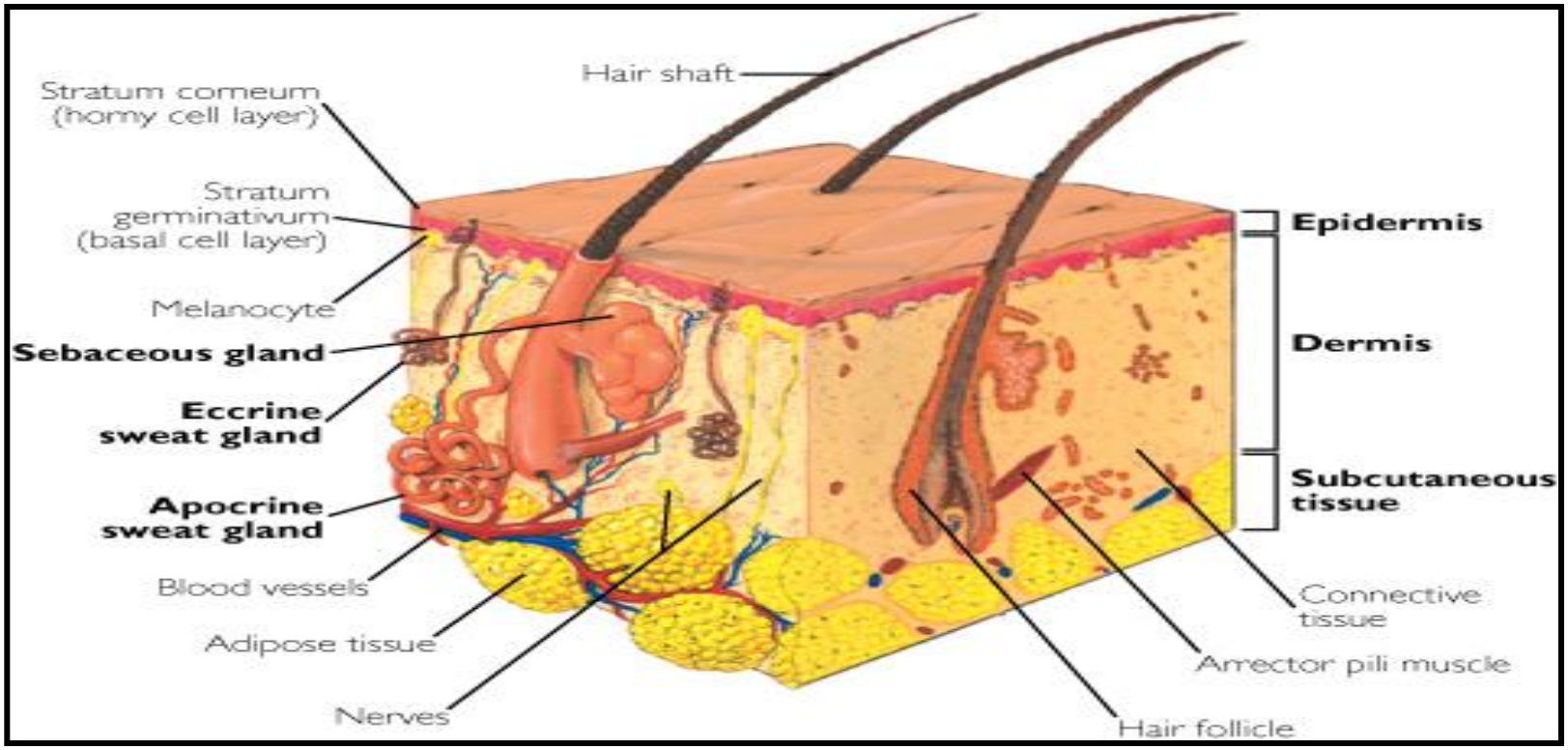
Integumentary system



By

Dr. Heba Sharaf Eldin

Associate Professor of Histology & Cell Biology

Integumentary system

- Is composed of skin and its appendages.

- **Skin** is the heaviest single organ of the body (about 16% of the total body weight).

Integumentary system

The **skin:**

- **Epidermis:** an epithelial layer of ectodermal origin.
- **Dermis:** a connective tissue layer of mesodermal origin.

The **skin appendages** develop from epidermis.

They are sweat glands, sebaceous glands, hairs and nails.

The hypodermis (superficial fascia) is not a part of the skin. It connects the skin with the underlying structures and it is formed of loose connective tissue that may contain a pad of adipose tissue.

The skin varies in its thickness according to the thickness of its epidermis. Generally, there are two types; thick and thin skin.

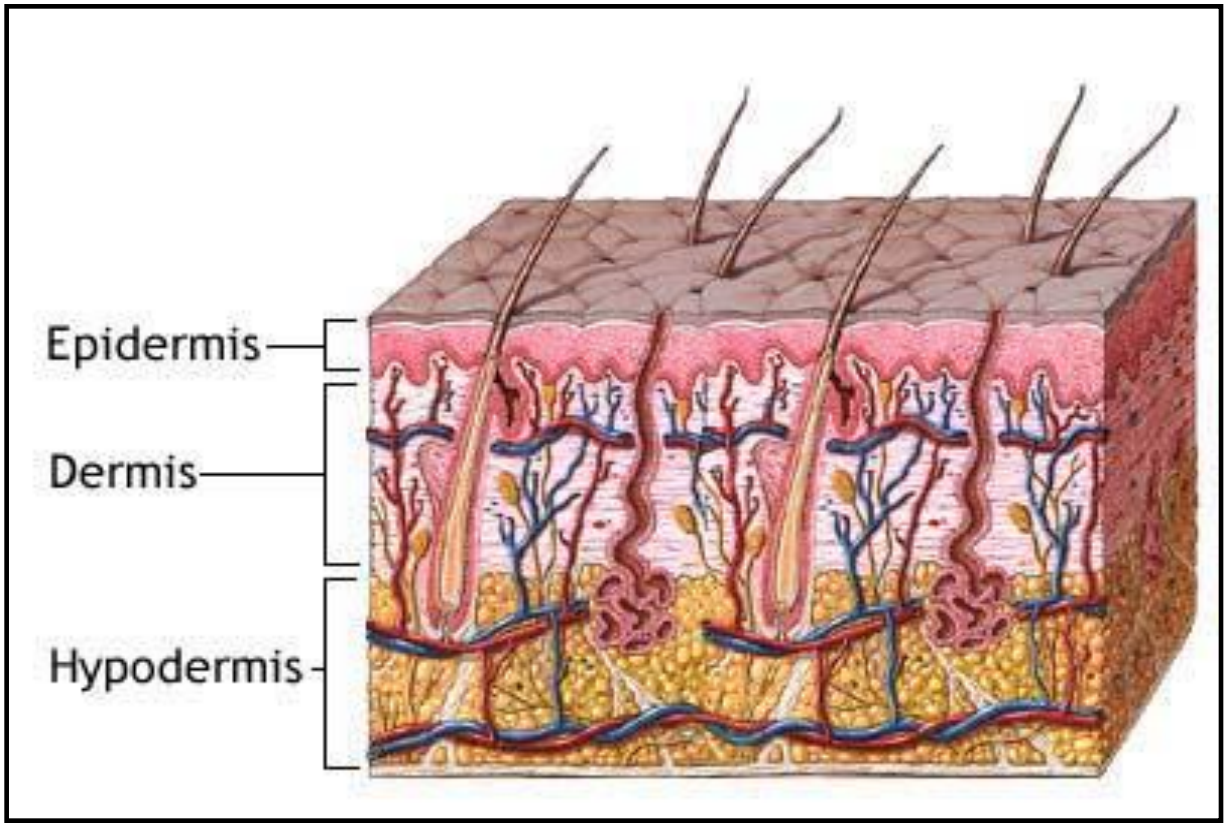
The Skin

- **Functions**
- **Types:**

❑Thick skin

❑Thin skin

- **Structure**



Functions

1- Protection.

2- Regulation of temperature.

3- Formation of vitamin D.

4- Reception of sensation.

5- Excretion.

6-Finger and foot prints by their dermatographic .

Types

- According to **thickness** of epidermis:

1- Thick skin: palms of hands, soles of feet

2- Thin skin: covers body except palm and sole

Structure:

1- Epidermis.

2- Dermis.

3- Dermo-epidermal junction.

Structure of Thick Skin

A- Epidermis:

keratinocytes (85%): The epithelial cells (**keratinized stratified squamous epithelium)**

Non-keratinocytes (15%): other less abundant cells in the epidermis

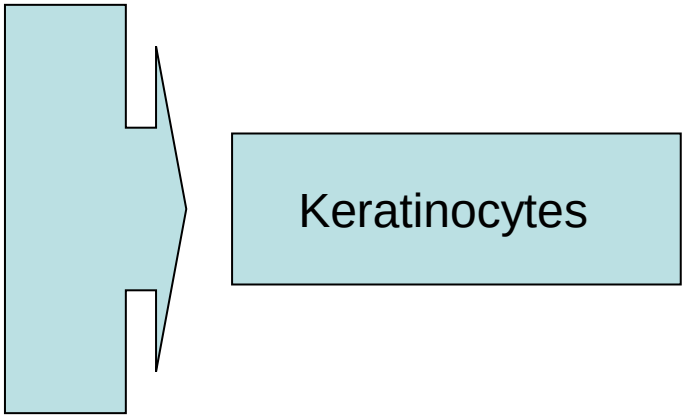
1- Stratum Basale

2- Stratum Spinosum

3- Stratum Granulosum

4- Stratum Lucidum

5- Stratum Corneum



B- Dermis

-Papillary layer (cells – receptors –BV)

-Reticular layer (fibers –glycosaminoglycan- receptors).

