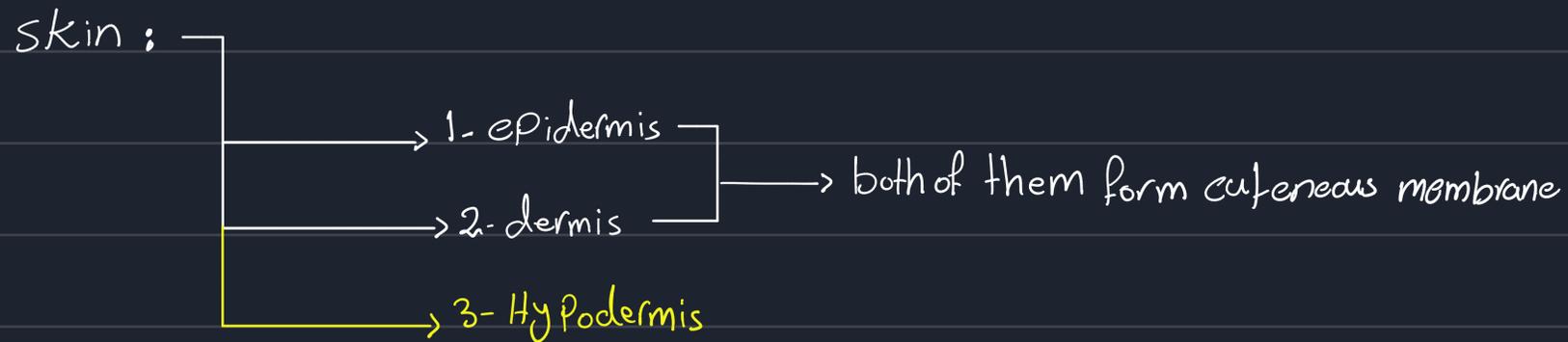


\* the skin is considered as the largest organ in the body.



functions of the skin :

- 1- Protection → against dehydration and UV light

- 2- sensation

- 3- thermoregulation

- 4- excretion → sweat glands

- 5- formation of vitamin D

1- epidermis : 1- outermost layer of the skin.

2- rich in keratin.

3- contains different cell cells.

4- act as water proof barrier.

5- derived from ectoderm.

→ 1- stratum basale

→ 2- stratum spinosum

→ 3- stratum granulosum

→ 4- stratum lucidum \*

→ 5- stratum corneum

\* regulation of body temperature through skin can be with two ways :

- 1- sweat glands

- 2- blood vessels : dilation or constriction to regulate the temperature :

- 1- when the body is Hot → blood vessels dilation

- 2- when the body is Cold → blood vessels constriction

1- stratum basale : 1- deepest layer of epidermis.

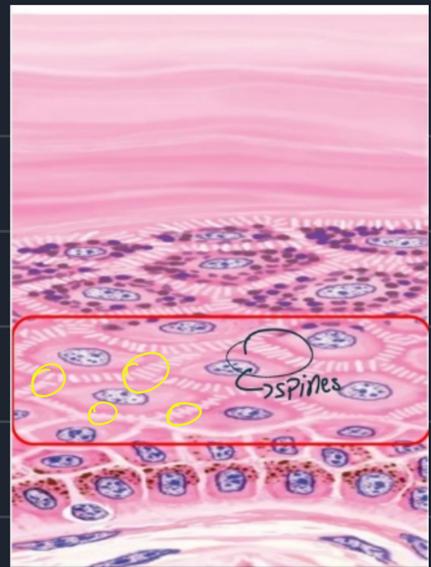
2- basophilic cuboidal cells.

3- attach to each other by desmosomes and to basement membrane by hemidesmosomes

4- can undergo mitosis.

