ve ergin Petromyzonda Solungaç yarıklarının konumu

# Omurgalı embriyosunda yutak bölgesi oluşumu - Hipotetik

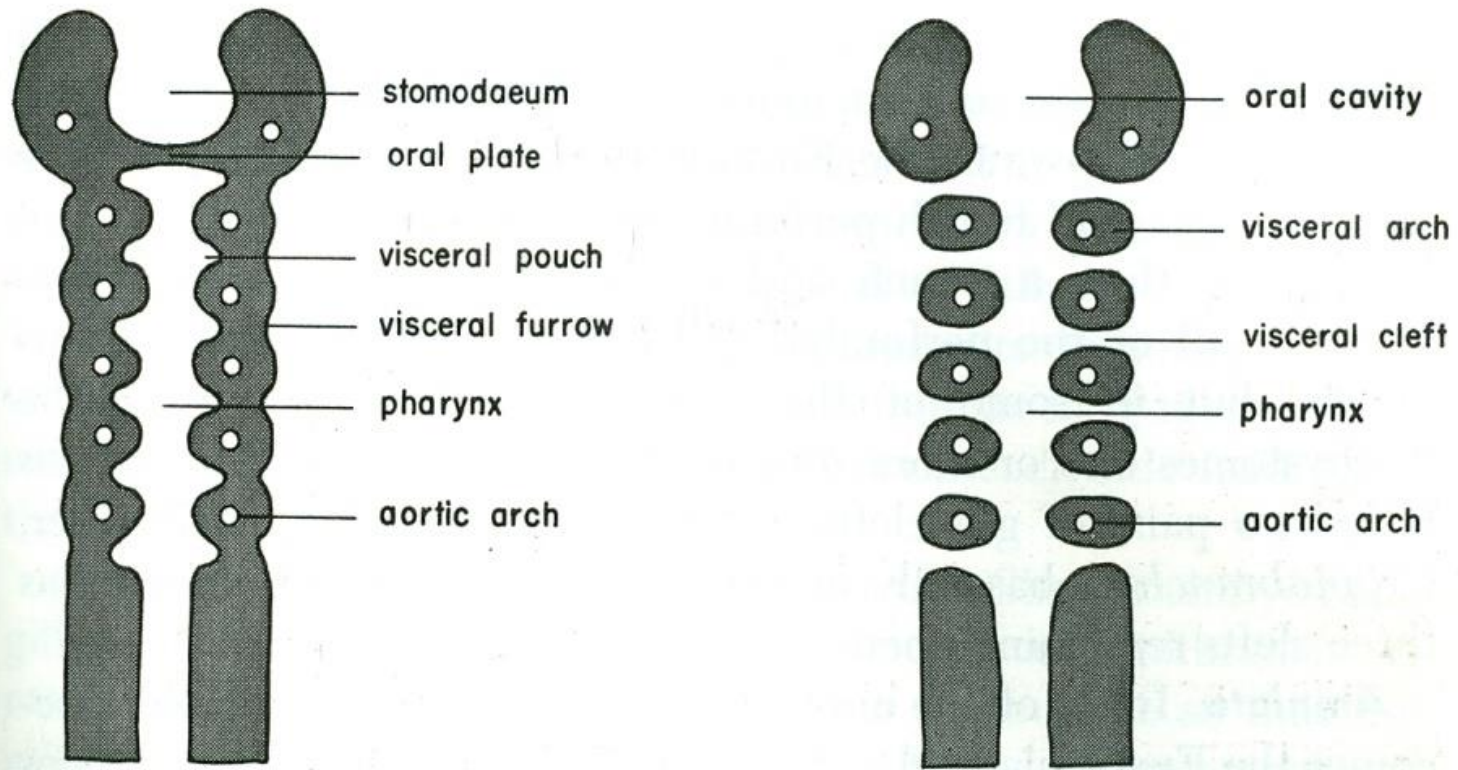
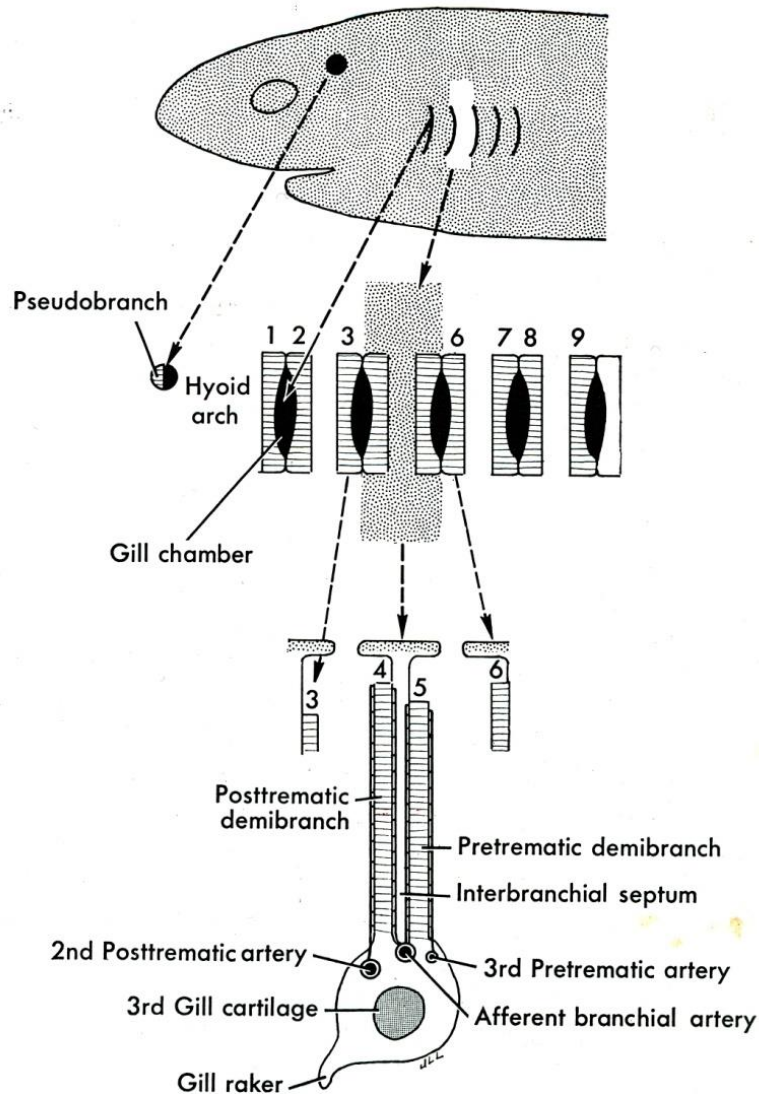


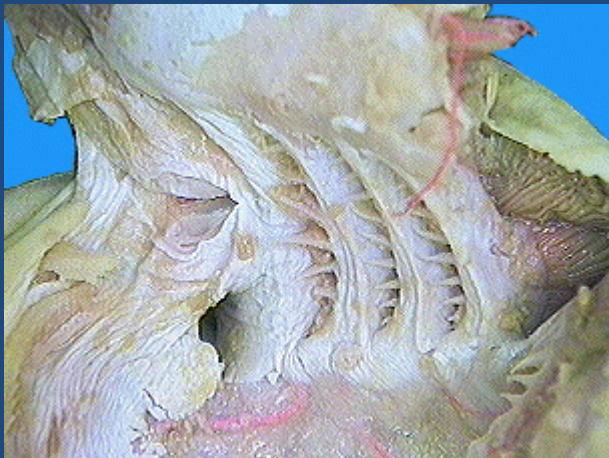
FIG. 9-1. Frontal section through pharyngeal region of hypothetical vertebrate embryo, showing relationship of visceral pouches, visceral furrows, visceral arches, and visceral clefts. Left, before the plates separating the pouches and furrows perforate; right, after the plates have perforated, resulting in the formation of visceral clefts. (Redrawn from Weichert, *Elements of Chordate Anatomy*, McGraw-Hill, 1959, by permission.)



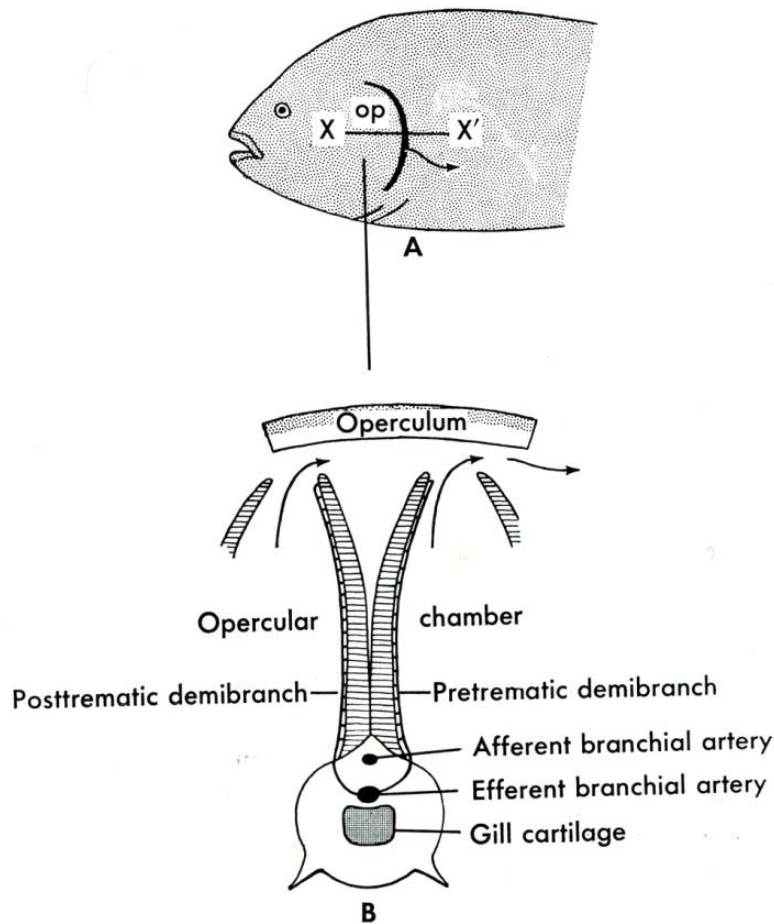
**Fig. 12-1.** Respiratory structures in *Squalus acanthias*, an animal with a spiracle, five naked gill slits, nine demibranchs (1 to 9), and four holobranchs. The second holobranch (fourth visceral arch) has been excised and demonstrated in cross section.

