麦哲伦企鹅
组织学特征和病理学观察

中国医学科学院医学实验动物研究所
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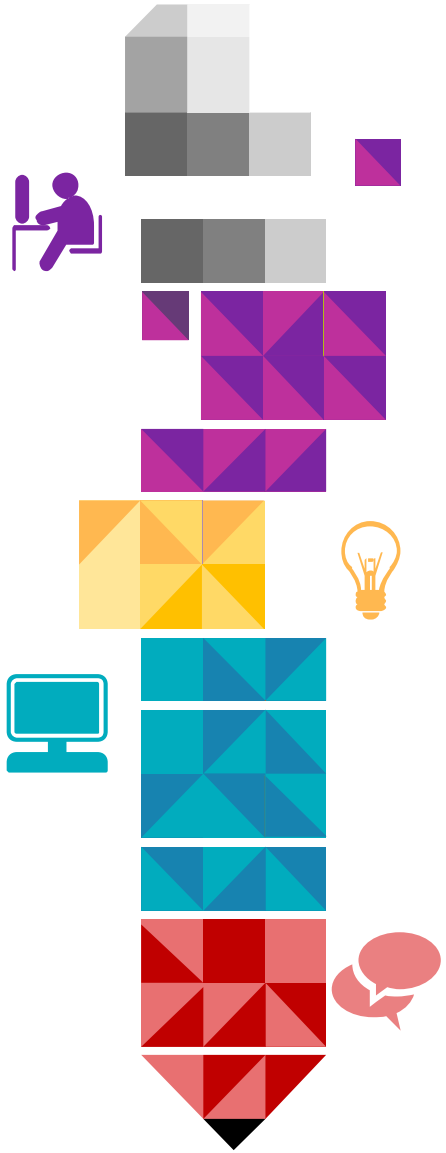

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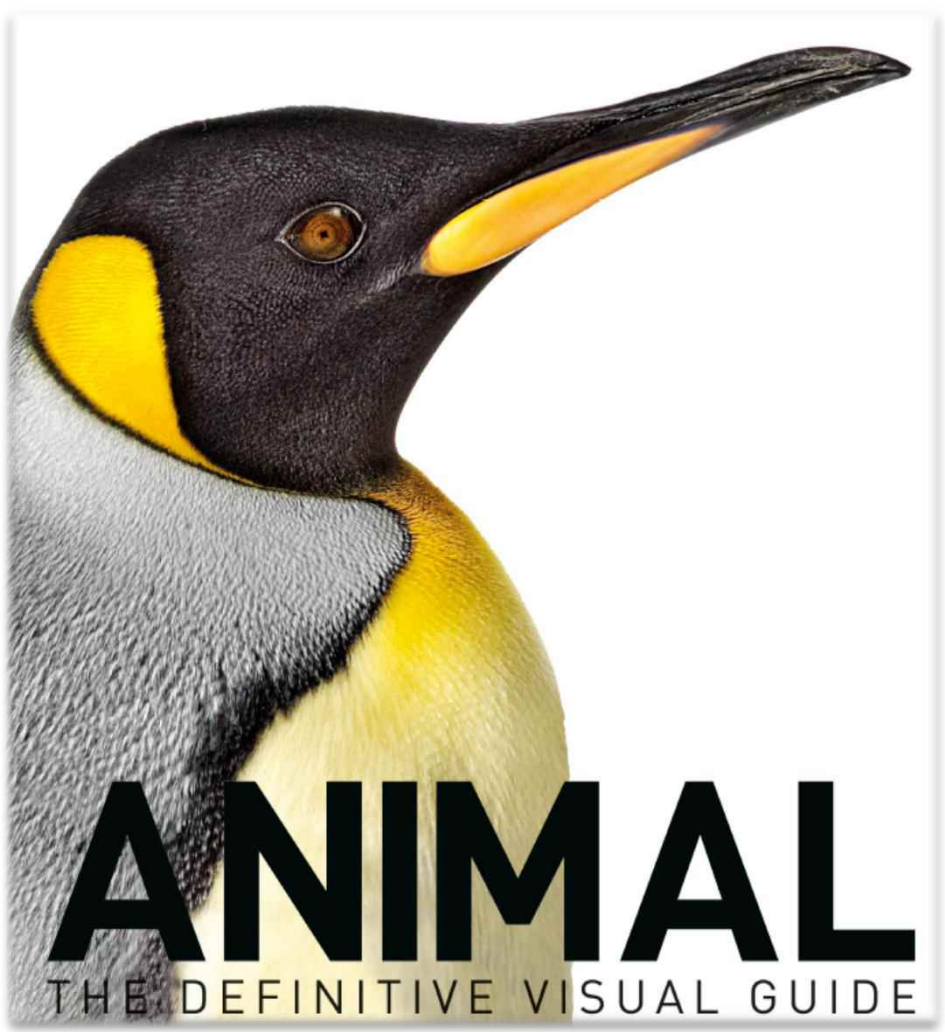


麦哲伦企鹅（学名：*Spheniscus magellanicus*）

SWIMMING

Penguins use 3 different swimming techniques:

1.When **idling**, they swim slowly at the surface, paddling with their wings, and with their head and tail raised.

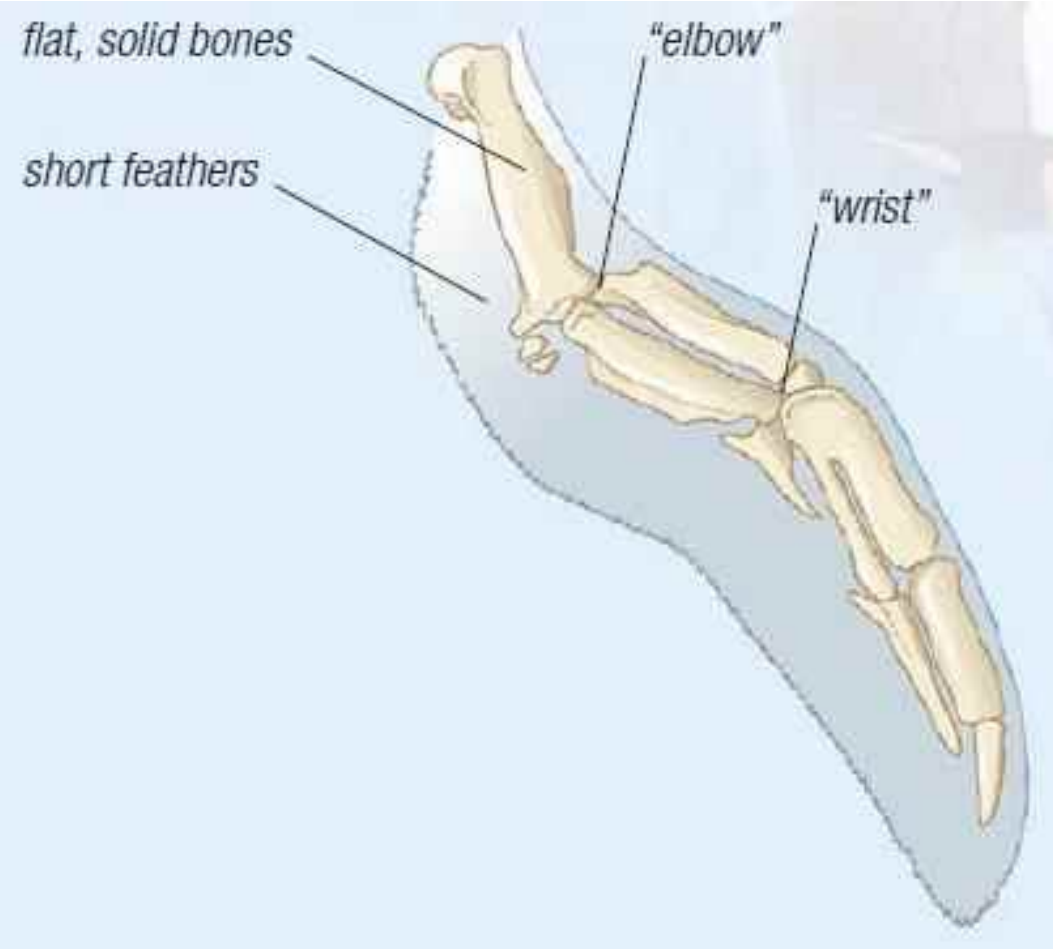
2.When **hunting**, they dive below the surface and effectively fly underwater, flapping their wings to provide power. Most dives last about a minute, but dives of 20 minutes have been recorded.

3.The third form of movement is called **porpoising**, in which penguins swimming near the surface periodically leap out of the water to breathe.

DIVING

Penguins (here, a king penguin) move much more efficiently in water than they do on land. Some species can swim at speeds of 9 mph (14 kph).

