

## ACTIVITY



# HISTOLOGY AND INTEGUMENT

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## OBJECTIVES

1. **How to get ready:** Read CHAPTERS 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.

# Activity 2

## EPITHELIAL TISSUES

Note the following features on each tissue.

CELL SHAPES	NUMBER OF LAYERS	IDENTIFY
squamous cuboidal columnar	simple stratified pseudostratified	<ul style="list-style-type: none"> <li>• each tissue as an <b>epithelium</b></li> <li>• specific <b>type/name of tissue</b></li> <li>• <b>shape</b> of cells</li> <li>• <b>number</b> of cell layers</li> <li>• specific <b>body location</b> of each tissue</li> <li>• specialized structures, when relevant</li> <li>• <b>basement membrane, basal surface, apical surface</b></li> </ul>

TABLE 2-1. Types of epithelial tissues (10 tissues to identify)

NAME	BODY LOCATIONS/STRUCTURES	TEXT REFERENCES & SKETCH
<input type="checkbox"/> <b>simple squamous epithelium</b>	<p><b>location:</b> air sacs in lungs (alveoli), lining blood vessels, serous membranes of body cavities</p> <p><b>structure:</b> single layer of flat cells resembling floor tiles, with a single nucleus in the center of each</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> basement membrane</li> <li><input type="checkbox"/> apical surface</li> <li><input type="checkbox"/> basal surface</li> </ul> <p><b>function:</b> rapid diffusion, filtration, and some secretion</p>	<p>P. 86, TABLE 4.2A; DESCRIBED: PP. 84–85</p>

**TABLE 2-1. Types of epithelial tissues (10 tissues to identify)**

NAME	BODY LOCATIONS/STRUCTURES	TEXT REFERENCES & SKETCH
<input type="checkbox"/> <b>stratified squamous epithelium</b> <span style="display: inline-block; border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; text-align: center; vertical-align: middle;">2</span> <input type="checkbox"/> <b>keratinized</b> <span style="display: inline-block; border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; text-align: center; vertical-align: middle;">3</span> <input type="checkbox"/> <b>non-keratinized</b>	<input type="checkbox"/> <b>location:</b> lining oral cavity, esophagus, vagina, and anus (non-keratinized); epidermis of skin (keratinized) <input type="checkbox"/> <b>structure:</b> 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 <ul style="list-style-type: none"> <li><input type="checkbox"/> basement membrane</li> <li><input type="checkbox"/> apical surface</li> <li><input type="checkbox"/> basal surface</li> </ul> <input type="checkbox"/> <b>function:</b> protection of underlying tissue	<b>P. 89 TABLE 4.3A, B;</b> <b>DESCRIBED: PP. 88–91</b>
<span style="display: inline-block; border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; text-align: center; vertical-align: middle;">4</span> <input type="checkbox"/> <b>simple cuboidal epithelium</b>	<input type="checkbox"/> <b>location:</b> lining kidney tubules; ducts of most glands <input type="checkbox"/> <b>structure:</b> single layer of cells as tall as they are wide; spherical, centrally located nucleus <ul style="list-style-type: none"> <li><input type="checkbox"/> basement membrane</li> <li><input type="checkbox"/> apical surface</li> <li><input type="checkbox"/> basal surface</li> <li><input type="checkbox"/> lumen</li> </ul> <input type="checkbox"/> <b>function:</b> absorption and secretion	<b>P. 86 TABLE 4.2B;</b> <b>DESCRIBED: P. 85</b>
<span style="display: inline-block; border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; text-align: center; vertical-align: middle;">5</span> <input type="checkbox"/> <b>stratified cuboidal epithelium</b>	<input type="checkbox"/> <b>location:</b> large ducts in most exocrine glands <input type="checkbox"/> <b>structure:</b> two or more layers of cells; cells at apical surface are cuboidal <ul style="list-style-type: none"> <li><input type="checkbox"/> basement membrane</li> <li><input type="checkbox"/> apical surface</li> <li><input type="checkbox"/> basal surface</li> </ul> <input type="checkbox"/> <b>function:</b> protection and secretion	<b>P. 90 TABLE 4.3C;</b> <b>DESCRIBED: P. 91</b>