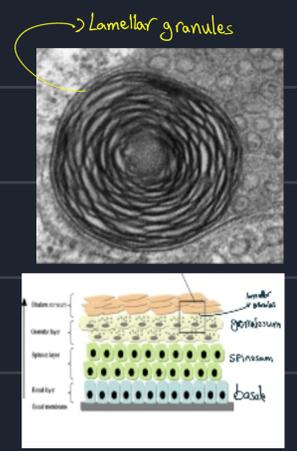
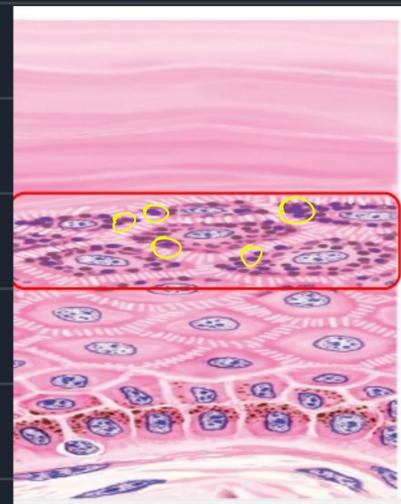


- 2- stratum spinosum: 1- consist of 8-10 rows of cells.
- 2- synthesize keratin filaments and then become tonofilaments.
- 3- appears as spines during histologic preparation.
- 4- spines are the site of desmosomes to keratin fibrils.



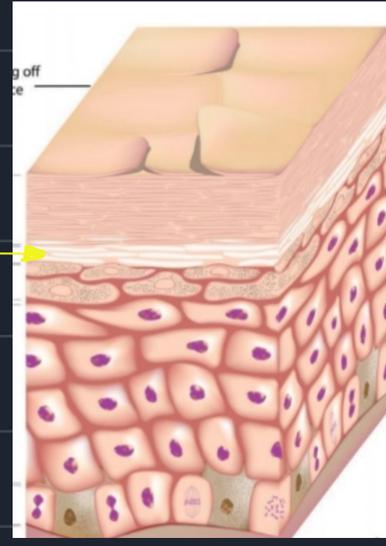
\* stratum germinativum: stratum basale + deepest part of stratum spinosum → can undergo mitosis.

- 3- stratum granulosum: 1- consist of 3-5 layers of flattened cells.
- 2- cells are filled with:
  - a- basophilic keratohyalin granules (non-membranous bond).
  - b- lamellar granules (membrane-bond).



\* Lamellar granules: lipid material between the cells waterproof the skin.

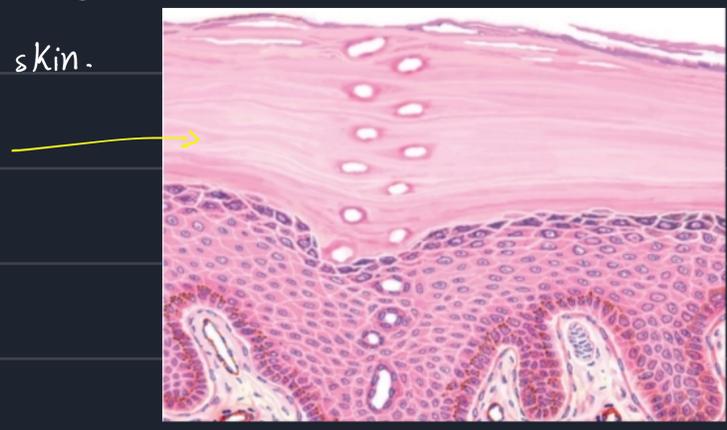
4- stratum lucidum: 1- found only in thick skin.



- 2- translucent.
- 3- tightly packed by desmosomes.
- 4- lack of nuclei
- 5- consist of dead cells.

5- stratum corneum: 1- most superficial layer of the skin.

- 2- consist of dead cells.
- 3- cells contain a lot of keratin filament.
- 4- this layer is continually shedding and replaced from stratum basale.
- 5- waterproof layer of the skin.



Calluses and cornes: Pressure on the skin can cause it.



\* Psoriasis: extra skin appears as red itchy painful patches.

↳ acceleration of keratinization process → fast shedding of keratin layer.



Type of the skin:

\* thin or thick refer to the thickness of epidermal layer.

