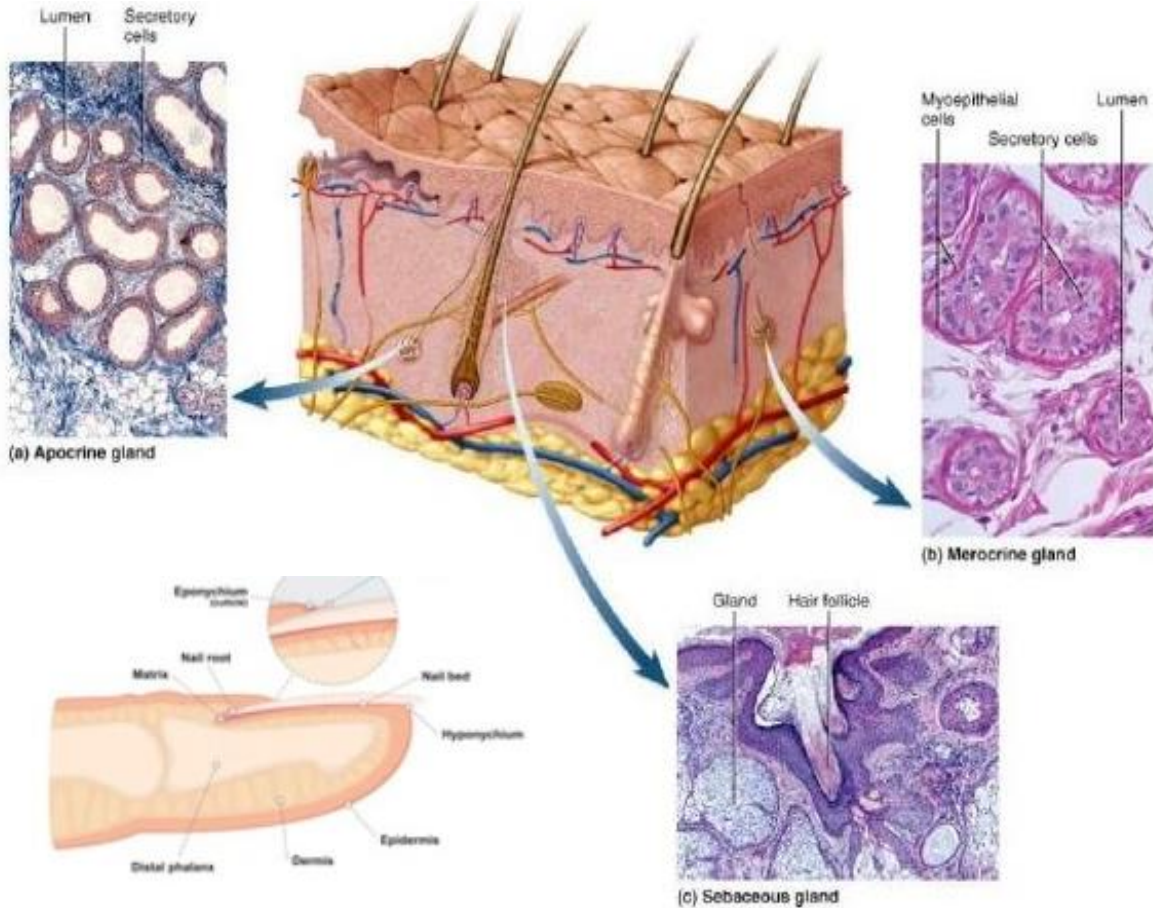




General Histology / Year 2



Integumentary System *Hair, glands, Nail* **Lecture 9**

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Hair

- Hairs are elongated keratinized structures derived from invaginations of the epidermal epithelium called hair follicles.
- The color, size, shape and texture of hairs vary according to age, genetic background, and region of the body.
- One portion of the hair projects through the epithelium of the skin to the exterior surface; the other portion remains embedded in the dermis.
- Hair grows from the expanded portion at the base of the hair follicle called the hair bulb, which consists of a matrix of dividing cells that produce the growth of hair.
- Also present here are melanocytes that provide the pigment for the hair.
- The base of the hair bulb is indented by a connective tissue papilla, a highly vascularized region that brings essential nutrients to hair follicle cells.
- Here, the hair cells divide, grow, cornify, and form the hairs.

