



Anatomy and Physiology- Unit C



Essential Standard 5.00

Discuss the role of major systems of small animals.



Objective 5.01

- Discuss the role of major body systems of small animals.

Basic Anatomy Terminology

- Cheek- fleshy side of the face
- Dewlap- loose skin under the chin (female rabbits)
- Elbow- upper joint of the front leg
- Flank- fleshy part of the side between ribs and rump (croup)
- Foot pad- part that the animal walks on
- Guard hair- longer coarse hair above the shorter under fur (protection from rain and cold)

Basic Anatomy Terminology

- Hock- tarsal joint halfway up the hind limb
- Muzzle- projecting jaw (nose and mouth)
- Nose pad
 - Tip of the nose
 - Used for investigating food and unfamiliar objects
 - Called the nose leather in cats



Basic Anatomy Terminology

- Rump- upper rounded part of the hindquarter (a.k.a. croup)
- Shoulder- above the elbow of the fore leg
- Stifle- joint above the hock
- Thigh- area between the rump and hock
- Whiskers- long hairs growing near the mouth

Basic Anatomy Terminology- Birds

- Crown
 - top of the head
- Ear covert
 - feathers covering the ears
- Nape
 - back of the neck
- Orbital ring
 - ring around the eye

Basic Anatomy Terminology- Fish, Amphibians, and Reptiles

■ Brille

- transparent layer covering eyes
- Eyelid for snakes

■ Fins

- Web of skin supported with bone or cartilage rods
- Enables fish to move through water

Basic Anatomy Terminology- Fish, Amphibians, and Reptiles

■ Gills

- Major organ of the respiratory system
- Breath without lungs

■ Scales

- Modified portion of the epidermal layer
- Provides protection
- Fish and reptiles

■ Scutes

- Epidermal scales found on turtles



Skeletal System

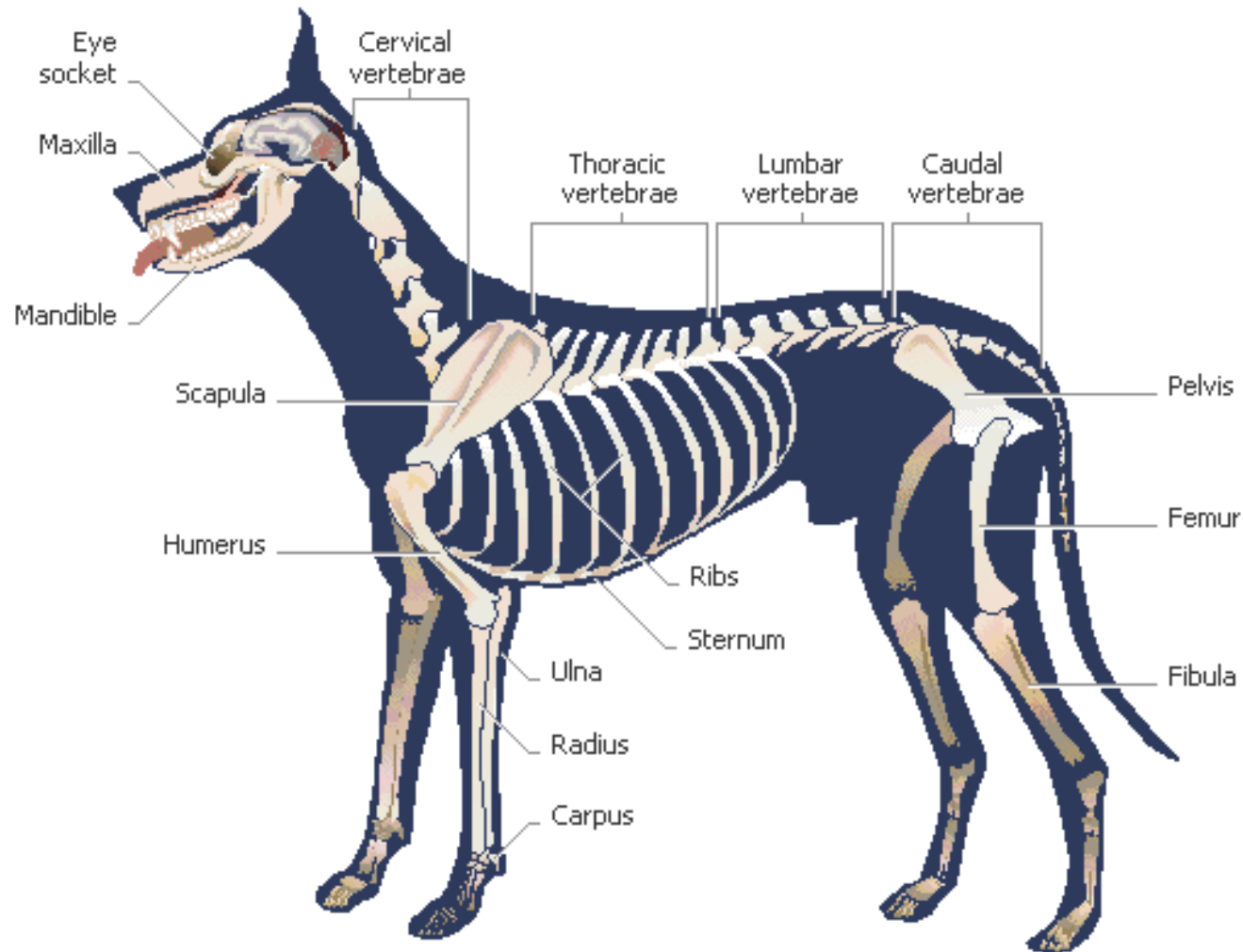
- Purpose-to protect vital body organs and give form or shape to the body
 - Skull protects brain
 - Ribs protect lungs and internal organs
 - Spinal column or backbone protects the spinal cord and provides shape to the animal.