Dermal- epidermal junction

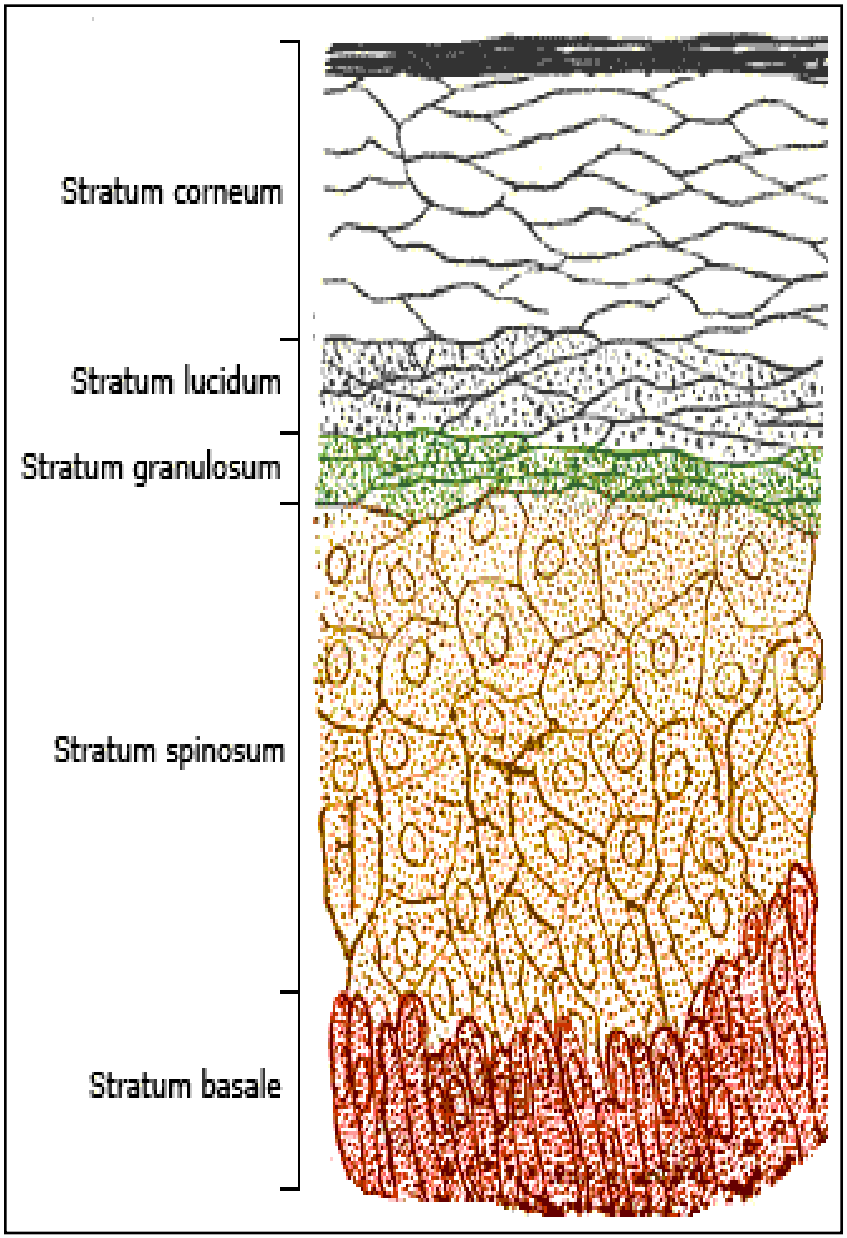
1-Stratum Basale (Germinal Layer):

- single layer of columnar cells resting on basement membrane.
- Many **mitotic figures** are seen.

2- Stratum Spinosum *(prickle cell layer):*

2-6 layers of polygonal cells with central nuclei.

- joined together by desmosomes.
- This layer and stratum basale are called **Malipigian layer** from which regeneration of skin occurs.

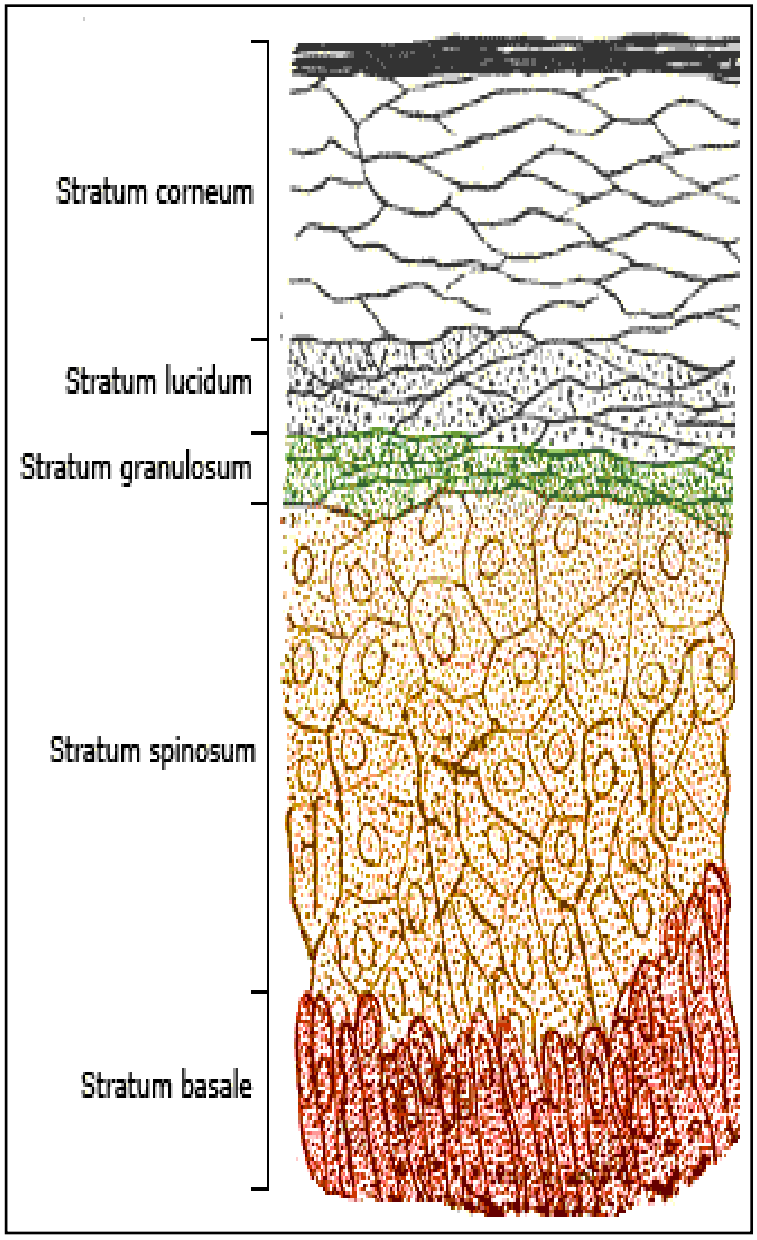


3- Stratum Ganulosum *(granular layer):*

- 3-5 layers of polygonal flat cells.
- The cytoplasm contains basophilic keratohyaline granules and membranous lamellar granules that contain lipid

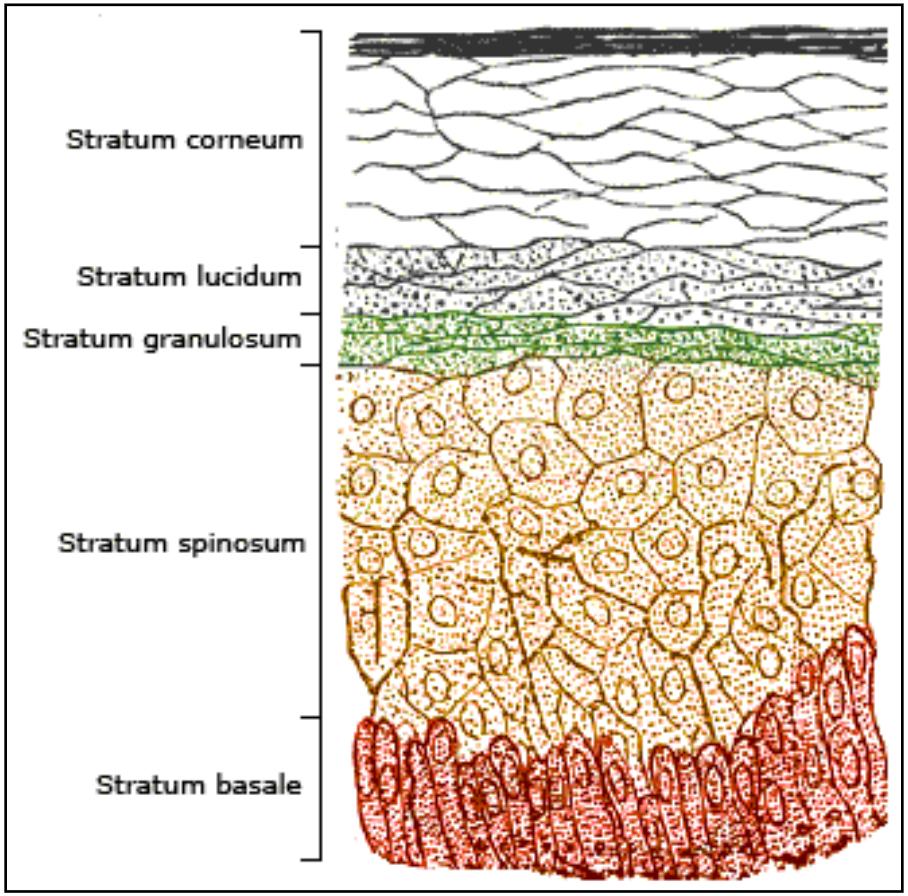
4- Stratum Lucidum *(clear layer):*

- translucent thin layer of acidophilic flat cells with no nuclei or organelles.
- The cytoplasm contains packed tonofilaments

