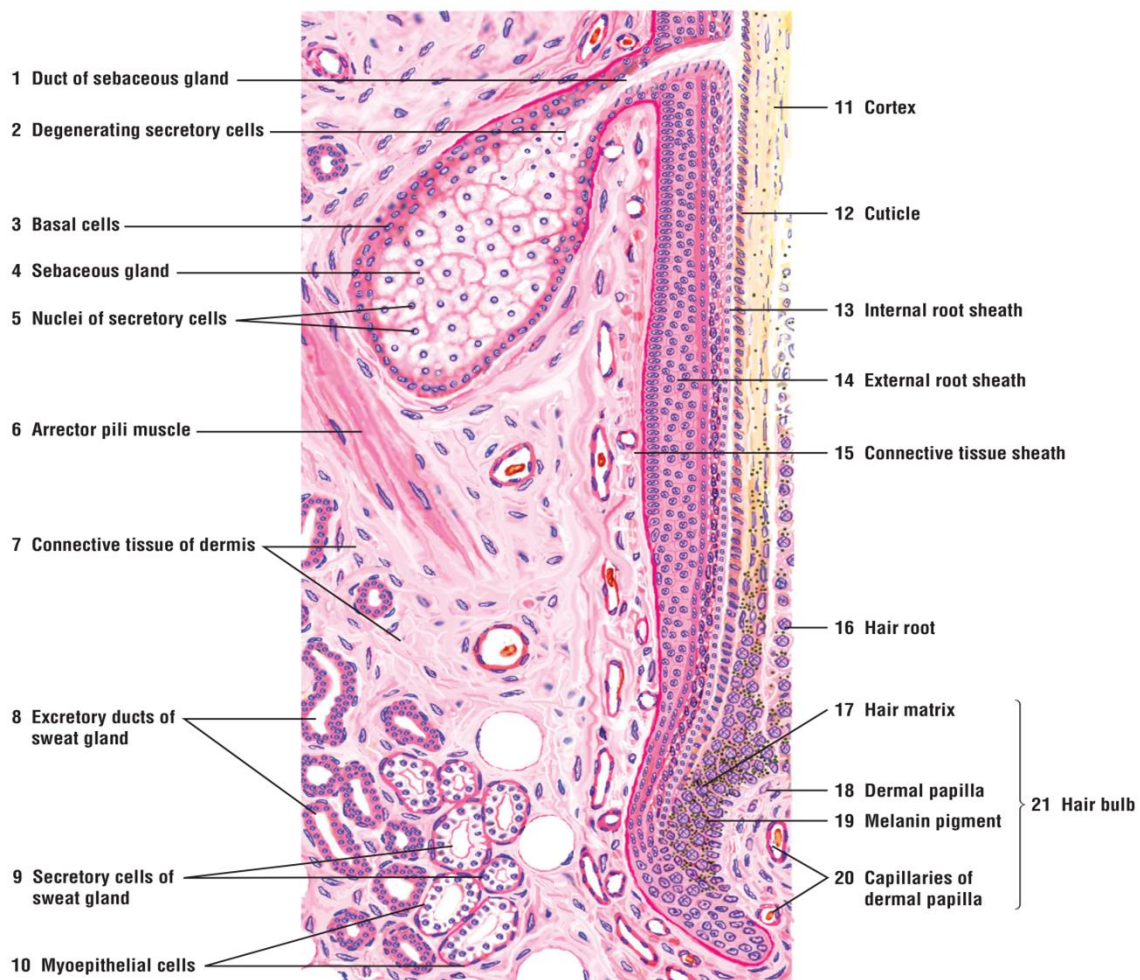


## Integumentary system part 2

### Skin Derivatives:

#### Hairs

- Develop from surface epithelium of the epidermis and reside deep in the dermis
- They are hard cylindrical structures that arise from hair follicles
- Surrounded by external and internal root sheaths
- Grow from expanded hair bulb of the hair follicle
- Hair bulb indented by connective tissue (dermal) papilla that is highly vascularized
- Hair matrix situated above papilla contains mitotic cells and melanocytes.



## **Sebaceous Glands**

- Numerous sebaceous glands associated with each hair follicle
- Cells in sebaceous glands grow, accumulate secretions, die, and become oily secretion sebum
- Smooth muscles arrector pili attach to papillary layer of dermis and to sheath of hair follicle
- Contraction of arrector pili muscle stands hair up and forces sebum into lumen of hair follicle

## **Sweat Glands**

- Widely distributed in skin and are of two types: eccrine and apocrine
- Assist in temperature regulation and excretion of water, salts, and some nitrogenous waste

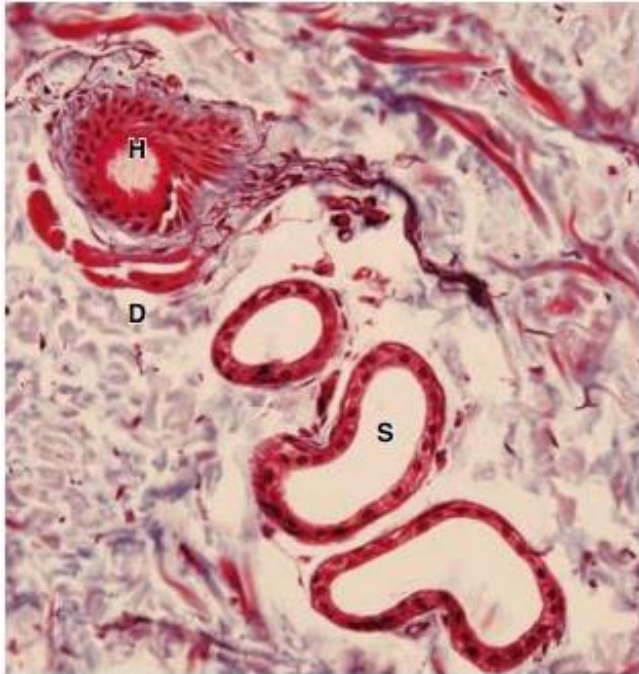
### **Eccrine (Merocrine) Sweat Glands:**