# Activity 2

TABLE 2-1. Types of epithelial tissues ( <i>10 tissues to identify</i> )		
NAME	BODY LOCATIONS/STRUCTURES	TEXT REFERENCES & SKETCH
<p><b>simple columnar epithelium</b></p> <p><input type="checkbox"/> <b>ciliated</b> <span style="border: 1px solid black; border-radius: 50%; padding: 2px 5px;">6</span></p> <p><input type="checkbox"/> <b>non-ciliated</b> <span style="border: 1px solid black; border-radius: 50%; padding: 2px 5px;">7</span></p>	<p><b>location:</b> lining of most of the digestive tract (non-ciliated); lining of uterine tubes (ciliated)</p> <p><b>structure:</b> single layer of tall, narrow cells; oval shaped nucleus in the basal region of cells</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> basement membrane</li> <li><input type="checkbox"/> apical surface</li> <li><input type="checkbox"/> basal surface</li> <li><input type="checkbox"/> goblet cells</li> <li><input type="checkbox"/> cilia (when present)</li> </ul> <p><b>function:</b> absorption and secretion (non-ciliated); secretion of mucin and movement of mucus along apical surface of epithelium by action of cilia (ciliated)</p>	<p>P. 87 TABLE 4.2C, D; DESCRIBED: PP. 85,88</p>
<p><input type="checkbox"/> <b>stratified columnar epithelium</b> <span style="border: 1px solid black; border-radius: 50%; padding: 2px 5px;">8</span></p>	<p><b>location:</b> rare, found in large ducts of some exocrine glands and in some regions of the male urethra</p> <p><b>structure:</b> two or more layers of cells; cells at the apical surface are columnar</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> basement membrane</li> <li><input type="checkbox"/> basal surface</li> <li><input type="checkbox"/> apical surface</li> </ul> <p><b>function:</b> protection and secretion</p>	<p>P. 90 TABLE 4.3D; DESCRIBED: P. 91</p>
<p><input type="checkbox"/> <b>pseudostratified columnar epithelium</b> <span style="border: 1px solid black; border-radius: 50%; padding: 2px 5px;">9</span></p>	<p><b>location:</b> ciliated form lines most of the respiratory tract</p> <p><b>structure:</b> 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</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> basement membrane</li> <li><input type="checkbox"/> apical surface</li> <li><input type="checkbox"/> basal surface</li> <li><input type="checkbox"/> cilia</li> <li><input type="checkbox"/> goblet cells</li> </ul> <p><b>function:</b> protection; ciliated form also involved with secretion of mucin and movement of mucus across surface with ciliary action</p>	<p>P. 88 TABLE 4.2E; DESCRIBED: P. 88</p>

**TABLE 2-1. Types of epithelial tissues (10 tissues to identify)**

NAME	BODY LOCATIONS/STRUCTURES	TEXT REFERENCES & SKETCH
<div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center; margin-right: 5px;">10</div> <div style="margin-left: 10px;"> <input type="checkbox"/> <b>transitional epithelium</b> </div> </div>	<p><b>location:</b> lining of urinary bladder, ureters, and part of urethra</p> <p><b>structure:</b> epithelial appearance varies, depending on whether the tissue is stretched or relaxed; shape of cells on the apical surface changes</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> basement membrane</li> <li><input type="checkbox"/> apical surface</li> <li><input type="checkbox"/> basal surface</li> </ul> <p><b>function:</b> distention and relaxation to accommodate urine volume changes in the bladder, ureters, and urethra</p>	<p><b>P. 91 TABLE 4.3E;</b> <b>DESCRIBED: P. 91</b></p>

## CONNECTIVE TISSUES

Identify on each slide or image:

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

# Activity 2

TABLE 2-2. Types of connective tissue (12 tissues to identify)			
	NAME	BODY LOCATIONS/STRUCTURES	TEXT REFERENCES & SKETCH
<b>CONNECTIVE TISSUES PROPER</b> <b>LOOSE CONNECTIVE TISSUES</b> (3 tissues): generally have a loose association of fibers in extracellular matrix	<input type="checkbox"/> <b>blood</b> <sup>1</sup>	<b>location:</b> within blood vessels (arteries, veins, and capillaries), and the heart <b>structure:</b> contains <ul style="list-style-type: none"> <li><input type="checkbox"/> erythrocytes</li> <li><input type="checkbox"/> leukocytes</li> <li><input type="checkbox"/> platelets</li> <li><input type="checkbox"/> plasma (matrix)</li> </ul> <b>function:</b> erythrocytes transport gases, leukocytes control immune response, platelets initiate blood clotting; plasma transports nutrients, wastes, and hormones throughout the body, and contains clotting elements to stop blood loss	P. 108, TABLE 4.11; DESCRIBED: P. 105
	<input type="checkbox"/> <b>areolar connective tissue</b> <sup>2</sup>	<b>location:</b> subcutaneous layer; surrounding organs <b>structure:</b> vascular, matrix is gel-like with <ul style="list-style-type: none"> <li><input type="checkbox"/> fibroblasts</li> <li><input type="checkbox"/> collagen fibers</li> <li><input type="checkbox"/> elastic fibers</li> <li><input type="checkbox"/> ground substance</li> </ul> <b>function:</b> 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
	<input type="checkbox"/> <b>reticular connective tissue</b> <sup>3</sup>	<b>location:</b> forms stroma of lymph nodes, spleen, thymus, and bone marrow <b>structure:</b> ground substance is gel-like liquid; scattered arrangement of <ul style="list-style-type: none"> <li><input type="checkbox"/> reticular fibers</li> <li><input type="checkbox"/> extracellular matrix</li> </ul> <b>function:</b> provides supportive framework for spleen, lymph nodes, thymus, and bone marrow	P. 103 TABLE 4.7C; DESCRIBED: P. 101
	<input type="checkbox"/> <b>adipose connective tissue</b> <sup>4</sup>	<b>location:</b> subcutaneous layer; covers and surrounds some organs <b>structure:</b> closely packed <ul style="list-style-type: none"> <li><input type="checkbox"/> adipocytes, with nucleus squeezed to one side</li> <li><input type="checkbox"/> lipid vacuole (fat droplet)</li> </ul> <b>function:</b> stores energy; protects, cushions, and insulates	P. 102 TABLE 4.7B; DESCRIBED: P. 100

**TABLE 2-2. Types of connective tissue (12 tissues to identify)**

		NAME	BODY LOCATIONS/STRUCTURES	TEXT REFERENCES & SKETCH
<b>CONNECTIVE TISSUES PROPER</b>  <b>DENSE CONNECTIVE TISSUES (3 tissues):</b> generally have a dense association of fibers in the extracellular matrix	5	<input type="checkbox"/> <b>dense regular connective tissue</b>	<b>location:</b> forms tendons, most ligaments <b>structure:</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> collagen fibers (densely packed, parallel)</li> <li><input type="checkbox"/> fibroblast nuclei</li> <li><input type="checkbox"/> ground substance (scarce)</li> </ul> <b>function:</b> attaches muscle to bone and bone to bone; resists stress applied in one direction	<b>P. 104 TABLE 4.8A;</b> <b>DESCRIBED: P. 101</b>
	6	<input type="checkbox"/> <b>elastic connective tissue</b>	<b>location:</b> walls of elastic arteries; trachea; bronchial tubes; true vocal cords; suspensory ligaments of penis <b>structure:</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> elastic fibers (parallel)</li> <li><input type="checkbox"/> fibroblast nuclei</li> <li><input type="checkbox"/> ground substance</li> </ul> <b>function:</b> allows stretching of some organs	<b>P. 105 TABLE 4.8C;</b> <b>DESCRIBED: P. 101</b>
	7	<input type="checkbox"/> <b>dense irregular connective tissue</b>	<b>location:</b> dermis; periosteum covering bone; perichondrium covering cartilage, organ capsules <b>structure:</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> collagen fibers (bundled; randomly arranged)</li> <li><input type="checkbox"/> fibroblasts</li> <li><input type="checkbox"/> ground substance (more than in dense regular connective tissue)</li> </ul> <b>function:</b> withstands stresses in all directions; durable	<b>P. 104 TABLE 4.8B;</b> <b>DESCRIBED: P. 101</b>

