

# **(The Integumentary System)**

## **Skin**

### **Lec.16**

**Histology**

**Second year**

**A. Hadeel Kamil**

# Functions of the Skin

1. Protection
  2. Temperature regulation
  3. Sensations
  4. Storage of chemical compounds
  5. Excretion of wastes
  6. Synthesis of compounds
  7. Determines characteristics
- **Mechanical/Chemical damage** – keratin toughens cells; fats cells cushion blows; and pressure receptors to measure possible damage
  - **Bacterial damage** – skin secretions are acidic and inhibit bacteria.
  - **Ultraviolet radiation** – melanin produced to protect from UV damage

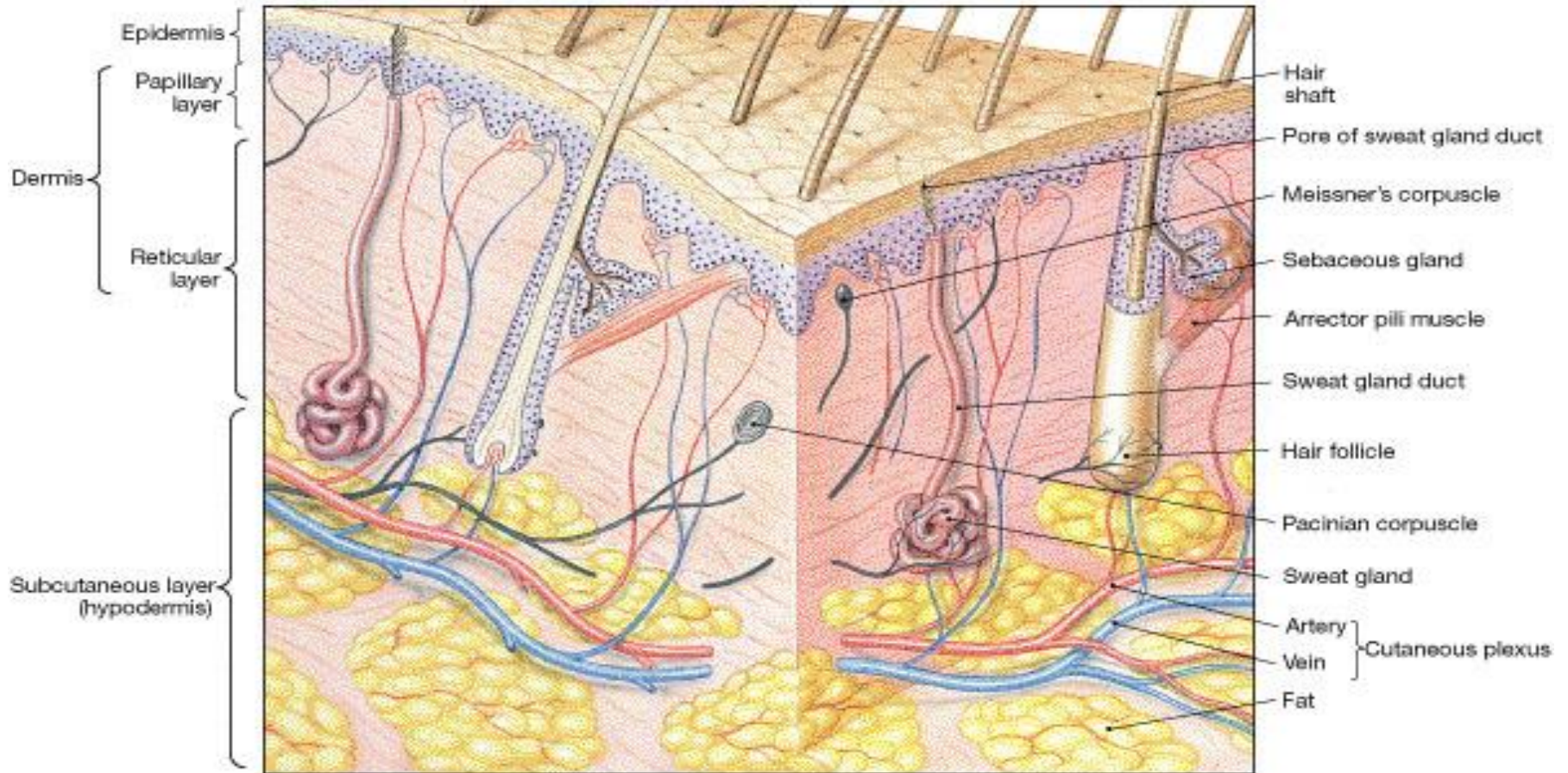
- **Thermal control** – regulates body temperature
  - Heat loss: sweat to cool the skin
  - Heat retention: prevents blood to rush into capillary beds
- **Waterproofing** – contains lipids to prevent drying out
- **Excretion of waste** – urea and uric acid secreted in sweat
- **Makes vitamin D** – modifies cholesterol molecules in skin and converts it to vitamin D

