

Histology Of Skin & It`s Appendages



م.م. منار الزهيري
مختبر الانسجة العامة

Introduction to Skin Histology



- The skin is considered the largest organ of the body and has many different functions.

1

Superficial Layer

- EPIDERMIS
- Stratified Squamous Epithelium

2

Deeper Layer

- DERMIS
- Connective Tissue

FUNCTIONS OF SKIN

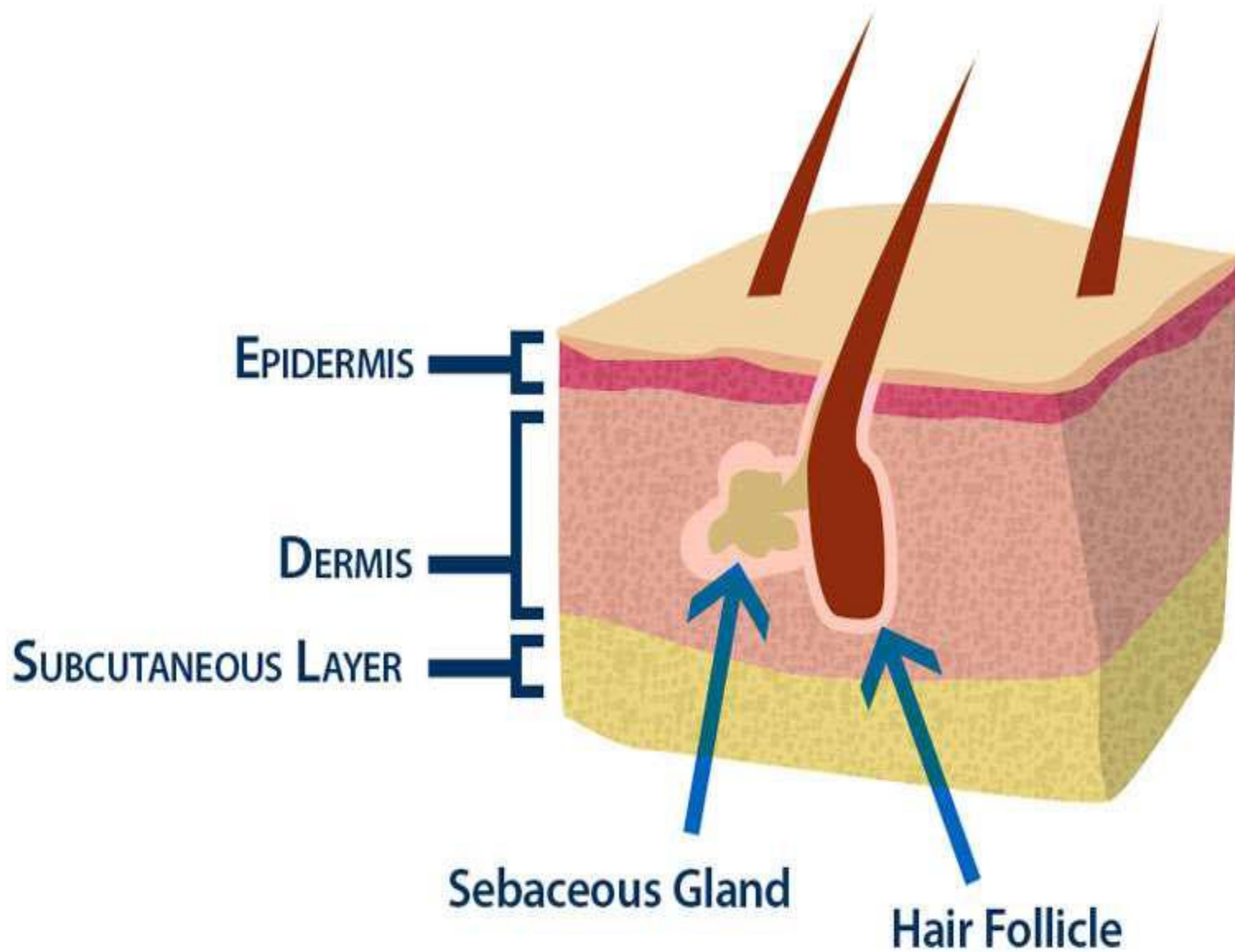


- **Protective function** : It is the first line of defense. It protects our body from infection, pathogens, and harmful UV irradiation.
- **Sensory function:** Free nerve endings on the skin are sensitive to pain, touch, heat and cold, resulting in either voluntary or reflex activities.
- **Secretory function:** Sweat help in temperature regulation and sebum makes skin smooth.
- **Heat regulatory function:** Sweating and cutaneous blood flow help in temperature regulation
- **Excretory function:** Through the secretion of glands of the skin – water, salt, fatty substances and urea are excreted.
- **Synthetic function** :Sun's ultraviolet rays help in synthesis of natural vitamin D. skin can also manufacture melanin pigment.
- **Water balance:** Skin serve a useful means in regulating water balance of the body by perspiration.



- It is composed of the **epidermis**, an epithelial layer of ectodermal origin, and the **dermis**, a layer of connective tissue of mesodermal origin.
- Epidermal derivatives include hairs, nails, and sebaceous and sweat glands.
- Beneath the dermis lies the **hypodermis** or **subcutaneous tissue**, a loose connective tissue that may contain a pad of adipose cells.

The junction of dermis and epidermis is irregular, and projections of the dermis called **papillae** interdigitate with evaginations of the epidermis known as **epidermal ridges**.



Layers of the Skin

Epidermis



- The epidermis consists mainly of a **stratified squamous keratinized epithelium**. **The first barrier of protection from the invasion of foreign substances**

Contain 5 layers and 4 abundant cell types

Epidermis consist of 5 layers:-



Basal layer
Stratum basale

Stratum spinosum
(Malpighian layer)

Stratum
Granulosum

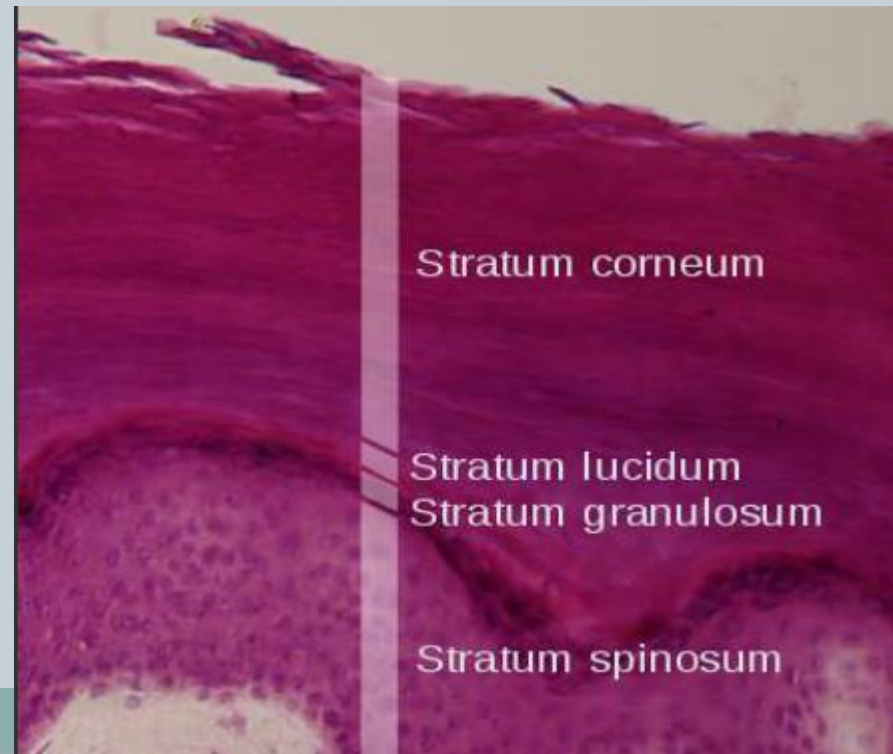
Stratum Lucidum

Stratum Corneum

Stratum Corneum



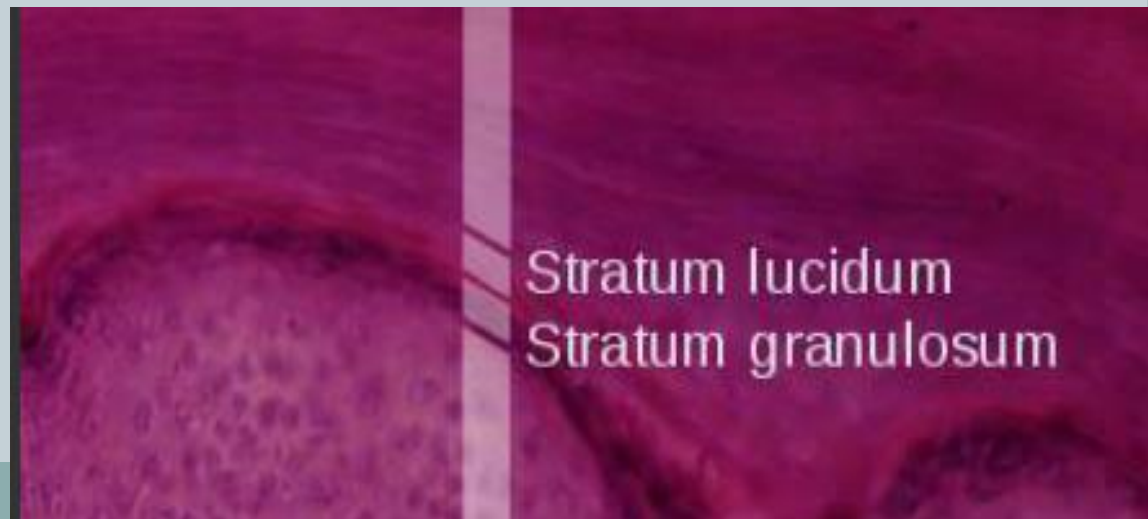
- • Single layer of columnar cells
- • Undergo mitosis & give off cells called Keratinocytes



Stratum Lucidum



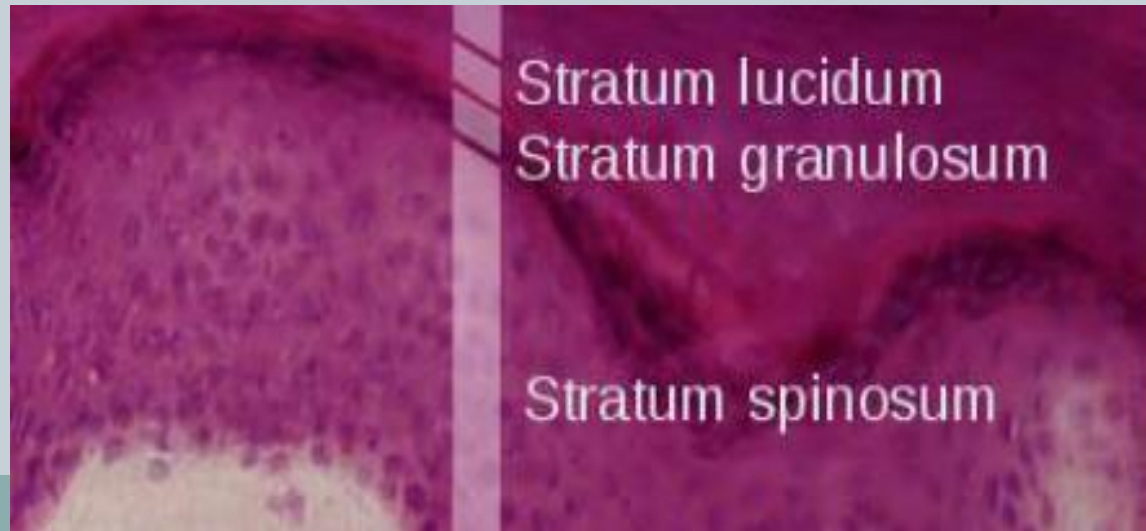
- More apparent in thick skin, the stratum lucidum is a translucent, thin layer of extremely flattened epidermal cells.