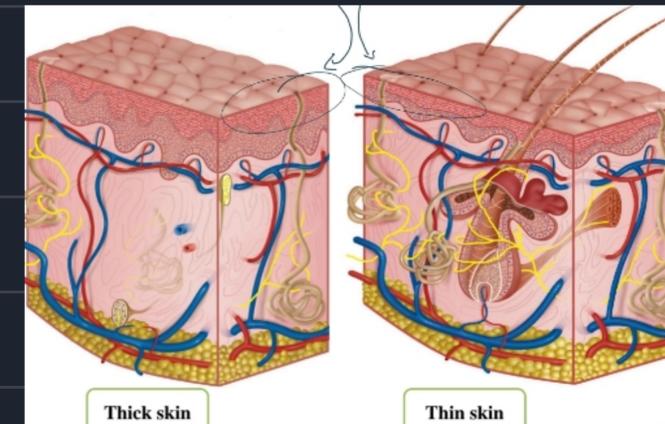
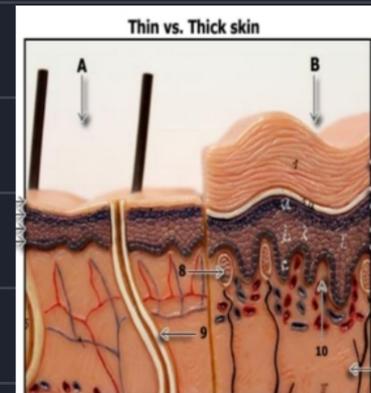
→ 1- thin skin: 1- cover most of our body surface.

2- 4 layers, less prominent of stratum corneum.

3- less developed stratum granulosum.

4- thicker dermis.

5- have hair and sebaceous gland in it.



→ 2- thick skin: 1- only found on palms and soles.

2- 5 layers, prominent stratum corneum.

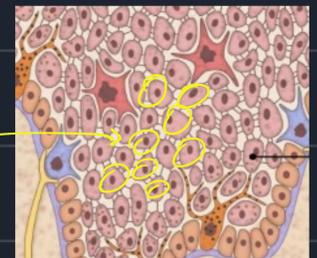
3- well developed stratum granulosum.

4- thinner dermis.

5- no hair and sebaceous gland in it.

types of epidermal cell: 1- keratinocytes 3- langerhans cells

2- melanocytes 4- merkel cells

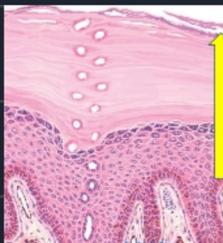


1- keratinocytes: 1- make 90% of epidermal cells.

2- produce keratin

3- produce lamellar granules → waterproof the skin.

4- shed and regenerate every 2-4 weeks.



\* as we go up the cell change from cuboidal to polyhedral to flat squamous cells at the end that will be shed.  
(flattening of the cells)

2- melanocytes: 1- derived from the neural crest cells.

2- Protrusions transfer melanin granules to keratinocytes.

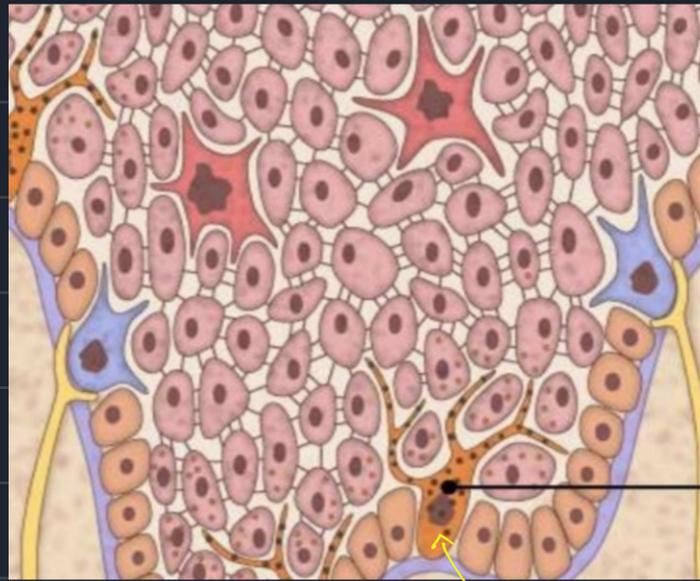
3- found in stratum basale.