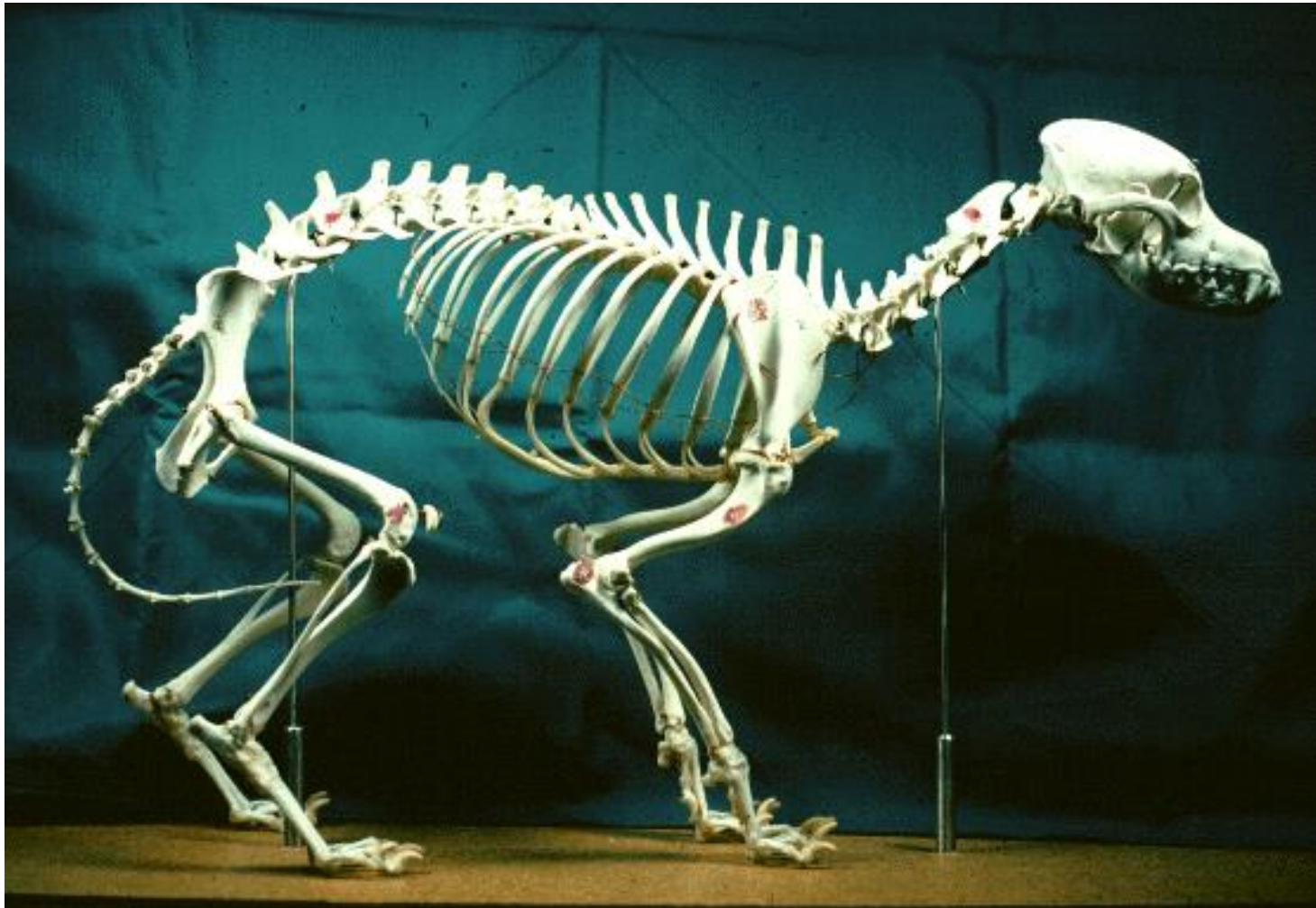
Skeletal System

- Axial skeleton
 - Vertebral column
 - Ribs
 - Sternum
 - skull

Dog Skeleton



Dog Skeleton



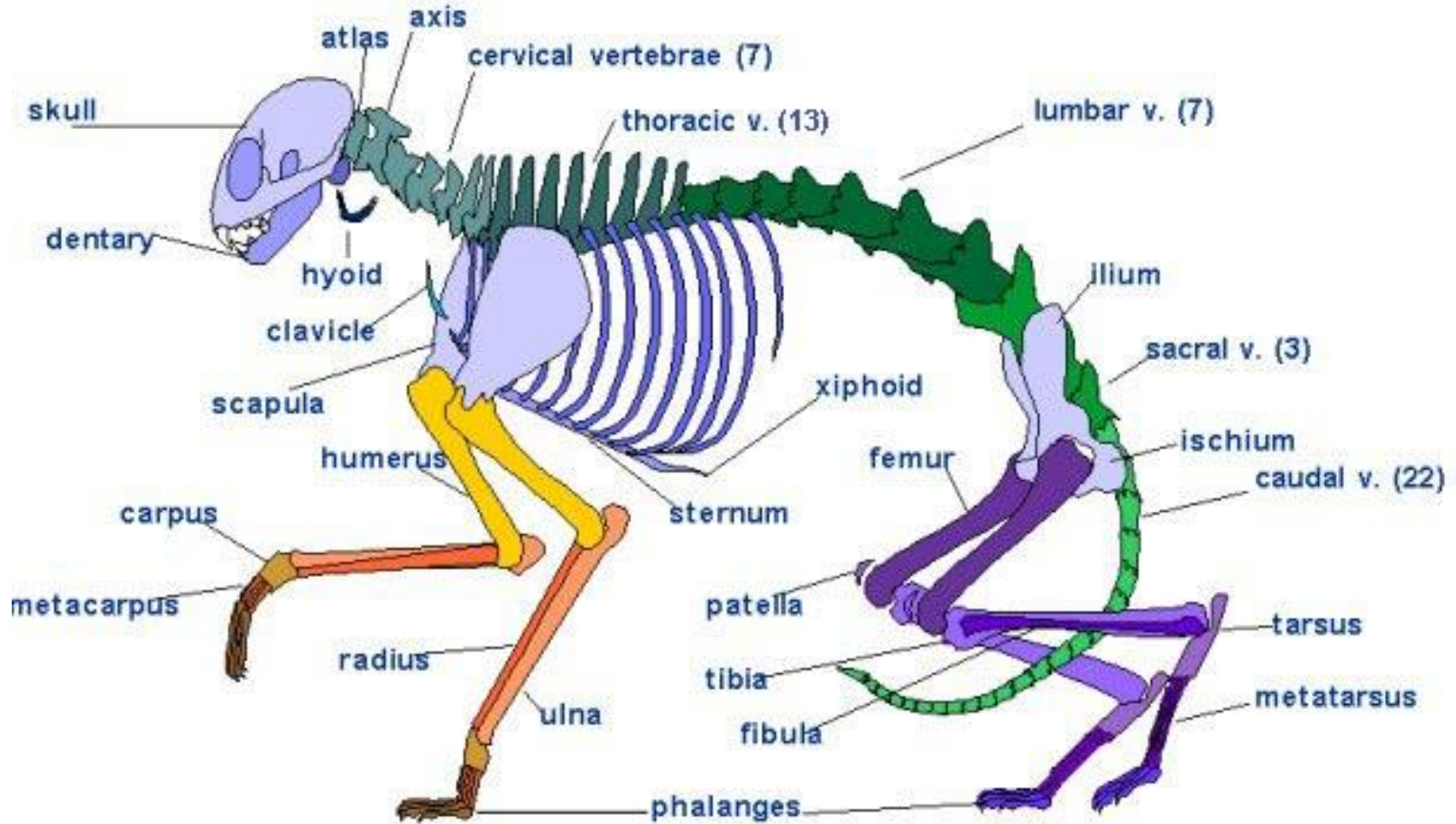
<http://www.ndsu.nodak.edu/instruct/tcolvill/135/images/S23.GIF>

