

Basic Review of Anatomy and Physiology

1. Metric system review

length, mass and capacity are measured using the base 10

milli = 1/1000
centi = 1/100
kilo = 1000

basic unit of length = meter
basic unit of weight = gram
basic unit of volume = liter

British	Metric
WEIGHT (dry)	
1 ounce (oz)	28.4 grams (g)
2.2 pounds (lb)	1 kilogram (kg)
1 pound (lb)	454 grams (g)
VOLUME (liquid)	
1 ounce (fluid) (oz)	30 milliliters (ml)
1 quart (qt)	946 milliliters (ml)
1 quart (qt)	0.946 liters (l)
DISTANCE	
1 inch (in)	2.54 centimeters (cm)
1 inch (in)	25.4 millimeters (mm)
39.3 inches (in)	1 meter (m)

temperature is measured in Centigrade or Celsius

$$C = \frac{5}{9} F - 32$$

freezing point of water: 0 C or 32 F

boiling point of water: 100 C or 212 F

2. Basic Organization of Living Tissue

A. the basic unit of organization is the cell

B. living tissues are organized at 3 levels:

- i) cellular level
- ii) tissue level (connective, muscle, nervous & epithelial tissue)
- iii) organ level--organs are groups of several types of tissues joined together to achieve a specific function (heart, kidney, etc.)

C. Taxonomy is the science of classification

Kingdom:	Animals
Phylum:	Chordata
Subphylum:	Vertebrata
Class:	Mammalia
Order:	Carnivora
Family:	Canidae
Genus:	Canis
Species:	familiaris

3. Medical terminology

- A. 3 basic parts of a medical term: prefix, root, suffix
- B. Table of scientific prefixes, roots and suffixes

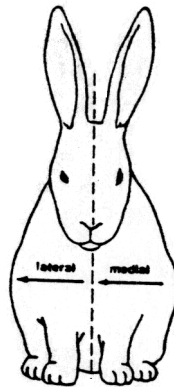
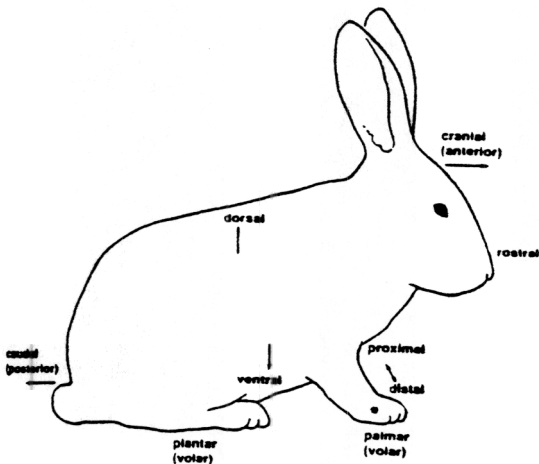
TABLE 3. Selected scientific prefixes, roots, and suffixes and their meanings.

Prefix	Root	Suffix
a – without	cardio – heart	algia – pain
ante – before	cyto – cell	cide – killing
anti – against	dermo – skin	ectomy – surgical removal
bi – two	entero – intestine	itis – inflammation
con – together	gastro – stomach	logy – study of
ecto – outside	hemo – blood	lysis – breakdown
endo – inside	hepato – liver	oma – tumor
hemi – half	lacto – milk	osis – disease condition
hyper – greater than	neuro – nerve	tomy – cut into
inter – between	osteo – bone	
intra – within	oto – ear	
iso – equal	patho – disease	
macro – large	podo – foot	
neo – new	tricho – hair	
pseudo – false		

C. examples:

hepatoma-tumor of the liver
 gastrectomy-surgical removal of the stomach
 gastrotomy-to make a cut or incision in the stomach

4. Anatomical Terms for Direction and Position



Term	Definition
anterior/posterior	toward the front/ toward the rear
cranial (cephalic)/caudal	toward the head/ toward the tail
dorsal/ventral	toward the back/ toward the abdomen
lateral/medial	away from/toward the midline of the body or part of the body
proximal/distal	closer to/further from a specific point on the body
superior/inferior	above/below
sagittal	in an anterior-posterior direction, usually separating the right from the left side of the body
radial and ulnar	relating to the radius and ulna, which are bones of the forelimbs
tibial and fibular	relating to the tibia and fibula, which are bones of the hindlimbs
palmar	relating to the palm of the forelimb
plantar	relating to the sole of the hindlimb
	concerning the mouth