4- synthesize dark brown pigment melanin.

5- melanin protect the skin from UV Light.

6- acts as SPF.

7- exposure to sunlight increase the synthesis of melanin.



\* Albinism: no melanin production.



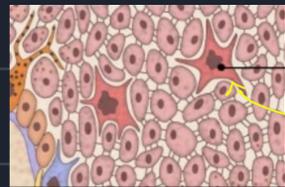
melanin found on the top of keratinocyte to make umbrella to protect the dna of keratinocyte from UV light.



3- Langerhans cells: 1- star like shape originate from bone marrow.

2- found in stratum spinosum.

3- immune cells that have phagocytic activity.



4- merkel cells: 1- found in stratum basale.

2- abundant in the fingertips.

3- act as light touch receptors.



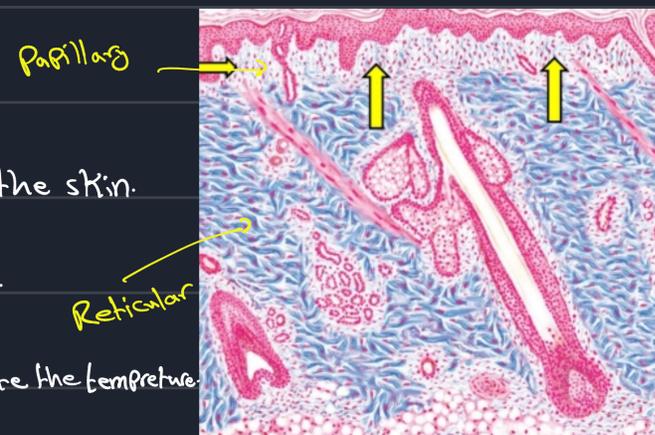
2- dermis: 1- much thicker than epidermis.

2- responsible for elasticity and strength of the skin.

3- contains blood vessels and nerve supply.

4- supplies epidermis with nutrients and regulate the temperature.

5- derived from mesoderm.



reticular layer is important in giving the skin it overall strength and elasticity (collagen).

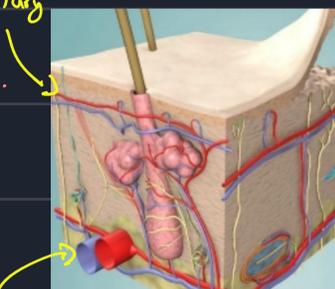
blood vessels have two major plexuses:

1- subpapillary plexus: a- branched from subdermal plexus.

b- have thermoregulation role.

2- subdermal plexus: between dermis and hypodermis.

subpapillary



subdermal

→ 1- Papillary layer (regular): loose connective tissue.

→ 2- Reticular layer (irregular): dense connective tissue.

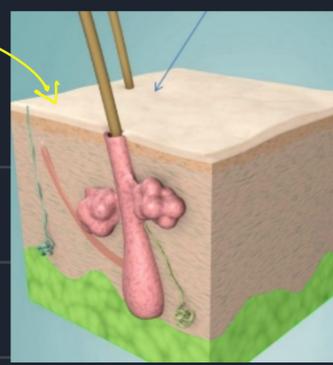
ecchymosis (bruise): hemorrhage from cutaneous blood vessels.



ecchymosis

- acid mantle: 1- very fine, acidic film found on the top of stratum corneum.
- 2- made of natural oils, sweat and dead skin cells.
- 3- Protect against harmful contaminants such as bacteria, pollutants ----.
- 4- Prevent moisture loss.

acid mantle

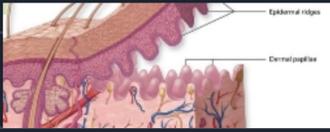


dermal Papillae: extensions of the dermis into the epidermis.

epidermal ridges: conforms to the contours of underlying dermal papillae.

