Circulation

Circulatory systems maintain homeostasis by transporting materials throughout the bodies of animals.

Tunicates have short, tubelike hearts with a simple pump but no true chambers.

Lancelets have a fairly well-developed circulatory system but no specialized heart.

Vertebrates that use gills for respiration have a single-loop circulatory system. In this system, blood travels from the heart to the gills, then to the rest of the body, and then back to the heart in one circuit.

Figure 33-11
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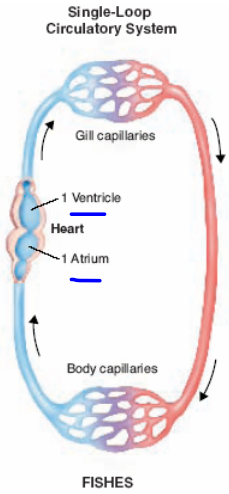
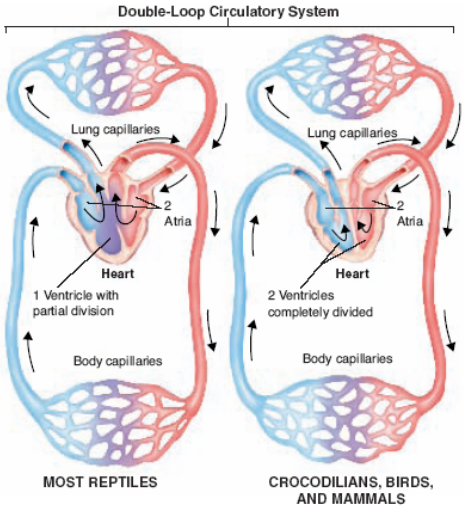


Chambers
atrium
↳ "receiving"
ventricle
↳ "shipping"

Vertebrates that use lungs for respiration have a double-loop circulatory system. The first loop carries blood between the heart and lungs. Oxygen-poor blood from the heart is pumped to the lungs, while oxygen-rich blood from the lungs returns to the heart. The second loop carries blood between the heart and the body. Oxygen-rich blood from the the heart is pumped to the body while oxygen-poor blood from the body returns to the heart.

Figure 33-11
Page 860



During the course of chordate evolution, the heart developed chambers and partitions that help separate oxygen-rich and oxygen-poor blood traveling in the circulatory system.

fish and larval amphibians
-> two chambers: one atrium and one ventricle
-> atrium receives blood from the body
-> ventricle pumps blood to the gills and then on to the rest of the body

most amphibians
-> three chambers: two atria and one ventricle
-> the left-atrium receives oxygen-rich blood from the lungs
-> the right-atrium receives oxygen-poor blood from the body
-> both atria empty into the ventricle (mixing of blood)
-> the ventricle directs most of the oxygen-poor blood to the lungs and the oxygen-rich blood to the rest of the body

Most reptiles have a three-chambered heart, but most have a partial partition in their ventricle. There is less mixing of oxygen-rich and oxygen-poor blood than there is in amphibians.

birds and mammals
-> four chambers: two atria and two ventricles (double pump)
-> one pump moves blood through the lung loop
-> one pump moves blood through the body loop
-> the two loops are completely separate
-> no mixing of oxygen-rich and oxygen-poor blood

Excretion

Excretory systems eliminate nitrogenous wastes (formed from the breakdown of proteins) from the body.

nonvertebrates and fishes -> gills and gill slits

most vertebrates -> kidneys
-> excretory organs composed of small filtering tubes that remove wastes from the blood

Nitrogenous Wastes

ammonia - highly toxic substance that must be quickly eliminated from the body or changed into a less poisonous form

aquatic amphibians and fishes -> excrete ammonia from the gills into the surrounding water through simple diffusion

land amphibians and mammals -> ammonia is changed to urea before being excreted

reptiles and birds -> ammonia is changed to uric acid

Vertebrate kidneys help maintain homeostasis by regulating the amounts of water, salt, and other substances dissolved in body fluids.

Response

Nonvertebrate chordates have a relatively simple nervous system with a mass of nerve cells that form a brain. Vertebrates have a more complex brain with distinct regions, each with a different function.

Vertebrates display a high degree of cephalization.

