ACTIVITY 2: HISTOLOGY AND INTEGUMENT

Objectives:

1) How to get ready: **Read Chapter 4 and 5, McKinley *et al.*, Human Anatomy, 5e. All text references are for this textbook.**
2) **Identify each tissue (26 tissues) in a histology photo or microscope slide.**
3) **Sketch each tissue in the space provided.**
4) **Identify the features of the integument (skin) on a slide and/or model.**
5) Before next class: **Preview axial skeleton terms lists from SLCC Anatomy Laboratory website or your printed laboratory manual and your textbook.**

★ *EPITHELIAL TISSUES:* **Note the following features on each tissue.**

Cell Shapes:
-squamous
-cuboidal
-columnar

Number of Layers:
-simple
-stratified
-pseudostratified

Identify:
- each tissue as an **epithelium**
- **specific type/name** of tissue
- **shape** of cells
- number of **cell layers**
- **specific body location** of each tissue
- **specialized structures,** when relevant
- **basement membrane, basal surface, apical surface**

TABLE 1. TYPES OF EPITHELIAL TISSUES ***(10 tissues to identify)***

NAME	BODY LOCATIONS/ STRUCTURES	TEXT REFERENCES & SKETCH
❑ simple squamous epithelium	location**: air sacs in lungs (alveoli), lining blood vessels, serous membranes of body cavities** structure**: single layer of flat cells resembling floor tiles, with a single nucleus in the center of each** ❑ **basement membrane** ❑ **apical surface** ❑ **basal surface** function: **rapid diffusion, filtration, and some secretion**	**p. 86, table 4.2a;** **described: pp. 84-85**
stratified squamous epithelium ❑ keratinized ❑ non-keratinized	location**: lining oral cavity, esophagus, vagina, and anus (non-keratinized); epidermis of skin (keratinized)** structure: **multiple layers of cells; apical cells squamous; surface cells are alive in non-keratinized; surface cells in keratinized are dead and filled with the protein keratin** ❑ **basement membrane** ❑ **apical surface** ❑ **basal surface** function**: protection of underlying tissue**	**p. 89 table 4.3a, b;** **described: pp. 88-91**

NAME	BODY LOCATIONS/ STRUCTURES	TEXT REFERENCES & SKETCH
❑ simple cuboidal epithelium	location: **lining kidney tubules; ducts of most glands** structure: **single layer of cells as tall as they are wide; spherical, centrally located nucleus** ❑ **basement membrane** ❑ **apical surface** ❑ **basal surface** ❑ **lumen** function**: absorption and secretion**	**p. 86 table 4.2b; described: p. 85**
❑ stratified cuboidal epithelium	location**: large ducts in most exocrine glands** structure**: two or more layers of cells; cells at apical surface are cuboidal** ❑ **basement membrane** ❑ **apical surface** ❑ **basal surface** function**: protection and secretion**	**p. 90 table 4.3c; described: p. 91**
simple columnar epithelium ❑ ciliated ❑ non-ciliated	location**: lining of most of the digestive tract (non-ciliated); lining of uterine tubes (ciliated)** structure**: single layer of tall, narrow cells; oval shaped nucleus in the basal region of cells** ❑ **basement membrane** ❑ **apical surface** ❑ **basal surface** ❑ **goblet cells** ❑ **cilia (when present)** function**: absorption and secretion (non-ciliated); secretion of mucin and movement of mucus along apical surface of epithelium by action of cilia (ciliated)**	**p. 87 table 4.2c, d; described: pp. 85,88**
❑ stratified columnar epithelium	location**: rare, found in large ducts of some exocrine glands and in some regions of the male urethra** structure**: two or more layers of cells; cells at the apical surface are columnar** ❑ **basement membrane** ❑ **basal surface** ❑ **apical surface** function**: protection and secretion**	**p. 90 table 4.3d; described: p. 91**

NAME	BODY LOCATIONS/ STRUCTURES	TEXT REFERENCES & SKETCH
❏ pseudostratified columnar epithelium	location: **ciliated form lines most of the respiratory tract** structure**: single layer of cells with varying heights that appear multi-layered; all cells connect to the basement membrane but not all cells reach the apical surface** ❏ **basement membrane** ❏ **apical surface** ❏ **basal surface** ❏ **cilia** ❏ **goblet cells** function: **protection; ciliated form also involved with secretion of mucin and movement of mucus across surface with ciliary action**	**p. 88 table 4.2e; described: p. 88**
❏ transitional epithelium	location**: lining of urinary bladder, ureters, and part of urethra** structure**: epithelial appearance varies, depending on whether the tissue is stretched or relaxed; shape of cells on the apical surface changes** ❏ **basement membrane** ❏ **apical surface** ❏ **basal surface** function: **distention and relaxation to accommodate urine volume changes in the bladder, ureters, and urethra**	**p. 91 table 4.3e; described: p. 91**

