

ACTIVITY



HISTOLOGY AND INTEGUMENT

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"> • 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 2-1. Types of epithelial tissues (*10 tissues to identify*)

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

Histology and Integument

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

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

Activity 2

TABLE 2-1. Types of epithelial tissues (<i>10 tissues to identify</i>)		
NAME	BODY LOCATIONS/STRUCTURES	TEXT REFERENCES & SKETCH
<p>simple columnar epithelium</p> <p><input type="checkbox"/> ciliated 6</p> <p><input type="checkbox"/> non-ciliated 7</p>	<p>location: lining of most of the digestive tract (non-ciliated); lining of uterine tubes (ciliated)</p> <p>structure: single layer of tall, narrow cells; oval shaped nucleus in the basal region of cells</p> <ul style="list-style-type: none"> <input type="checkbox"/> basement membrane <input type="checkbox"/> apical surface <input type="checkbox"/> basal surface <input type="checkbox"/> goblet cells <input type="checkbox"/> cilia (when present) <p>function: 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"/> stratified columnar epithelium 8</p>	<p>location: rare, found in large ducts of some exocrine glands and in some regions of the male urethra</p> <p>structure: two or more layers of cells; cells at the apical surface are columnar</p> <ul style="list-style-type: none"> <input type="checkbox"/> basement membrane <input type="checkbox"/> basal surface <input type="checkbox"/> apical surface <p>function: protection and secretion</p>	<p>P. 90 TABLE 4.3D; DESCRIBED: P. 91</p>
<p><input type="checkbox"/> pseudostratified columnar epithelium 9</p>	<p>location: ciliated form lines most of the respiratory tract</p> <p>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</p> <ul style="list-style-type: none"> <input type="checkbox"/> basement membrane <input type="checkbox"/> apical surface <input type="checkbox"/> basal surface <input type="checkbox"/> cilia <input type="checkbox"/> goblet cells <p>function: 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"/> transitional epithelium </div> </div>	<p>location: lining of urinary bladder, ureters, and part of urethra</p> <p>structure: 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"> <input type="checkbox"/> basement membrane <input type="checkbox"/> apical surface <input type="checkbox"/> basal surface <p>function: distention and relaxation to accommodate urine volume changes in the bladder, ureters, and urethra</p>	<p>P. 91 TABLE 4.3E; DESCRIBED: P. 91</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
CONNECTIVE TISSUES PROPER	FLUID CONNECTIVE TISSUE (1 tissue)	<p><input type="checkbox"/> blood ¹</p> <p>location: within blood vessels (arteries, veins, and capillaries), and the heart</p> <p>structure: contains</p> <ul style="list-style-type: none"> <input type="checkbox"/> erythrocytes <input type="checkbox"/> leukocytes <input type="checkbox"/> platelets <input type="checkbox"/> plasma (matrix) <p>function: 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>	P. 108, TABLE 4.11; DESCRIBED: P. 105
	LOOSE CONNECTIVE TISSUES (3 tissues): generally have a loose association of fibers in extracellular matrix	<input type="checkbox"/> areolar connective tissue ²	<p>location: subcutaneous layer; surrounding organs</p> <p>structure: vascular, matrix is gel-like with</p> <ul style="list-style-type: none"> <input type="checkbox"/> fibroblasts <input type="checkbox"/> collagen fibers <input type="checkbox"/> elastic fibers <input type="checkbox"/> ground substance <p>function: surrounds and protects tissues and organs; loosely binds epithelium to deeper tissues; provides nerve and blood vessel packing</p>
<input type="checkbox"/> reticular connective tissue ³		<p>location: forms stroma of lymph nodes, spleen, thymus, and bone marrow</p> <p>structure: ground substance is gel-like liquid; scattered arrangement of</p> <ul style="list-style-type: none"> <input type="checkbox"/> reticular fibers <input type="checkbox"/> extracellular matrix <p>function: provides supportive framework for spleen, lymph nodes, thymus, and bone marrow</p>	P. 103 TABLE 4.7C; DESCRIBED: P. 101
<input type="checkbox"/> adipose connective tissue ⁴		<p>location: subcutaneous layer; covers and surrounds some organs</p> <p>structure: closely packed</p> <ul style="list-style-type: none"> <input type="checkbox"/> adipocytes, with nucleus squeezed to one side <input type="checkbox"/> lipid vacuole (fat droplet) <p>function: stores energy; protects, cushions, and insulates</p>	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
CONNECTIVE TISSUES PROPER DENSE CONNECTIVE TISSUES (3 tissues): generally have a dense association of fibers in the extracellular matrix	5	<input type="checkbox"/> dense regular connective tissue	location: forms tendons, most ligaments structure: <ul style="list-style-type: none"> <input type="checkbox"/> collagen fibers (densely packed, parallel) <input type="checkbox"/> fibroblast nuclei <input type="checkbox"/> 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
	6	<input type="checkbox"/> elastic connective tissue	location: walls of elastic arteries; trachea; bronchial tubes; true vocal cords; suspensory ligaments of penis structure: <ul style="list-style-type: none"> <input type="checkbox"/> elastic fibers (parallel) <input type="checkbox"/> fibroblast nuclei <input type="checkbox"/> ground substance function: allows stretching of some organs	P. 105 TABLE 4.8C; DESCRIBED: P. 101
	7	<input type="checkbox"/> dense irregular connective tissue	location: dermis; periosteum covering bone; perichondrium covering cartilage, organ capsules structure: <ul style="list-style-type: none"> <input type="checkbox"/> collagen fibers (bundled; randomly arranged) <input type="checkbox"/> fibroblasts <input type="checkbox"/> ground substance (more than in dense regular connective tissue) function: withstands stresses in all directions; durable	P. 104 TABLE 4.8B; DESCRIBED: P. 101

