

# Ch 4

## Skin and Body Membranes

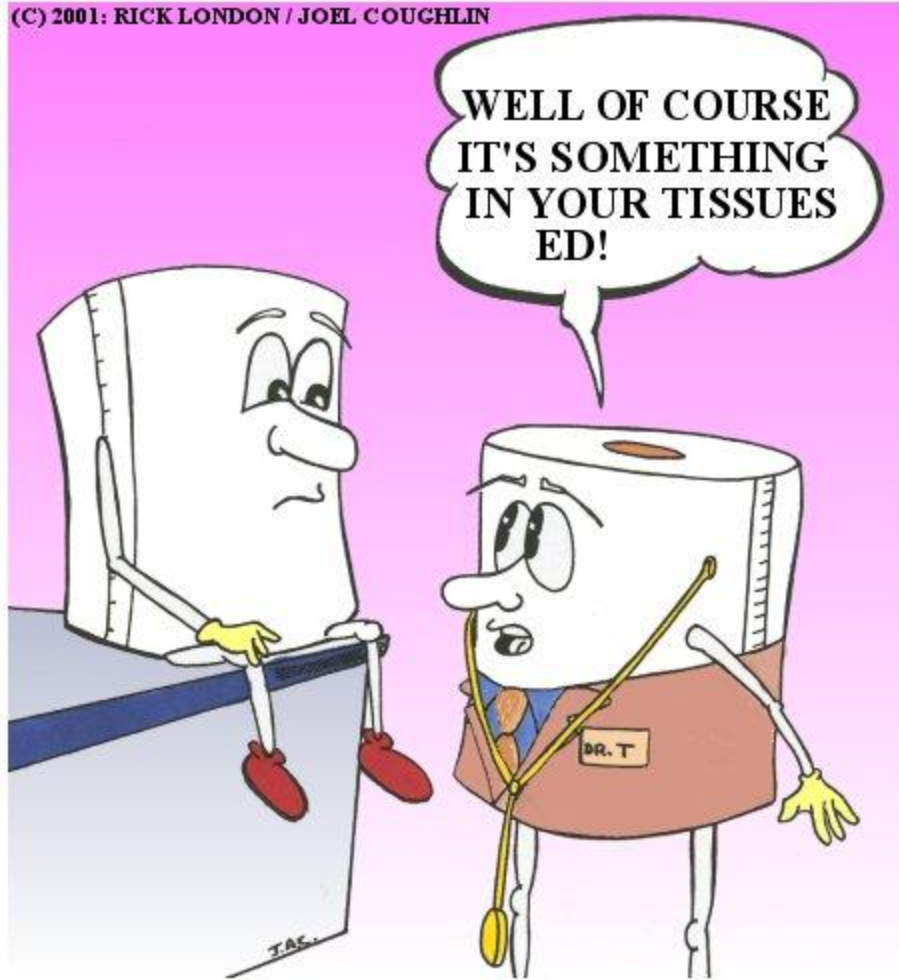
## **TITLE**

- HISTOLOGY SLIDES & NOTES

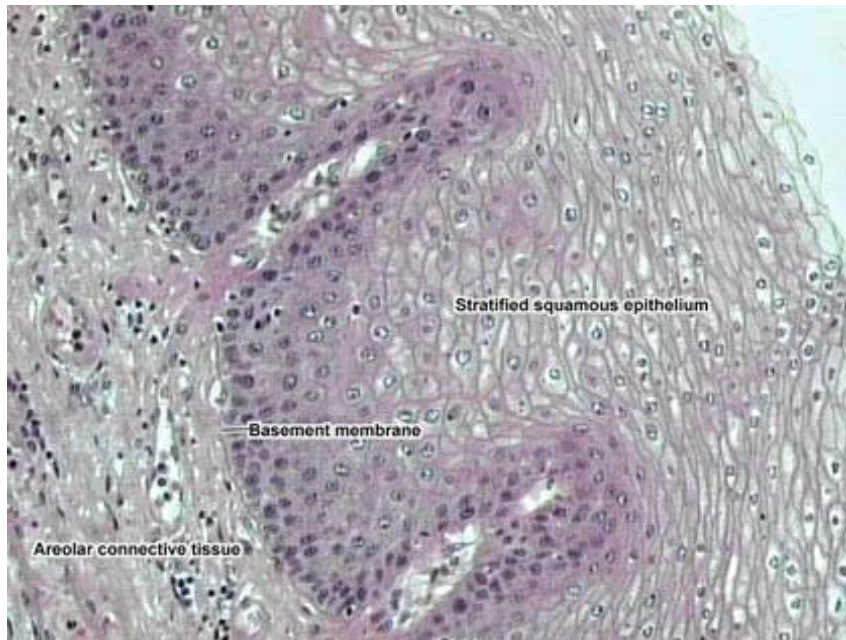
## **ESSENTIAL QUESTION**

- What tissues compose the integumentary system?

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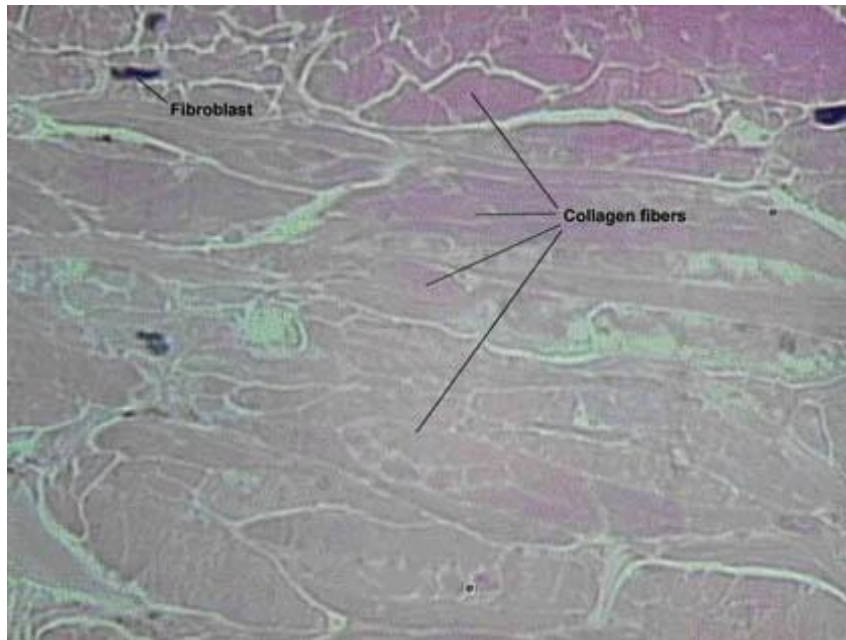


# Stratified Squamous Epithelium



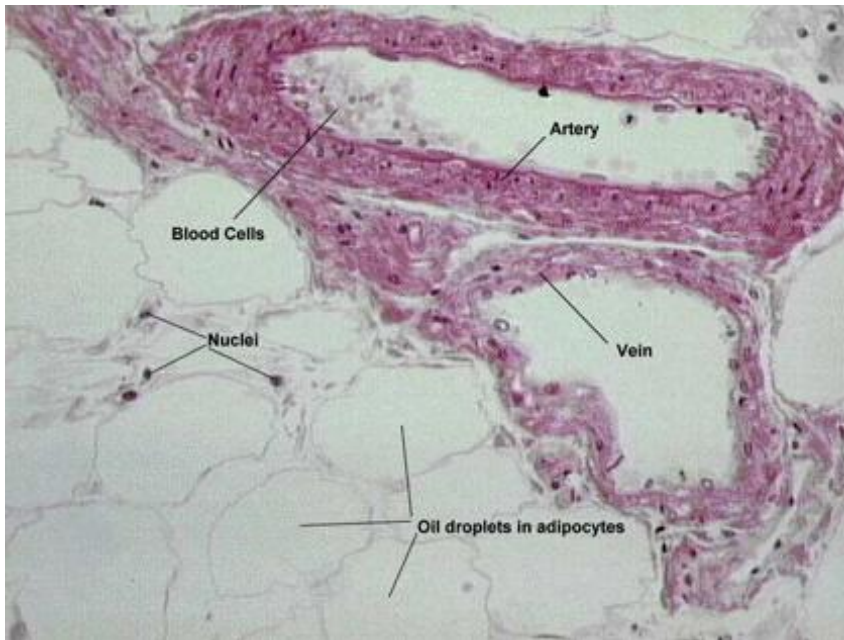
- Stratified = several layers;  
Squamous = shape of cells are flat
- Cells fit together to form sheets
- Has an apical surface (free edge)
- Basement membrane – lower surface composed of connective tissue
- Avascular – no blood supply
- Regenerates easily
- Makes up the epidermis of skin

# Dense Irregular Connective Tissue



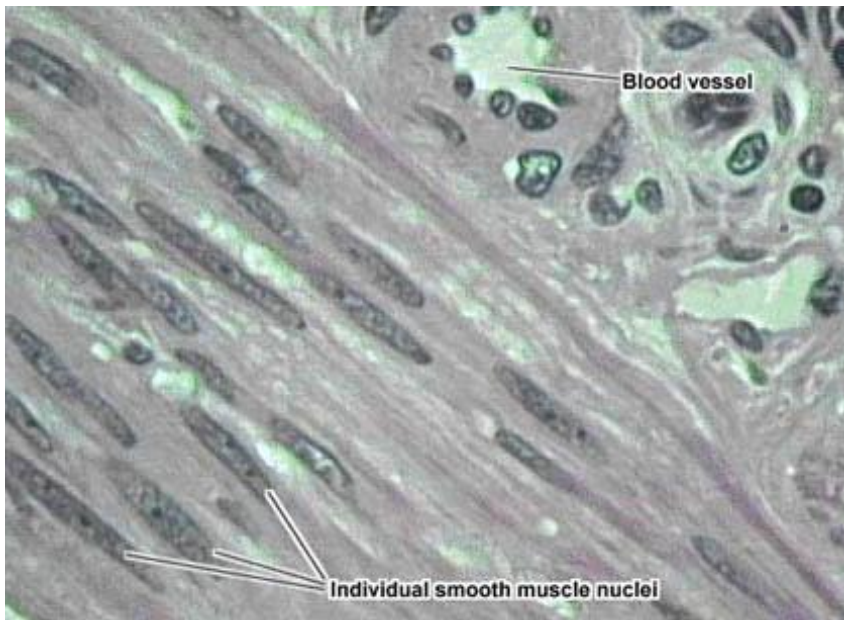
- Has a blood supply
- Collagen and elastic fibers located throughout the dermis of skin
  - Collagen fibers give skin its toughness
  - Elastic fibers give skin elasticity

# Adipose



- A type of areolar tissue
- Has a blood supply
- Composed of adipocytes
- Insulates and protects body from extreme heat and cold; Protects organs
- Makes up the hypodermis or the subcutaneous tissue of the skin

# Smooth Muscle



- No striations
- Uninucleate
- spindle shape
- Involuntary
- In skin it makes up the arrector pili muscle that is attached to each hair follicle

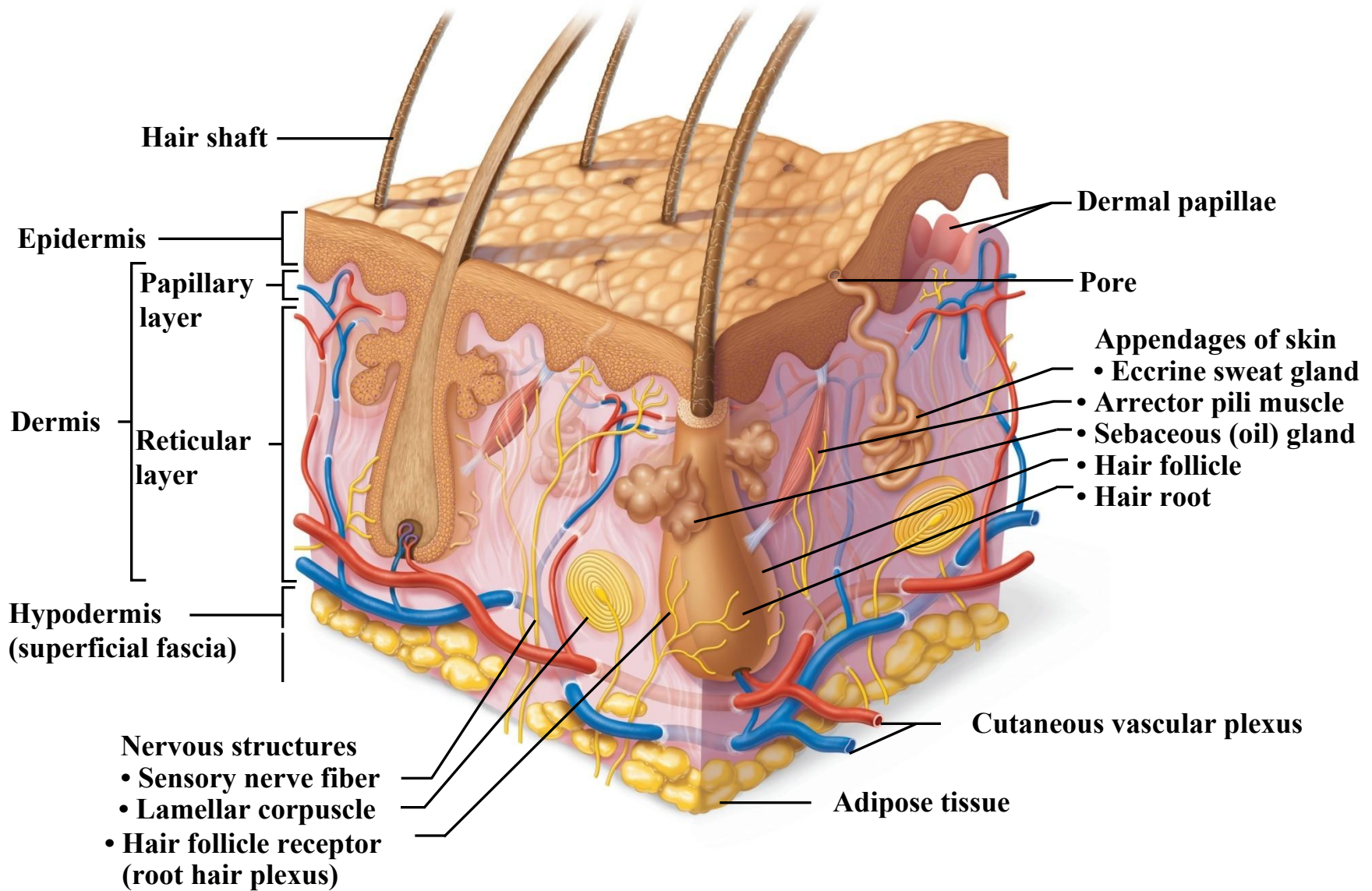


Figure 4.3



# Clock Example!!

You will complete the following on page 35 of your INB:

- Look at the “Clock Examples” on page 5 of your INB and **choose one of the following** to complete using the concepts of the notes you just took:
  - 5, 6, 8, 9, 12
- USE THE ENTIRE PAGE!
- USE COLOR!