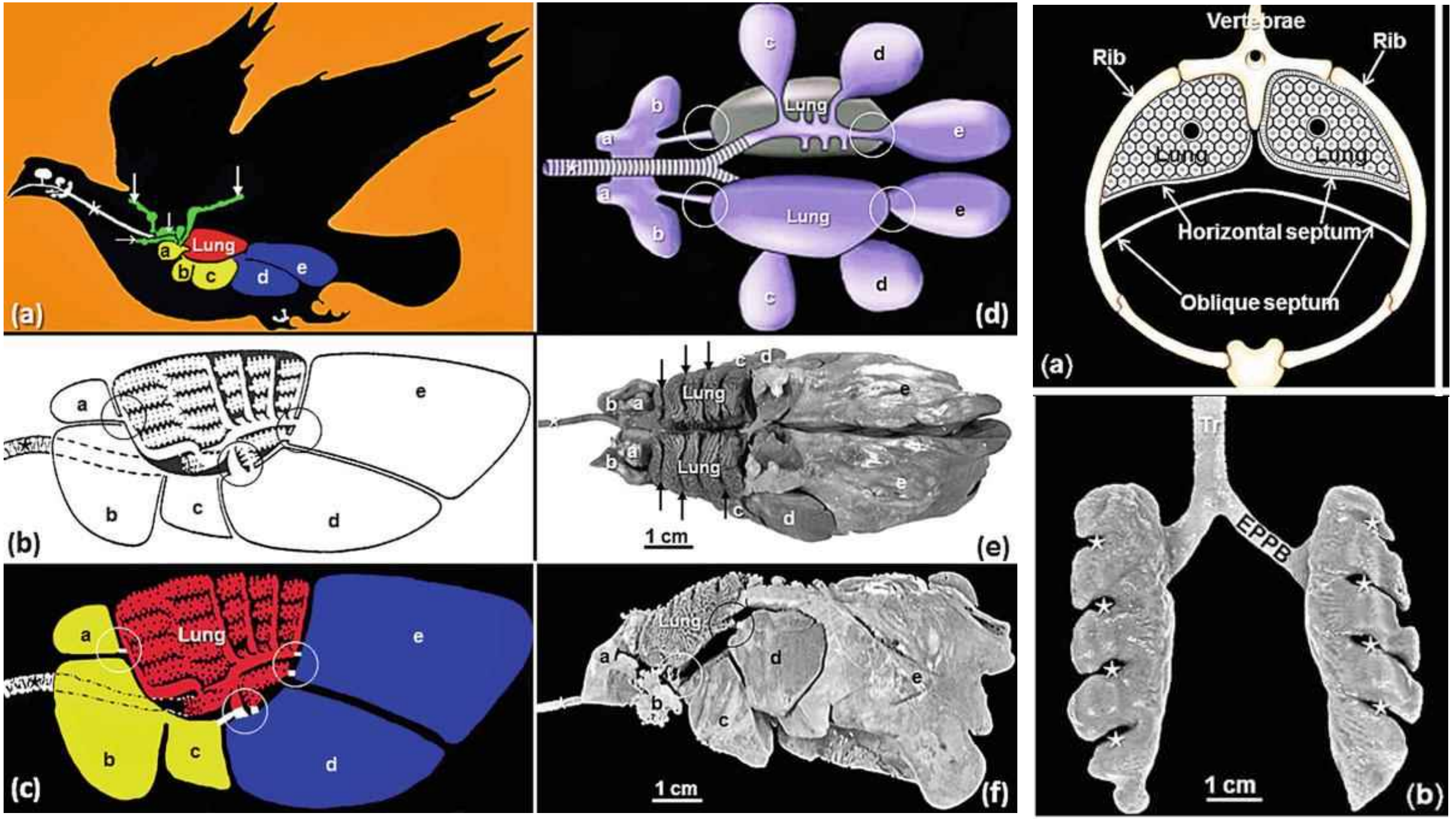
WING STRUCTURE

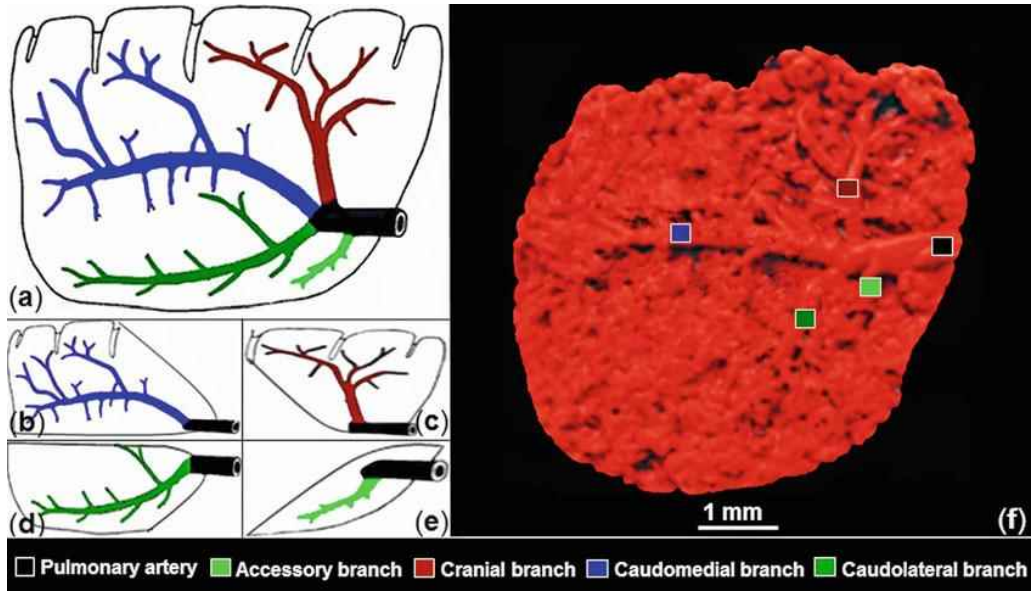


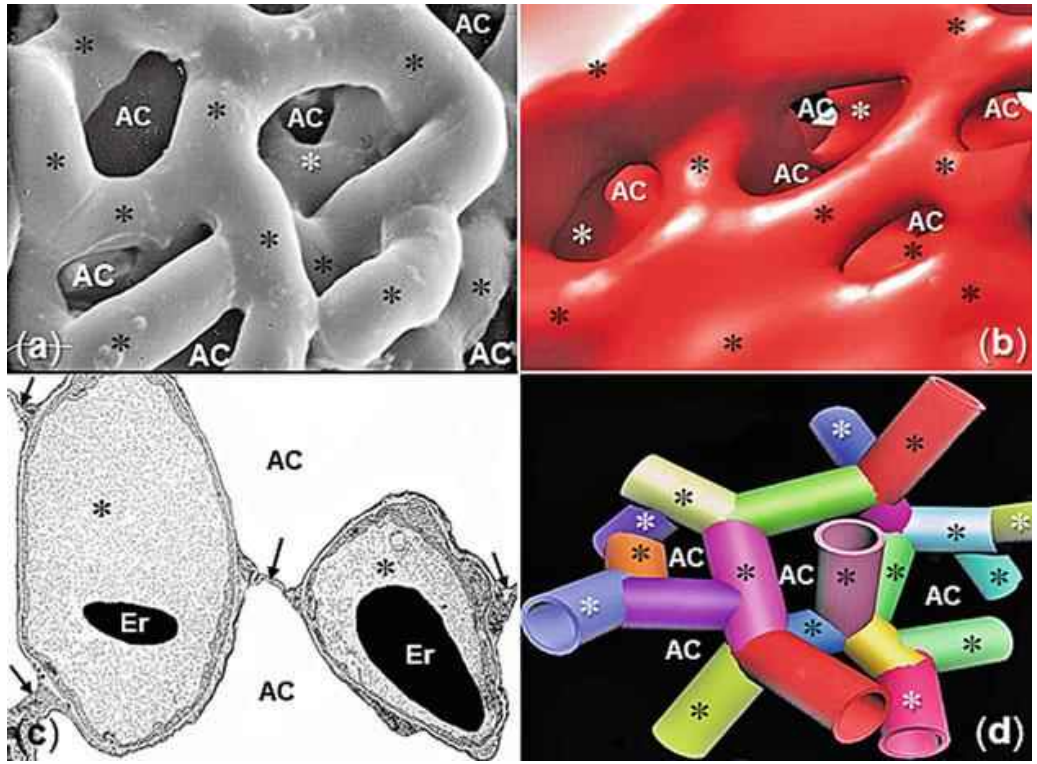
The wing of a penguin is unlike that of any other bird. **The bones are flattened to make a flipper**, and are **solid** instead of hollow, increasing their density and strength.

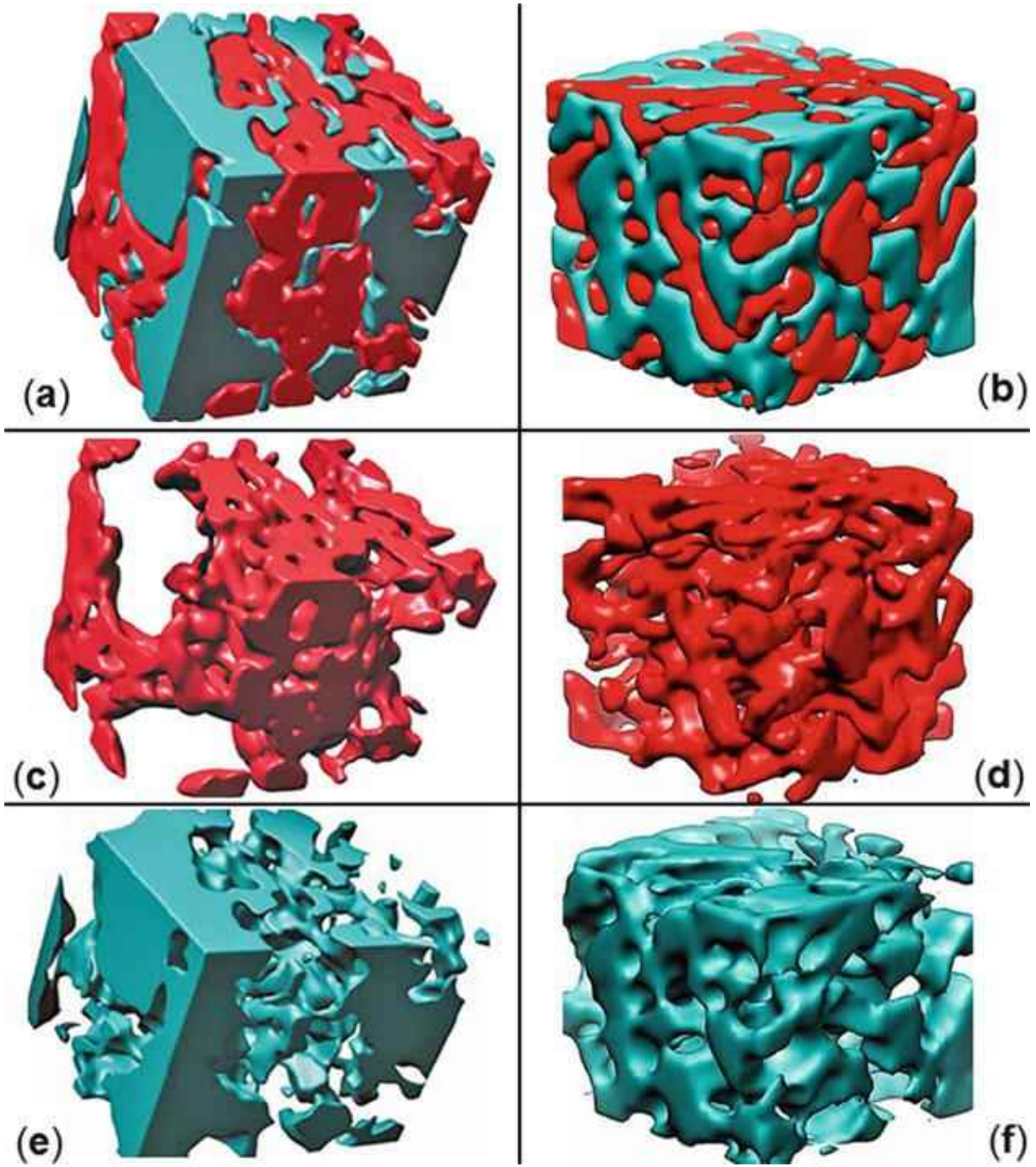
The wing as a whole forms a rigid structure—**free movement** is possible only at the **shoulder**—the joints that form the equivalents of the wrist and elbow in humans being relatively inflexible.

Well-developed muscles, as large as those of flying birds, help power the flapping of the wings.