Stratum Granulosum



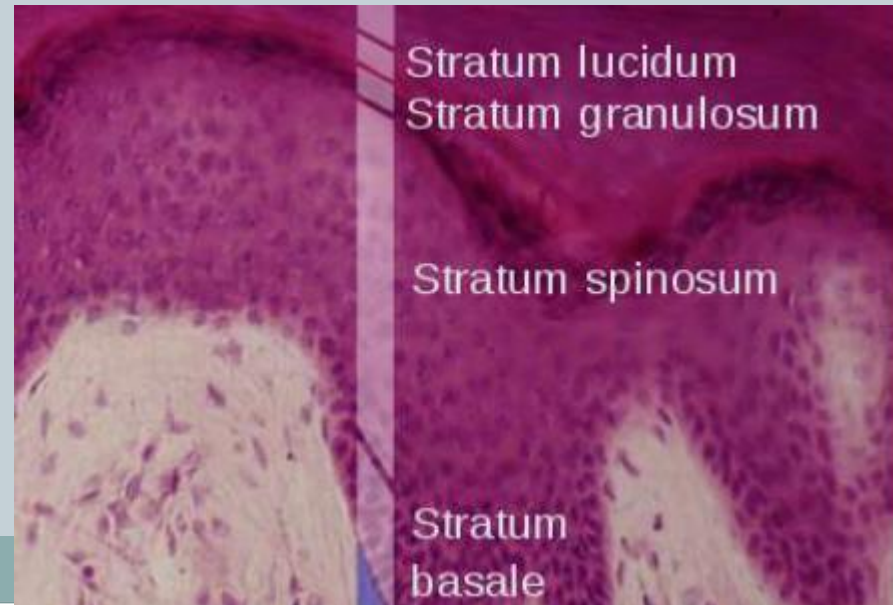
- The stratum granulosum consists of three to five layers of flattened polygonal cells whose cytoplasm is filled with **keratohyalin granules**.



Stratum Spinosum



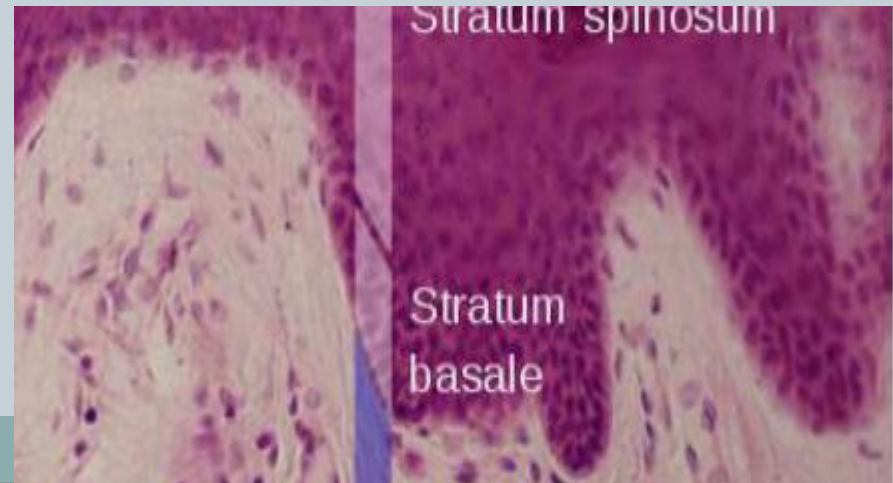
- The cells of this layer are firmly bound together by the filament-filled cytoplasmic spines and desmosomes that punctuate the cell surface, providing a spine-studded appearance



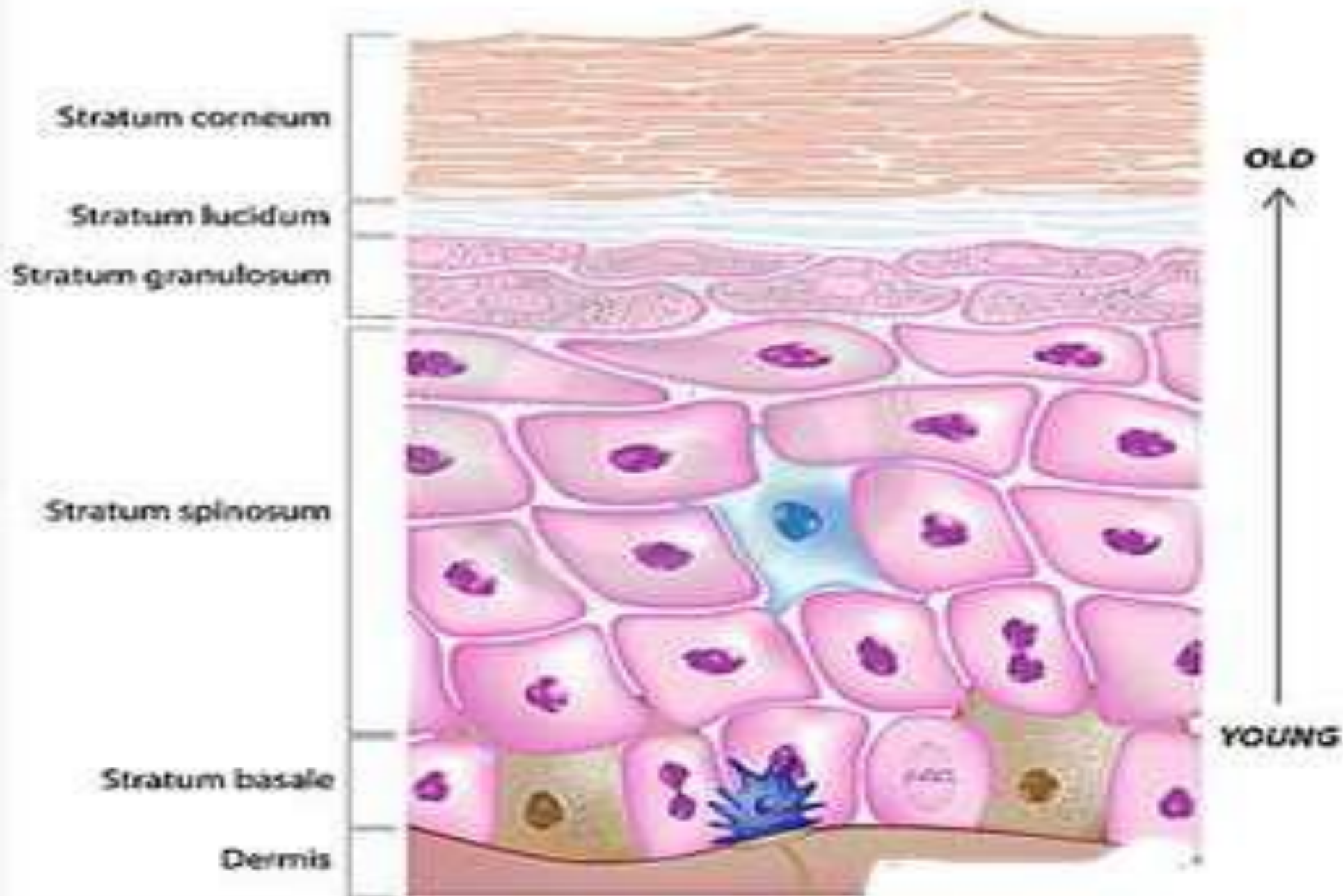
Stratum Basale



- The stratum basale containing **stem cells**, is characterized by **intense mitotic activity** and is responsible, in conjunction with the initial portion of the next layer, for **constant renewal** of epidermal cells.