Skeletal System

■ Pectoral limb

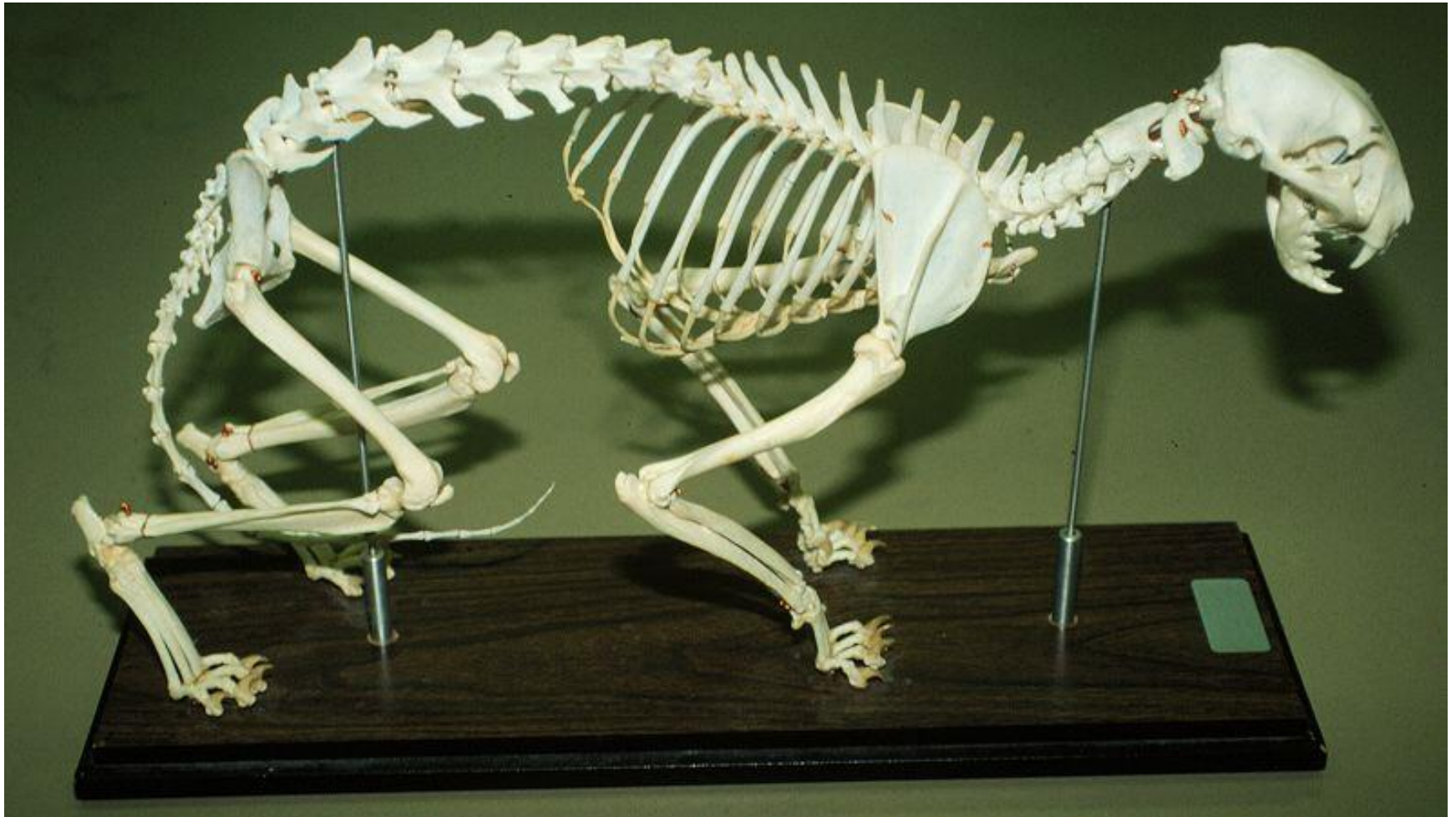
□ front limbs

- shoulders, legs and feet
- scapula (shoulder blade)
- humerus (arm)
- radius and ulna (forearm)
- carpals, metacarpals and phalanges (toes)



