ANATOMY

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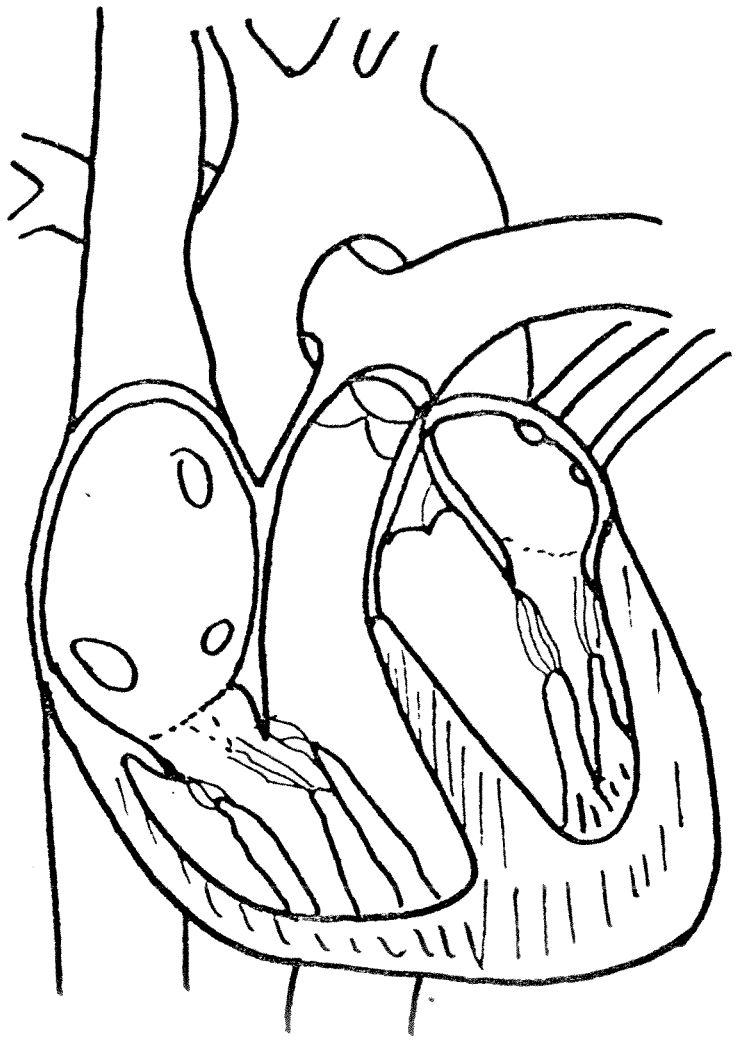


INTRODUCTION: While a particular text may be officially recommended text for this course from time to time, any good anatomy text ***organized systemically*** (not regionally) will suffice. It is assumed that each student has access to some equivalent text (see instructor if you are not sure), and the supplementary materials included here have been chosen with this in mind. This handout includes many of the illustrations that will be used during lecture as well as an abbreviated outline of the topics covered and *most* of the vocabulary words. The intent is that this will enable the student to spend more time listening and thinking, since much of the drawing and spelling will have been done. Therefore, it is recommended that this handout be brought to lecture and be used as a reference and guide while taking notes. However, it is a ***supplement***, not a substitute for lecture notes.

The course requirements will be described in lecture, and exams will be based primarily on material covered in lecture, although some reading assignments will be included as well. As you consult your syllabus or handouts, do not consider chapter references to be exhaustive but rather use them as a guide to the first place to look for information. You might want to use other source material in the library for instance. There are many excellent Anatomy texts and atlases. Do not limit yourselves to any one source.

what is anatomy?