5. Skeletal System

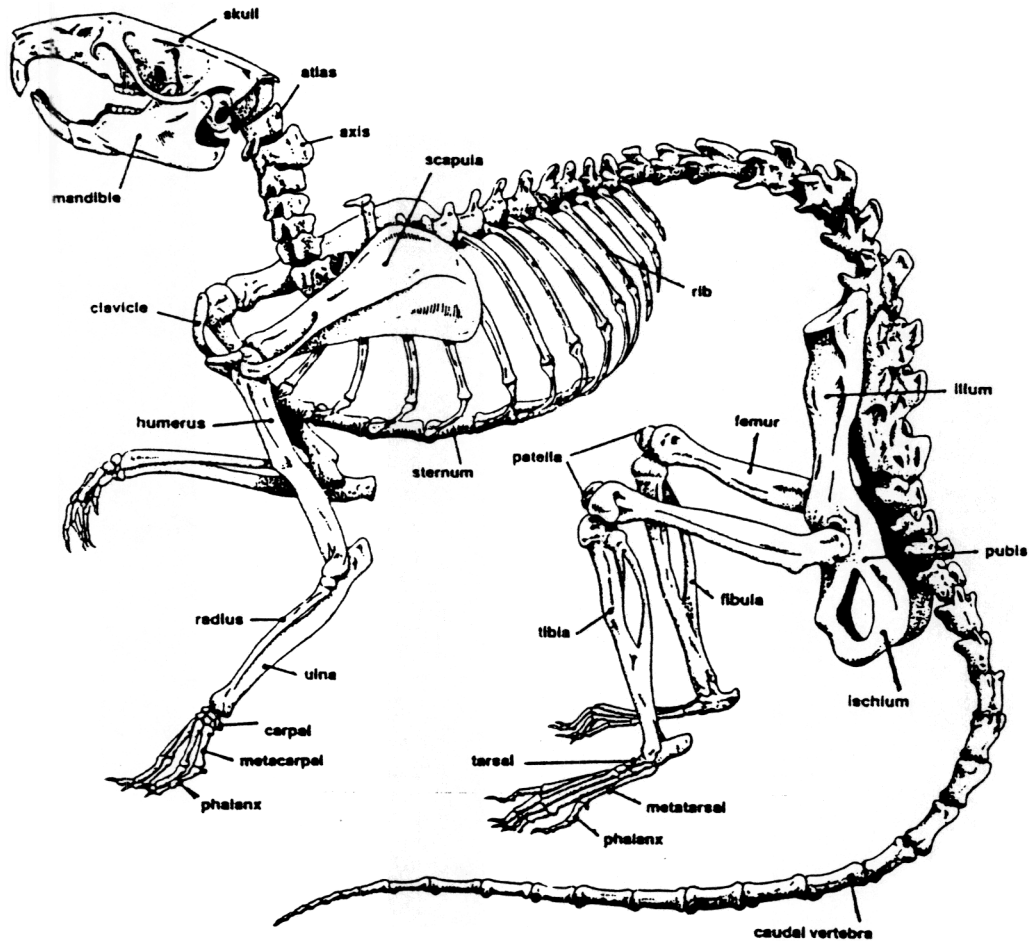
function: support and protect organs, allow movement, mineral storage, production of bone marrow

components: bone & cartilage

basic divisions:

axial--skull, vertebrae, ribs & sternum

appendicular--limbs



Terms that describe joint movement:

- a. rotation--pivoting movement (turn head from side to side)
- b. flexion--bending or folding a joint
- c. extension--opening the joint
- d. abduction--movement away from the midline of the body
- e. adduction--movement toward the midline of the body