The vertebrate brain is divided into several parts: cerebrum, cerebellum, medulla oblongata, optic lobes and olfactory bulbs.

fishes ----------> mammals

size and complexity of cerebrum and cerebellum increase

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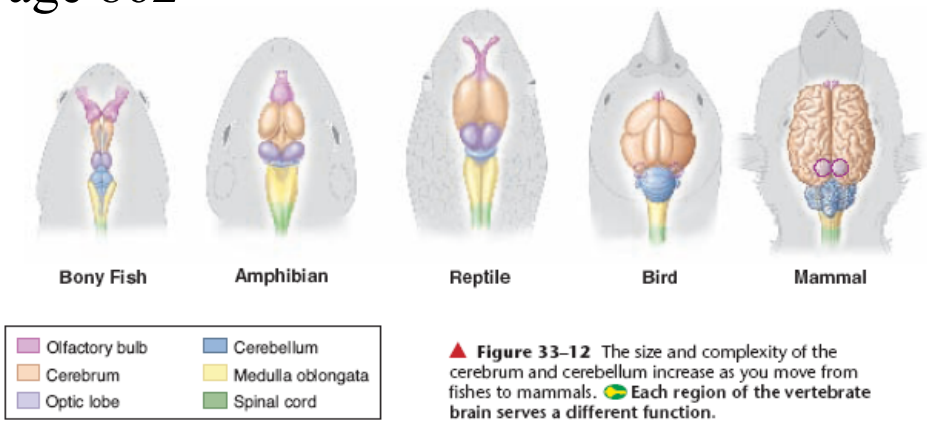


▲ **Figure 33–12** The size and complexity of the cerebrum and cerebellum increase as you move from fishes to mammals. **Each region of the vertebrate brain serves a different function.**

cerebrum - thinking region
- receives, interprets and responds to sensory information
- learning, memory, conscious thought

cerebellum - coordinates movement and controls balance

medulla oblongata - controls the functions of many internal organs

Reproduction

Almost all chordates reproduce sexually.

There is a general trend from external to internal reproduction.

After fertilization, the development of chordates can be oviparous, ovoviviparous or viviparous

oviparous - eggs develop outside the mother's body
- fishes, amphibians and birds

ovoviviparous - eggs develop within the mother's body and embryos receive nutrients from the yolk in the eggs
- sharks

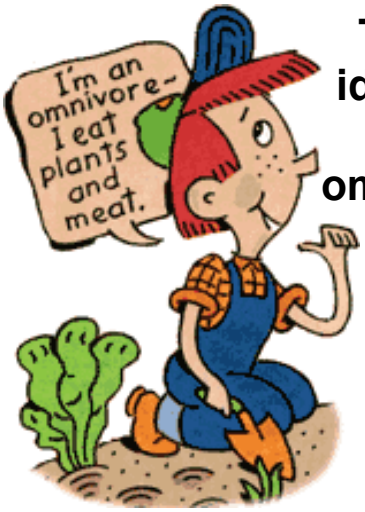
viviparous - embryos obtain nutrients directly from the mother's body

Class Mammalia

Class Mammalia

Typical mammals are warm blooded, air breathing, four legged vertebrates. Their skin is covered with hair in the form of bristles, wool, scales or fur. They have sweat glands, which help with regulating body temperature.

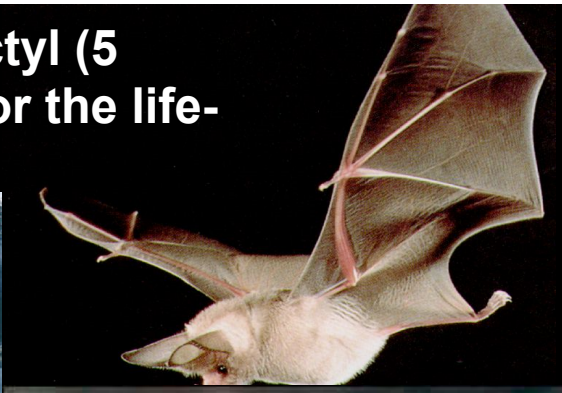
Mammals have fleshy lips, a diaphragm, 4 chambered heart, middle ear (for balance) and a well-developed brain. All except monotremes are viviparous (bear live young).

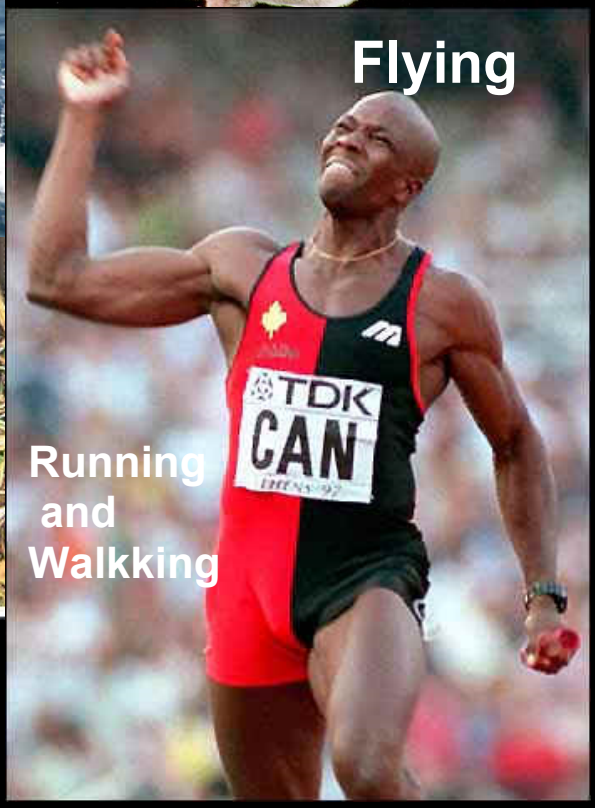


Teeth are used to identify whether an organism is an omnivore, carnivore, insectivore or herbivore.