(a)
Lung
a
b
c
d
e
(d)
Lung
(b)
(e)
1 cm
(c)
(f)
1 cm
Vertebrae
Rib
Rib
Lung
Lung
Horizontal septum
Oblique septum
(a)
Tr
EPPB
1 cm
(b)


(a)
(b)
(c)
(d)
(e)
(f)
1 mm
Pulmonary artery
Accessory branch
Cranial branch
Caudomedial branch
Caudolateral branch


AC
(a)
(b)
Er
(c)
(d)


(a)
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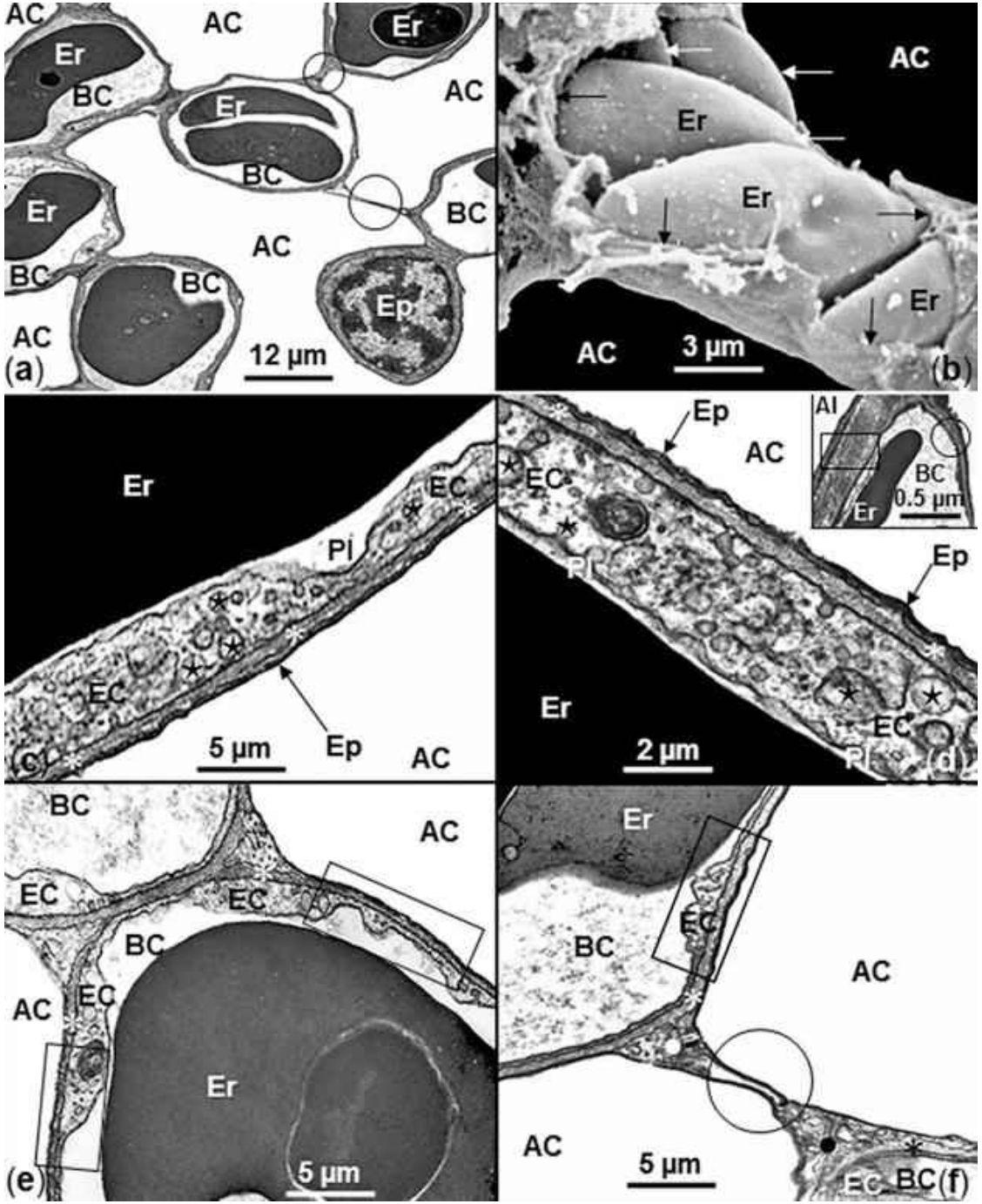
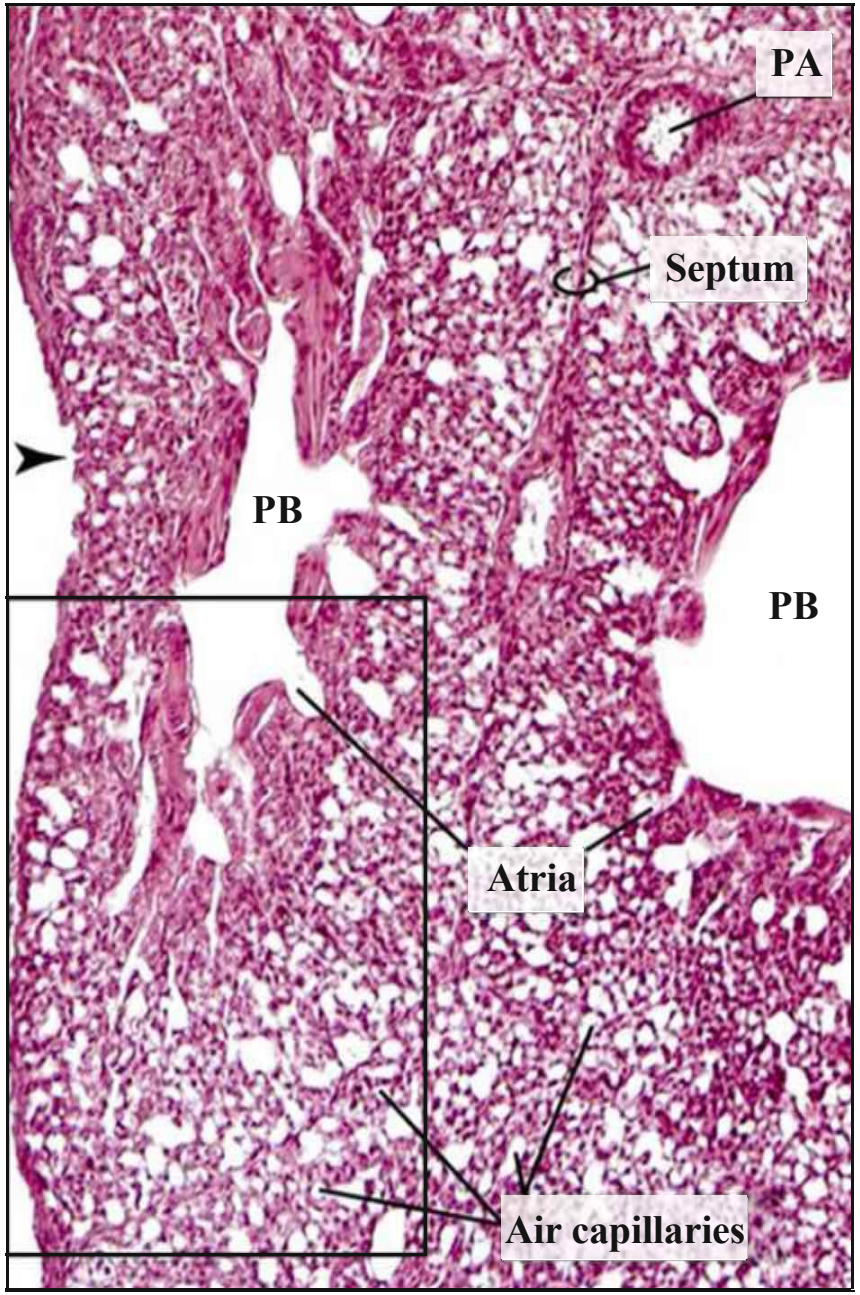
(f)

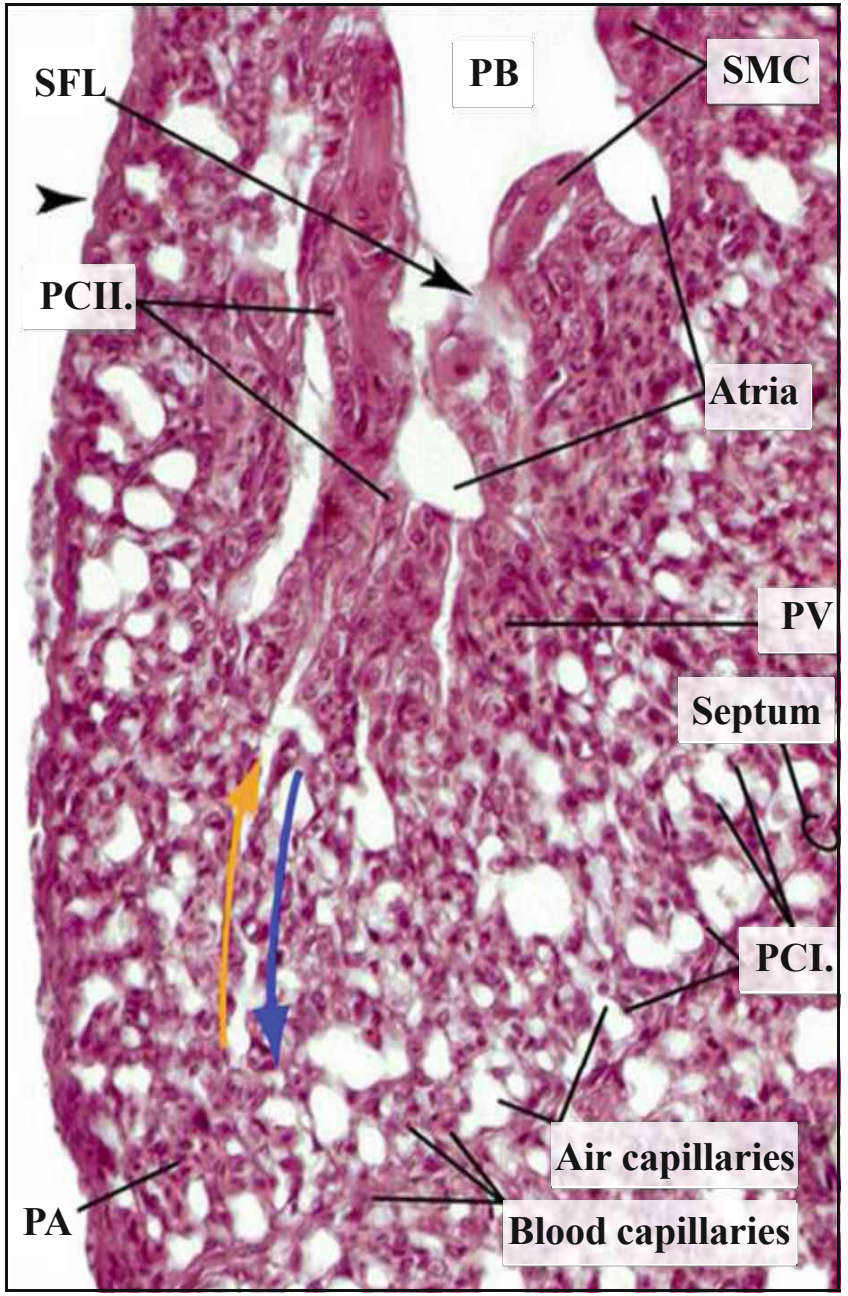


(a) Transmission electron micrograph of the exchange tissue of the lung of the domestic fowl (Gallus gallus variant domesticus) showing **air capillaries (AC)**, **blood capillaries (BC)** and erythrocytes (Er).
Circles, epithelial-epithelial cell connections; Ep, epithelial cell.
(b) Scanning electron micrograph from the lung of the domestic fowl showing erythrocytes (Er) passing through a blood capillary in a file. **A blood-gas barrier (arrows)** separates the erythrocytes from air in the air capillaries (AC).
(c) Transmission electron micrograph of the blood-gas barrier of the lung of the black-headed gull (Larus ridibundus) showing its components, namely, the epithelial cell (Ep), the basement membrane (asterisk) and the **endothelial cell (Ec)**. Stars, micropinocytotic vesicles; Er, erythrocyte; Pl, plasma layer; AC, air capillary.