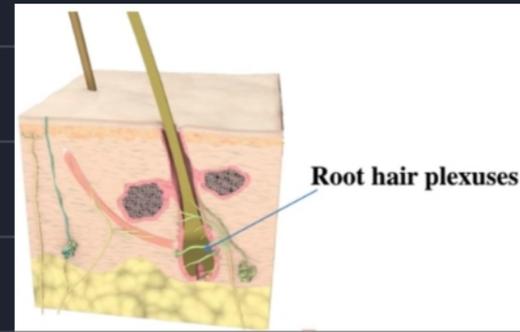
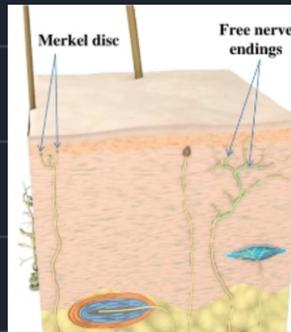
both of them for: epidermal-dermal junction.

Prevent two layers of the skin from separating.



sensory receptors:

→ 1- unencapsulated: don't have connective tissue capsule



→ 1- merkel disc: for light touch and sensing object texture.

→ 2- free nerve ending: 1- found in papillary dermis

2- for sensing temp, pain, itching, tactile sensation.

→ root hair Plexus: 1- around hair follicles in reticular dermis.

2- detect movement of hair.

→ 2- encapsulated: have connective tissue capsule

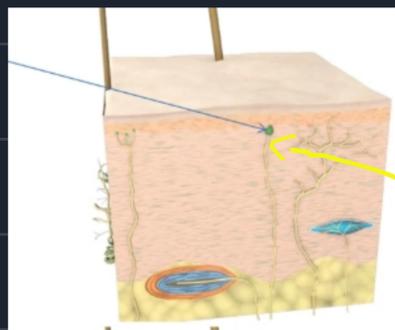
→ 1- meissner corpuscles: 1- found in dermal papilla, for sensing light touch.

2- abundant in fingertips, palms, soles and decline with aging.

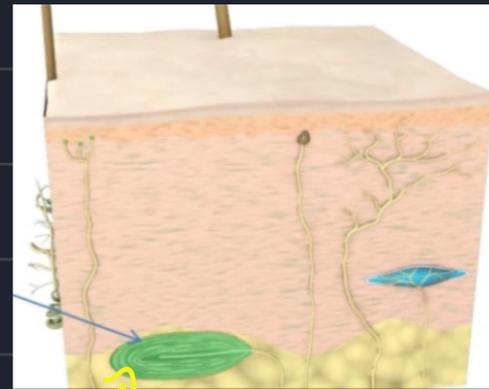
→ 2- Pacinian corpuscles: 1- found in deep reticular dermis and hypodermis.

2- detect coarse touch, pressure and vibration.

→ 3- ruffini corpuscles: 1- detect stretch and twisting.



Pacinian corpuscles



ruffini corpuscles



meissner corpuscles

Skin appendages: originate from epidermis. **hair**: elongated keratinized structures that form within epidermal invaginations.

→ 1- hair follicles and hair. **hair shaft**: the part of the hair that extends beyond the skin surface (visible part).

→ 2- sebaceous glands. **hair root**: the part of the hair below the skin surface (embedded part).

→ 3- sweat glands. **hair follicle**: a tube of stratified squamous epithelium invaginated into the dermis.

→ 4- nails. **inner root sheath**: disintegrate at the level of sebaceous gland.