## **TITLE**

- Integumentary System  
Structure & Function

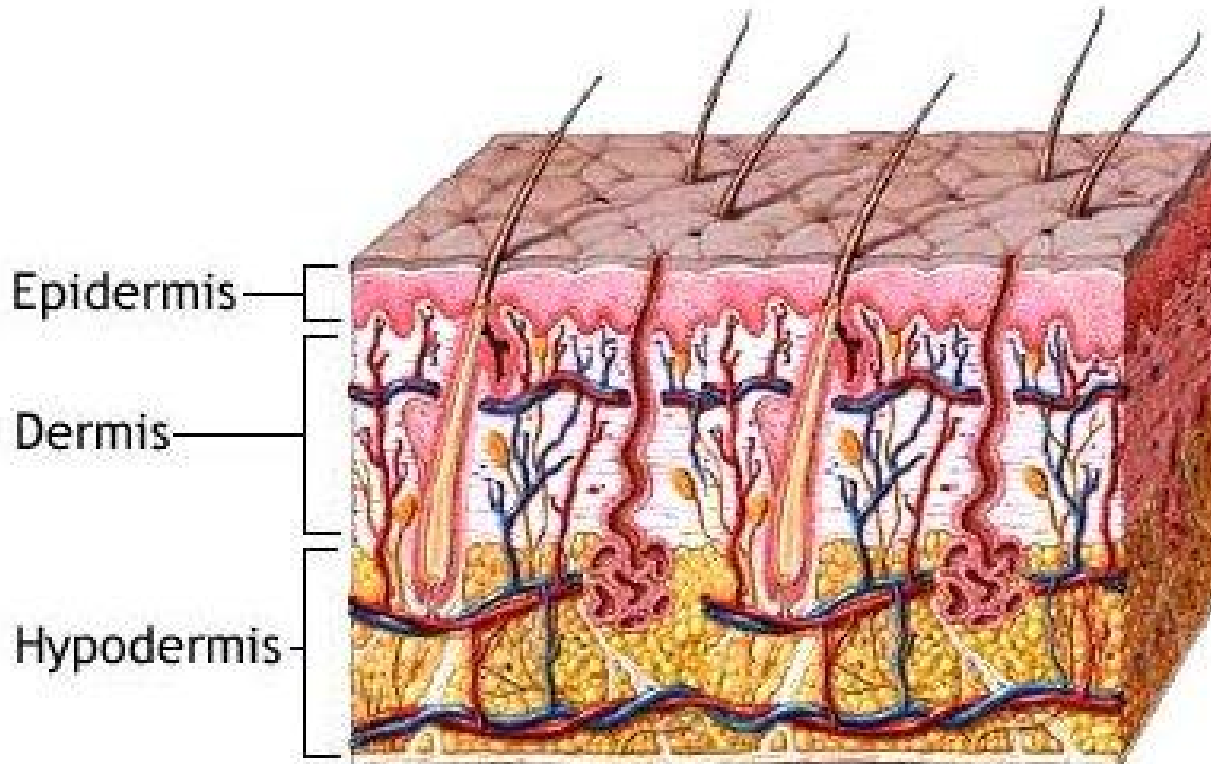
## **ESSENTIAL QUESTION**

- Describe the structure and function of the three layers of skin.

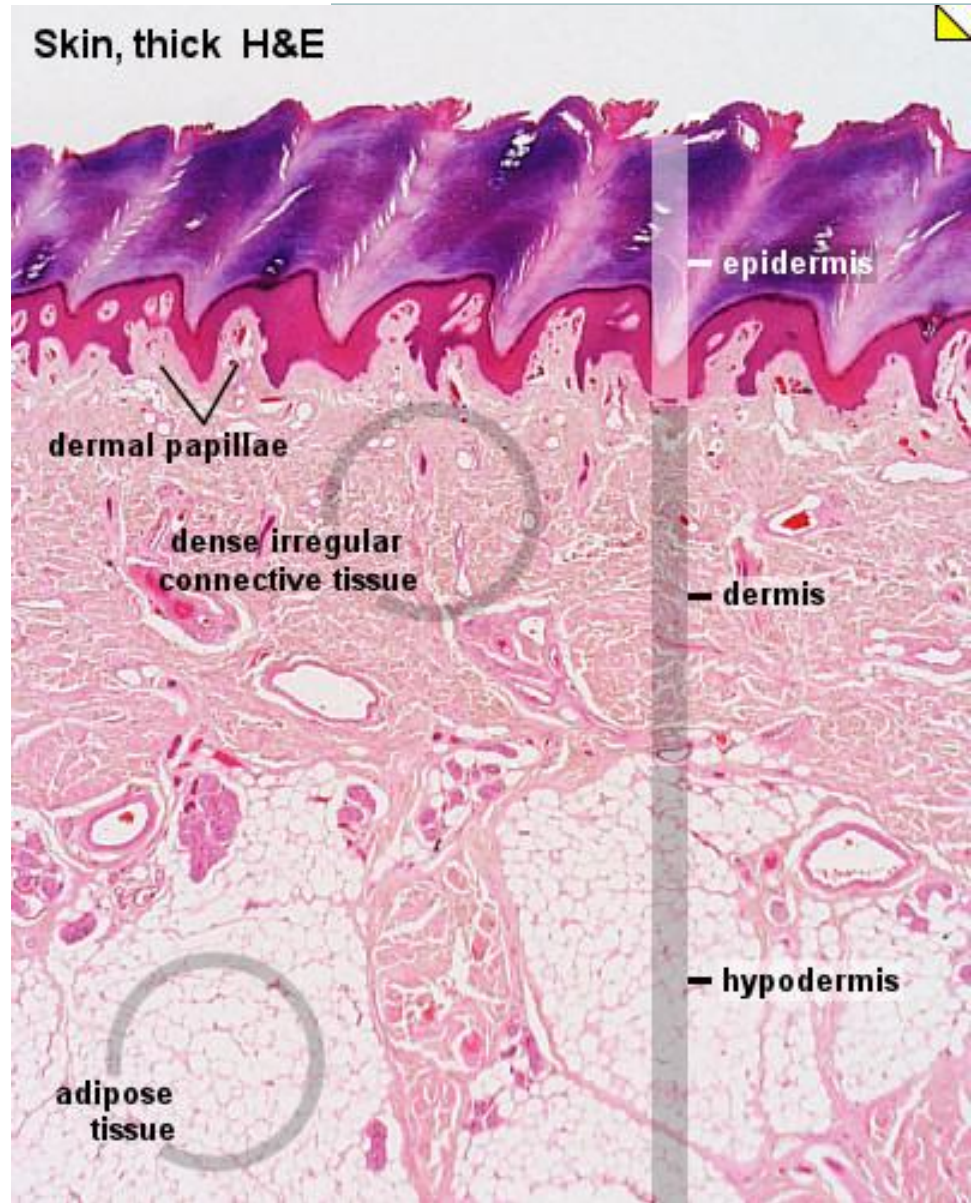
# Integumentary System Functions

- Is a Cutaneous Membrane
- Protects deeper tissues from:
  - Mechanical damage (bumps)
  - Chemical damage (acids and bases)
  - Bacterial damage
  - Ultraviolet radiation (sunlight)
  - Thermal damage (heat or cold)
  - Dessication (drying out)
- Aids in body heat loss or heat retention as controlled by the nervous system
- Aids in excretion of urea and uric acid
- Synthesizes vitamin D

# Skin Structure



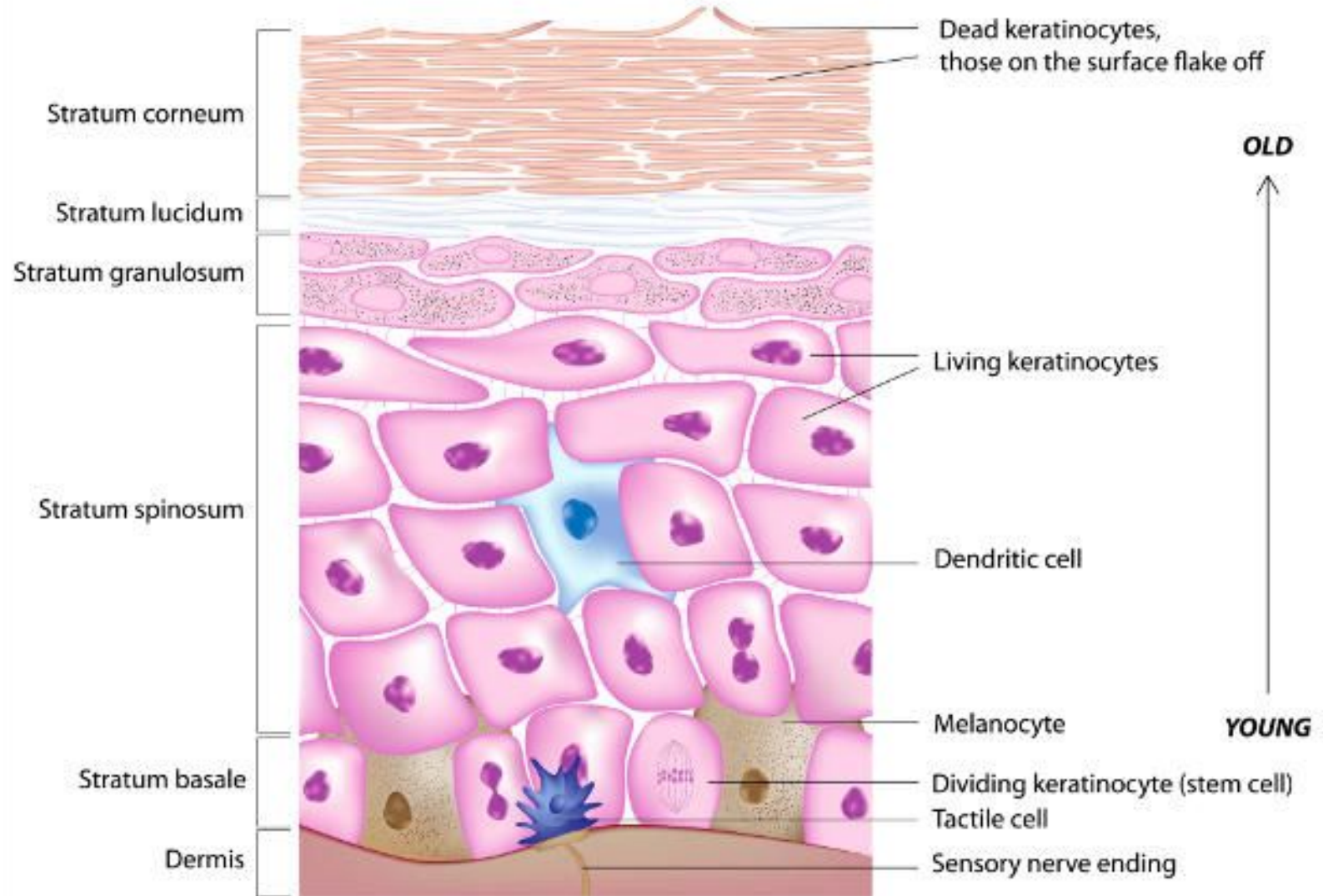
# Skin Structure



# Skin Structure

- Epidermis Tissue Type
  - Stratified squamous epithelium - top layer is hardened by the protein keratin to help waterproof the skin, blocking diffusion of nutrients and wastes

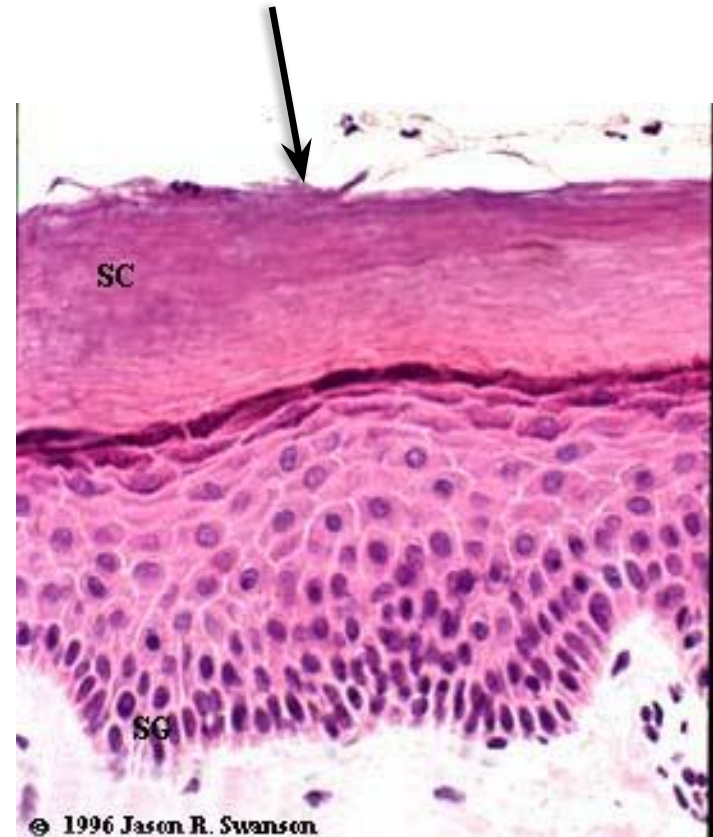
# Structure of the Epidermis





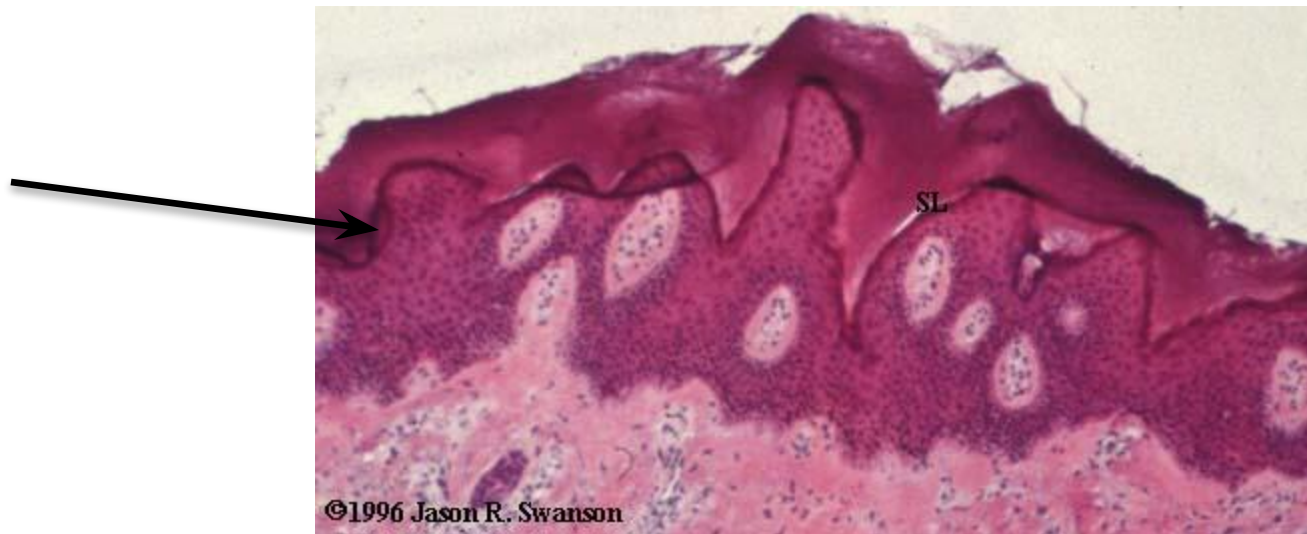
# Layer of Epidermis

- Stratum corneum
  - Exposed surface of the skin
  - Shingle-like dead cells filled with keratin