İnternal Solungaçlar  
(*Squalus acanthias*)





**Solungaç yarıkları**



**Fig. 12-2. A,** Gill chambers of a teleost are covered by an operculum, **op**, which grows caudad over the gills from the hyoid arch. **B,** Cross section of one holobranch in the plane **X** to **X'**. Note the absence of an interbranchial septum in the teleost holobranch. Arrows indicate direction of efferent water flow.

Solungaç odacığ  
İnternal solungaç  
Yapısı -*Teleostei*

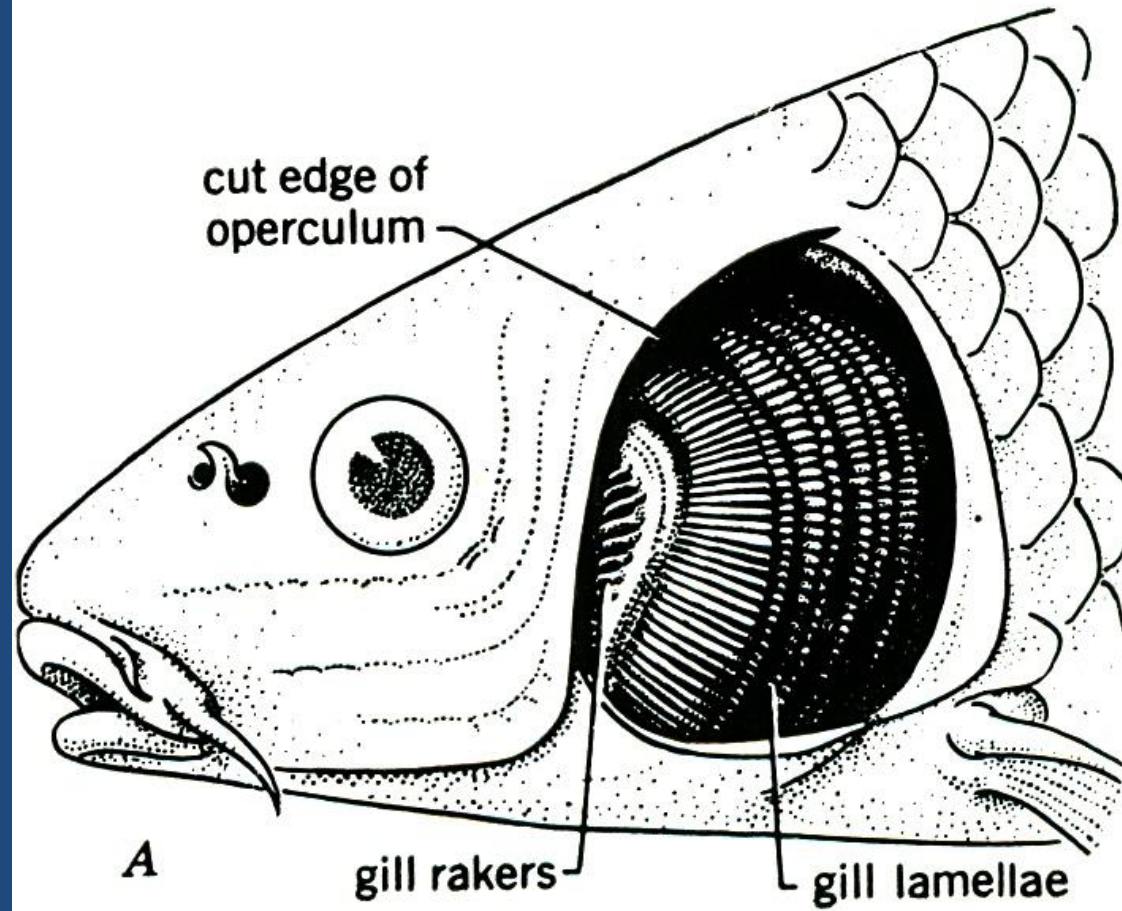


FIG. 6.4. Head of bony fish (carp). The operculum has been cut away in order to expose the internal gills. (From Storer, "General Zoology," McGraw-Hill Book Company, Inc. By permission.)

İnternal solungaçlar  
*Sazan balığı*



## GILL STRUCTURE

GILL  
RAKERS

GILL ARCH

GILL FILAMENTS



İnternal solungaç yapısı





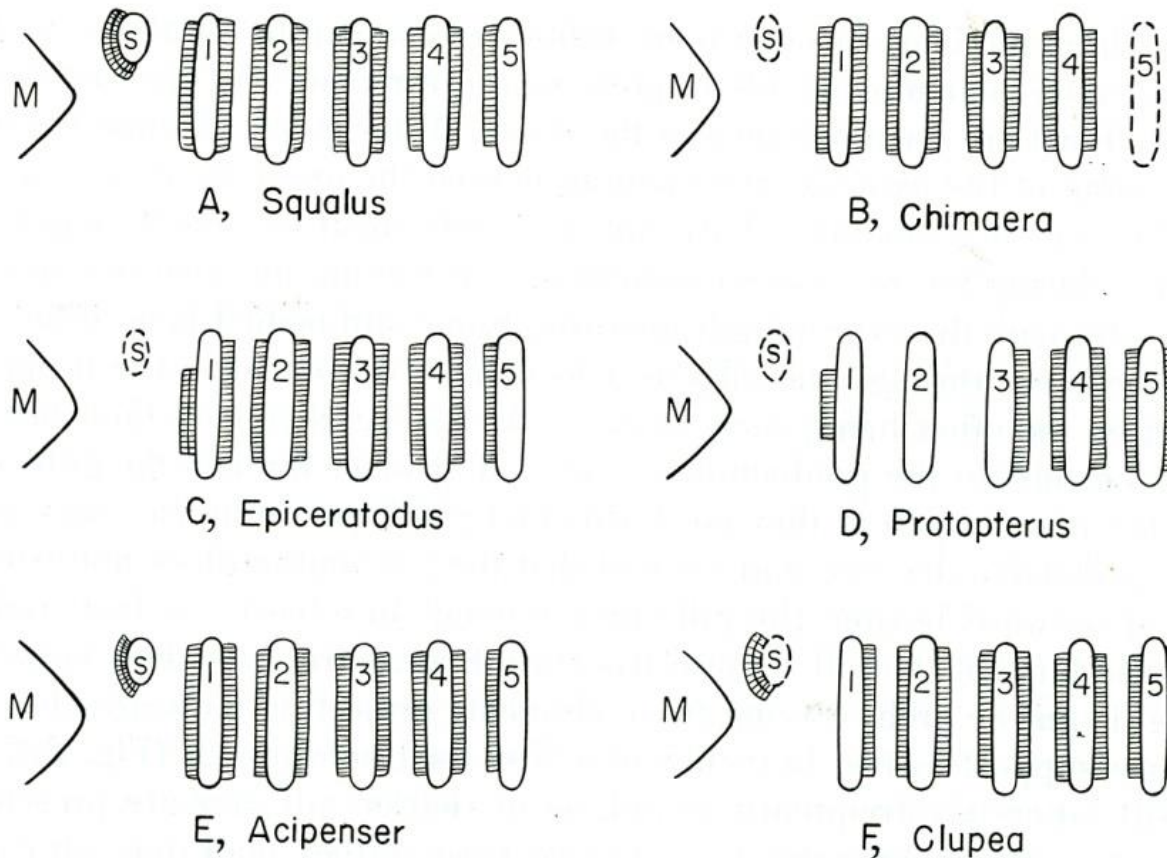


**İnternal solungaçlar**

# Solungaç düzeni diyagramı

## MOUTH, PHARYNX, RESPIRATORY ORGANS

321



**Fig. 229.** Diagrams to show the gill arrangement. *A*, Shark; *B*, a chimaera; *C*, the Australian lungfish; *D*, the African lungfish; *E*, sturgeon; *F*, a teleost (herring). Broken line indicates a closed slit. Hatched area adjoining slit indicates gill surface; vertical line through hatching indicates pseudobranch. The presence in *Protopterus* of a gill surface on the posterior side of the last slit is unique. *M*, mouth; *s*, spiracle; postspiracular slits numbered.