CONNECTIVE TISSUES

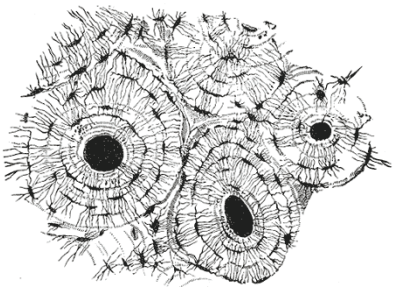
★ *Identify on each slide*:

- **each tissue as a** connective tissue
- **each tissue as** fluid connective tissue *vs.* connective tissue proper *vs.* supporting connective tissue
- **for connective tissue proper: identify** loose *vs.* dense connective tissues
- **specific** name **of each connective tissue**
- cells, fibers, ground substance or matrix
- **any relevant special structures**

TABLE 2. TYPES OF CONNECTIVE TISSUE *(12 tissues to identify)*

NAME	BODY LOCATIONS/ STRUCTURES	TEXT REFERENCES & SKETCH
FLUID CONNECTIVE TISSUE ***(1 tissue)***		
❑ blood	location**: within blood vessels (arteries, veins, and capillaries), and the heart** structure**: contains** ❑ **erythrocytes** ❑ **leukocytes** ❑ **platelets (thrombocytes)** ❑ **plasma (matrix)** function**: erythrocytes transport gases, leukocytes control immune response, platelets initiate blood clotting; plasma transports nutrients, wastes, and hormo throughout the body, and contains clotti elements to stop blood loss**	**p. 108, table 4.11;** **described: p. 105**
CONNECTIVE TISSUES PROPER**: includes the LOOSE CONNECTIVE TISSUES and the DENSE CONNECTIVE TISSUES**		
LOOSE CONNECTIVE TISSUES (***3 tissues***): **generally have a loose association of fibers in extracellular matrix**		
❑ areolar connective tissue	location**: subcutaneous layer; surrounding organs** structure**: vascular, matrix is gel-like with** ❑ **fibroblasts** ❑ **collagen fibers** ❑ **elastic fibers** ❑ **ground substance** function**: surrounds and protects tissues and organs; loosely binds epithelium to deeper tissues; provides nerve and blood vessel packing**	**p. 102 table 4.7a;** **described: p. 100**

LOOSE CONNECTIVE TISSUES, **continued**		
❑ reticular connective tissue	location**: forms stroma of lymph nodes, spleen, thymus, and bone marrow** structure**: ground substance is gel-like liquid; scattered arrangement of** ❑ **reticular fibers** ❑ **extracellular matrix** function**: provides supportive framework for spleen, lymph nodes, thymus, and bone marrow**	**p. 103 table 4.7c;** **described: p. 101**
❑ adipose connective tissue	location: **subcutaneous layer; covers and surrounds some organs** structure: **closely packed** ❑ **adipocytes, with nucleus squeezed to one side** ❑ **lipid vacuole (fat droplet)** function**: stores energy; protects, cushions, and insulates**	**p. 102 table 4.7b;** **described: p. 100**
DENSE CONNECTIVE TISSUES (***3 tissues***): **generally have a dense association of fibers in the extracellular matrix**		
❑ dense regular connective tissue	location**: forms tendons, most ligaments** structure**:** ❑ **collagen fibers (densely packed, parallel)** ❑ **fibroblast nuclei** ❑ **ground substance (scarce)** function**: attaches muscle to bone and bone to bone; resists stress applied in one direction**	**p. 104 table 4.8a;** **described: p. 101**
❑ elastic connective tissue	location: **walls of elastic arteries; trachea; bronchial tubes; true vocal cords; suspensory ligaments of penis** structure**:** ❑ **elastic fibers (parallel)** ❑ **fibroblast nuclei** ❑ **ground substance** function**: allows stretching of some organs**	**p. 105 table 4.8c;** **described: p. 101**
❑ dense irregular connective tissue	location: **dermis; periosteum covering bone; perichondrium covering cartilage, organ capsules** structure**:** ❑ **collagen fibers (bundled; randomly arranged)** ❑ **fibroblasts** ❑ **ground substance (more than in dense regular connective tissue)** function**: withstands stresses in all directions; durable**	**p. 104 table 4.8b;** **described: p. 101**

SUPPORTING CONNECTIVE TISSUES: **includes bone tissue and 3 cartilage tissues**		
BONE OR OSSEOUS TISSUE (***1 tissue***)		
❑ compact bone	location: **exterior of bones of the body** structure: **calcified matrix arranged in** ❑ **osteons** ❑ **osteocytes in lacunae** ❑ **lamellae (concentric)** ❑ **central canal** ❑ **canaliculi** function: **supports soft structures; protects vital organs; provides levers for movement; stores minerals**	**p. 107 table 4.9;** **described: p. 105** 