# Activity 2

TABLE 2-2. Types of connective tissue (12 tissues to identify)				
	NAME	BODY LOCATIONS/STRUCTURES	TEXT REFERENCES & SKETCH	
SUPPORTING CONNECTIVE TISSUES: includes bone tissue and 3 cartilage tissues	BONE or OSSEOUS TISSUE (1 tissue)	<p style="text-align: center;"><b>8</b></p> <input type="checkbox"/> <b>compact bone</b>	<p><b>location:</b> exterior of bones of the body</p> <p><b>structure:</b> calcified matrix arranged in</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> osteons</li> <li><input type="checkbox"/> osteocytes in lacunae</li> <li><input type="checkbox"/> lamellae (concentric)</li> <li><input type="checkbox"/> central canal</li> <li><input type="checkbox"/> canaliculi</li> </ul> <p><b>function:</b> supports soft structures; protects vital organs; provides levers for movement; stores minerals</p>	P. 107 TABLE 4.9; DESCRIBED: P. 105
	CARTILAGE TISSUES (3 tissues)	<p style="text-align: center;"><b>9</b></p> <input type="checkbox"/> <b>hyaline cartilage</b>	<p><b>location:</b> most of fetal skeleton; covers articular ends of long bones; costal cartilage; most of the larynx, trachea, and nose</p> <p><b>structure:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> extracellular matrix</li> <li><input type="checkbox"/> lacunae</li> <li><input type="checkbox"/> chondrocytes</li> <li><input type="checkbox"/> perichondrium (often visible)</li> </ul> <p><b>function:</b> smooth surfaces for movement at joints; model for bone growth; supports soft tissue</p>	P. 106 TABLE 4.9A; DESCRIBED: P. 103
		<p style="text-align: center;"><b>10</b></p> <input type="checkbox"/> <b>fibrocartilage</b>	<p><b>location:</b> intervertebral discs; pubic symphysis; menisci of knee joint</p> <p><b>structure:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> collagen fibers (parallel)</li> <li><input type="checkbox"/> extracellular matrix</li> <li><input type="checkbox"/> lacunae</li> <li><input type="checkbox"/> chondrocytes</li> </ul> <p><b>function:</b> resists compression; absorbs shock in some joints</p>	P. 106 TABLE 4.9B; DESCRIBED: P. 103
		<p style="text-align: center;"><b>11</b></p> <input type="checkbox"/> <b>elastic cartilage</b>	<p><b>location:</b> external ear; epiglottis of the larynx</p> <p><b>structure:</b> contains abundant</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> elastic fibers (branching)</li> <li><input type="checkbox"/> lacunae</li> <li><input type="checkbox"/> chondrocytes</li> </ul> <p><b>function:</b> maintains structure and shape while permitting flexibility</p>	P. 107 TABLE 4.9C; DESCRIBED: PP. 103–104

# Activity 2

## MUSCLE TISSUES

TABLE 2-3. Types of muscle tissue ( <i>3 tissues to identify</i> )		
NAME	BODY LOCATIONS/STRUCTURES	TEXT REFERENCES AND SKETCH
<p><b>1</b></p> <p><input type="checkbox"/> <b>smooth muscle</b></p>	<p><b>location:</b> walls of hollow internal organs: vessels, airways, stomach, bladder, and uterus</p> <p><b>structure:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> muscle fiber (spindle-shaped)</li> <li><input type="checkbox"/> nucleus (centrally located)</li> </ul> <p><b>function:</b> involuntary movements and motion; moves materials through internal organs</p>	<p>P. 111 TABLE 4.12C; DESCRIBED: P. 109</p>
<p><b>2</b></p> <p><input type="checkbox"/> <b>skeletal muscle</b></p>	<p><b>location:</b> attaches to bones or sometimes skin</p> <p><b>structure:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> muscle fiber (long, cylindrical, unbranched)</li> <li><input type="checkbox"/> nuclei (multiple per fiber)</li> <li><input type="checkbox"/> striations</li> </ul> <p><b>function:</b> moves skeleton; responsible for voluntary body movements, locomotion, and heat production</p>	<p>P. 110 TABLE 4.12A; DESCRIBED: P. 109</p>
<p><b>3</b></p> <p><input type="checkbox"/> <b>cardiac muscle</b></p>	<p><b>location:</b> heart wall (myocardium)</p> <p><b>structure:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> muscle fiber (or cardiomyocyte) short, branched</li> <li><input type="checkbox"/> nucleus (one per cell)</li> <li><input type="checkbox"/> striations</li> <li><input type="checkbox"/> intercalated discs (between cells)</li> </ul> <p><b>function:</b> involuntary contraction and relaxation; pumps blood in the heart</p>	<p>P. 110 TABLE 4.12B; DESCRIBED: P. 109</p>