Hair

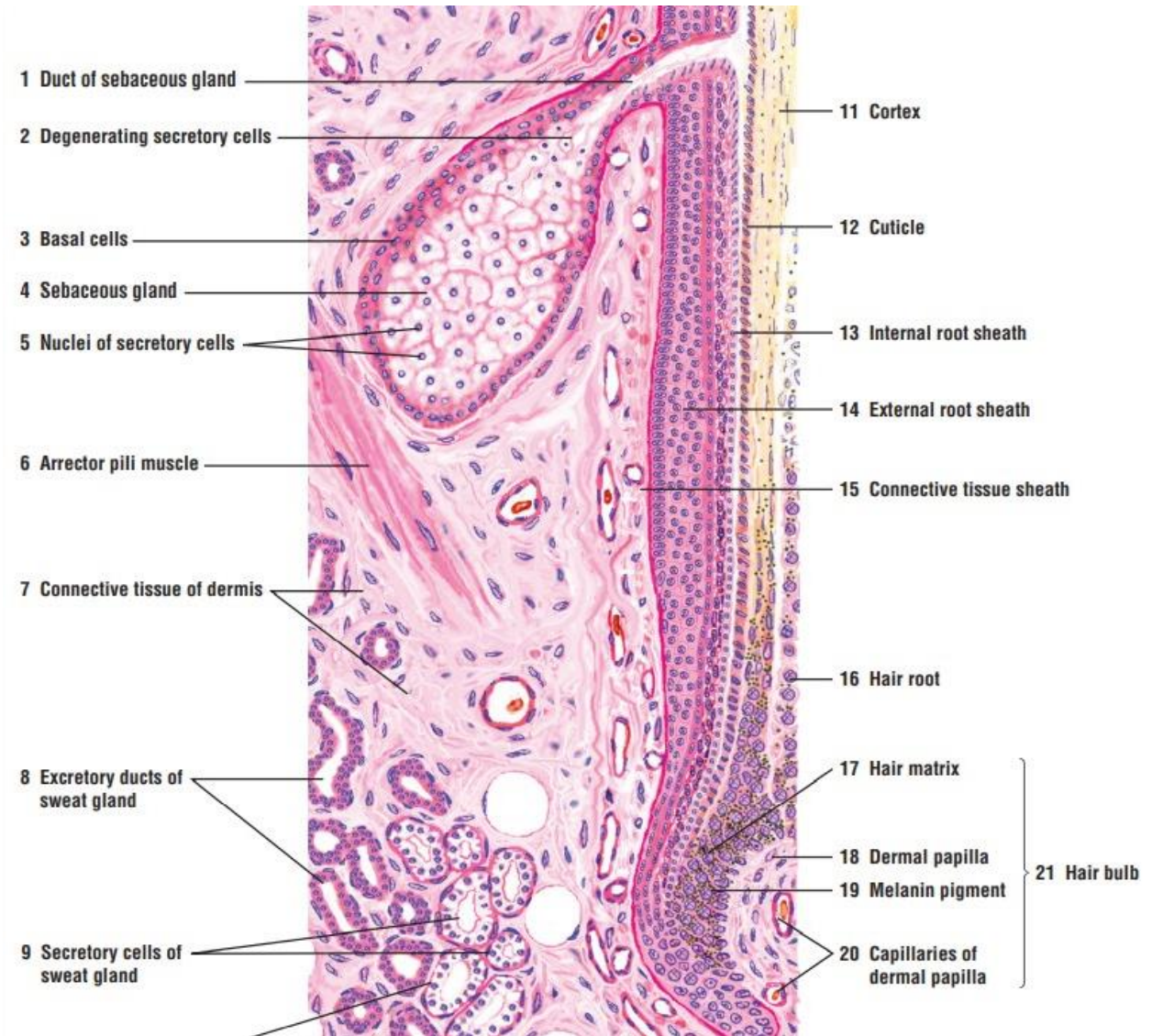
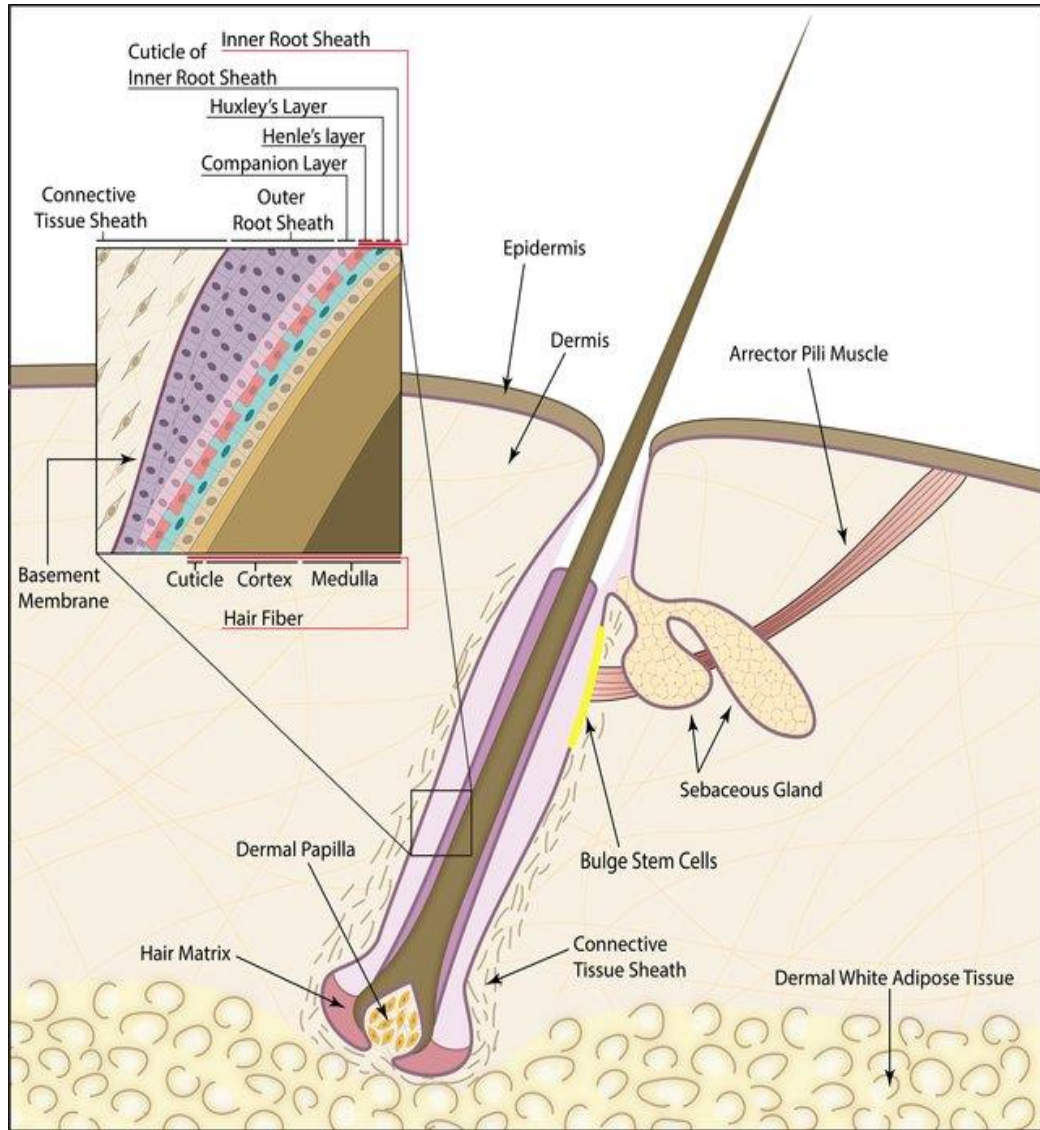
- Regions of hair:-
 - **Hair shaft**
 - - Upper part of the hair.
 - - Not attached to the integument.
 - **Hair root**
 - - Lower part of the hair.
 - - Attached to the integument.