- They can be found in both thin and thick skin over most of the body. They are more numerous in the palms and soles
- They are simple coiled glands located deep in dermis in skin
- The secretory units of eccrine sweat glands contain three cell types. (1) Dark cells, (2) Clear cells both are pyramid-shaped cells containing secretory granules, (3) Myoepithelial cells are not secretory cells. They are spindle-shaped contractile cells, which help to push secretory products into and along the lumen.
- Clear cells secrete watery product, whereas dark cells secrete mainly mucus
- Contractile myoepithelial cells surround only the secretory cells
- Excretory duct is thin, dark-staining, and lined by stratified cuboidal cells
- Excretory duct ascends, straightens, and penetrates epidermis to reach surface of skin

### **Apocrine Sweat Glands:**

- Found coiled in deep dermis of axilla, anus, and areolar regions of the breast
- Ducts of glands open into hair follicles
- Lumina wide and dilated, with low cuboidal epithelium

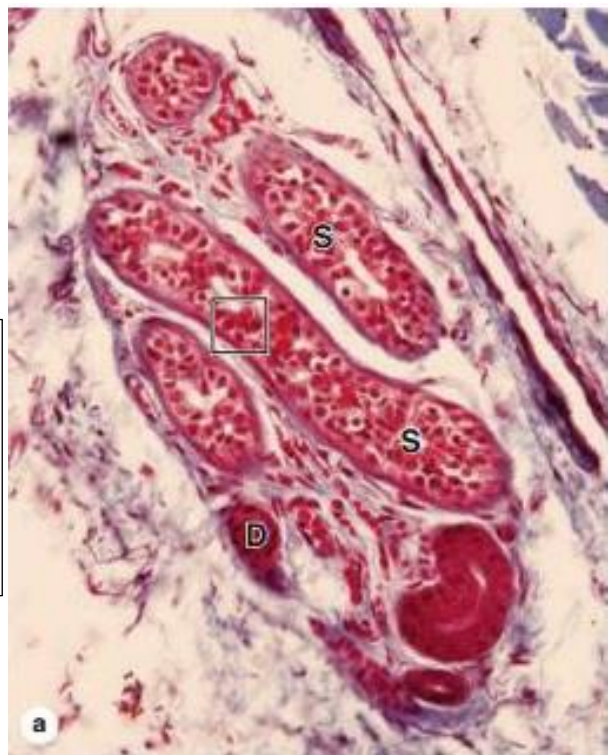
- Contractile myoepithelial cells surround secretory portion of glands
- Become functional at puberty, when sex hormones are present
- Secretion has unpleasant odor after bacterial decomposition



The secretory portions (S) of apocrine sweat glands have lumens that are much larger than those of eccrine sweat glands. The ducts (D) of apocrine glands also differ from those of eccrine glands in opening into hair follicles (H) rather than to the epidermal surface. (X200; Mallory trichrome)

**Apocrine glands**

(a) Histologically eccrine glands have small lumens in the secretory components (S) and ducts (D), both of which have an irregular stratified cuboidal appearance. Both clear and acidophilic cells are seen in the stratified cuboidal epithelium of the secretory units. (X200; Mallory trichrome)



**Eccrine glands**

## Comparison of Thick and Thin Skin

Comparison of Thick and Thin Skin					
Type of Skin	Epidermis	Hair/Hair Follicles	Glands	Sensory Receptors	Location/ Distribution
Thick skin	Five layers; thick stratum corneum; thick stratum granulosum	No	Lack of sebaceous glands; more eccrine sweat glands	More receptors	Palms of the hand and soles of the feet
Thin skin	Four layers; no stratum lucidum; thin layer of stratum granulosum	Present in most areas (except a few places, such as lips, labia minora, and glans penis)	Many sebaceous glands; fewer eccrine sweat glands	Fewer receptors	Entire body except thick skin areas

### Major Skin Functions:

The skin comes in direct contact with the external environment. As a result, skin performs numerous important functions, most of which are protective.

**1- Protection:** The keratinized stratified epithelium of the epidermis protects the body surfaces from mechanical abrasion and forms a physical barrier to pathogens or foreign microorganisms. Because a glycolipid layer is present between the cells of the stratum granulosum, the epidermis is also impermeable to water. This layer also prevents the loss of body fluids through dehydration. Increased synthesis of the pigment melanin protects the skin against ultraviolet radiation.

**2-Temperature:** Regulation Physical exercise or a warm environment increases sweating. Sweating reduces the body temperature after evaporation of sweat from skin surfaces. In addition to sweating, temperature regulation also involves increased dilation of blood vessels for maximum blood flow to the skin. This function also increases heat loss. Conversely, in cold temperatures, body heat is conserved by constriction of blood vessels and decreased blood flow to the skin.

**3- Sensory Perception:** The skin is a large sensory organ of the external environment. Numerous encapsulated and free sensory nerve endings within the skin respond to stimuli for temperature (heat and cold), touch, pain, and pressure.

**4-Excretion:** Through production of sweat by the sweat glands, water, sodium salts, urea, and nitrogenous wastes are excreted to the surface of skin.

**5-Formation of Vitamin D:** Vitamin D is formed from precursor molecules synthesized in the epidermis during exposure of the skin to ultraviolet rays from

the sun. Vitamin D is essential for calcium absorption from the intestinal mucosa and for proper mineral metabolism.