



ZOOLOGI VERTEBRATA AVES

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Zoologi Vertebrata

AVES

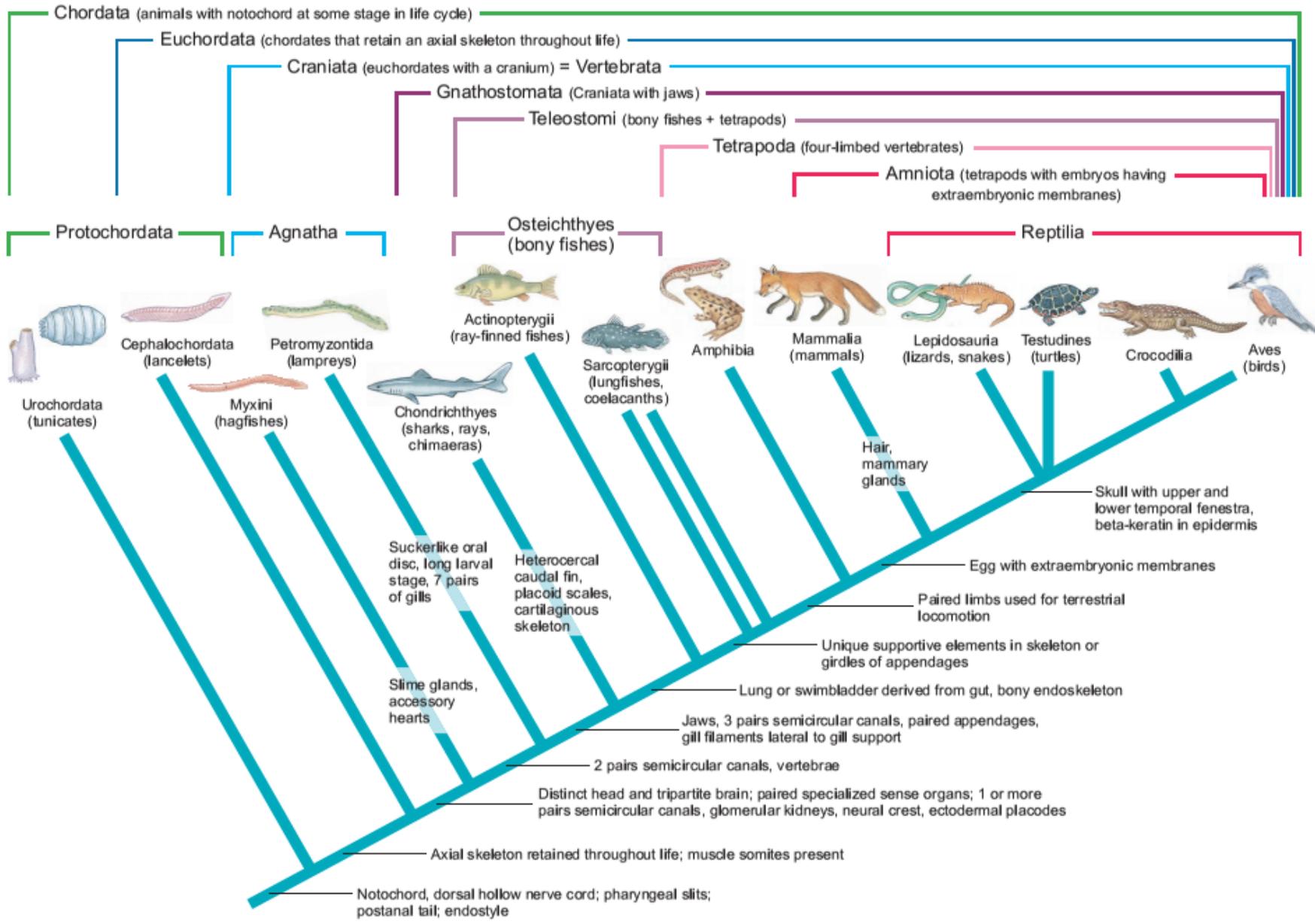
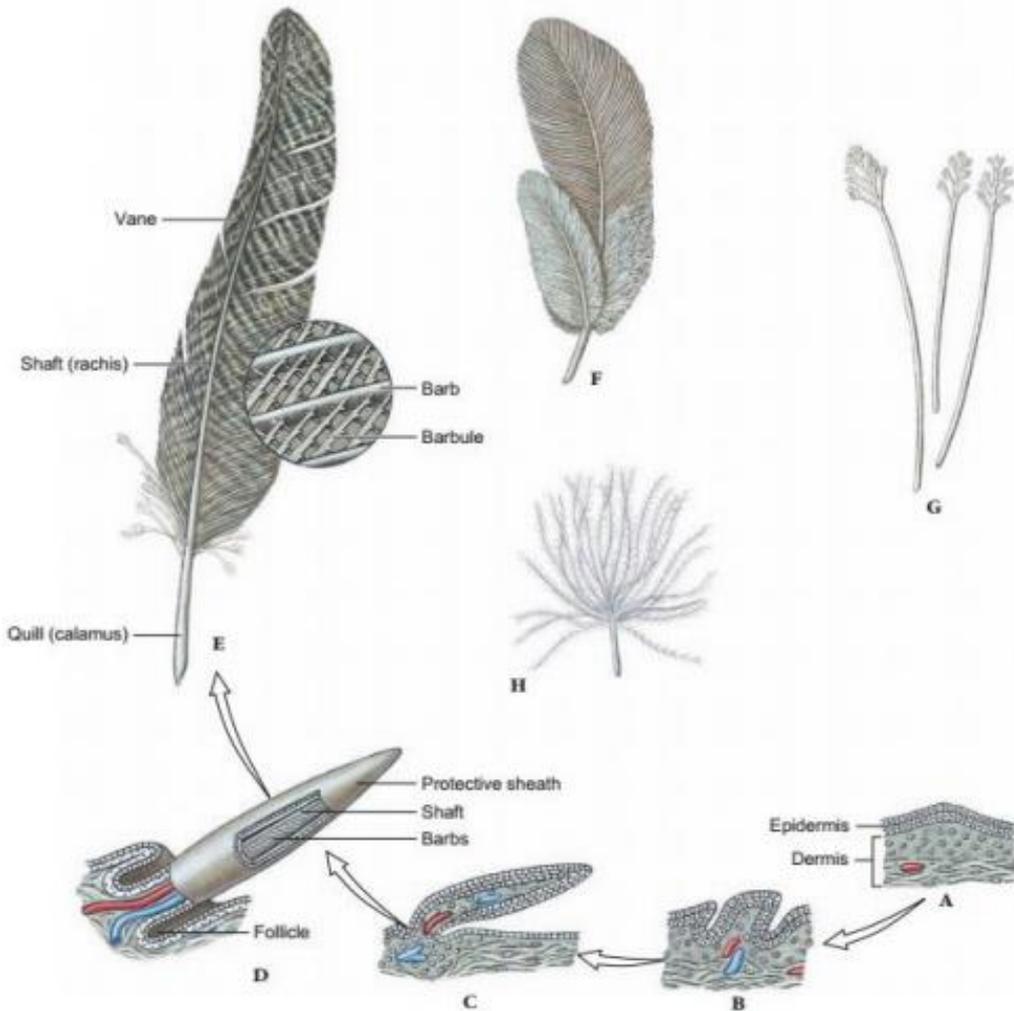


Figure 23.3
 Cladogram of living members of phylum Chordata showing probable relationships of monophyletic groups composing the phylum. Each branch in the cladogram represents a monophyletic group. Some derived character states that identify the branchings are shown at right of the branch points. Nesting brackets across the top of the cladogram identify monophyletic groups within the phylum. The term Craniata, although commonly equated with Vertebrata, is preferred by many authorities because it recognizes that some jawless vertebrates have a cranium but no vertebrae. The lower set of brackets identify the traditional groupings Protochordata, Agnatha, Osteichthyes, and Reptilia. These paraphyletic groups are not recognized in cladistic treatments, but are shown because of widespread use.



Plumae, terdiri dari :

- Calamus, tangkai bulu yang berongga
- Rachis, tangkai bulu yang tak berongga
- Vexillum, lanjutan calamus yang tak berongga
- Umbilicus inferior, lubang pangkal calamus
- Umbilicus superior, lubang bagian distal calamus
- Vexillum, dibentuk oleh barbae yang merupakan cabang kearah lateral dan rachis,

Flumulae, terdapat pada burung yang masih muda, terdiri dari: Calamus (pendek), Rachis (tereduksi), Barbae (panjang), Barbulae (pendek)

Filoplumae, mempunyai tangkai yang panjang, pada ujungnya terdapat beberapa barbae.