Cat Skeleton

<http://www.uoguelph.ca/~mammals/CatSkeleton.jpg>



<http://www.biology.ualberta.ca/courses.hp/zoo.225/Catskeleton.jpeg>

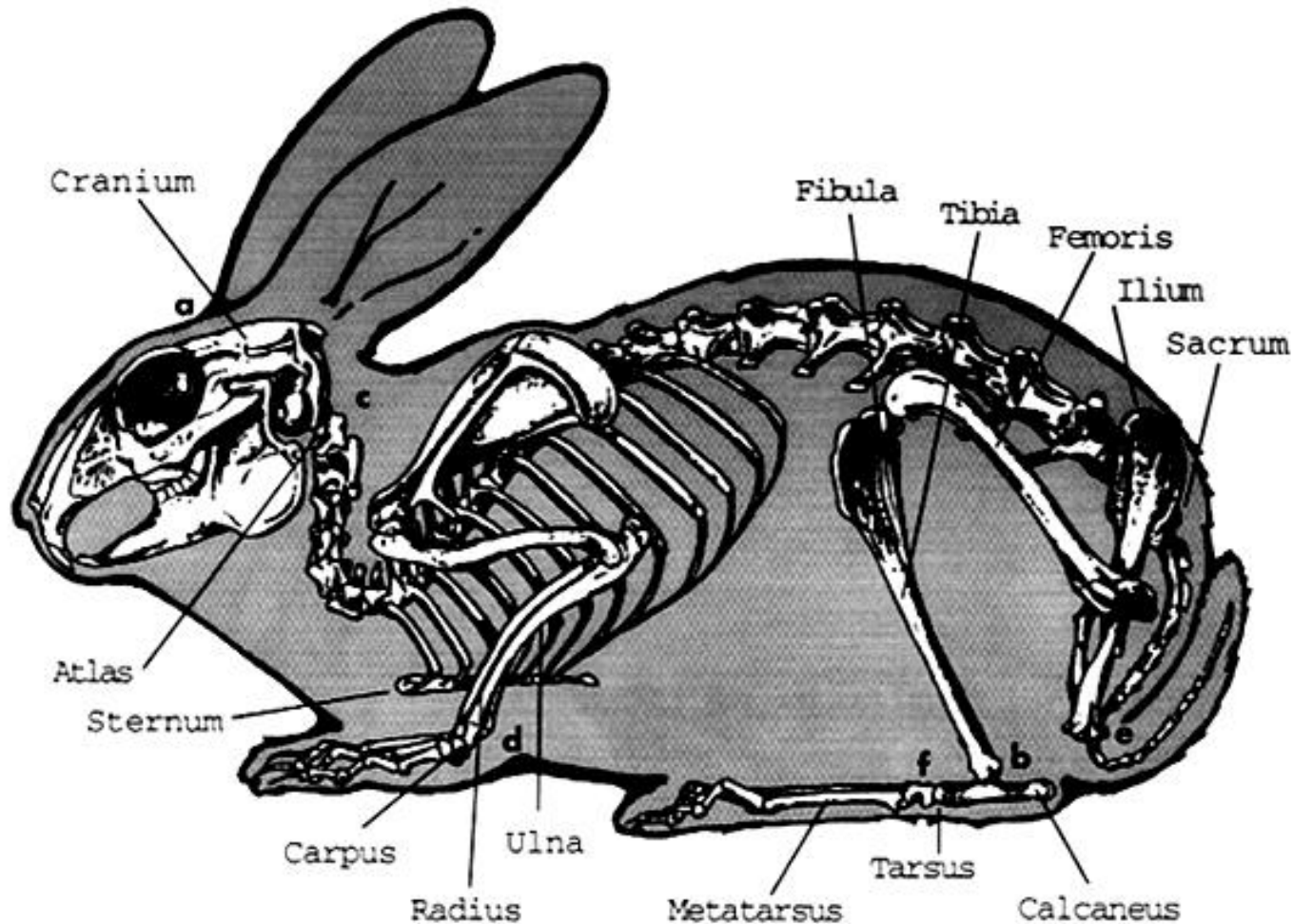
Skeletal System

■ Pelvic limb

□ rear legs and pelvic bones

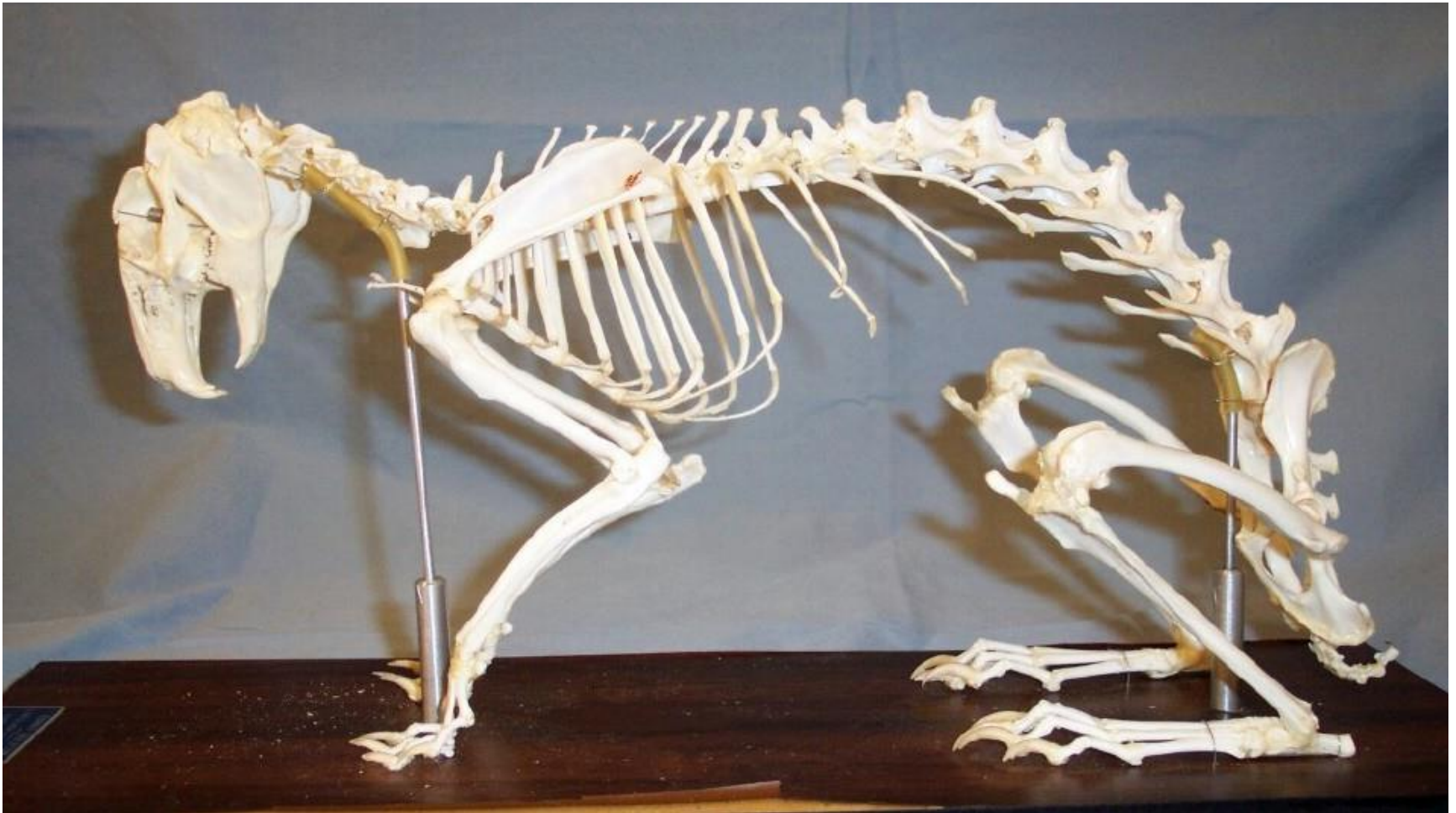
- hooks
- pin bones
- femur (upper leg bone)
- tibia and fibula (lower leg bones)
- Tarsals (hocks)
- Metatarsals (feet)
- Phalanges (toes)