6. Integumentary System

function: protection from the environment

components: skin, feathers, scales, hooves, horns

7. Muscular System

function: movement and protection

components: muscle

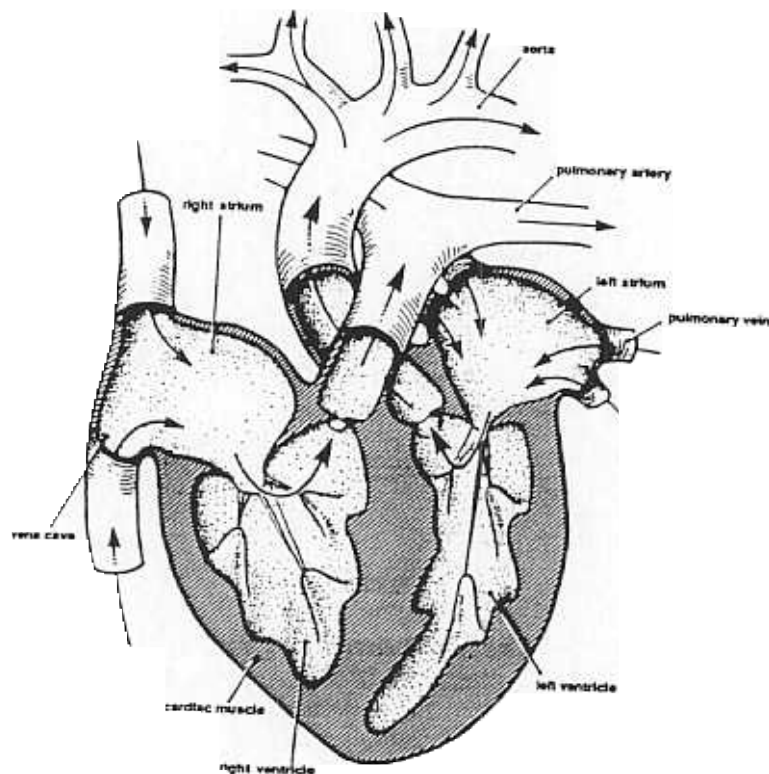
- a) smooth (involuntary)--gut, blood vessels
- b) skeletal (voluntary)--limbs
- c) cardiac--heart

8. Circulatory System

function: supply oxygen, remove wastes, transport hormones, fight infection

components: heart, blood vessels, blood

arteries--carry blood away from the heart
veins--carry blood toward the heart
capillaries--connect arteries and veins



9. Respiratory System

function: gas exchange, temperature control, voice production

components:

nares--nostrils

pharynx

larynx--voice box

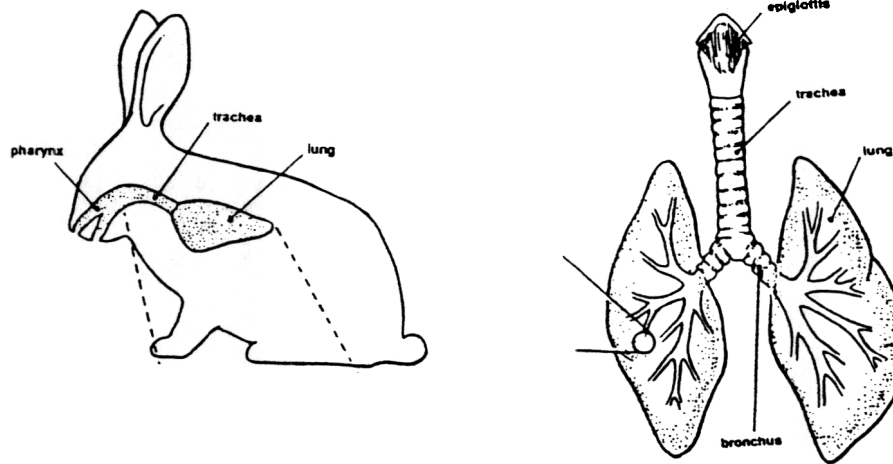
trachea--windpipe

bronchi

bronchioles

alveoli--air sacs; site of gas exchange

diaphragm--muscle that separates thoracic and abdominal cavities



species variations: gills in fish, skin in amphibians, air sacs of birds

10. Digestive System

function: assimilation, ingestion, digestion, absorption and excretion of food

components:

mouth (teeth, tongue, salivary glands)

pharynx

esophagus

stomach

small intestine--duodenum, jejunum, ileum

cecum

large intestine--colon and rectum

anus

associated organs:

liver--produces bile, largest organ in the body
gall bladder--absent in rat, horse, fish
pancreas--produces digestive enzymes & insulin

basic feeding strategies:

- a. carnivore--meat eater
- b. herbivore--plant eater
- c. omnivore--eats both plants and meat

dogs & cats are carnivores
pigs, rats, mice and humans are omnivores
cattle, sheep, horses, rabbits, and guinea pigs are herbivores

Urinary/Excretory System

function: removal of wastes from the body, controls composition and volume of body fluids

components: kidneys, ureters, urinary bladder, urethra

Reproductive System

function: propagation of the species

components:

female--ovaries, oviducts, uterus, cervix, vagina, vulva

male--testis, epididymis, ductus deferens, urethra, prostate, penis

reproduction is under hormonal control by the pituitary gland and the gonads (ovary/testis)

Nervous System

function: monitoring of the external and internal environments, evaluates information and directs responses

components: brain, spinal cord, nerves

major divisions:

central nervous system (CNS)--brain and spinal cord

peripheral nervous system (PNS)--nerves, ganglia

14. Endocrine System

function: produce hormones, which are chemical regulators of the body

components:

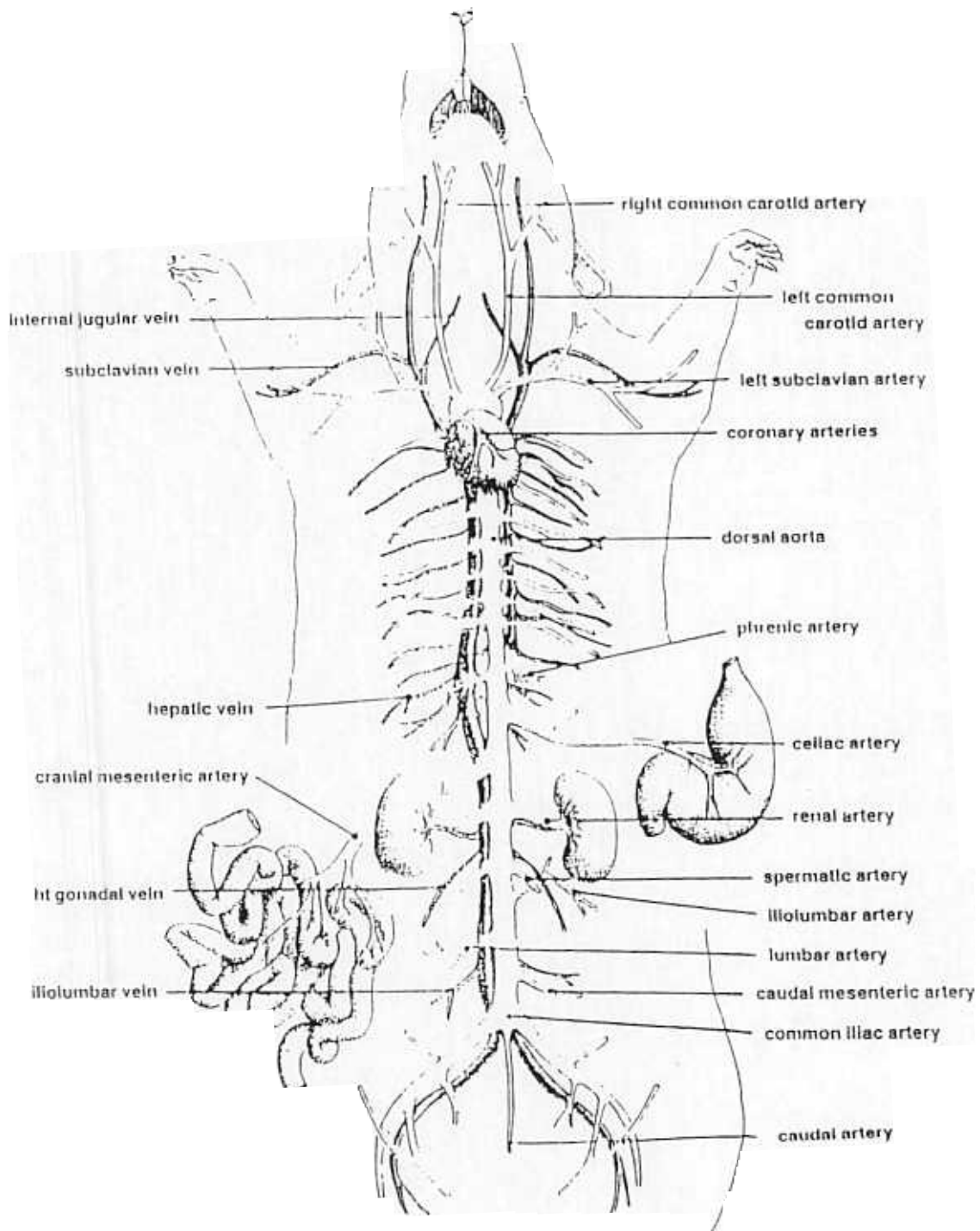
pituitary gland (hypophysis)
adrenal gland
thyroid gland
parathyroid glands
pancreas
gonads