Structure of the Epidermis



Stratum corneum

Stratum lucidum

Stratum granulosum

Stratum spinosum

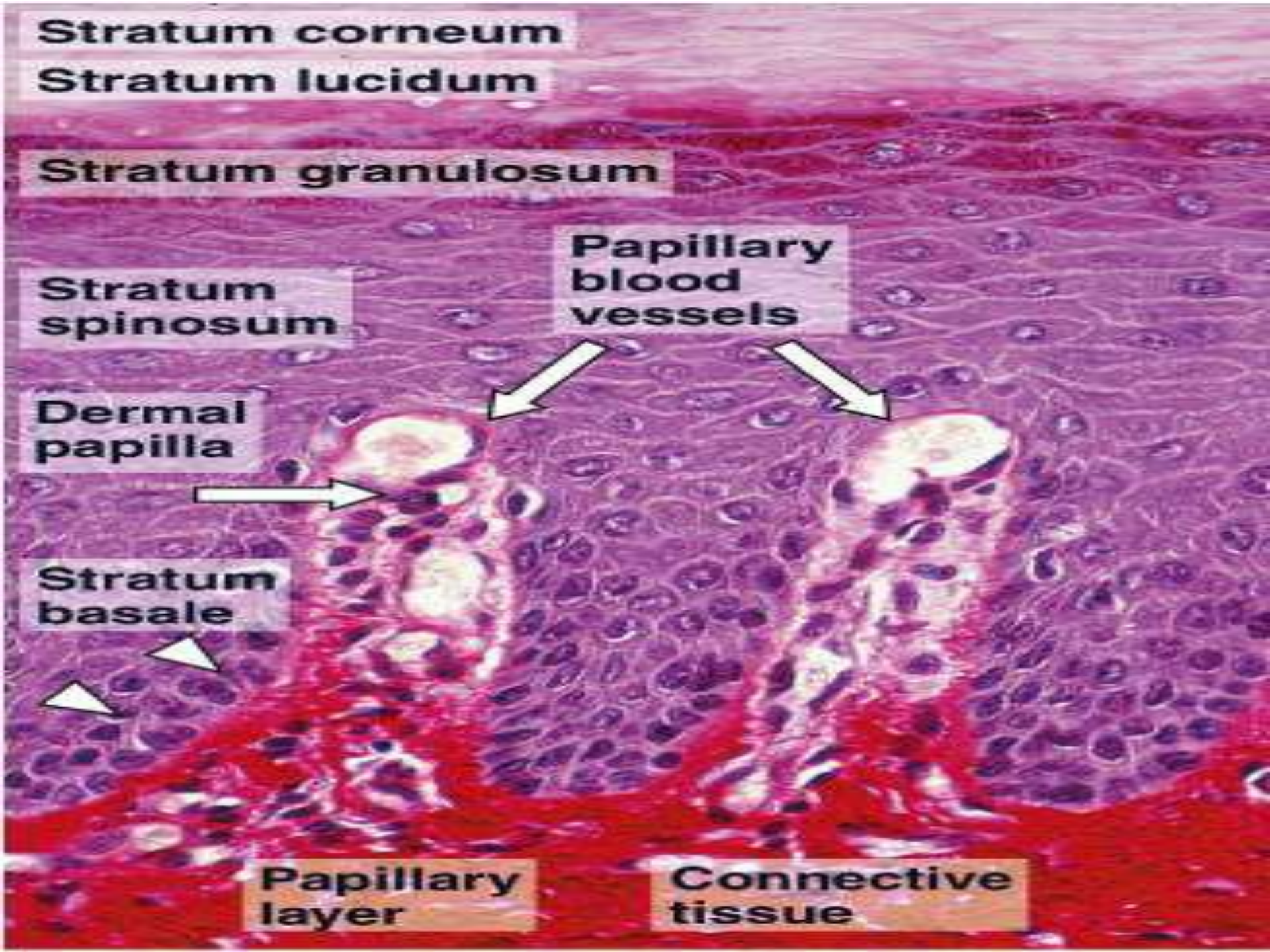
Papillary blood vessels

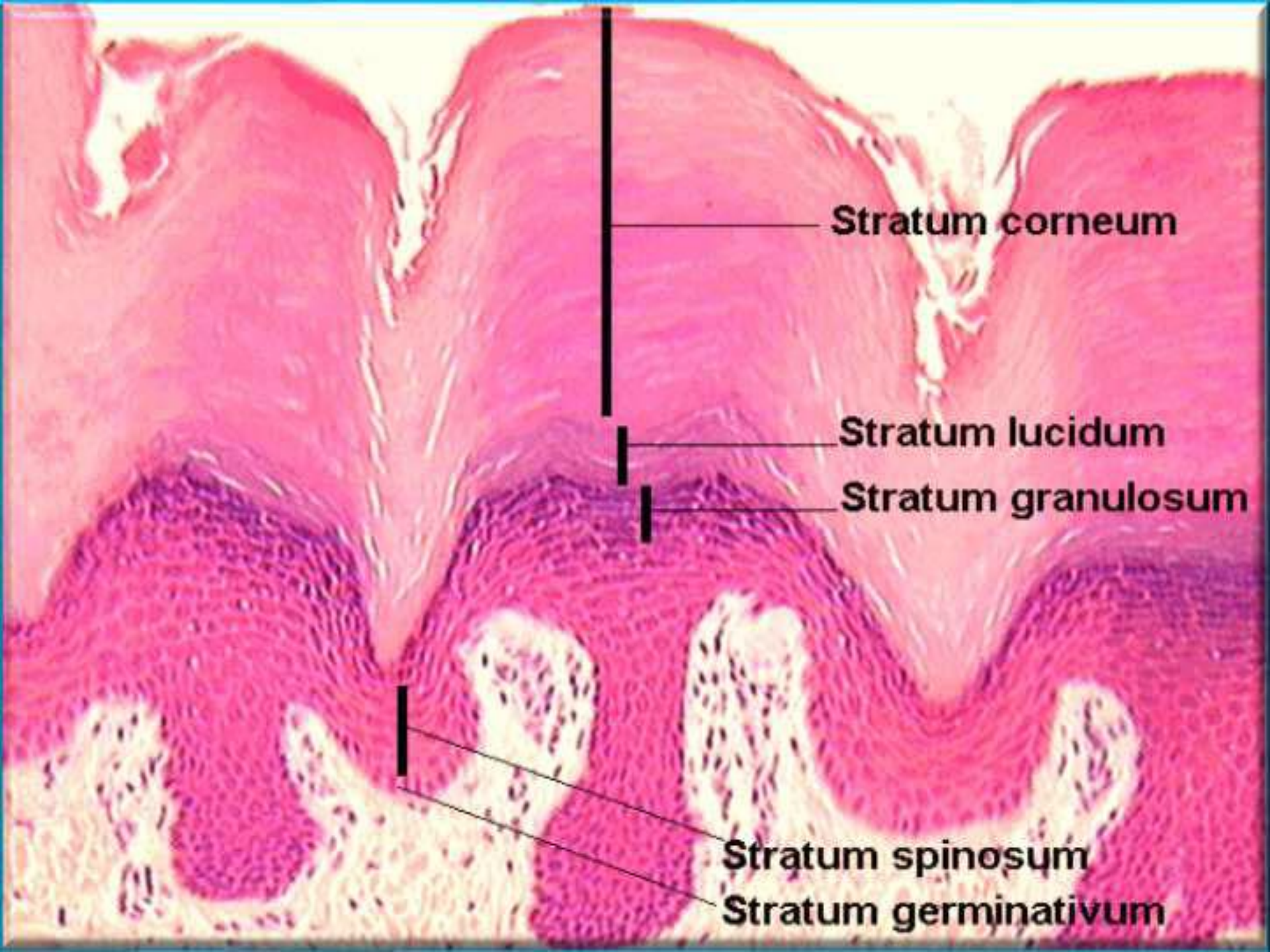
Dermal papilla

Stratum basale

Papillary layer

Connective tissue





Stratum corneum

Stratum lucidum

Stratum granulosum

Stratum spinosum

Stratum germinativum

Cells of epidermis

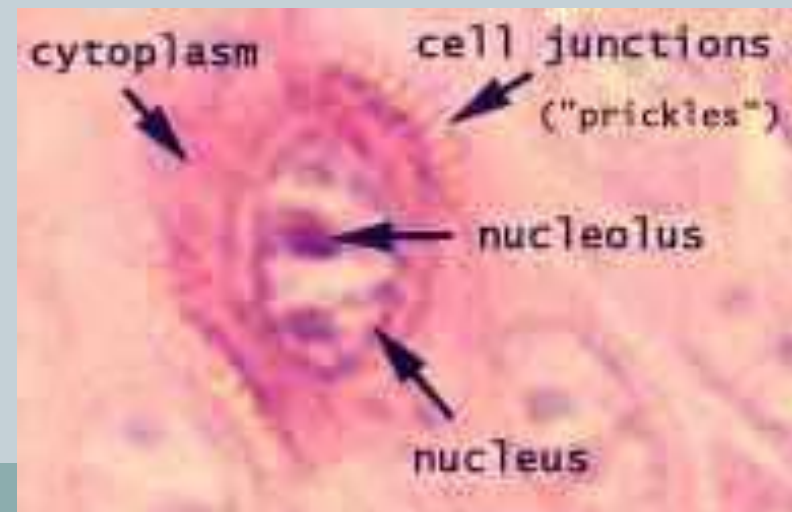


- 1. Keratinocyte**
- 2. Melanocytes**
- 3. Langerhans cells**
- 4. Merkel's cells.**

(1)-keratinocytes:



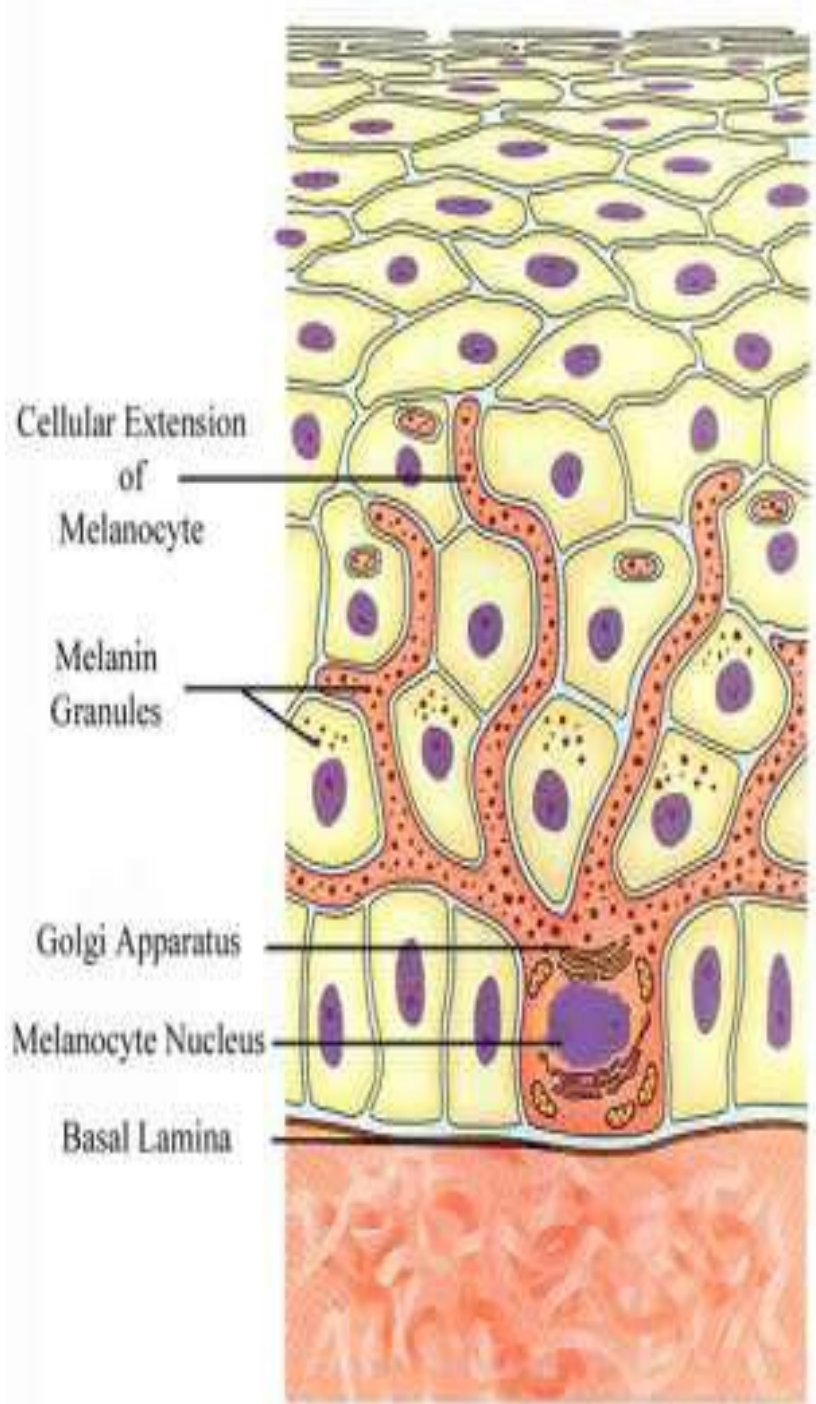
- **Formed of many layers that continuously shed and regenerate every 2-4 weeks.**
- **They are responsible for keratin formation.**
- **They are arranged In many layers.**



(2)-Melanocytes:

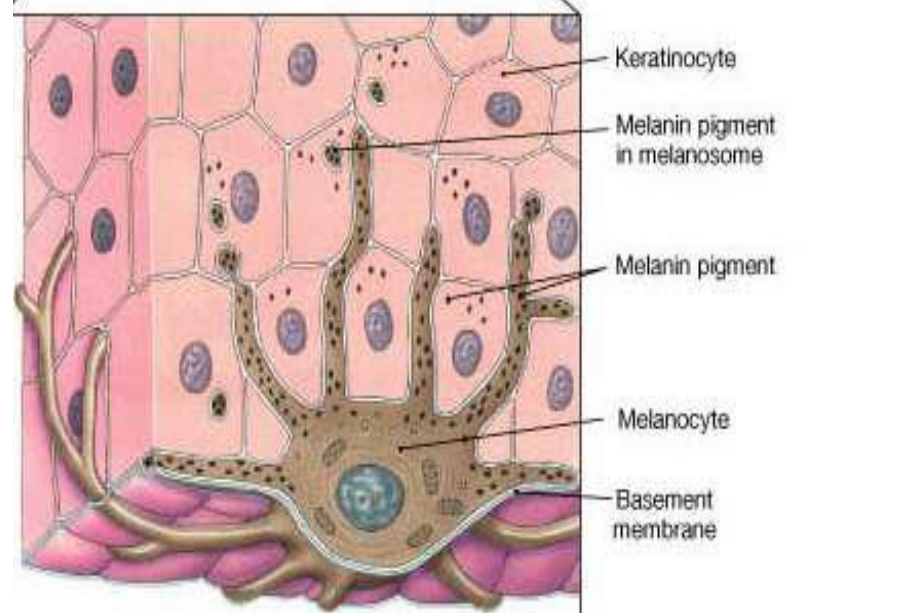
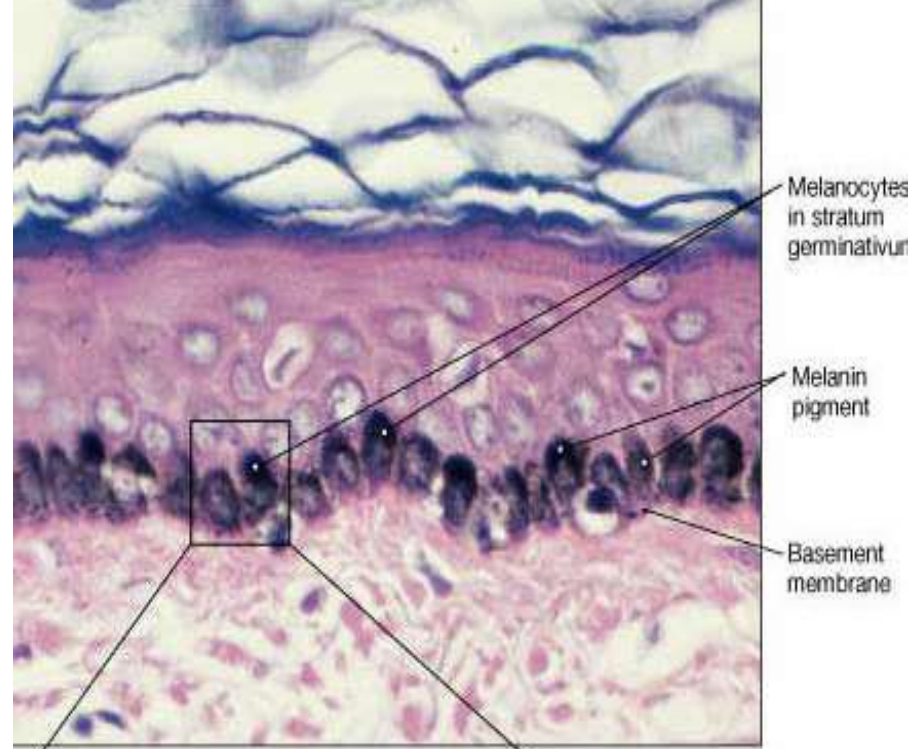


- **Found inbetween cells of the basal layer
Branched cells with central nuclei by EM
contains organells for protein synthesizes
(RER, Golgi, mitochondria &melanosomes).**
- **They form melanin by tyrosinase from
tyrosine amino acid by converting it to
dioxyphenyl alanine DOPA.**



Epidermis

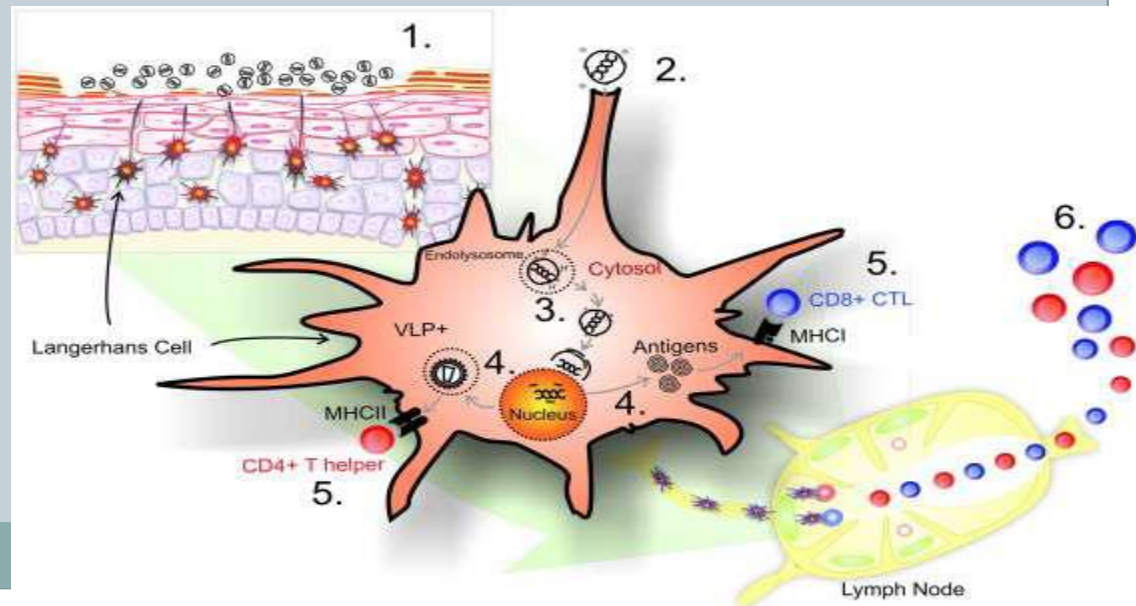
Dermis



(3)- Langerhans cells:

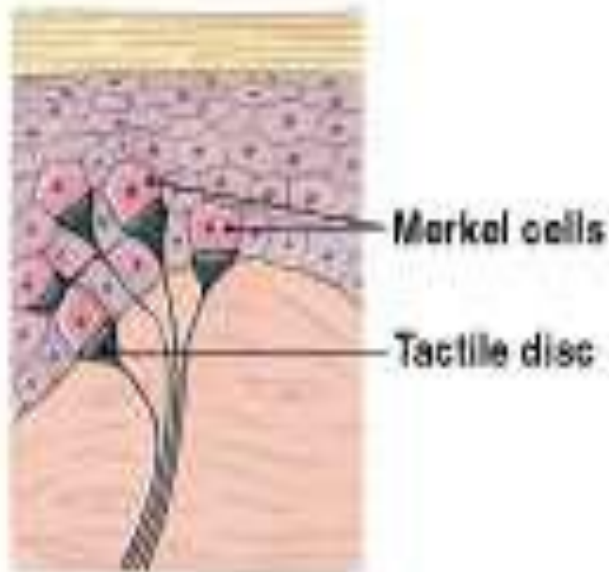


- Langerhans cells are dendritic cells (antigen-presenting immune cells) of the skin.
- Found in upper layers of stratum spinosum
- Have branched shape & central nuclei
- Represent 3-8% of epidermal cells

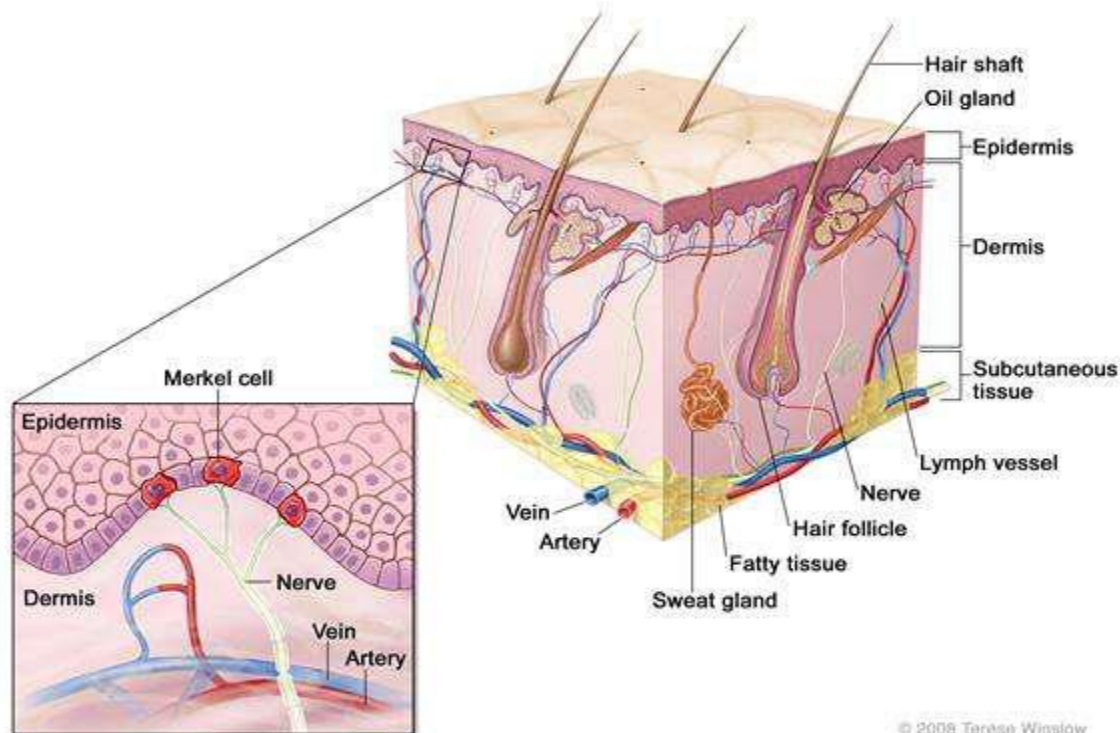


(4)-Merkel cells

- Found in basal cell layer
- They are modified epidermal cells Sensory nerve fibers form terminal disk under Merckels cells
- Function as touch receptors



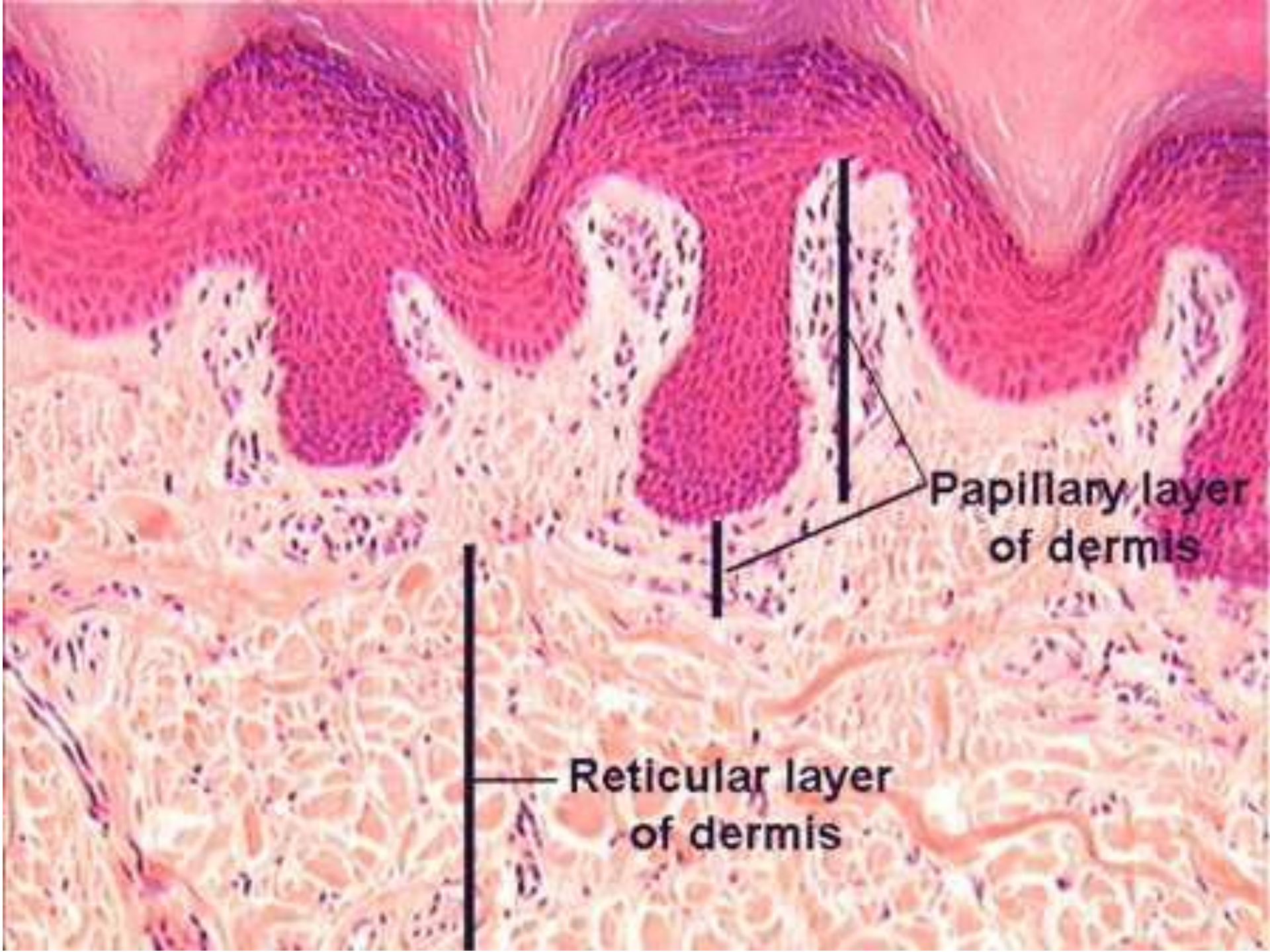
(c) Merkel cells and tactile discs



Dermis



- Made up of connective tissue Supply the avascular epidermis with nutrients.
- The dermis is typically subdivided into two zones, a papillary dermis and a reticular layer.
- The dermis contains mostly fibroblasts which are responsible for secreting collagen, elastin
- and ground substance that give the support and elasticity of the skin.

