



# Integumentary System and Histology

## Learning Objectives

- Identify key tissues with a microscope
- Learn the basic structure-function relationships of general body tissues

## Introduction

In this section you will learn to identify the four basic groups of tissue: epithelial, connective, muscular, and nervous. As you learn each tissue type identify why that specific tissue type is found in that location and then how it is directly related to its function and physiology.

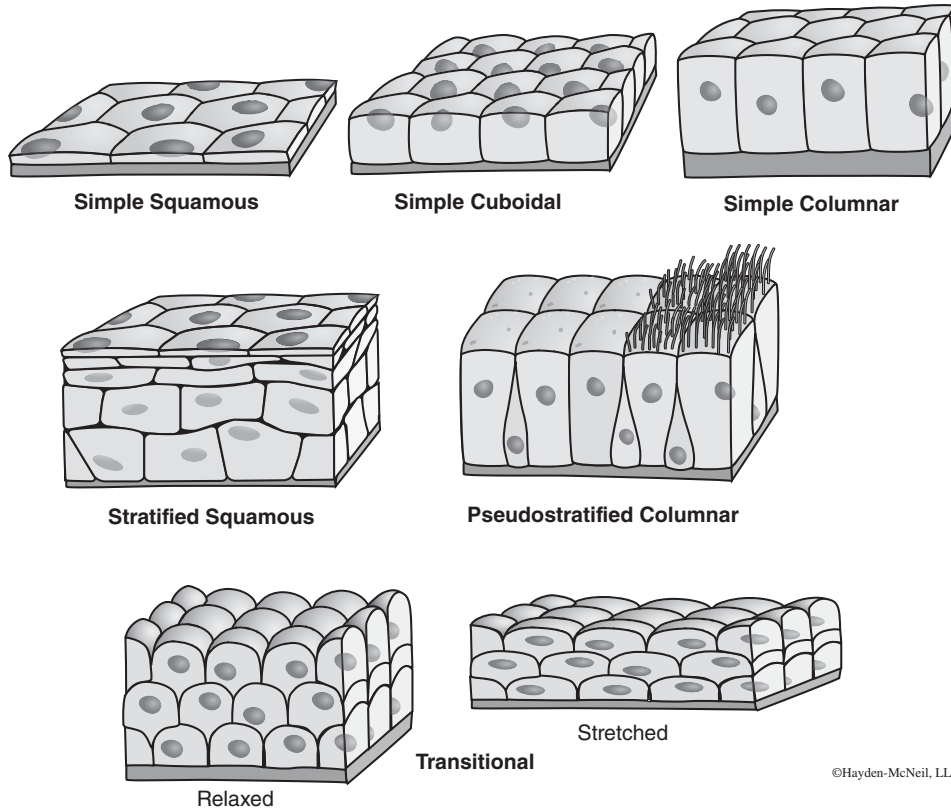
Within this section you will find labeled representative photos of each tissue type at 4 $\times$ , 10 $\times$ , and 40 $\times$  magnification. One of the keys to learning histology is identifying what is unique about each type of tissue, key characteristics that make it look different from the other tissues. When you look at the slides your first thought may be that they all look the same or that what you are looking at looks nothing like the example in the picture. At this point you have to create a mental image of what makes them unique. To help with this process, we have included areas next to each representative picture that you will use to draw what you are seeing for each tissue at each magnification.

It is also a good idea to take pictures of what you are viewing and use those pictures to make your own note cards to study from. It is also good to study in groups; have one person set up the microscope without the second person knowing what is being set up, and then the second person tries to identify the tissue.

The main key to learning histology is repetition. Look at lots of different slides and pictures and look at them often. This is not a test you can cram for!

## Terminology

CELL LAYERS	DEFINITION
SIMPLE	
STRATIFIED	
PSEUDOSTRATIFIED	
SHAPE OF CELLS	DEFINITION
SQUAMOUS	
CUBOIDAL	
COLUMNAR	



©Hayden-McNeil, LLC

**Notes:**

---



---



---



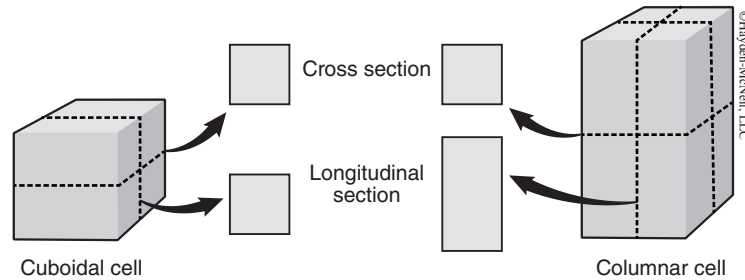
---



---

**TISSUE SECTIONS**

When tissues are cut to make the slides they are cut in one of two major ways: cross section (CS) or longitudinal section (LS). It is important to know what view you are looking at. For example, a cross section view of a cuboidal cell and columnar cell both look cuboidal from the surface. This is typically labeled on the slide if it is a consideration.



Which one is cuboidal and which is columnar (CS) view? Versus the (LS) where it is obvious.

**Notes:**

---

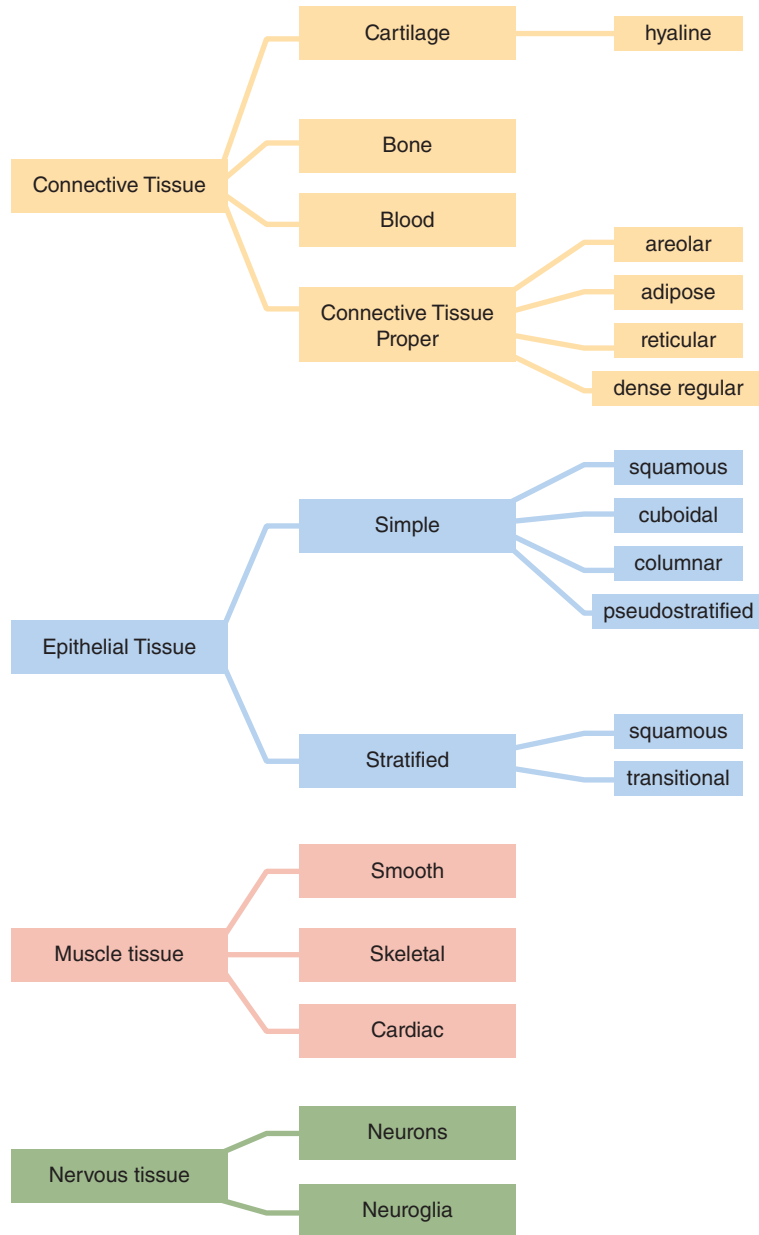
---

---

---

---

## Tissue Flowchart



**Notes:**

---



---



---



---



---

## Testing

In this histology section, you will be introduced to the tissues that will be covered in this Anatomy and Physiology course. Within this section, you will look at a few specific tissue types at the microscopic level and will be responsible for being able to identify these tissues/cells, common locations, and functions. In each following section through AP 1 and AP 2, we will cover different body systems and their representative tissues. For each of these sections, you will again be responsible for the identification, locations, and functions of those tissues or cell types within the tissues.

**Notes:**

---

---

---

---

---

## Epithelial Tissue

The following are the main types of epithelial tissues:

TISSUE TYPE	LOCATIONS TISSUE IS FOUND	FUNCTION
SIMPLE SQUAMOUS		
SIMPLE CUBOIDAL		
SIMPLE COLUMNAR*		
STRATIFIED SQUAMOUS		
PSEUDOSTRATIFIED COLUMNAR*		
TRANSITIONAL*		

\*These tissues will be covered in other sections in full detail. At this point, you should be familiar with all of them, location and function. Details of these tissues/cells are in subsequent chapters.