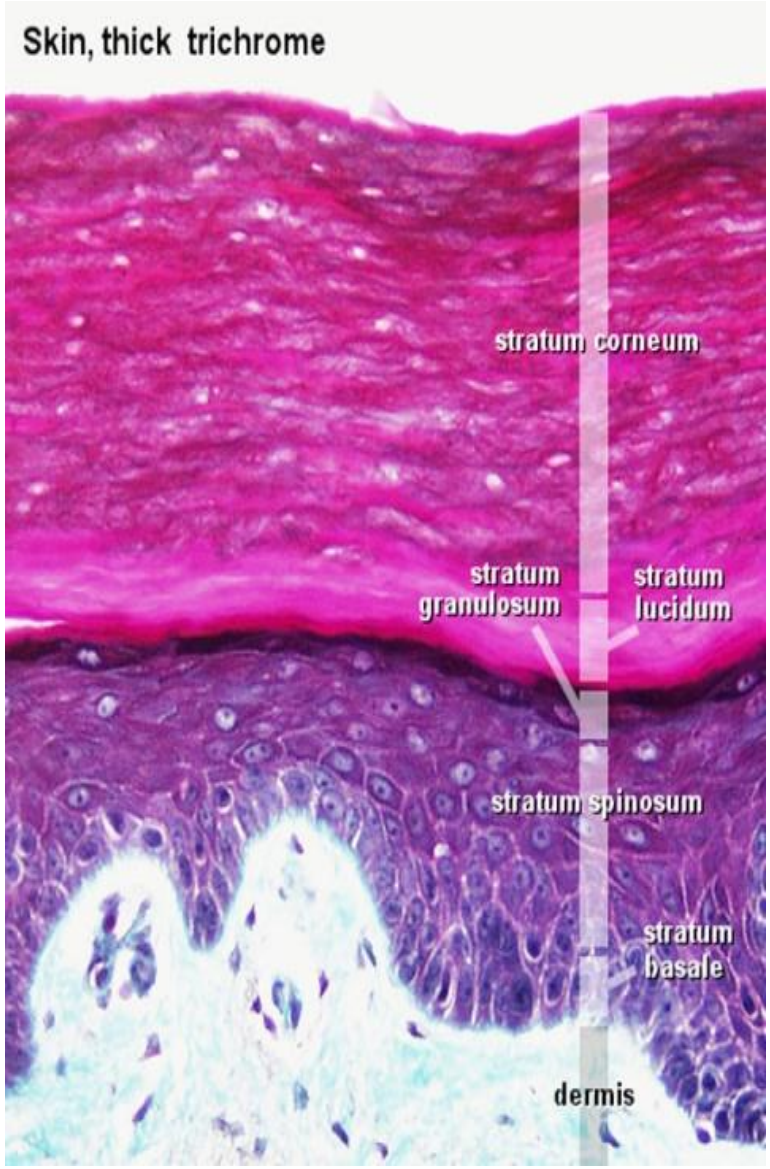


5- Stratum Corneum *(horny layer):*

- many layers.
- flattened non-nucleated cells. Cytoplasm is filled with **keratin.**
- The superficial cells are **continuously shed.**



Epidermis of Thick skin



Dermis

1- Papillary layer:

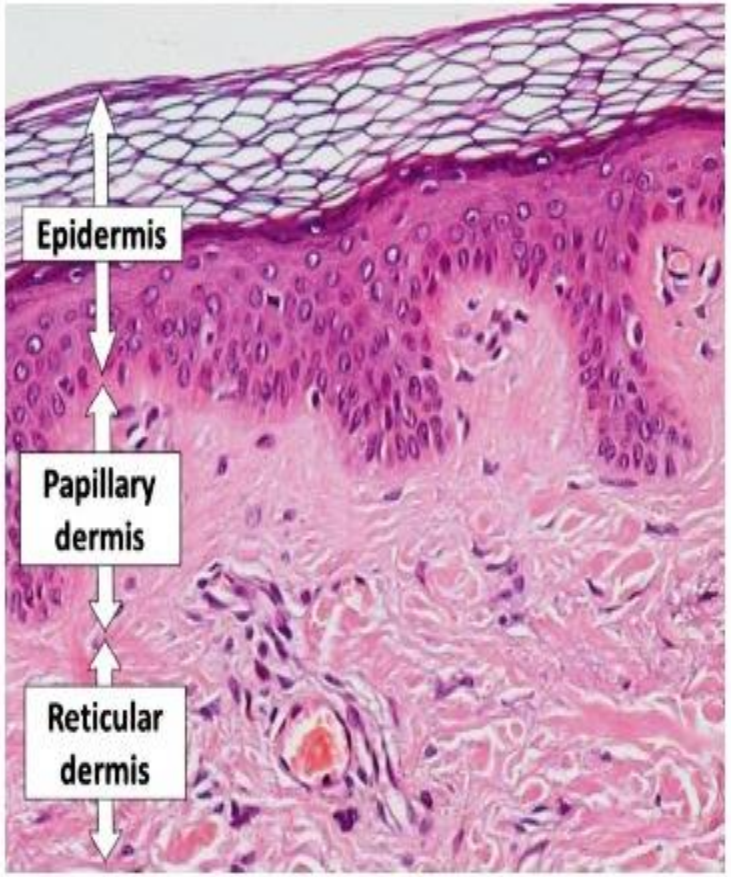
-outer layer beneath the epidermis.

-loose C.T. rich in cells, free nerve endings, and blood capillaries

2- Reticular layer:

-deep thicker layer.

-dense C.T. rich in collagen fibers type I and elastic fibers.

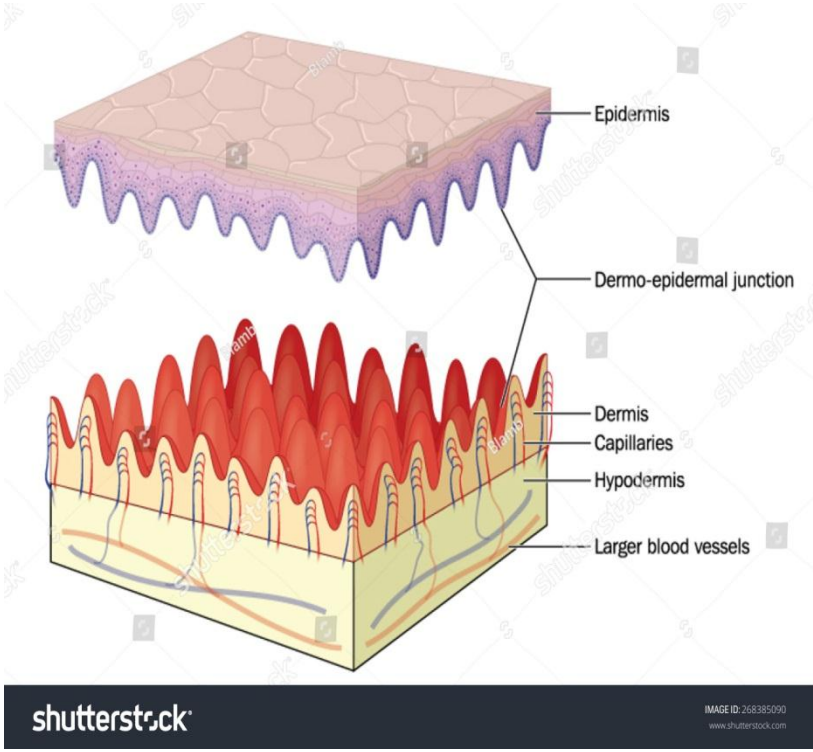


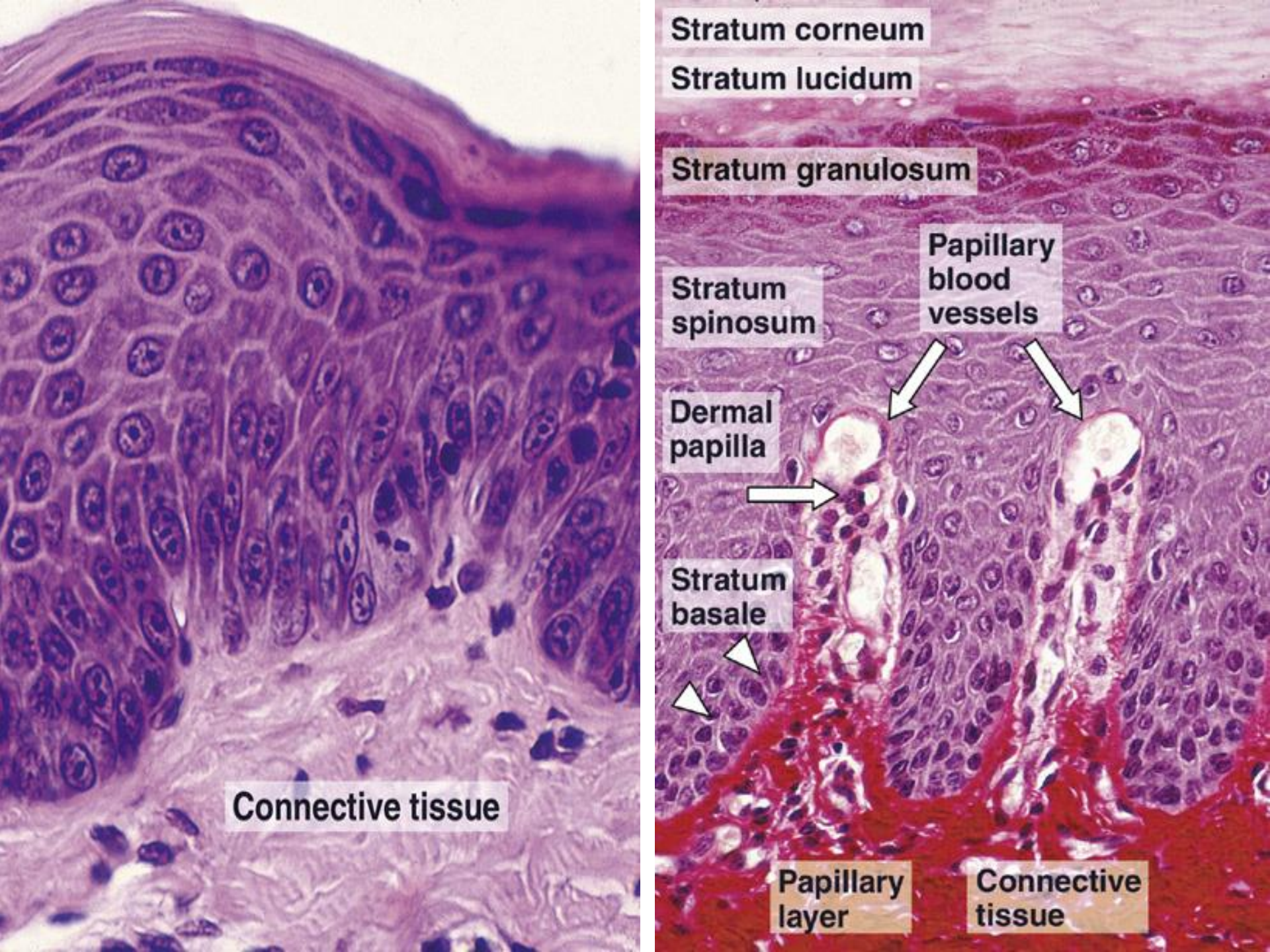
Sweat glands are present in the dermis

Dermo-epidermal junction

- This junction has the appearance of **zigzagging** interdigitations between conical projections of dermis **(dermal papillae)** and epidermis **(epidermal ridges)**.