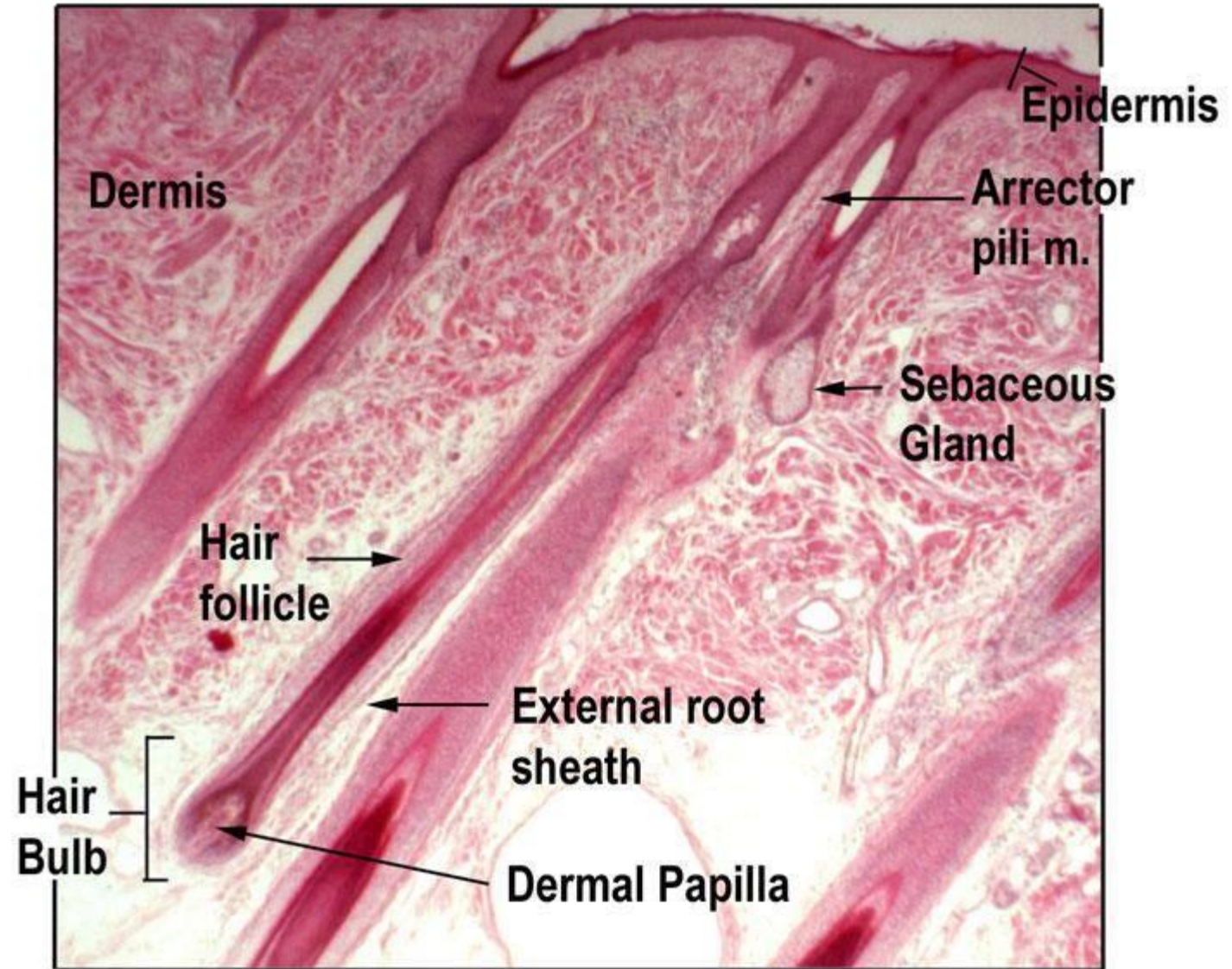
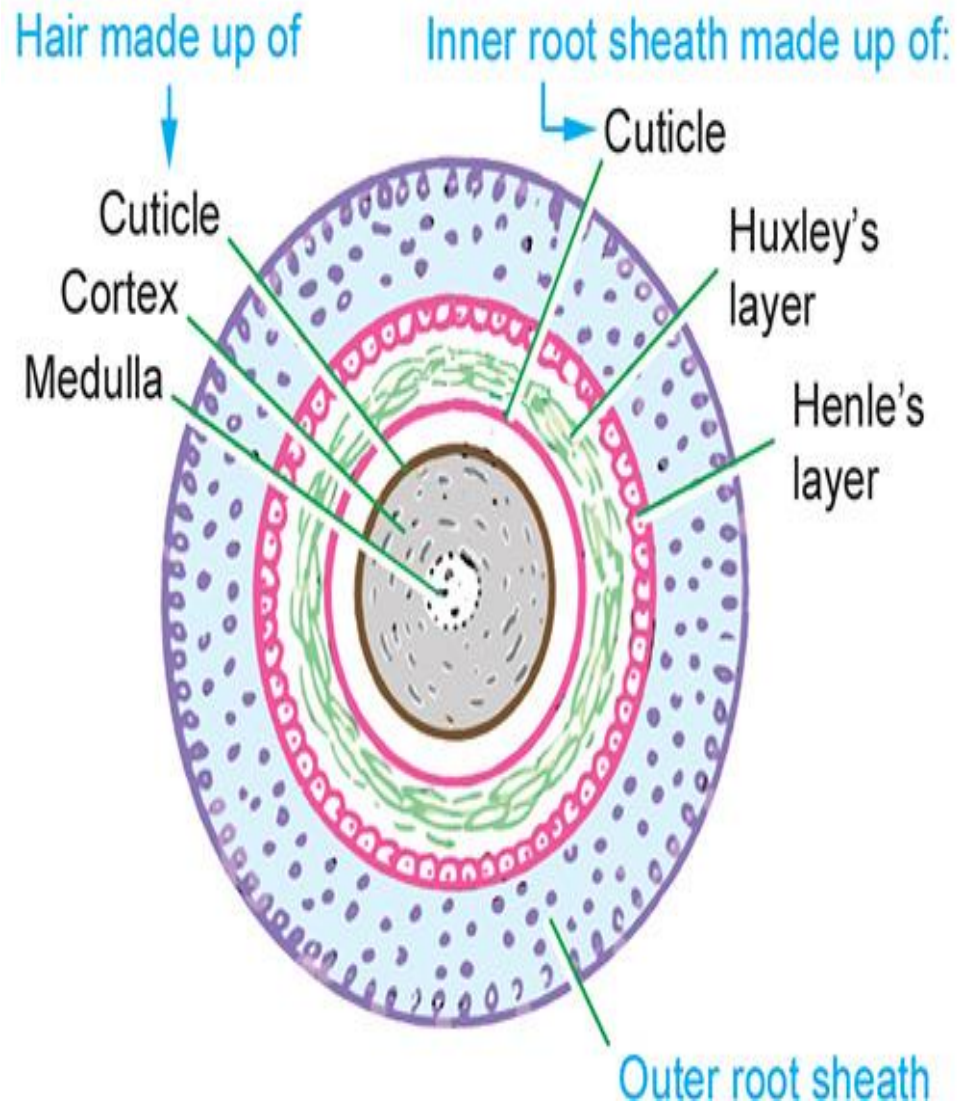
Hair shaft