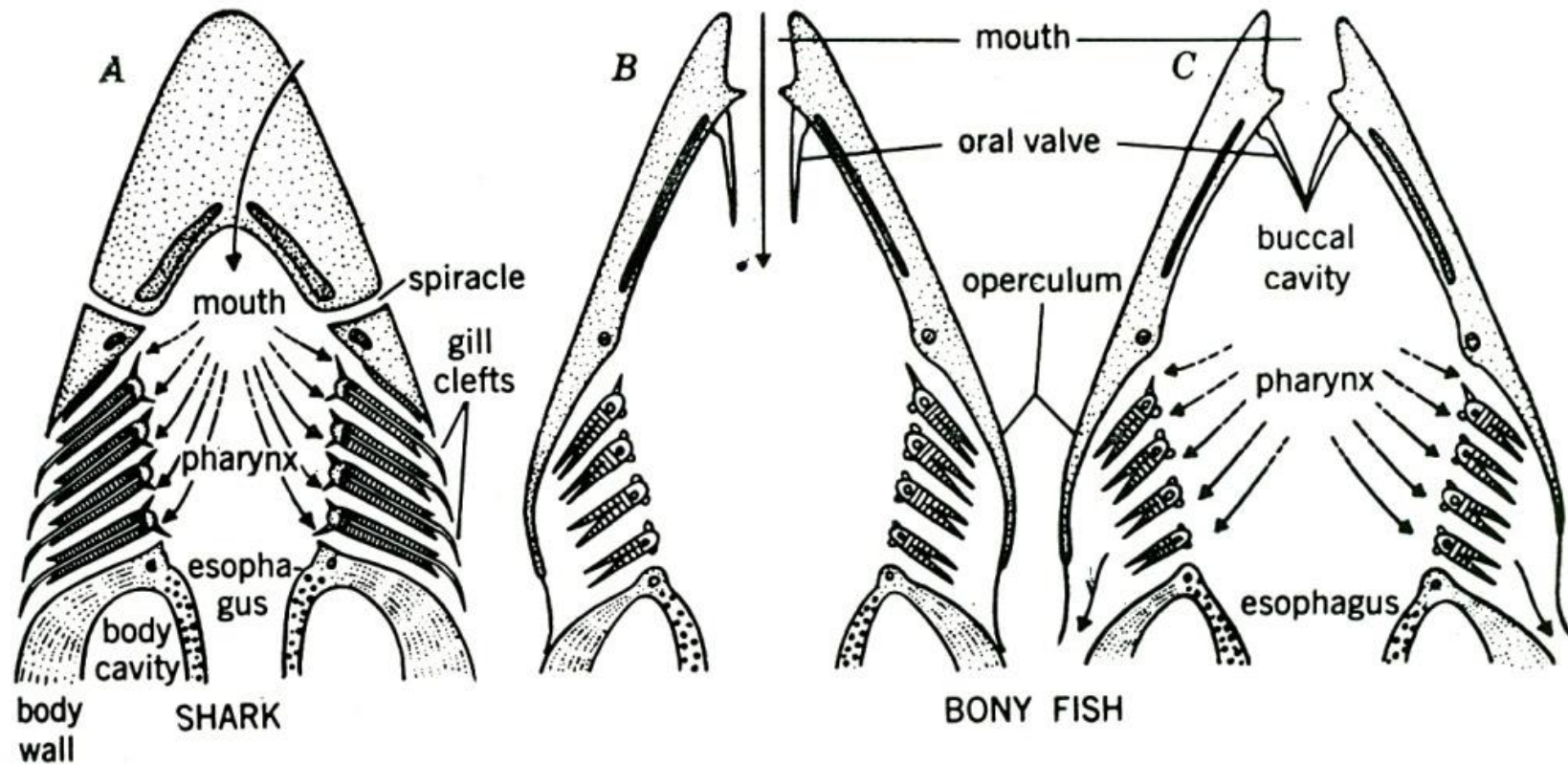
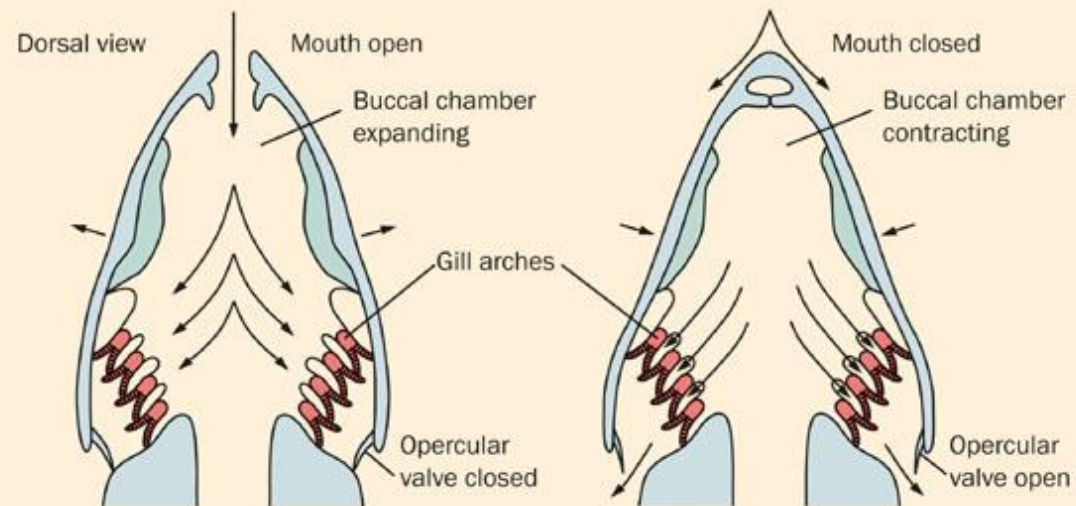
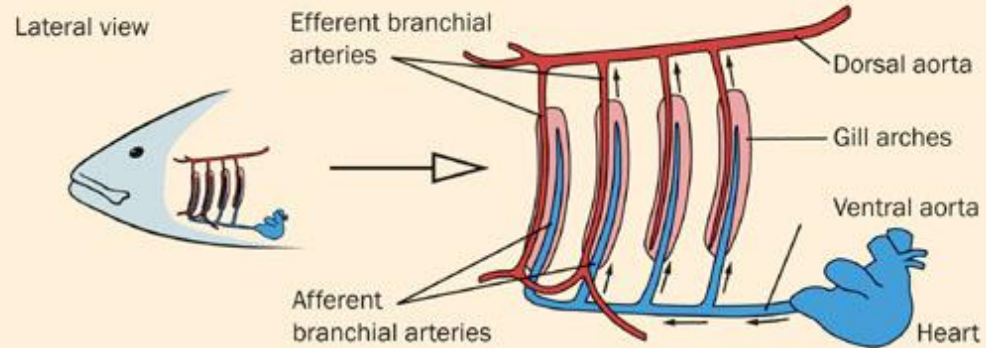


FIG. 6.8. The respiratory mechanism of fishes; diagrammatic frontal sections (lobes of oral valves are actually dorsal and ventral); arrows show paths of water currents. SHARK: A, water enters ventrally placed mouth, which then closes, and floor of mouth region rises to force water over the gills and out the separate gill clefts. BONY FISH: B, inhalent, opercula closed, oral valve open, cavity dilated, and water enters. C, exhalent, oral valve closes, buccal cavity contracts, water passes over gills in common cavities at sides of pharynx and out beneath opercula. (From Storer, "General Zoology," McGraw-Hill Book Company, Inc. By permission.)