Berdasarkan letaknya bulu dapat dibedakan :

- Remiges, bulu pada sayap.
- Retrices, bulu pada ekor.
- Tetrices, bulu pada badan.
- Parapterum, bulu yang terdapat didaerah bahu antara badan sayap dan sayap.
- Alula sive ala spuria, bulu pada extremitas

Gambar 6.1. Tipe bulu burung dan perkembangannya. A-E perkembangan bulu, F bulu bertangkai, G filoplumula, H bulu bawah (Hickman, 2008).

Figure 27.11

Some bills of birds showing variety of adaptations.



Raven
Generalized bill



Cardinal
Seed cracker



American avocet
Worm burrow probe



Pelican
Dip net



Flamingo
Zooplankton strainer



Parrot
Nut cracker



Anhinga
Fish spear



Eagle
Meat tearer

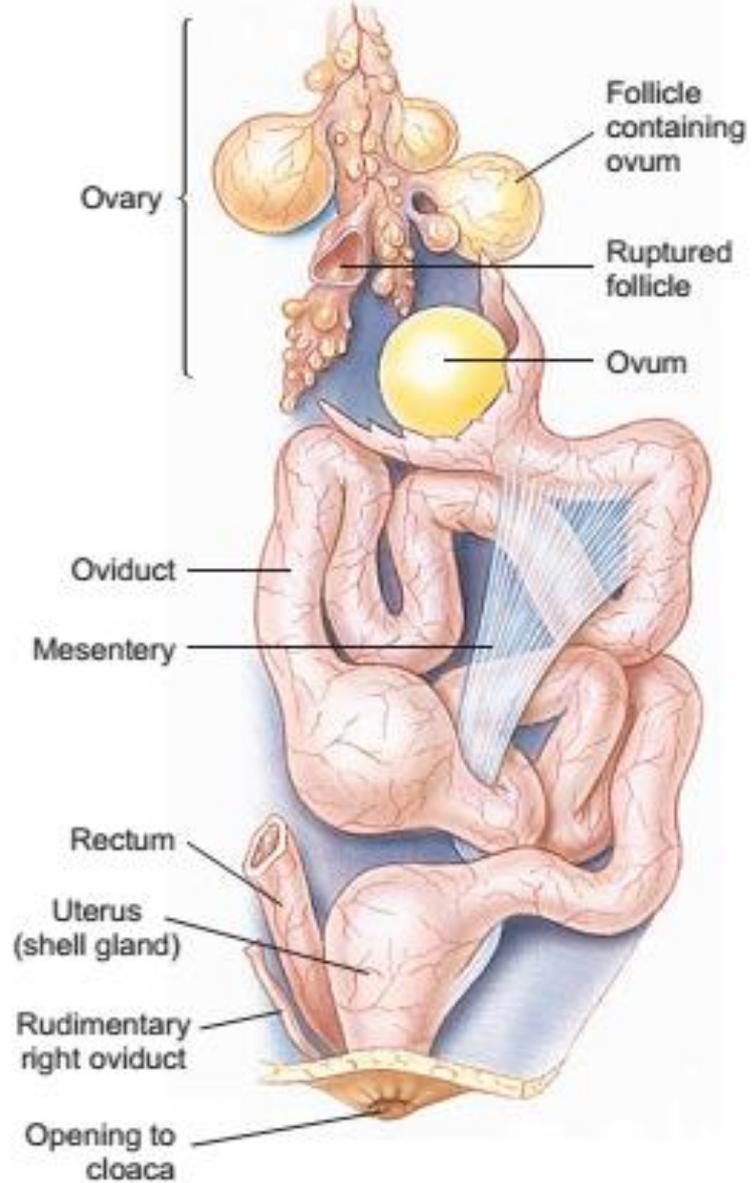
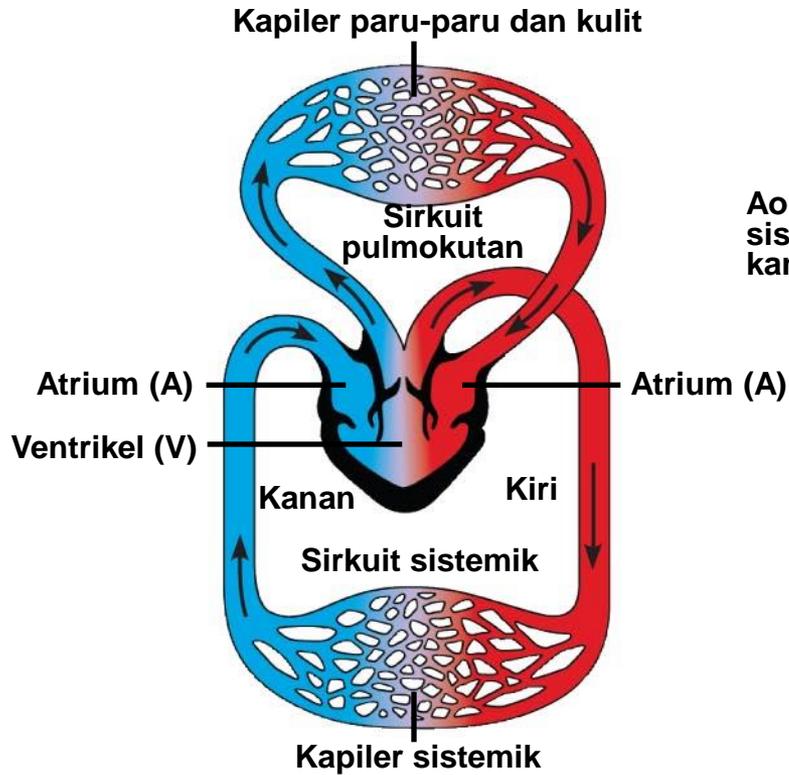


Figure 27.25

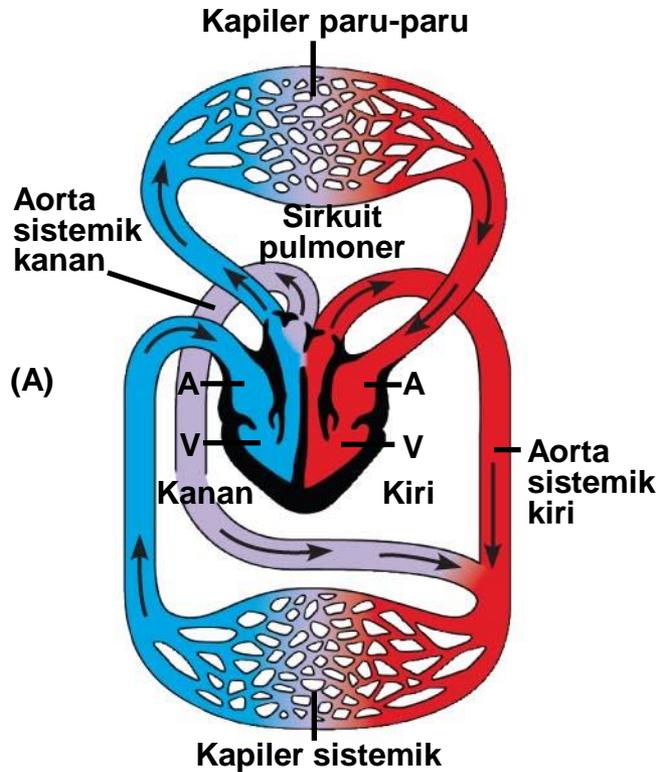
Reproductive system of a female bird. For most birds, only the left ovary and reproductive tract are functional. Structures on the right dwindle to vestiges.