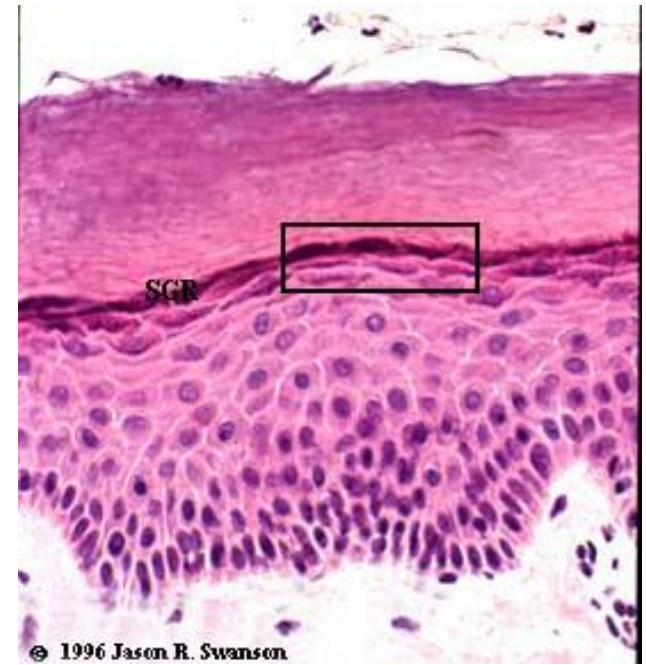
# Layer of Epidermis

- Stratum lucidum
  - Helps to withstand frictional forces
  - Occurs only in thick skin such as the palms of hands and soles of feet



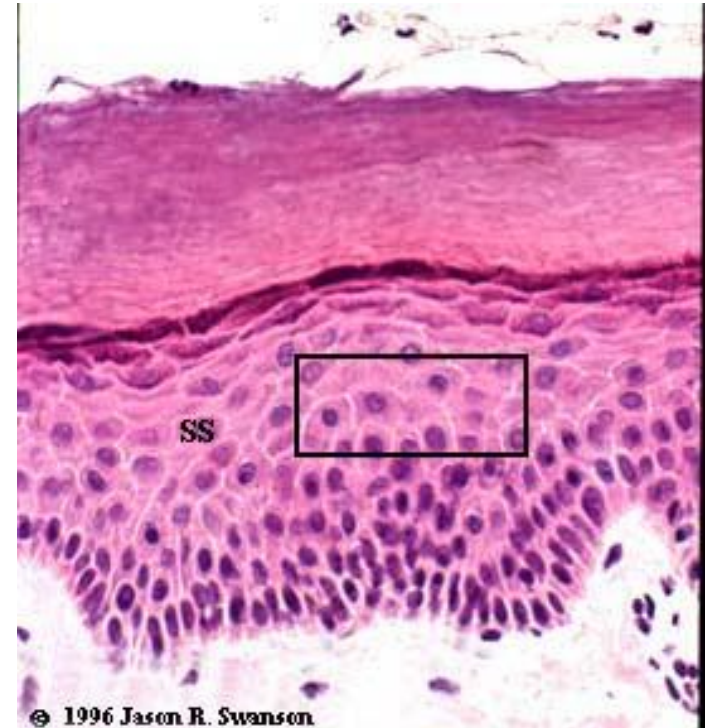
# Layer of Epidermis

- Stratum granulosum
  - help to form a waterproof barrier that functions to prevent fluid loss from the body



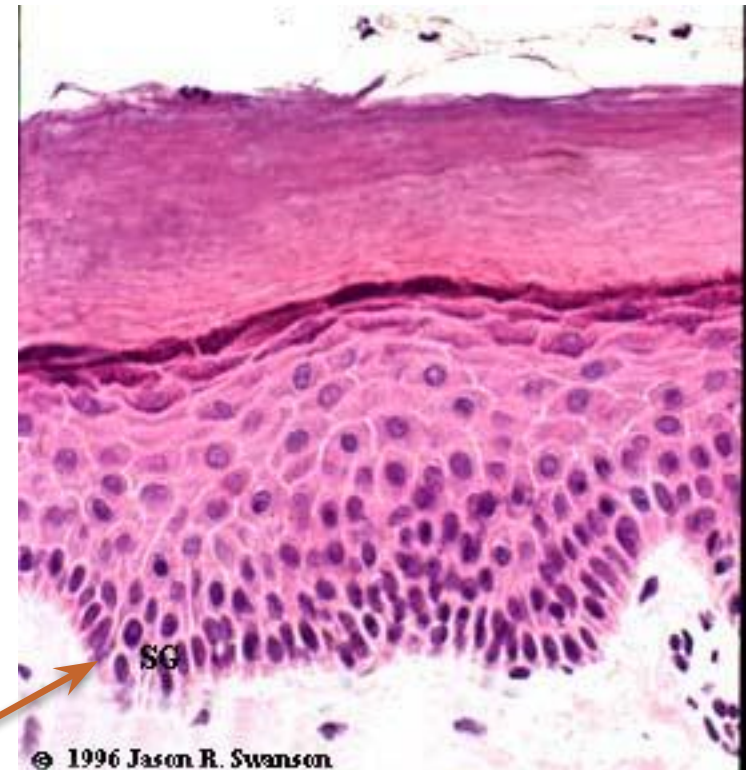
# Layer of Epidermis

- Stratum spinosum
  - Makes keratin for structural support, helping the skin resist abrasion

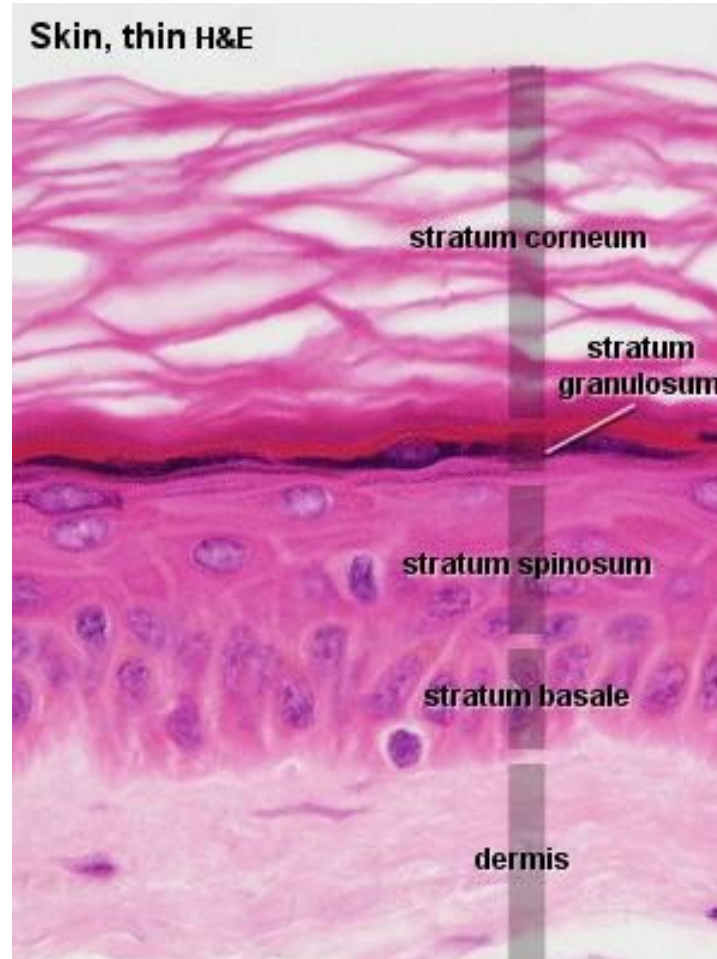


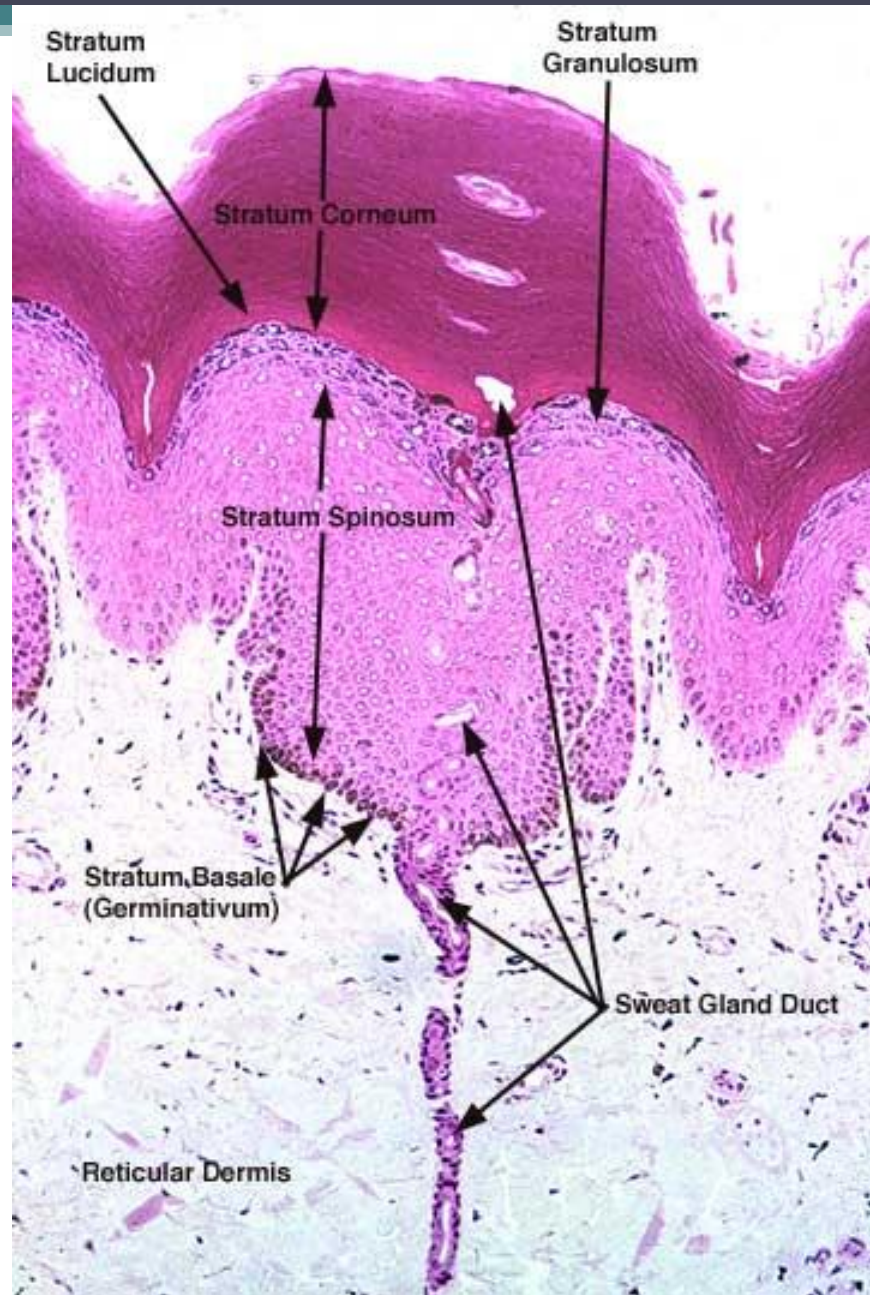
# Layer of Epidermis

- Stratum basale
  - Cells undergoing rapid mitosis
  - Lies next to dermis
  - Contains melanocytes to produce melanin

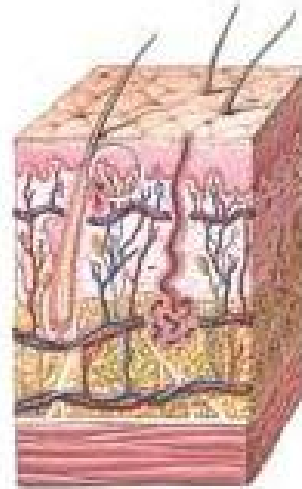
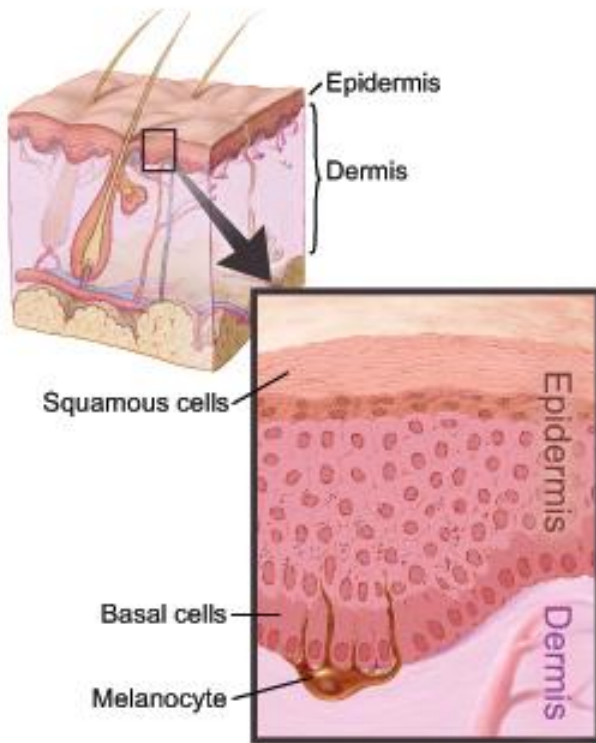