Rabbit Skeleton



<http://www.ext.vt.edu/pubs/foods/458-878/rabbit.gif>

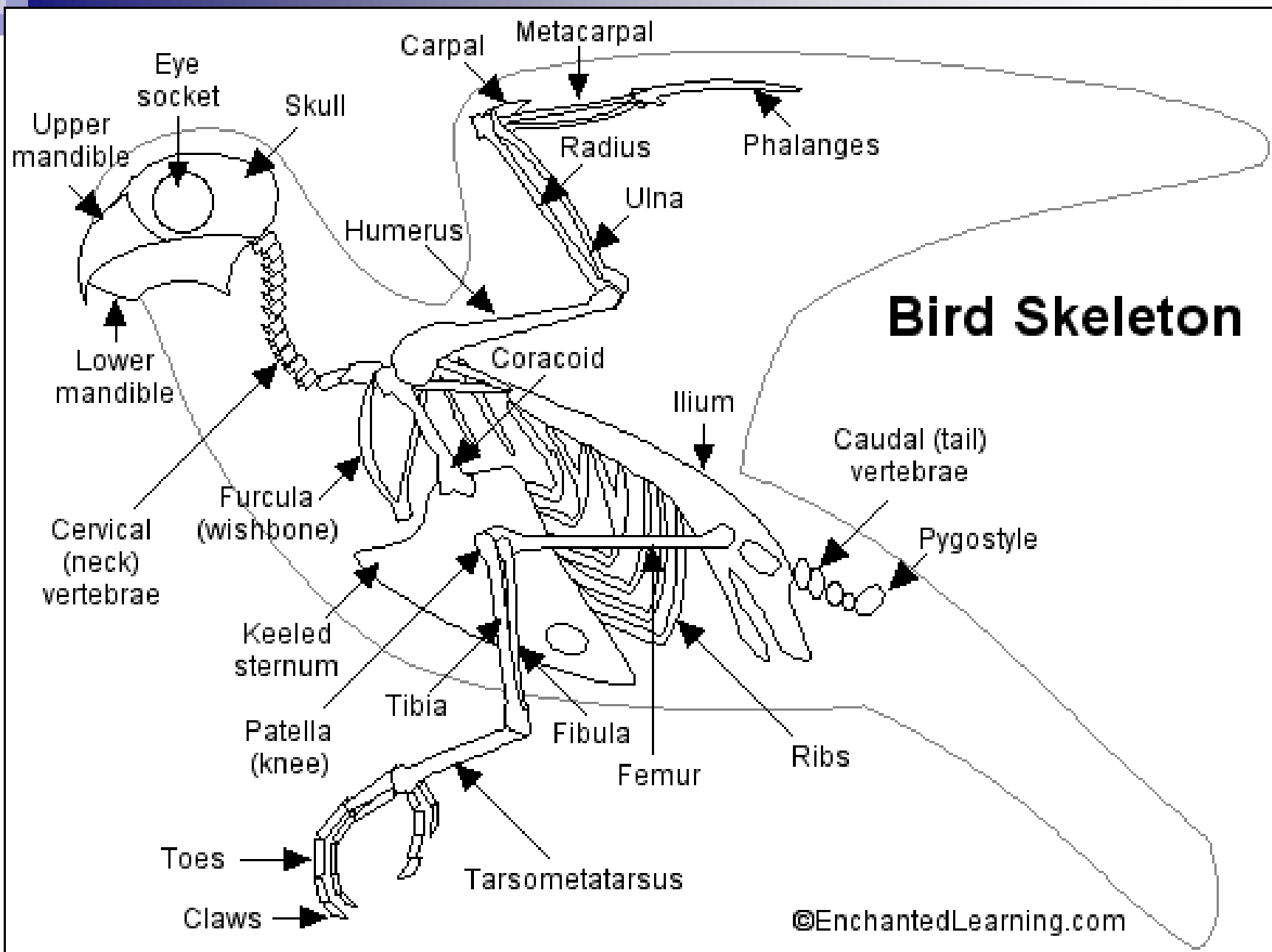
Rabbit Skeleton



http://www.avte.net/AVTE2003/contents/anatomy/lab%20animal/rabbit_skeleton.jpg

Skeletal System-Birds

- Have some unique bones unlike mammals
 - Most have a skull bone that elongates toward the front of the head
 - Some have a skull with an upper beak fused to it while other birds have hinges on both upper and lower mandibles giving it more flexibility