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)	<input type="checkbox"/> 8 <input type="checkbox"/> compact bone	location: exterior of bones of the body structure: calcified matrix arranged in <ul style="list-style-type: none"> <input type="checkbox"/> osteons <input type="checkbox"/> osteocytes in lacunae <input type="checkbox"/> lamellae (concentric) <input type="checkbox"/> central canal <input type="checkbox"/> 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)	<input type="checkbox"/> 9 <input type="checkbox"/> hyaline cartilage	location: most of fetal skeleton; covers articular ends of long bones; costal cartilage; most of the larynx, trachea, and nose structure: <ul style="list-style-type: none"> <input type="checkbox"/> extracellular matrix <input type="checkbox"/> lacunae <input type="checkbox"/> chondrocytes <input type="checkbox"/> 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
		<input type="checkbox"/> 10 <input type="checkbox"/> fibrocartilage	location: intervertebral discs; pubic symphysis; menisci of knee joint structure: <ul style="list-style-type: none"> <input type="checkbox"/> collagen fibers (parallel) <input type="checkbox"/> extracellular matrix <input type="checkbox"/> lacunae <input type="checkbox"/> chondrocytes function: resists compression; absorbs shock in some joints	P. 106 TABLE 4.9B; DESCRIBED: P. 103
		<input type="checkbox"/> 11 <input type="checkbox"/> elastic cartilage	location: external ear; epiglottis of the larynx structure: contains abundant <ul style="list-style-type: none"> <input type="checkbox"/> elastic fibers (branching) <input type="checkbox"/> lacunae <input type="checkbox"/> chondrocytes function: maintains structure and shape while permitting flexibility	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>1</p> <input type="checkbox"/> smooth muscle	<p>location: walls of hollow internal organs: vessels, airways, stomach, bladder, and uterus</p> <p>structure:</p> <ul style="list-style-type: none"> <input type="checkbox"/> muscle fiber (spindle-shaped) <input type="checkbox"/> nucleus (centrally located) <p>function: involuntary movements and motion; moves materials through internal organs</p>	<p>P. 111 TABLE 4.12C; DESCRIBED: P. 109</p>
<p>2</p> <input type="checkbox"/> skeletal muscle	<p>location: attaches to bones or sometimes skin</p> <p>structure:</p> <ul style="list-style-type: none"> <input type="checkbox"/> muscle fiber (long, cylindrical, unbranched) <input type="checkbox"/> nuclei (multiple per fiber) <input type="checkbox"/> striations <p>function: moves skeleton; responsible for voluntary body movements, locomotion, and heat production</p>	<p>P. 110 TABLE 4.12A; DESCRIBED: P. 109</p>
<p>3</p> <input type="checkbox"/> cardiac muscle	<p>location: heart wall (myocardium)</p> <p>structure:</p> <ul style="list-style-type: none"> <input type="checkbox"/> muscle fiber (or cardiomyocyte) short, branched <input type="checkbox"/> nucleus (one per cell) <input type="checkbox"/> striations <input type="checkbox"/> intercalated discs (between cells) <p>function: 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;">1</p> <p><input type="checkbox"/> nervous tissue (from multipolar neuron smear slide)</p>	<p>location: brain, spinal cord, peripheral nervous tissue</p> <p>structure:</p> <ul style="list-style-type: none"> <input type="checkbox"/> neuron <input type="checkbox"/> soma (cell body) <input type="checkbox"/> axon <input type="checkbox"/> dendrites <input type="checkbox"/> neuroglia (glial cells) <p>function: 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 skin/integument/cutaneous membrane , from superficial to deep:	P. 119; FIG. 5.1; TABLE 5.2
<input type="checkbox"/> EPIDERMIS —most superficial layer; keratinized stratified squamous epithelium	
<input type="checkbox"/> Layers of the epidermis: from apical surface to basement membrane	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"/> DERMIS —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"/> HYPODERMIS OR SUBCUTANEOUS LAYER (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
lumen	the space inside a structure, 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

Useful etymology for Histology and Integument

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