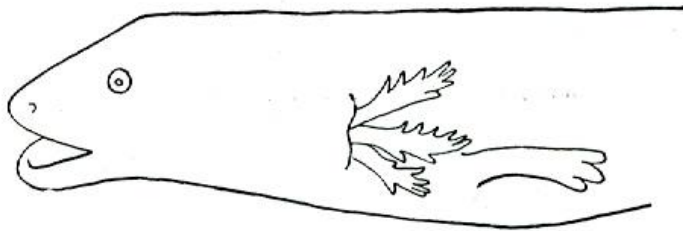
# Balıklarda solunum mekanizması



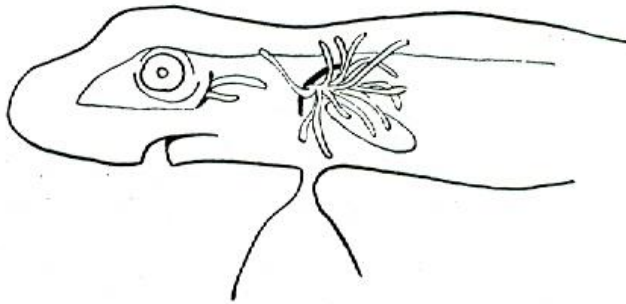




A. POLYPTERUS



B. AMPHIUMA



C. SCYLLIUM

Fig. 12-6. Larval external gills of a bony fish,

Larval eksternal solungaçlar

A. Tatlısu balığı

B. Amphibia

C. Elasmobranch



Polypterus – External solungaç





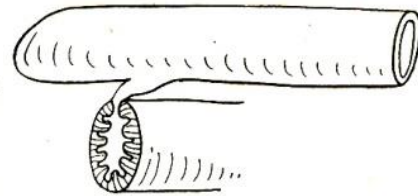
## Eksternal solungaçlar

*Ambystoma mexicanum*  
-salamandridae -

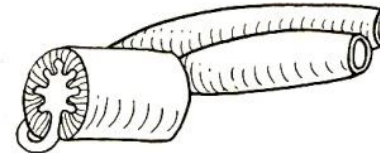
*Siren galore*  
- Salamandridae -



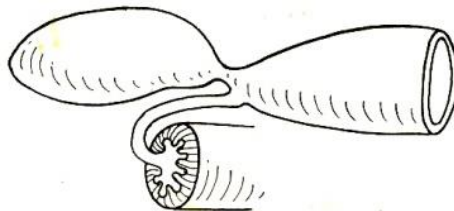
# Aquatik omurgalılarda yüzme kesesi



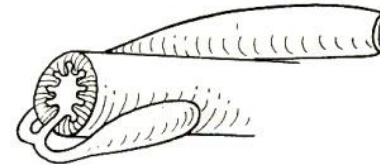
AMIA



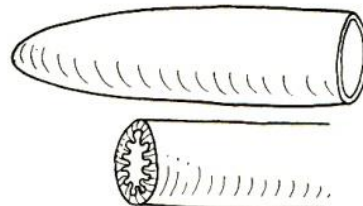
PROTOPTERUS



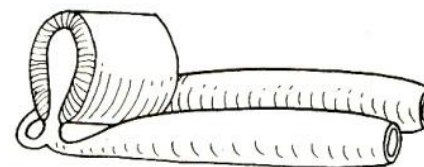
CARP



POLYPTERUS



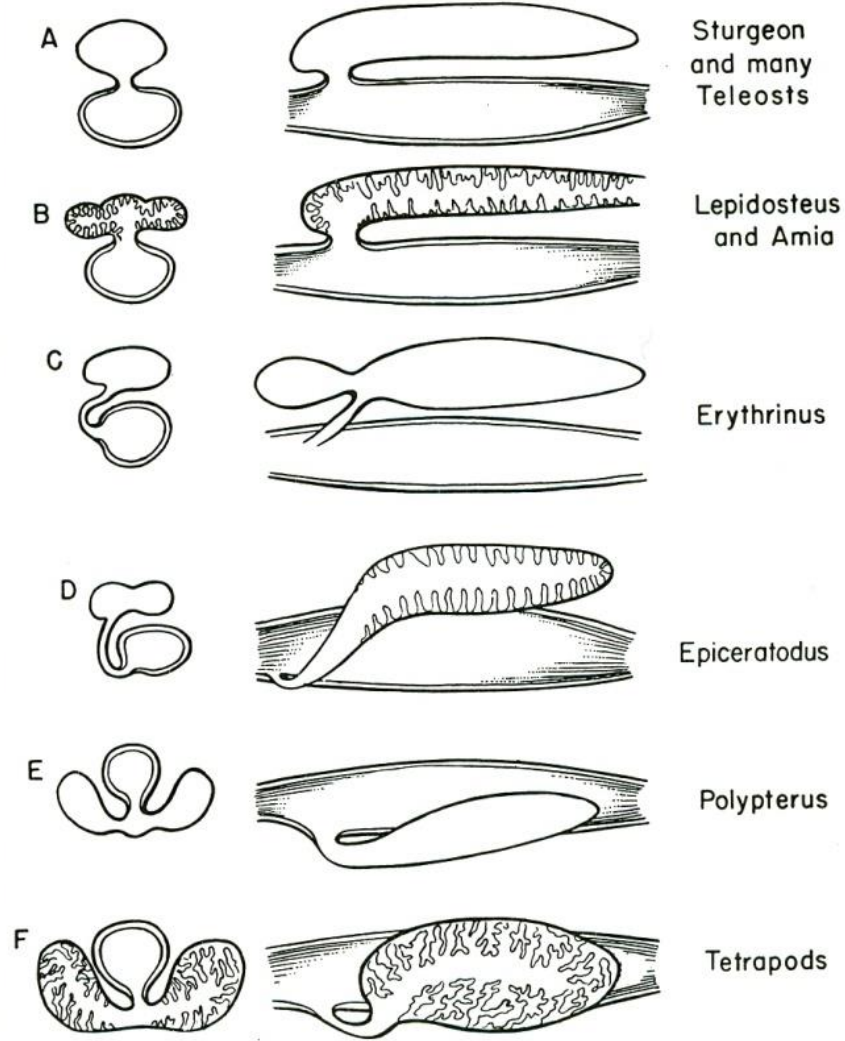
TELEOST



URODELE

**Fig. 12-7.** Swim bladders and lungs in aquatic vertebrates. In many teleosts the embryonic pneumatic duct later closes, and the swim bladder thereafter has no connection with the gut.

**Fig. 235.** Diagrammatic cross sections and longitudinal sections of the air bladder or lung in various fishes and in tetrapods. *A*, Typical dorsal air bladder of actinopterygians; *B*, a bladder type found in holosteans with a folded inner surface capable of some breathing function; *C*, an unusual teleost type with a lateral opening suggestive of a transition from lung to air bladder; *D*, the Australian lungfish, with the bilobed lung rotated dorsally, although the opening remains ventral in position; *E*, the archaic actinopterygian, *Polypterus*, with a ventral lung, probably primitive and antecedent to all other lung or air bladder types; *F*, the type of lung developed in land vertebrates, with complex internal structure. (After Dean.)



**Çeşitli balıklarda hava keseleri ve akciğerler**

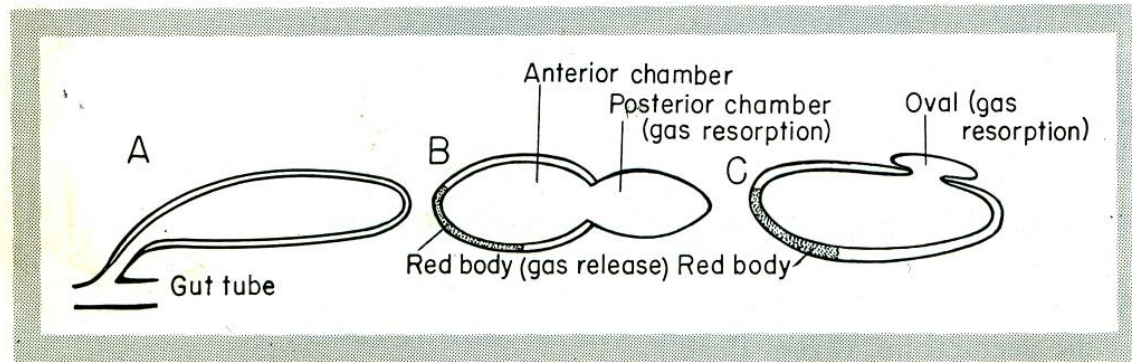




Yüzme kesesi –  
(*Scardinius erythrophthalmus*)



## Kemikli balıklarda hava kesesi – Longitudinal kesit



**Fig. 234.** Diagrammatic longitudinal sections of the air bladder in various teleosts. *A*, Primitive type, open to the gut; *B*, *C*, closed types, with gas-producing red body and other areas for gas resorption.



# Çeşitli omurgalı gruplarında akciğerin yapısı

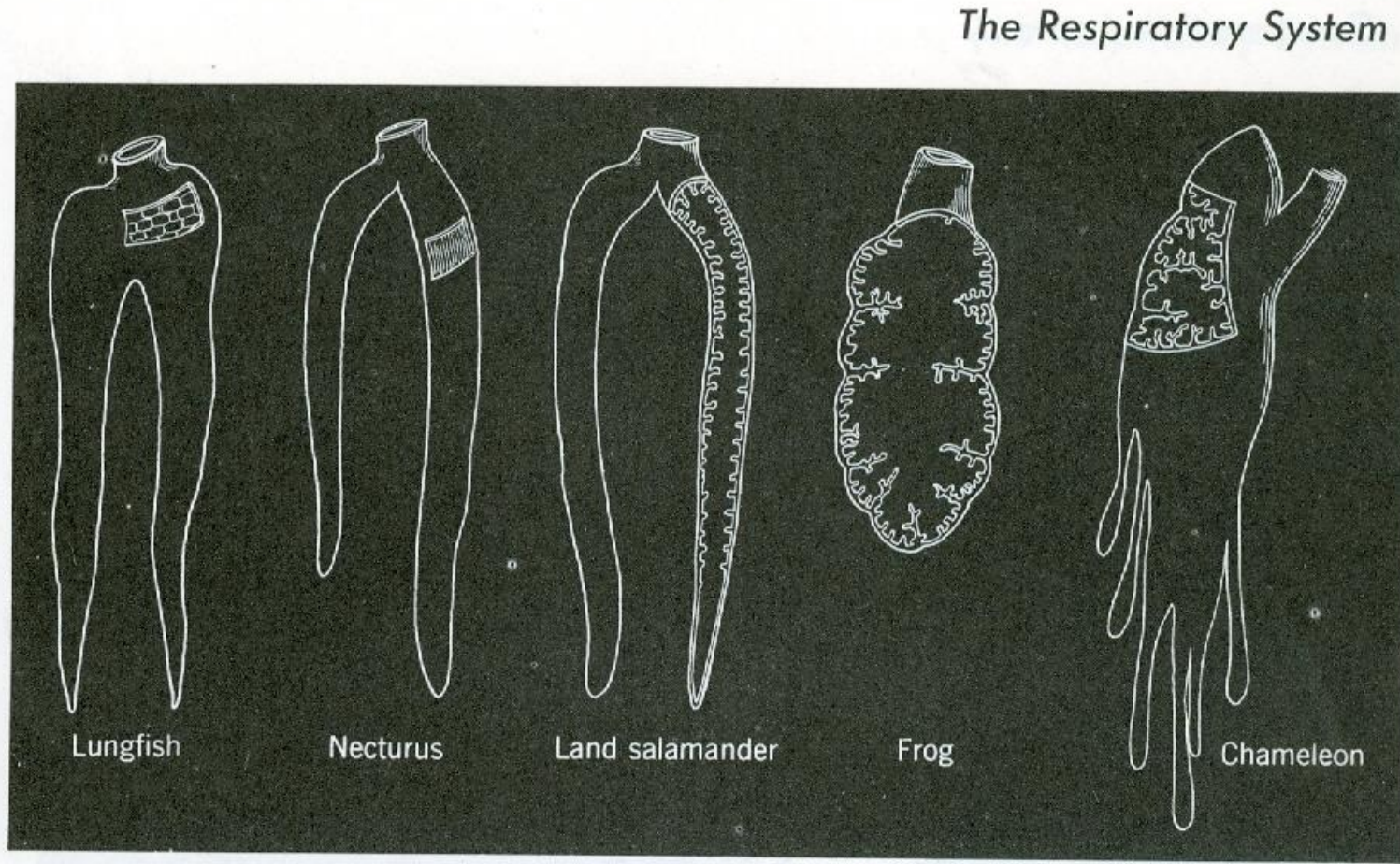
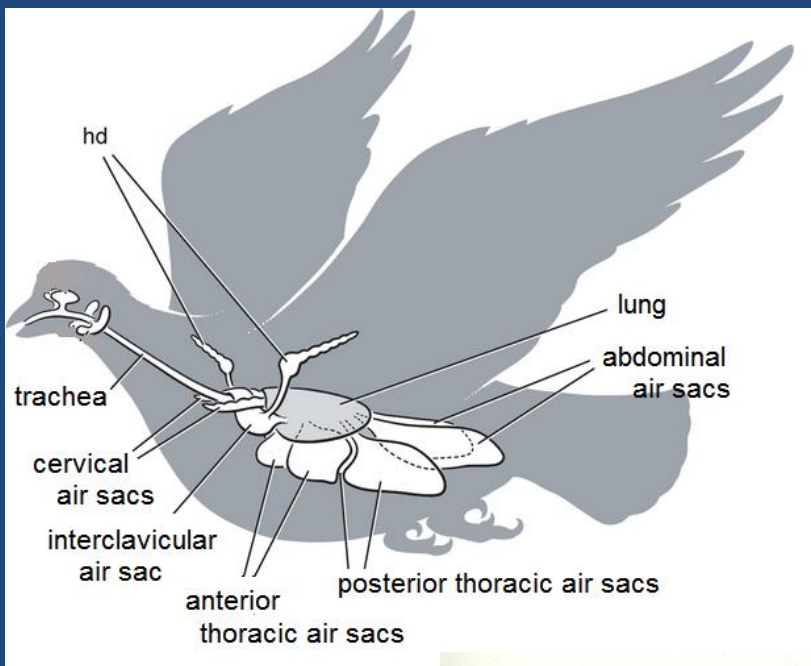
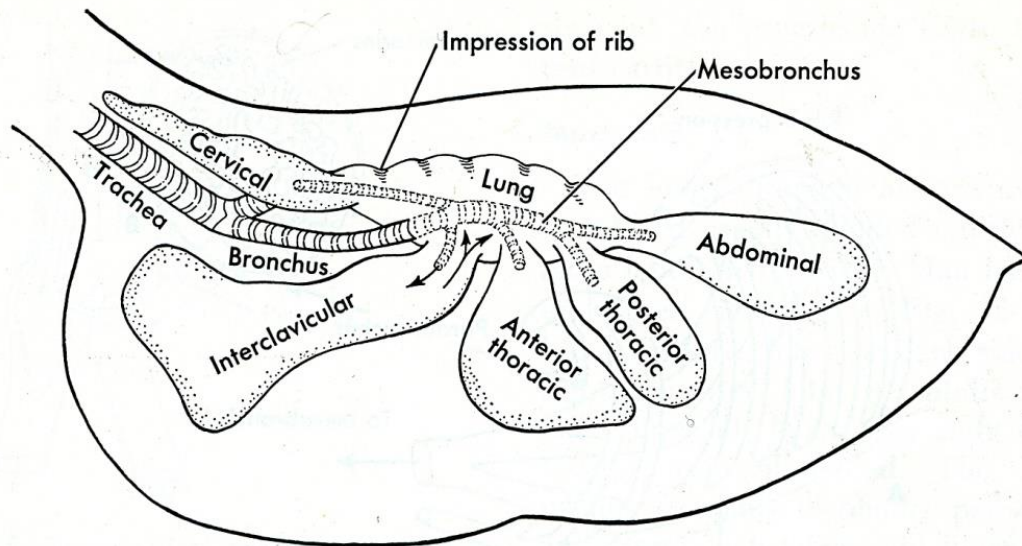