Peraga 42.5 Sirkulasi ganda pada vertebrata

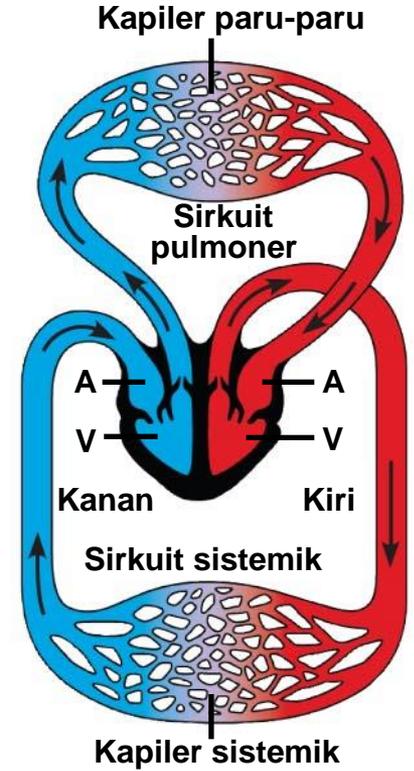
Amfibia



Reptil (kecuali burung)



Mamalia dan burung





- Mamalia dan burung memiliki jantung beruang-empat dengan dua atrium dan dua ventrikel
- Bagian kiri jantung memompa dan menerima hanya darah kaya-oksigen, sementara bagian kanan menerima dan memompa hanya darah miskin-oksigen
- Mamalia dan burung adalah endoterm dan membutuhkan O_2 yang lebih banyak daripada ektoterm

Bagaimana Burung Bernapas



- Burung memiliki delapan atau sembilan kantong udara yang berfungsi sebagai alat peniup yang menjaga udara mengalir melalui paru-paru
- Udara mengalir melalui paru-paru hanya ke satu arah
- Setiap ekshalasi memperbarui udara dalam paru-paru

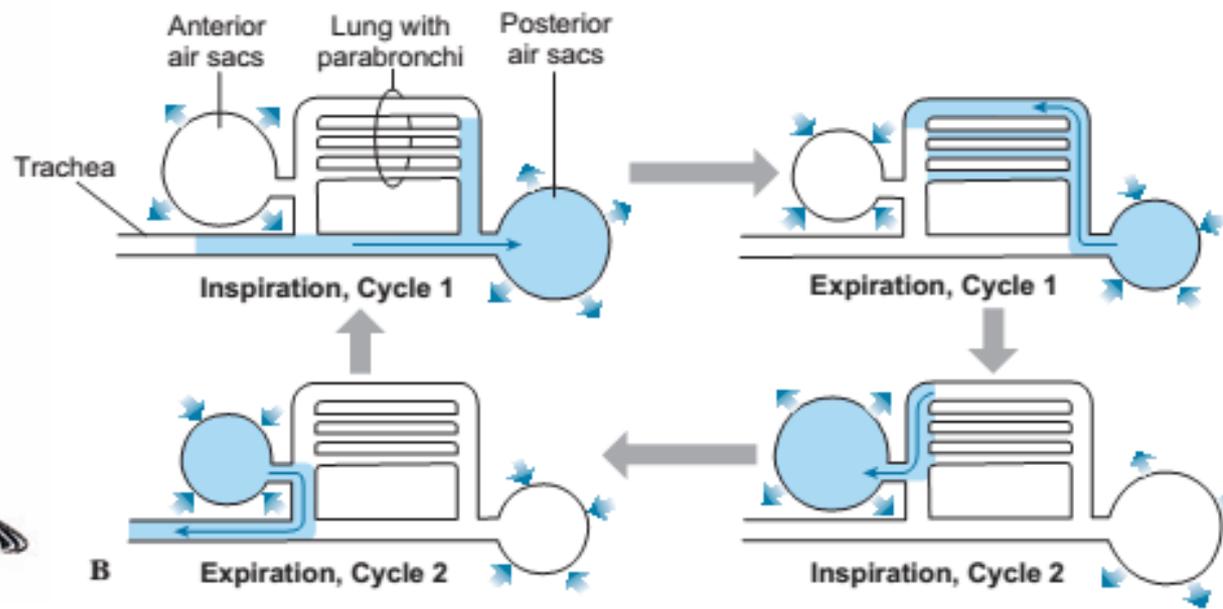
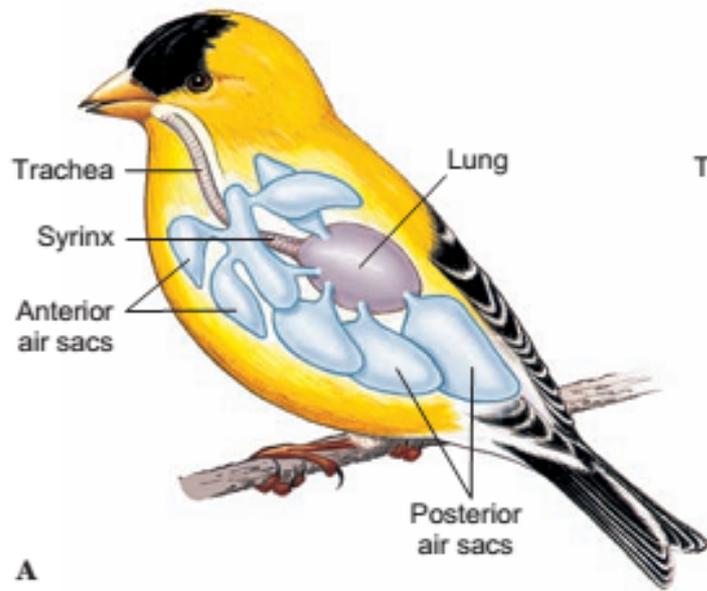


Figure 27.12

Respiratory system of a bird. **A**, Lungs and air sacs. One side of the bilateral air sac system is shown. **B**, Movement of a single volume of air through a bird's respiratory system. Two full respiratory cycles are required to move air through the system.