- The hair shaft is a long, slender filament in the center of the follicle that extends above the surface of the epidermis.
- It consists of an inner medulla, cortex, and outer cuticle of the hair.
- **The medulla** forms the central part of the shaft and contains large vacuolated cells. The medulla is present only in thick hairs.
 - - Dead cells contain soft keratin and air to provide flexible.
- **The cortex** is located peripherally to the medulla and contains cuboidal cells. These cells undergo differentiation into keratin-filled cells. In addition, the hair shaft contains melanin pigment produced by melanocytes present in the germinative layer of the hair bulb.
 - - Middle layer, dead cells contain hard keratin to provide stiffness.
- **The cuticle** of the hair shaft contains squamous cells that form the outermost layer of the hair.
 - - Outermost, overlapping dead keratinized cells form shiny surface.

Hair root

- The outermost cells of the hair bulb are continuous with the epithelial root sheath in which two layers can be recognized.
- **The internal root sheath**
- Completely surrounds the initial part of the hair shaft but degenerates above the level of the attached sebaceous glands.
- The internal root sheath has three layers:-
- **Henle's layer:** consists of an outer single layer of cuboidal cells.
- **Huxley's layer:** consists of a single or double layer of flattened cells that form the middle plate of the internal root sheath.
- **The inner root sheath cuticle:** consists of squamous cells whose outer free surface faces the hair shaft.
- **The external root sheath**
- Covers the internal sheath and extends all the way to the epidermis, where it is continuous with the basal and spinous layers.
- Separating the hair follicle from the dermis is an acellular hyaline layer, the thickened basement membrane called the (**glassy membrane**).