Figure 6. Comparison of vertebrate lungs.



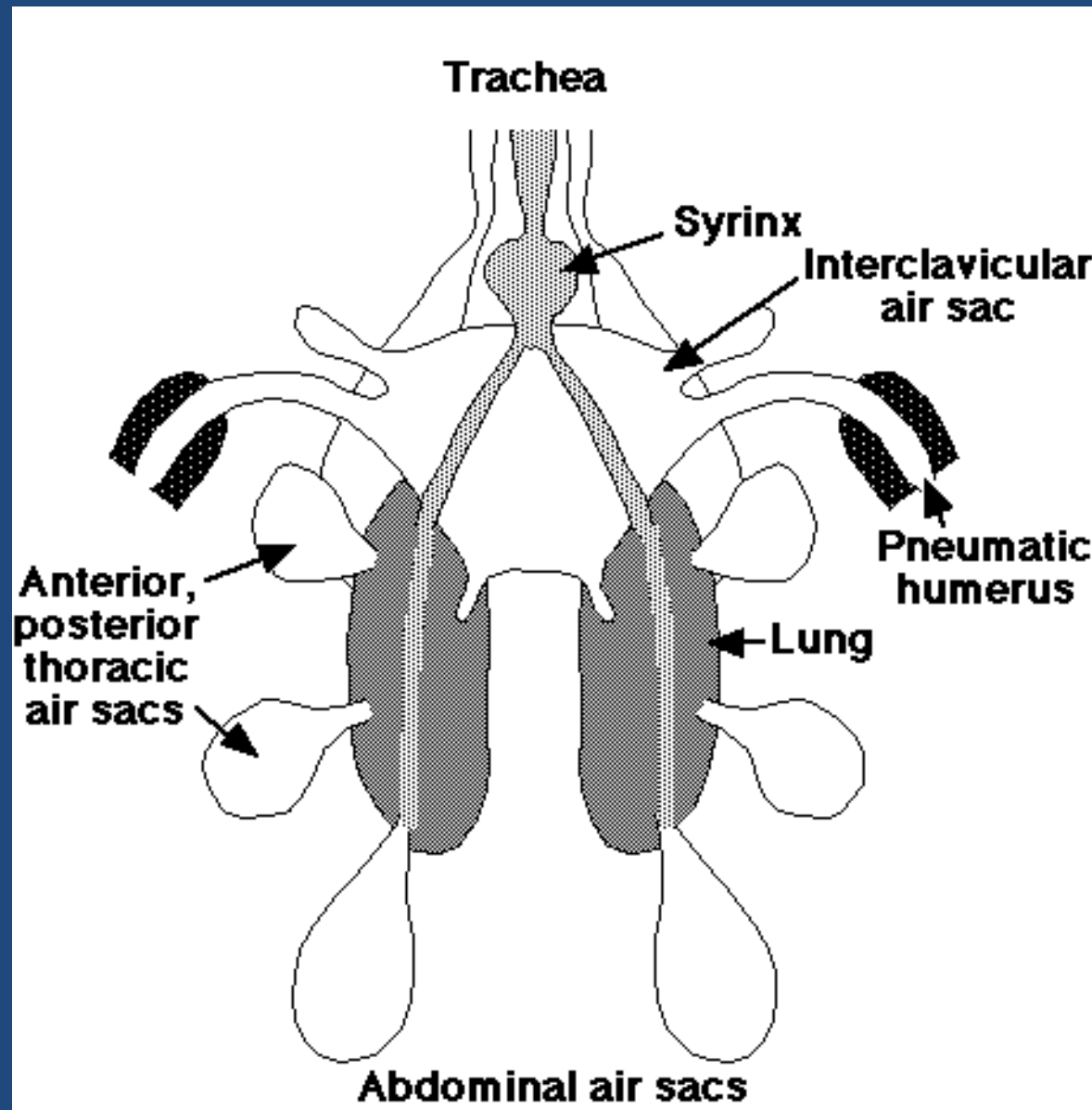


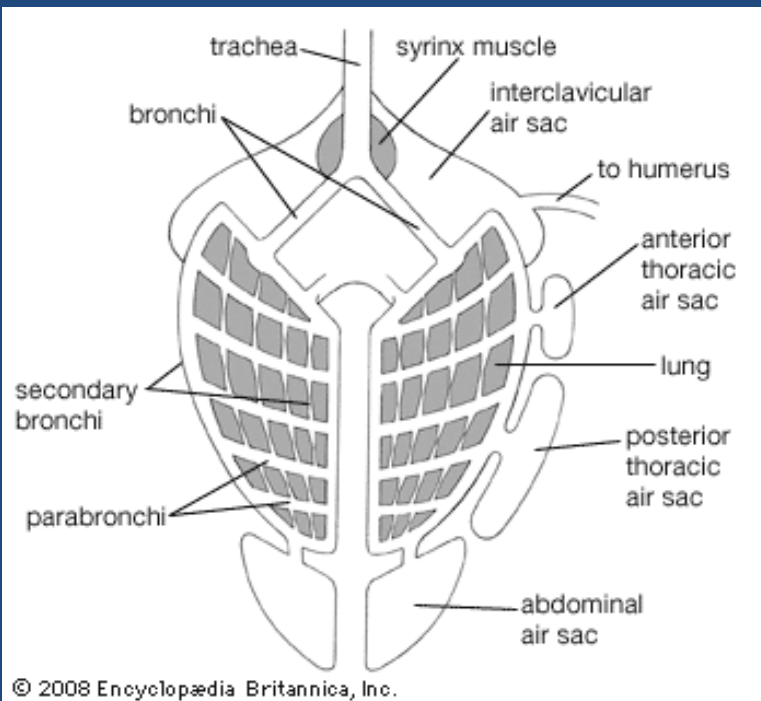
## Kuşlarda hava keseleri



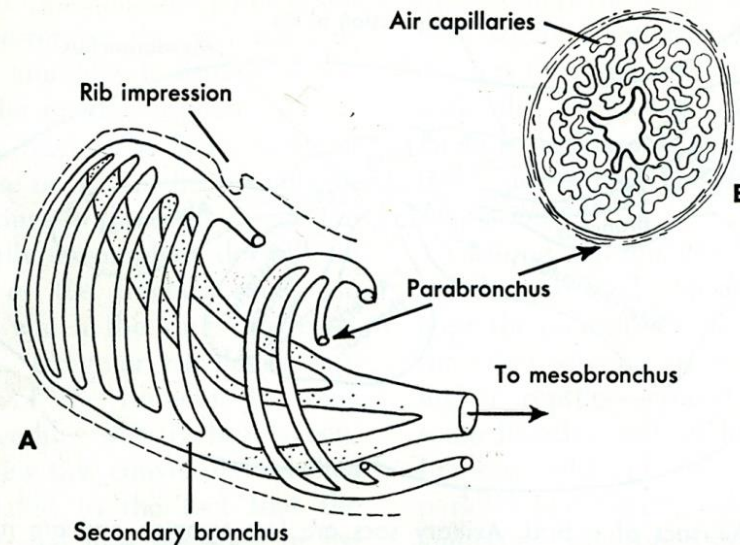
**Fig. 12-13.** Air sacs of a bird. Axillary sacs are less common and are not illustrated. Air leaves the sacs via recurrent bronchi, which lead to the respiratory surfaces of the lung. The position of one recurrent bronchus is indicated by the double arrow.