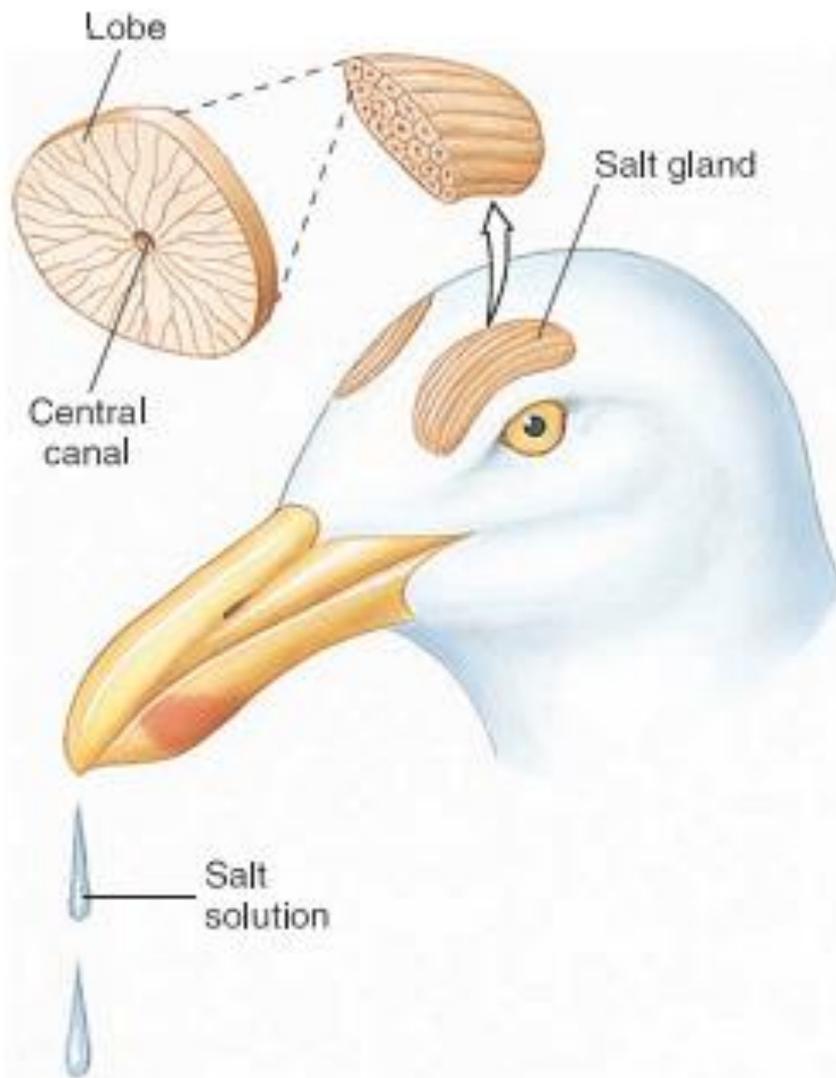
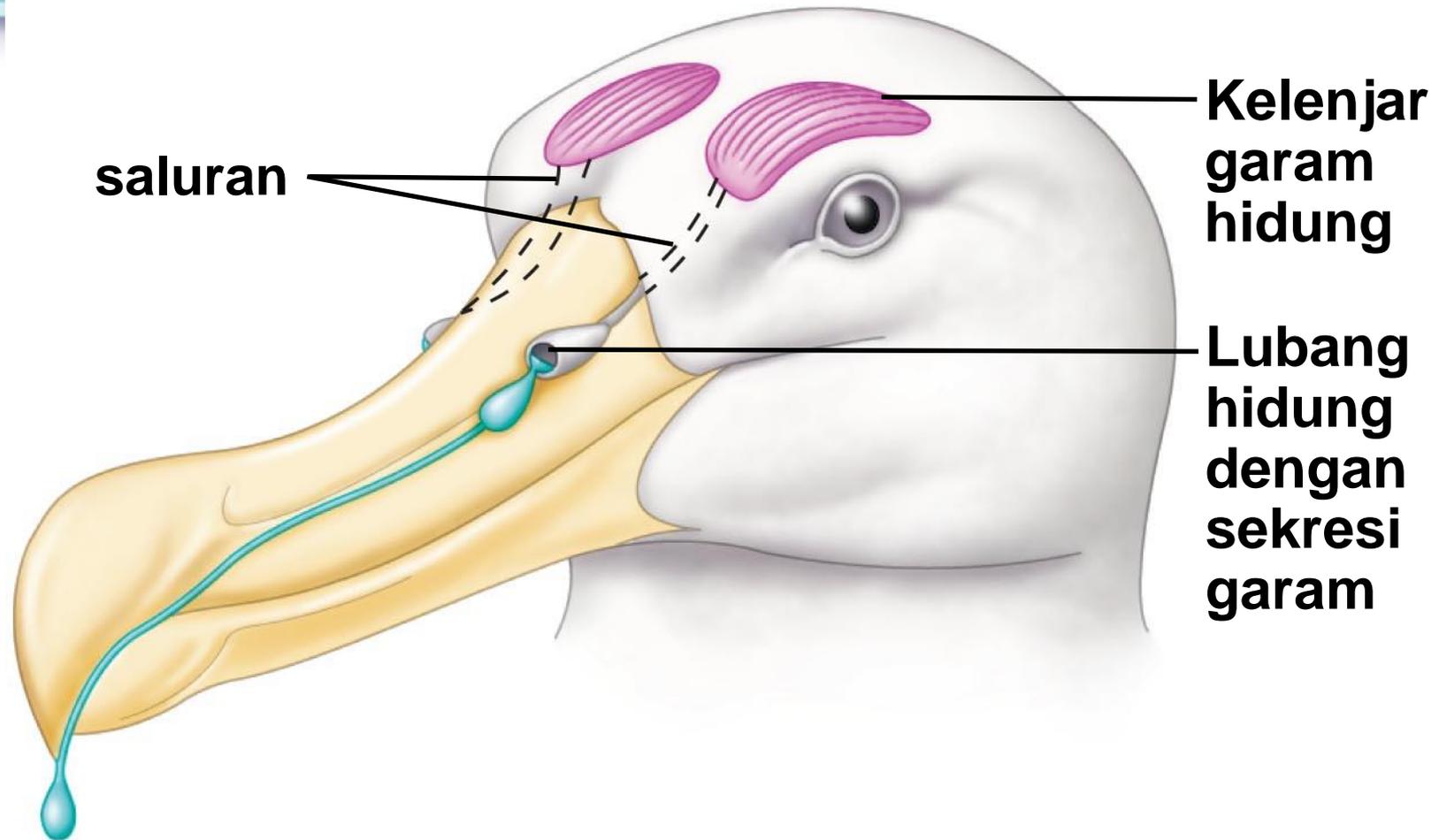


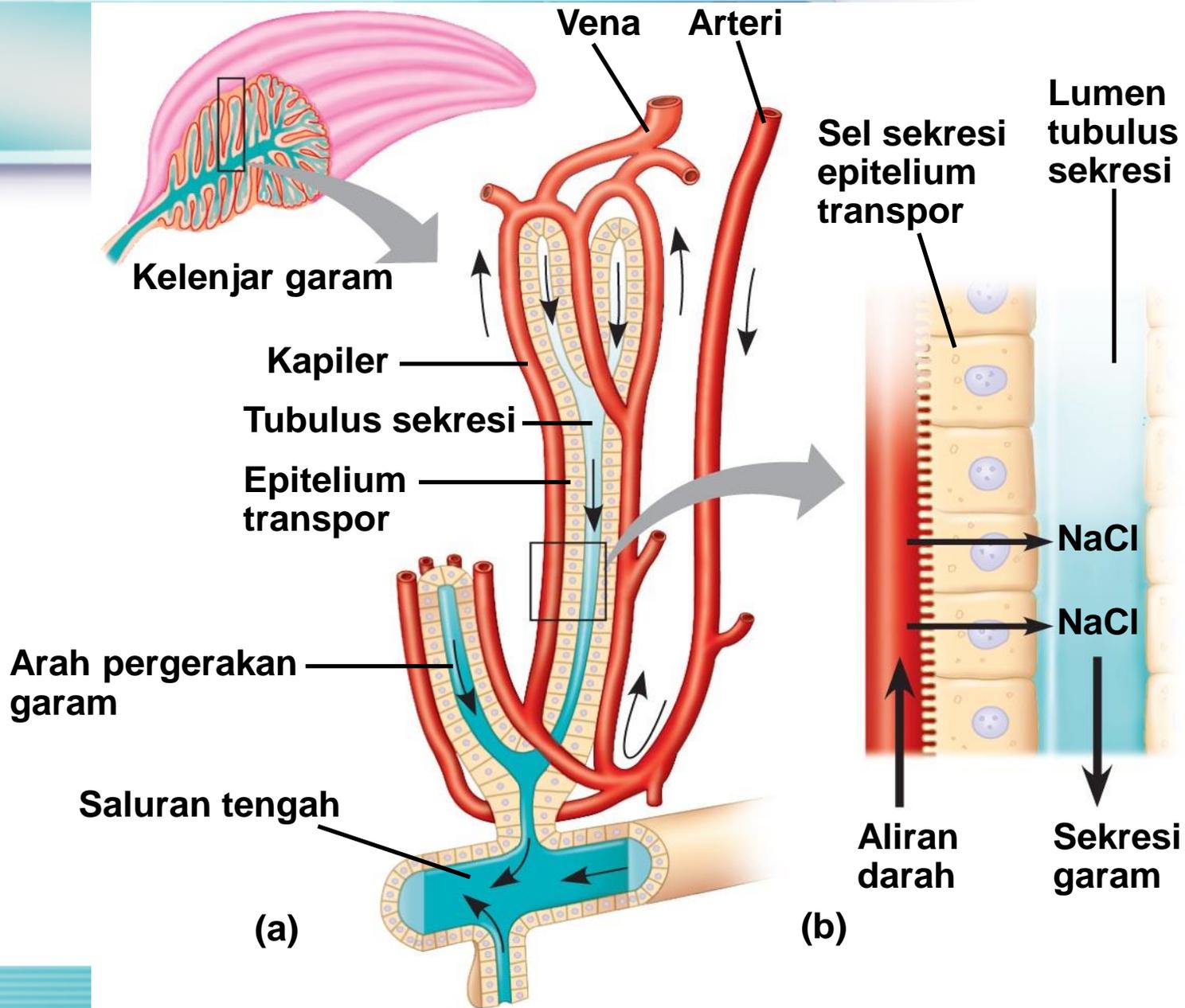
Figure 27.13

Salt glands of a marine bird (gull). One salt gland is located above each eye. Each gland consists of several lobes arranged in parallel. One lobe is shown in cross section, much enlarged. Salt is secreted into many radially arranged tubules, then flows into a central canal that leads into the nose.