Internal Anatomy

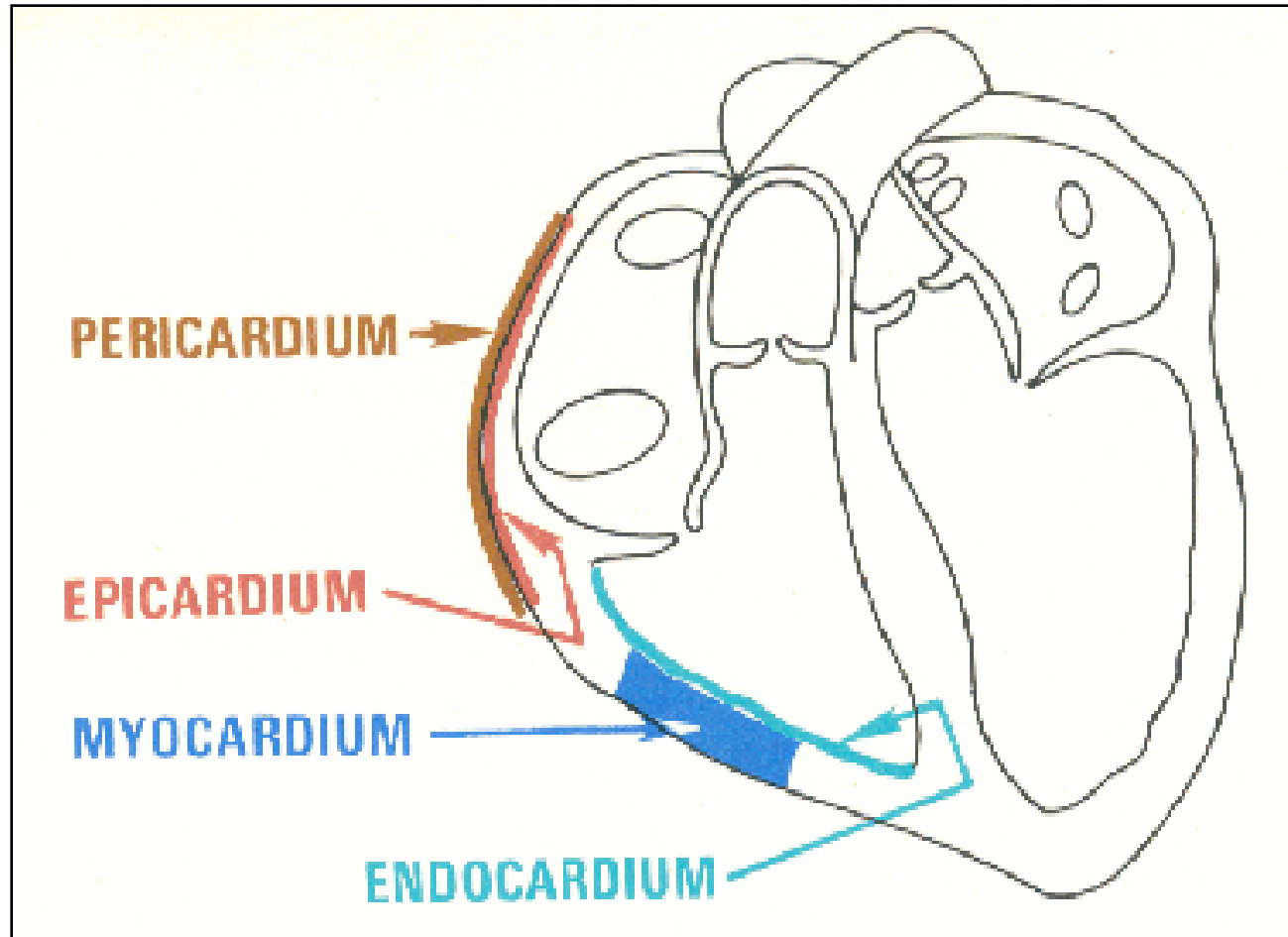
■ Heart

- major organ in the circulatory system
- 3 muscle layers

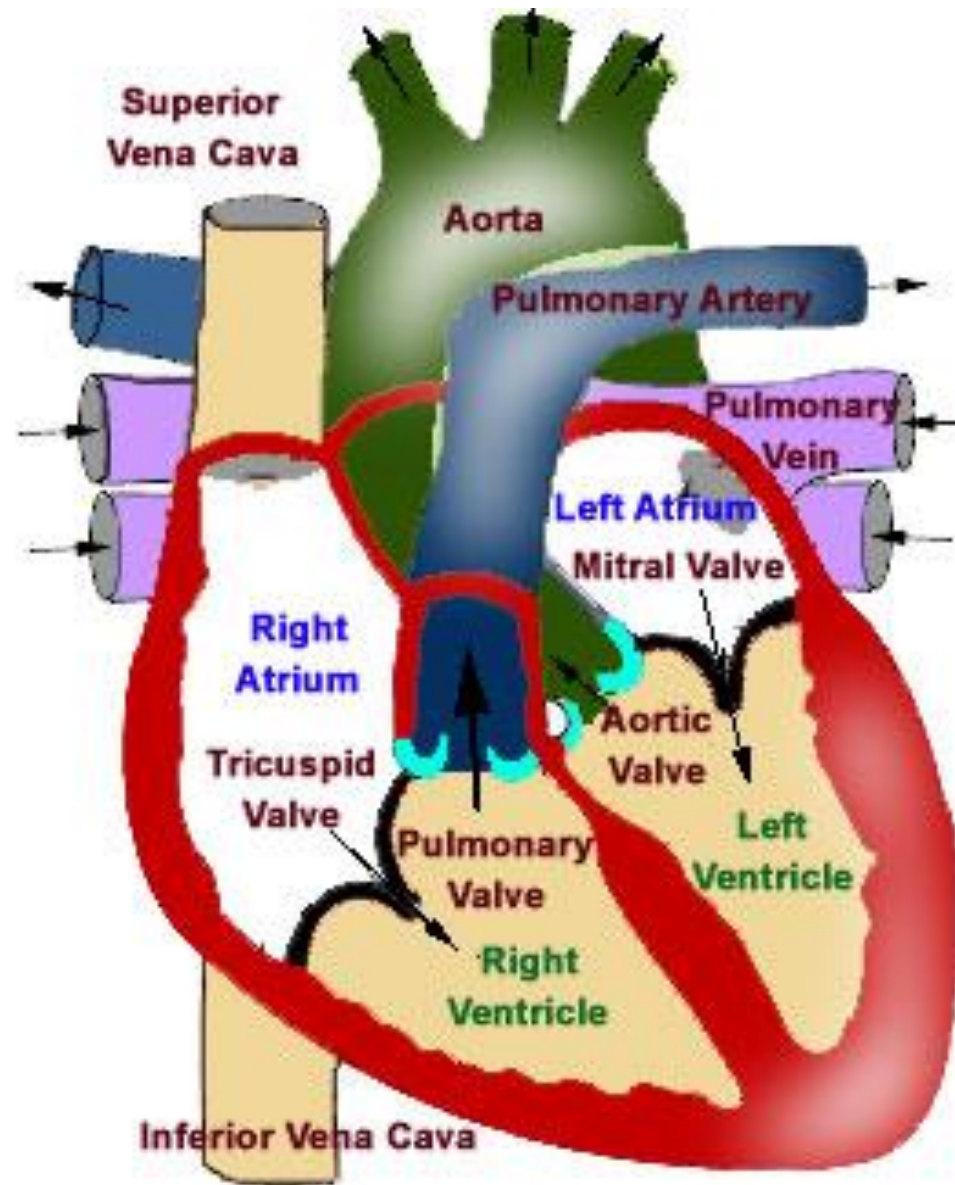
Circulatory System

- Myocardium
 - second layer muscle that makes up the thickness of the heart
- Endocardium
 - thin layer inside myocardium
- Epicardium
 - thin cover over the myocardium
- Other parts of the circulatory system are the arteries, capillaries, veins and blood