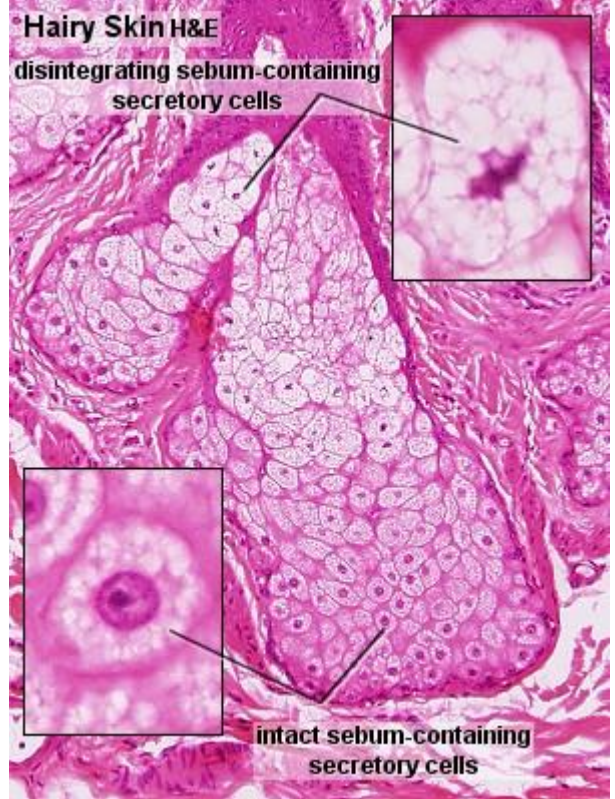
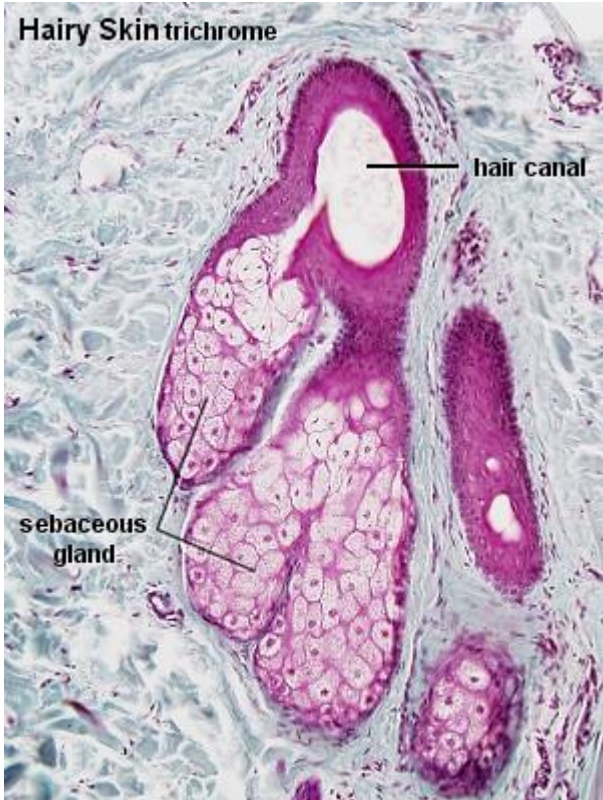
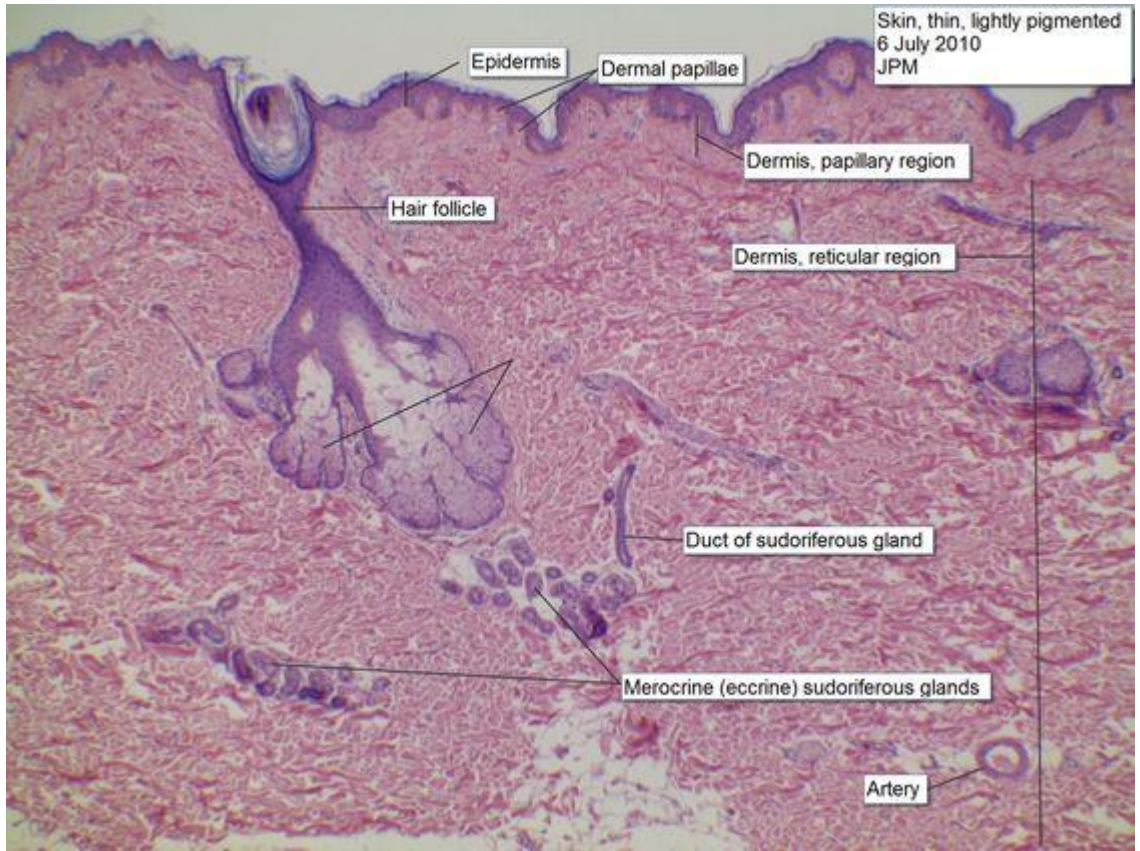


Sebaceous Glands

- **The sebaceous glands are located between the arrector pili muscle and the hair follicle.**
- **The arrector pili muscle attaches at an oblique angle to the dermal sheath surrounding a hair follicle.**
- **Arrector pili muscles are controlled by the autonomic nervous system and contract during strong emotions, fear, and cold.**
- **Contraction of the arrector pili muscle erects the hair shaft, depresses the skin where it inserts, and produces a small bump on the surface of skin, often called a “goose bumps”.**
- **In addition, this contraction forces the sebum from sebaceous glands onto the hair follicle and skin.**
- **Sebum oils keep the skin smooth, waterproof it, prevent it from drying, and give it some antibacterial protection.**

Sebaceous Glands

- **Associated with each hair follicle are one or more sebaceous glands that produce an oily secretion called sebum.**
- **In Histological section, in this type of gland, the secretory portion is divided into smaller acini having a lobular appearance.**
- **The secretory portion is provided with single excretory duct formed of stratified epithelium.**
- **The duct empties into the neck of a hair follicle.**
- **Sebaceous glands are embedded in the dermis over most of the body's surface but are absent from the palms and soles.**
- **They are most abundant on the face, forehead, and scalp.**
- **These holocrine glands release sebum (composed of an oily secretion and degenerating epithelial cells).**