### Notes:

---



---



---



---



---

The key to identifying many of the epithelial tissues is knowing where on the slide to look for the specific cell type. Remember that these slides are cross sections through a tissue or organ, and by definition a tissue or organ is made up of multiple cell types.

### General Characteristics of Epithelial Tissues

- Epithelial tissues line surfaces. Most of the time the cells you are looking for are on the outside of the tissue layers on any tissue slide you are looking at.
- The shapes of the cells are just a general characteristic. Don't take it too literally!
  - Cuboidal cells do not have to be exactly square. In general, their sides will be reasonably equal. But just because their shape is not exactly the same height and width, it still may be a cuboidal cell.
  - This holds true for all cell types.
- Regeneration
- Generalized functions
  - Barriers such as:
    - Keeping things out of the body (stratified squamous)
    - Keeping things in the body (fluids) to prevent dehydration (stratified squamous)
  - Absorption of nutrients in the digestive tract (columnar epithelium)
  - Excretion (cuboidal cells) in glands
  - Diffusion (simple squamous) in the lungs and other capillary beds

#### Notes:

---

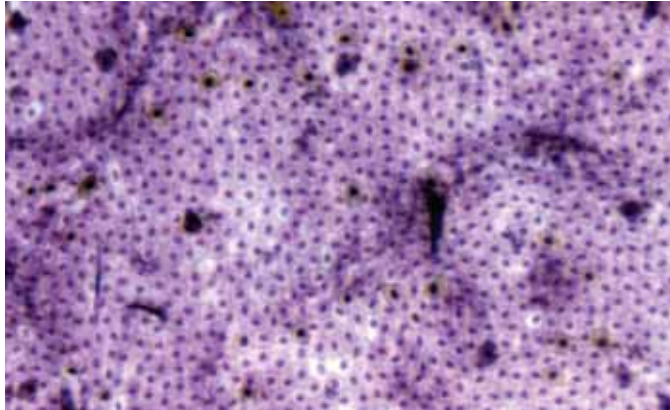
---

---

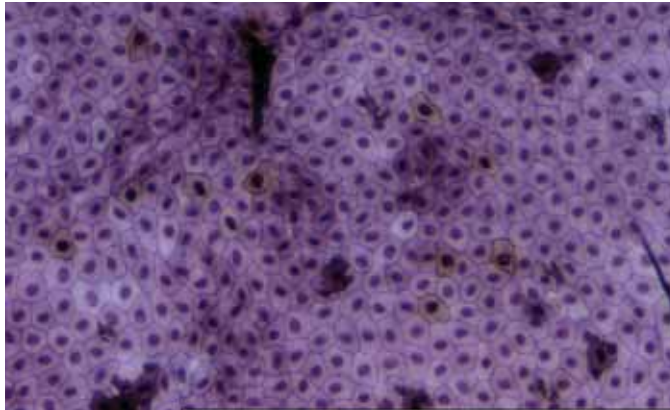
---

---

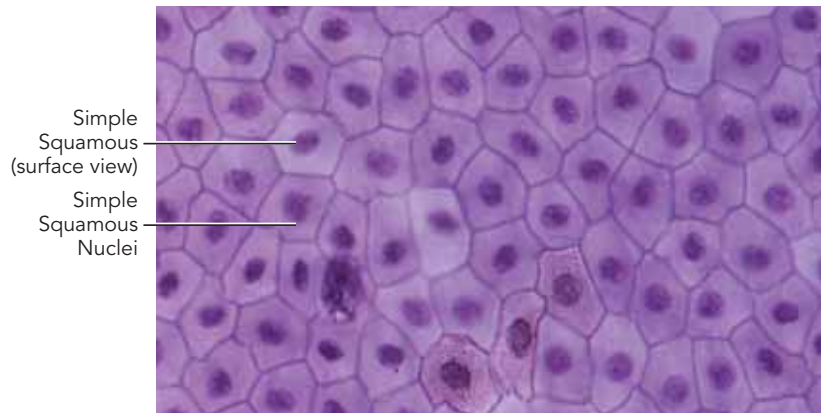
## Simple Squamous (Surface View)



(4× magnification)



(10× magnification)



(40× magnification)

### Notes:

---

---

---

---

---



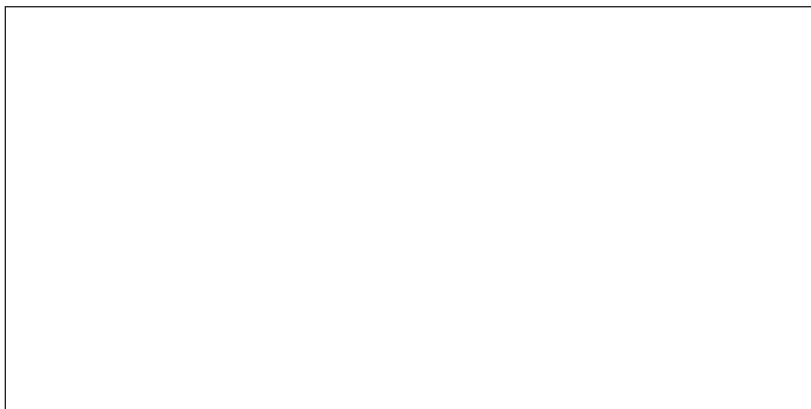
## Simple Squamous Drawings



(4× magnification)



(10× magnification)



(40× magnification)

### Notes:

---

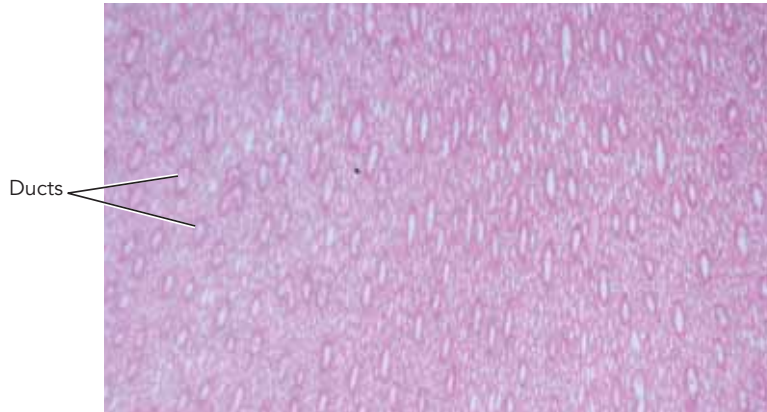
---

---

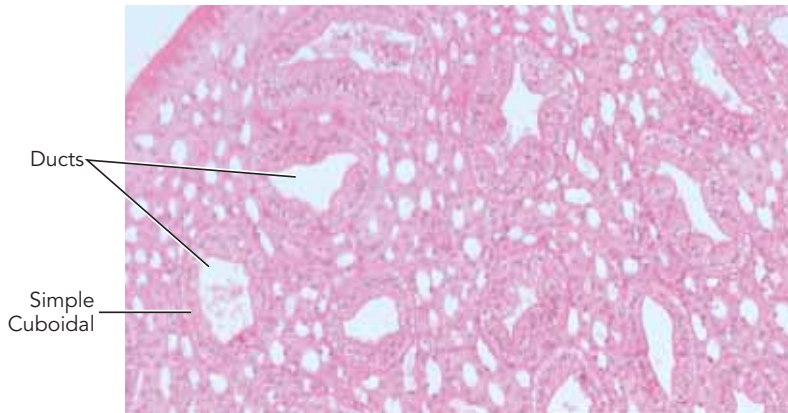
---

---

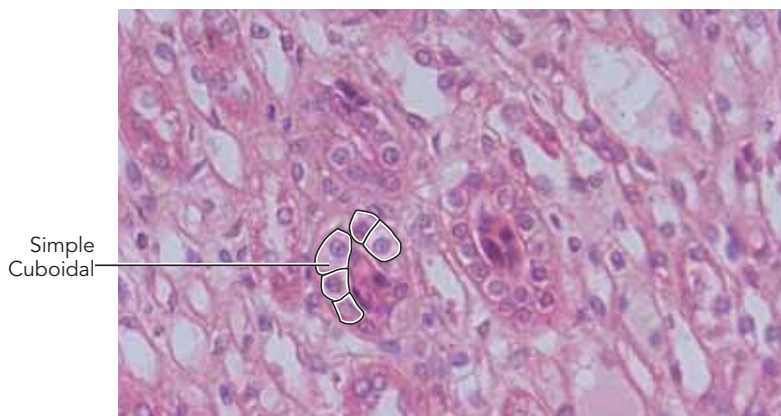
## Simple Cuboidal



(4× magnification)



(10× magnification)



(40× magnification)