TERMINOLOGY: Anatomy, by its nature, involves a large vocabulary as we attempt to have a specific, precise name for each identifiable structure or component of a structure. We also must have precise vocabulary for describing the relative positions, shapes, and in some cases movements and functions of these structures. In order to increase the precision of these descriptions, we have developed a specialized vocabulary. In many cases the etymology of a word will help decipher its meaning (*e.g.* in "muscular dystrophy" dystrophy comes from "dys" - faulty + "trophe" - nourishment; "myasthenia gravis": "mys" - muscle + "astheneia" - weakness + "gravis" - heavy). Often your text elaborates these explanations; other good sources are medical dictionaries and other anatomy textbooks. You are responsible for the terminology used this semester but the etymology (the explanations) are for your benefit only.

Throughout the semester, the handouts will include much of the required vocabulary, but the handouts are **not** intended to be exhaustive. Any material covered in lecture or cited in your textbook is to be considered "required".

You are responsible for proper grammar *e.g.* proper singular and plural forms, distinguishing nouns from adjectives, spelling, etc.

BODY ORGANIZATION:

A. DIRECTIONS and RELATIVE POSITIONS

anatomical position
dorsal - ventral (palmar, plantar)
anterior - posterior
superior - inferior
proximal - distal
superficial - deep
medial - lateral (median, paramedian sagittal planes)
sagittal - coronal (vertical) - transverse (horizontal)
internal - external
parietal - visceral
ipsilateral - contralateral
supine - prone
extension - flexion
abduction - adduction - opposition
medial rotation - lateral rotation (supination - pronation)
circumduction
inversion - eversion
protraction - retraction

B. REGIONS: body cavities; axial - appendicular; membranes;
dermatomes

C. SYSTEMIC ORGANIZATION: cell - tissue - organ - system

D. OVERVIEW
fascia(e)
membranes: serous

mucous

synovial

cutaneous

nervous system
central - peripheral
somatic - autonomic
sympathetic - parasympathetic

endocrine system
exocrine

skeletal system
bone
cartilage

muscle
skeletal
cardiac
smooth

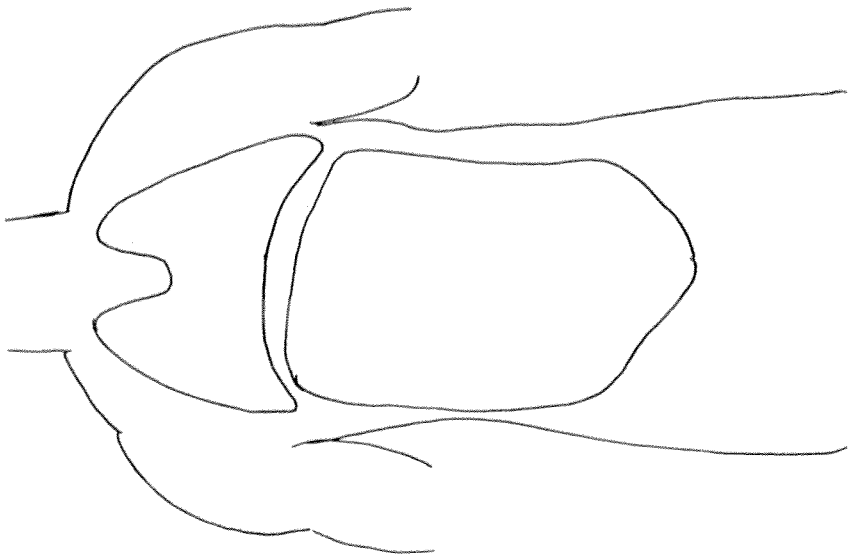
joints
fibrous - cartilaginous - synovial
ligaments - tendons - bursae