# Kuş hava keseleri



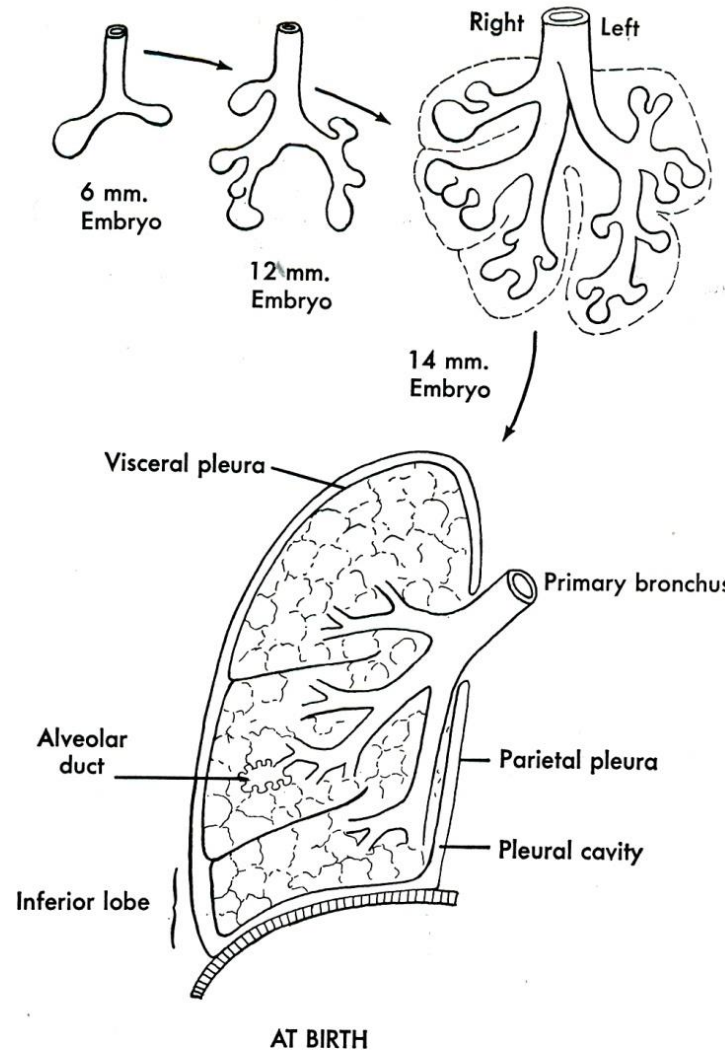


# Kuş akciğeri



**Fig. 12-14. A**, Small section of bird's lung, showing parabronchi interconnecting larger channels. **B**, Parabronchus has been transected to display the air capillaries. The section illustrated is on the airflow path between an air sac and the mesobronchus. (**A** based on Locy and Larsell.<sup>77</sup>)





**Fig. 12-16.** Development of mammalian lung. Embryo lengths are applicable approximately to both the fetal pig and to man.

# Memelilerde akciğer gelişimi

# Memeli Akciğeri

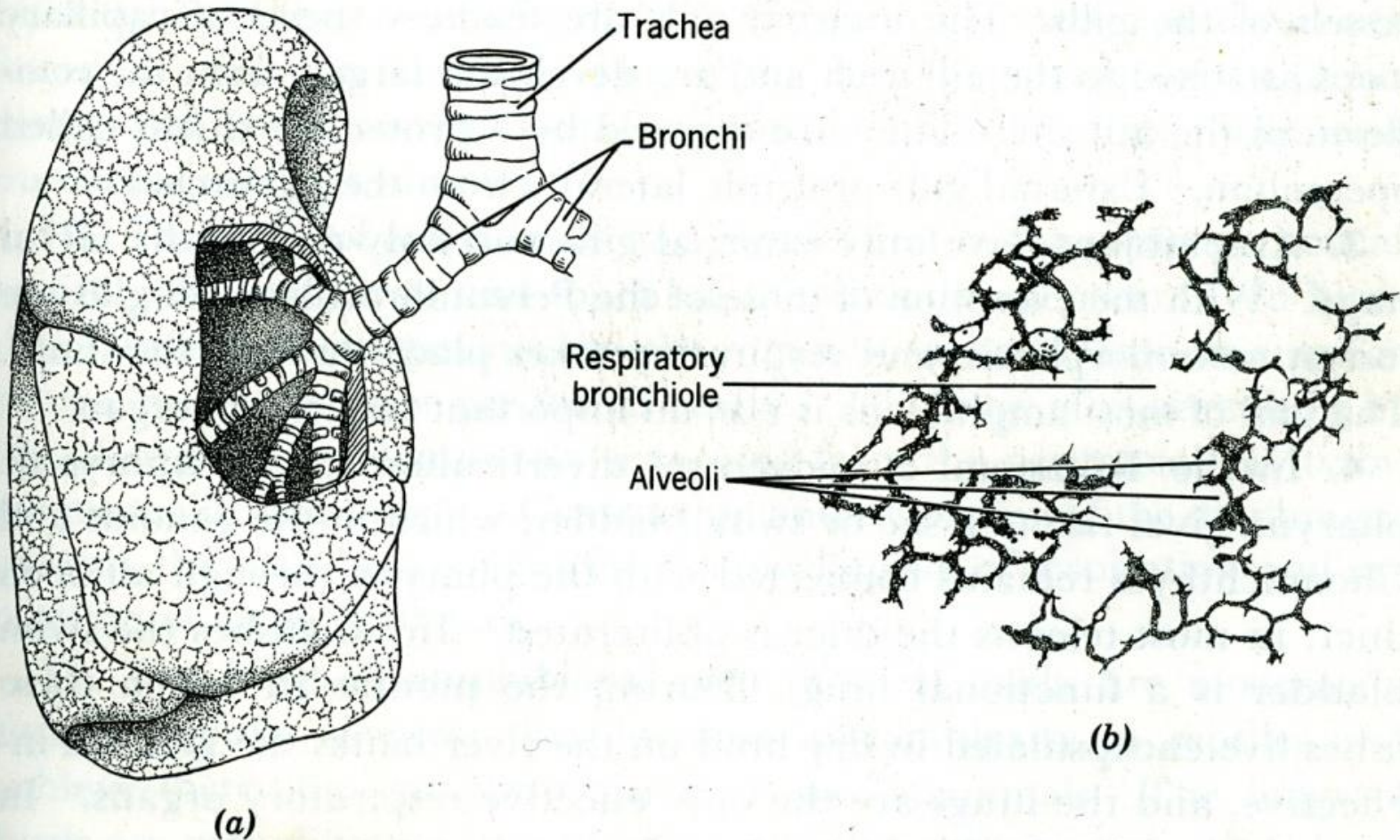
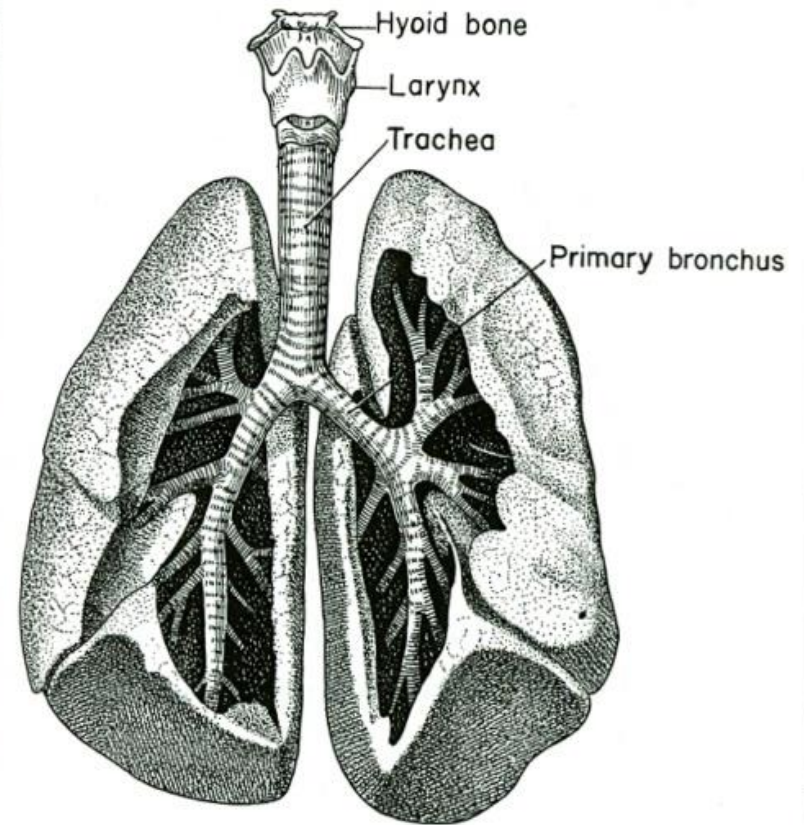


Figure 10. Mammalian lung: (a) dorsal view; (b) microscopic detail of lung.