### Notes:

---

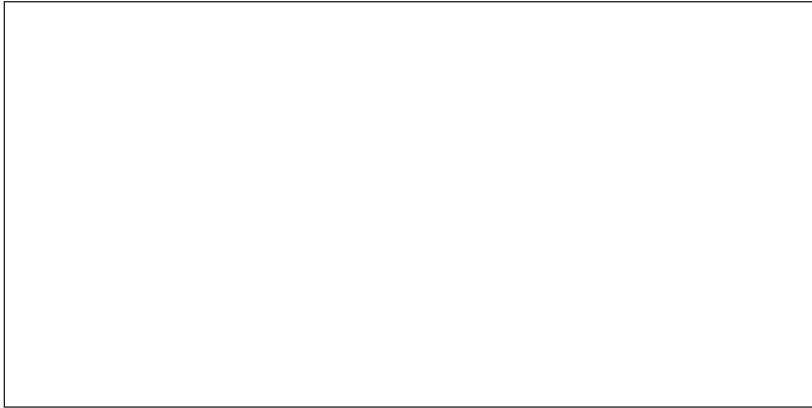
---

---

---

---

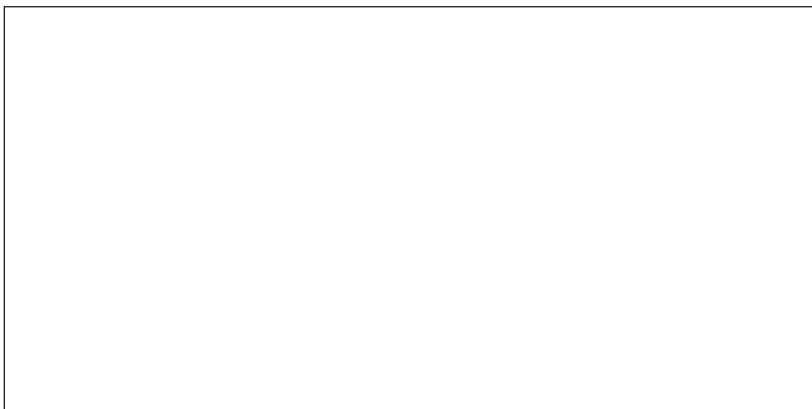
## Simple Cuboidal Drawings



(4× magnification)



(10× magnification)



(40× magnification)

### Notes:

---

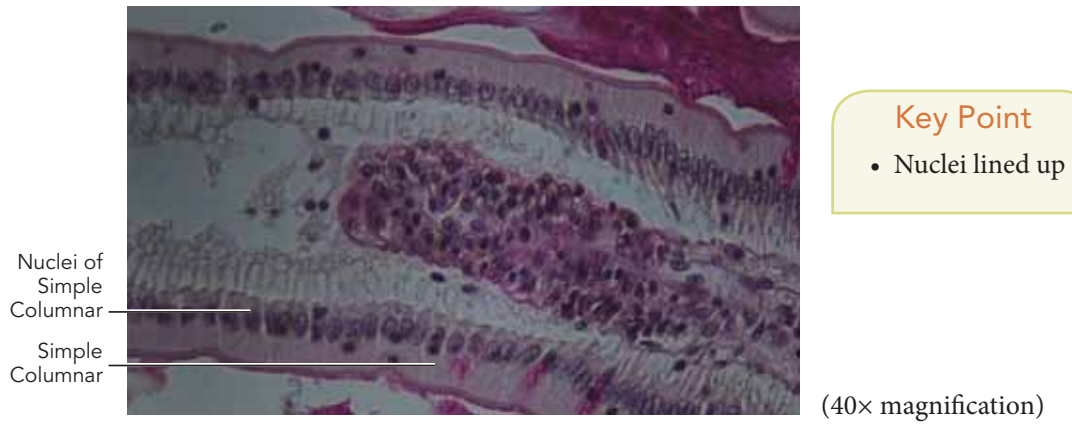
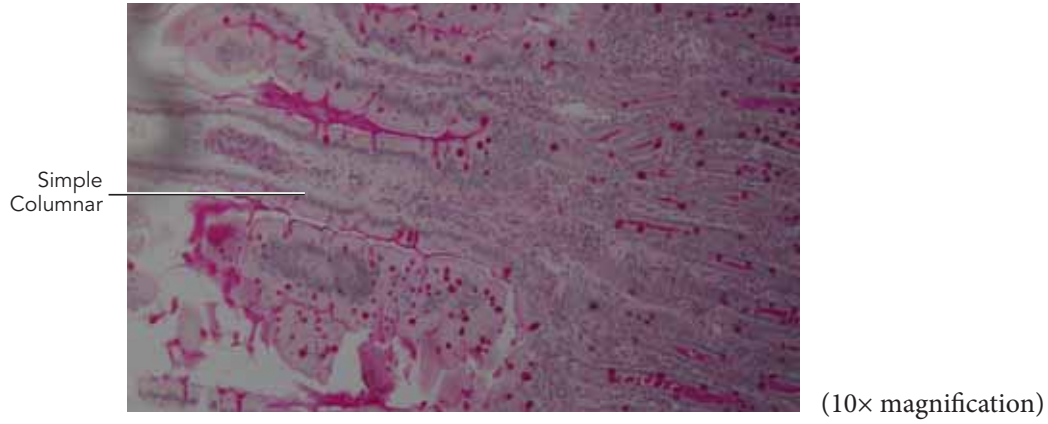
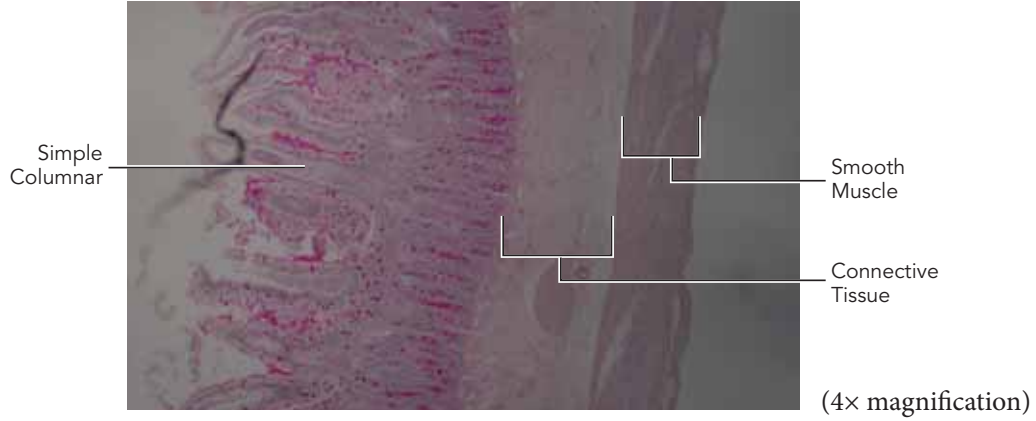
---

---

---

---

## Simple Columnar



### Notes:

---

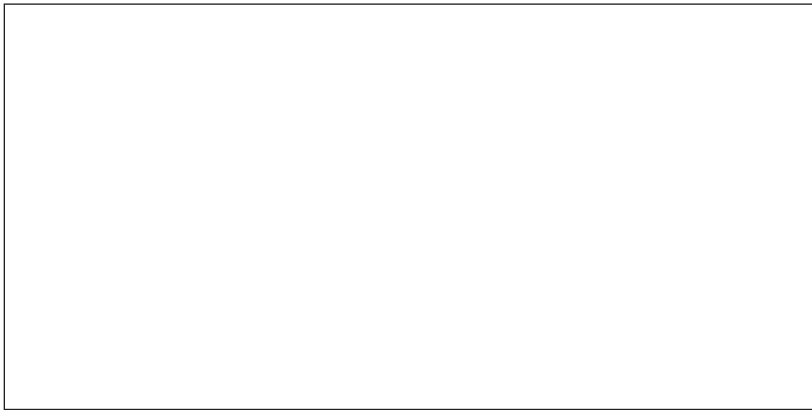
---

---

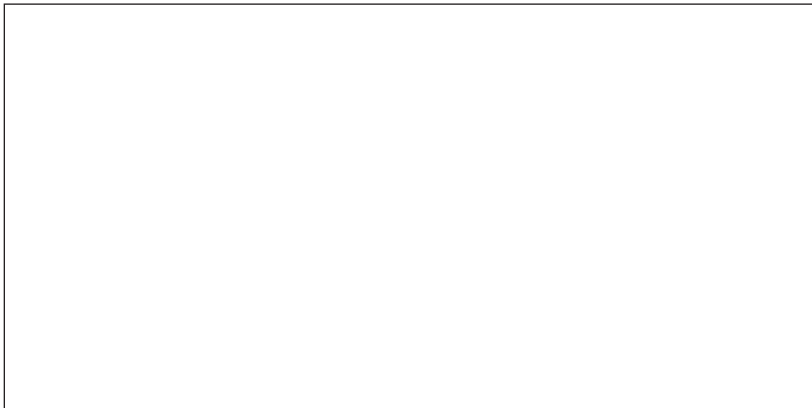
---

---

## Simple Columnar Drawings



(4× magnification)



(10× magnification)



(40× magnification)