Percobaan



Peraga 44.7 Bagaimana burung laut membuang kelebihan garam dari tubuhnya? (Campbell, 2010)



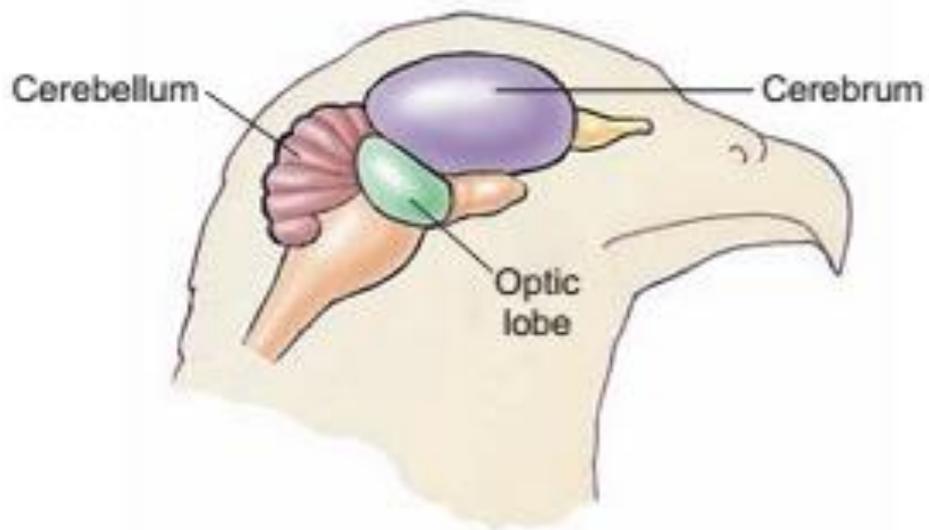
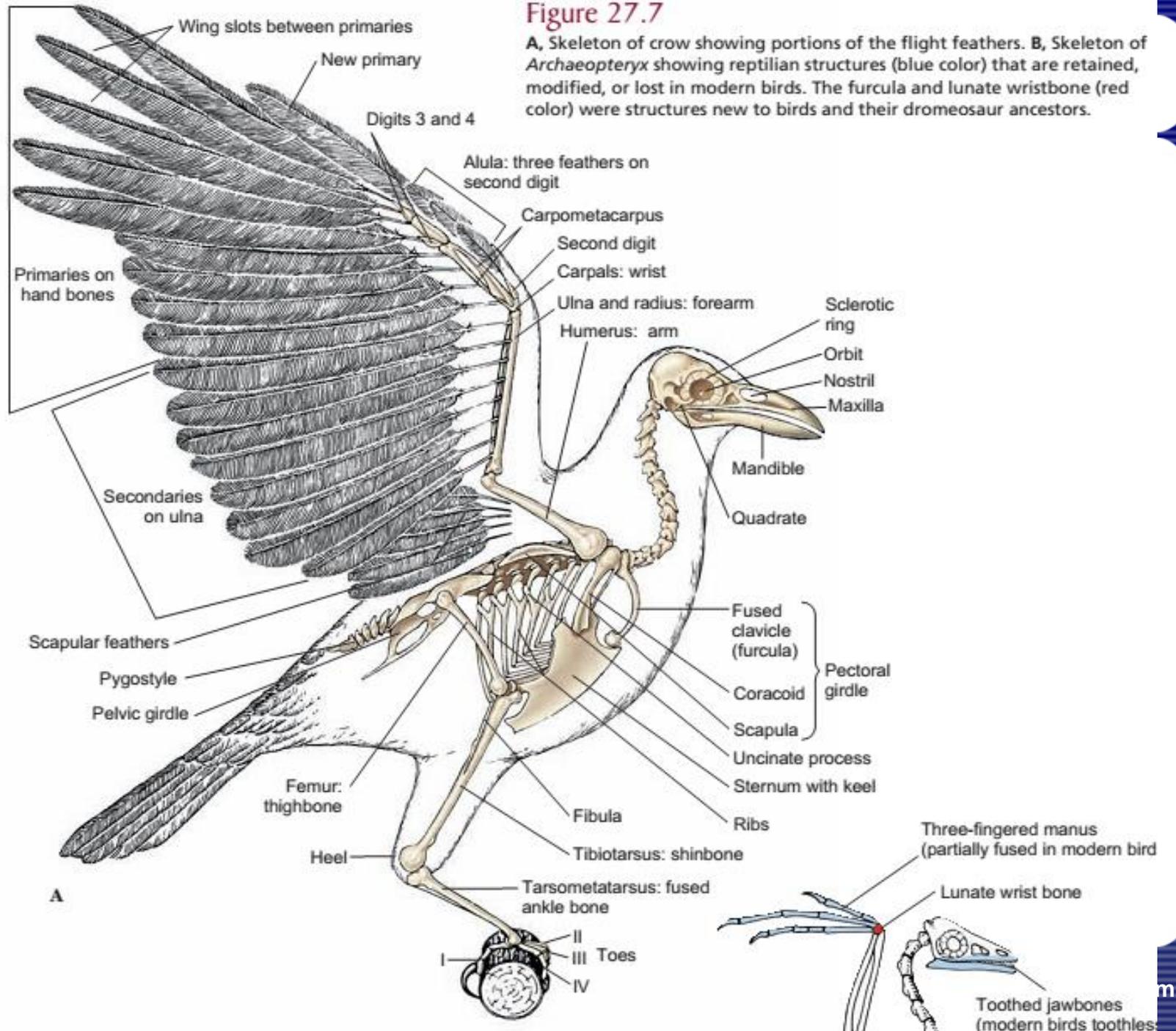


Figure 27.14

Bird brain showing principal divisions.

Figure 27.7

A, Skeleton of crow showing portions of the flight feathers. B, Skeleton of *Archaeopteryx* showing reptilian structures (blue color) that are retained, modified, or lost in modern birds. The furcula and lunate wristbone (red color) were structures new to birds and their dromeosaur ancestors.



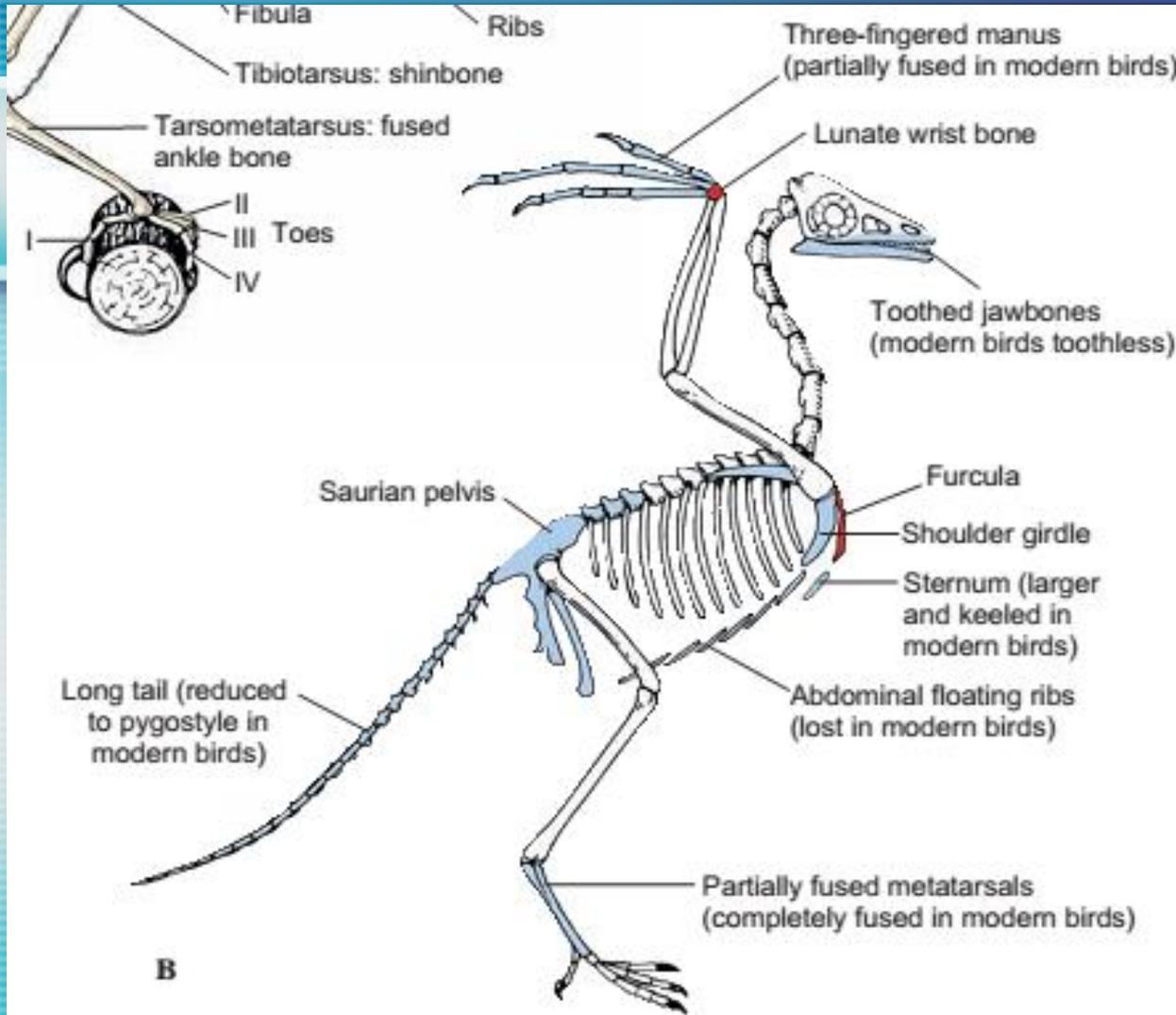
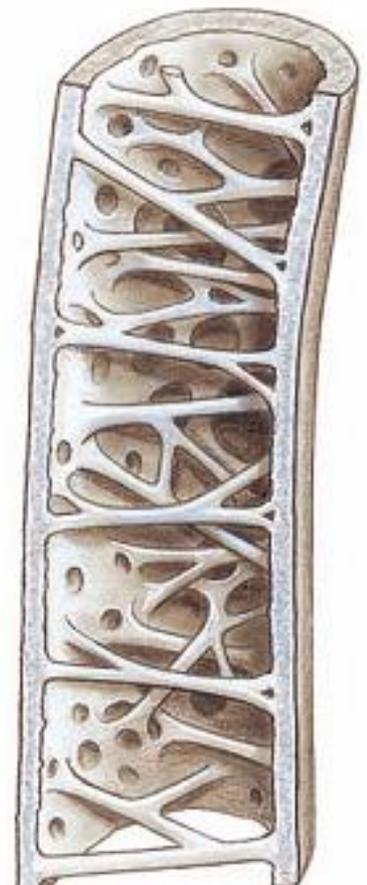