Layers of the Heart



Heart





Circulatory System- Functions

- **Transports**

- nutrients

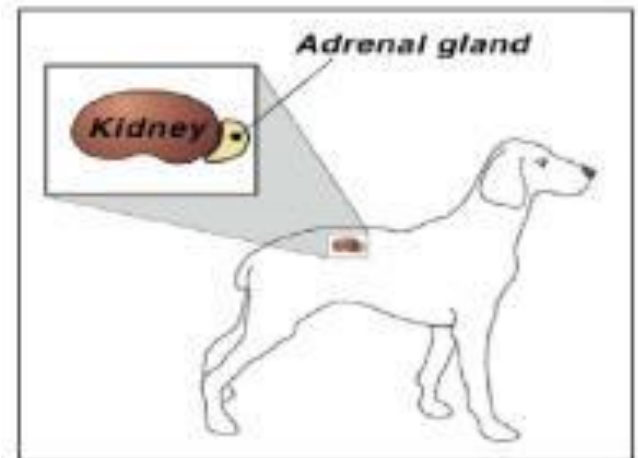
- metabolic waste

- oxygen

- **Protects against microbes and injury**

Kidneys and Bladder

- Part of the excretory system
 - rids the body of waste
 - maintain chemical composition
 - volume of blood
 - regulates tissue fluid





Stomach and Intestines

- Major part of digestive system
 - breaks food down into smaller pieces to be used by the body
- Nutrients are gleaned from these food materials



Lungs

- Part of the respiratory system
 - oxygen is taken in by the nose, passed on to the lungs and then goes into the blood



Nervous System

- Brains, spinal cord, and nerves
 - Coordinator of all body activities
 - Regulates other systems
 - Controls memory and learning



Reproductive system

- Ovaries and testes

- Egg

- Sperm

- Help produce new individuals of the same species



Muscular System

- Muscles

- Movement
- Posture
- Support
- Produces heat



Digestive System

- Single-stomached
- Monogastric
 - includes all of the small animals
 - Cats
 - Dogs
 - Rabbits
 - Birds



Non-Ruminant

- Rabbits and birds are classified as non-ruminants
 - Slightly different than monogastrics though



Rabbits

- Similar to horses
- Non-ruminant herbivores
 - Consumes large amounts of roughage
 - Large cecum and colon between the small and large intestines
 - contains bacteria

Rabbit Digestive System



Rabbits

- Rabbits eat undigested feces
 - Coprophagy
 - Usually occurs late night or early morning
 - Makes use of undigested material so they can make full use of bacteria in cecum



Birds

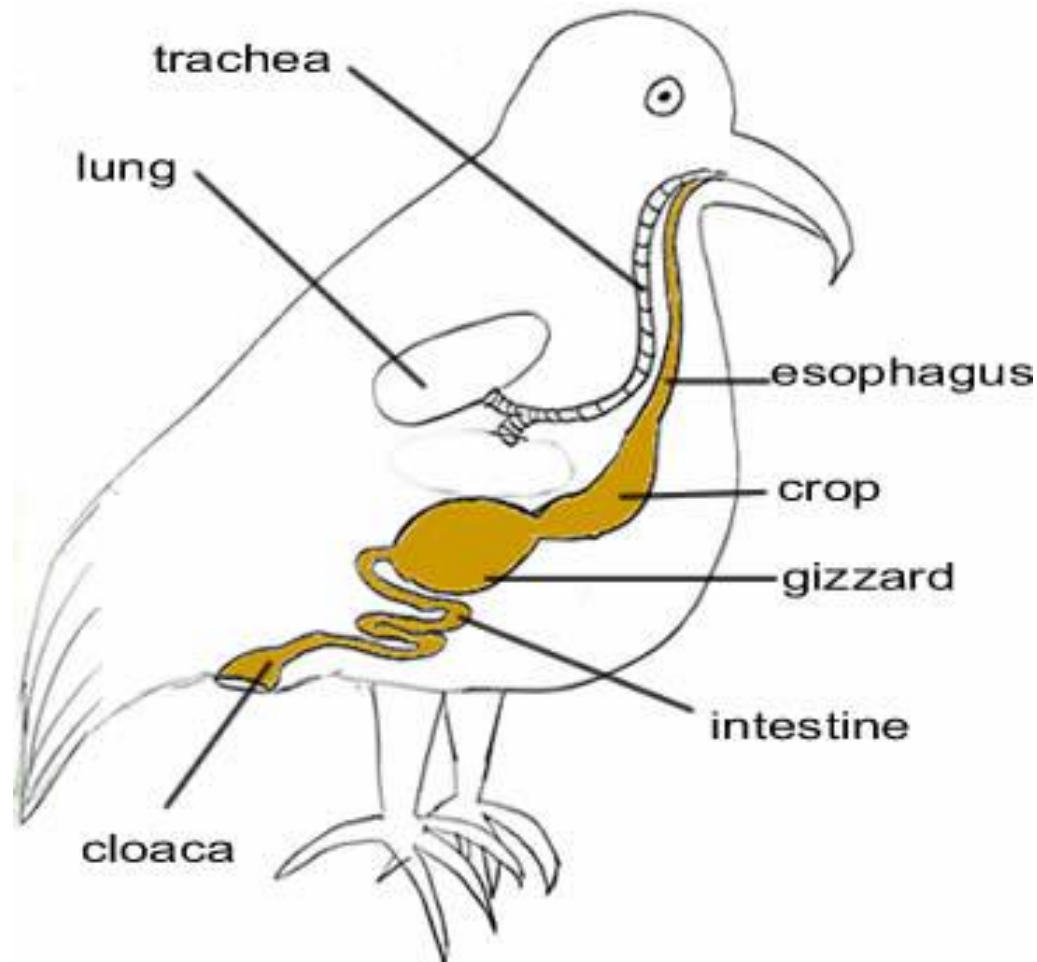
- Lack teeth

- Saliva is added to aid in swallowing
 - Very little breakdown in the mouth

- Gizzard

- Largest digestive organ
- Grinds and crushes

Digestive System- Bird



http://www.biologycorner.com/resources/bird_anatomy.jpg



Digestive Process of Non-Ruminants

- Food is broken down in mouth (except birds)
- Passes to the stomach
- Small Intestine
 - Primary site of absorption
- Large Intestine
 - Absorption of Water
 - Addition of mucus



Digestive Process - birds

- Food is broken down in the mouth (except birds), stomach (gizzard), and then passed into the small intestine.
 - Primary site for digestion
 - Absorption of carbohydrates, fats, and proteins.