**Notes:**

---

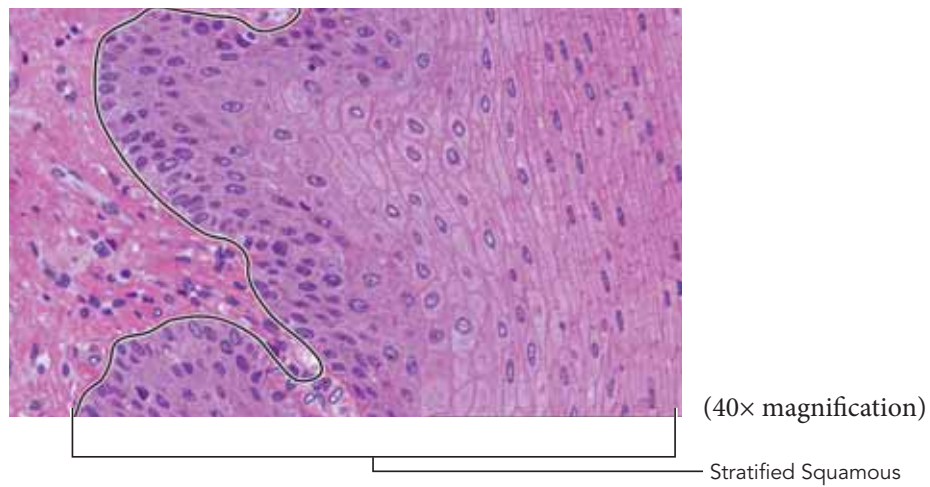
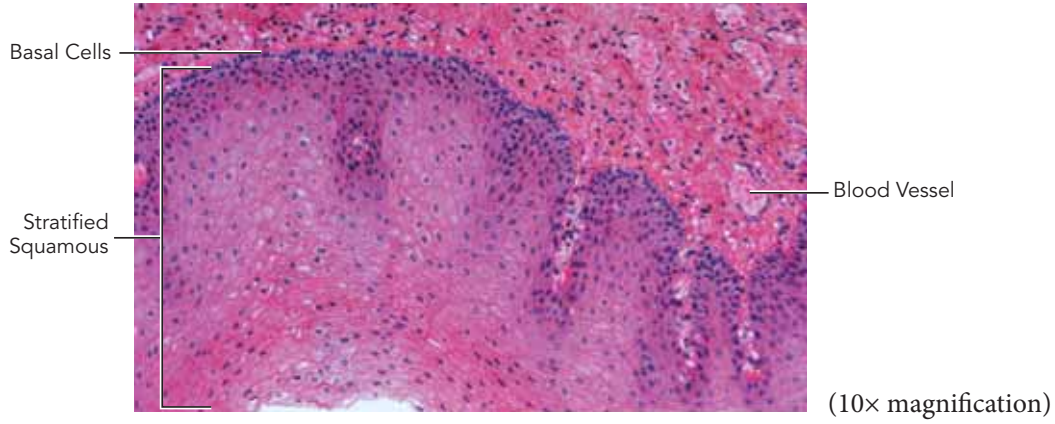
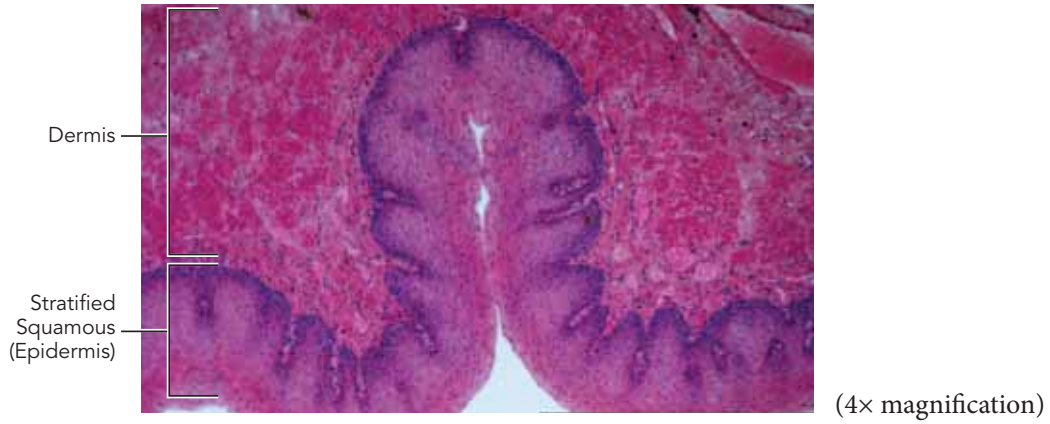
---

---

---

---

## Stratified Squamous



### Notes:

---

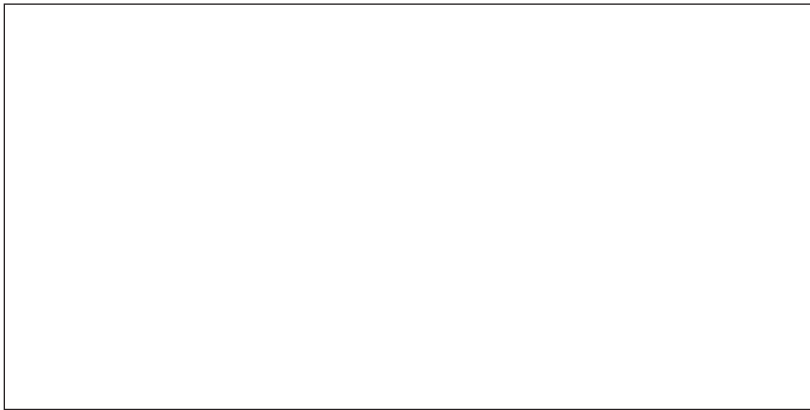
---

---

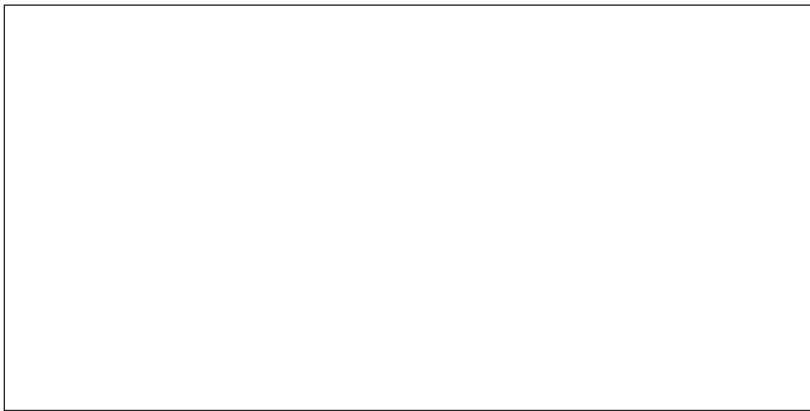
---

---

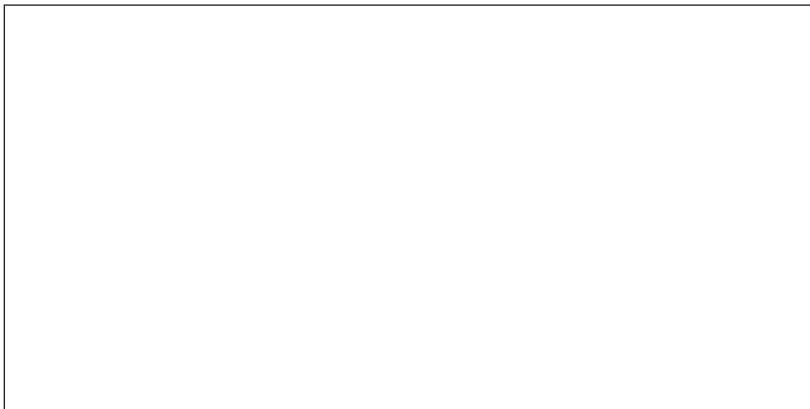
## Stratified Squamous Drawings



(4× magnification)



(10× magnification)



(40× magnification)

### Notes:

---

---

---

---

---



**Notes:**

---

---

---

---

---



## Connective Tissue

Within this section we will cover tissues that have such functions as holding structures together, separating a group of structures from another, support, protection, and storage. As with the other sections, this is not a comprehensive list of all connective tissues, but a sample of each major area.

The following are the main types of connective tissues:

TISSUE TYPE	LOCATIONS TISSUE IS FOUND	FUNCTIONS
AREOLAR		
DENSE REGULAR*		
ADIPOSE		
RETICULAR*		
HYALINE*		
COMPACT BONE*		
SPONGY BONE*		
BLOOD*		

\*These tissues will be covered in other sections in full detail. At this point, you should be familiar with all of them, location and function. Details of these tissues/cells are in subsequent chapters.