- The pattern of papillary ridges is responsible for **finger prints** which are unique for every individual.

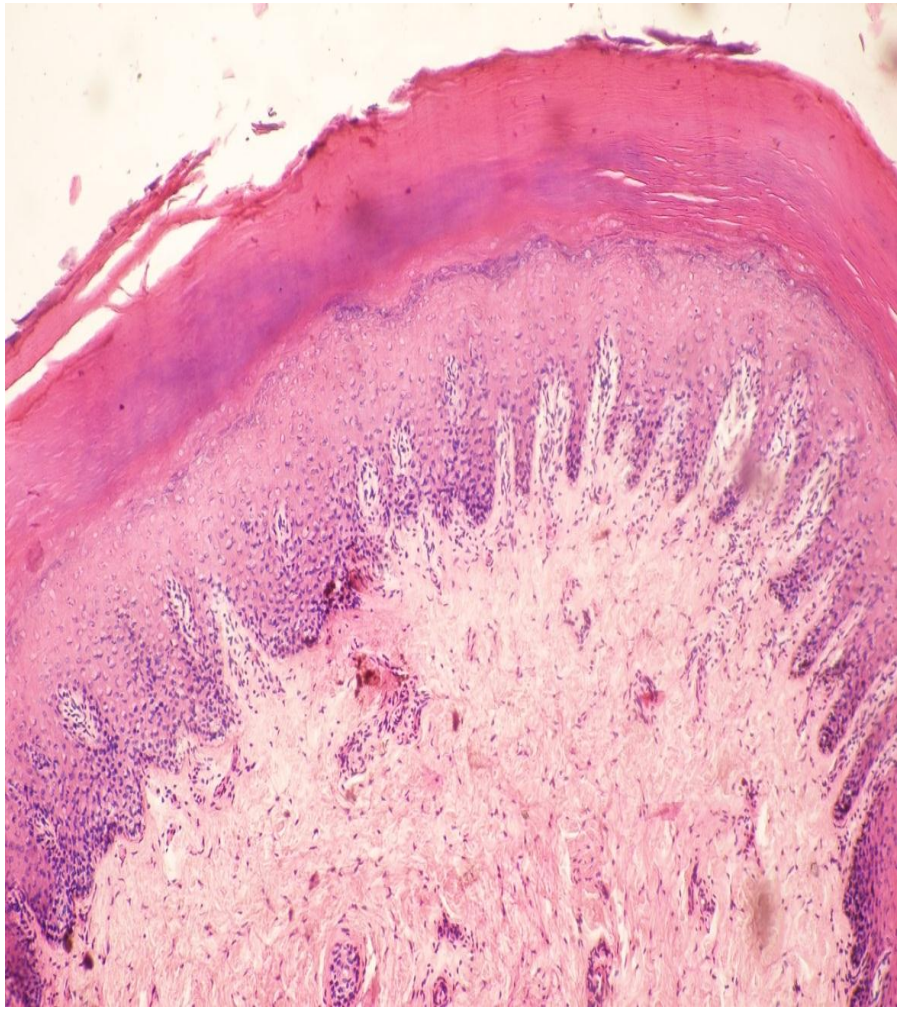


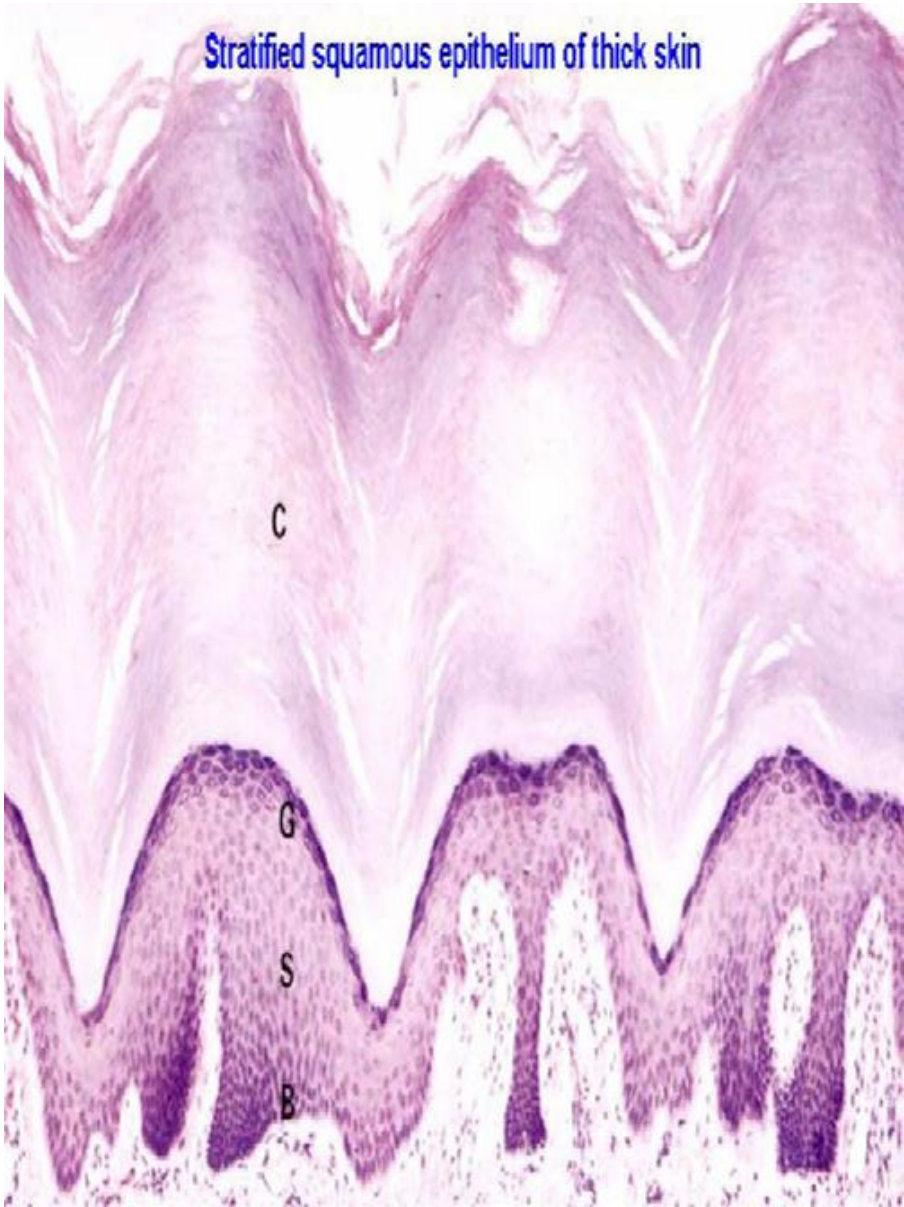

Connective tissue
Stratum corneum
Stratum lucidum
Stratum granulosum
Stratum spinosum
Papillary blood vessels
Dermal papilla
Stratum basale
Papillary layer
Connective tissue

