

## Histology Learning Objectives for the Anato-Bee

Anato-Bee Learning Objectives were obtained from the American Association for Anatomy, Anatomical Curriculum Task Force, and adapted by the co-founders of the Anato-Bee.

TOPIC	LOCAL OBJECTIVES	REGIONAL OBJECTIVES
<b>Epithelium and Glands</b>	Explain the morphological differences between different types of surface epithelium (number of cell layers, shape of cells, and presence of surface specializations).	
	Correlate the morphology of different types of surface epithelium with their functions.	
	Explain the composition and function of the basement membrane.	
	Explain the structural and functional differences between exocrine and endocrine glands.	Distinguish the types of exocrine glands based on their classification by secreted product, mechanisms of secretion and morphology (merocrine, apocrine, and holocrine secretions).
<b>Connective Tissue</b>	Compare and contrast the different types of connective tissue proper (loose versus dense connective tissue).	Compare and contrast the different types of connective tissue: Connective tissue proper (loose and dense connective tissue) versus specialized connective tissue (adipose, blood, bone).
	Define the extracellular matrix, including its locations and functions.	
	Describe the basic components of loose connective tissue including cells (fibroblasts, lymphocytes, macrophages) and fibers (collagen, elastic, and reticular).	

TOPIC	LOCAL OBJECTIVES	REGIONAL OBJECTIVES
<b>Cartilage and Bone</b>	Describe the microscopic structure and molecular compositions of the three types of cartilage (hyaline, elastic, fibrocartilage); correlate with their locations and functions.	Explain the processes of chondrogenesis and osteogenesis, identifying the cell types involved and their morphology.
	Identify the three types of bone cells (osteoblasts, osteocytes, and osteoclasts) and describe their morphology, functions, and locations.	Compare the histological composition, locations, and functions of the periosteum vs. endosteum.
	Compare histological structures, locations, and functions of the compact (cortical) vs. spongy (trabecular) bone.	Describe the organization and structure of an osteon (Haversian system) and correlate with its locations and functions.
		Compare histological structures, functions, and locations of primary (woven, immature) vs. secondary (lamellar, mature) bone tissues.
<b>Muscle Tissue</b>	Compare the three different types of skeletal muscle (skeletal, cardiac, and smooth) in terms of histological morphology, function, and typical locations in the body.	Compare the histological organization and contractile mechanisms of cardiac and smooth muscle to those of skeletal muscle.
	Correlate the molecular organization of the sarcomere with its histology and function in the skeletal muscle.	Identify and define neuromuscular junctions.
	Describe the organizational layers of skeletal muscle from muscle bundle to muscle fiber, including their connective tissue coverings.	Compare and contrast the histological structure of muscles to their tendinous attachments.
<b>Nervous Tissue</b>	Describe the structural components of a typical neuron (cell body, dendrites, axons, and axon terminals).	Identify the location and function for neurotransmitter vesicle storage in a neuron.

TOPIC	LOCAL OBJECTIVES	REGIONAL OBJECTIVES
	Describe the three different morphological categories of neurons (multipolar, unipolar, and bipolar), and describe their general locations and functions.	Correlate the histological structures of myelin with their locations (CNS vs. PNS) and their roles in the action potential conduction and its speed.
	Describe the organizational layers within a peripheral nerve including their connective tissue sheaths.	Identify the different types of glial cells in the CNS (astrocytes, oligodendrocytes, microglia, and ependymal cells) and PNS (Schwann cells and satellite cells), and describe their functions in supporting neuronal activity.
<b>Cardiac and Circulatory System</b>	Describe the structural composition of the three histological layers (tunics) of a typical blood vessel.	Compare the histology, locations, and functions of different categories of arteries and veins (large arteries & veins, medium arteries & veins, arterioles and venules, and capillaries).
	Identify the histological features of the three layers of the heart (endocardium, myocardium, epicardium) and correlate with their functions.	
	Identify the types of blood cells in a peripheral blood sample and discuss proportionate population ratios, functions.	Distinguish granulocytes (neutrophils, eosinophils, and basophils) and agranulocytes (lymphocytes, monocytes) by their morphology and explain their functions.
<b>Integumentary System</b>	Describe the two major layers of the skin (epidermis and dermis) and correlate with their histology, location, and function.	Identify the morphology of the major sensory structures of the skin (Pacinian corpuscles, Meissner corpuscles, Merkle cells), their locations in the layers of the skin and functions.
	Correlate the histology of hypodermis with its location, function, and its criteria for exclusion from the skin.	
		Compare the locations and functions of accessory structures

TOPIC	LOCAL OBJECTIVES	REGIONAL OBJECTIVES
		(sweat glands, hair follicles, sensory structures).
<b>Respiratory</b>	Identify and describe the four layers (mucosa, submucosa, hyaline cartilage rings, adventitia) of large conducting airways (trachea and bronchi) including their morphology, location, and function.	Identify and describe the histological organization of the three types of bronchioles (conducting bronchiole, terminal bronchiole, and respiratory bronchiole) including their morphology, location, and function.
	Identify and describe the different cell types within the respiratory zone (type I alveolar cells, type II alveolar cells, alveolar macrophages) including their morphology, location, and function.	Identify and describe the histological organization of the respiratory zone (alveolar ducts and sacs) including their cellular components, morphology, location, and function.
<b>Accessory Organs of Digestion</b>	Distinguish the three major salivary glands (parotid, submandibular, sublingual) based on cellular composition, histological structures (secretory & ductal) and the types of secretions produced.	Identify the histological structure and cellular composition of the pancreas and gallbladder and correlate with their functions.
		Identify the structural organization of the liver (hepatic lobule with hepatic cords, sinusoids, portal triads and central veins) and correlate with its functions.
<b>Gastrointestinal (GI) Tract</b>	Describe the four histological layers of the gut tube (mucosa, submucosa, muscularis, and serosa/adventitia).	Explain the variations in histological layers throughout the length of the GI tract (esophagus, small intestine, large intestine, and appendix); correlate these variations with function.
	Identify components of the enteric nervous system (submucosal and myenteric nerve plexuses) between the histological layers of the gut	Describe the microscopic structure of the stomach, including its layers, distribution of glands, and cell types in the gastric glands.

TOPIC	LOCAL OBJECTIVES	REGIONAL OBJECTIVES
	tube and explain their general function.	
<b>Urinary and Reproductive Systems</b>	Describe the microstructure of the ureter, urinary bladder and urethra and correlate with their location and function.	Describe the microscopic structure of the renal cortex vs. medulla and correlate with functions.
		Describe the histological features of the mammary gland.
	Describe the gross histological organization of the ovary (germinal epithelium, capsule, cortex with follicles, medulla).	Describe histological changes that occur to the female reproductive system with respect to the phases of the ovarian cycle.
	Compare the histology and function of the three layers of the uterine wall (endometrium, myometrium, perimetrium).	
	Describe the microscopic organization of the testis and correlate with its function.	Explain the process of spermatogenesis and describe the features and location of each cell type in seminiferous tubules (spermatogonia, primary spermatocytes, secondary spermatocytes, spermatids).
<b>Lymphoid Organs</b>	Compare the histological organizations, location, and functions of the diffuse lymphoid tissue vs. lymphoid follicles vs. lymphoid organs.	