15. Species Peculiarities

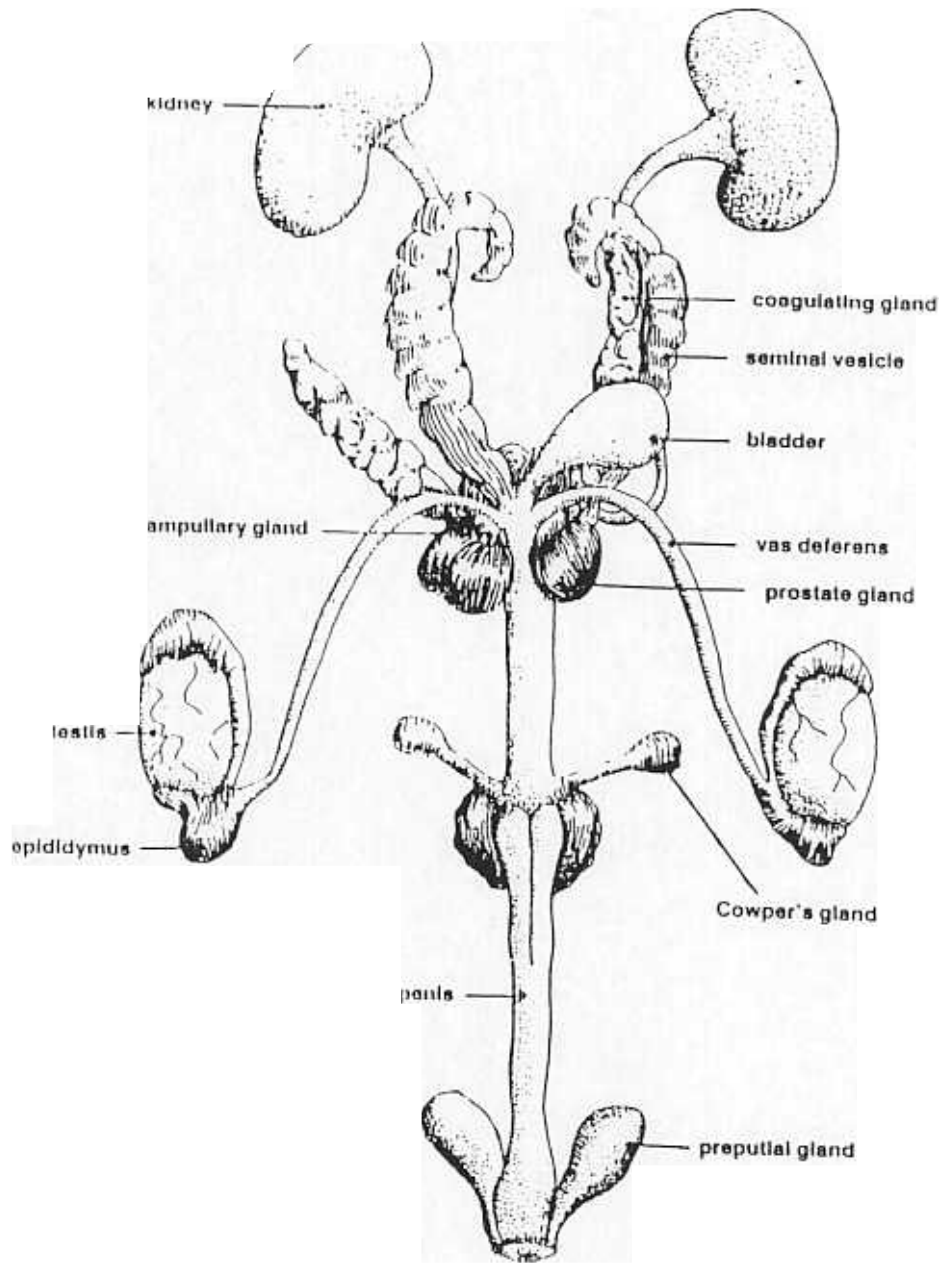
no gall bladder:	rat, horse, fish
cannot vomit:	rat, horse
large cecum:	horse, guinea pig, rabbit
4-part stomach:	cow, sheep
breathe through skin:	frogs (amphibians)
induced ovulators:	cat, rabbit, ferret