- Sweat glands excrete sweat through pores.
- Sweat is made up of urea, salts, and water.
- Body' s first line of defense.

–Combination of 4 main tissues:

- **Epithelial** – outer layer
- **Connective** – underlies dermis
- **Smooth Muscle**
- **Nervous** – sensory receptors

# The Skin



# Structure of the skin:

- **Epidermis** — outer layer
  - Stratified squamous epithelium
  - Often keratinized (hardened by keratin)
- **Dermis**
  - Dense connective tissue
- **Subcutaneous tissue**
  - hypodermis

# Epidermis and Dermis

- **Epidermis** is **avascular** (no blood vessels)
- **Dermis** is highly **vascular** (has blood vessels)
- Epidermis receives nourishment from dermis
- Cells far away from nourishment die

# Epidermis

**Summary of layers from deepest to most superficial:**

- 1. Stratum basale**
- 2. Stratum spinosum**
- 3. Stratum granulosum**
- 4. Stratum lucidum**
- 5. Stratum corneum**

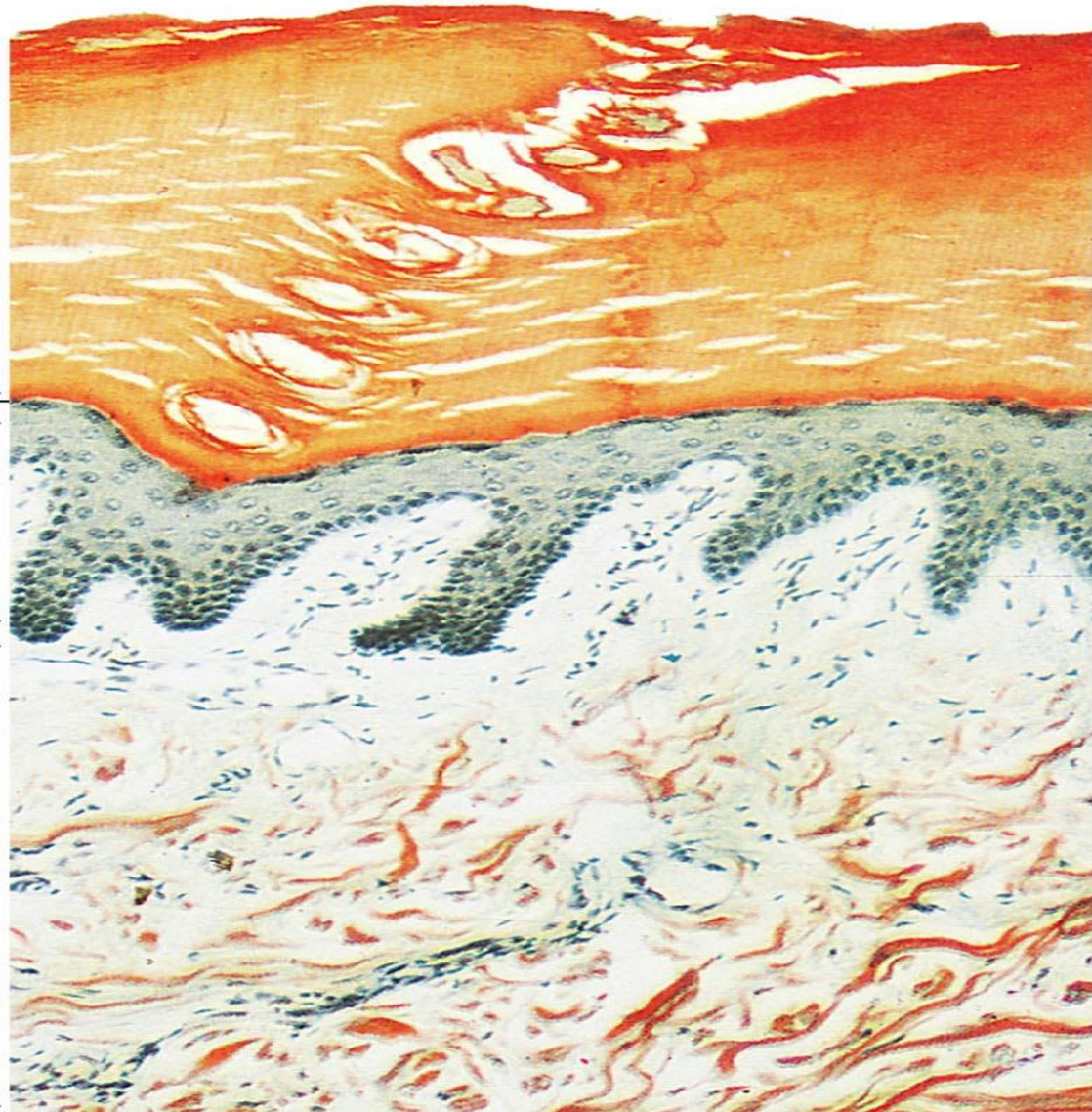


# Skin Structure

## **Epidermis**

- **Stratum corneum**
- **Stratum lucidum**
- **Stratum granulosum**
- **Stratum spinosum**
- **Stratum basale**

## **Dermis**



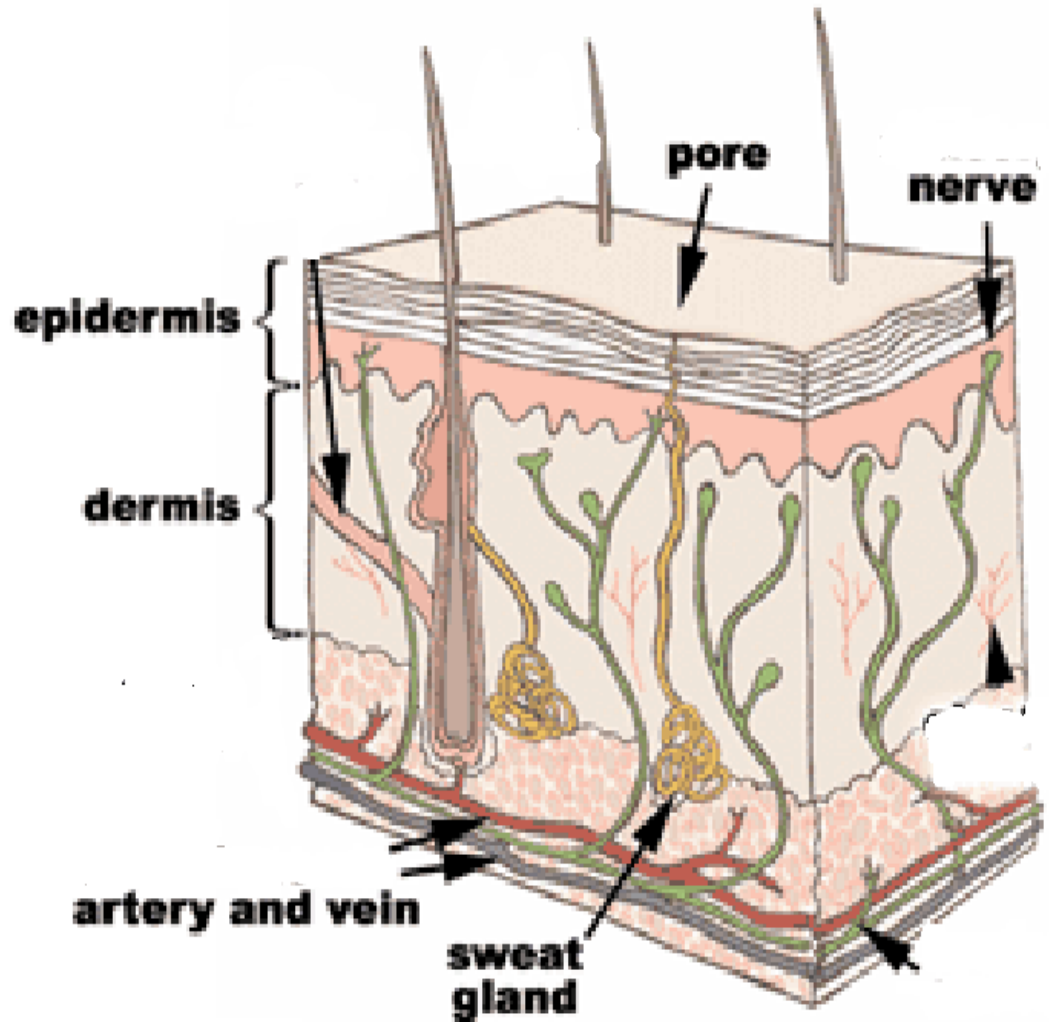
1. **Stratum basale**
  - Deepest layer of epidermis
  - Cells actively undergoing cell division
  - New cells are pushed upward to become the more superficial layers
2. **Stratum spinosum** – intermediate layer
3. **Stratum granulosum** – another layer
  