Differences between thick & thin skin

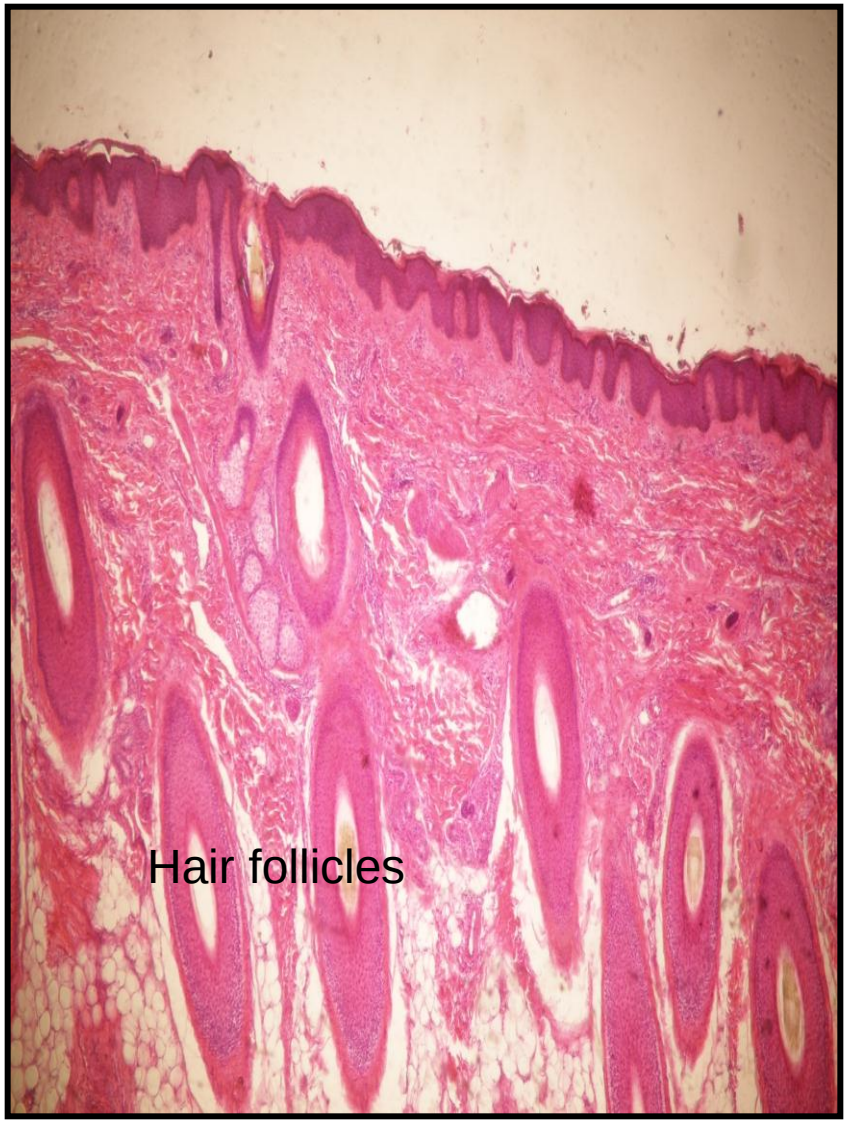
	Thick Skin	Thin Skin
Site	Palms & soles	Whole body except palms and soles
Epidermis	Thicker	Thinner
Stratum S + G + C	Thicker	Thinner
Stratum lucideum	Apparent	Absent
Hair follicles & sebaceous glands	Absent	Present
Sweat glands	Many	Few
papillary ridges	Characteristic (finger prints)	Not characteristic.
Meissner's corpuscles	Many	Few

❑Thick skin





❑Thin skin



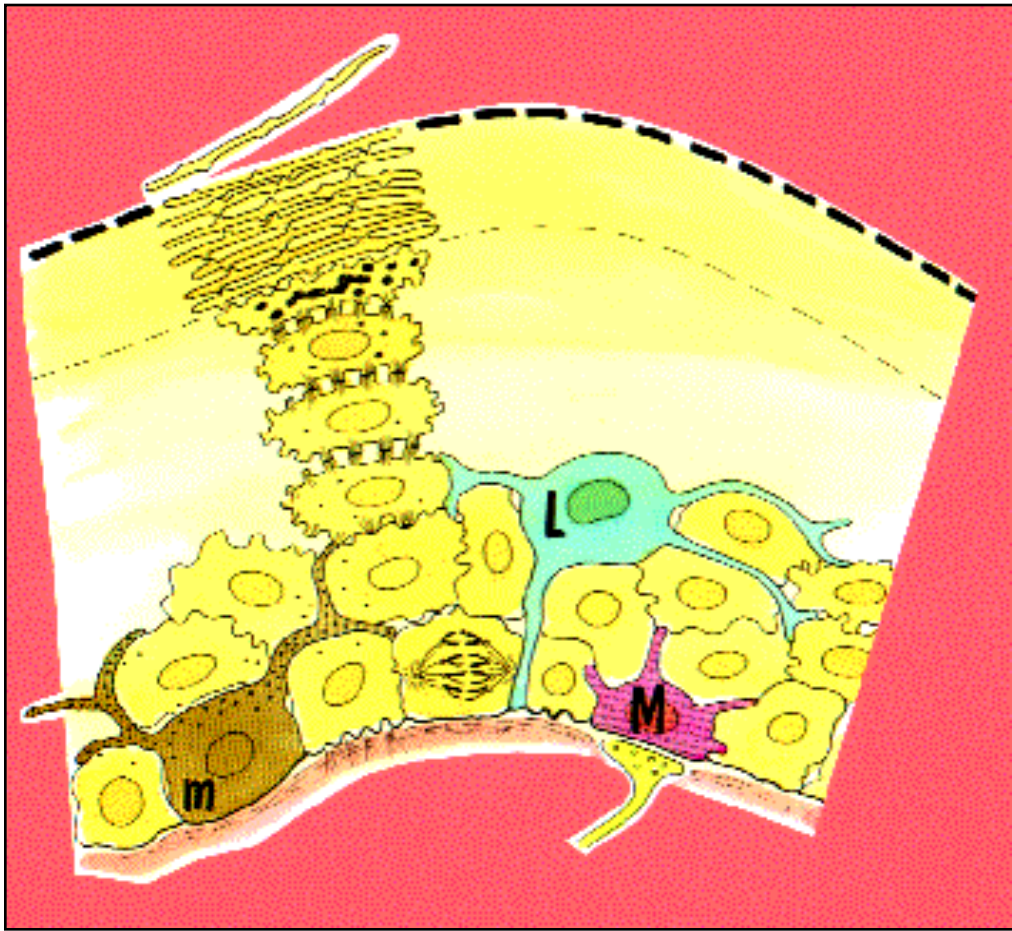
Other Cells of Epidermis

Nonkeratenocytes 15%:

1-Melanocytes

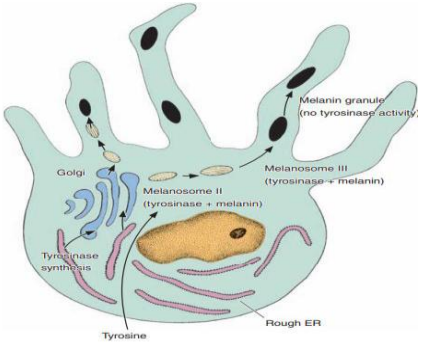
2-Langerhan`s Cells

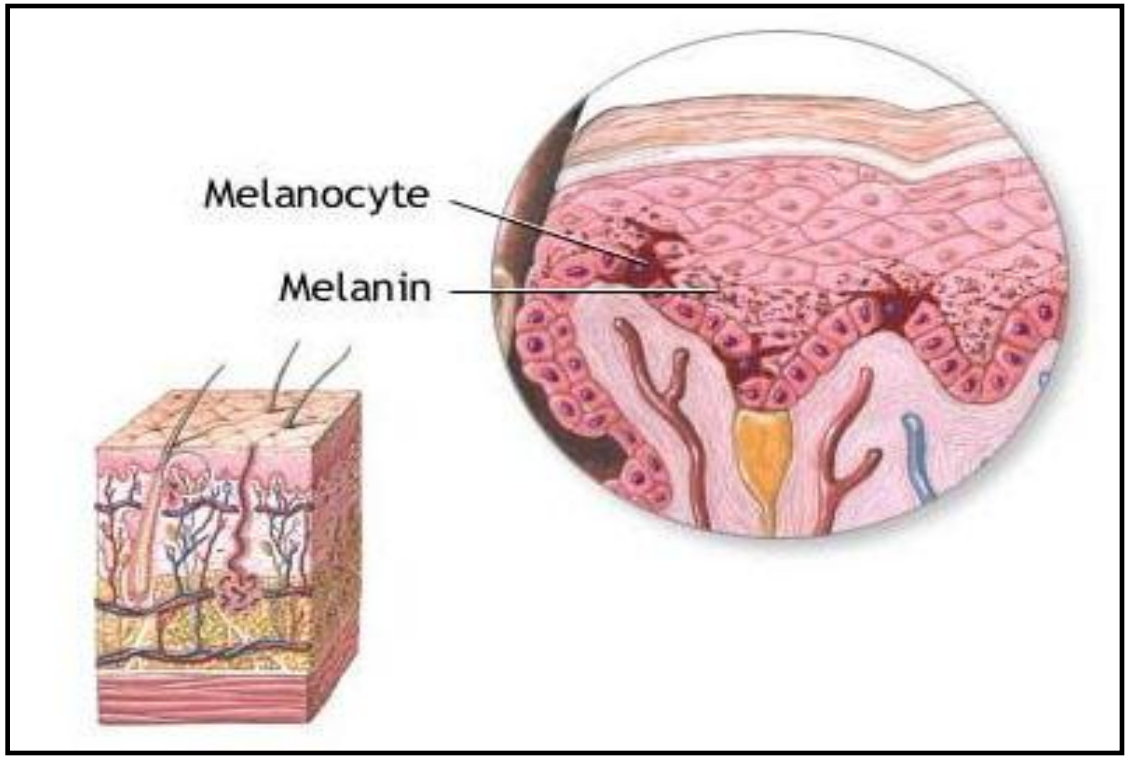
3- Merkel`s cells



1-Melanocytes:

- In stratum basale and in hair follicles.
- Rounded.
- Branched. Their long extensive cytoplasmic processes extend between the cells of **Malpighian layer**
- Form melanin pigment.