### Notes:

---



---



---



---

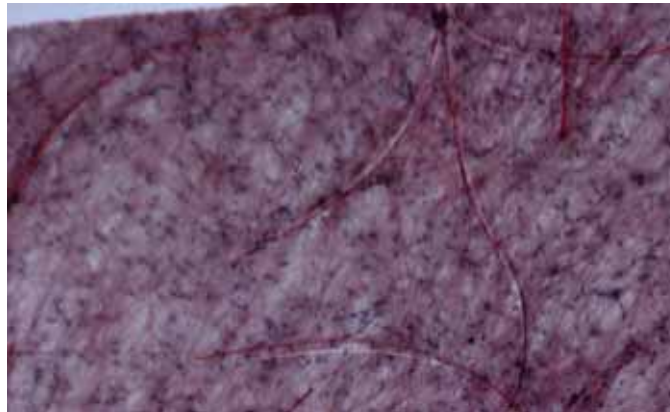


---

## Areolar (Loose)

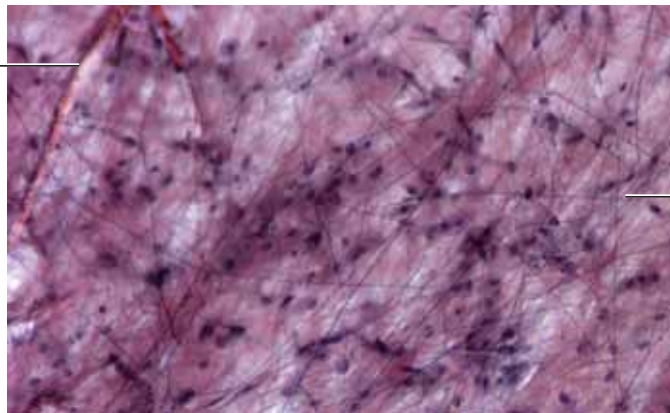
### Key Points

- Collagen: thick fibers
- Elastic: thin, straight fibers
- Reticular: thin, curly, kinky fibers



(4× magnification)

Collagen Fiber

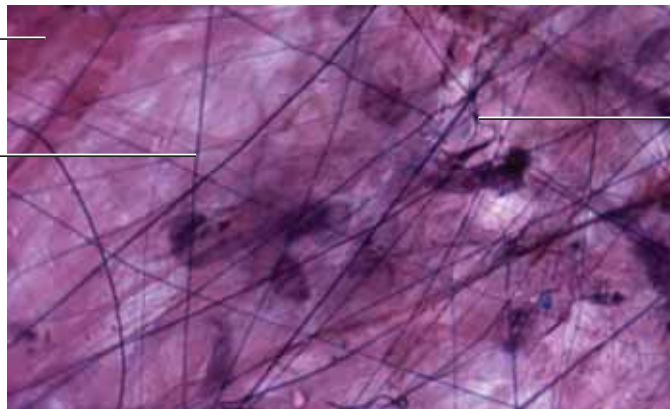


Elastic Fiber

(10× magnification)

Collagen Fiber

Elastic Fiber



Reticular Fibers  
(curly fibers)

(40× magnification)

### Notes:

---

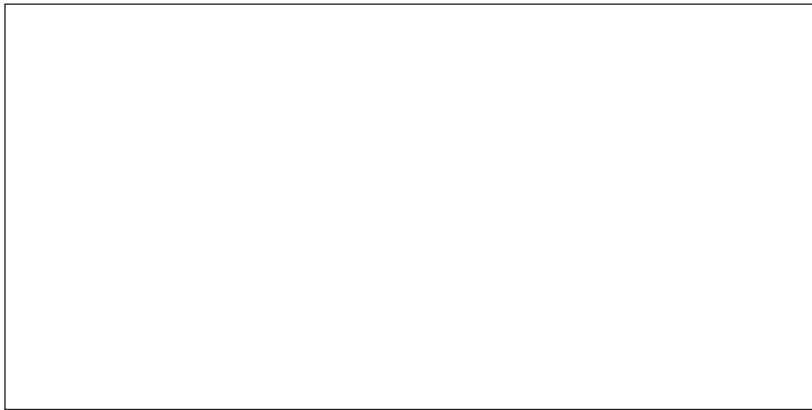
---

---

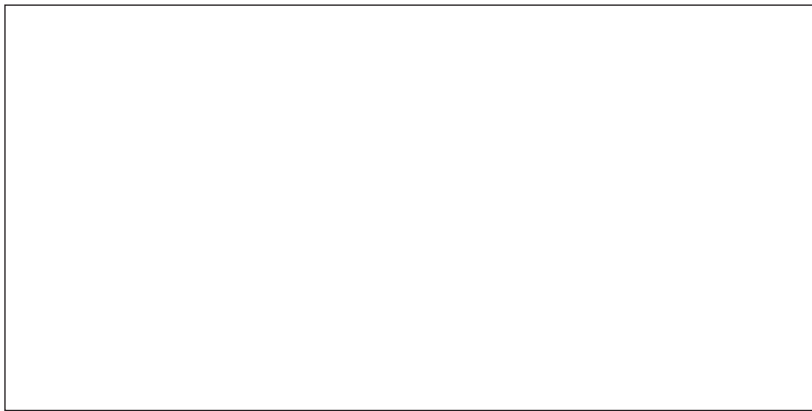
---

---

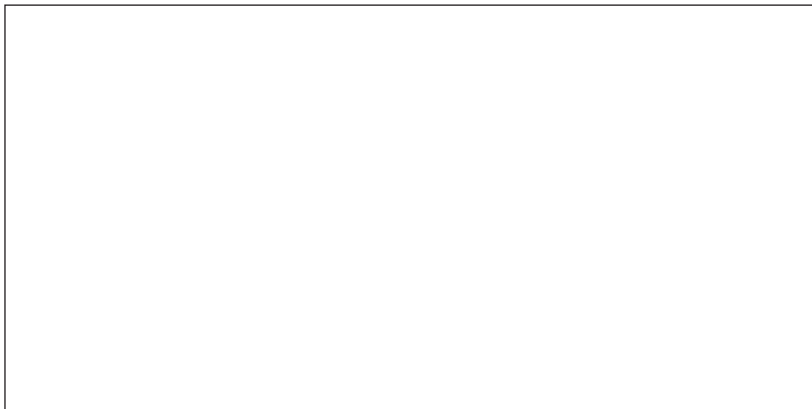
## Areolar Drawings



(4× magnification)



(10× magnification)



(40× magnification)

### Notes:

---

---

---

---

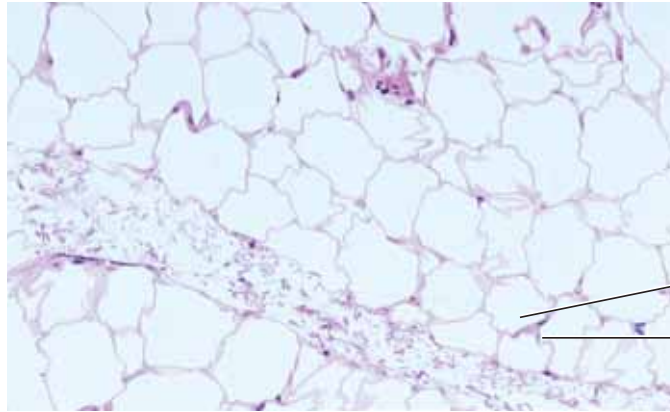
---

## Adipose (Fat)



Adipose  
Nuclei of Adipose

(4x magnification)



Adipose  
Nuclei of Adipose

(10x magnification)



Adipose  
Nuclei of Adipose

(40x magnification)