4. **Stratum lucidum**
  - Formed from dead cells of the deeper layers
  - Occurs only in thick, hairless skin of the palms of hands and soles of feet
5. **Stratum corneum**
  - Outermost layer of epidermis
  - Scale-like dead cells are filled with keratin which is a protective protein preventing water loss from skin

# Dermis

- Two layers
  - **Papillary layer** (upper dermal region)
    - Projections called dermal papillae
      - Some contain capillary loops containing blood
      - Some pain receptors and touch receptors
  - **Reticular layer** (deepest skin layer)
    - Blood vessels
    - Sweat and oil glands
    - Deep pressure receptors

# Dermis

- Thick layer under the epidermis
- Contains blood vessels
- Oil glands
- Sweat glands
- Hair follicles
- Fat tissue
- Nerves
- Connective tissue



# Deeper Layer of the Dermis

Dense connective tissue

– Contains

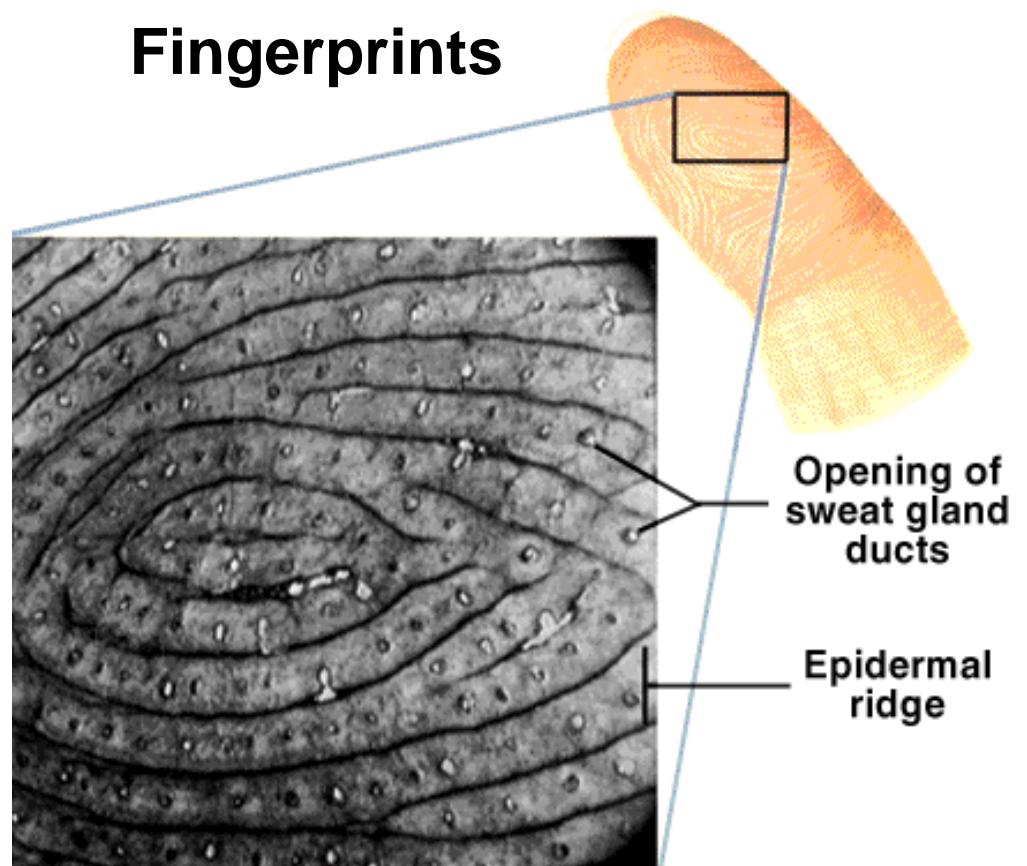
- Blood vessels
- Glands
- Deep pressure receptors

– Attached to underlying organs by the subcutaneous layer

- Loose connective tissue
  - Packed with adipose cells
- Stabilizes position of skin

# What Else Comes from the Epidermis?

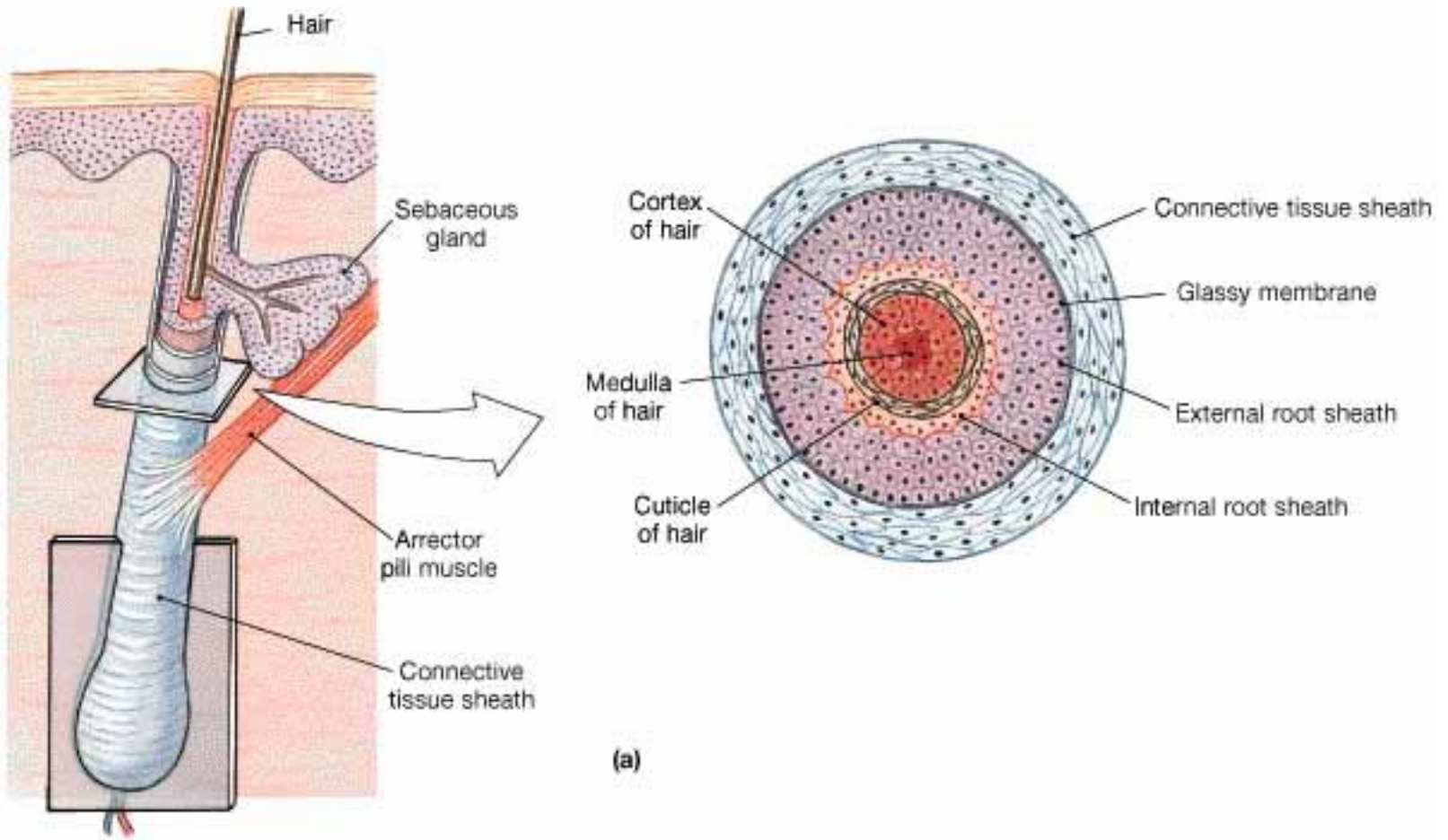
- Hair \ function:
  - Protection
  - Thermoregulation
  - Sensory
- Glands
- Nails