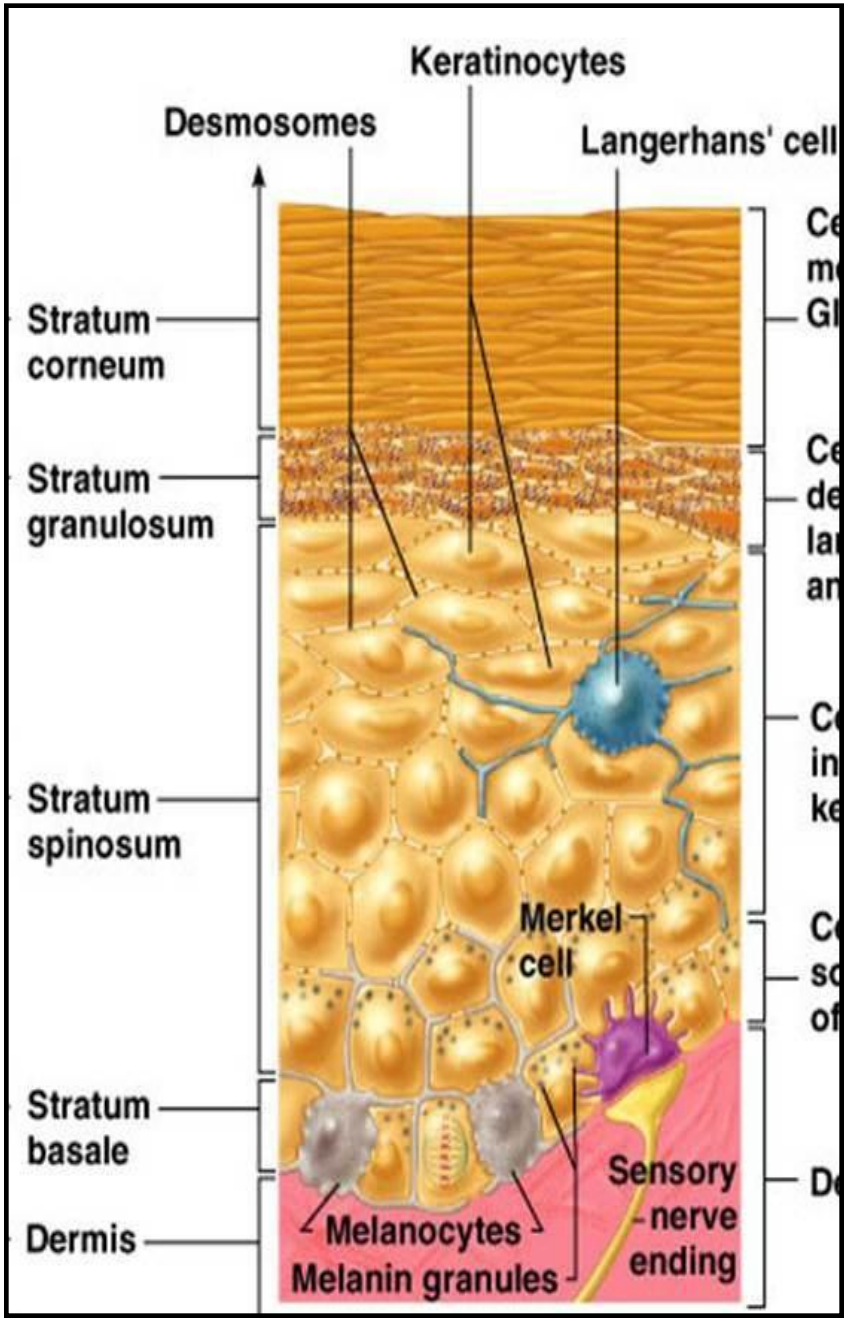




2-Langerhan`s Cells:

- Star shaped.
- Branched
- In stratum spinosum.
- Role in immunity.

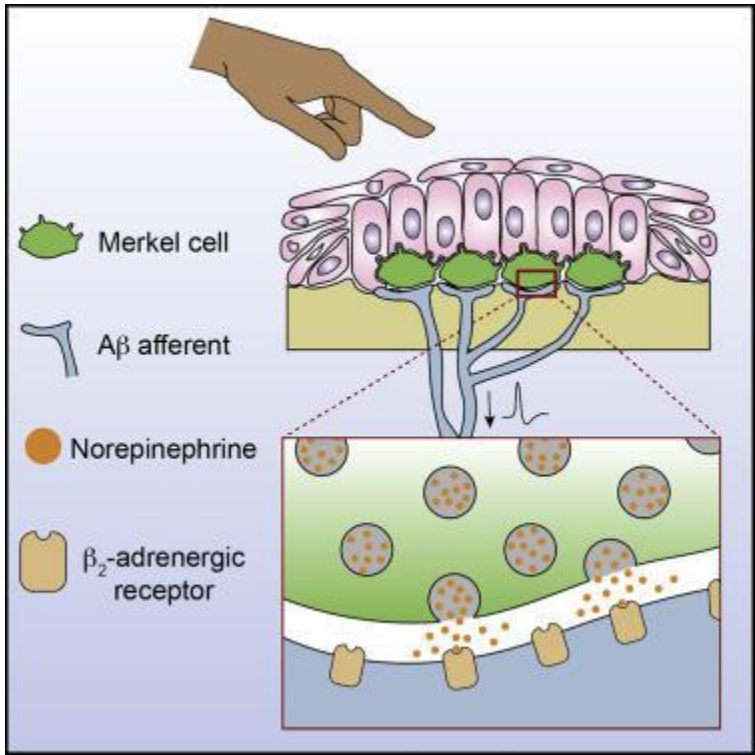
(antigen presenting cells for lymphocytes)



3- Merkel`s cells:

- Resemble keratinocytes

  but the cytoplasm contains small dense granules.
- Present in thick skin.
- Sensory receptor (act as **sensory mechanoreceptors)**



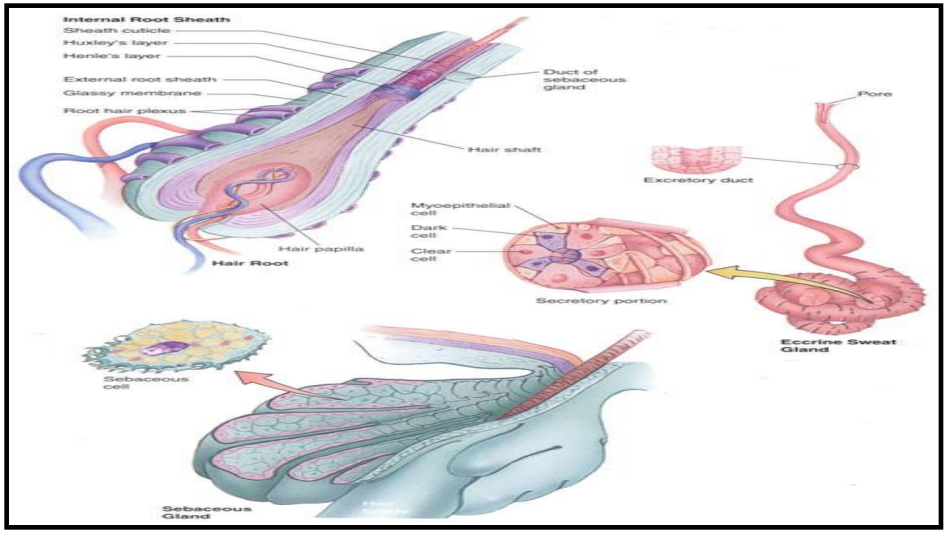
Skin appendages

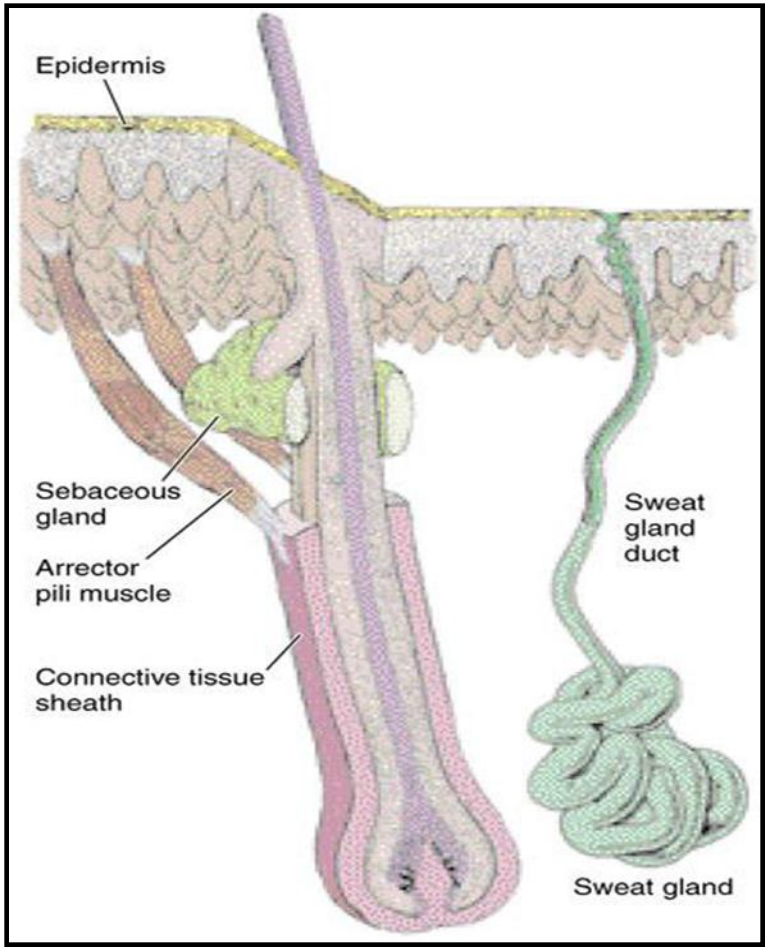
1- Hairs

2- Nails

3- Sweat glands

4- Sebaceous glands





Hair

- **Shape:** elongated keratinized thread-like structures derived from epidermal invaginations called hair follicle.
- **Color, size & distribution:** variable according to race, age, sex & body region.
- **Origin of hair follicles:** develop during embryonic life & no follicles develop after birth.
- **Parts:** **root** (inside follicle) & **shaft** (on skin surface).

Each hair consists of:

a- Shaft that protrudes beyond the surface of the skin.

b- Root embedded within the skin and enclosed by

c- Hair follicle: has a terminal dilatation called hair bulb.

Structure of the hair follicle

- The hair follicle has a terminal dilatation called the hair bulb.
- The hair bulb overlies a connective tissue dermal papilla.
- The deepest cluster of cells over the dermal papilla is called germinal matrix.