### Notes:

---

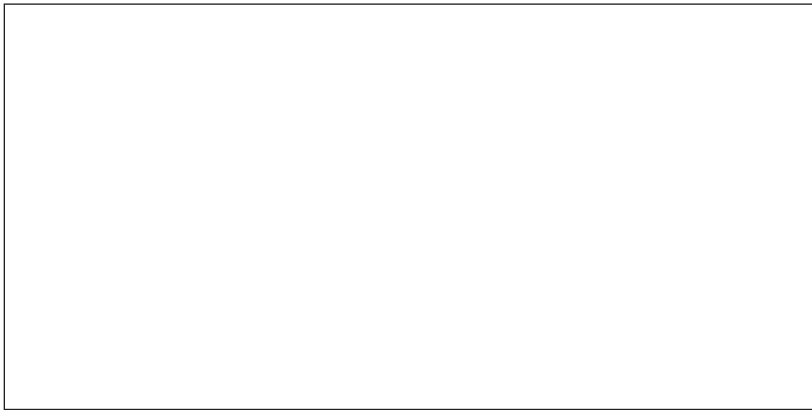
---

---

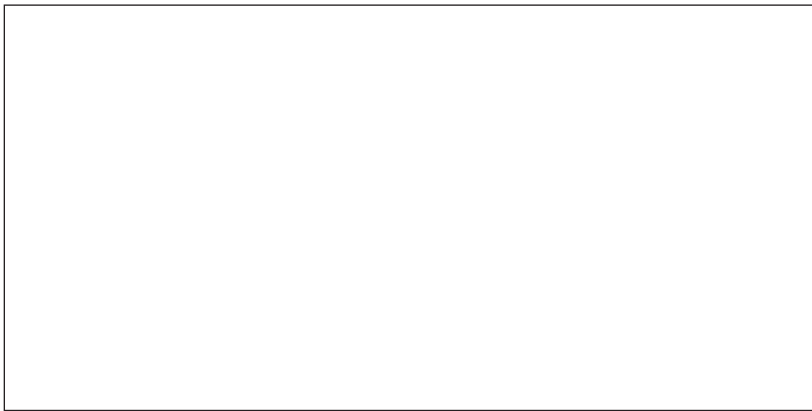
---

---

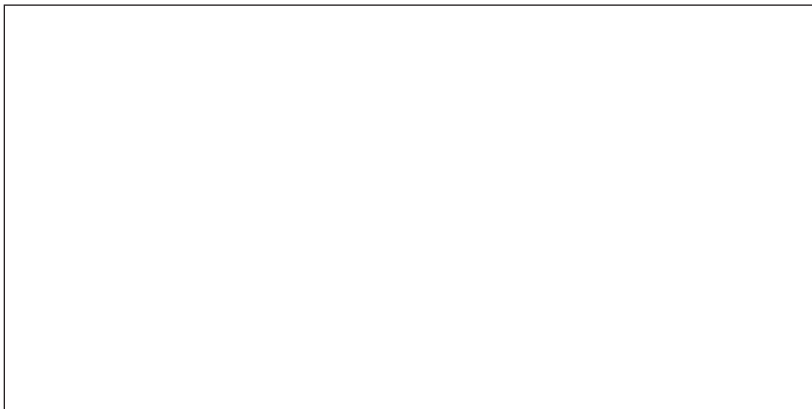
## Adipose Drawings



(4× magnification)



(10× magnification)



(40× magnification)

### Notes:

---

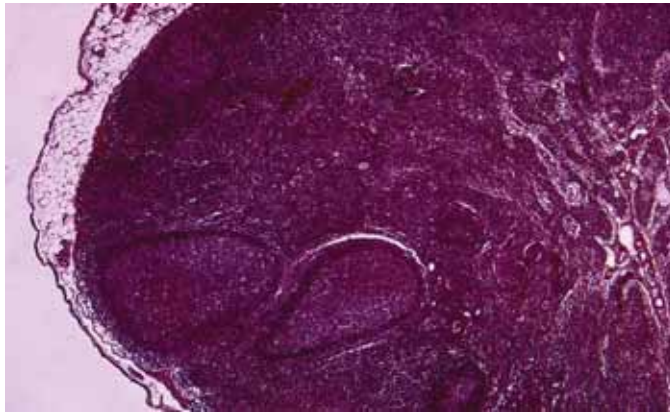
---

---

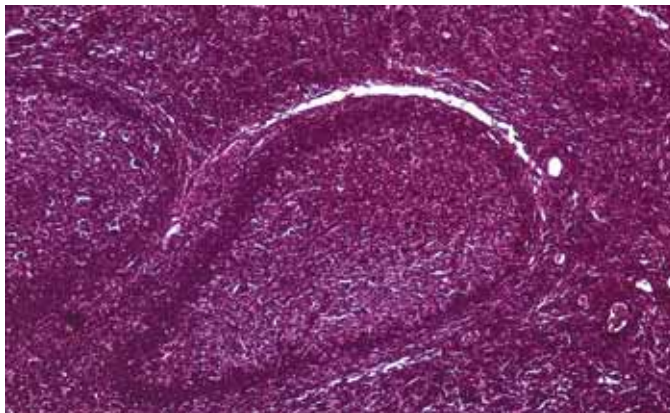
---

---

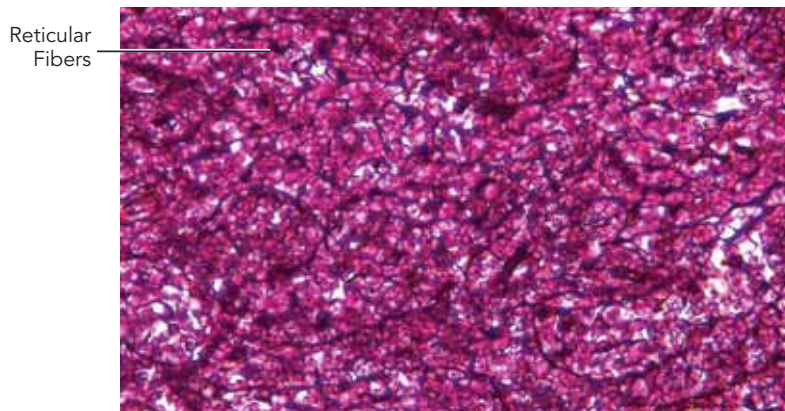
## Reticular



(4× magnification)



(10× magnification)



(40× magnification)

### Notes:

---

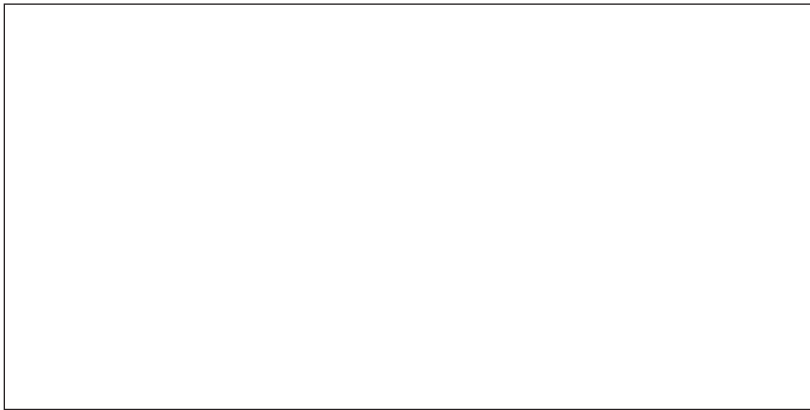
---

---

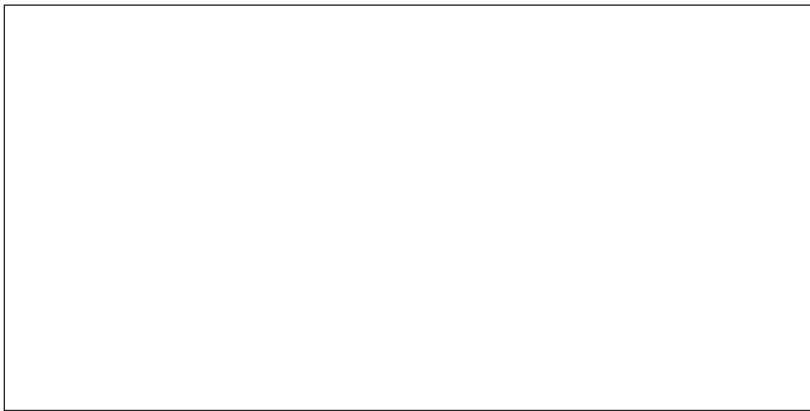
---

---

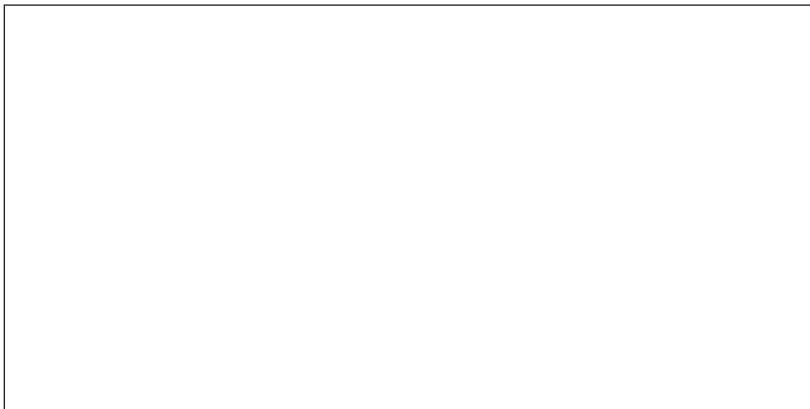
## Reticular Drawings



(4× magnification)



(10× magnification)



(40× magnification)

### Notes:

---

---

---

---

---

## Skin

Label the following structures on the models on the following three pages.