Supplemental Reading

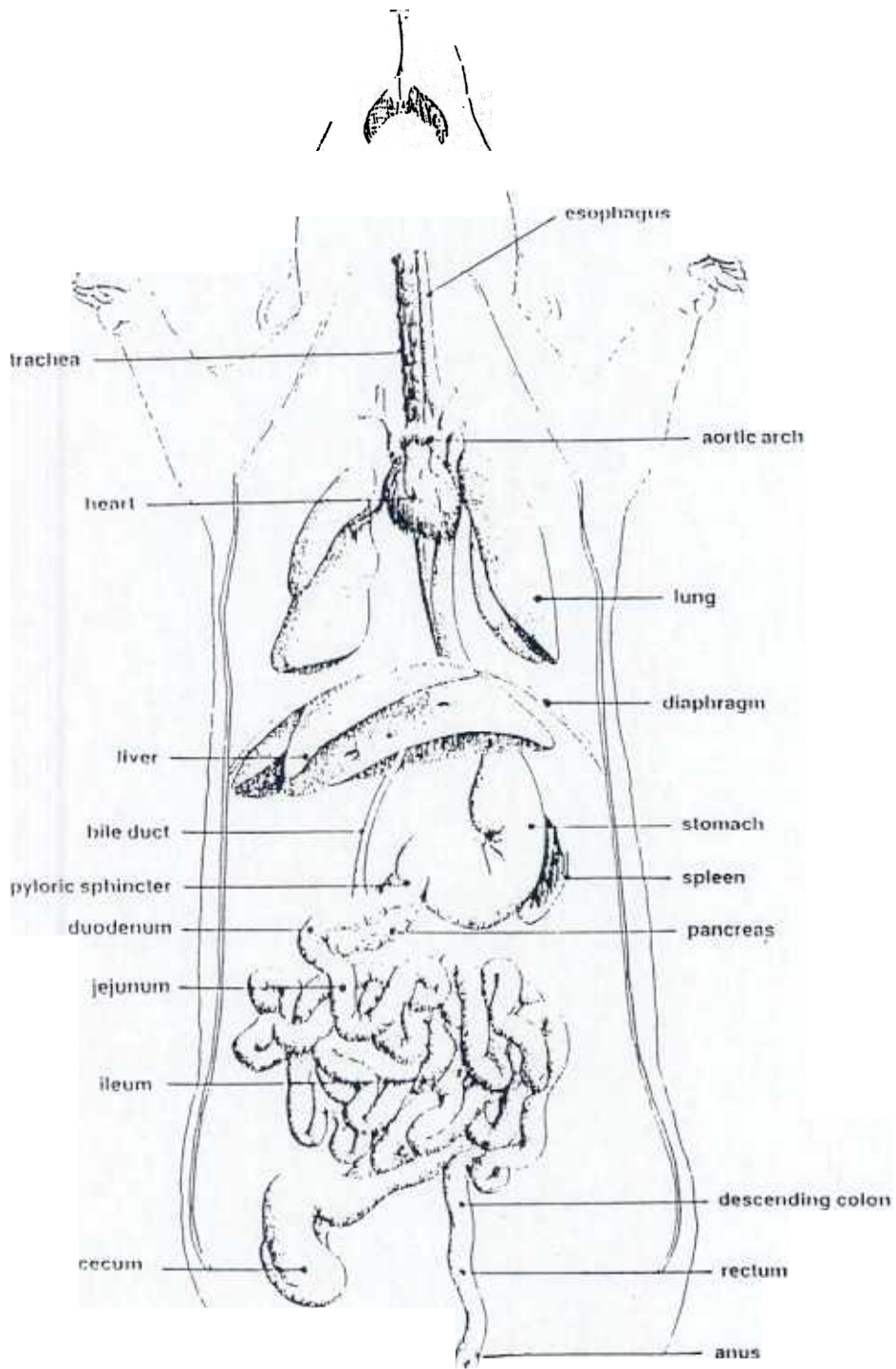
1. Training Manual Series, Volume One, Assistant Laboratory Animal Technician, Chapters 3-5. D.M. Stark and M. E. Ostrow (eds.). American Association for Laboratory Animal Science, 1991.