# Layer of Epidermis



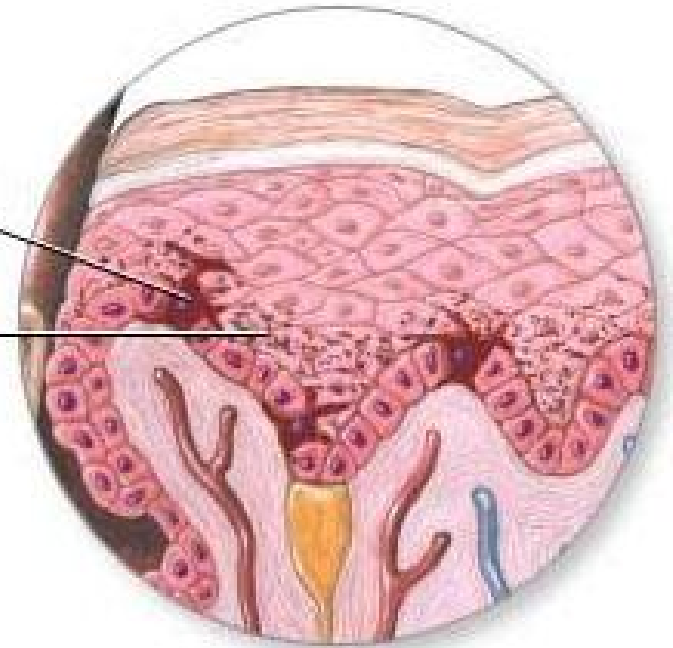


# Melanin



Melanocyte

Melanin





# Melanin

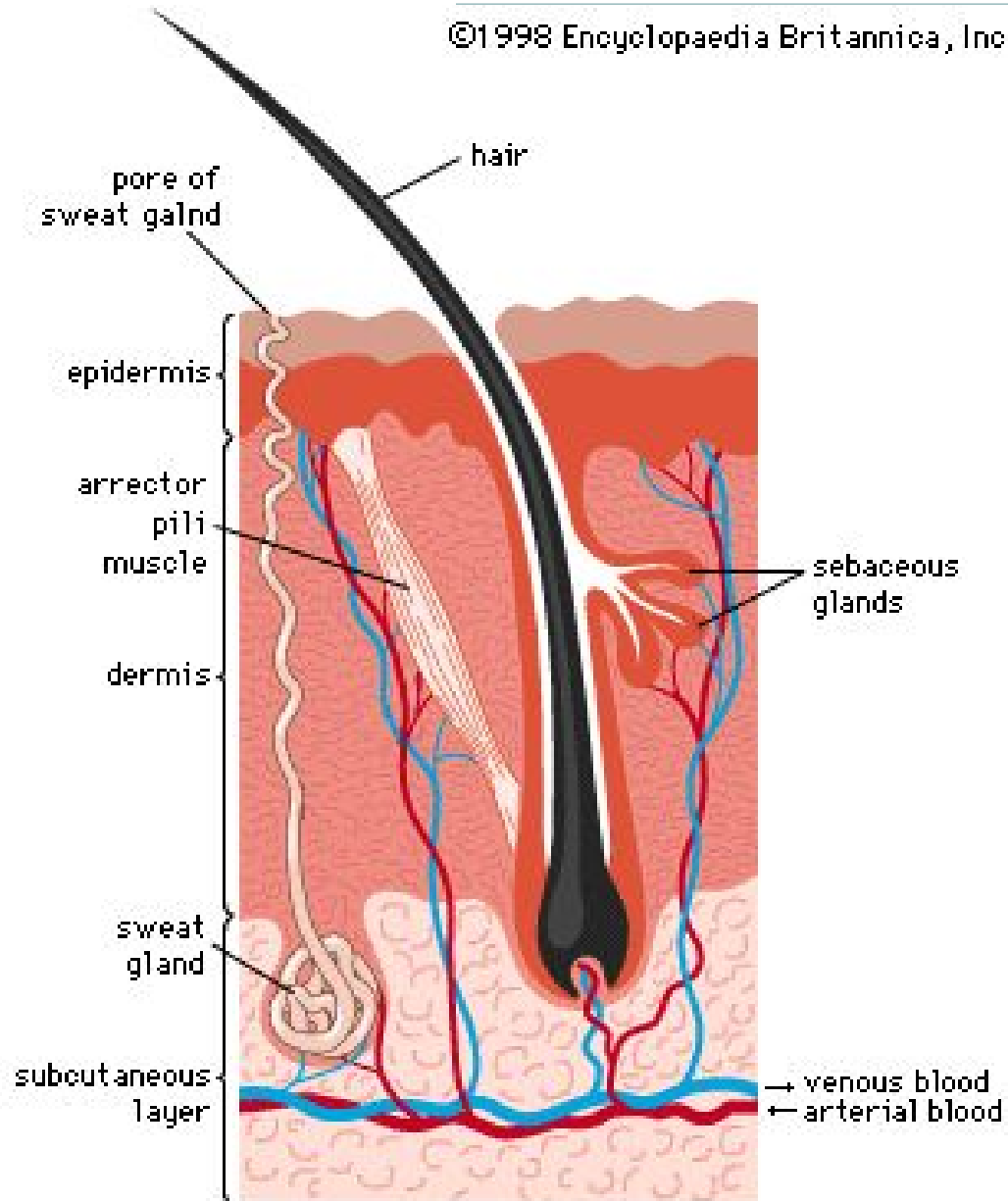
- Pigment (melanin) produced by melanocytes in the stratum basale
- Color is yellow to brown to black
- Amount of melanin produced depends upon genetics and exposure to sunlight

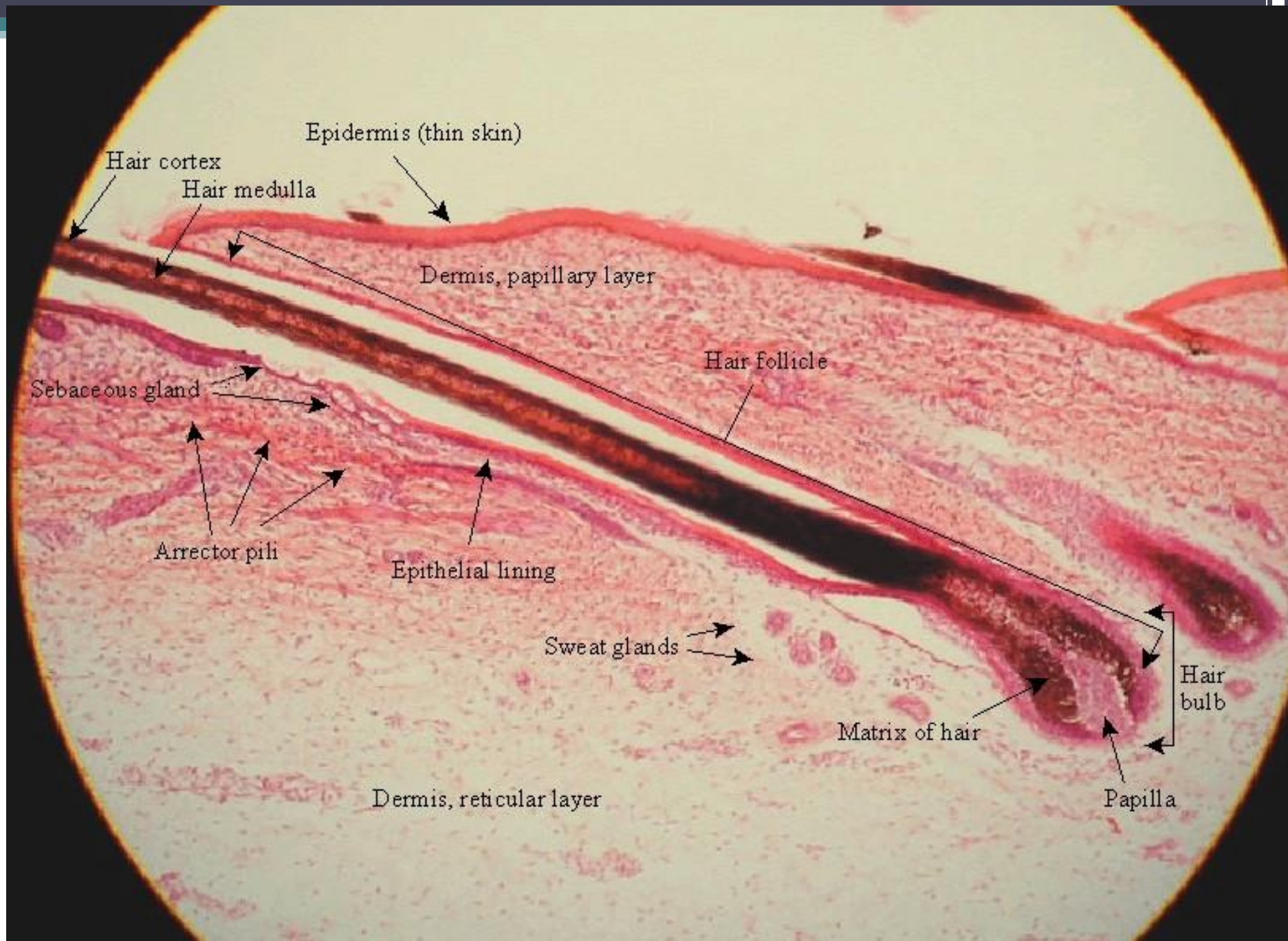
# Skin Structure

- Dermis Tissue Type
  - Dense connective tissue

# Dermis

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# Dermis

- Two layers
  - Papillary layer (upper dermal region)
    - Projections called dermal papillae
      - Some contain capillary loops
      - Others house pain receptors and touch receptors

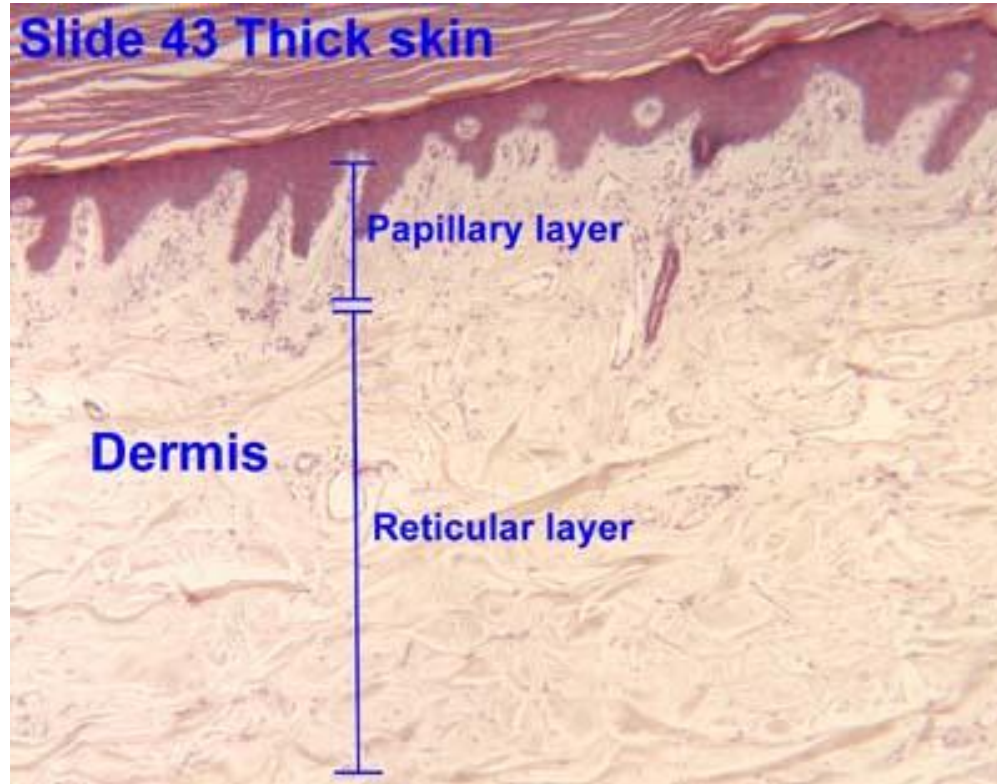
# Dermis

- Reticular layer (deepest skin layer)
  - Blood vessels
  - Sweat and oil glands
  - Deep pressure receptors

# Skin Structure

- Hypodermis
  - **Type of tissue**: adipose
  - **Function**: Anchors skin to underlying organs