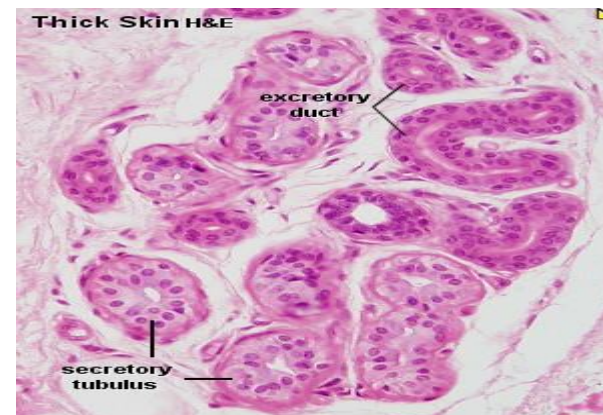
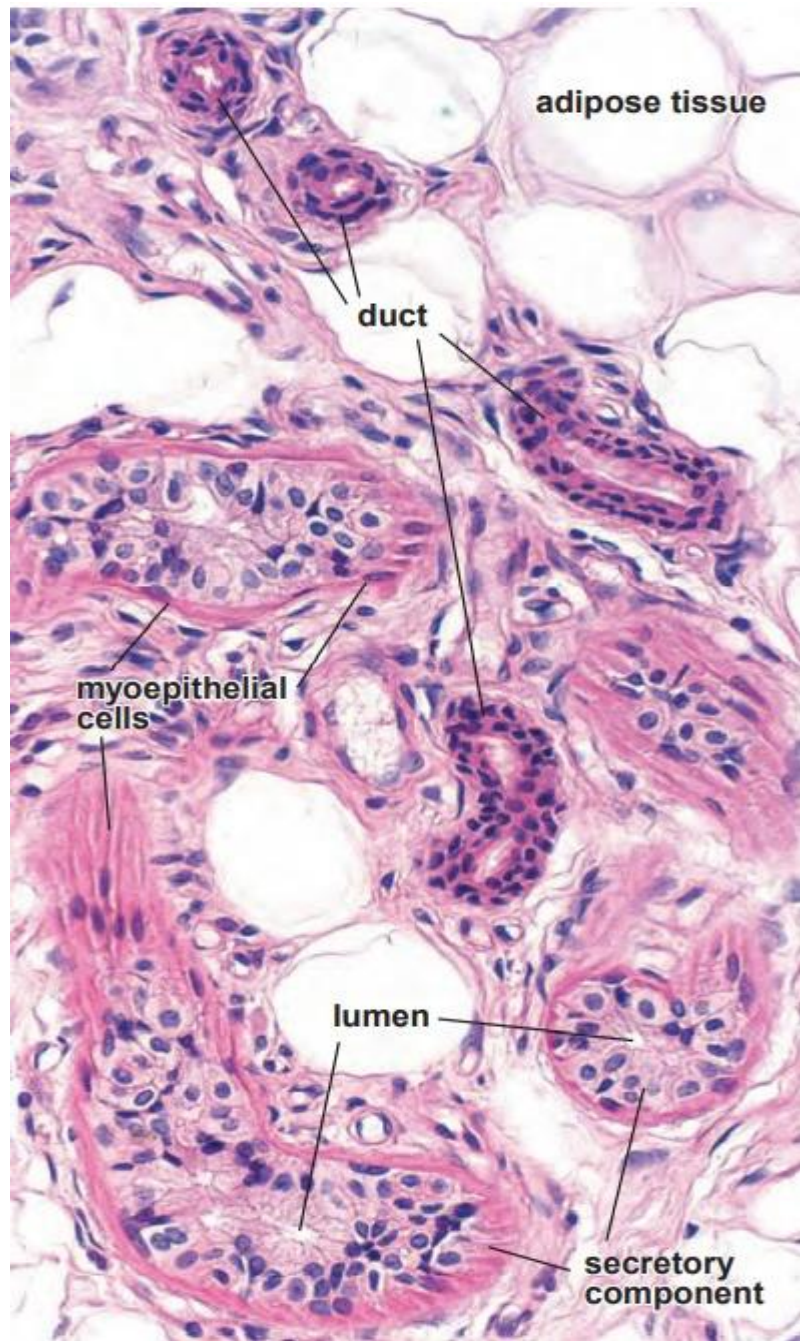


Merocrin (Eccrine) Sweat Glands

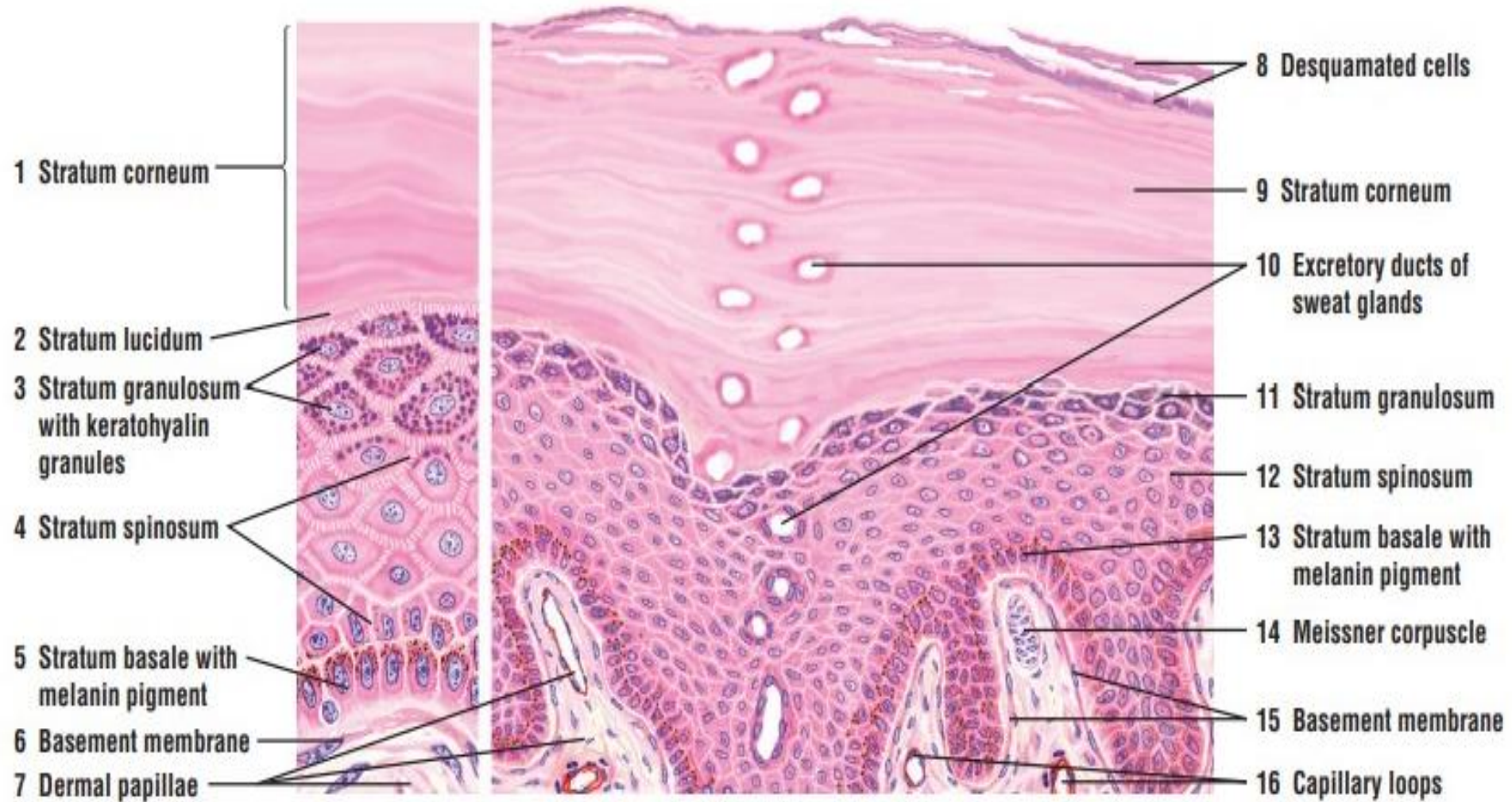
- **Sweat Glands** Widely distributed in the skin and are of two types: merocrine (eccrine) and apocrine glands.
- Their secretory portion is found deep in the dermis, from which a coiled, stratified cuboidal excretory duct leads to the skin surface.
- The eccrine sweat glands contain two cell types: clear cells without secretory granules and dark cells with secretory granules.
- Secretion from the dark cells is primarily mucus, whereas secretion from clear cells contains water and electrolytes.
- Surrounding the basal region of the secretory portion of each sweat gland are myoepithelial cells, whose contraction expels the secretion (sweat) from sweat glands.
- Excretory duct ascends, straightens, and penetrates the epidermis to reach the surface of the skin.