Figure 27.8 Hollow wing bone of a songbird showing stiffening struts and air spaces that replace bone marrow. Such "pneumatized" bones are remarkably light and strong.



B

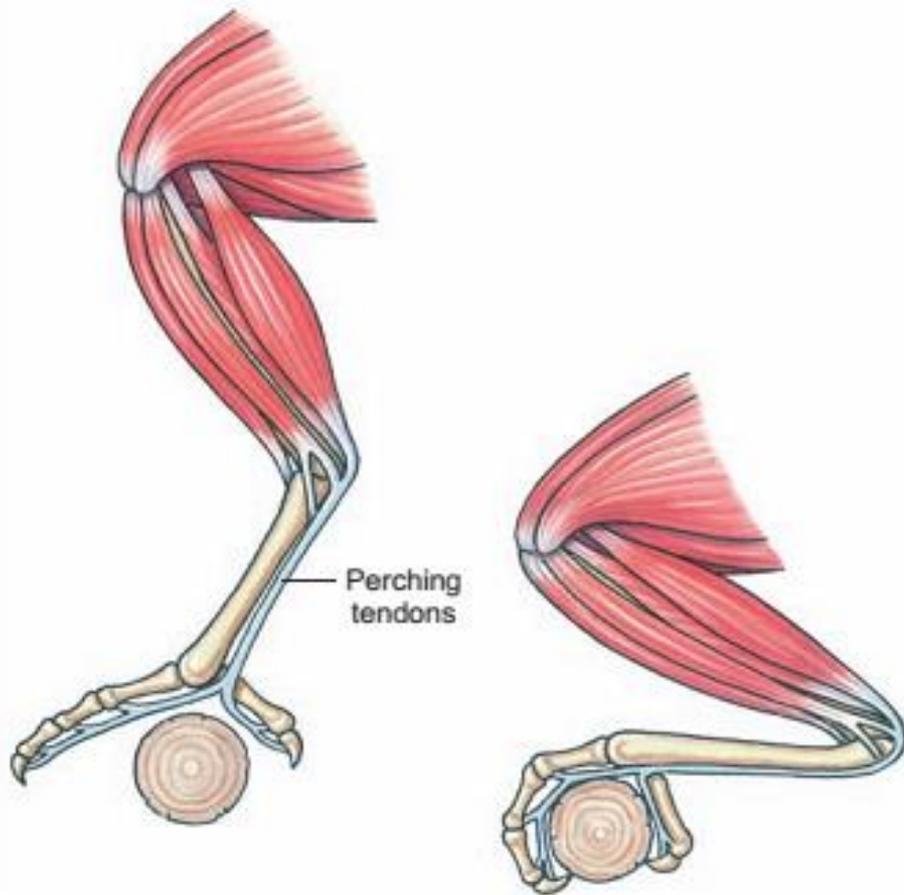


Figure 27.10

Perching mechanism of a bird. When a bird settles on a branch, tendons automatically tighten, closing the toes around the perch.

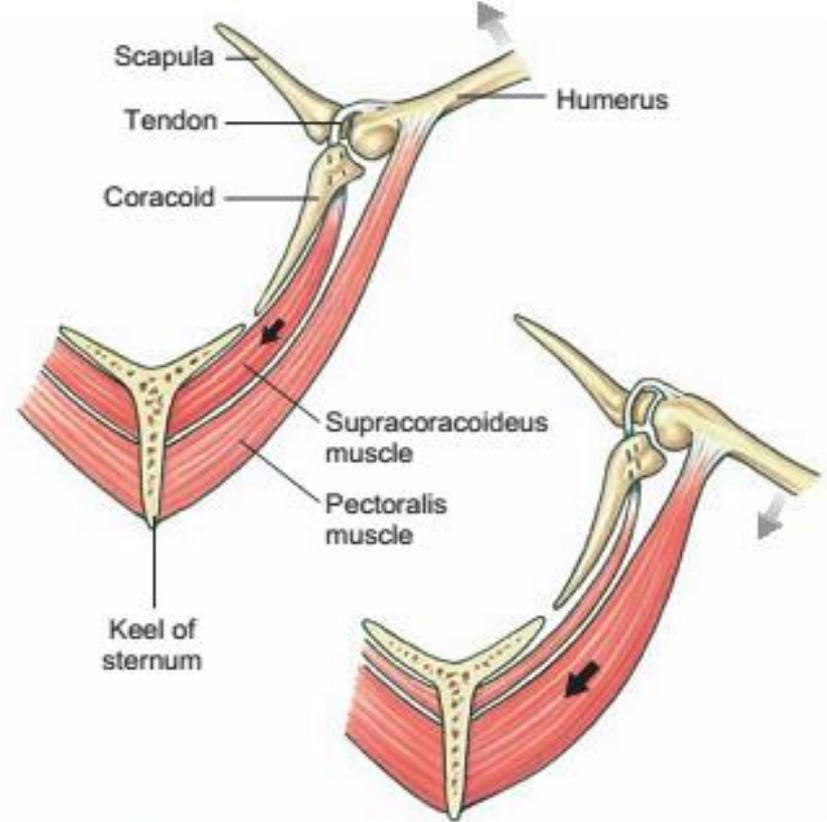
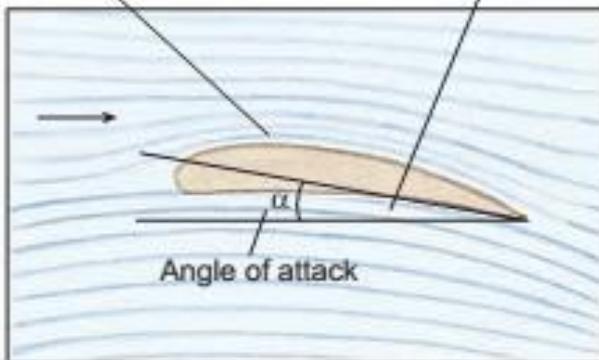


Figure 27.9

Flight muscles of a bird are arranged to keep the center of gravity low in the body. Both major flight muscles are anchored on the sternum keel. Contraction of the pectoralis muscle pulls the wing downward. Then, as the pectoralis relaxes, the supracoracoideus muscle contracts and, acting as a pulley system, pulls the wing upward.