# İnsan akciğeri

**Fig. 236.** Ventral view of the respiratory system of man. The lungs dissected to show the bronchi. (After Toldt.)





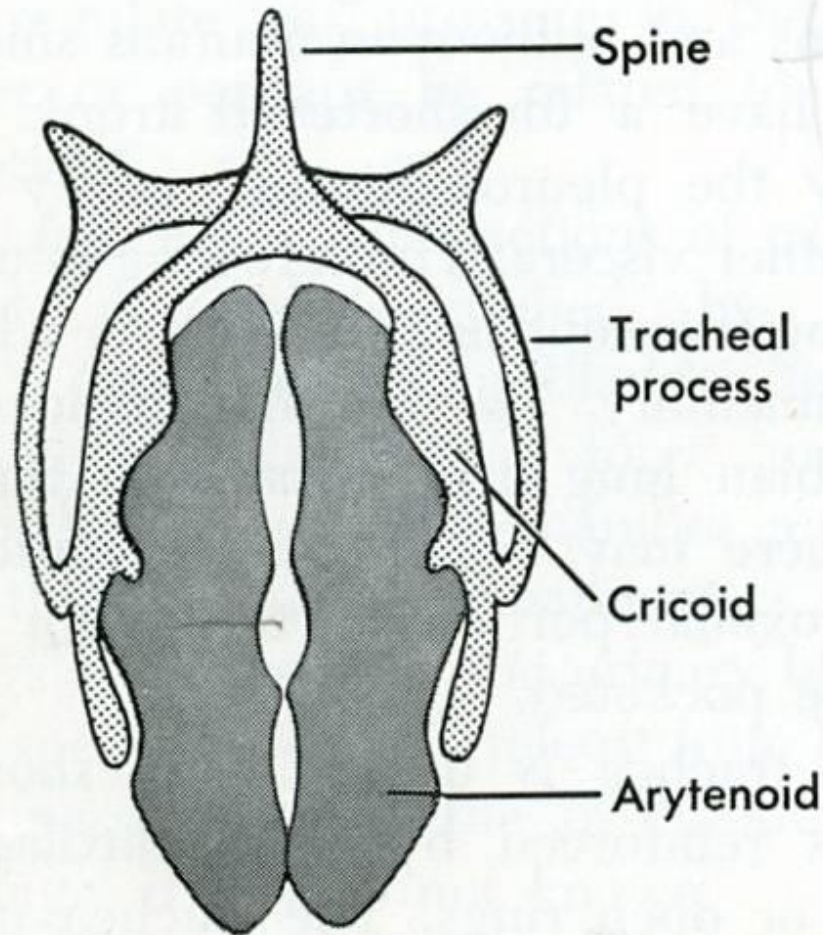
# Diyafram



The diaphragm  
is shaped  
like a parachute



# Kurbağa gırtlak iskeleti

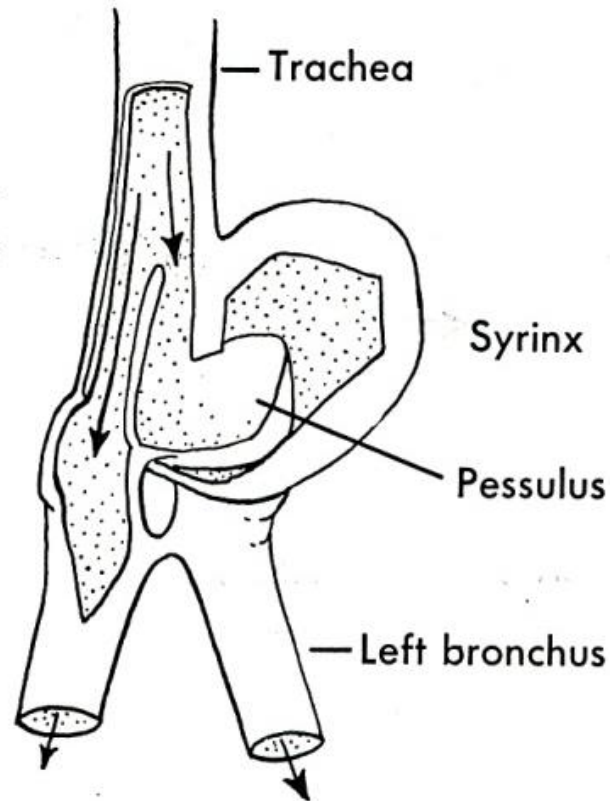


**Fig. 12-10.** Laryngeal skeleton of a frog. The glottis lies between the two arytenoid cartilages.



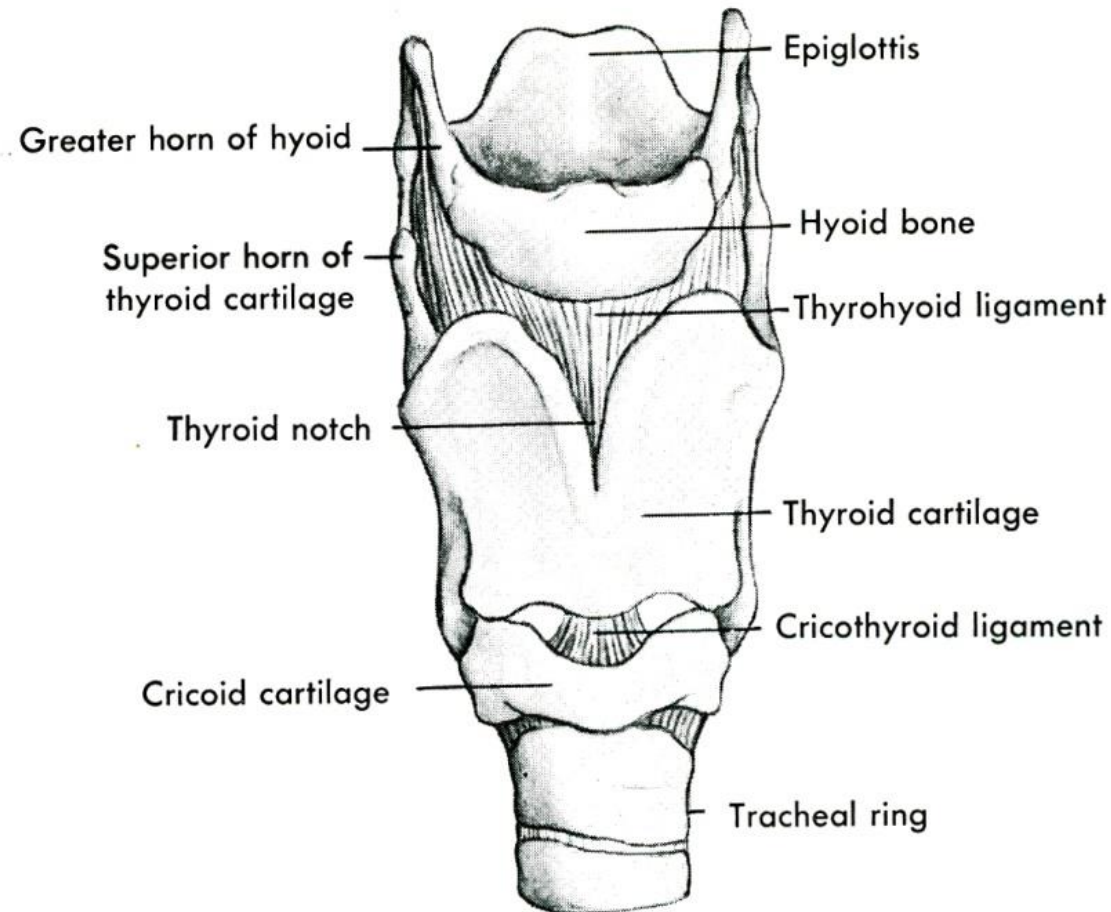


# Syrinx - Bronchotracheal



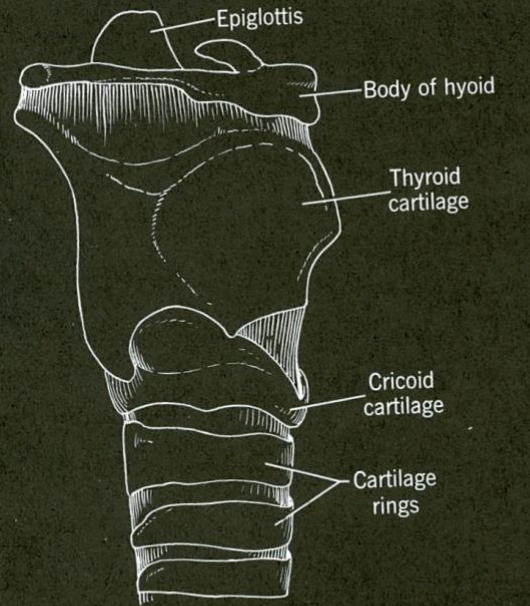
**Fig. 12-15.** Asymmetrical bronchotracheal syrinx of a canvasback duck. Arrows indicate path of inhaled air.

# İnsan larinks'i – Frontalden görünüm

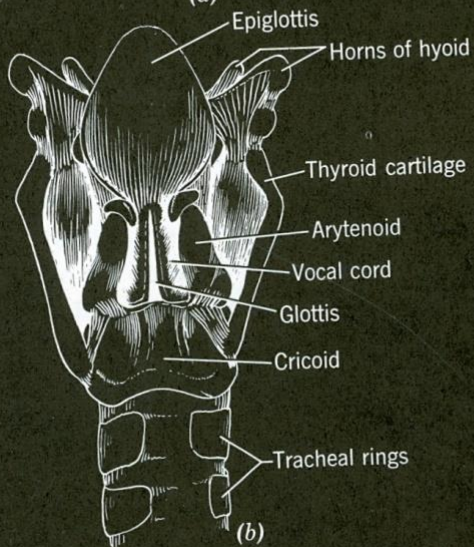


**Fig. 12-17.** Human larynx, frontal view. (From Francis: Introduction to human anatomy, ed. 5, St. Louis, 1968, The C. V. Mosby Co.)

# İnsan larynx'i - ses şeritleri



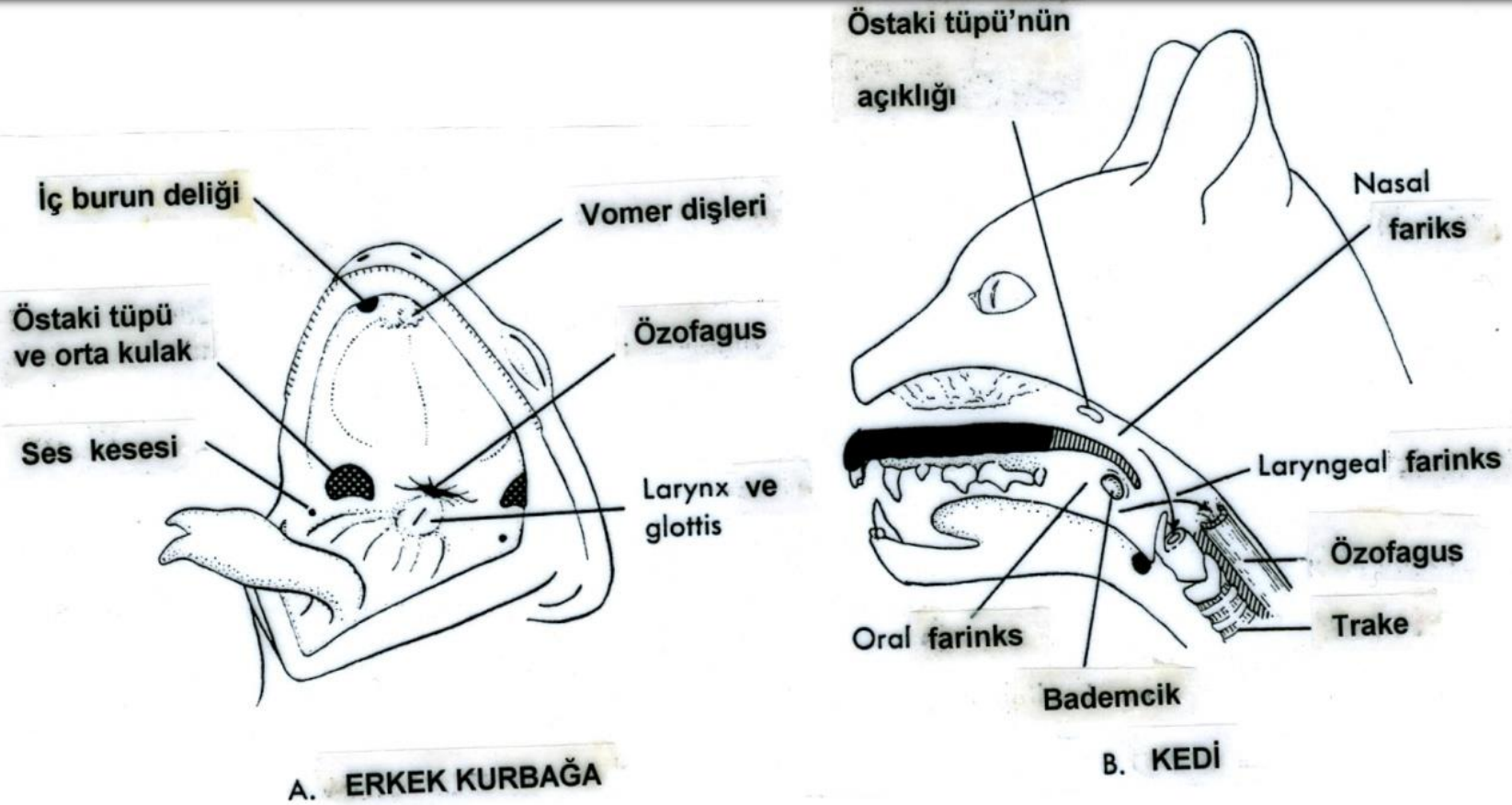
(a)