**Slide 43 Thick skin**





# Skin Structure

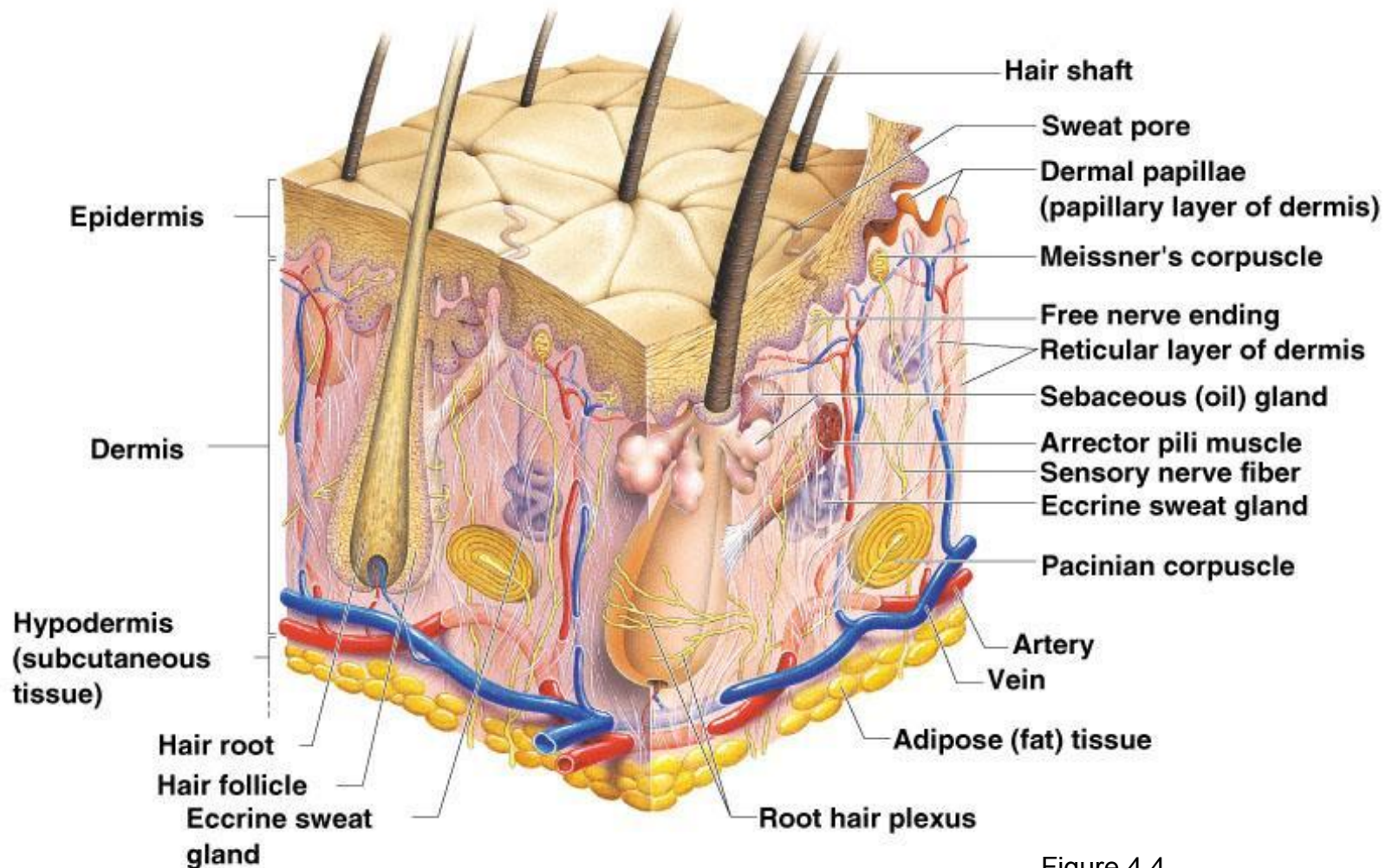
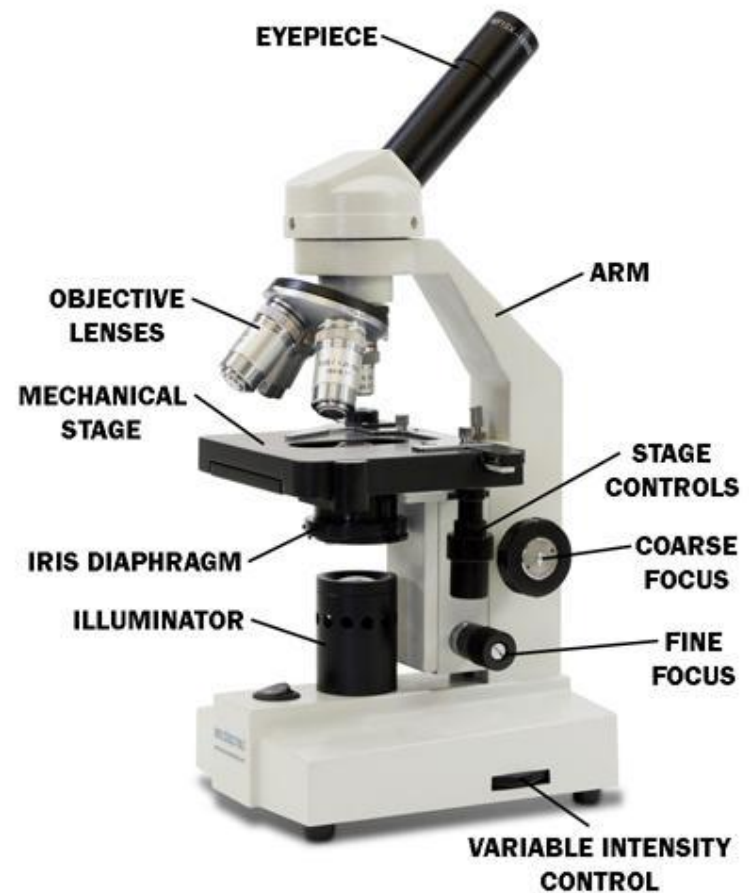


Figure 4.4

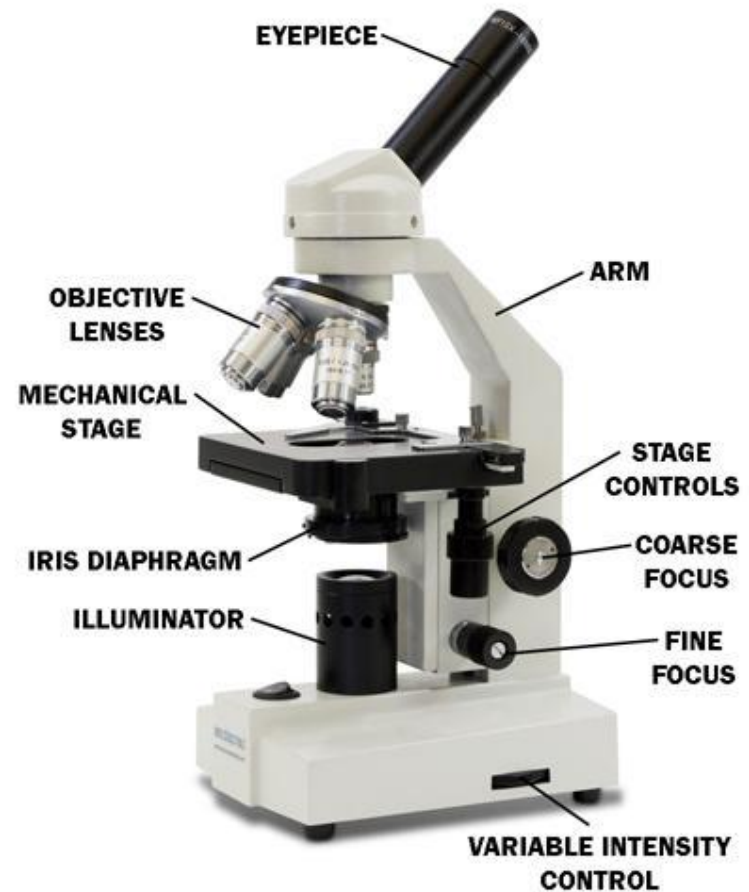
# Reminders of How to Use a Microscope

- Remove bag and unwrap cord
- Plug in and make sure the stage is orientated toward the back wall and the eyepiece is towards you.
- Make sure the microscope is on the lowest power and the stage is all the way down (move the course focus knob)
- Turn on the light source – you may have to adjust the amount of light using the diaphragm as you move up to different objective lenses.
- Place slide on microscope (make sure it is not upside down). Clip the slide down.



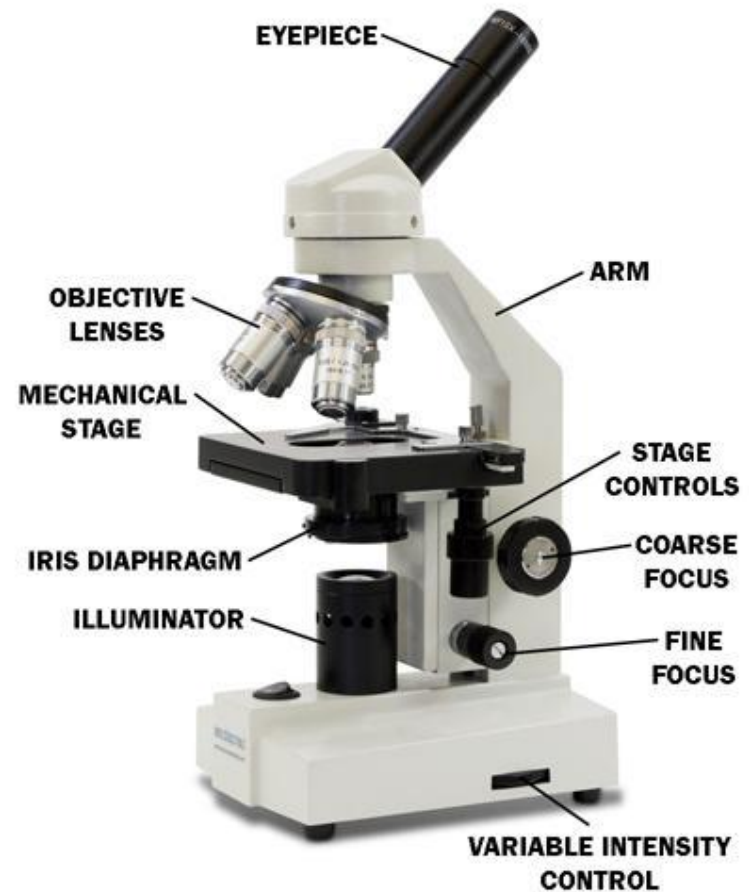
# Reminders of How to Use a Microscope

- How to find the specimen
  - ALWAYS start by looking through the lowest power objective
  - Move the course adjustment knob until you start to see an image – you might have to move the slide
  - Use the fine adjustment knob to focus on the object
  - If you need to look beyond the lowest power, continue with the instructions



# Reminders of How to Use a Microscope

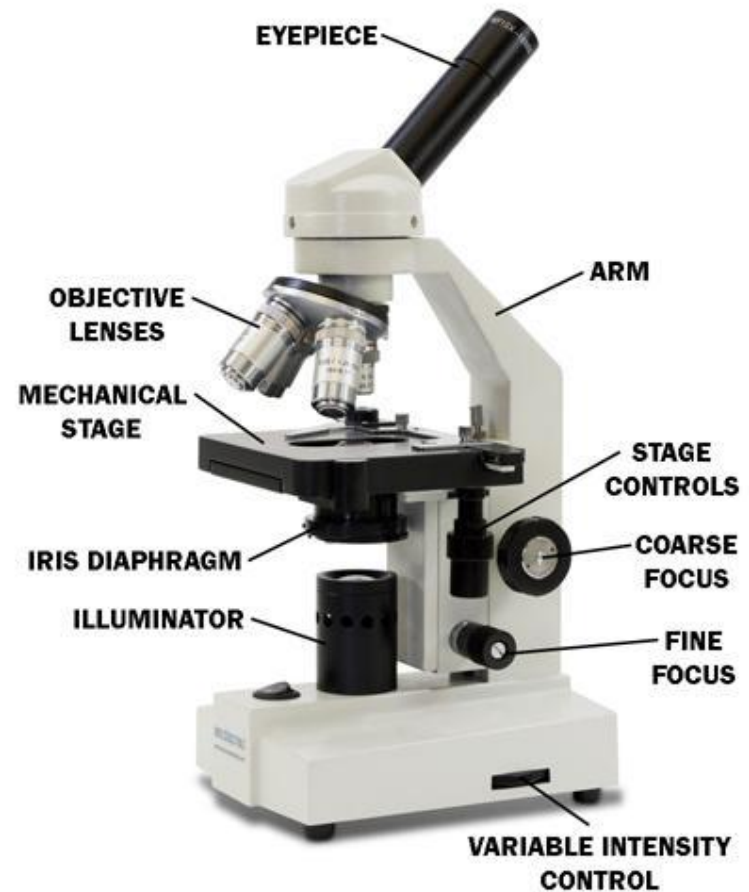
- DO NOT MOVE THE KNOBS and turn the objective to the medium power objective. You might have to move the slide very slightly. You should not need to move the course adjustment knob, but if you do, move it very slowly while looking at the specimen. Move the fine adjustment knob to focus.
- DO NOT MOVE THE KNOBS and turn the objective to the highest power objective. You may have to move the slide very slightly. DO NOT MOVE THE COURSE ADJUSTMENT KNOB!!! While looking at the specimen, move the fine adjustment knob to focus.



# Reminders of How to Use a Microscope

- Clean up:
  - put the specimen slide back in the container
  - move the stage all the way down
  - turn the objective to the lowest power
  - Wrap the cord, cover, and place microscope at the back of the lab bench

[VIDEO: HOW TO USE A MICROSCOPE](#)

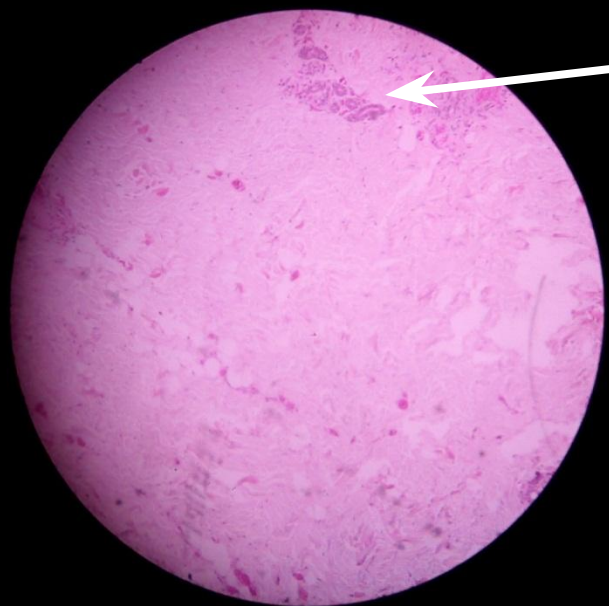
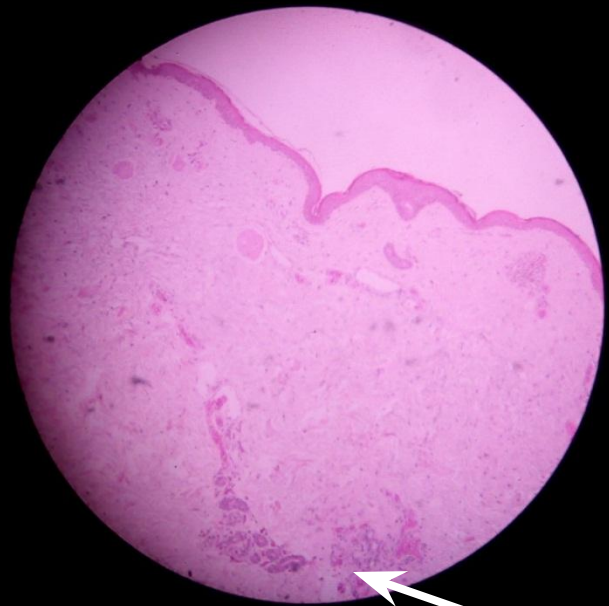


# Skin Lab - Complete on pg 38 of your INB

- Divide your paper into two parts
- Part 1 – Layers of the Skin
  - In the center of this section of paper, draw a 4”x4” square
  - Study the diagram on pages 88 in your textbook
  - Look at the slide under low power starting at the top edge of the slide.
  - Draw and color, move the slide down and draw and color
  - Label the three layers of the **SKIN** and describe what tissue each is composed of
- Part 2 – Layers of the Epidermis
  - In the center of this section of paper, draw a large circle, making sure there is enough room to write labels and functions on the sides.
  - Look at a prepared slide of skin under the microscope under high power (remember what we just talked about to get to high power.)
  - **Draw, color, and label** all the layers of the **EPIDERMIS**.
  - Write the **function** of each layer next to the label.



Part 1  
-Draw a Continuous Picture of all the layers in your square  
-Label the Layers of the skin  
-Write the type of tissue that composes each.