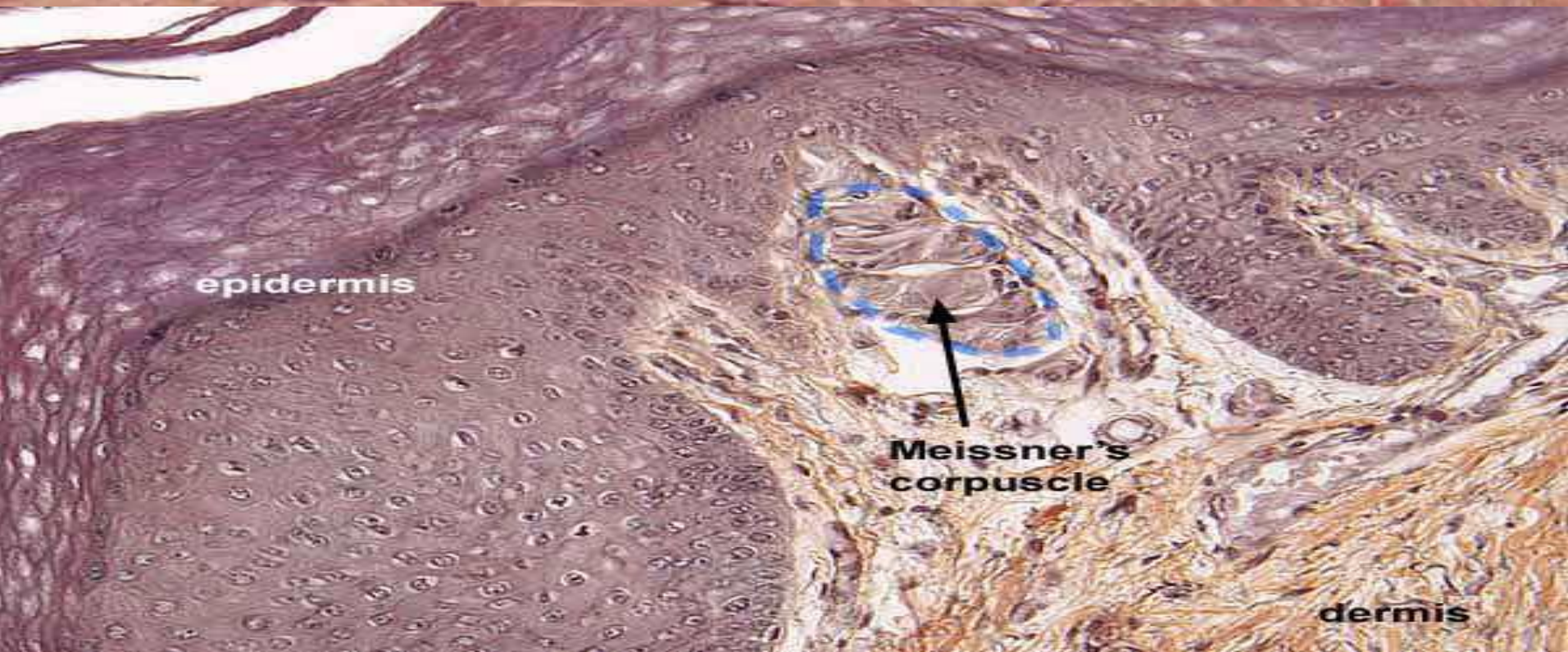
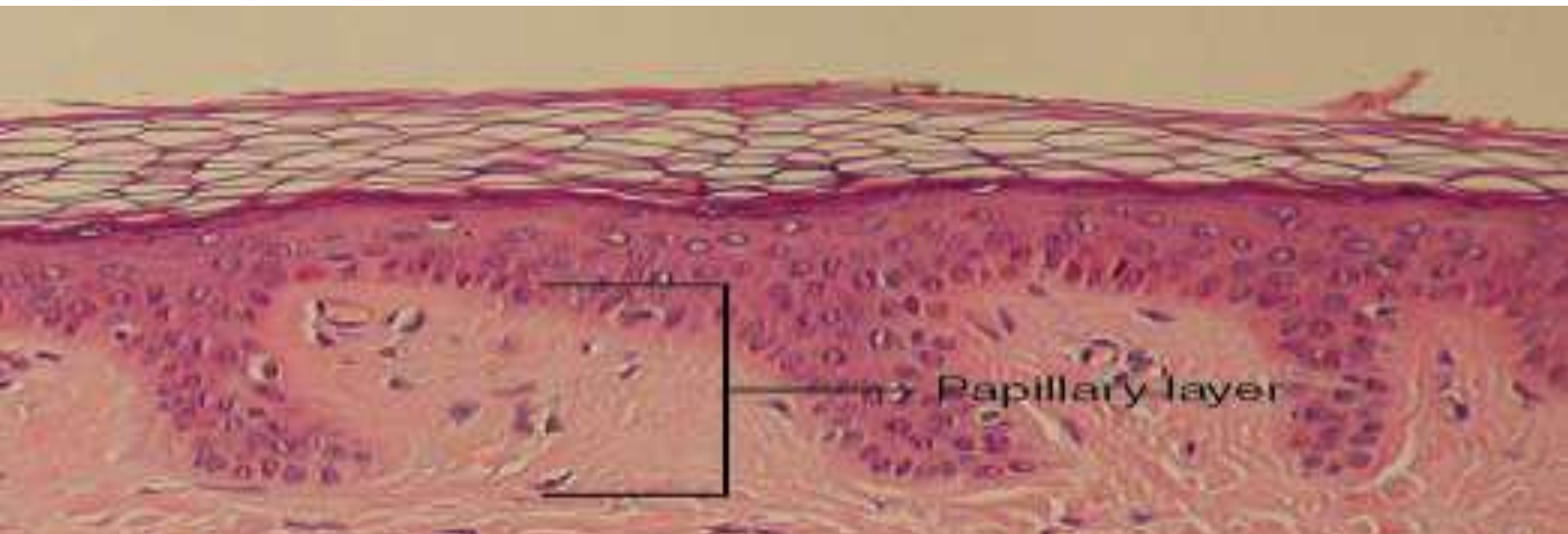


Papillary layer of dermis

Reticular layer of dermis

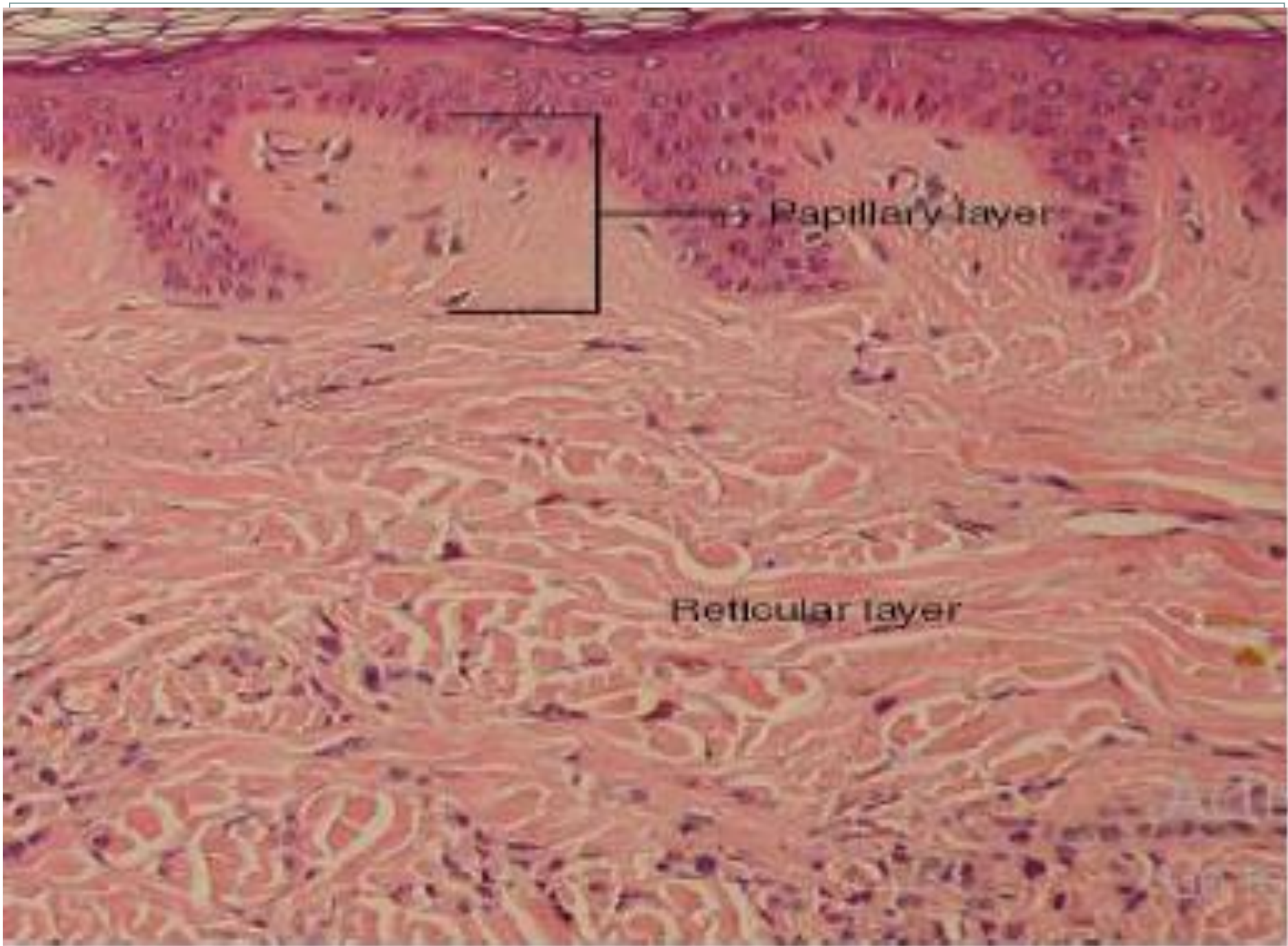


- **Papillary dermis:** contains vascular networks that have two important functions. The first being to support the avascular epidermis with vital nutrients and secondly to provide a network for thermoregulation.
- The papillary dermis also contains the free sensory nerve endings and structures called Meissners corpuscles also called mechanoreceptor which is responsible for light touch.