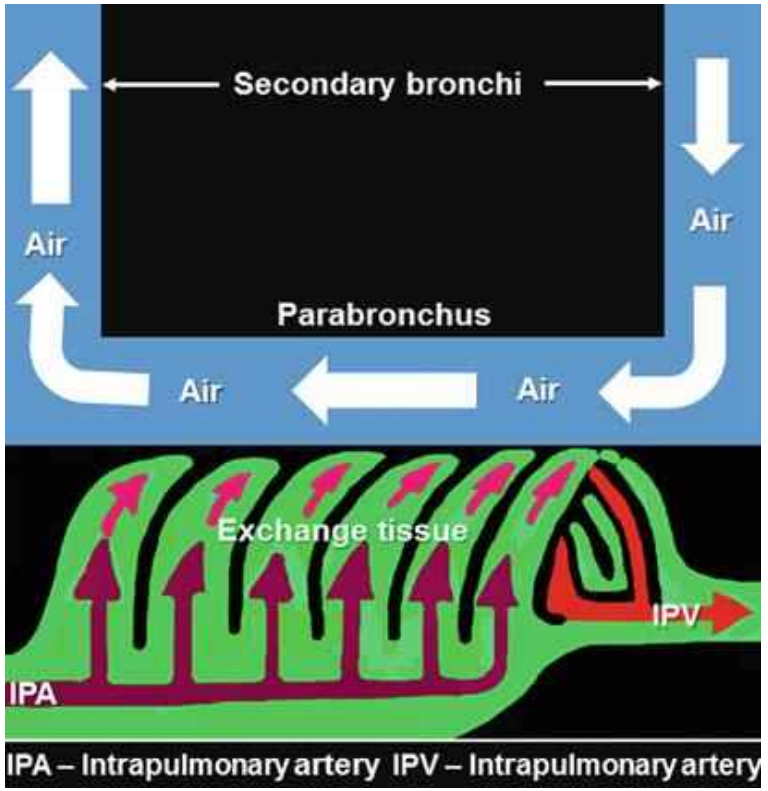
(d) Closeup of a transmission electron micrograph showing the structure of the blood-gas barrier of the lung of the black-headed gull. Ep, epithelial cell; asterisk, basement membrane; Ec, endothelial cell; stars, micropinocytotic vesicles; Er, erythrocyte, plasma layer (Pl); air capillary (AC).
d—insert: Interalveolar septum of the lung of the lesser bushbaby (Galago senegalensis) showing a thick supporting side of the septum (boxed area) **containing plentiful collagen fibres and a relatively thinner gas-exchange side** (circled). Al, alveolus; Er, erythrocyte; BC, blood capillary.

(e, f) Transmission electron micrographs of the lung of the domestic fowl showing **the periodic attenuation** of the blood-gas barrier (boxed areas). BC, blood capillaries; AC, air capillaries; Er, erythrocytes; EC, endothelial cell; asterisk, basement membrane; dots (f), the triangular areas; circle, epithelial-epithelial cell connection

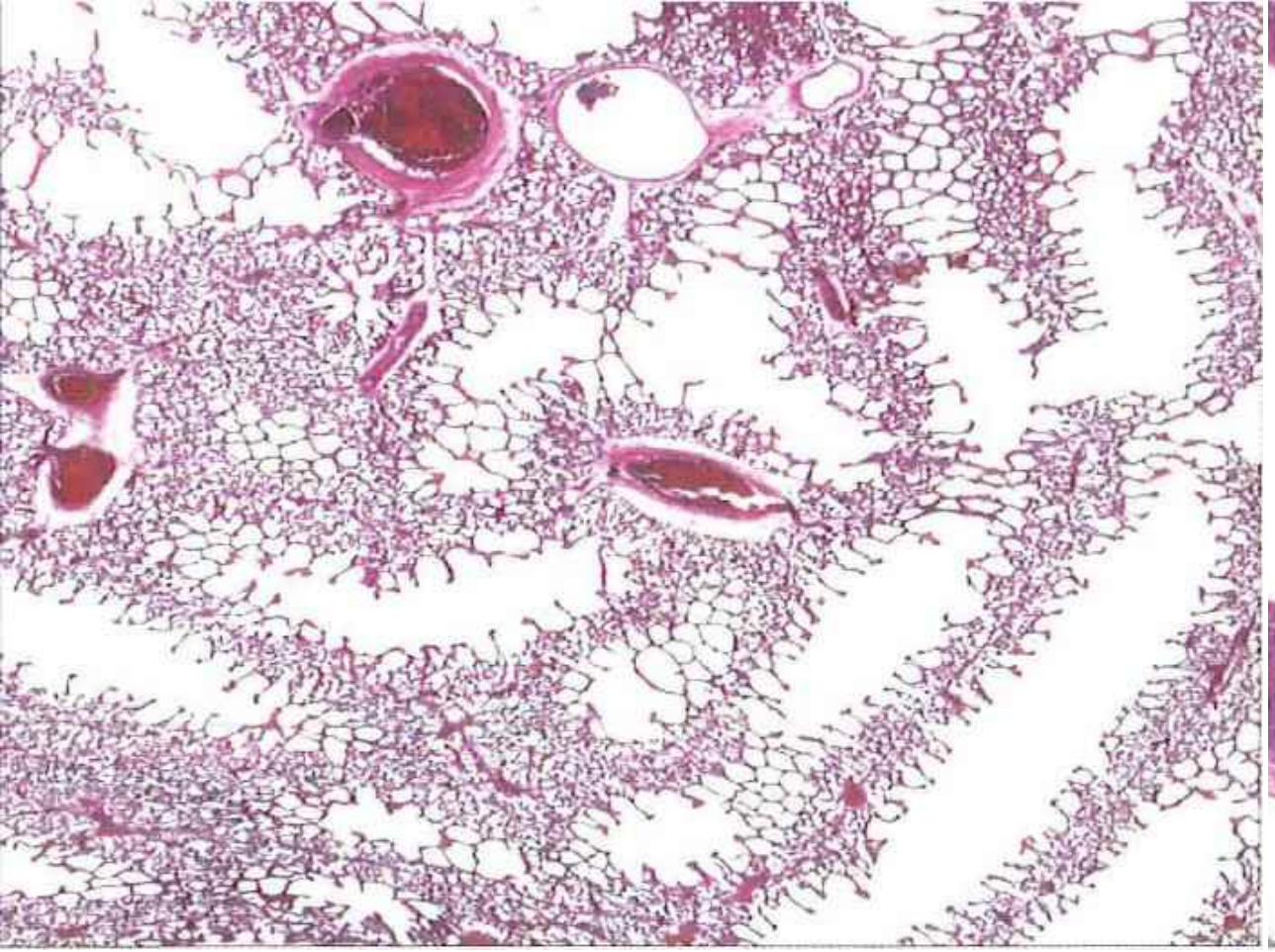




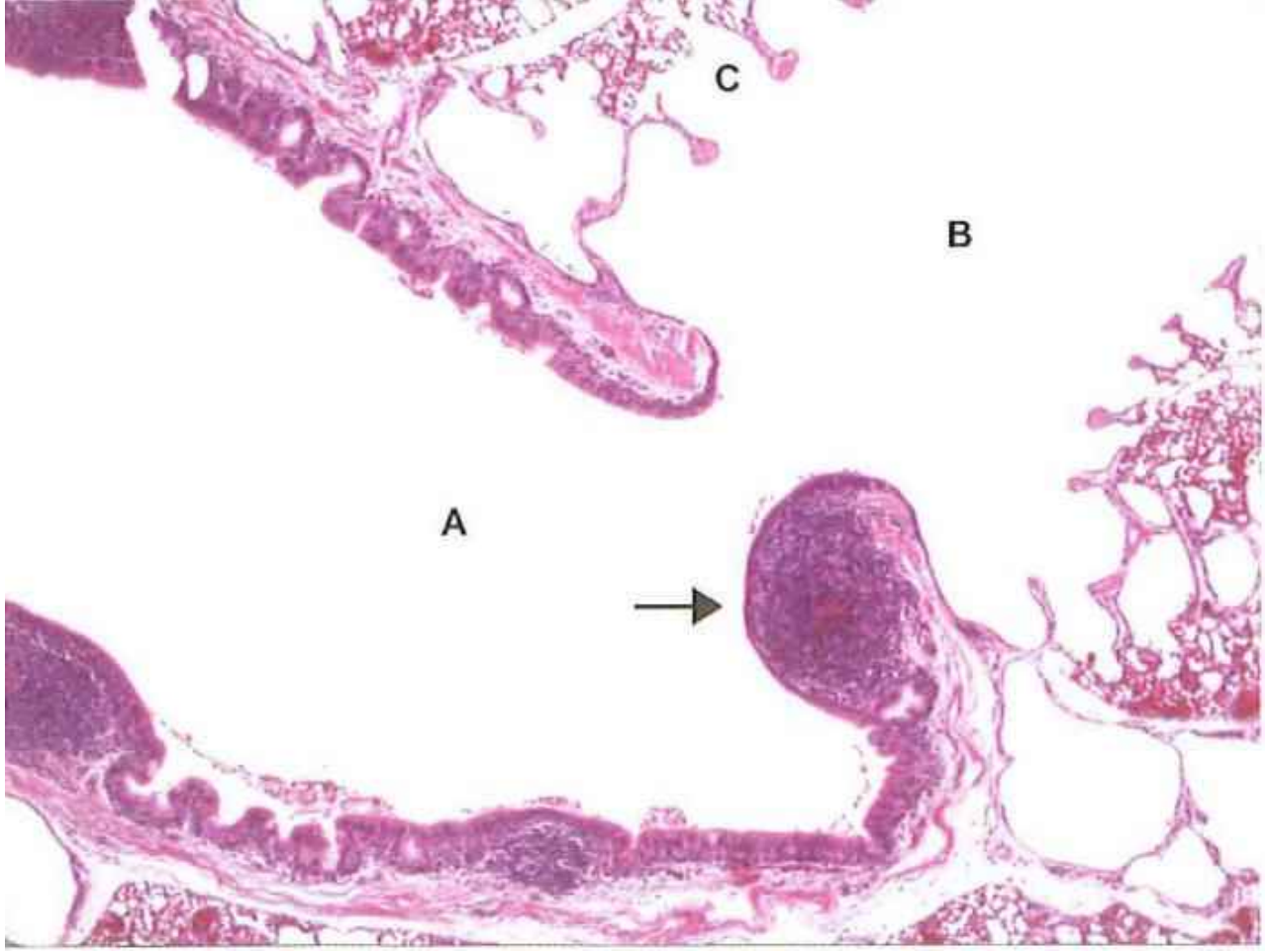
A parabronchial unit. PB parabronchus. Blue arrow-air flow, orange arrow-blood flow, PA pulmonary artery, PCI pneumocytes type I, PCII pneumocytes type II, PV pulmonary vein, SFL surfactant layer, SMC smooth muscle cells.