- **Hair:**
  - Medulla
  - Cortex
  - Cuticle
- **Epithelial sheath:**
  - External root sheath
  - Internal root sheath
- **Connective tissue sheath**

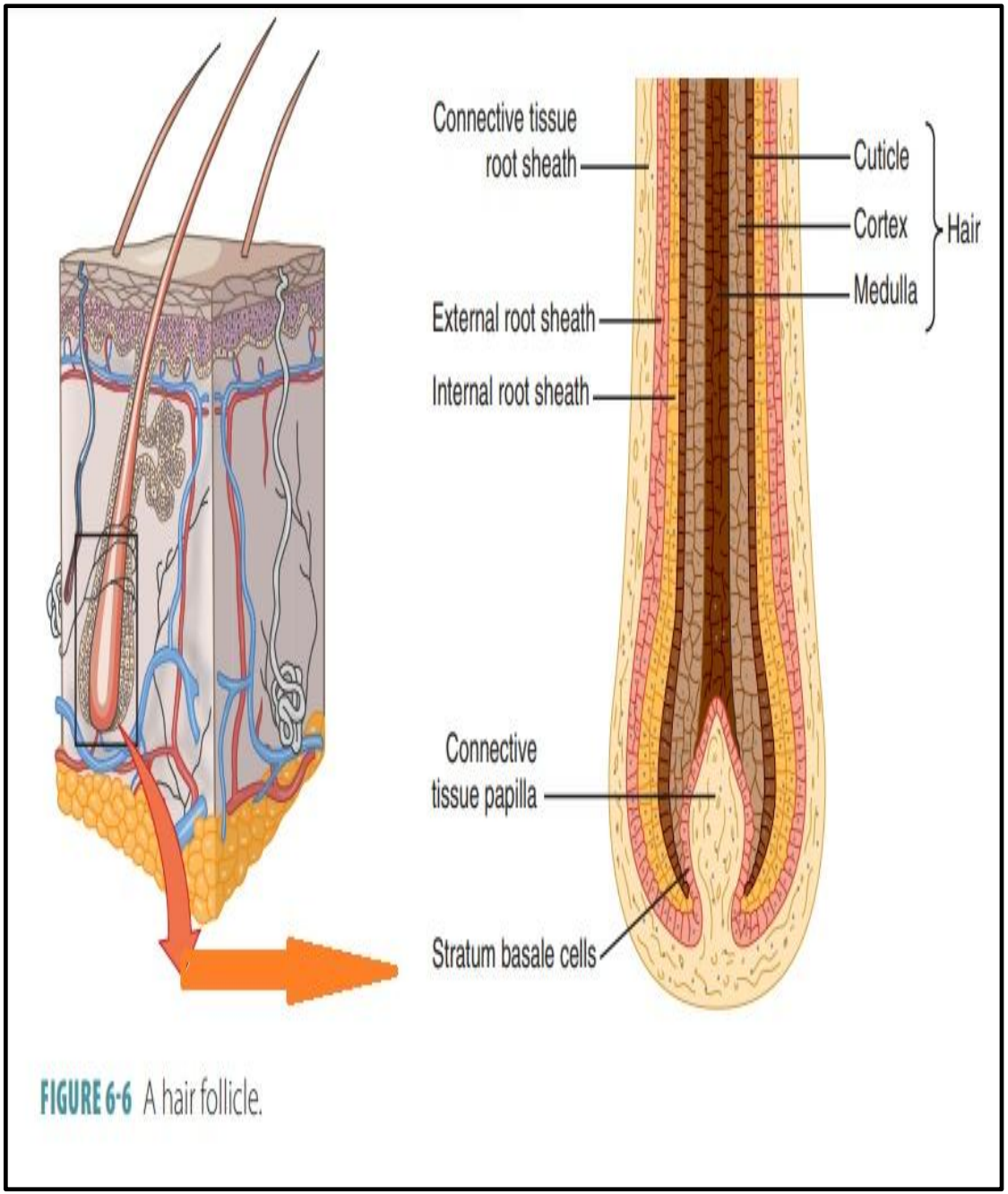
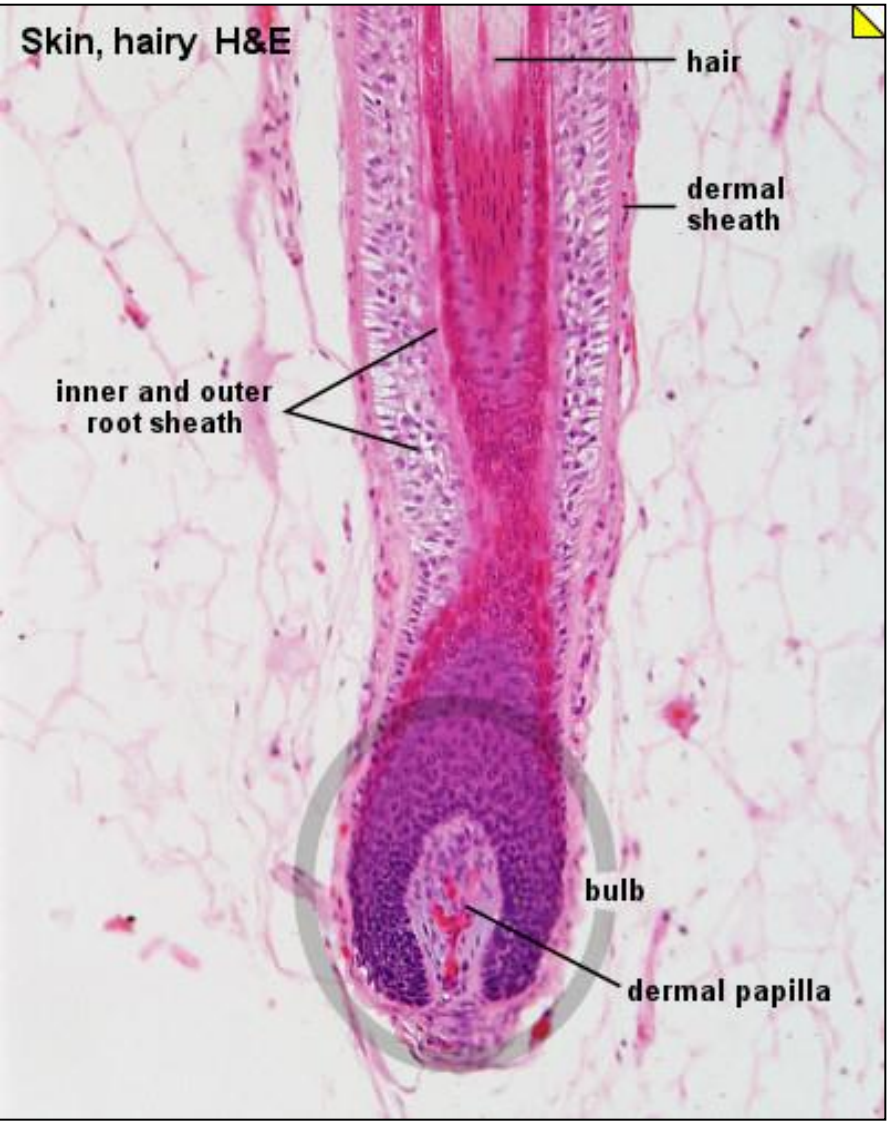
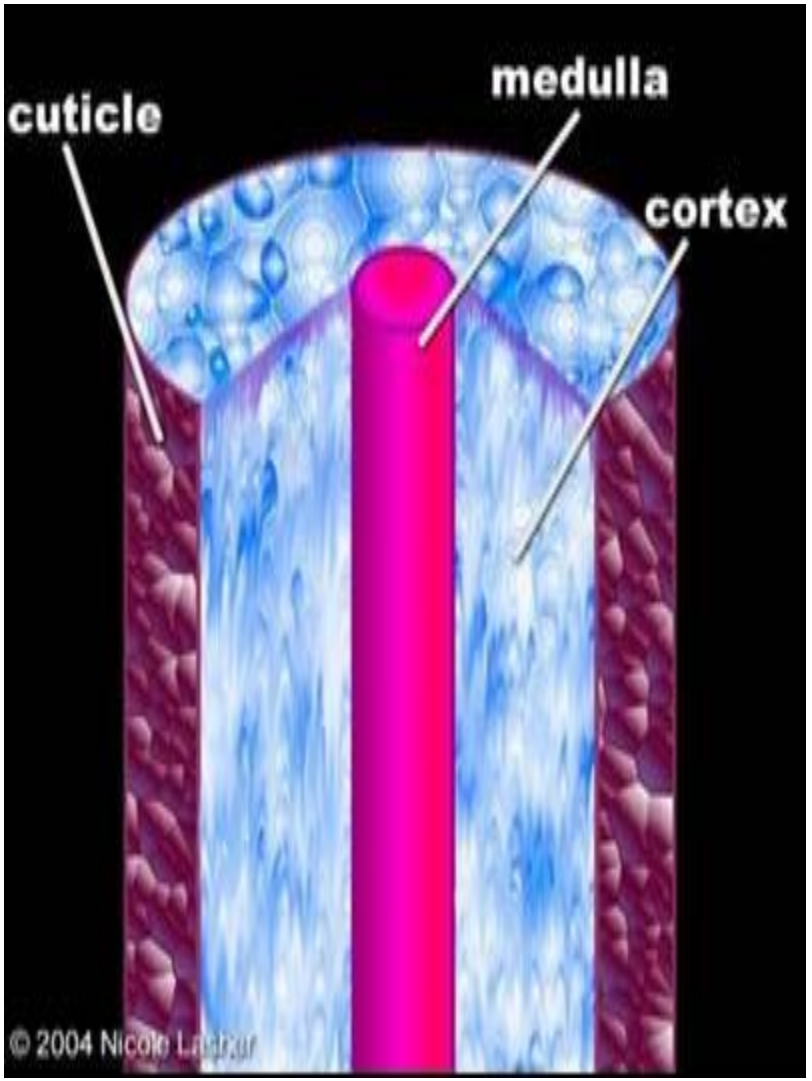


FIGURE 6-6 A hair follicle.