Merocrine (Eccrine) Sweat Glands

- **Eccrine sweat glands are most numerous in the skin of the palms and soles.**
- **The eccrine sweat glands have an important role in assisting the organism in temperature regulation through evaporation of water from sweat on the body surfaces.**
- **Also, as excretory structures, sweat glands excrete water, sodium salts, ammonia, uric acid, and urea.**

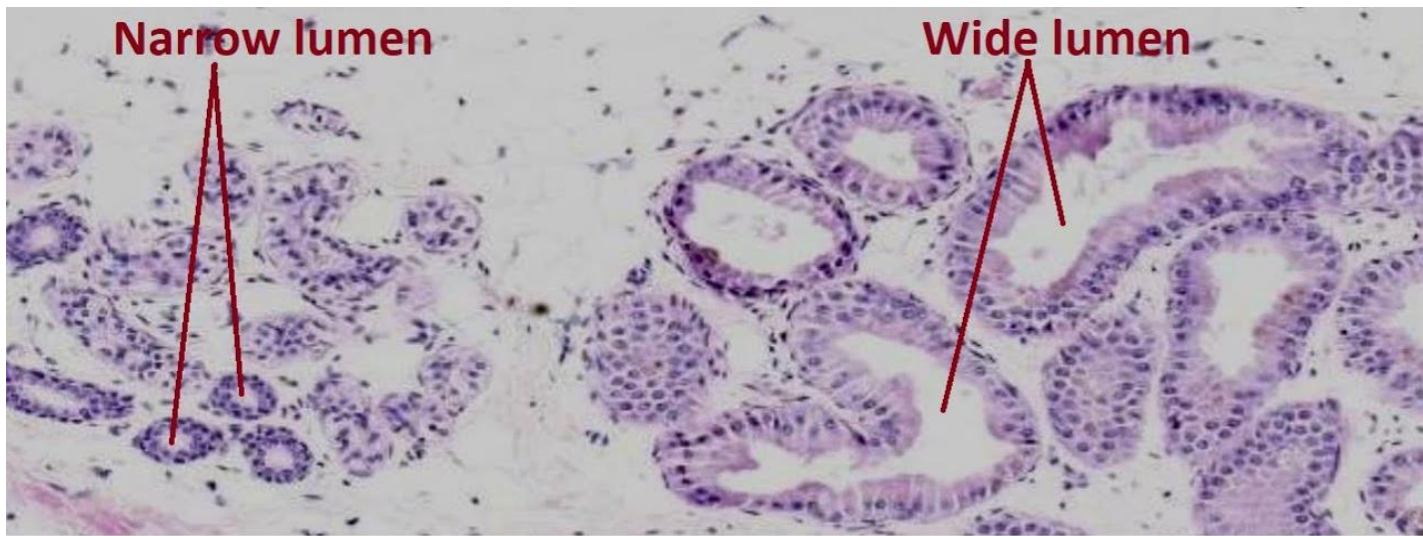
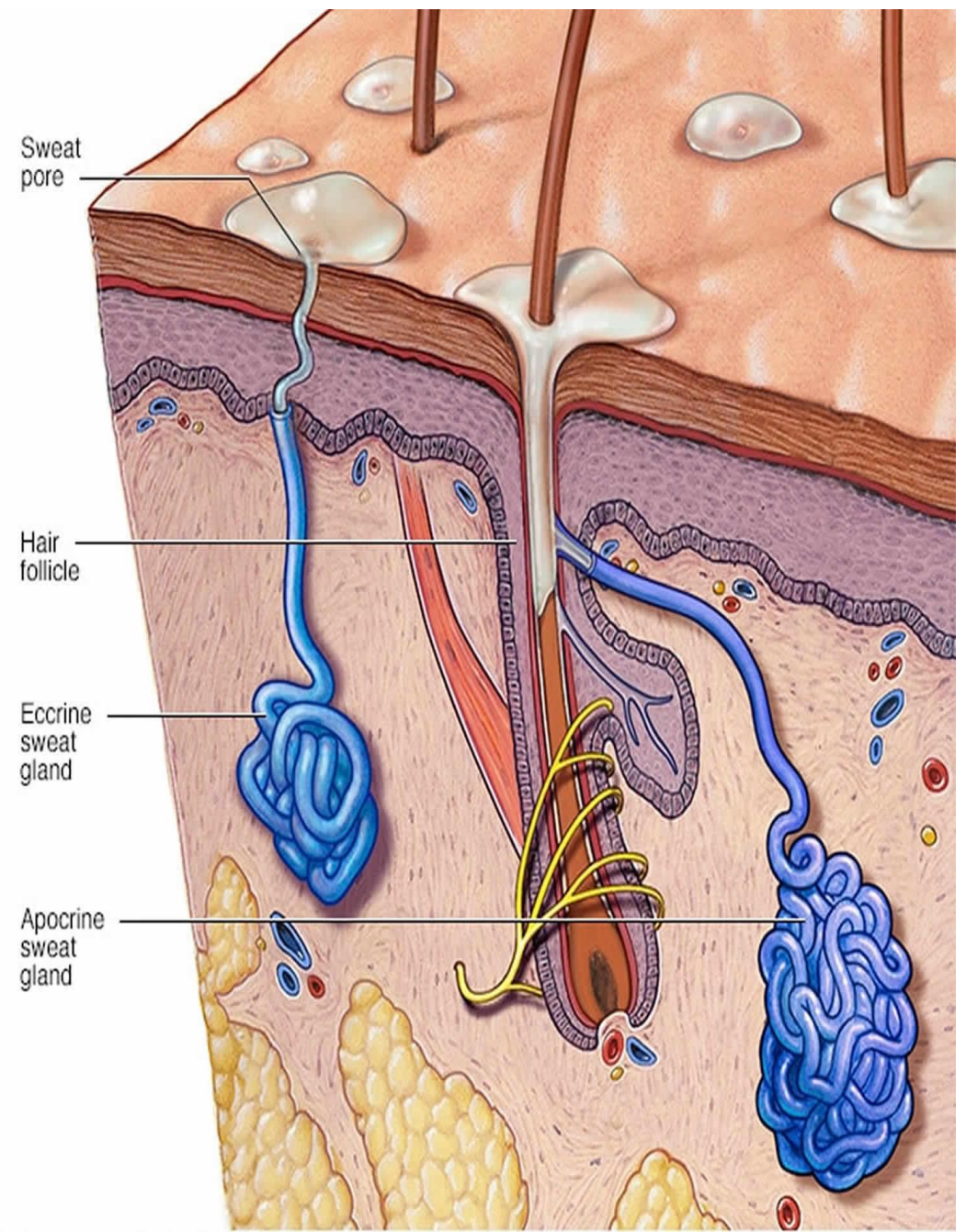
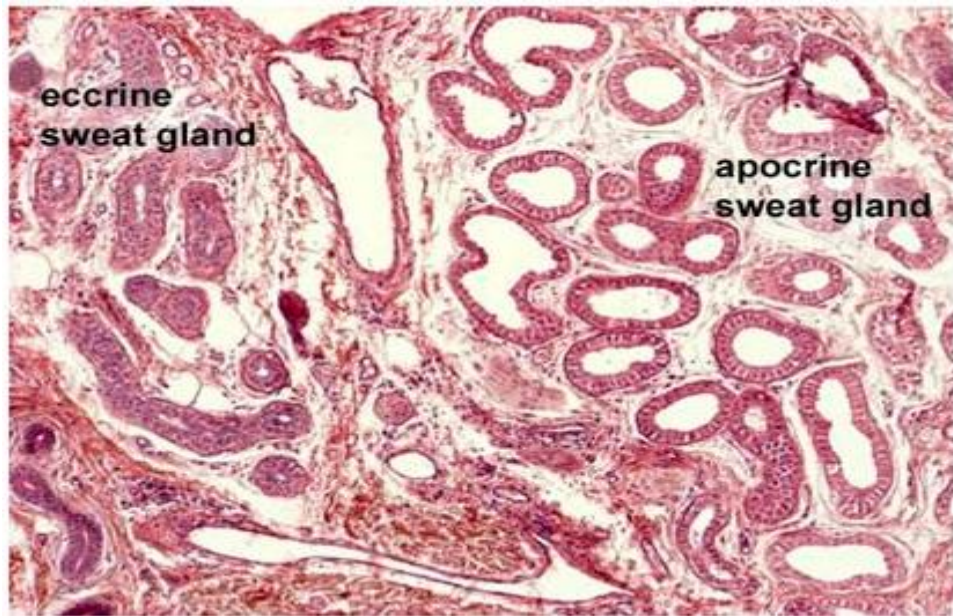