Mammary glands found in adult females secrete milk to nourish young.

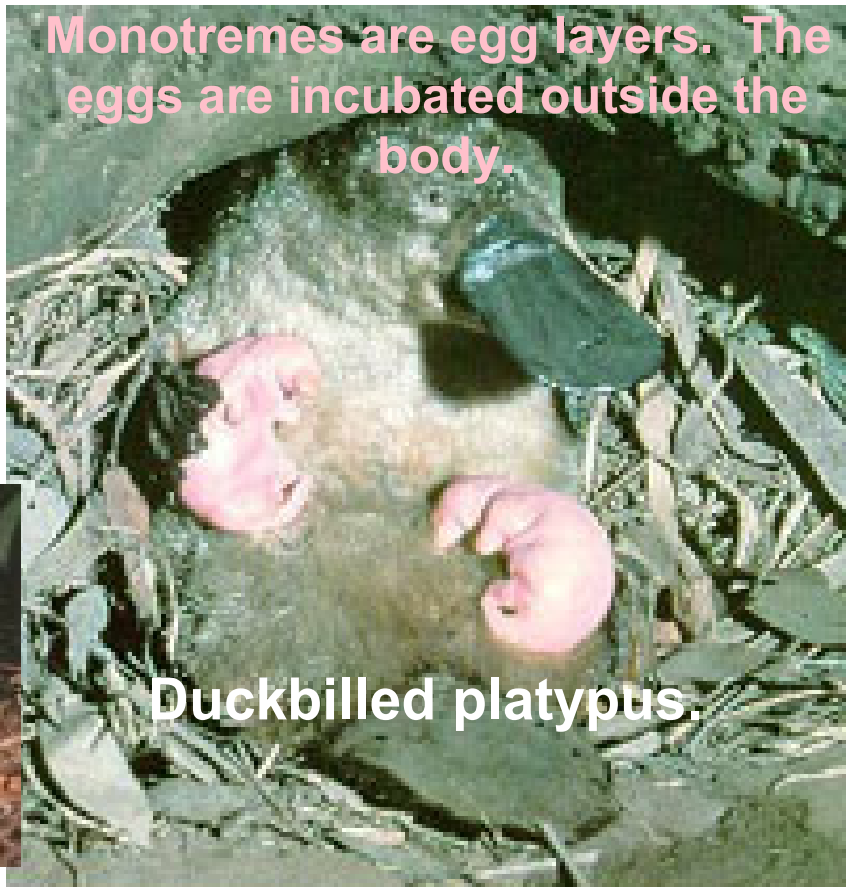
Limbs are usually pentadactyl (5 toes). Limbs are adapted for the life-style of the mammal.

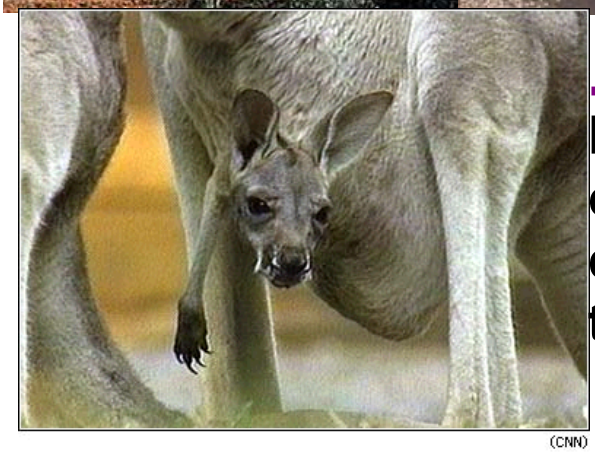




Monotremes


Anteaters


Monotremes are egg layers. The eggs are incubated outside the body.
Duckbilled platypus.