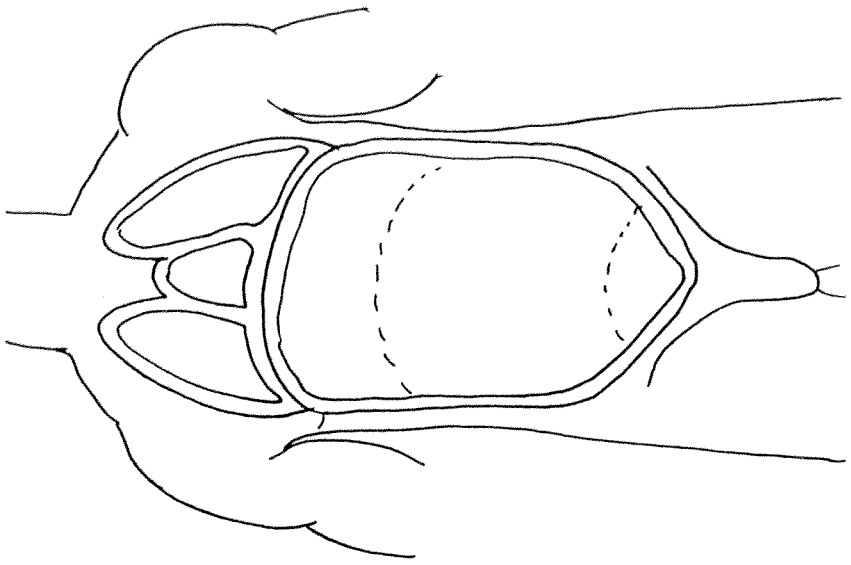
circulatory system - cardiovascular system
blood vessels
heart
lymphatics

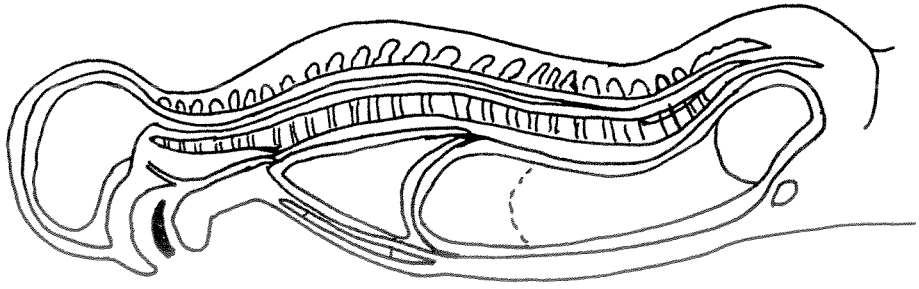
respiratory system

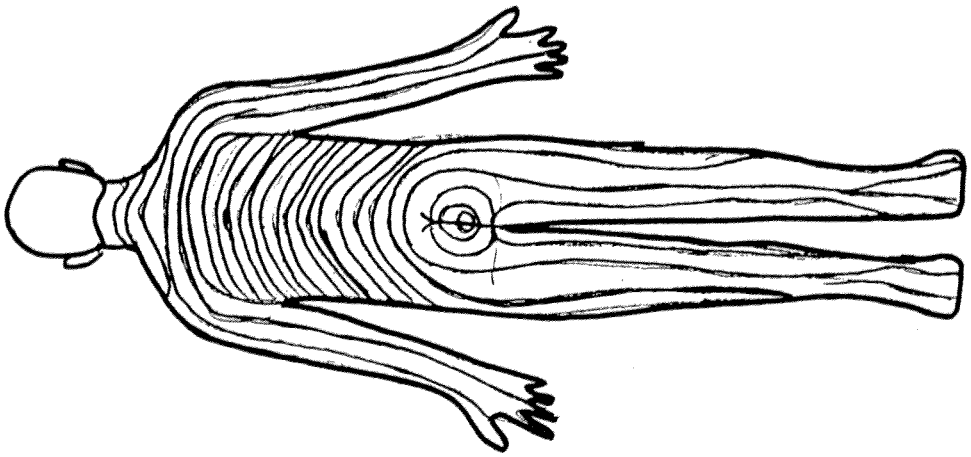
digestive system - alimentary canal - gastrointestinal tract