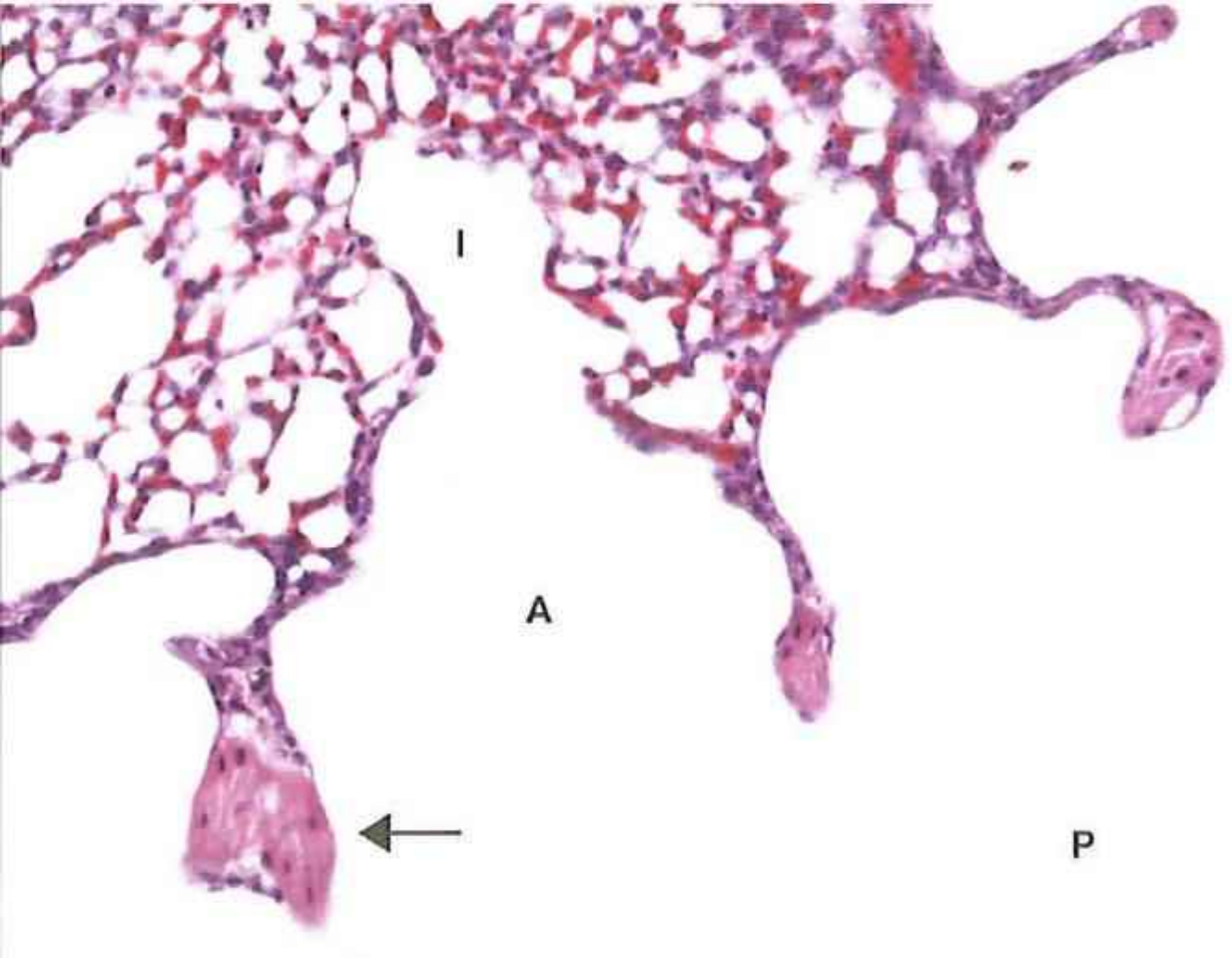
Simplified diagram showing the **highly efficacious cross-current system** in the avian lung. The system is formed by the essentially **perpendicular** arrangement between the direction of the flow of air in the parabronchial lumen and that of deoxygenated blood from the periphery of the parabronchus.



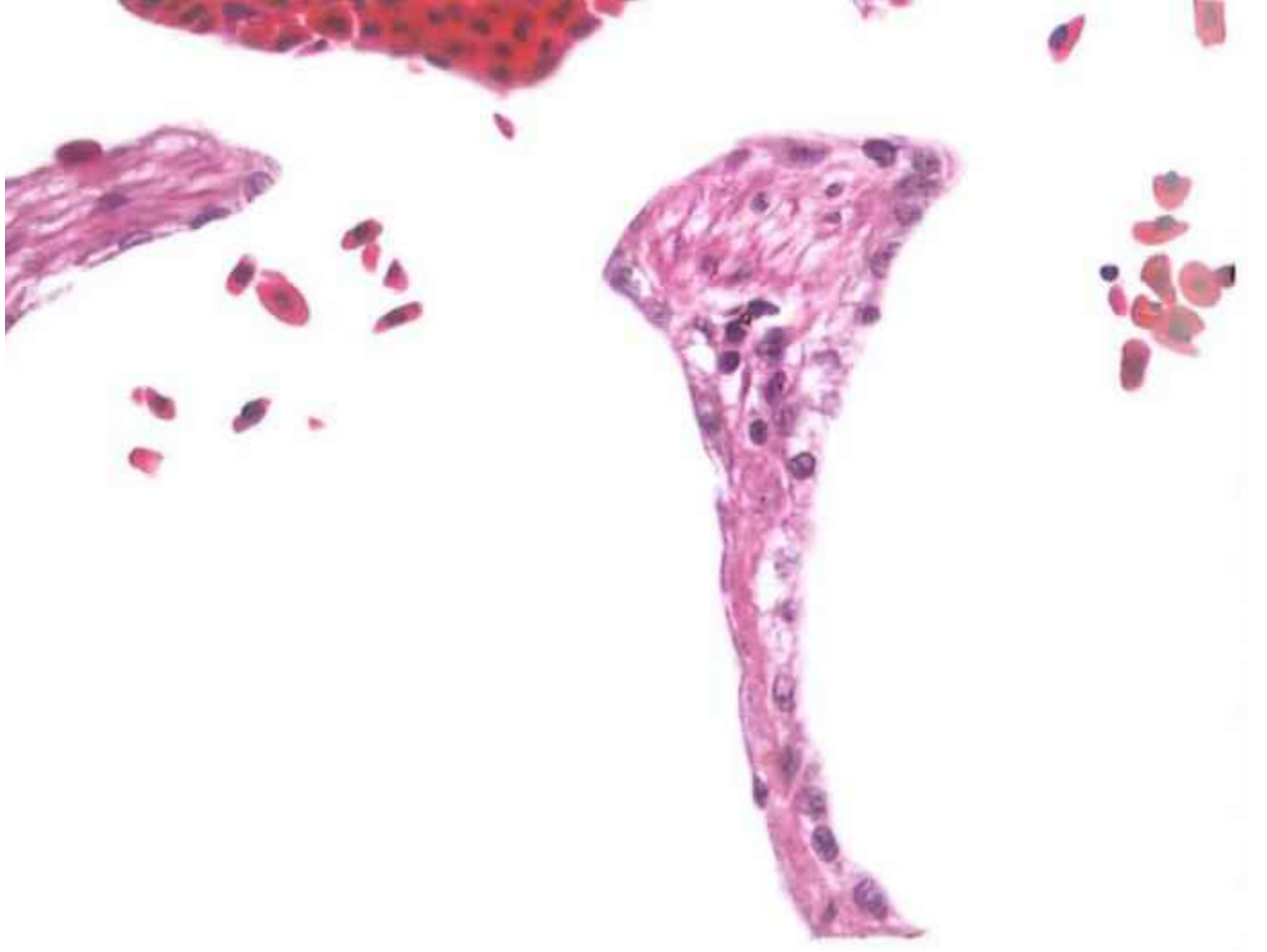
Lung. Normal. Turkey.
Respiratory lobules are composed of air and blood capillaries that surround **parabronchi (tertialy bronchi).** Interstitial tissue contains larger blood vessels and is relatively thin.



Lung. Normal. Turkey.
The junction of secondary bronchus (A) with parabronchus (B) is illustrated. Atria (C) connect the air capillaries to parabronchi . The arrow points to lymphoid aggregate that is part of the **bronchial-associated lymphoid tissue** (BALT).



Lung. Normal. Turkey.
Higher magnification of showing the relationship between **parabronchus (P), atrium (A), and infundibulum (I).** The arrow identifies **smooth muscle** in the wall of the parabronchus. Note the **air-blood capillary network**, sometimes referred to as the capillary bed.



Lung. Normal. Turkey.
Higher-power view showing the **simple squamous epithelium** lining atrium and the smooth muscle in the wall of the parabronchus.

Table 4.1. Refractive Values in Selected Animal Species

Species	*Refractive value (D)*
Cat by habitat	
Street cat	−0.8
Laboratory cats	+1.4
Cat by age	
Kitten (≤4 months)	−2.45
Adult (>1 year)	−0.39
Dog (mean value)	−0.27 to −0.39
Horse	+0.33
Horizontal meridian	−0.06
Rabbit	+0.5
Adult chicken	−0.20
Guinea pig	+0.7
Rat	+4.5 to +18.5)
Penguin	
In water	+8.0 to +13.0
In air	+0.25 to 1.75

Penguins

Penguins have a very small lacrimal gland and lack nasolacrimal ducts. They also have a **supraorbital gland** that extracts salt from the blood and excretes it in concentrated form in the tears. This allows penguins to imbibe salt water and live in both fresh and salt water environments.