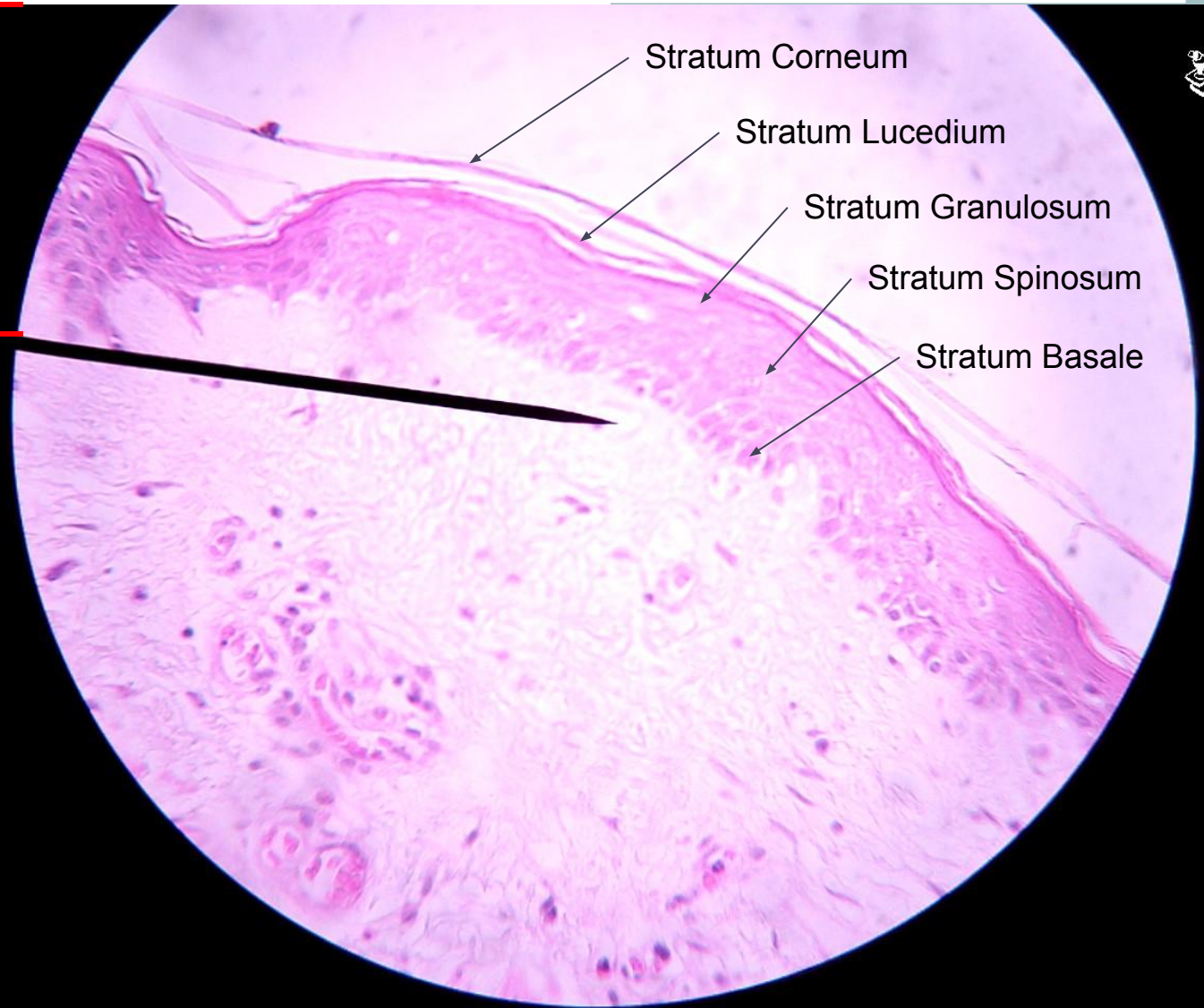


Look and Draw under Low Power

Notice how this section is in both images to make sure there is continuity

Part 2  
Epithelial  
Layers  
- Draw, color  
and label each  
layer  
- Write the  
Function

Look and  
Draw  
under  
High  
Power  
your entire  
field of  
view







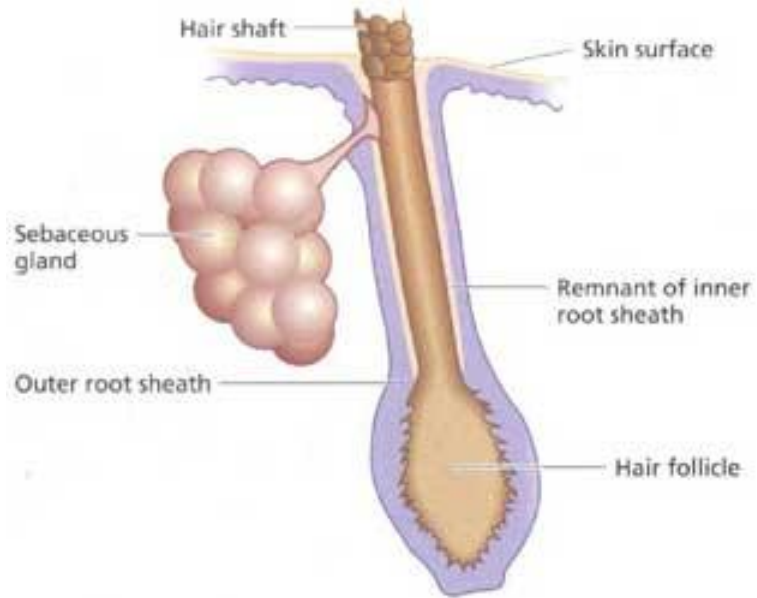
## **TITLE**

- Appendages of the Skin

## **ESSENTIAL QUESTION**

- Explain the structure and function of the appendages of the skin.

# Sebaceous glands



# Sebaceous glands

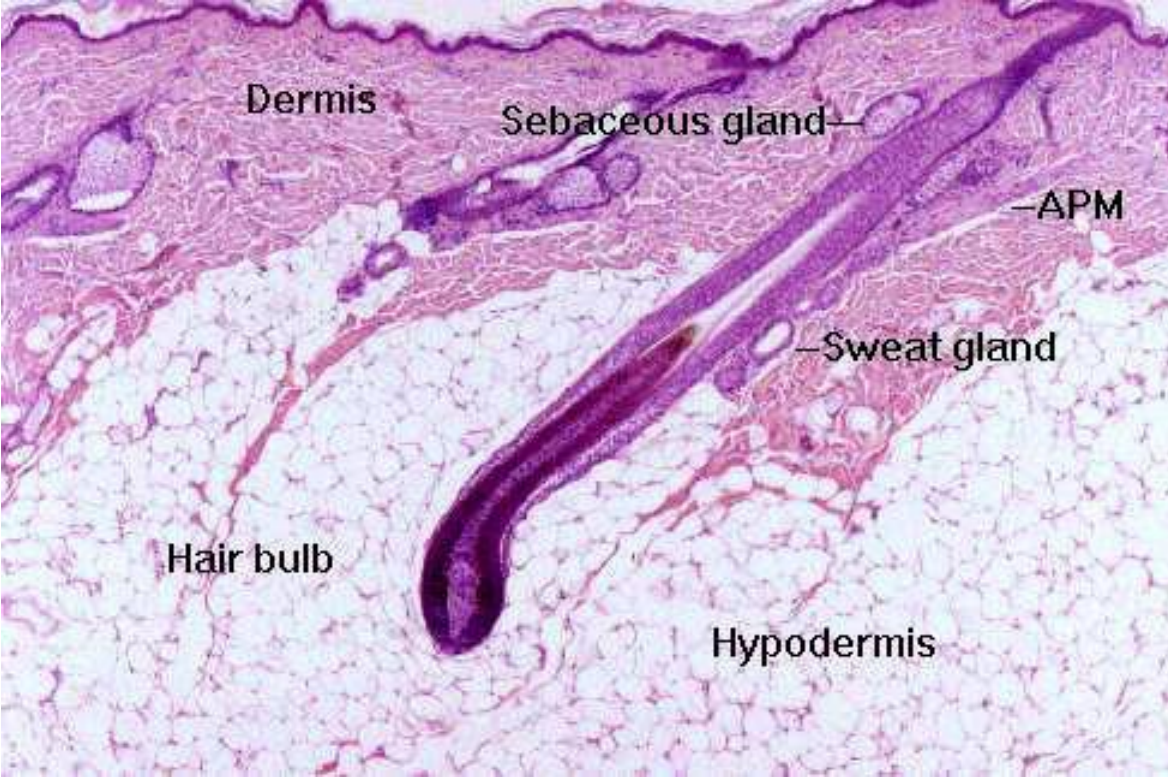
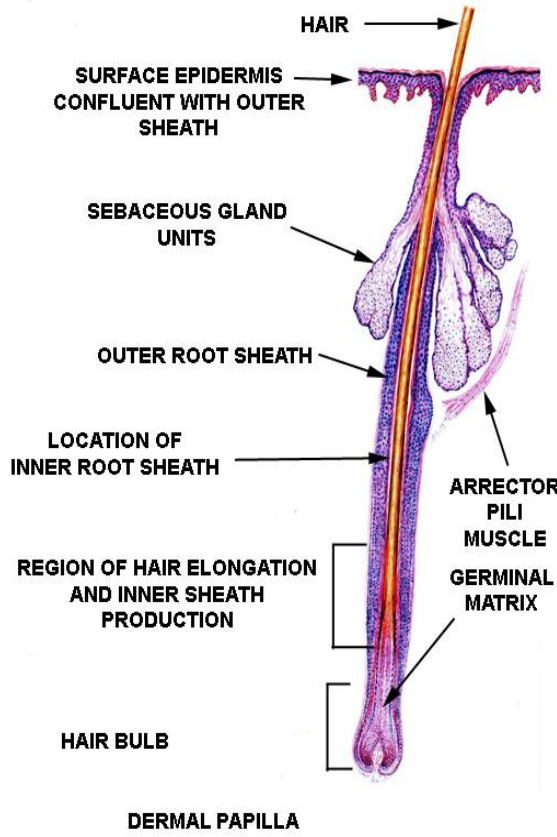
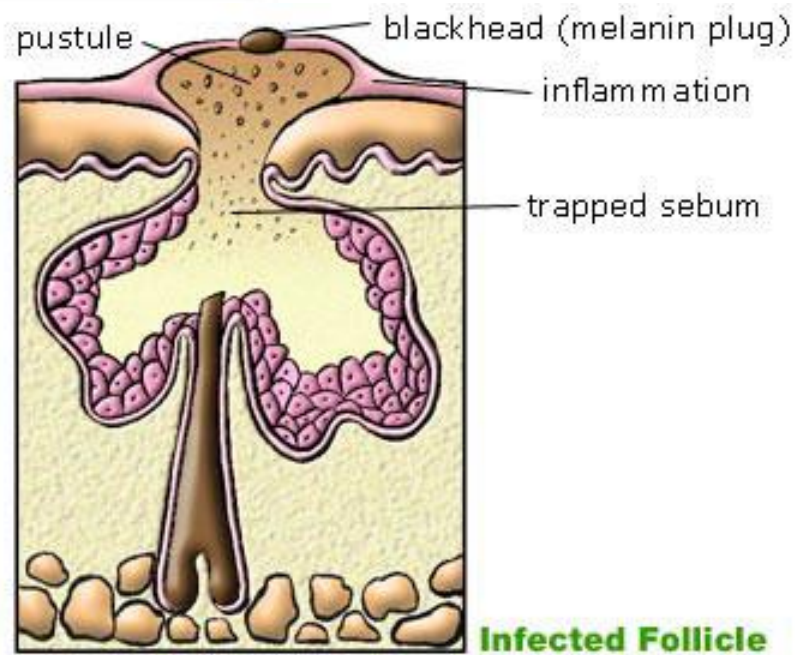
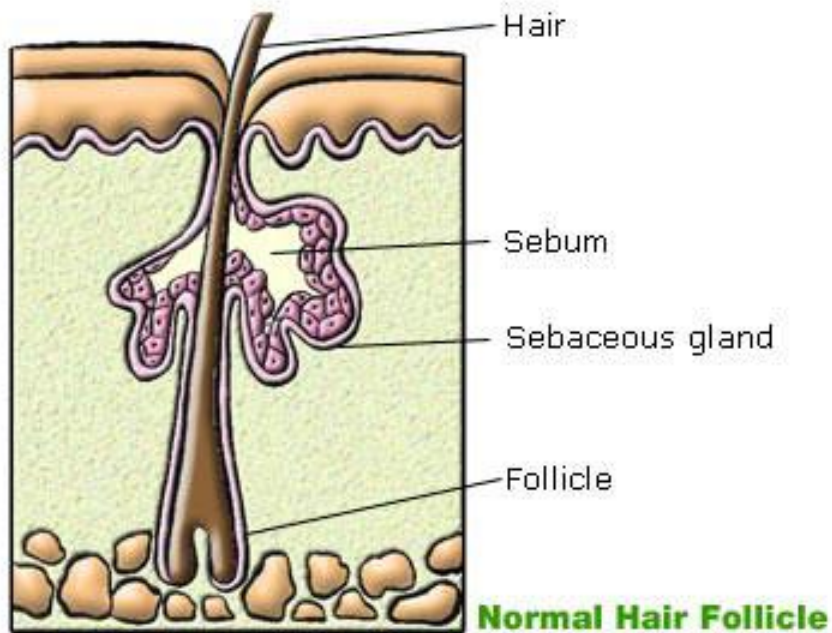