Hair


Skin, hairy H&E
hair
dermal sheath
inner and outer root sheath
bulb
dermal papilla


cuticle
medulla
cortex
© 2004 Nicole Lagnur

Note that:

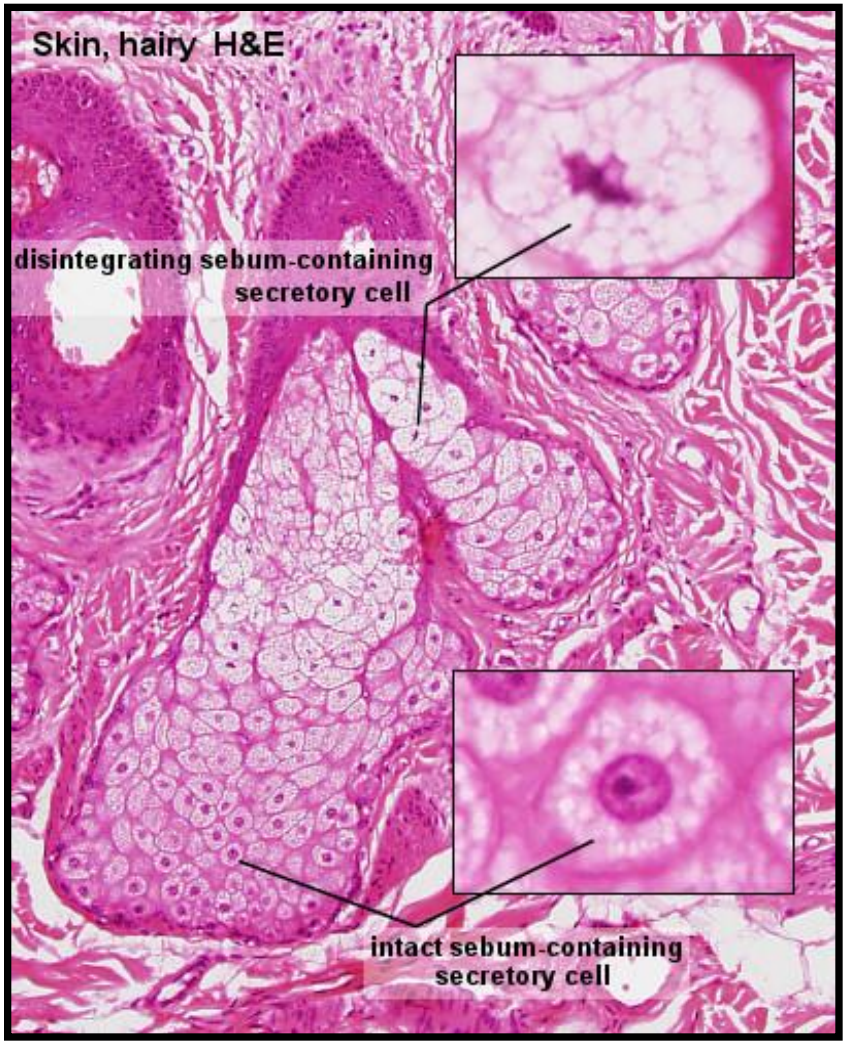
- **Terminal dilatation**:
  - **hair bulb.**
- **Hair bulb** overlies:
  - **CT dermal papilla.**
- **Deepest cluster of cells** over dermal papilla is:
  - **germinal matrix.**

Sebaceous Glands

- **Origin *:* epidermal** epithelium of the ***hair follicles***
- **Site :** They are ***absent*** in thick skin
- **Type: *holocrine***
- **Function: secrete sebum oils the hair** and lubricates the skin
- **Structure:**

a-secretory part(acini)

b-Excretory part(duct)



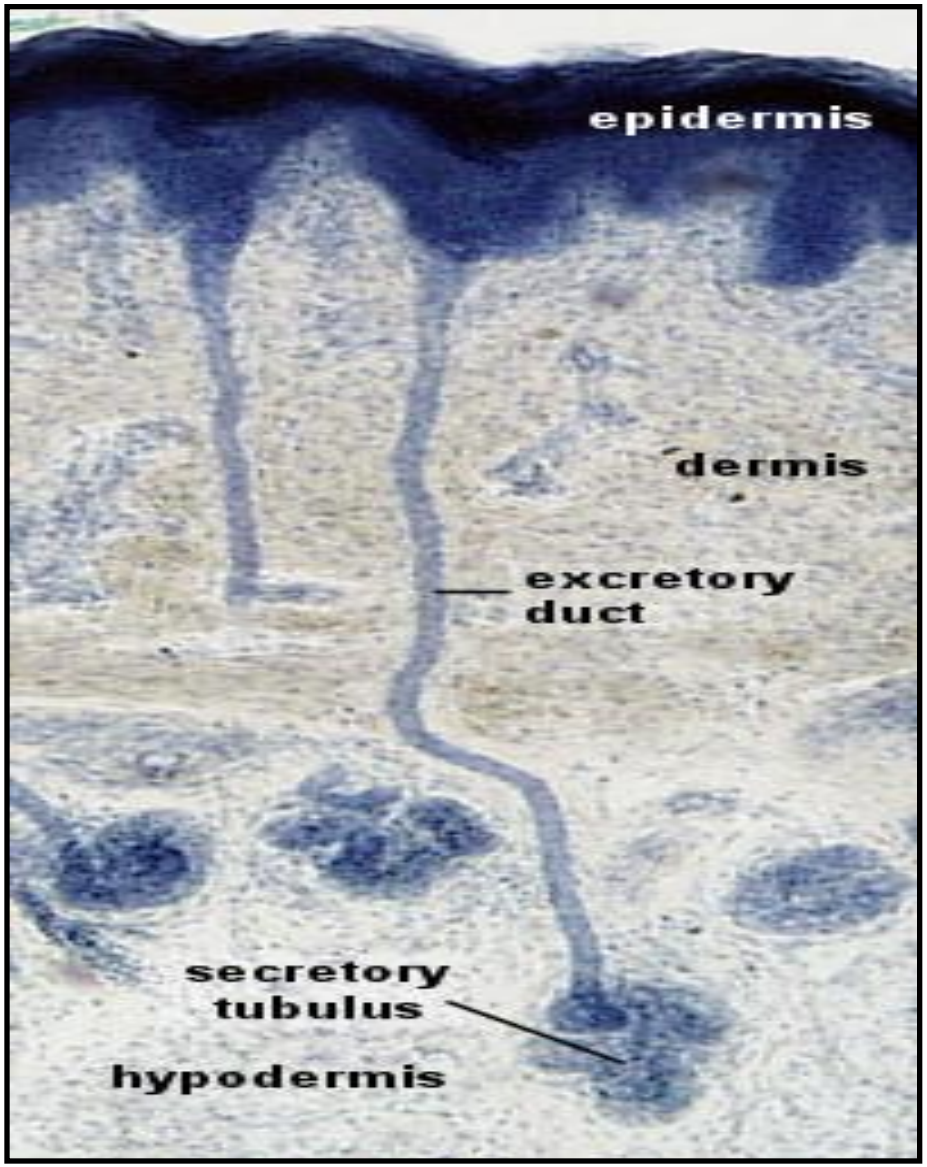
sweat glands

- **Merocrine sweat glands**

They are widely distributed in the skin but absent in the red margin of lips and glans penis.

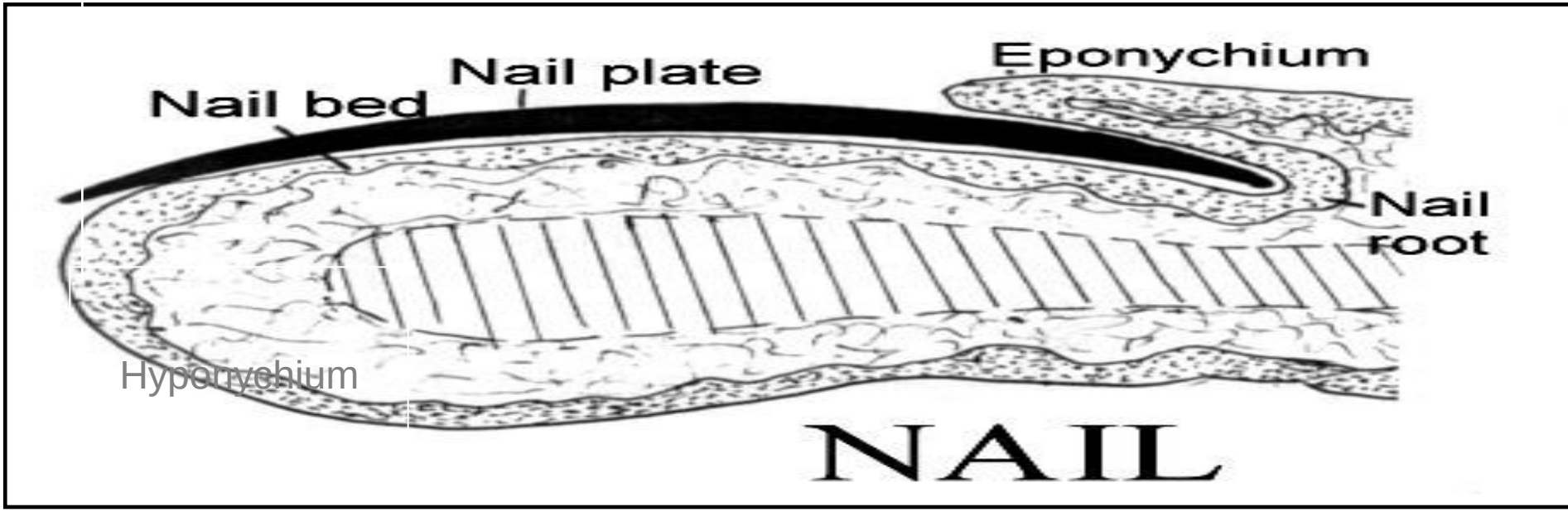
- **Apocrine sweat glands**

axilla, areola of the breast, anal and pubic regions.



Nail

- plates of keratinized cells
- The nail plate rests on a bed of epidermis called the nail bed, which is formed of stratum basale and stratum spinosum.
- The hidden part of the nail is called nail root.
- The nail grows by proliferation of cells from the nail matrix that lies behind the nail root.
- The skin over the root is termed nail fold.




Thank
You