Aerobic bacteria normally inhabit the corneal and conjunctival surfaces of salt and fresh water penguins. The most commonly cultured bacteria from both populations was Corynebacterium spp., followed by Staphylococcus spp., then Moraxella spp., Actinomyces canis, and others.

The corneal endothelium of the Magellanic penguin (Spheniscus magellanicus) is similar to that of other vertebrates. They are emmetropic in water and air. Penguin lenses are the most spherical lenses among birds and they are thought to accommodate enough to compensate for loss of corneal refractive power in water.

(A) Right eye of a Chinstrap penguin with a hypermature cataract and ectropion uveae.
(B) Right eye of a Chinstrap penguin with blepharospasm, diffuse corneal edema, Haab's stria, mydriasis, and a posteriorly luxated cataractous lens. The iris is also discolored due to chronic lens-induced uveitis.

01 / Summary：1+1+1

运动系统

鳍形肢-三动作

呼吸系统

气囊+三级细支气管

视觉

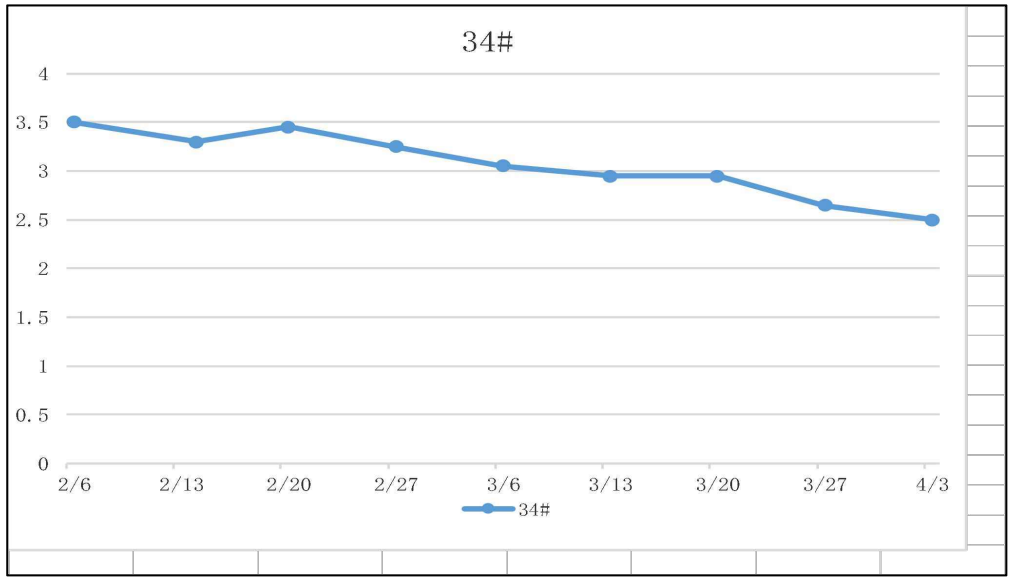
水陆通

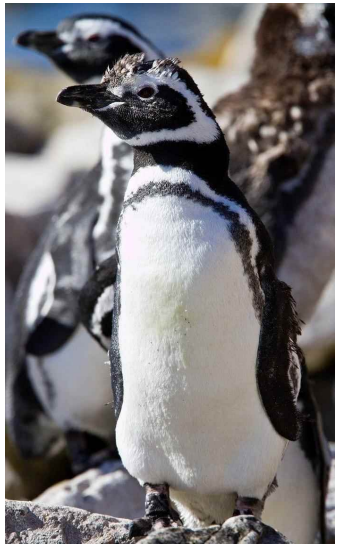
眼眶上腺

保水排盐

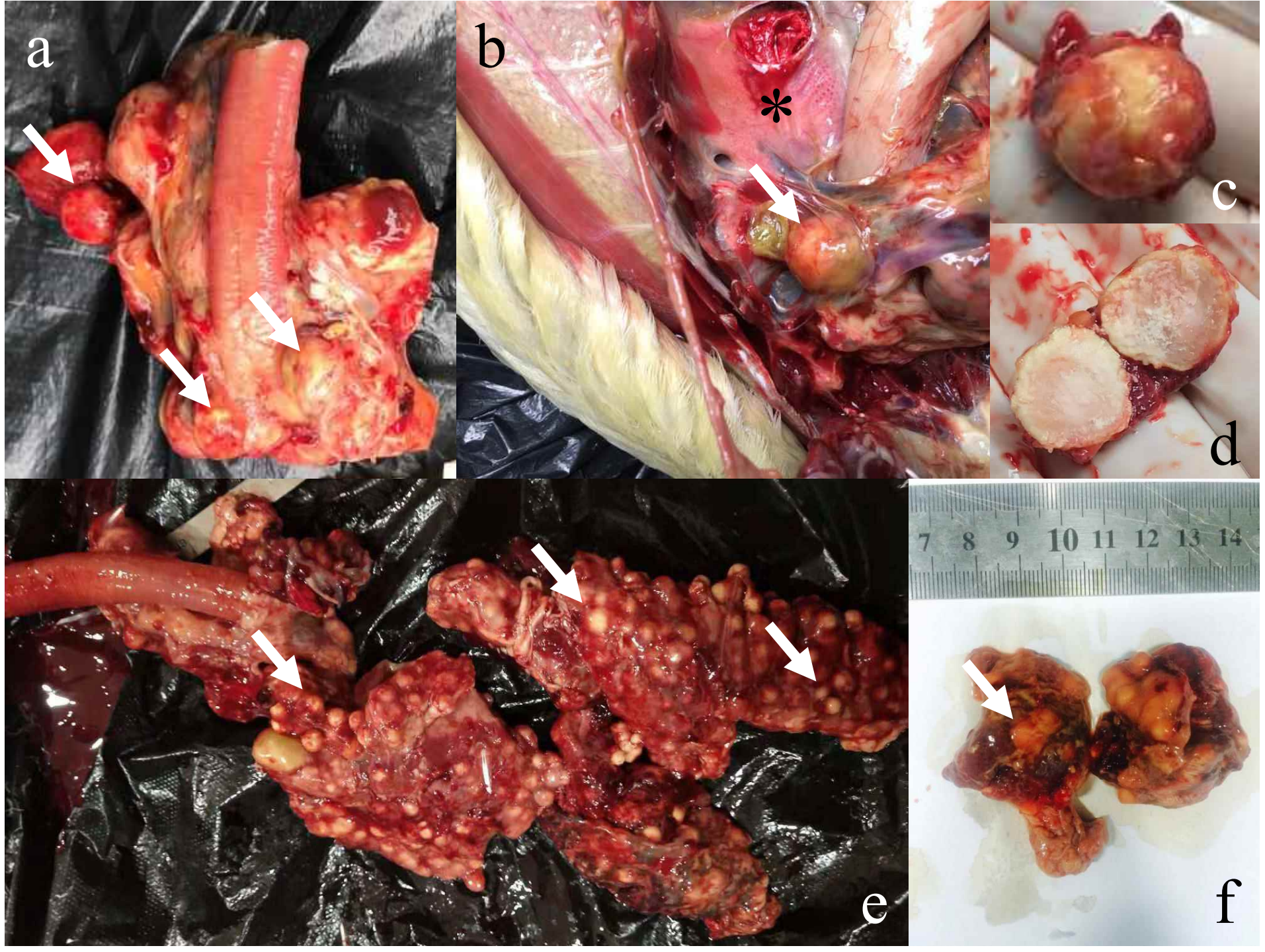
Background Information

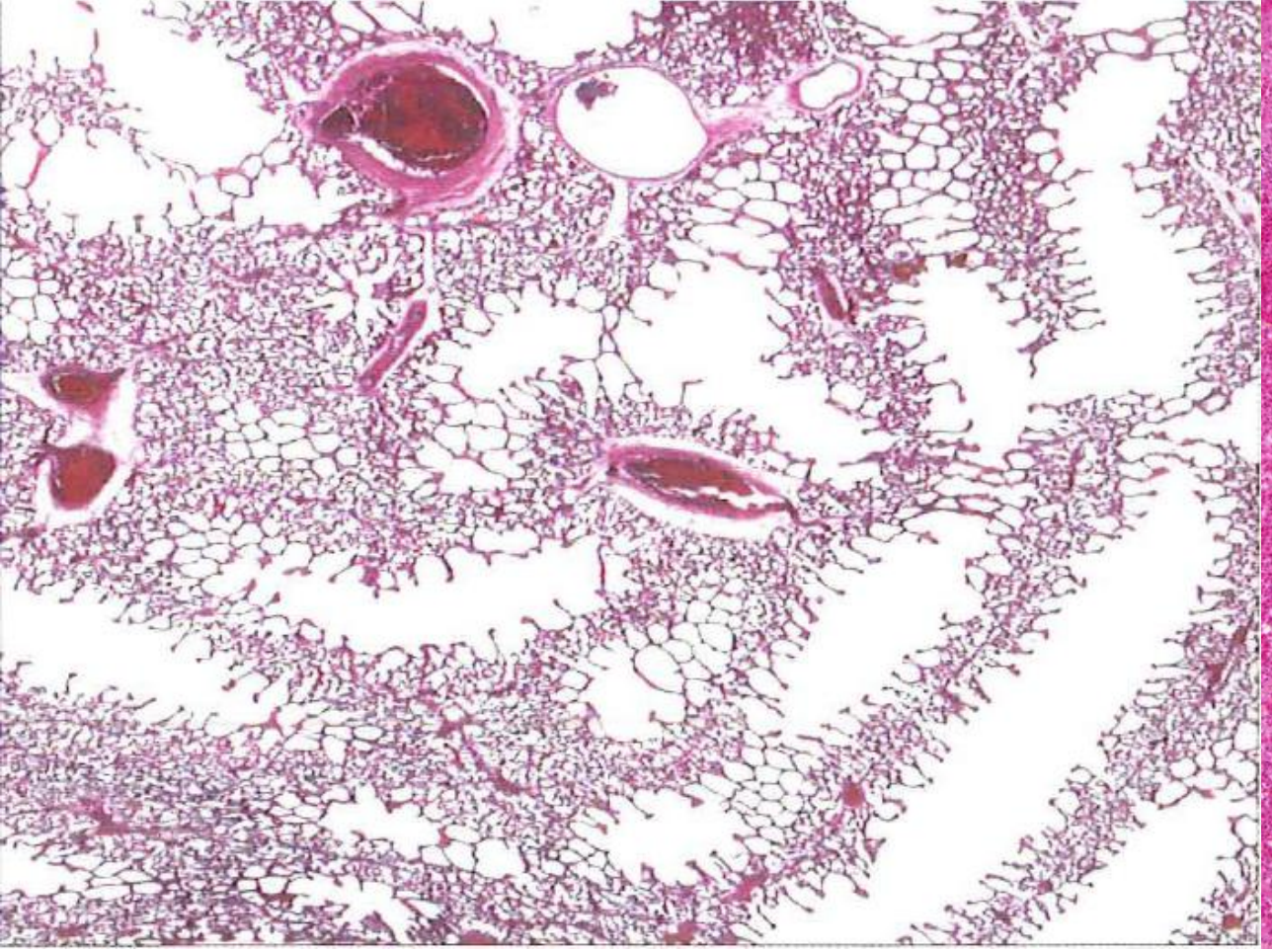
Age	Sex	Weight	Course of disease	Clinical Symptoms
2 years old	Female	3.5kg to 2.5kg	2 months	Dyspnea, gasping, and accelerated breathing…