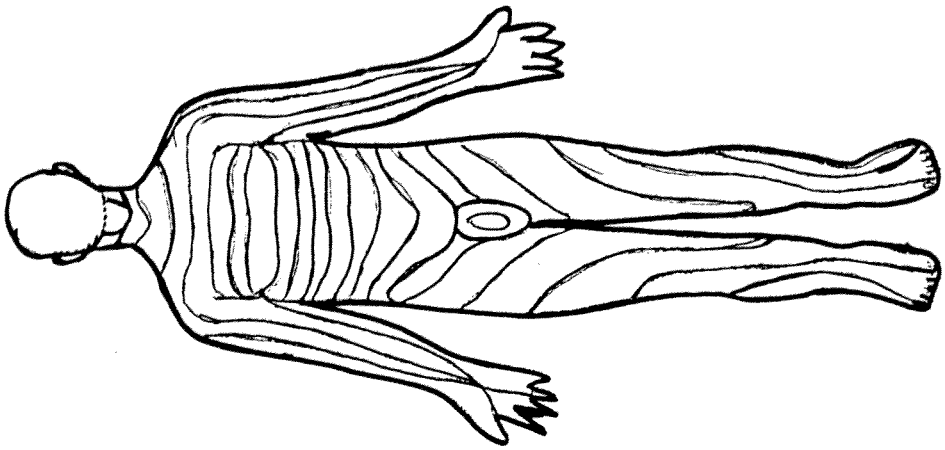
urogenital systems
urinary tract
reproductive systems: ♂ -- ♀
gonad
gamete

