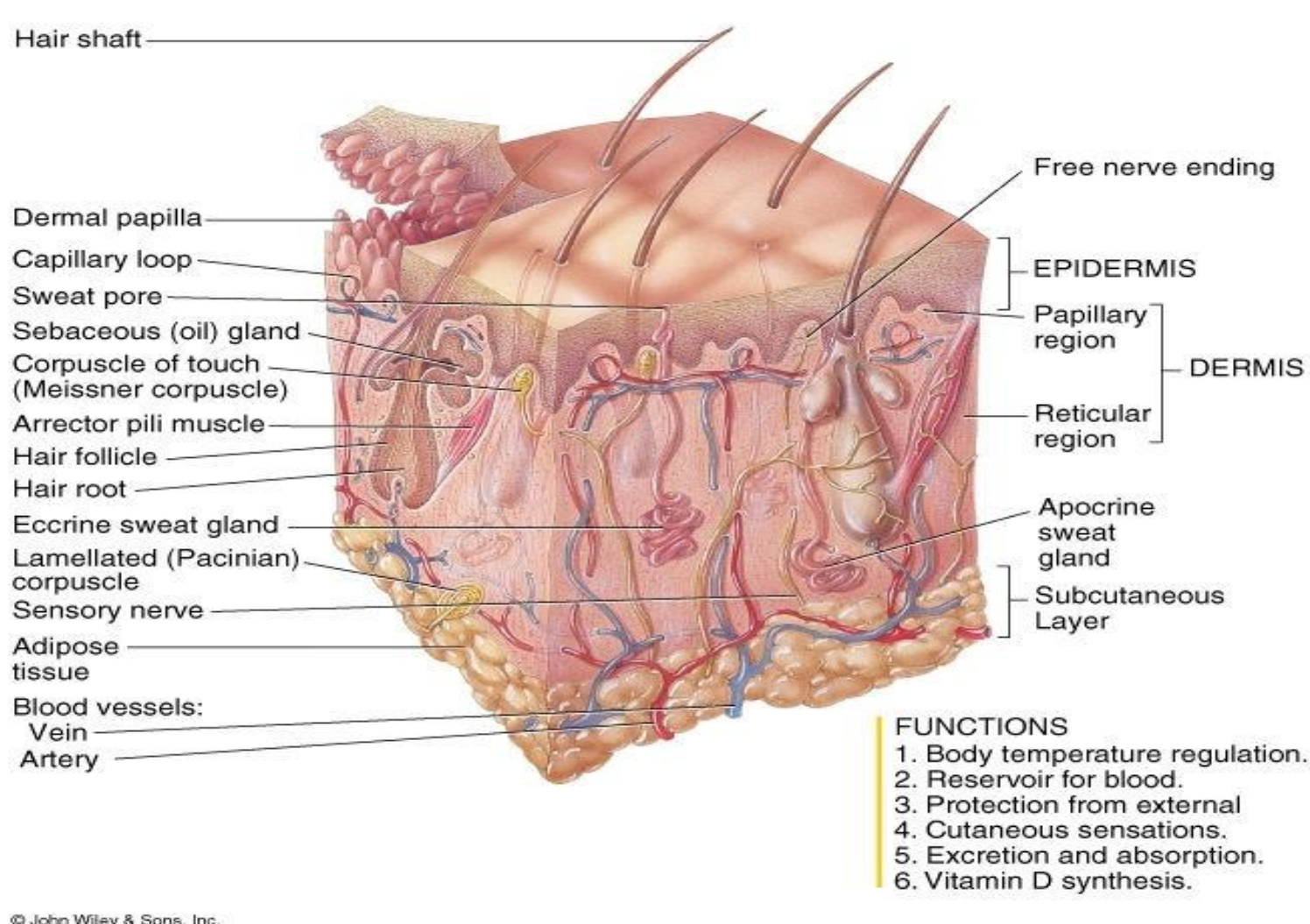


# SKIN

## DEFINITION

- GENERAL COVERING OF THE EXTERNAL
- SURFACE OF THE BODY
- FORMS 15% OF THE TOTAL BODY WEIGHT
- THICKNESS-1.5 to 5.0 mm
- LARGEST ORGAN OF THE BODY