# Hair Structure

- Shaft
  - Superficial portion
- Root
  - Below the surface
- Cuticle
  - Outermost layer of hair
- Hair develops in follicles

# Hair Structure





# Growth of Hair

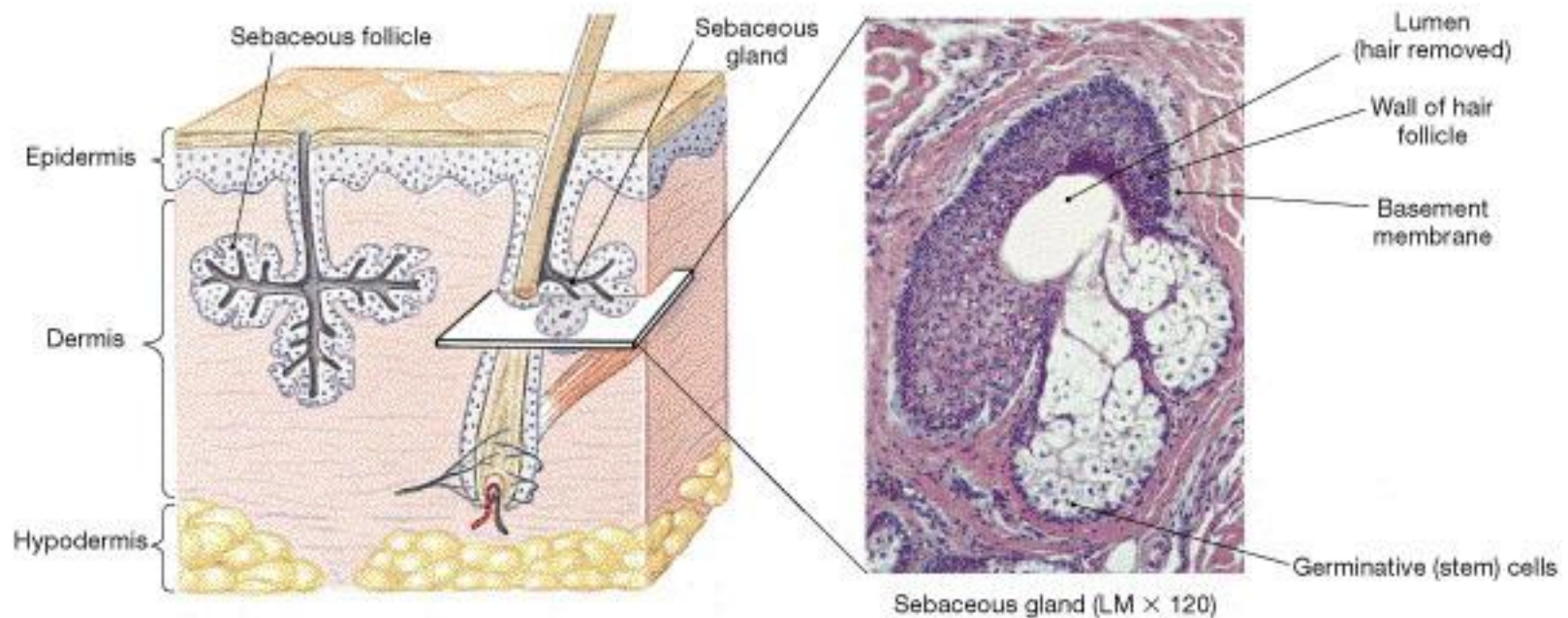
- At the base of the follicle, hair papilla
  - Contains blood vessels and nerves
    - Nourishes hair
- Bulb
  - Contains matrix – epithelial cells responsible for growth
    - Contains melanocytes