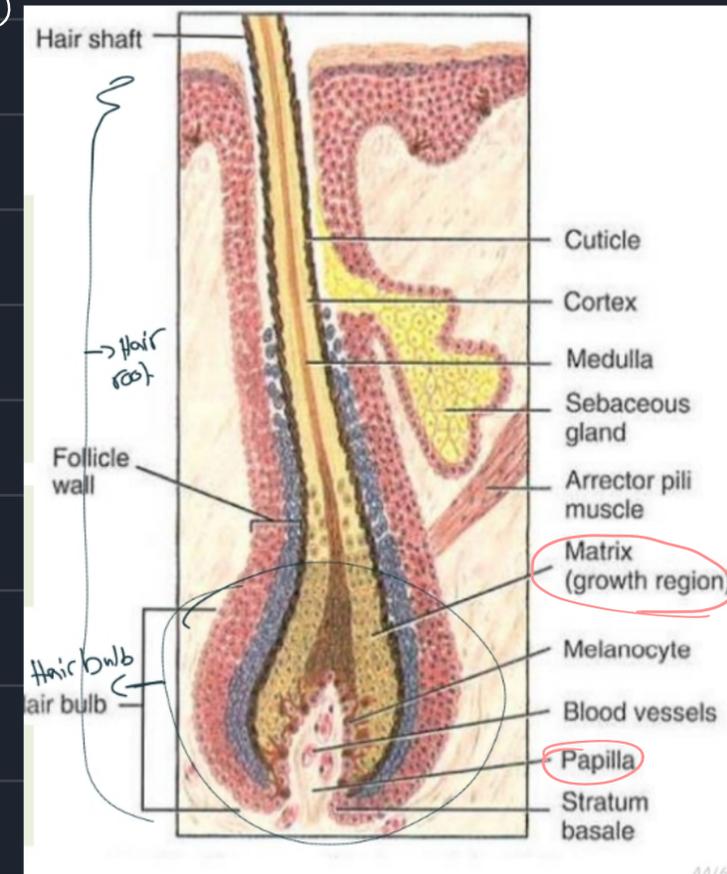
**outer root sheath**: continuous with the epidermis (stratum basale + stratum spinosum).

1- hair follicles and hair:

2- does not involved in hair formation, surrounded by a glassy basement membrane.

**hair matrix**: 1- contain the proliferating cells that generate hair and internal root sheath.

2- found above the dermal papilla, melanocytes found in it which produce hair color.



type of hair:

→ 1- lanugo hair: fetal hair.

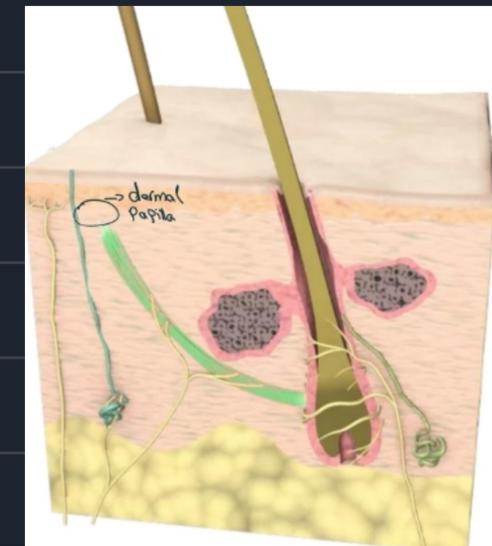
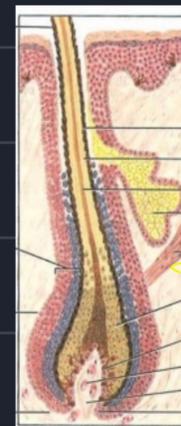
→ 2- down hair: hair of child.

→ 3- terminal hair: adult hair which is thicker, darker and start to grow in puberty.

**arrector pili muscles**: 1- small muscle extend from hair follicles to the dermal papilla.

2- contraction of these muscles cause hair to stand up (goose bumps).

3- innervated by the autonomic nervous system (sympathetic).

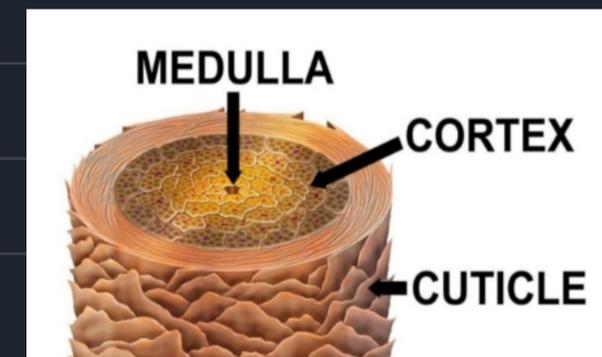


structure of the hair shaft:

→ 1- medulla: moderately keratinized cells.

→ Cortex: heavily keratinized cells and dens packed. (accumulation of melanin pigment).