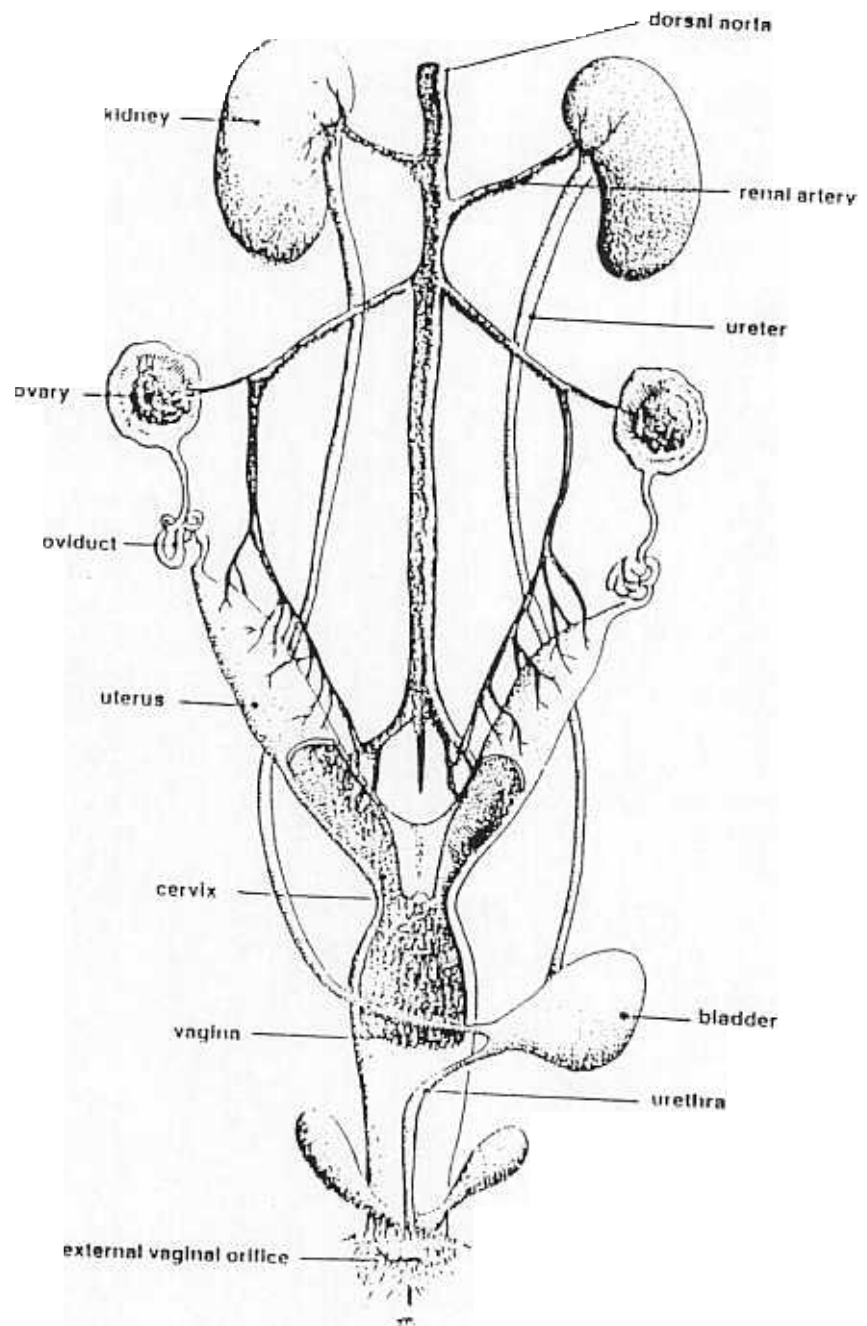
Circulatory System of the Rat



Sex Organs of the Male Rat



Location of Major Organs in the Rat



Sex Organs of the Female Rat