- **Reticular dermis:** The reticular layer of the dermis (RD) consists of mainly loose connective tissue
- The reticular layer of the dermis is important in giving the skin its overall strength and elasticity, as well as housing other important epithelial derived structures such as glands and hair follicles.



Papillary layer

Reticular layer

Skin Appendages



- **1-Hair Follicles and hair**
- **2-Sweat Glands Apocrine sweat glands**
- **3-Sebaceous glands**
- **4-Nails**

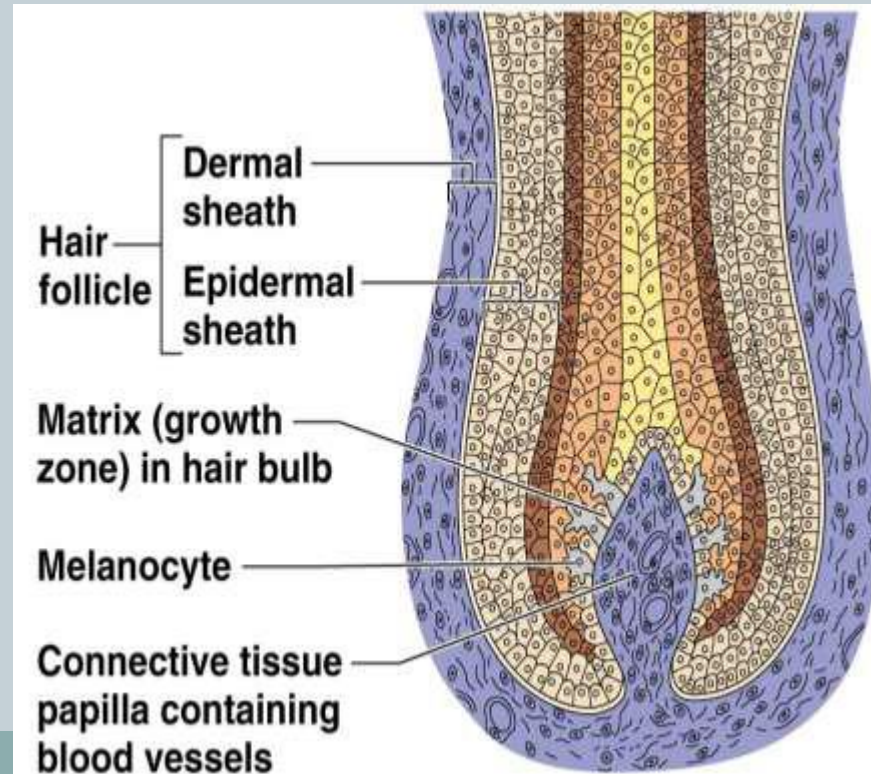
Hair and hair Follicles



- Hair -Produced by hair follicle which are made of hard keratinized epithelial cells.
- Melanocytes provide pigment for hair color.

Parts

- The visible part – shaft
- Embedded part – root
- Expanded lower end of the root – bulb
- The bulb is generated invaginated from below by part of the dermis – hair papilla
- Root is surrounded by a tubular sheath – hair follicle
- Arrector pili muscle :- Smooth muscle
- Sebaceous gland



Hair shaft

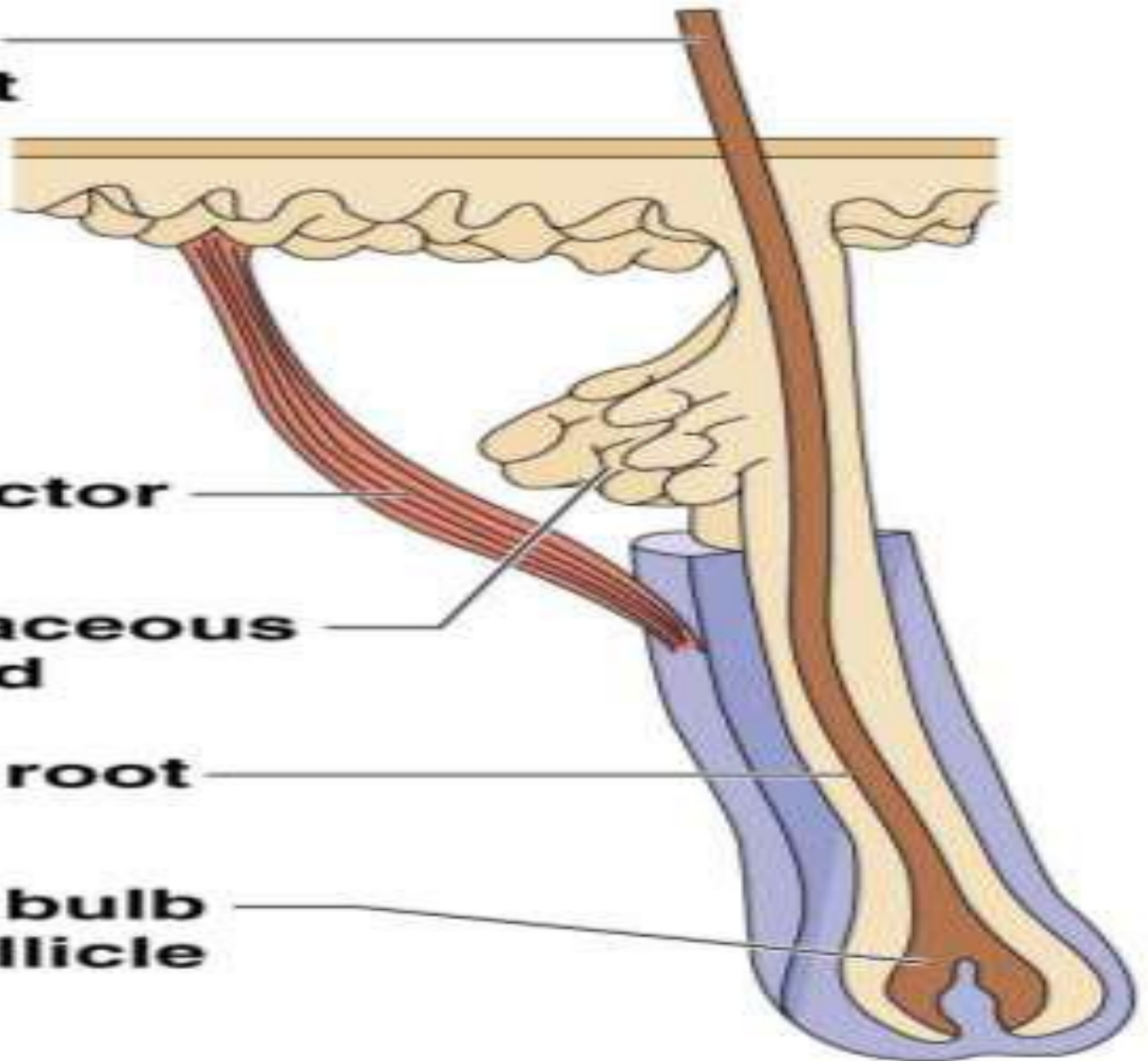
Arrector pili

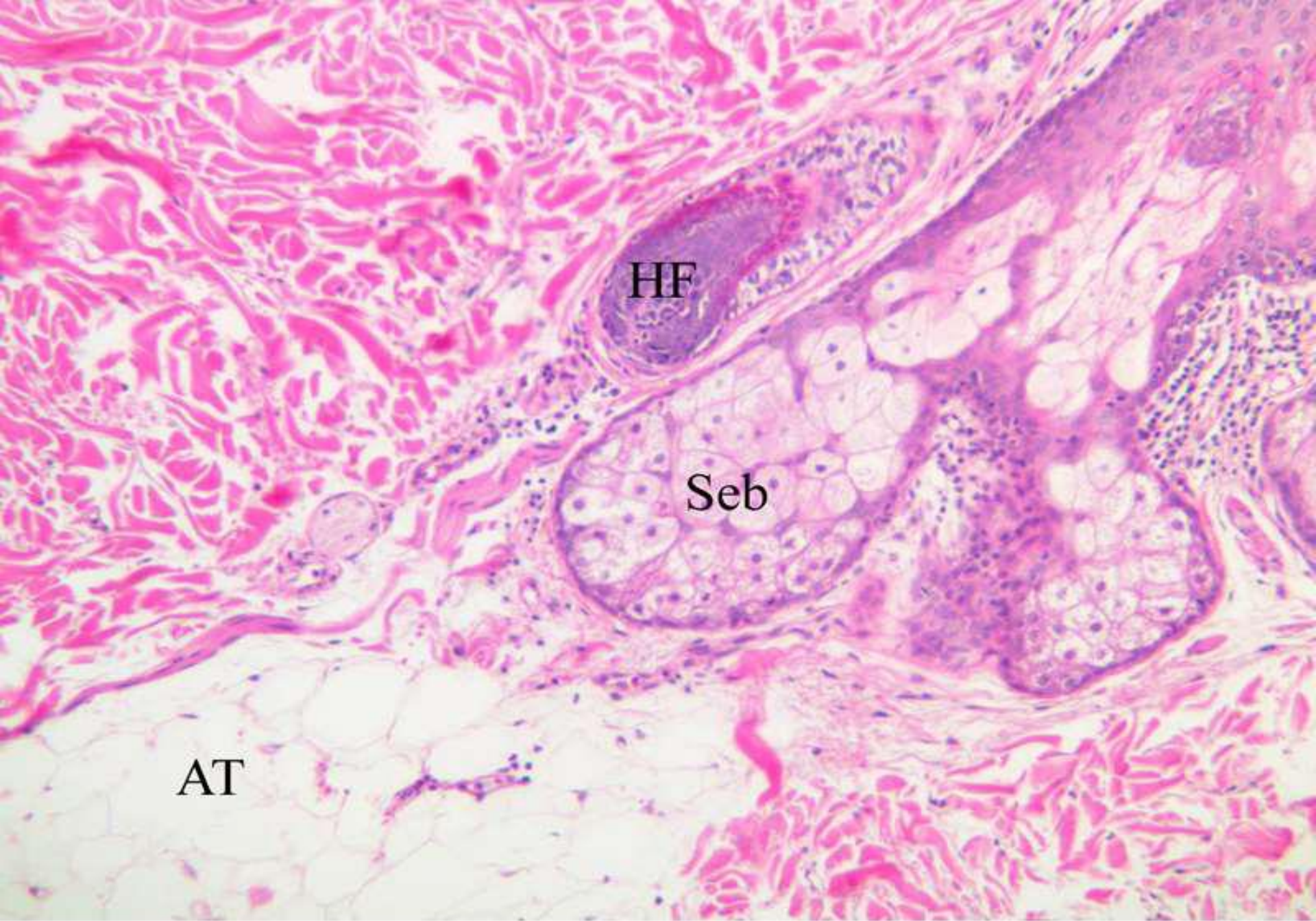
Sebaceous gland

Hair root

Hair bulb in follicle

(a)





Seb - sebaceous gland HF - hair follicle AT - adipose tissue

Nails



Nail top

Nail plate

Nail root

Nail contour
cuticle

Lunula
(half-moon)