## NERVOUS TISSUE

TABLE 2-4. Nervous tissue ( <i>1 tissue to identify</i> )		
NAME	BODY LOCATIONS/ STRUCTURES	TEXT REFERENCES AND SKETCH
<p style="text-align: center;"><b>1</b></p> <p><input type="checkbox"/> <b>nervous tissue</b> (from multipolar neuron smear slide)</p>	<p><b>location:</b> brain, spinal cord, peripheral nervous tissue</p> <p><b>structure:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> neuron</li> <li><input type="checkbox"/> soma (cell body)</li> <li><input type="checkbox"/> axon</li> <li><input type="checkbox"/> dendrites</li> <li><input type="checkbox"/> neuroglia (glial cells)</li> </ul> <p><b>function:</b> control and communication between tissues</p>	<p>P. 112 TABLE 4.13; DESCRIBED: P. 111</p>

# Activity 2

## INTEGUMENTARY SYSTEM

Skin and accessory structures

TABLE 2-5. Integumentary system

STRUCTURES TO IDENTIFY ON SKIN MODEL AND/OR SLIDES	TEXT REFERENCES
Layers of the <b>skin/integument/cutaneous membrane</b> , from superficial to deep:	P. 119; FIG. 5.1; TABLE 5.2
<input type="checkbox"/> <b>EPIDERMIS</b> —most superficial layer; keratinized stratified squamous epithelium	
<input type="checkbox"/> Layers of the epidermis: from apical <b>surface to basement membrane</b>	P. 121; FIG. 5.2
<input type="checkbox"/> stratum corneum	
<input type="checkbox"/> stratum lucidum (thick skin only)	
<input type="checkbox"/> stratum granulosum	
<input type="checkbox"/> stratum spinosum	
<input type="checkbox"/> epidermal dendritic (Langerhans) cells	
<input type="checkbox"/> stratum basale	
<input type="checkbox"/> melanocytes	
<input type="checkbox"/> keratinocytes	
<input type="checkbox"/> epidermal ridges	
<input type="checkbox"/> <b>DERMIS</b> —deep to the epidermis	P. 126; FIG. 5.6
<input type="checkbox"/> papillary layer (areolar connective tissue)	
<input type="checkbox"/> dermal papillae	
<input type="checkbox"/> reticular layer (dense irregular connective tissue)	
<input type="checkbox"/> hair follicles	
<input type="checkbox"/> arrector pili muscles	
<input type="checkbox"/> sebaceous (oil) glands	
<input type="checkbox"/> sudoriferous (sweat) glands	
<input type="checkbox"/> apocrine sweat gland	
<input type="checkbox"/> merocrine or eccrine sweat gland	
<input type="checkbox"/> sensory receptors	
<input type="checkbox"/> tactile (sensory) receptor <i>or</i> Meissner's corpuscle	
<input type="checkbox"/> lamellated (pacinian) corpuscle	
<input type="checkbox"/> <b>HYPODERMIS OR SUBCUTANEOUS LAYER</b> (not part of the integument proper)—areolar connective tissue and adipose tissue; often called superficial fascia	

# Activity 2

## STUDY AIDS FOR HISTOLOGY AND INTEGUMENT

Helpful terms for Histology and Integument

TERMS	DESCRIPTION
<b>lumen</b>	the space inside a structure, such as where blood is transported within a blood vessel
<b>cilia</b>	motile hair-like extension of a cell surface
<b>microvilli</b>	small folds projecting on the apical surface of certain types of epithelial cells, especially those of the small intestine
<b>goblet cells</b>	unicellular epithelial gland cells that secrete mucus
<b>lacunae</b>	cavity or depression
<b>canaliculi</b>	small passageways
<b>papilla</b>	nipple-like projection

Useful etymology for Histology and Integument

PREFIX/SUFFIX	DESCRIPTION
<b>epi-</b>	upon, on
<b>derm-</b>	skin
<b>sub-</b>	under
<b>myo-</b>	muscle
<b>pseudo-</b>	false
<b>trans-</b>	across
<b>vas-</b>	vessel
<b>inter-</b>	between
<b>intra-</b>	within
<b>micro-</b>	small
<b>osteo-</b>	bone
<b>chondro-</b>	cartilage
<b>-blast</b>	embryonic, immature cell
<b>-clast</b>	to break
<b>-cyte</b>	cell
<b>peri-</b>	around