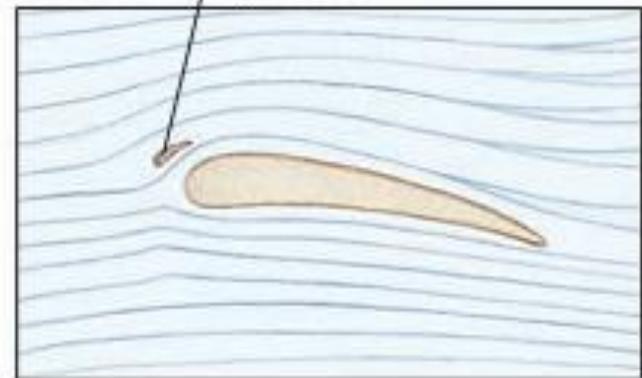
Lowest pressure and greatest lift where air flow is fastest

Smaller area of high pressure and lift beneath wing



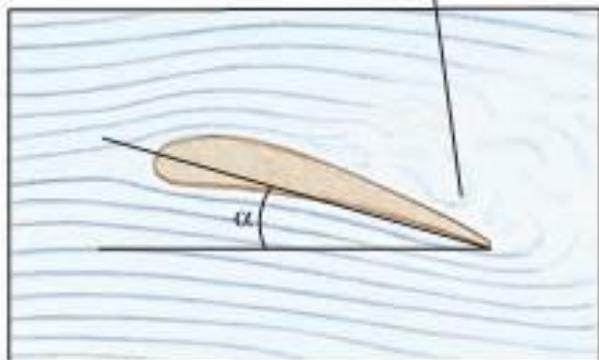
Air flow around wing

Wing slot directs fast-moving air over wing surface

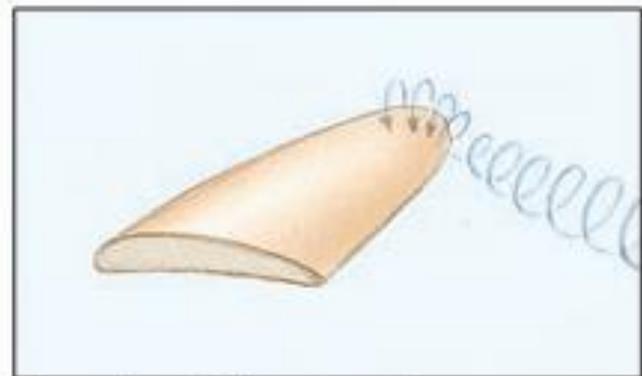


Preventing stall with wing slots

Lift-destroying turbulence



Stalling at low speed



Formation of wing tip vortex

Figure 27.16

Air patterns formed by an airfoil, or wing, moving from right to left. At low speed the angle of attack (α) must increase to maintain lift but this increases the threat of stalling. The upper figures show how low-speed stalling can be prevented with wing slots. Wing tip vortex (*bottom*), a turbulence that tends to develop at high speeds, reduces flight efficiency. The effect is reduced in wings that sweep back and taper to a tip.

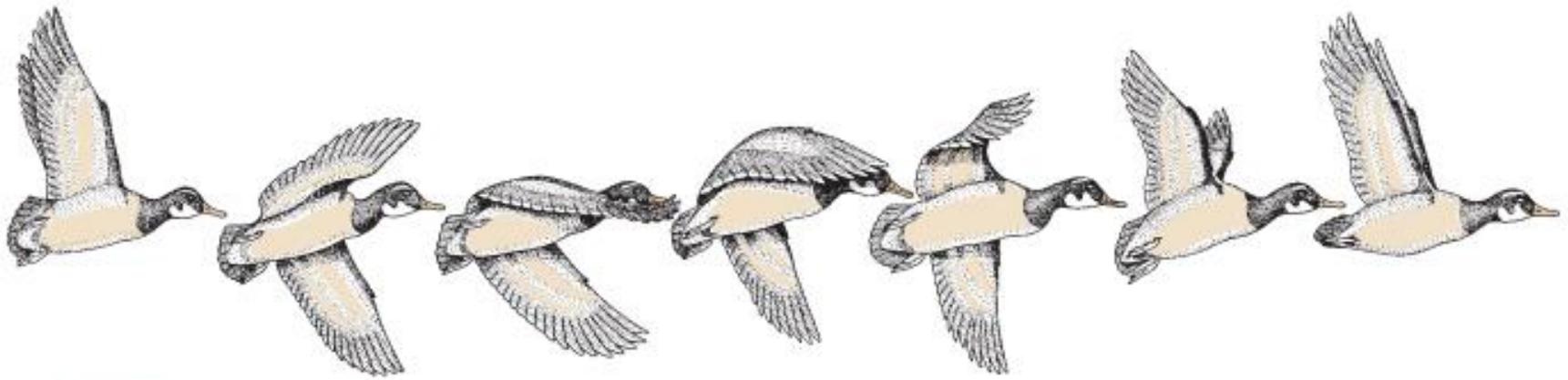


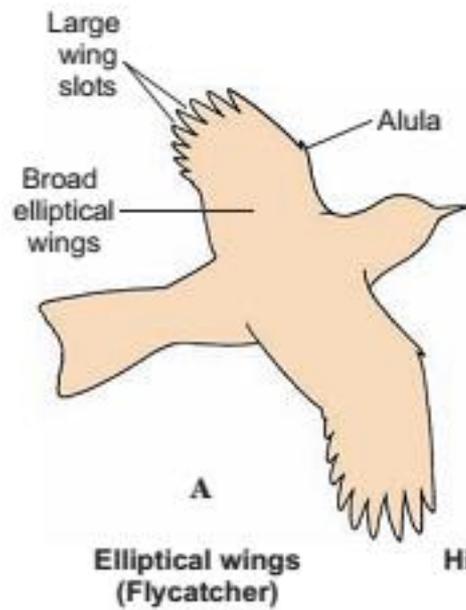
Figure 27.17

In normal flapping flight of strong fliers like ducks, the wings sweep downward and forward fully extended. Thrust is provided by the primary feathers at the wing tips. To begin the upbeat, the wing is bent, bringing it upward and backward. The wing then extends, ready for the next downbeat.

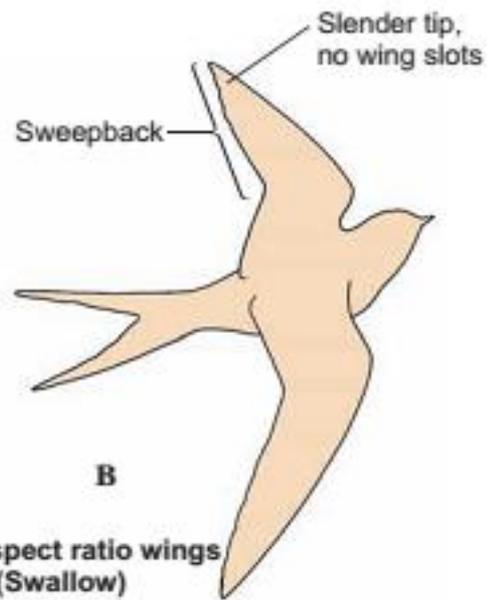


Figure 27.18

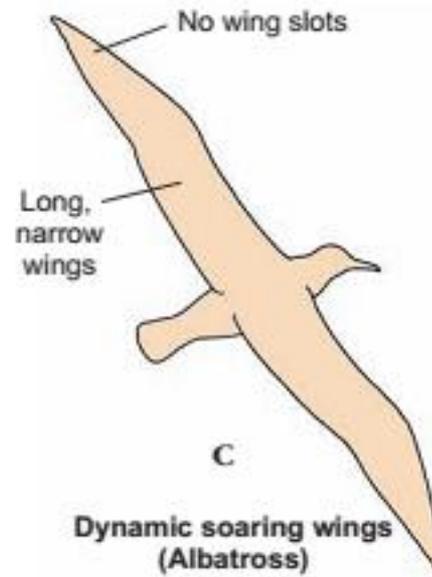
The secret of a hummingbird's ability to change direction instantly, or hang motionless in the air while sipping nectar from a flower, lies in its wing structure. The wing is nearly rigid, but hinged at the shoulder by a swivel joint and powered by a supracoracoideus muscle that is unusually large for the bird's size. When hovering the wing moves in a sculling motion. The leading edge of the wing moves forward on the forward stroke, then swivels nearly 180 degrees at the shoulder to move backward on the backstroke. The effect is to provide lift without propulsion on both forward and backward strokes.