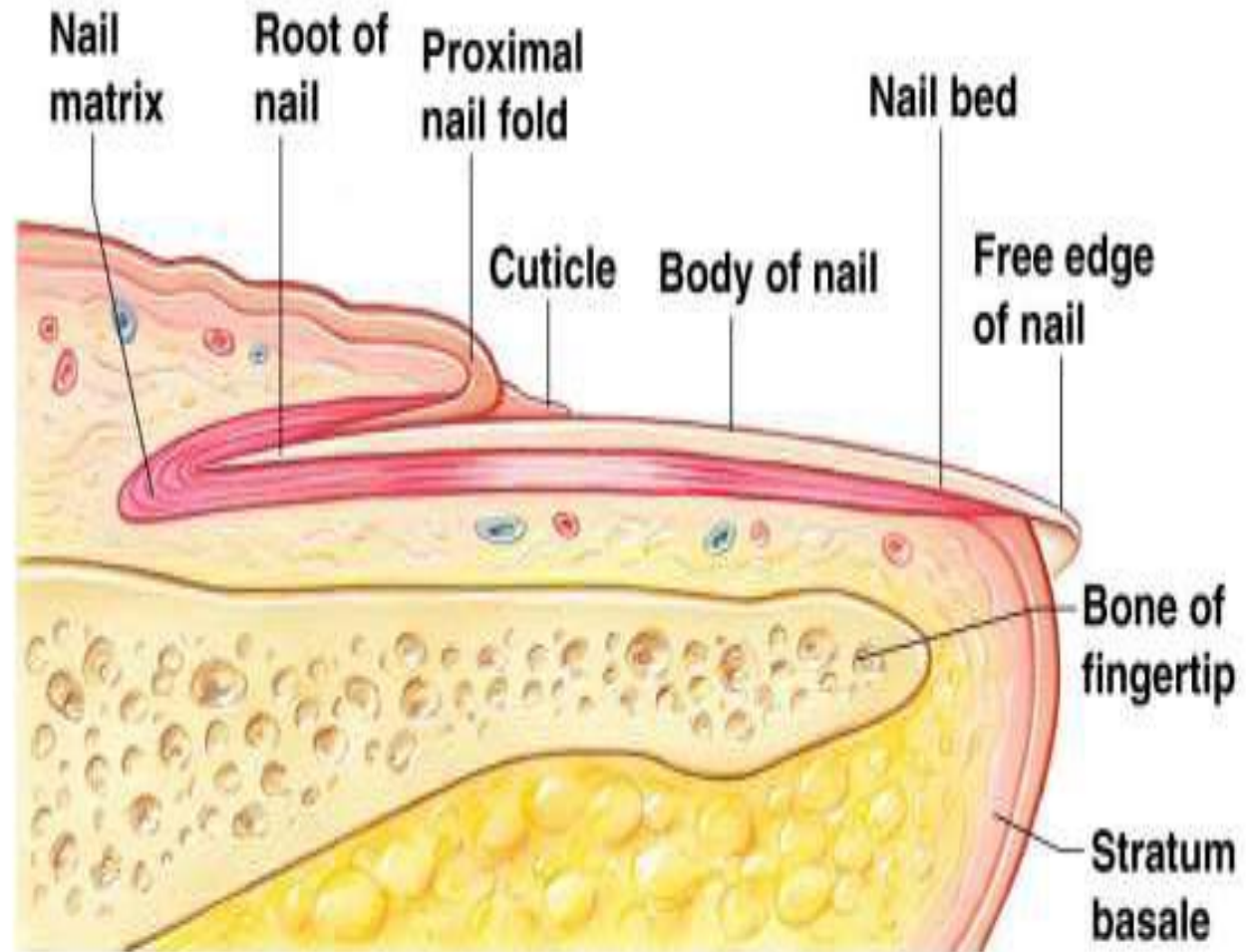


- Nails are plates of keratinised epithelial cells on dorsal surface of distal phalynx.
- Consists of 3 parts
 - Proximal part or root
 - Exposed part or body
 - Free distal border
- Body rests on nail bed which is composed of stratum basale & stratum spinosum

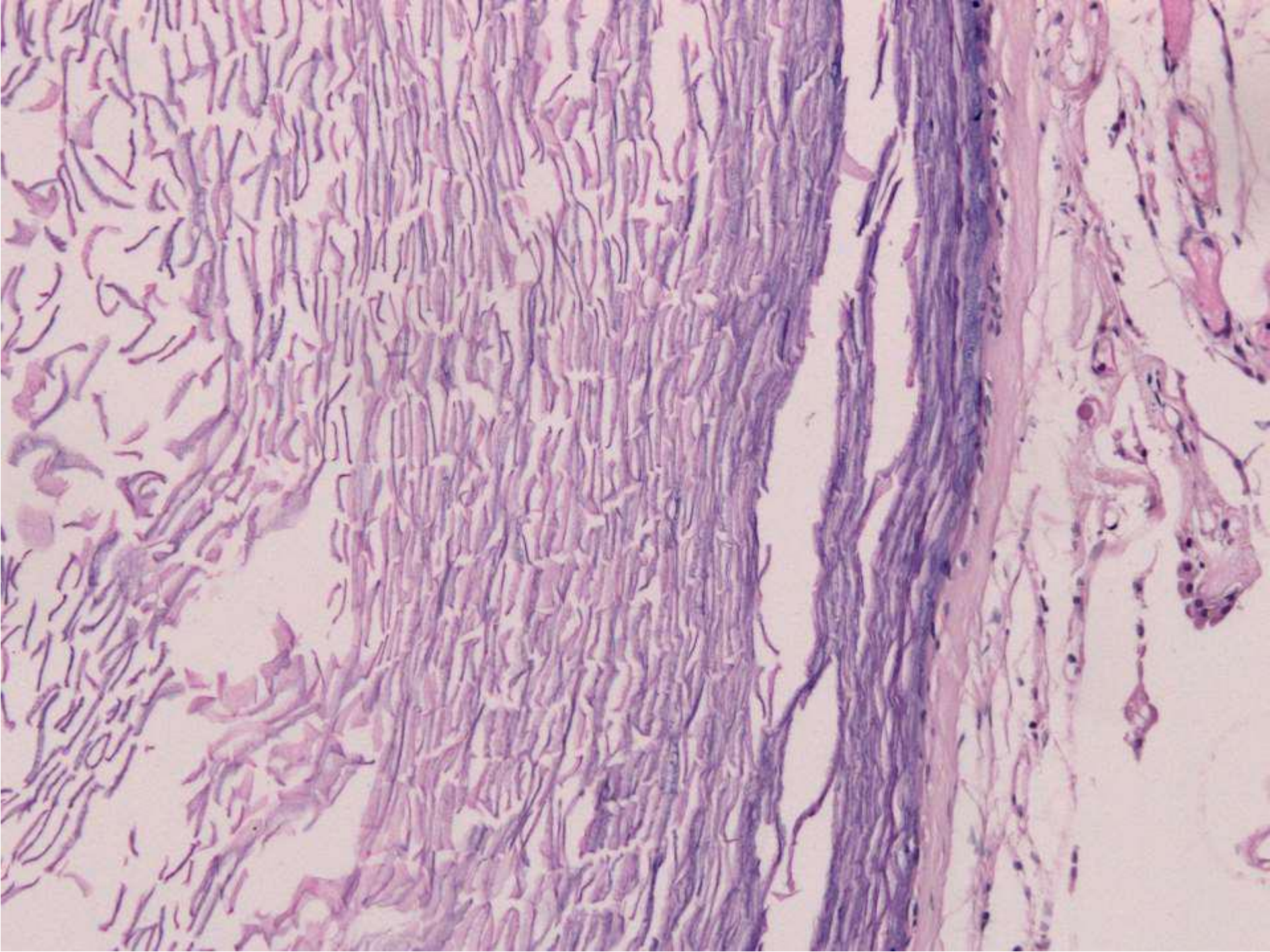
Nails



(a) Surface view



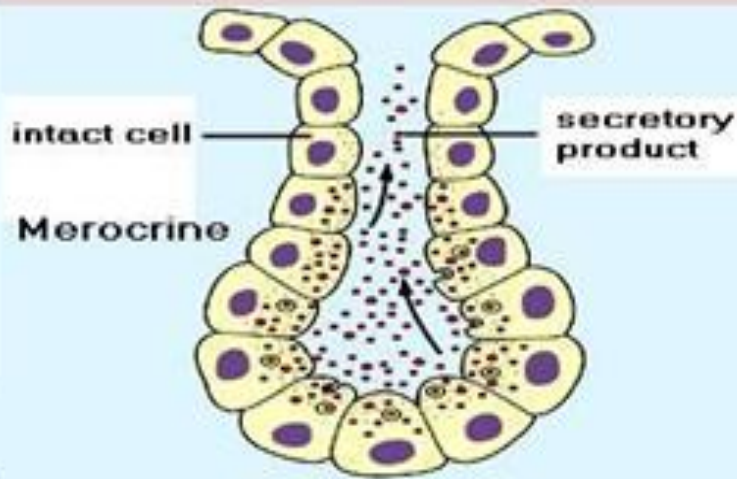
(b) Longitudinal section of the distal part of a finger