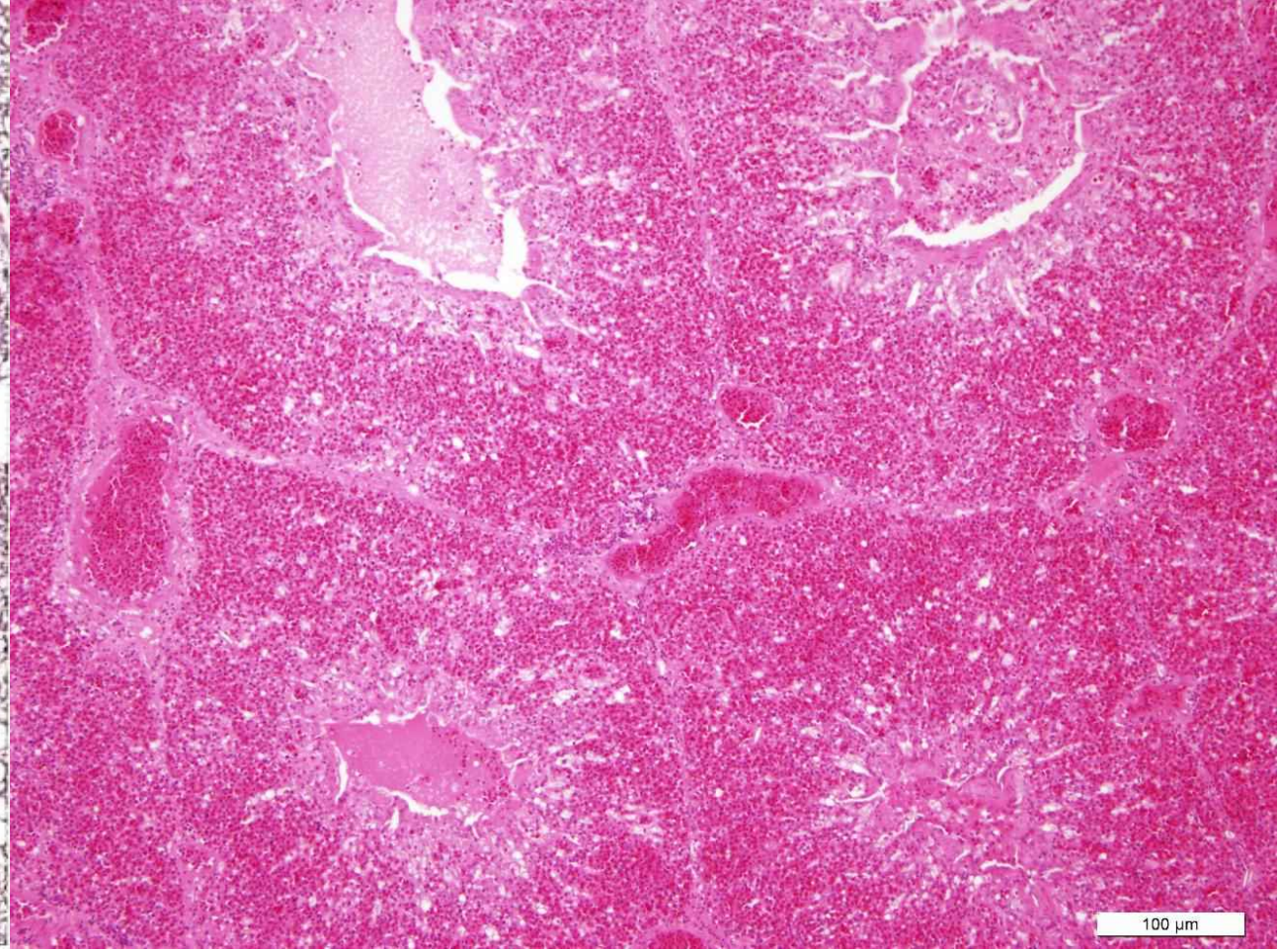


Gross lesions

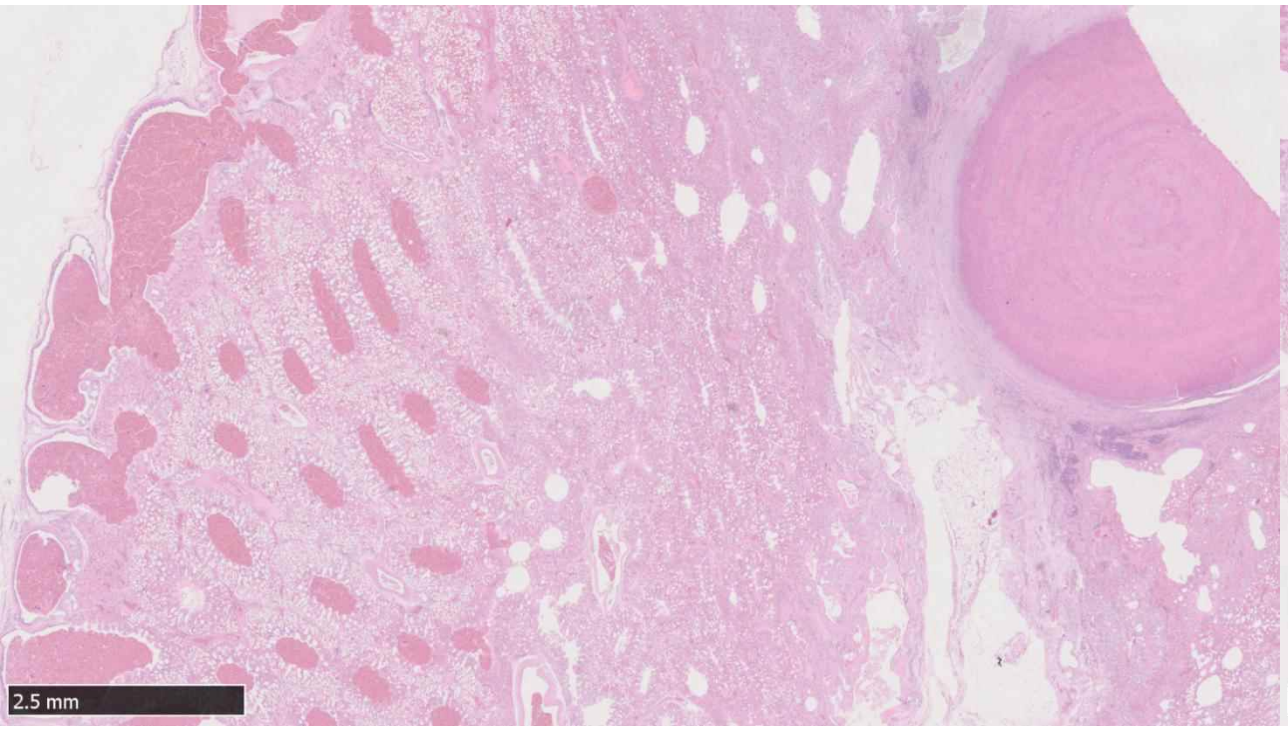


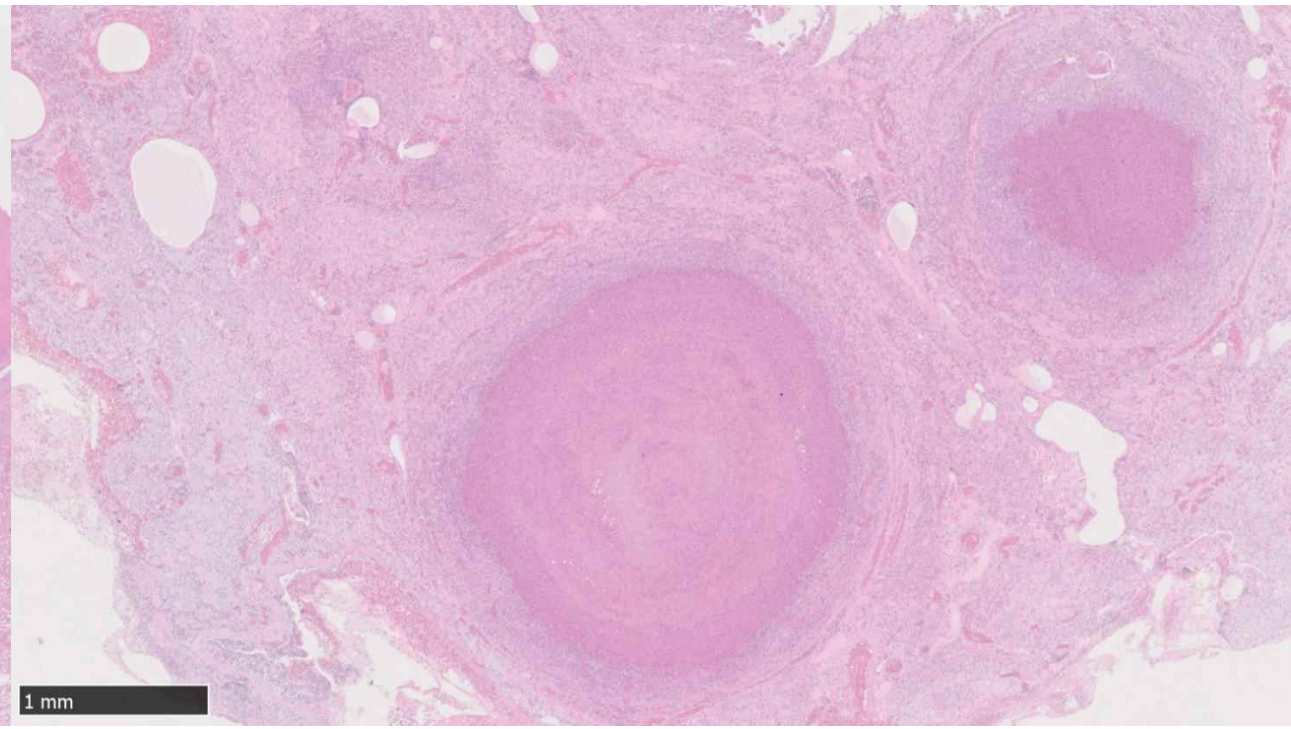


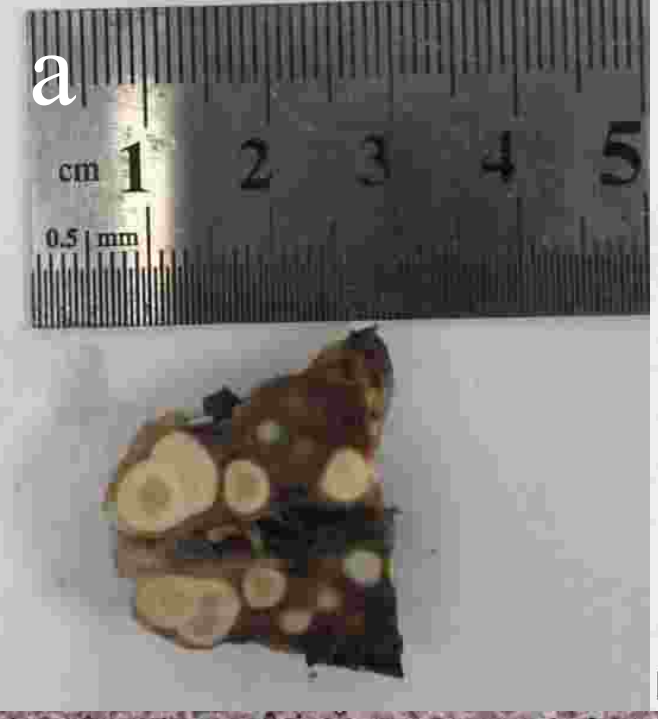
Lung. Normal. Turkey.
Respiratory lobules are composed of air and blood capillaries that surround **parabronchi (tertialy bronchi).** Interstitial tissue contains larger blood vessels and is relatively thin.