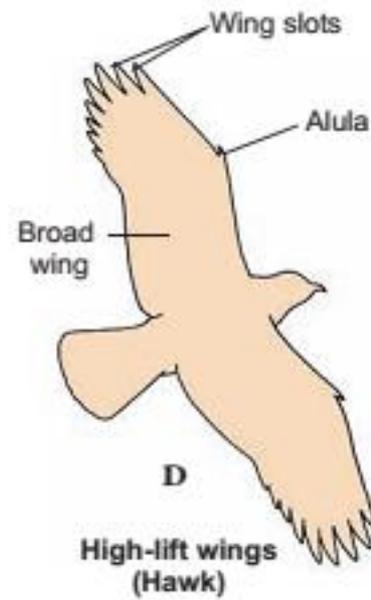
A
Elliptical wings
(Flycatcher)



B
High aspect ratio wings
(Swallow)

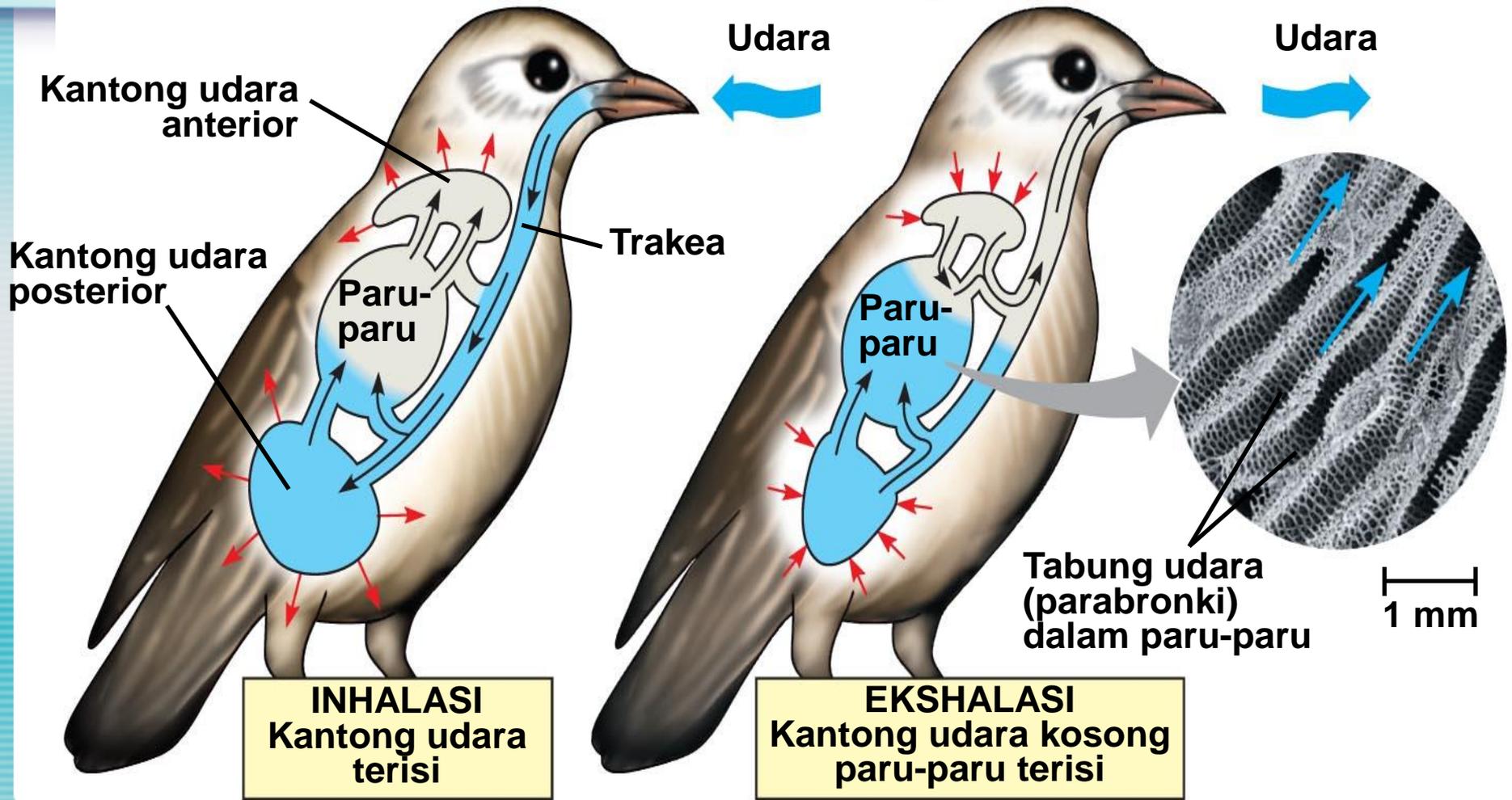


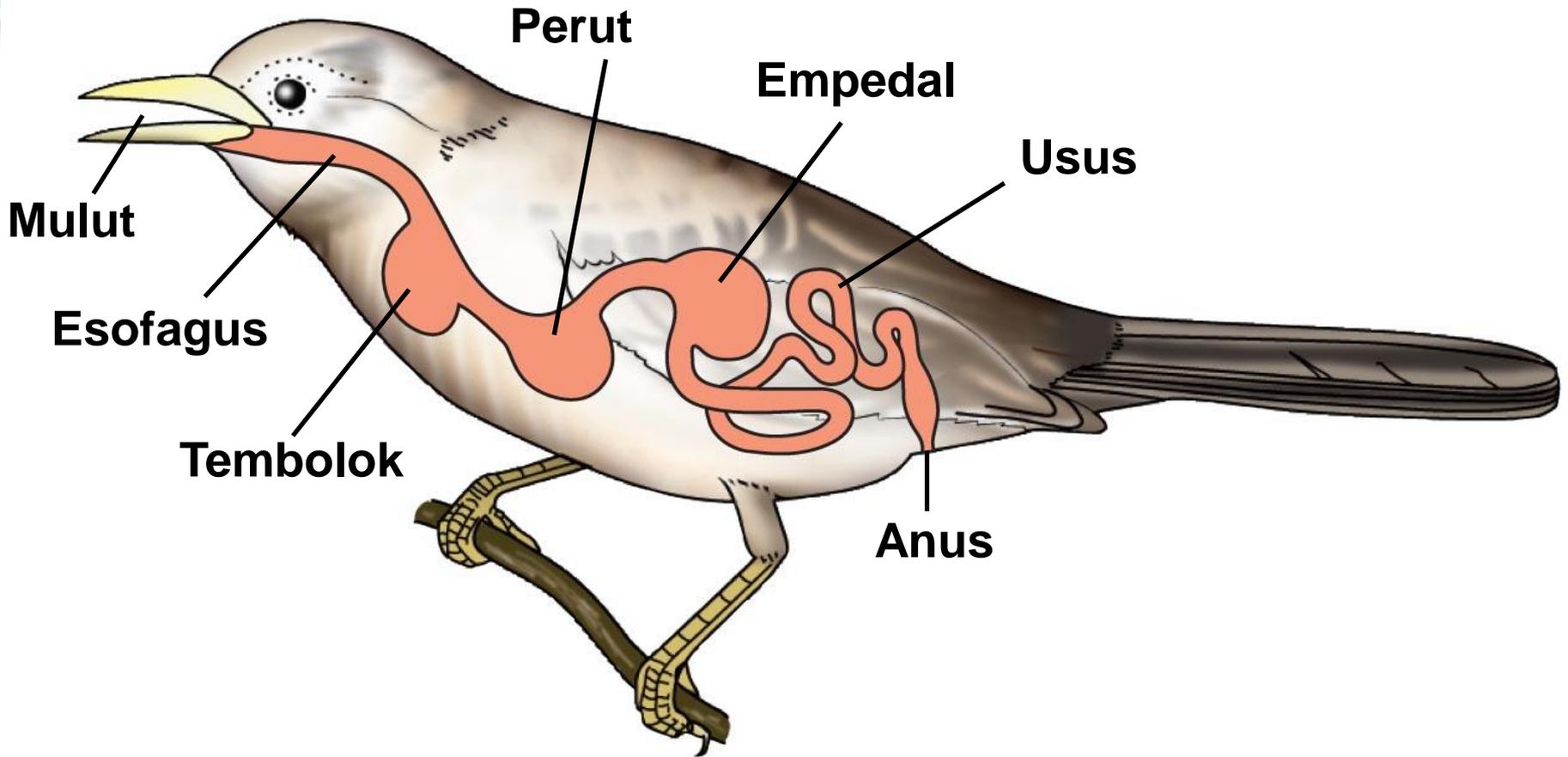
C
Dynamic soaring wings
(Albatross)



D
High-lift wings
(Hawk)

Figure 27.19
Four basic forms of bird wings.





(c) Burung