Apocrine Sweat Glands

- Apocrine sweat glands are also found in the dermis and are primarily limited to the axilla, anus, and areolar regions of the breast.
- These sweat glands are larger than eccrine sweat glands, and their ducts open into the hair follicle canal.
- The secretory portion of the gland is coiled and tubular. In contrast to eccrine sweat glands, the lumina of the secretory portion of the gland are wide and dilated, and the secretory cells are low cuboidal.
- The excretory ducts of the apocrine glands are also stratified cuboidal and are similar to eccrine sweat glands.
- Similarly, the secretory portions of the apocrine glands are surrounded by contractile myoepithelial cells.
- The apocrine sweat glands become functional at puberty, when the sex hormones are produced. Secretion has an unpleasant odor after bacterial decomposition.



Eccrine sweat gland

Apocrine sweat gland

Nails

- Nails are plates of keratinized cells containing hard keratin.
- The slightly arched fingernails and toenails, more properly referred to as nail plates, rest on nail beds.
- The nail bed consists of epithelial cells that are continuous with the stratum basale and stratum spinosum of the epidermis.
- The proximal part of the nail, the nail root, is buried in a fold of epidermis and covers the cells of the germinative zone, or matrix.
- The matrix contains a variety of cells, including stem cells, epithelial cells, melanocytes, Merkel's cells, and Langerhans' cells.
- The stem cells of the matrix regularly divide, migrate toward the root of the nail, and there differentiate and produce the keratin of the nail.
- Nail keratin is a hard keratin, like that of the hair cortex. Unlike the soft keratin of the epidermis, it does not desquamate.

Nails

- Occurs in deep epidermal fold near the bone called the “nail root”.
- The edge of the skin fold covering the root of the nail is the eponychium, or cuticle.
- Nails grow as the result of mitoses of cells in the matrix of the nail root.
- The crescent-shaped white area near the root of the nail, the lunula, derives its color from the thick, opaque layer of partially keratinized matrix cells in this region.
- When the nail plate becomes fully keratinized, it is more transparent and takes on the coloring of the underlying vascular bed.
- A thickened epidermal layer, the hyponychium, The free edge of the nail plate at the fingertip.