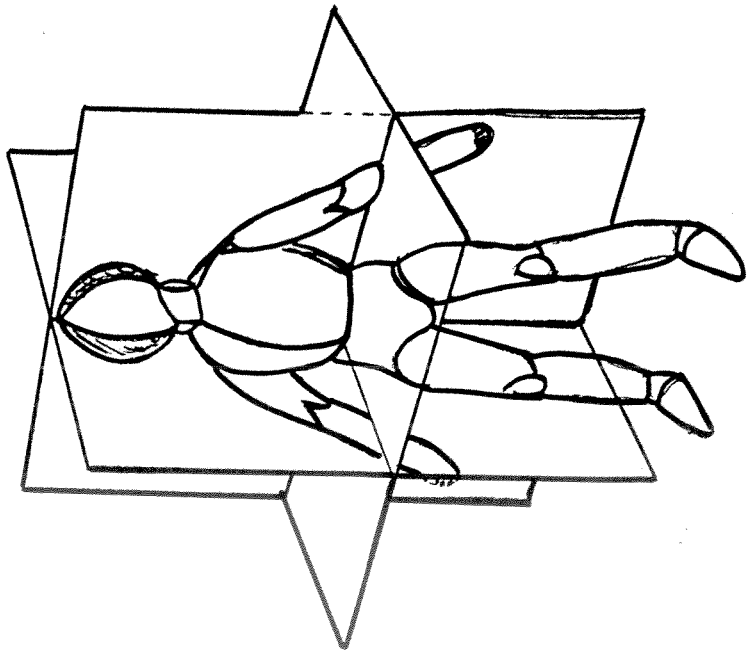


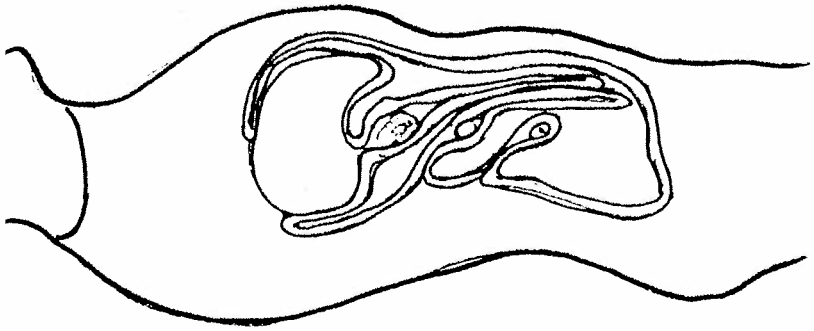


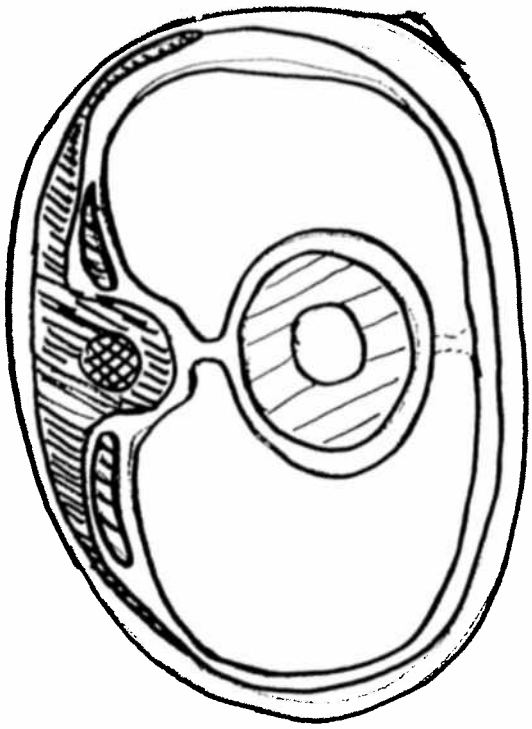


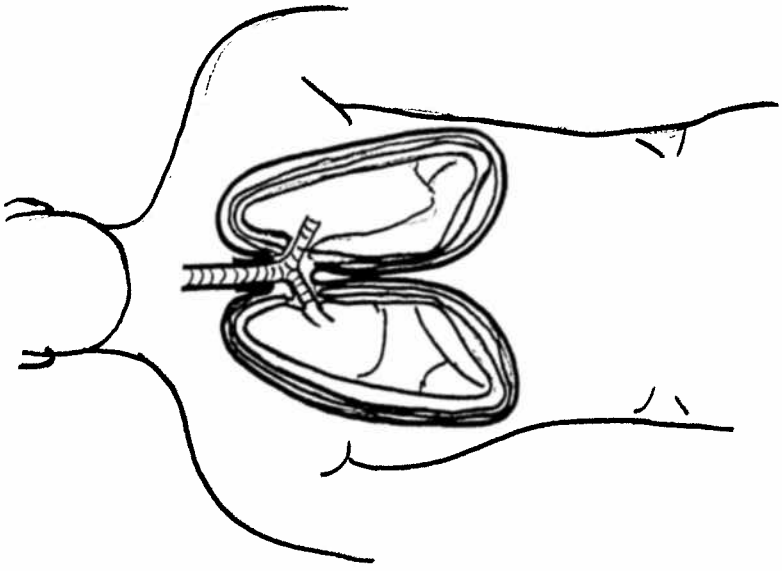












MICROANATOMY

PLASMA MEMBRANE - PLASMALEMMA
- phospholipid bilayer -- cholesterol
- integral membrane proteins; peripheral proteins
- fluid mosaic model
  - receptor, signal, anchor, enzyme, channel
- boundary - encloses & protects contents; separates in & out!! *life!*
- cell shape, locomotion; endocytosis & exocytosis; cell division, etc
- receptor sites
- enzyme anchorage (inside & outside)
- selective permeability
  - diffusion; osmosis -- concentration gradient
  - carrier-mediated diffusion - "facilitated"
  - active transport
  - endocytosis (phagocytosis, pinocytosis) & exocytosis

CYTOPLASM = CYTOSOL

NUCLEUS
- nuclear envelope, nucleoplasm, nucleolus, chromatin

MITOCHONDRION/__IA

ENDOPLASMIC RETICULUM
- -- ROUGH
- -- SMOOTH

GOLGI COMPLEX (APPARATUS)

LYSOSOMES

RIBOSOME

CYTOSKELETON
- microfilament = actin
- intermediate filament
- microtubule = tubulin

CENTRIOLE (BASAL BODY) -- cilia; flagella

other inclusions such as glycogen, lipid, melanin, specialized structures, etc.