Digestive Process - birds

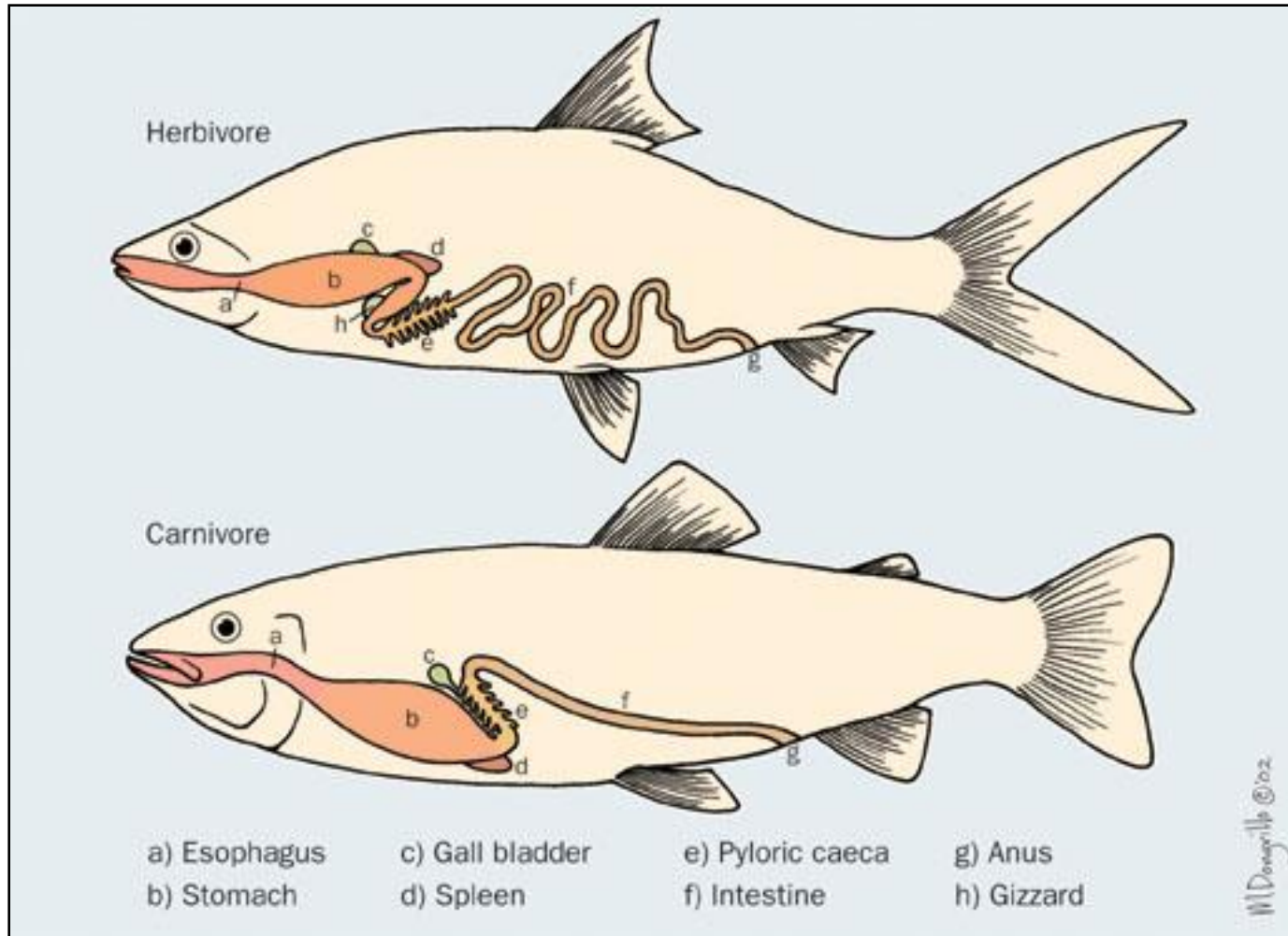
- Undigested food passes from the small intestine into the large intestine
 - Absorption of water
 - Addition of mucus to aid in waste passage



Fish Digestive System

- Systems vary
 - Type of feed determines teeth
- Some fish swallow their prey whole while others chew it up

Fish digestive system





Reproduction in Small Animals

- Sexual Reproduction is the union of egg and sperm to produce a new animal.
- Natural Insemination - process of male depositing semen into female reproductive tract
- Two parents required:
 - Male furnishes sperm
 - Female supplies egg or ovum



Sexual Terminology

- Conception

- Creation of new life by fertilization
 - Union of egg and sperm

- Estrus

- Heat period
- Female is receptive to breeding
- Stand for mating

Estrus- Stand for mating



http://www.clas.ufl.edu/jur/199912/images/balaguer_4.jpg



Sexual Terminology

■ Gestation

- Period of pregnancy
- Begins at conception ends at parturition

■ Ovulation

- Release of egg

■ Parturition

- Process of giving birth



Sexual Terminology

- Fertilization – union of egg and sperm
- Pregnant – Stage of baby development in reproductive tract

Female Reproductive Anatomy

■ Ovary

- Primary reproductive organ
- Produces the female gamete (egg)

■ Gamete

- Sex cell that unites with other sex cells

■ Embryo

- Developing young
- Mammals
 - Enters uterus after 3-5 days



Female Reproductive Anatomy

- Uterus

- Place of embryo growth and development

- Cervix

- Part of uterus that contains rings

- Cervical mucus

- Seals uterus during pregnancy



Female Reproductive Anatomy

- Vagina

- Reproductive passageway
- Urine excretion

- Vulva

- External opening of reproductive tract



Male Reproductive Anatomy

■ Testicle

- Primary organ
- Produces male gametes
- Externally held in scrotum
 - Controls temperature

■ Sheath

- Fold of skin
- Protective covering

Gestation Period

Species	Period (days)
Cats	51-65 (7-9 weeks)
Dogs	56-70 (9-10 weeks)
Rabbits	30-32 (4-4.5 weeks)
Hamsters	16
Gerbils	24-26
Rats	21-24
Mice	21-24
Guinea Pig	56-74
Ferrets	42



Gestation

- Time from conception to parturition (birth)
 - Varies for each species
- General Characteristics
 - Increase size of breast and abdomen, weight, and appetite
 - Restlessness
 - End of gestation



End of Gestation

- Pocket pets and rabbits
 - Nesting box should be provided
 - Wood shavings
 - Straw
 - Paper
- Dogs and cats
 - Birthing box
 - One to three weeks prior
 - Helps them to get comfortable with the setting