## **Arrector Pili**

- Smooth muscle attaches to follicle
- Raises hairs
- Response to fright or cold

# Glands

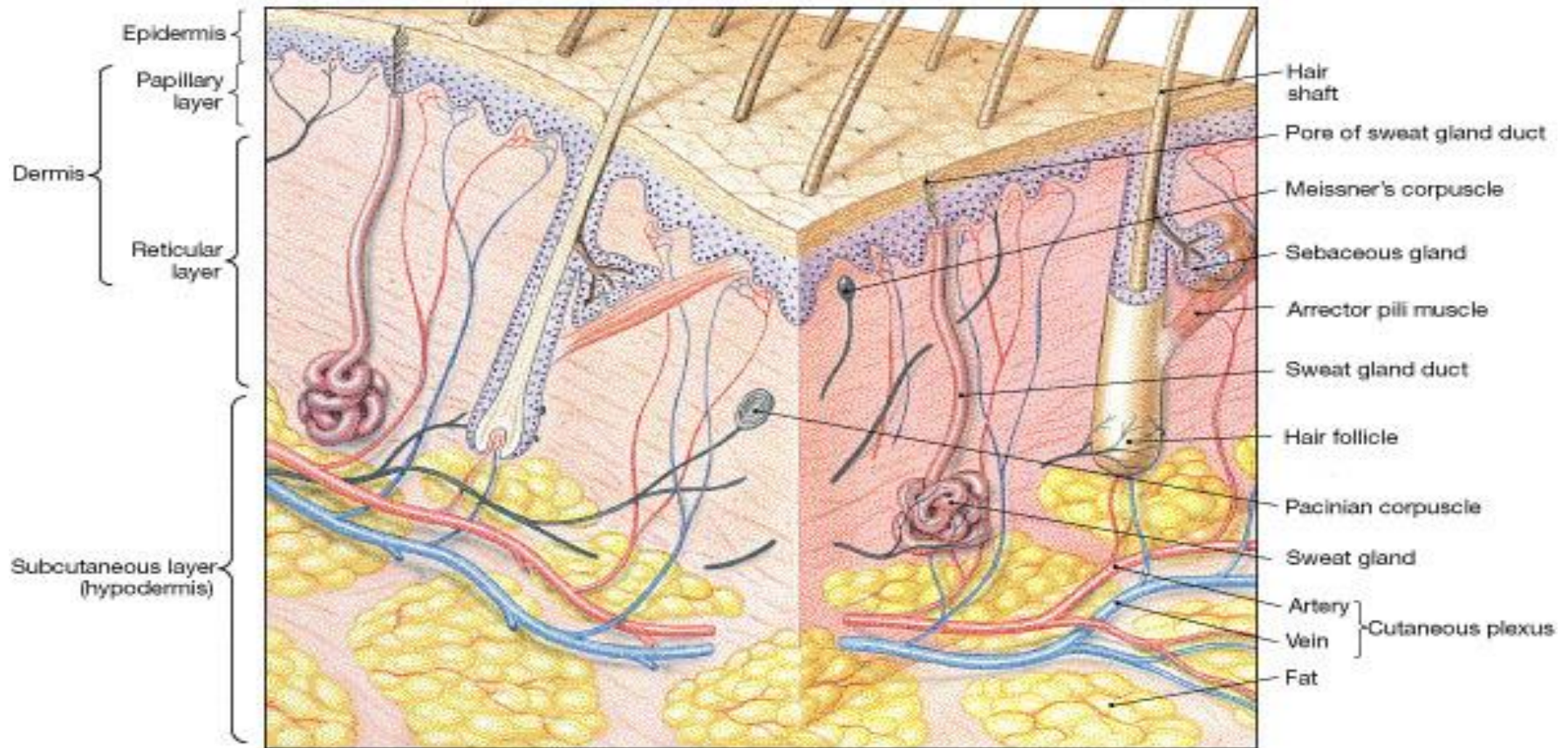
- Sebaceous glands
  - Connected to hair follicles
  - Secrete a waxy, oily substance (sebum)
    - Blackheads
  - Secretion increases at puberty