CARTILAGE TISSUES (***3 tissues***)		
❑ hyaline cartilage	location: **most of fetal skeleton; covers articular ends of long bones; costal cartilage; most of the larynx, trachea, and nose** structure: ❑ **extracellular matrix** ❑ **lacunae** ❑ **chondrocytes** ❑ **perichondrium (often visible)** function: **smooth surfaces for movement at joints; model for bone growth; supports soft tissue**	**p.106 table 4.9a;** **described: p. 103**
❑ fibrocartilage	location: **intervertebral discs; pubic symphysis; menisci of knee joint** structure: ❑ **collagen fibers (parallel)** ❑ **extracellular matrix** ❑ **lacunae** ❑ **chondrocytes** function: **resists compression; absorbs shock in some joints**	**p. 106 table 4.9b;** **described: p. 103**
❑ elastic cartilage	location: **external ear; epiglottis of the larynx** structure: **contains abundant** ❑ **elastic fibers (branching)** ❑ **lacunae** ❑ **chondrocytes** function: **maintains structure and shape while permitting flexibility**	**p. 107 table 4.9c;** **described: pp. 103-104**

MUSCLE TISSUES

TABLE 3. TYPES OF MUSCLE TISSUE *(3 tissues to identify)*

NAME	BODY LOCATIONS/ STRUCTURES	TEXT REFERENCES AND SKETCH
❑ smooth muscle	location: **walls of hollow internal organs: vessels, airways, stomach, bladder, and uterus** structure: ❑ **muscle fiber (spindle-shaped)** ❑ **nucleus (centrally located)** function: **involuntary movements and motion; moves materials through internal organs**	**p. 111 table 4.12c; described: p.109**
❑ skeletal muscle	location: **attaches to bones or sometimes skin** structure: ❑ **muscle fiber (long, cylindrical, unbranched)** ❑ **nuclei (multiple per fiber)** ❑ **striations** function: **moves skeleton; responsible for voluntary body movements, locomotion, and heat production**	**p.110 table 4.12a; described: p. 109**
❑ cardiac muscle	location: **heart wall (myocardium)** structure: ❑ **muscle fiber (or cardiomyocyte) short, branched** ❑ **nucleus (one per cell)** ❑ **striations** ❑ **intercalated discs (between cells)** function: **involuntary contraction and relaxation; pumps blood in the heart**	**p. 110 table 4.12b; described: p. 109**

NERVOUS TISSUE

TABLE 4. NERVOUS TISSUE (***1 tissue to identify***)

NAME	BODY LOCATIONS/ STRUCTURES	TEXT REFERENCES AND SKETCH
❑ nervous tissue **(from multipolar neuron smear slide)**	location**: brain, spinal cord, peripheral nervous tissue** structures**:** ❑ **neuron** ❑ **soma (cell body)** ❑ **axon** ❑ **dendrites** ❑ **neuroglia (glial cells)** function**: control and communication between tissues**	**p. 112 table 4.13; described: p. 111**

HELPFUL TERMS FOR HISTOLOGY AND INTEGUMENT

lumen**: the space inside a hollow or tube, such as where blood is transported within a blood vessel**

cilia: **motile hair-like extension of a cell surface**

microvilli: **small folds projecting on the apical surface of certain types of epithelial cells, especially those of the small intestine**

goblet cells**: unicellular epithelial gland cells that secrete mucus**

lacunae: **cavity or depression**

canaliculi: **small passageways**

papilla**: nipple-like projection**

INTEGUMENTARY SYSTEM: **skin and accessory structures**

★ STRUCTURES TO IDENTIFY ON SKIN MODEL AND/OR SLIDES — TEXT REFERENCES

Layers of the skin/ integument/ cutaneous membrane, **from superficial to deep:** **p.119; fig. 5.1; table 5.2**

- ❑ EPIDERMIS **-- most superficial layer;** keratinized stratified squamous epithelium
- ❑ LAYERS OF THE EPIDERMIS: FROM BASEMENT MEMBRANE TO APICAL SURFACE **p.121; fig. 5.2**
  - ❑ **stratum basale**
    - ❑ **melanocytes**
    - ❑ **keratinocytes**
  - ❑ **stratum spinosum**
    - ❑ **epidermal dendritic (Langerhans) cells**
  - ❑ **stratum granulosum**
  - ❑ **stratum lucidum (thick skin only)**
  - ❑ **stratum corneum**
  - ❑ **epidermal ridges**
- ❑ DERMIS **– deep to the epidermis** **p.126; fig. 5.6**
  - ❑ **papillary layer** (areolar connective tissue)
    - ❑ **dermal papillae**
  - ❑ **reticular layer** (dense irregular connective tissue)
    - ❑ **hair follicles**
    - ❑ **arrector pili muscles**
    - ❑ **sebaceous (oil) glands**
    - ❑ **sudoriferous (sweat) glands**
      - ❑ **apocrine sweat gland**
      - ❑ **merocrine or eccrine sweat gland**
    - ❑ **sensory receptors**
      - ❑ **tactile (sensory) receptor *or* Meissner's corpuscle**
      - ❑ **lamellated (pacinian) corpuscle**

- ❑ HYPODERMIS OR SUBCUTANEOUS LAYER **(not part of the integument proper) –** areolar connective tissue and adipose tissue often called superficial fascia