Sweat Glands

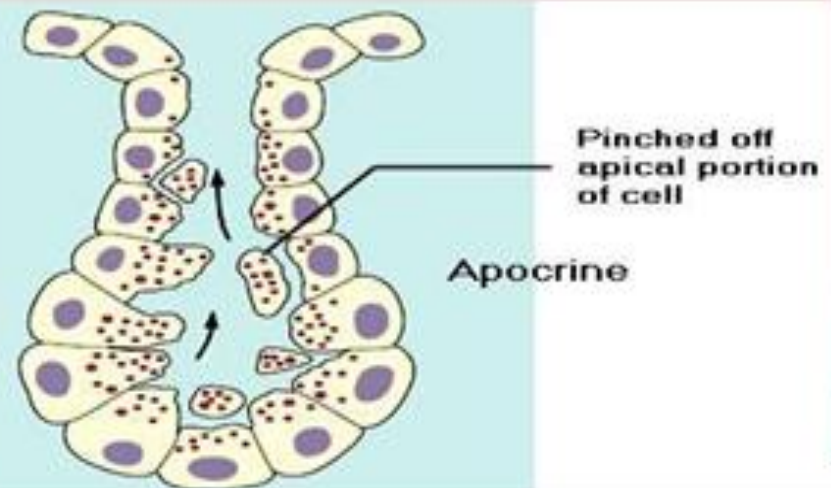
Eccrine sweat gland

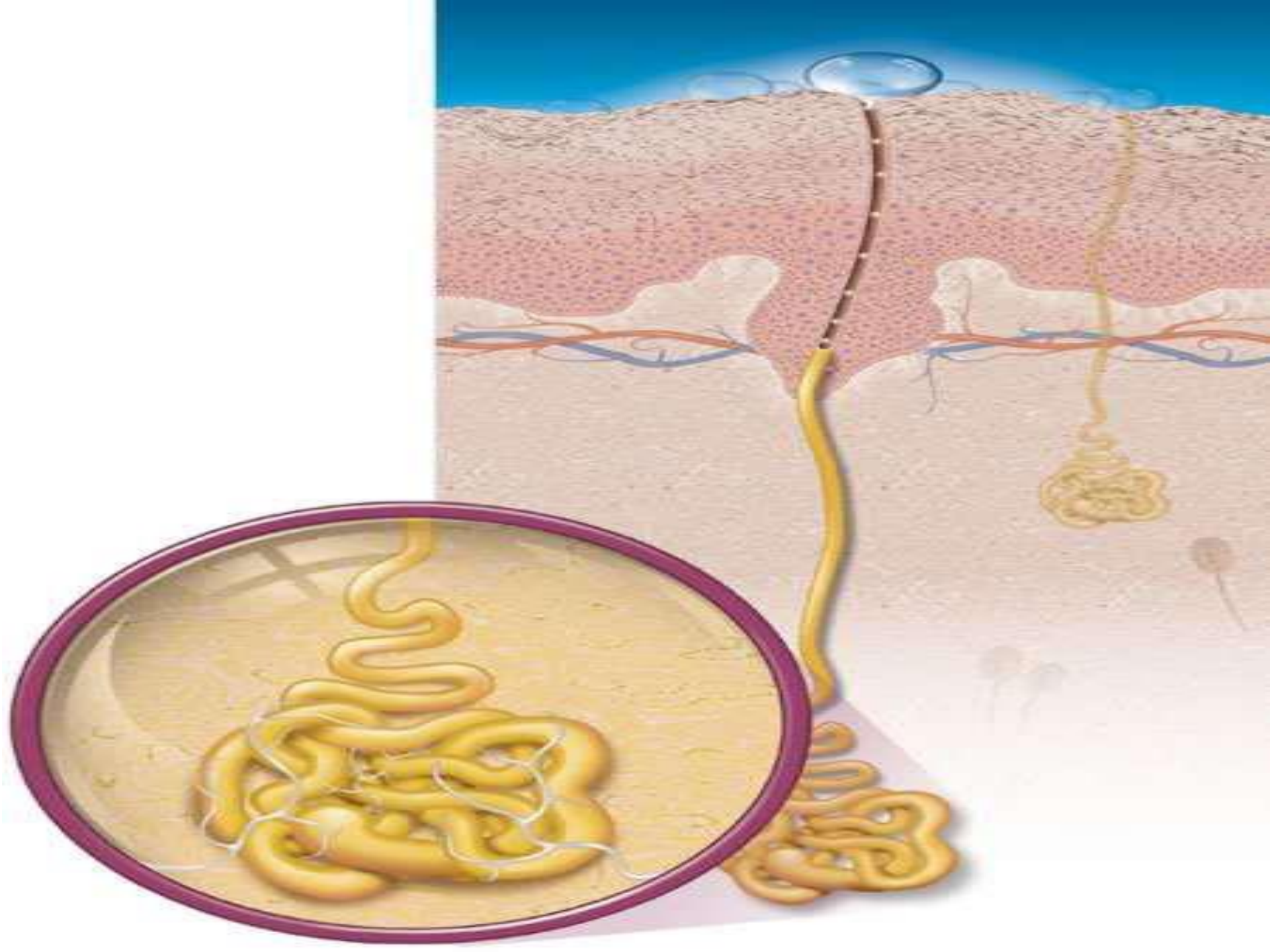
- Merocrine secretion Empty directly onto skin surface
- Location: most all over body esp. abundant on palms & soles
- Clear, watery secretion

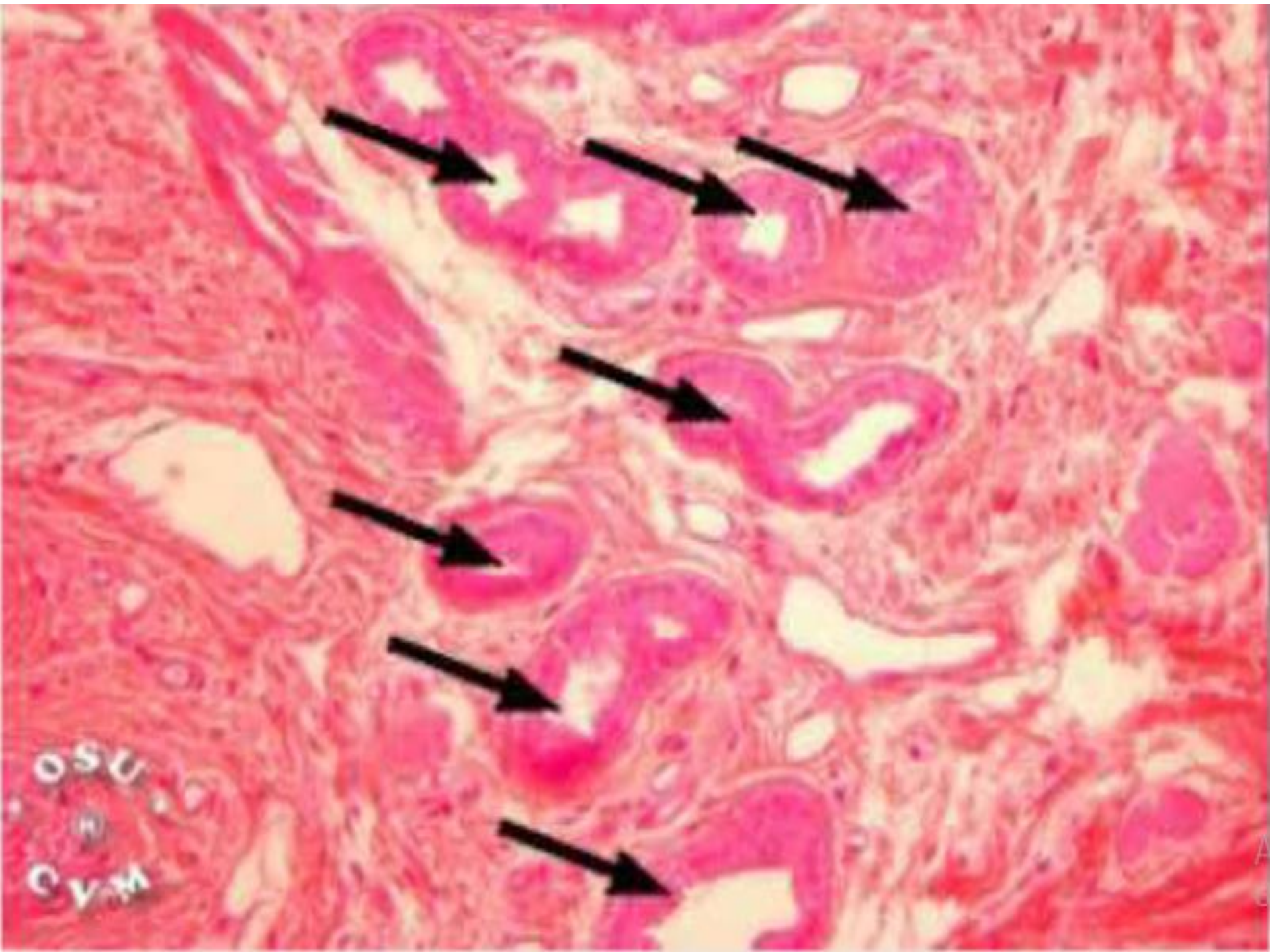


Apocrine sweat gland

- Empty into hair follicle
- Location: armpits, groin, nipples
- Viscous, cloudy secretion may contain Pheromones







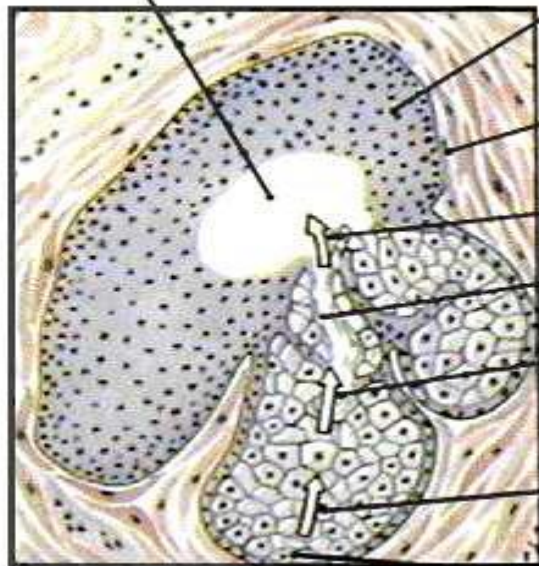
OSU
CVM

Sebaceous glands



- **Sebum discharged mostly into hair follicles**
- **(lubrication & bactericidal)**

Hair removed



Wall of hair follicle

Basement membrane

Discharge of sebum

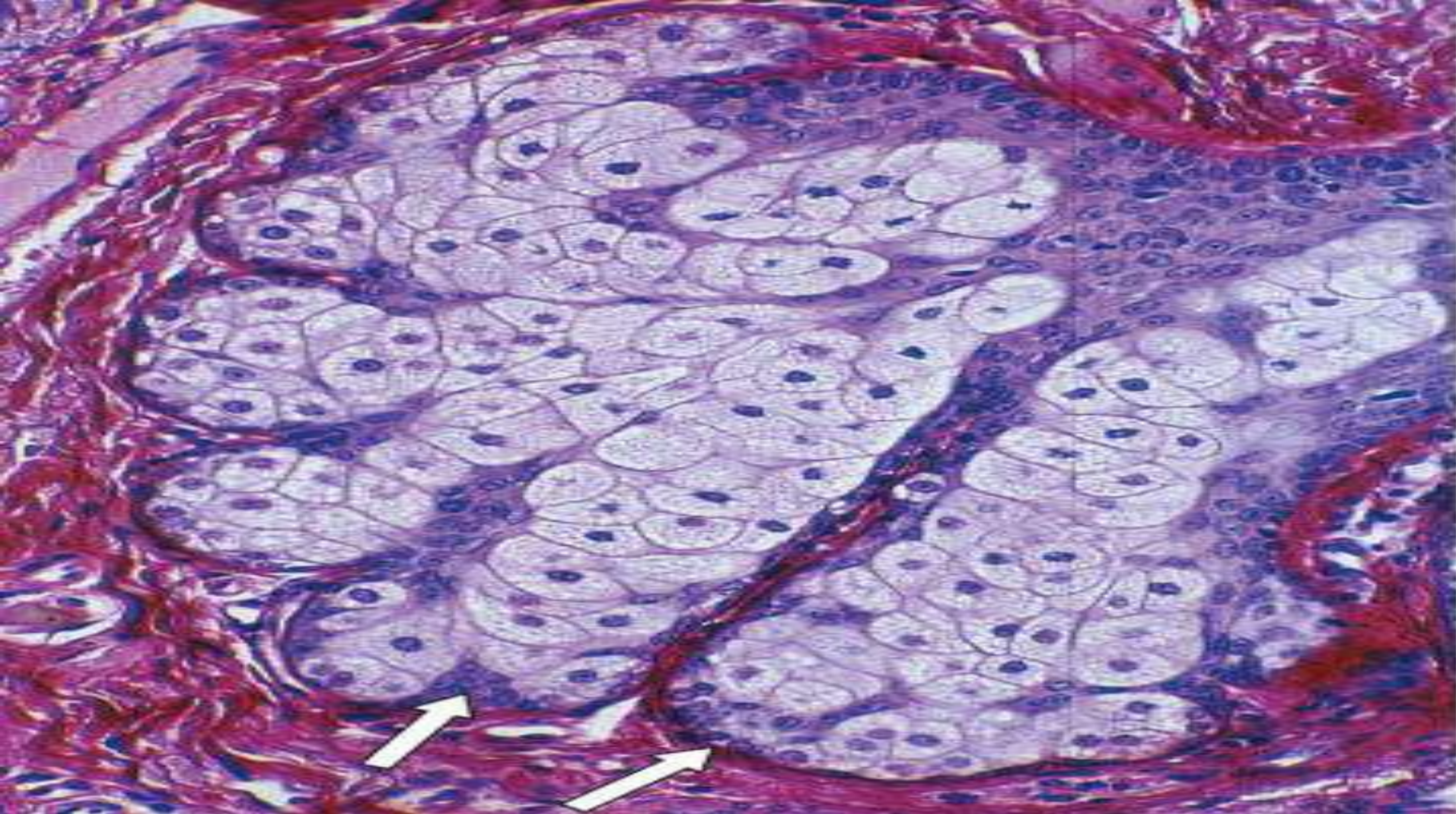
Lumen

Breakdown of cell walls

Mitosis and growth

Germinative (stem) cells





Stem cells (arrows) in the base of the gland proliferate to replace the lost cells

Goodbye
Luck!