# Glands

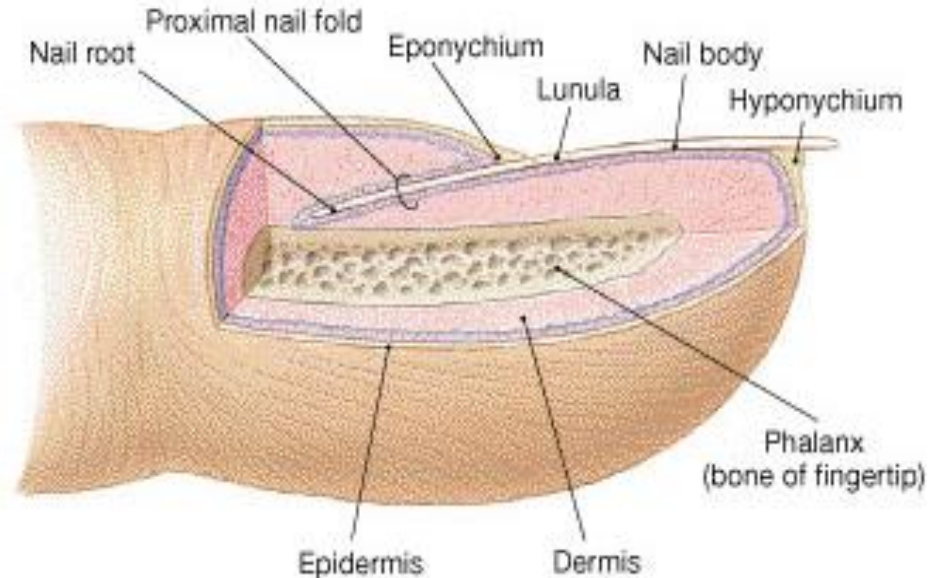
- Sweat glands
  - Found just about everywhere
  - Produce “perspiration”
    - Water, salt, materials Wastes
  - Function – cooling of the body
- Scent Glands
  - Specific type of sweat gland
  - Found near hair follicles
    - Axillary & genital regions
  - Develop at puberty

# The Skin with Sweat Glands



# Nail Structure

- Nail body
- Free edge
- Nail root \ Matrix
- Lunula (moon)



# The skin also helps control body temperature- Homeostasis

- When you sweat, heat leaves the body through your pores.
- When the sweat hits the outer surface of the skin, it is cooled by the air.
- This lowers your body temperature.

# What causes Normal Skin Color?

- Melanin
  - Yellow, brown, or black pigments
- Carotene
  - Orange-yellow pigment from some vegetables
- Hemoglobin
  - Red coloring from blood cells in dermal capillaries
  - Oxygen content determines the extent of red coloring