(b)

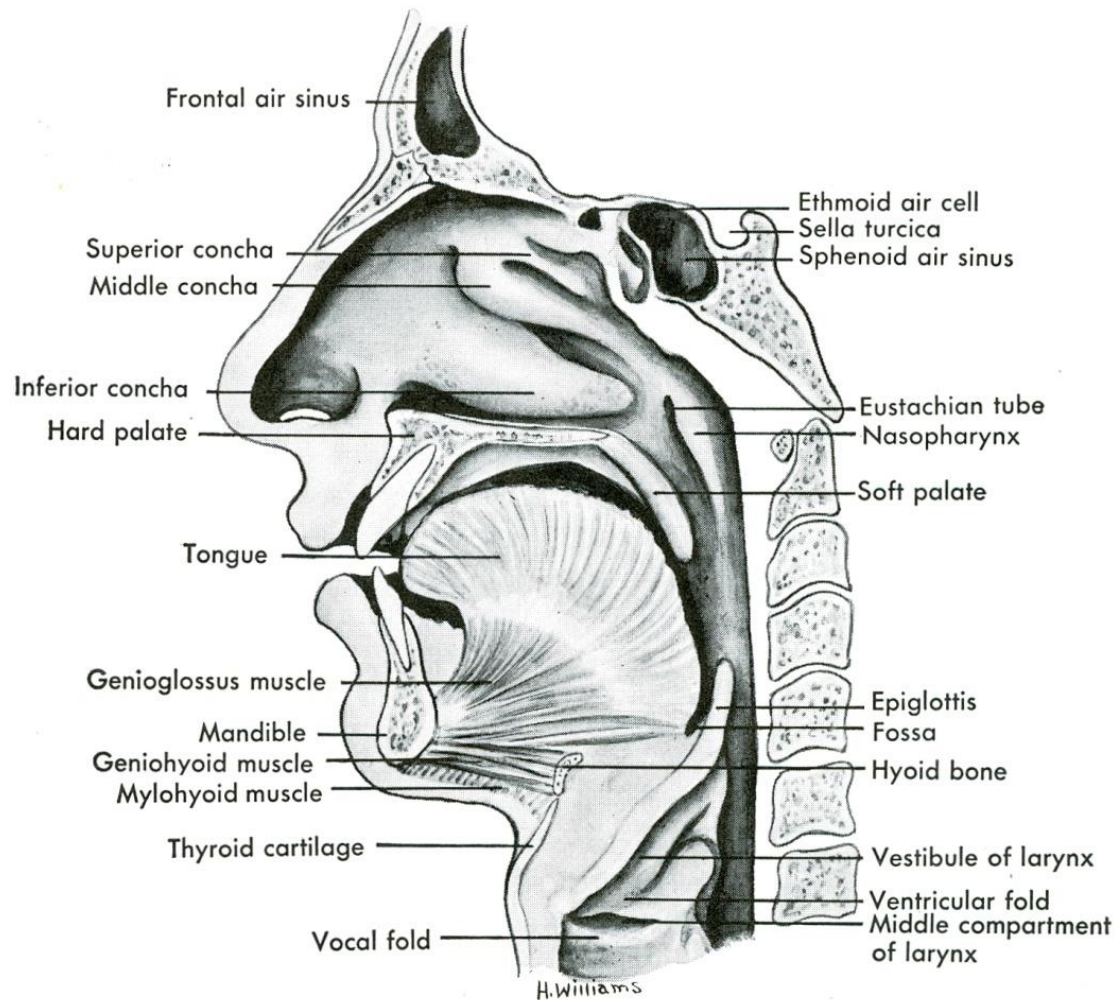
Figure 9. The human larynx:  
(a) lateral view; (b) dorsal view.





**Şekil 7 - 4.** Amfibi ve Memelilerde oral boşluk ve yutak. Segonder damak sadece memelilerde var. Segonder damağın kemiksi kısmı siyah ve yumuşak damak enine çizgili gösterilmiştir. Çapraz oklar besin ve hava'nın geçiş yollarını göstermektedir.

# Üst solunum yolları - İnsan



**Fig. 12-21.** Secondary palate and upper respiratory pathway, sagittal section, in man. The concha constitute the turbinal elements. (From Francis: Introduction to human anatomy, ed. 5, St. Louis, 1968, The C. V. Mosby Co.)

# Solunum yolu ( Nasal geit) -Kpek'te

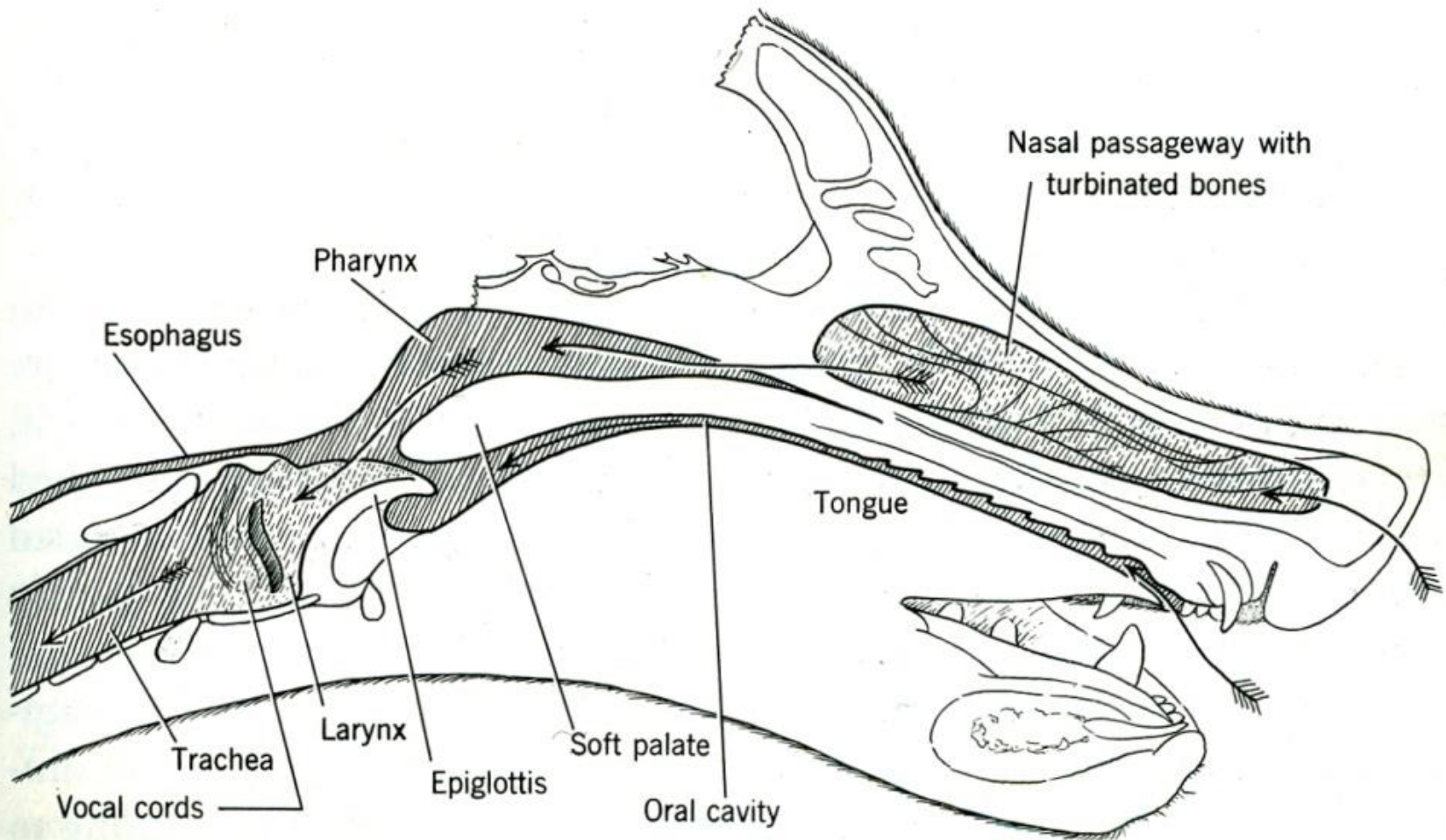


Figure 5. The respiratory passageway of the dog.