DIAGRAM OF AN ACTIVE HAIR FOLLICLE



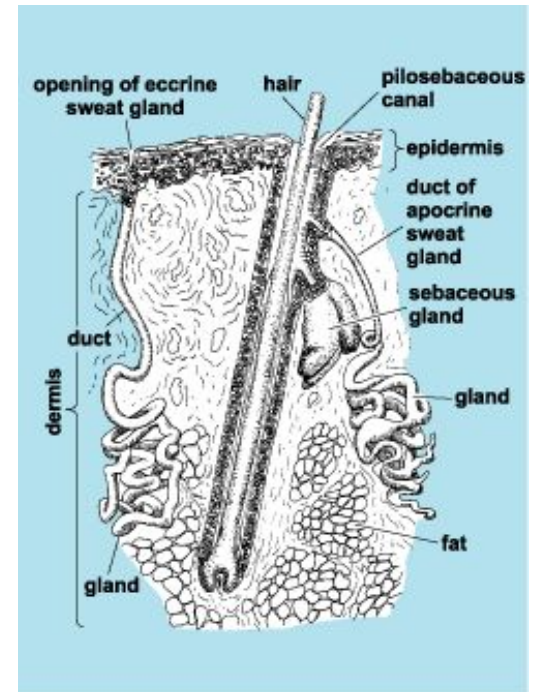
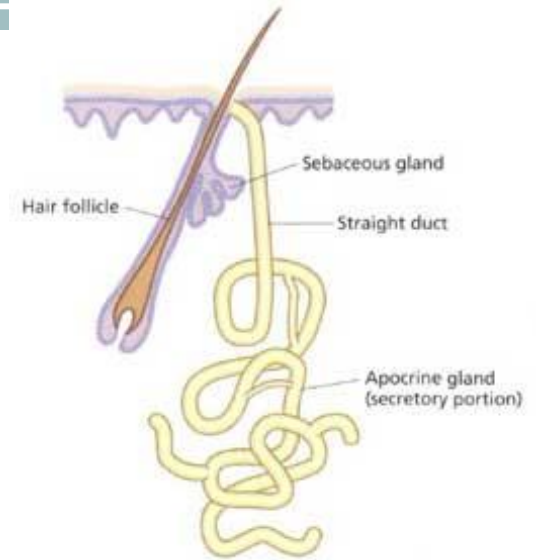
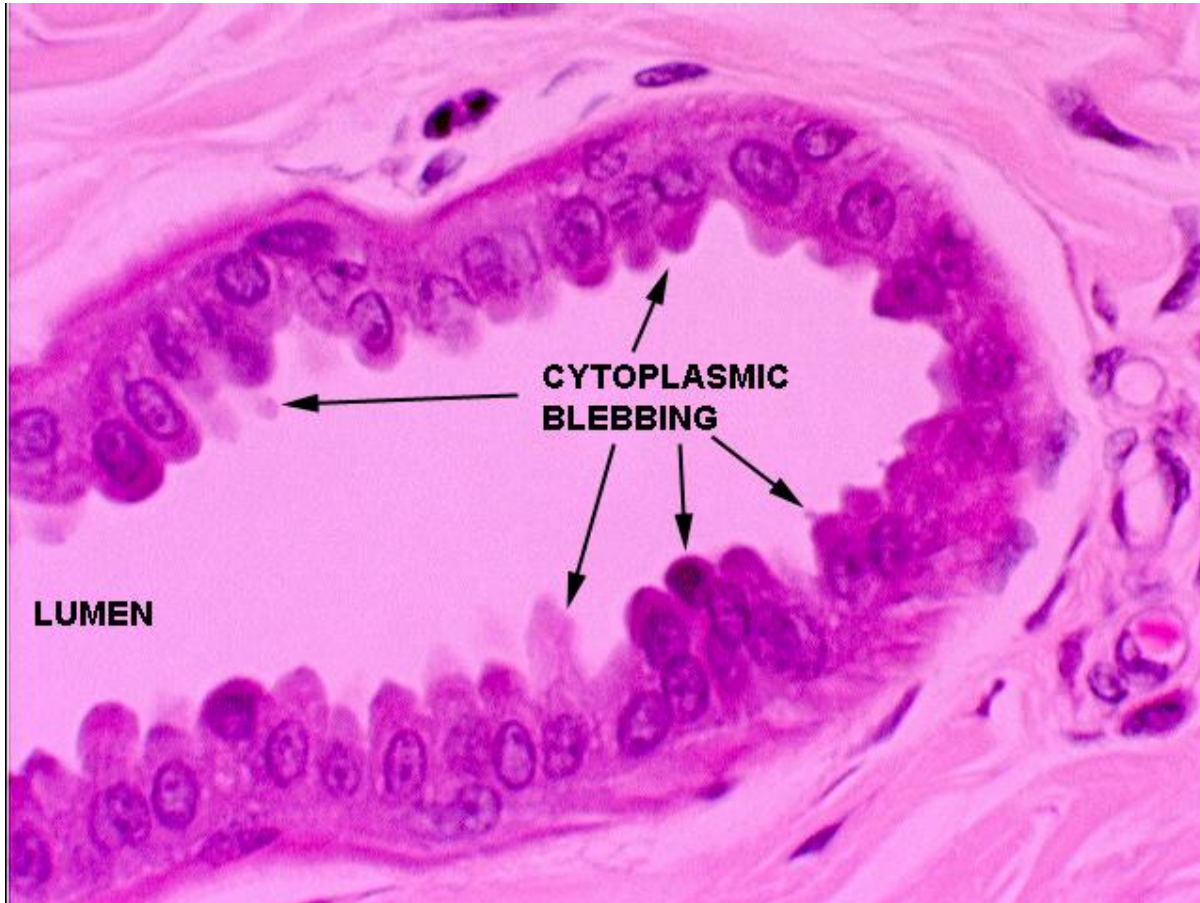
Acne



# Appendages of the Skin

- Sebaceous glands
  - Produce oil (sebum)
    - Lubricant for skin
    - Prevents brittle hair
    - Kills bacteria
  - Most have ducts that empty into hair follicles; others open directly onto skin surface
  - Glands are activated at puberty

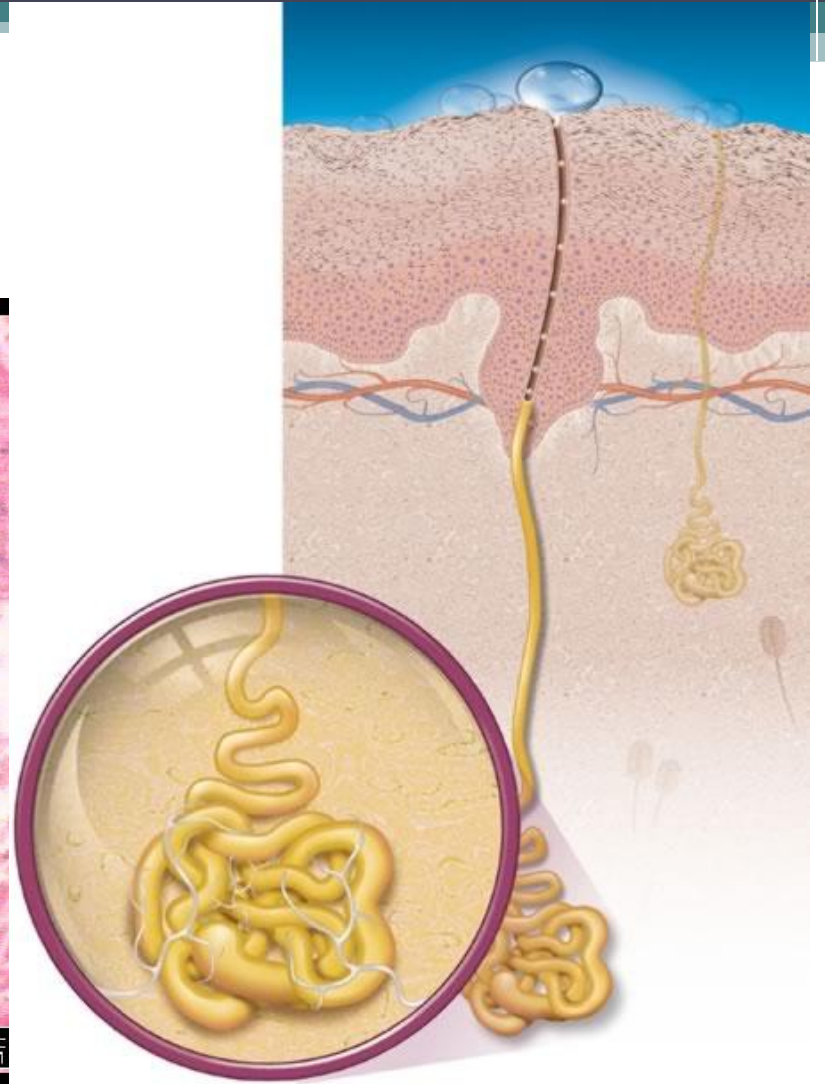
# Apocrine Gland







Eccrine Sweat Gland



# Appendages of the Skin

- Two types of sweat glands
  - Eccrine
    - Open via duct to pore on skin surface
    - Produce sweat (clear)
  - Apocrine
    - Ducts empty into hair follicles
    - Begin to function at puberty
    - Release sweat that also contains fatty acids and proteins (milky/yellowish color)

# Sweat and Its Function



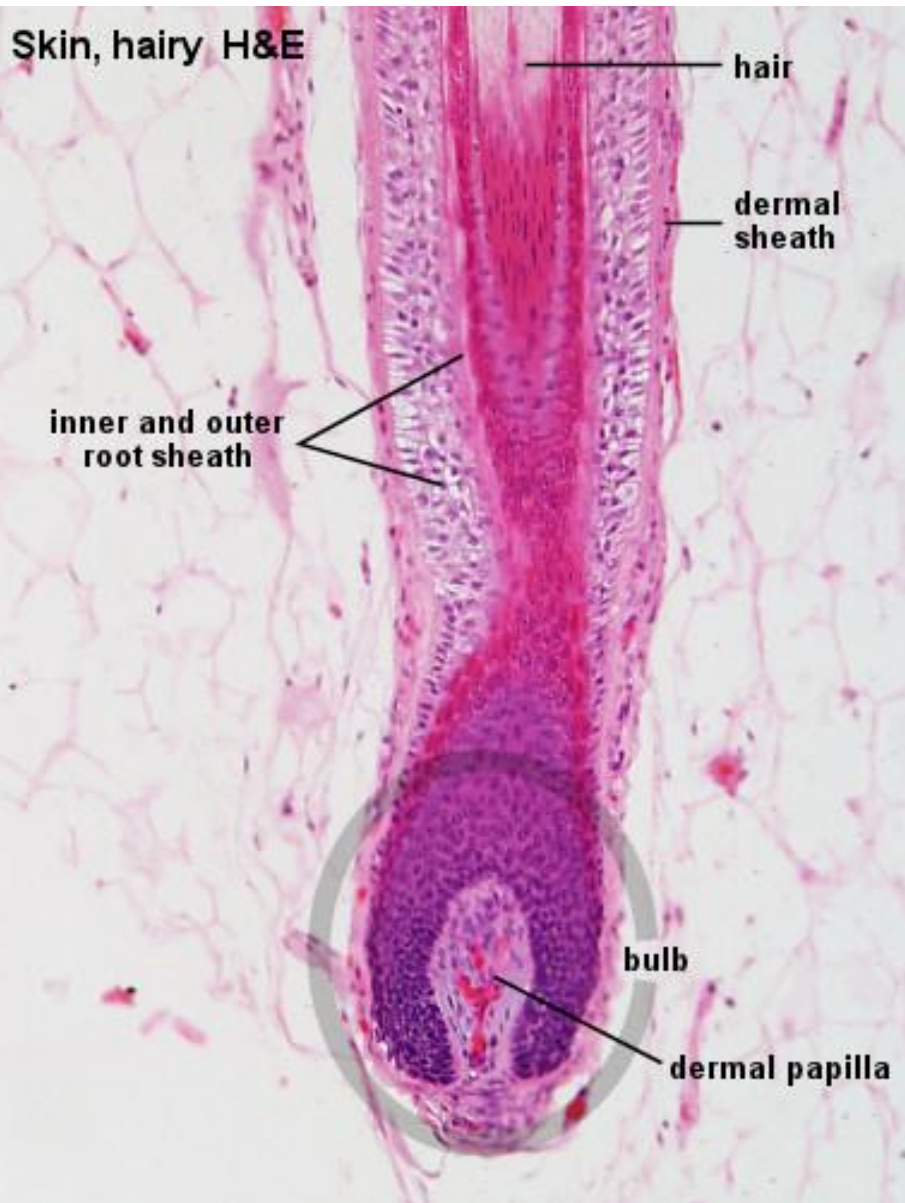
# Sweat and Its Function

- Composition
  - Mostly water
  - Salts and Vitamin C
  - Some metabolic waste
  - Fatty acids and proteins (apocrine only)

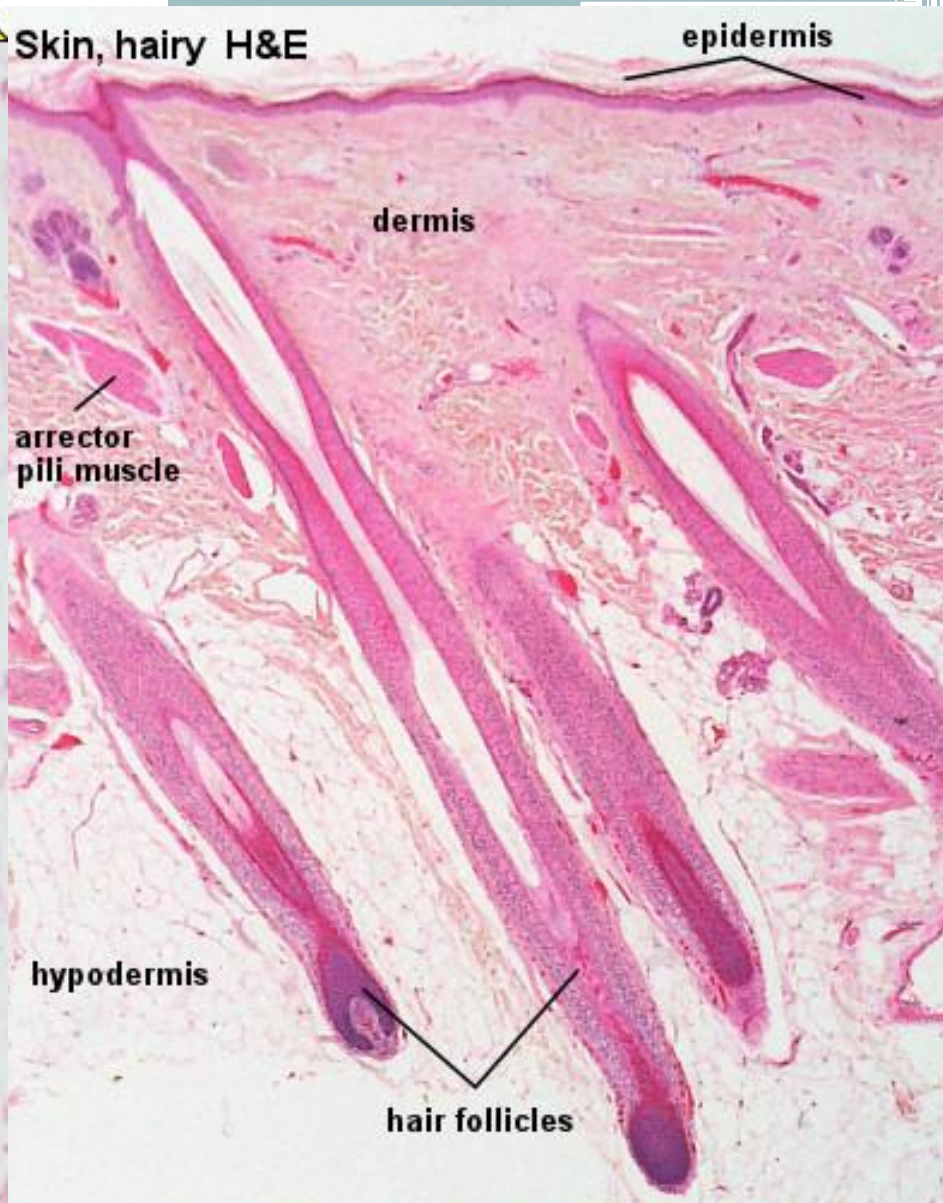
# Sweat and Its Function

- Function
  - Helps dissipate excess heat
  - Excretes waste products
  - Acidic nature inhibits bacteria growth
- Odor is from associated bacteria