EXTRACELLULAR MATRIX = ECM

CELL DIVISION = MITOSIS: prophase, metaphase, anaphase, telophase + CYTOKINESIS
- MEIOSIS: prophase, metaphase, anaphase, telophase I & II
- somatic cells -- germ cells = gametes = sperm & ovum/a = egg -- fertilization

TISSUES:

I. EPITHELIUM/__IA

apical, basal

junctions: tight junctions

intermediate junction -- terminal web

desmosome -- tonofilaments

hemidesmosomes

gap junction

basement membrane = basal lamina + reticular lamina

A. simple: one cell layer thick

B. stratified: >1 " "

C. pseudostratified (columnar only)

>> glandular epithelia - a class of its own <<

1. squamous: flattened cells
2. cuboidal
3. columnar
4. transitional (stratified only)

A1. simple squamous epithelium

A2. simple cuboidal epithelium

A3. simple columnar epithelium

B1. stratified squamous epithelium: keratinized -- non-keratinized

B2. stratified cuboidal epithelium

B3. stratified columnar epithelium

B4. transitional epithelium - umbrella cells

C. pseudostratified columnar epithelium: ± ciliated

D. glandular epithelia : *mucous* (--> mucus-type secretion) or *serous* (--> watery secretion)

ENDOCRINE = ductless \\ EXOCRINE = ducted

unicellular *e.g.* goblet cells

multicellular: tubular; acinar (flask-like); tubuloacinar \\ branched = compound or simple

holocrine

merocrine

apocrine

II. CONNECTIVE TISSUE [CT]

cells:

1. fibroblast
2. macrophage <-- monocyte
3. plasma cells <-- B-lymphocytes
4. mast cells: heparin = anti-coagulant, & probably serotonin & histamine = vasodilators
5. adipocytes
6. leucocytes =WBC
7. erythrocytes = RBC

ECM:
ground substance: hyaluronic acid; chondroitin sulfate; dermatan sulfate, keratan sulfate, etc

+ fibers: collagenous
elastic
reticular

Classes of CT:
I. embryonic: mesenchyme = fluid ground substance; mucous CT = gel or viscous ground substance

II. mature CT's:
a. FIBROUS CT
1. loose fibrous CT:
a. areolar CT
b. adipose -- "signet ring"
c. reticular
2. dense fibrous CT
a. regular
b. irregular
c. elastic (yellow CT)

b. CARTILAGE -- chondrocyte (chondroblast = immature)
lacuna(e)
perichondrium
apositional -- interstitial growth

1. hyaline: most common: amorphous matrix; smooth, shiny

2. fibrocartilage

3. elastic cartilage

c. BONE = OSSEOUS TISSUE -- osteoblasts -- osteocytes -- osteoclasts
lacuna(e)
canaliculi
hydroxy(l)apatite = mostly calcium phosphate + calcium phosphate
spongy bone -- compact bone
intermembranous or enchondrous growth
remodeling

Haversian system = osteon
Haversian = central canal
Volkmann's = perforating canal

d. BLOOD = RBC + WBC + PLASMA

e. MUSCLE: SMOOTH, STRIATED = CARDIAC + SKELETAL

f. NERVOUS & GLIAL TISSUES

INTEGUMENTARY SYSTEM (SKIN)

integument - largest organ = skin + structures derived from it
- epidermis
  - hair & follicles
  - glands - sebaceous, sweat
  - nails - bed, root, fold

EPIDERMIS
- keratinocyte
- melanocyte
- non-pigmented granular dendrocytes
  - = Langerhans' cells
  - & Granstein cells

layers:
- Stratum basale = germinativum
- S. Spinosum
- S. Granulosum
- S. Lucidum - eleidin
- S. Corneum

DERMIS
-- papillary region
- ** Meissner's corpuscles

-- reticular region
- sebaceous glands
- sweat = sudoriferous gland ducts
- arrector pili
- Pacinian corpuscles

sudoriferous glands:
(a) eccrine
(b) apocrine
(c) ceruminous
(d) mammary

HYPODERMIS (SUBCUTANEOUS)

color:
- melanin (melanocytes)
- carotene
- hemoglobin (red blood cells)

surface patterns
- flexion lines & creases
- friction ridges (fingerprints)
- lines of cleavage

BLOOD SUPPLY: cutaneous plexus & papillary plexus