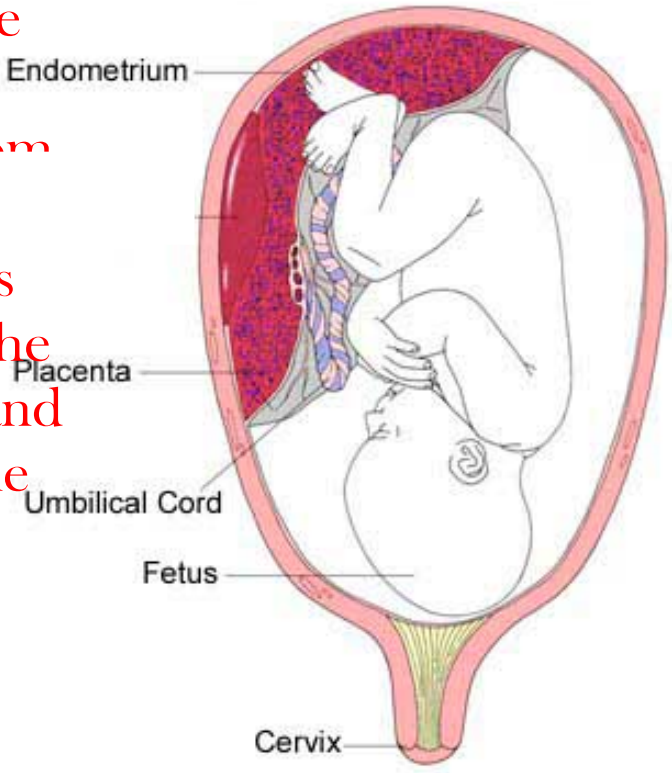
(CNN)

Marsupials

Marsupials are born in poor conditions and undergo development in a pouch on the ventral side.

In placental animals, the placenta allows the exchange of materials from mother and embryo. Umbilical cord contains veins and arteries. It is the lifeline between mother and embryo and connects the fetus and placenta.

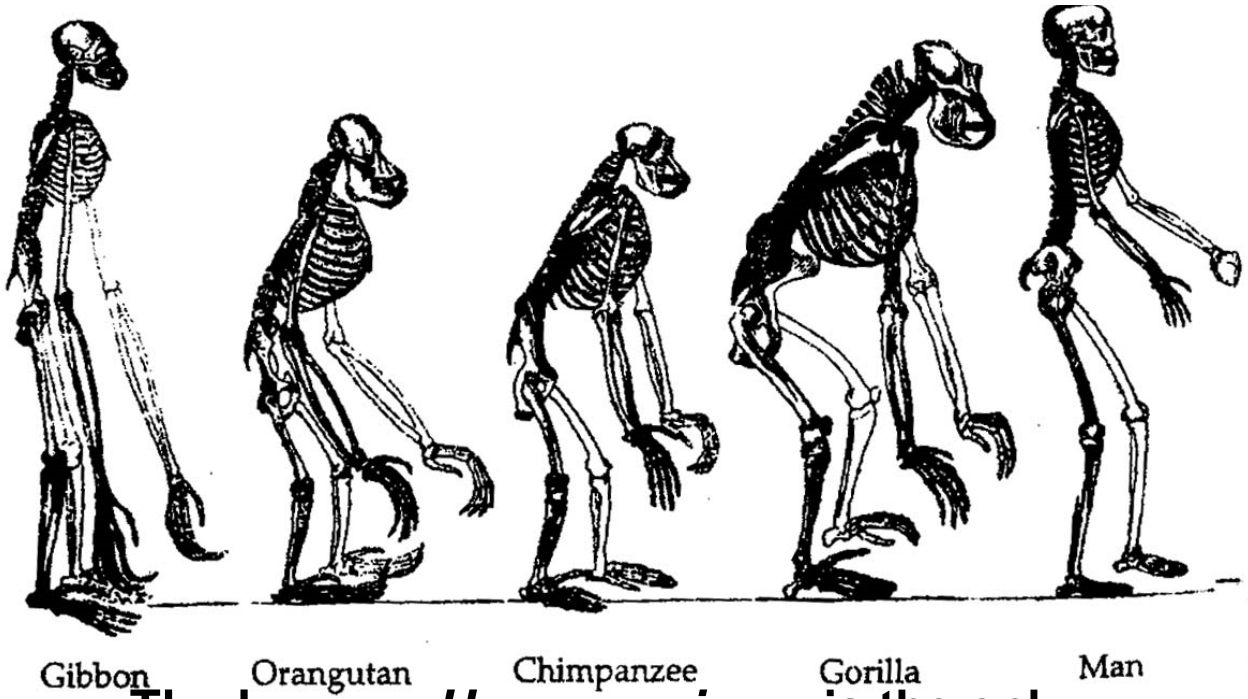
(20days)



Maternal care varies with mammals. Some are dependent on their mothers for long periods of time while others are less dependent.

Adults also protect and teach the young. The <u>gestation</u> period is the length of time an embryo is carried by the mother.

Most primates are tree dwellers. Lemurs, apes, monkeys and humans.



The human, *Homo sapiens,* is the only living hominid group. They have the ability to make and use tools.

Textbook questions

Read Chapter 32 Mammals

Pg. 827 # 1-5

Pg. 832 # 1-6

Pg. 841 # 1-5