Skin, hairy H&E

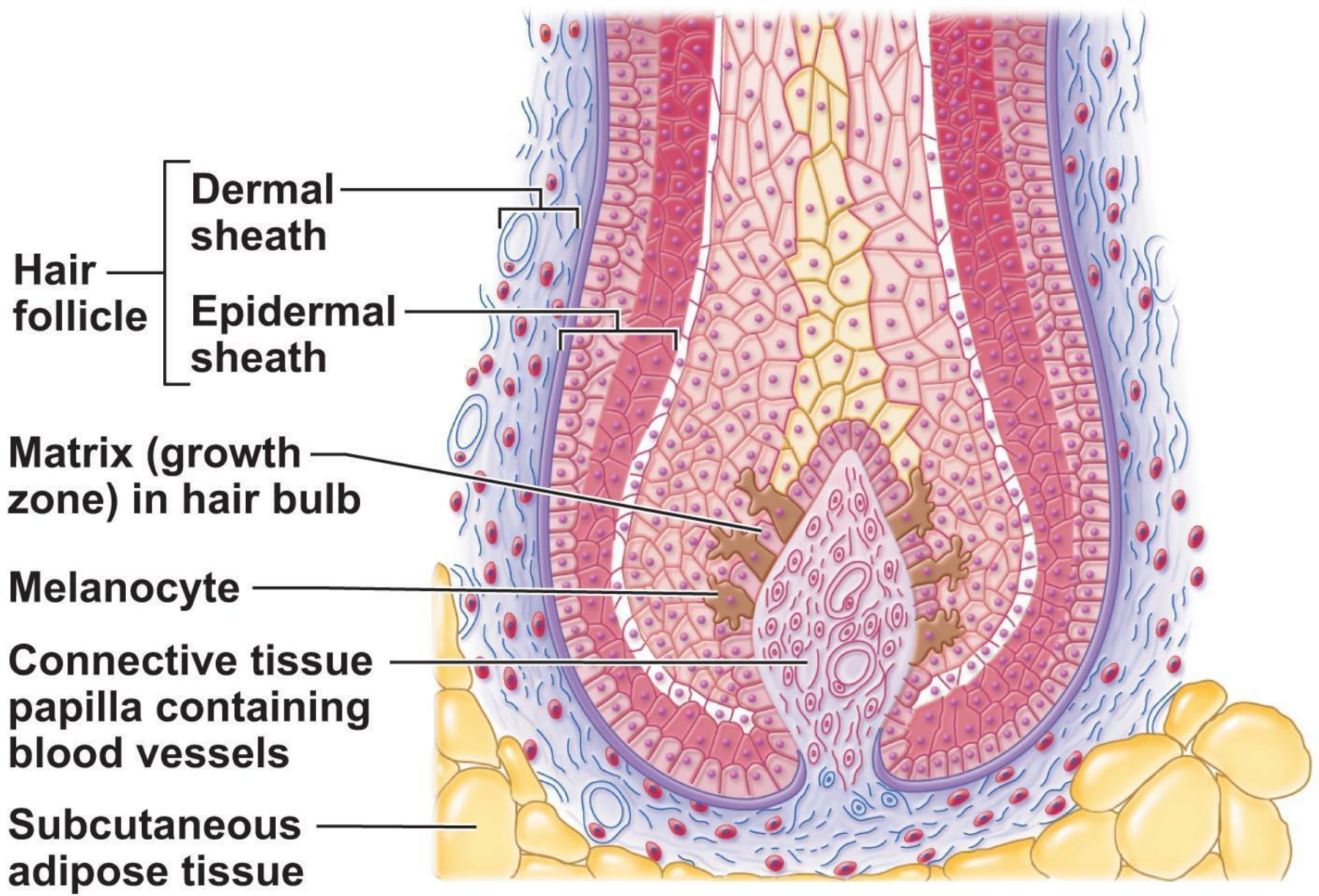


Skin, hairy H&E



# Appendages of the Skin

- Hair
  - Produced by hair follicle
  - Consists of hard keratinized epithelial cells
  - Melanocytes produce pigment for hair color
  - Hair grows in the matrix of the hair bulb in stratum basale



(c)

Figure 4.8c



# Associated Hair Structures

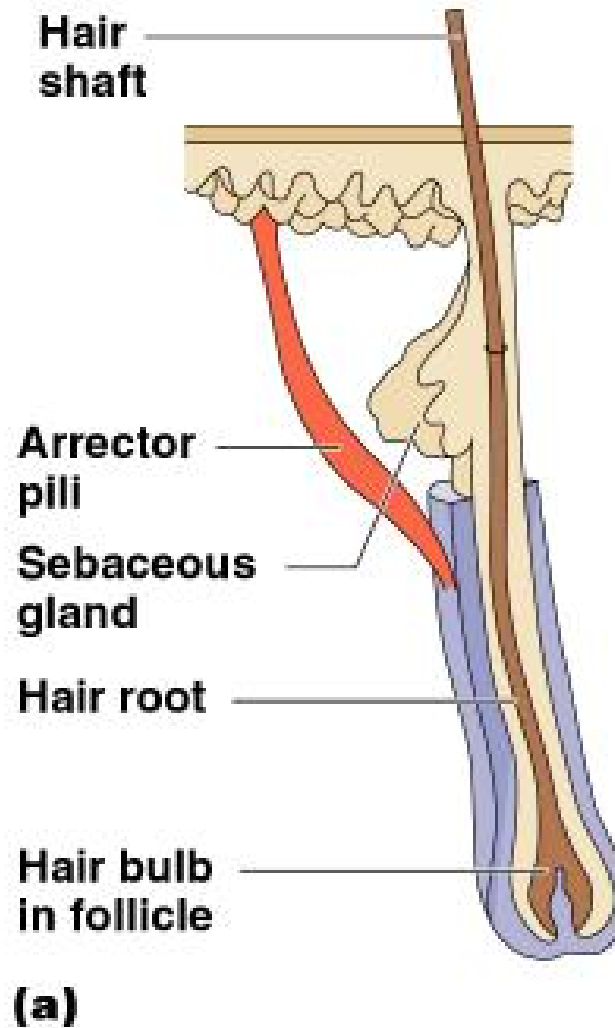
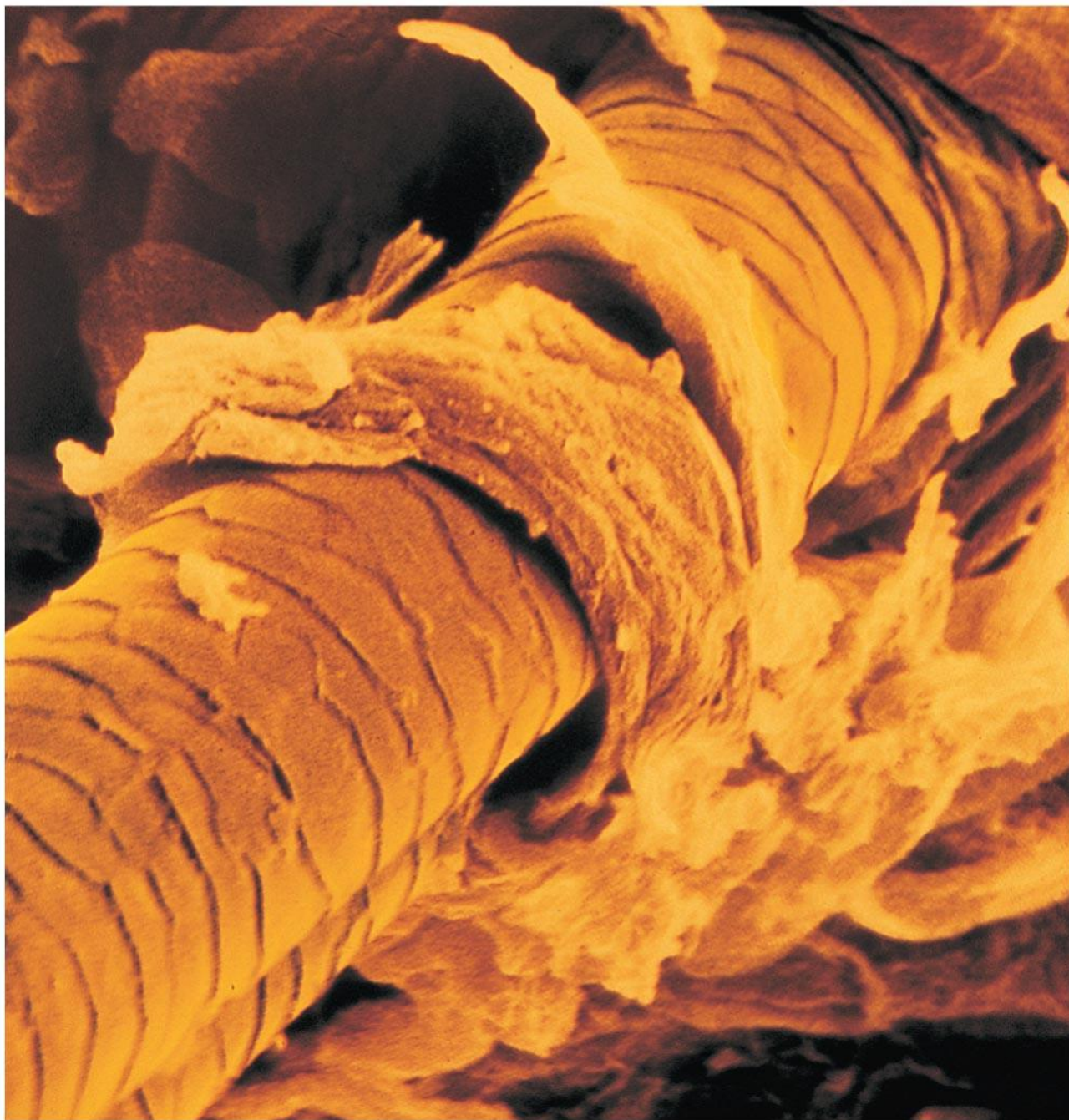
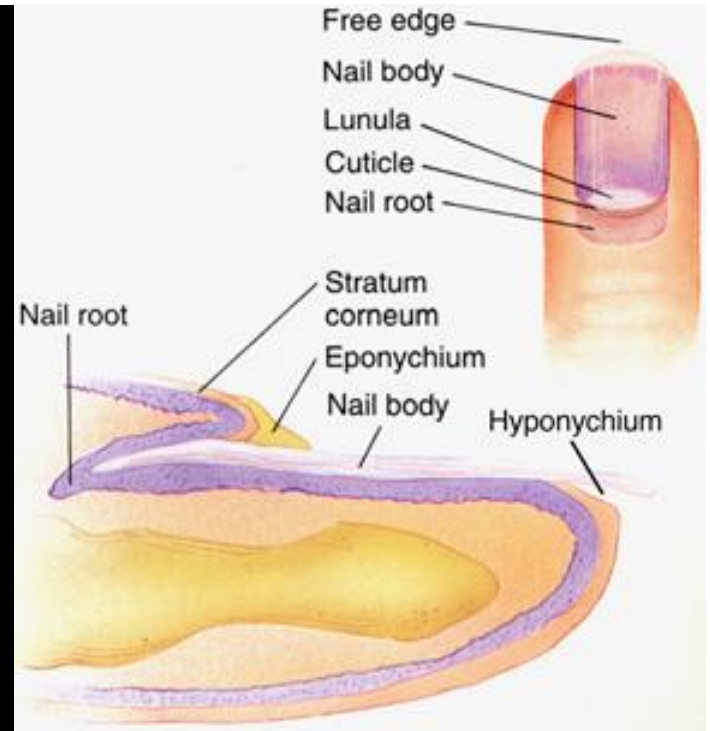
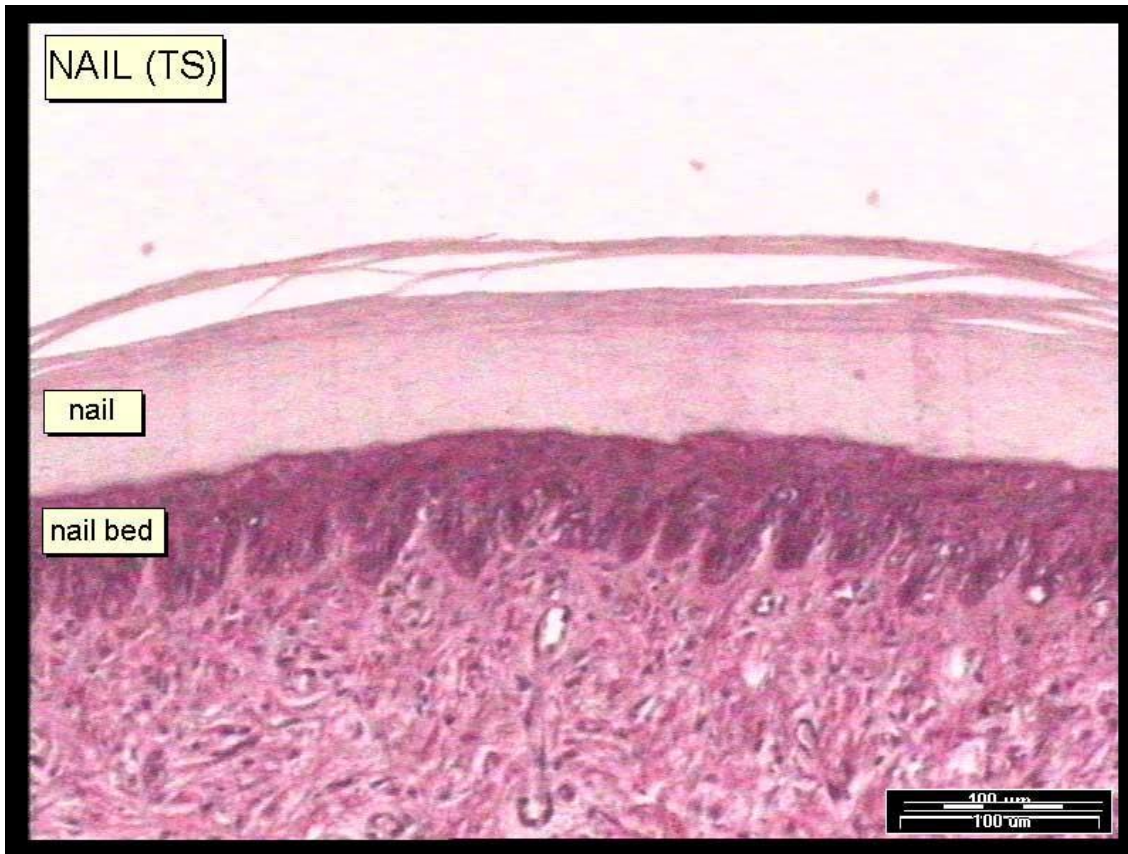


Figure 4.7a



**Figure 4.9**

# Nail



# Appendages of the Skin

- Nails
  - Scale-like modifications of the epidermis
    - Heavily keratinized
  - Stratum basale extends beneath the nail bed
    - Responsible for growth
  - Lack of pigment makes them colorless