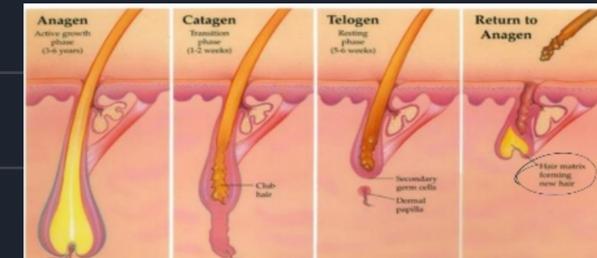
→ Cuticle: heavily keratinized cells, outermost layer.



hair growth cycle:

actr

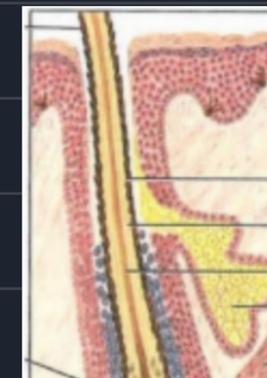
- 1- anagen: active phase, long period: matrix cells undergo mitosis, so more cells are produced to create more and more keratin fibers.
- 2- Catagen: transitional phase, short period: dermal papilla start to disintegrate from hair bulb in this phase.
- Telogen: resting phase: shedding of hair.
- return to anagen: formation of new hair from hair matrix.



2- Sebaceous glands: 1- secrete **sebum**: oily, waxy matter lubricate and waterproof the skin and hair.

2- sebum is secreted by holocrine mode of secretion (the whole cell will be secreted).

3- secretion is stimulated by hormones.



sebaceous gland

Comedo (black head): clogged (closed) hair follicle in the skin by keratin and oil.

Comedo



3- sweat glands:

→ 1- **eccrine sweat gland**: 1- merocrine secretion.

2- empty directly to the skin surface.

3- found all over the body and mainly palms and soles.

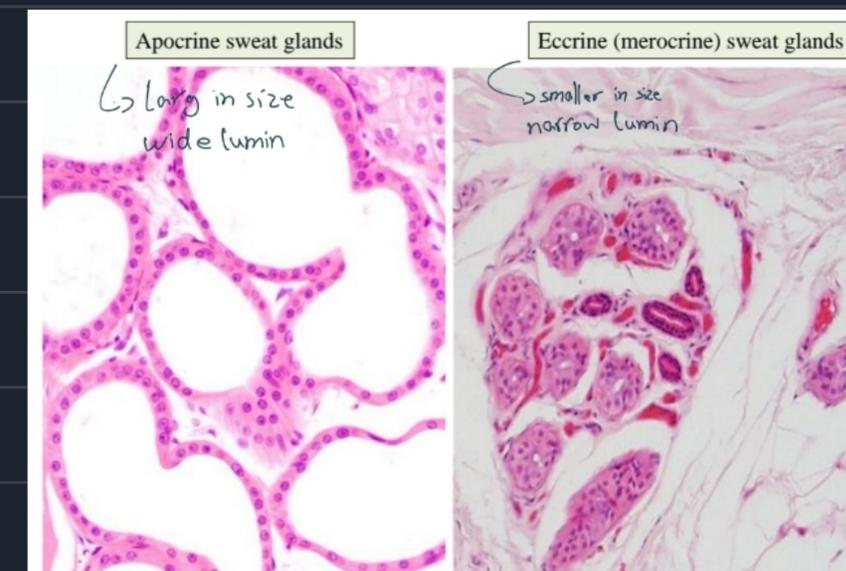
4- clear watery secretion (99%).

→ 2- **apocrine sweat gland**: 1- apocrine secretion.

2- empty into hair follicle.

3- viscous, cloudy secretion which is good nutrient source.

4- secretion begins at puberty.



4- nails : 1- hard plates of Keratin.  
 2- colorless, lack of pigment.

parts of nail:

- > 1- free edge : Part you cut.
- > 2- body : pink part because the nail bed under it.
- > 3- lunula : white semicircle area (moon-like shape).
- > 4- eponychium (cuticle) : proximal nail fold.
- > 5- hyponychium : under the free edge where the dirt accumulates.
- > 6- nail bed : under the pink part (body).
- > 7- nail matrix : growth of the nail.