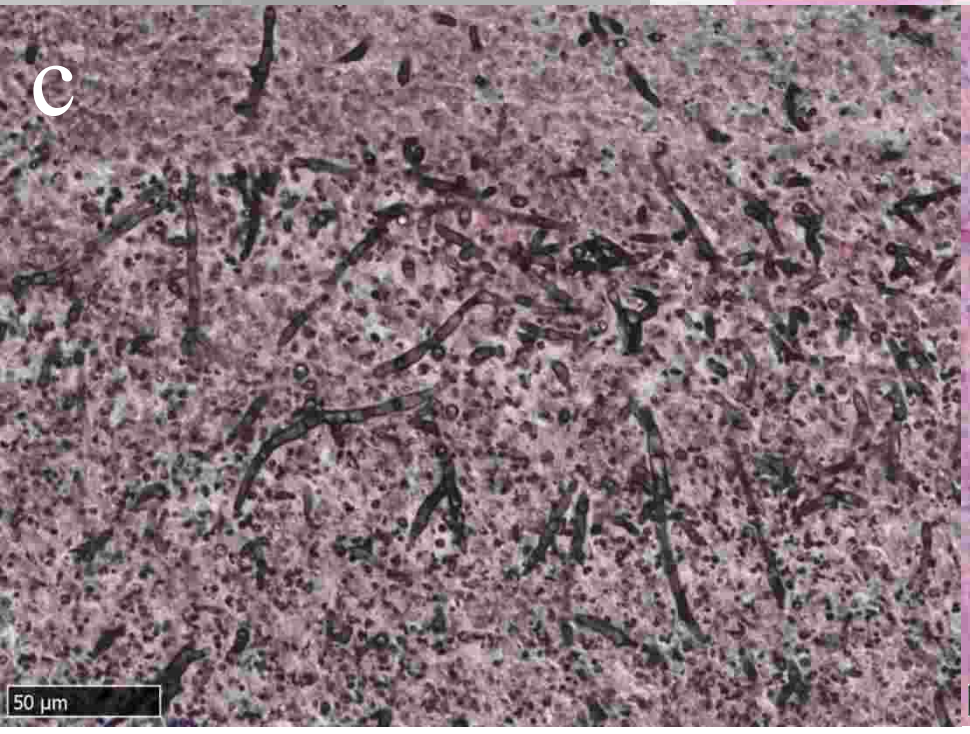
Lung. Abnormal. Penguin.
Accumulation of fibrin mixed with many heterophils in the lumen of parabronchus and in the atria and in fundibulae. Fibrinous exudate mixed with some heterophils fills and expands the lumens of air spaces. The capillary bed is severely disrupted by inflammatory exudate.

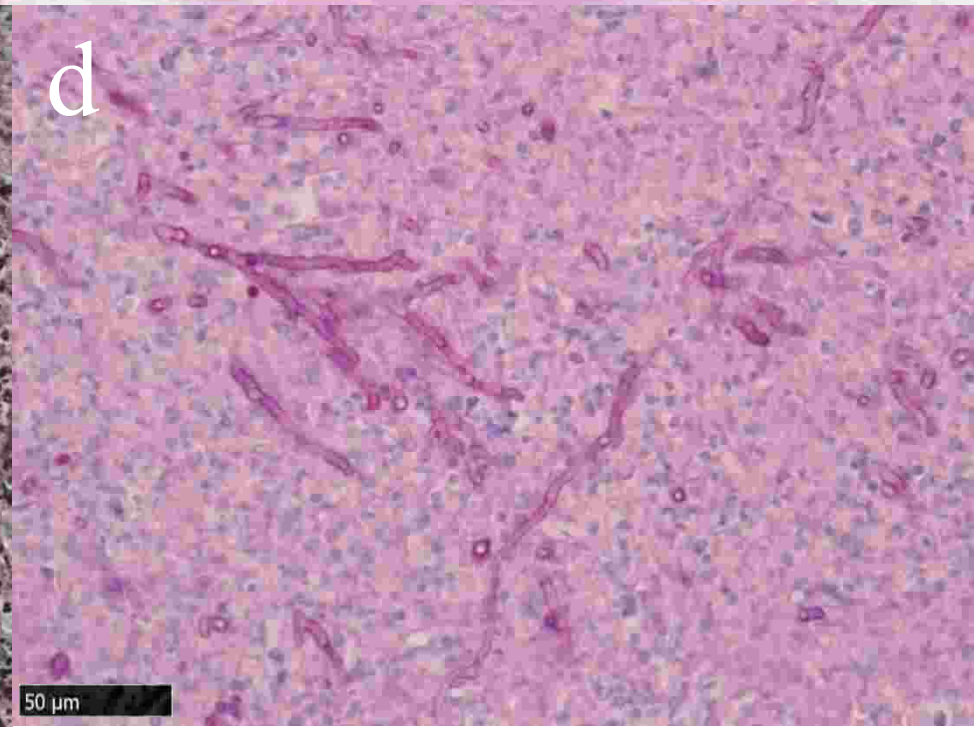

2.5 mm


1 mm



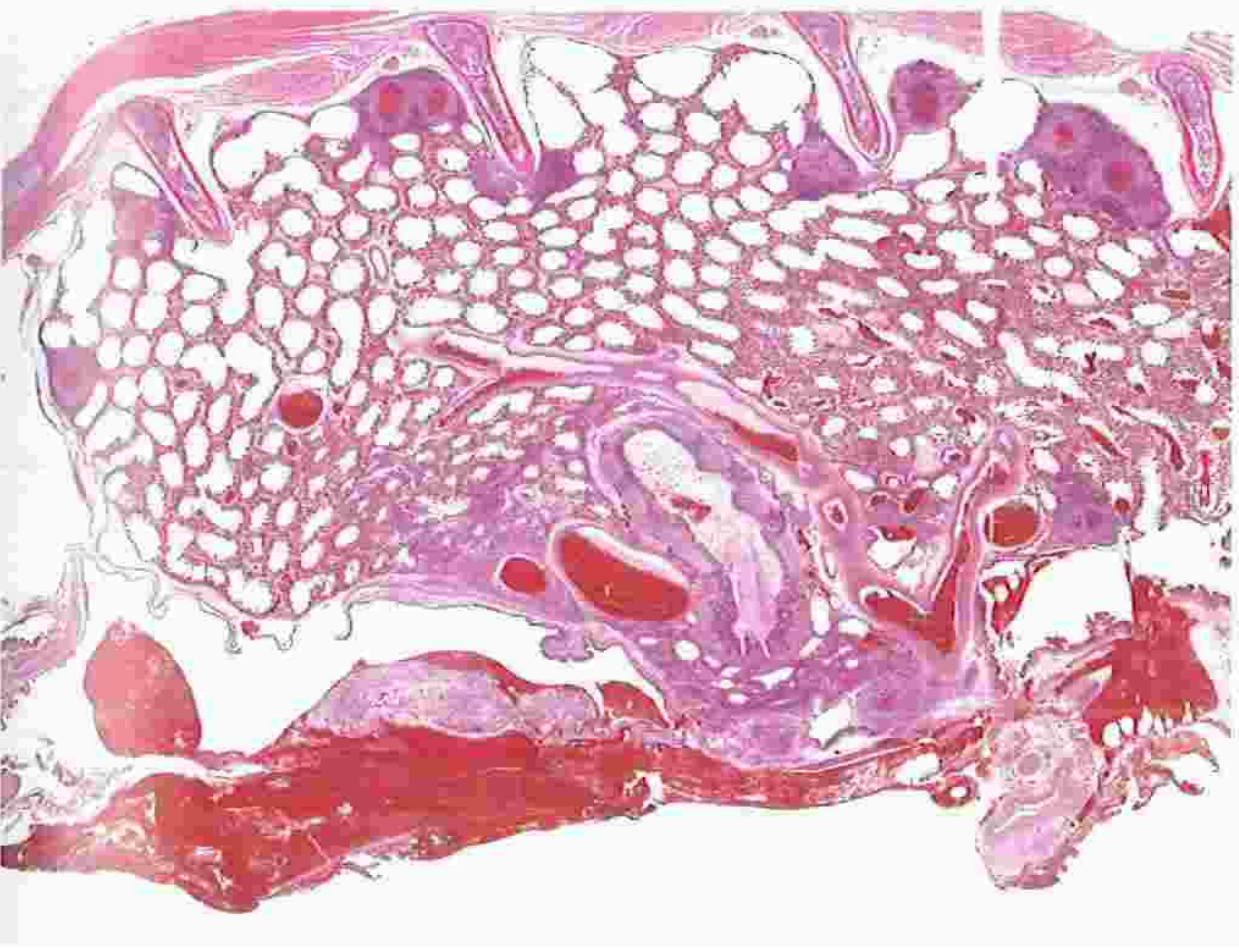
a-b Multifocal, well-delineated caseous granulomas, each with large center of caseous necrosis (b).





c. Gomori methenamine silver (GMS) stain.

d. PAS stain



Lung. Mycotic bronchopneumonia. Aspergillosis. Turkey.
Scanning view of lung within the thoracic cavity showing the peripheral distribution within the lung of granulomas caused by Aspergillus fumigatus.

Lung. Aspergillosis caused by Aspergillus fumigatus. 3-week-old broiler breeder pullet.
Low-power view showing multifocal, well-delineated caseous granulomas, each with large center of caseous debris.