- |  |  |
|--|--|
| <input type="checkbox"/> Hairy scalp             | <input type="checkbox"/> Papillary layer of the dermis |
| <input type="checkbox"/> Armpit                  | <input type="checkbox"/> Reticular layer of the dermis |
| <input type="checkbox"/> Sole of the foot        | <input type="checkbox"/> Eccrine sweat gland           |
| <input type="checkbox"/> Epidermis               | <input type="checkbox"/> Apocrine sweat gland          |
| <input type="checkbox"/> Dermis                  | <input type="checkbox"/> Sebaceous gland (oil)         |
| <input type="checkbox"/> Subcutaneous            | <input type="checkbox"/> Hair follicle                 |
| <input type="checkbox"/> Layers of the epidermis | <input type="checkbox"/> Hair root                     |
| • Stratum Corneum                                | <input type="checkbox"/> Hair shaft                    |
| • Stratum Lucidum                                | <input type="checkbox"/> Arrector pili muscle          |
| • Stratum Granulosum                             | <input type="checkbox"/> Pacinian corpuscle            |
| • Stratum Spinosum                               | <input type="checkbox"/> Meissner's corpuscle          |
| • Stratum Basale                                 | <input type="checkbox"/> Adipose                       |
| <input type="checkbox"/> Dermal papillae         |  |

STRUCTURE	FUNCTION
DERMAL PAPILLAE	
ECCRINE SWEAT GLAND	
APOCRINE SWEAT GLAND	
SEBACEOUS GLAND (OIL)	
ARRECTOR PILI MUSCLE	
PACINIAN CORPUSCLE	
MEISSNER'S CORPUSCLE	
ADIPOSE	

### Notes:

---



---



---

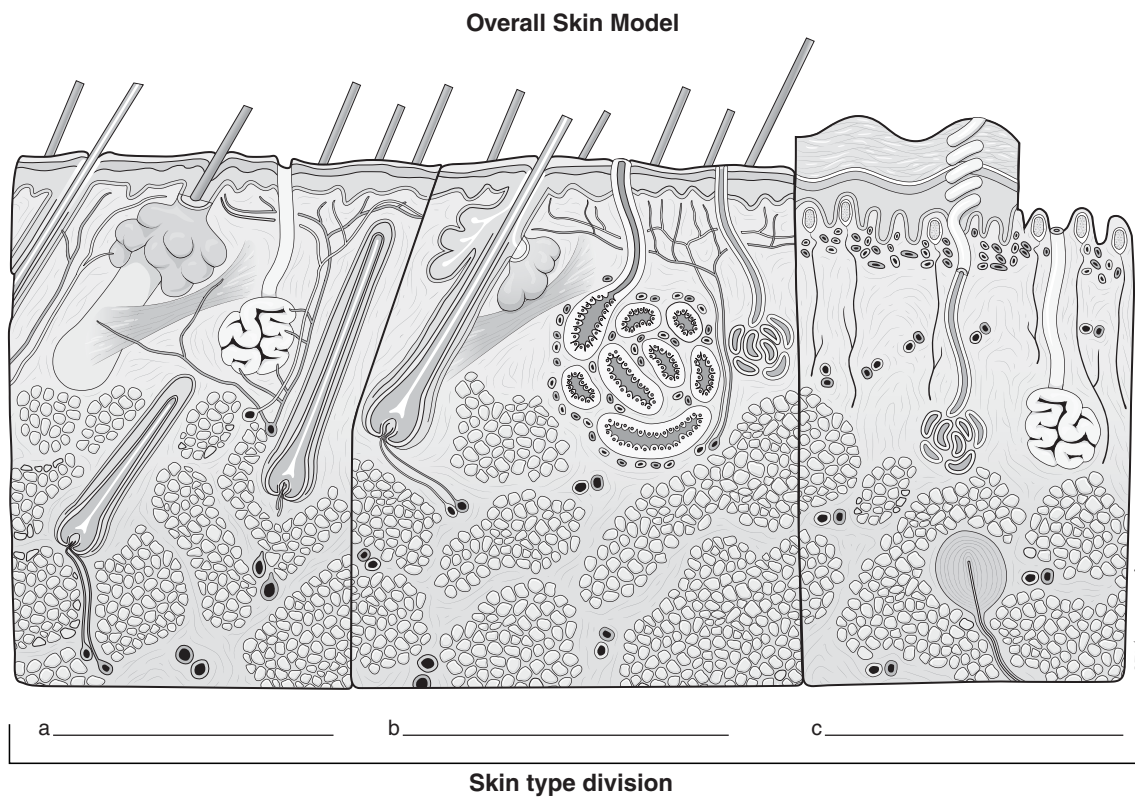


---



---





Label

- Armpit
- Foot
- Hairy

**Notes:**

---



---



---

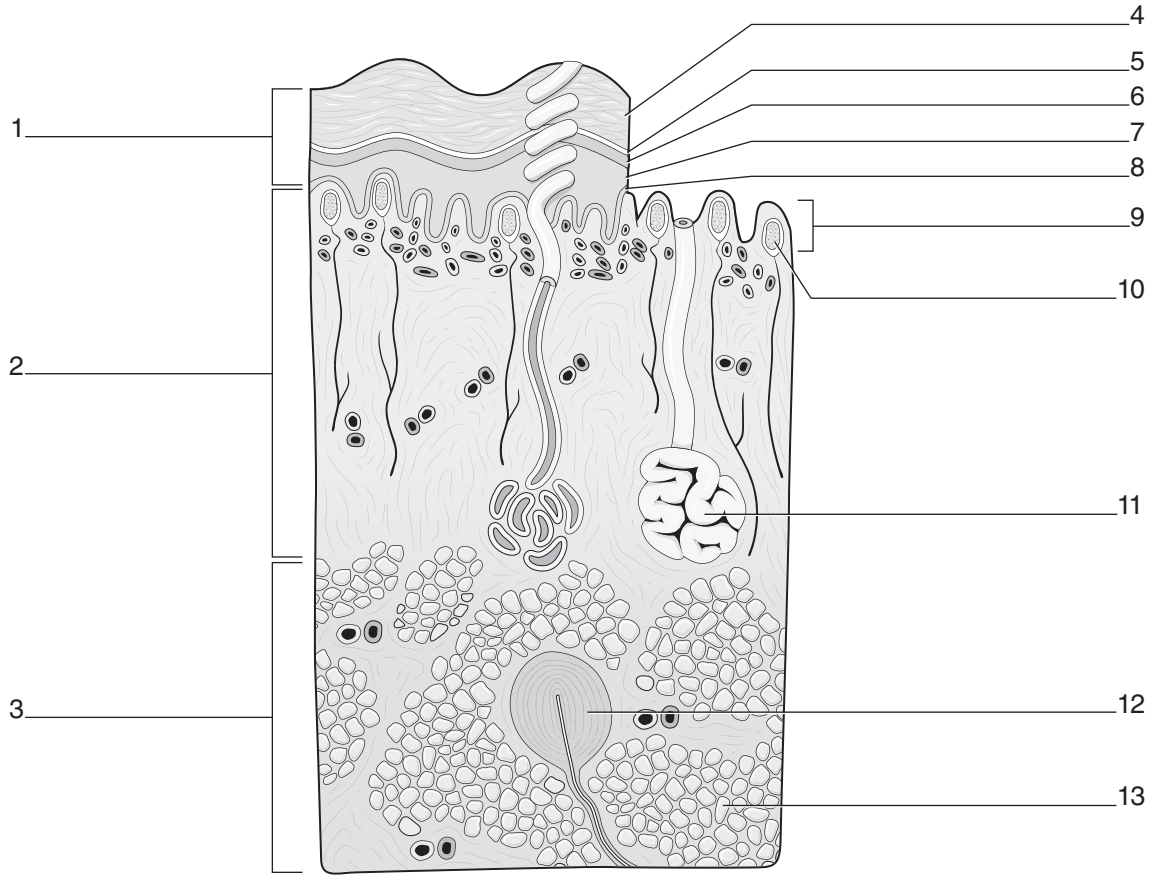


---



---

Skin of the Foot



©Hayden-McNeil, LLC

Notes:

---

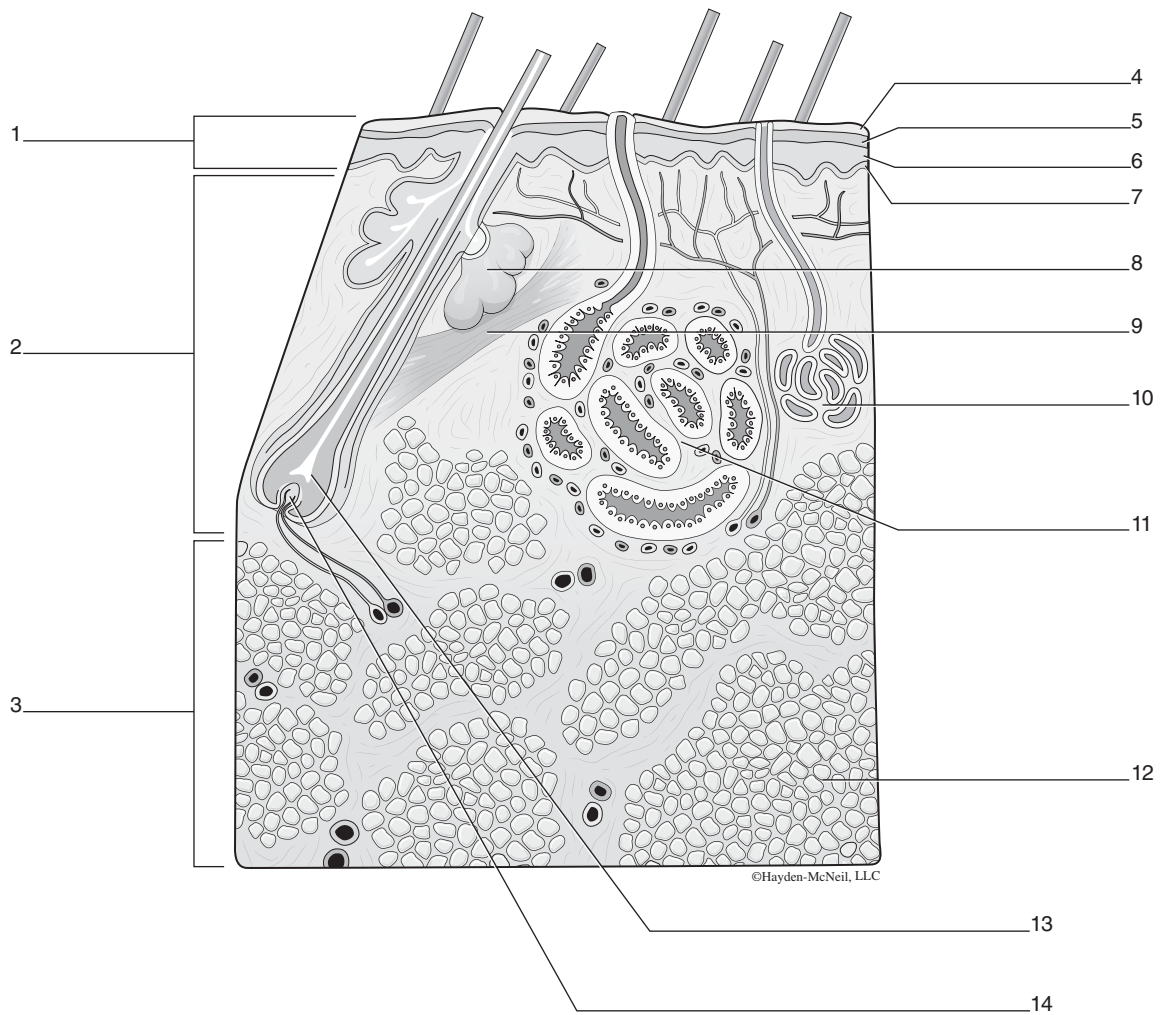
---

---

---

---

Skin of the Armpit



Notes:

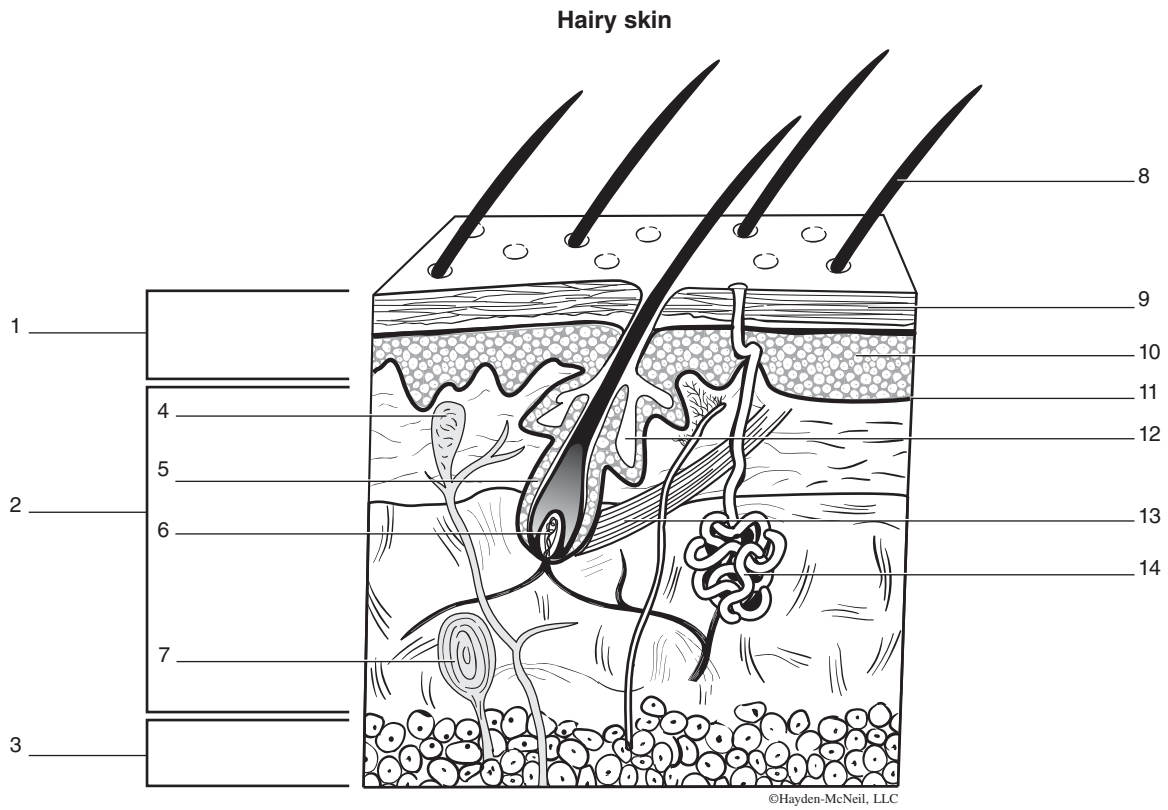
---

---

---

---

---



**Notes:**

---

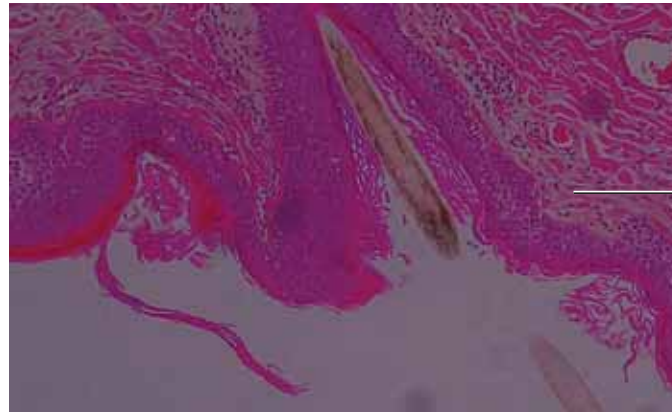
---

---

---

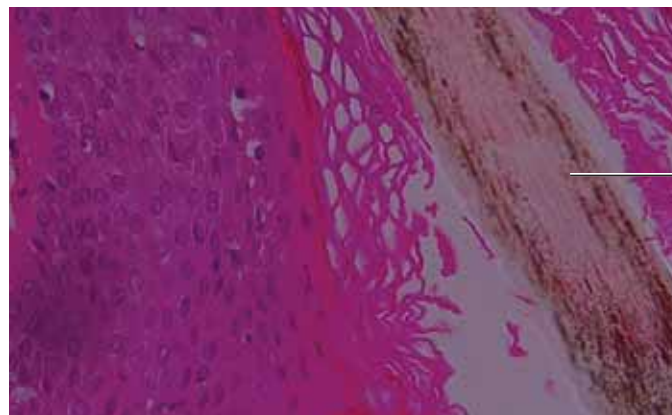
---

## Hairy Skin



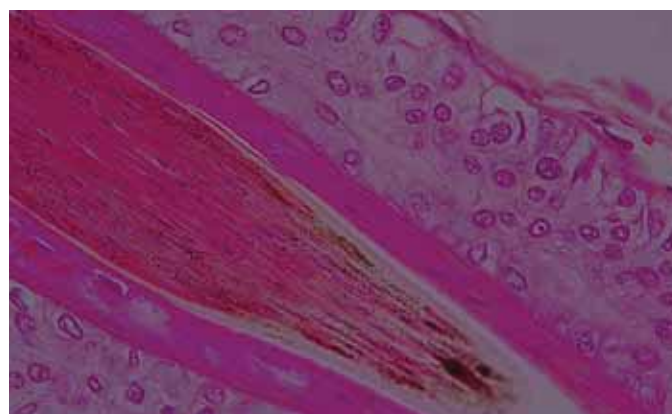
Stratified Squamous

(4× magnification)



Hair Follicle

(10× magnification)



(40× magnification)

Notes:

---

---

---

---

---



**Notes:**

---

---

---

---

---



# Skeletal System

## Learning Objectives

- Identify the various bones in the axial and appendicular skeletal areas
- Identify bony landmarks and their significance/function

## Introduction

The skeletal system is divided into two main areas: axial (central) and appendicular (peripheral). You will find a very intimate connection between structure and function within the skeleton. Protection is created where protection is needed, support where support is needed. Areas where muscles attach undergo enlargement to create areas such as condyles and trochanters, which grow to support the muscle connection; or, another way of looking at it is, they enlarge due to the stress the muscle places upon the bony area. Some other adaptations are holes (foramen) where nerves, blood vessels, and even babies can pass through.

Learning the following structures can be looked upon in two ways. First, a list of terms I have to memorize to pass the test. Second, and hopefully the best, these bony structures have specific functions because of their structure and function connection (i.e., there is a hole in the bottom of the skull because the spinal cord has to be connected directly to the brain). All of the anatomical structures you learn for the next two semesters have a relationship to the skeletal system. Ask yourself questions such as why is that hole there, why is that bump there, why is there one bone in the upper arm and two in the lower arm as you are learning the following structures, and you might find it makes it easier to learn and remember, not only for the test, but also for the rest of your health-related profession.