## INTEGUMENTARY SYSTEM



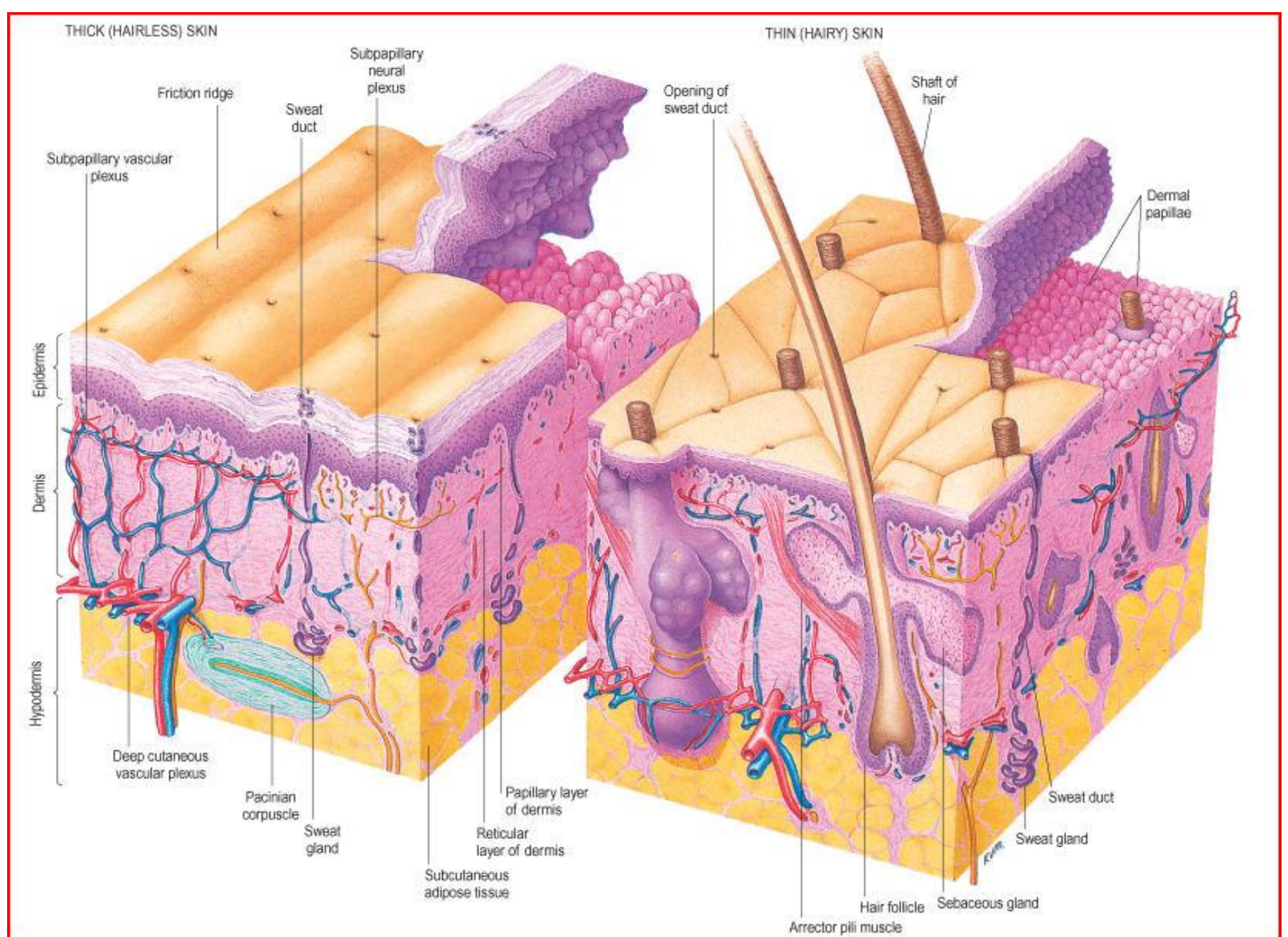
## Some Facts about Skin

- Surface area: 1.5-2.0 sq meters
- Growth rate of nail: 0.1mm per day
- Growth rate of hair: 1.5-2.2 mm per week
- Life span of hair:
  - Eyelashes, axilla- 4 months
  - Scalp – 4 years



# STRUCTURE OF SKIN

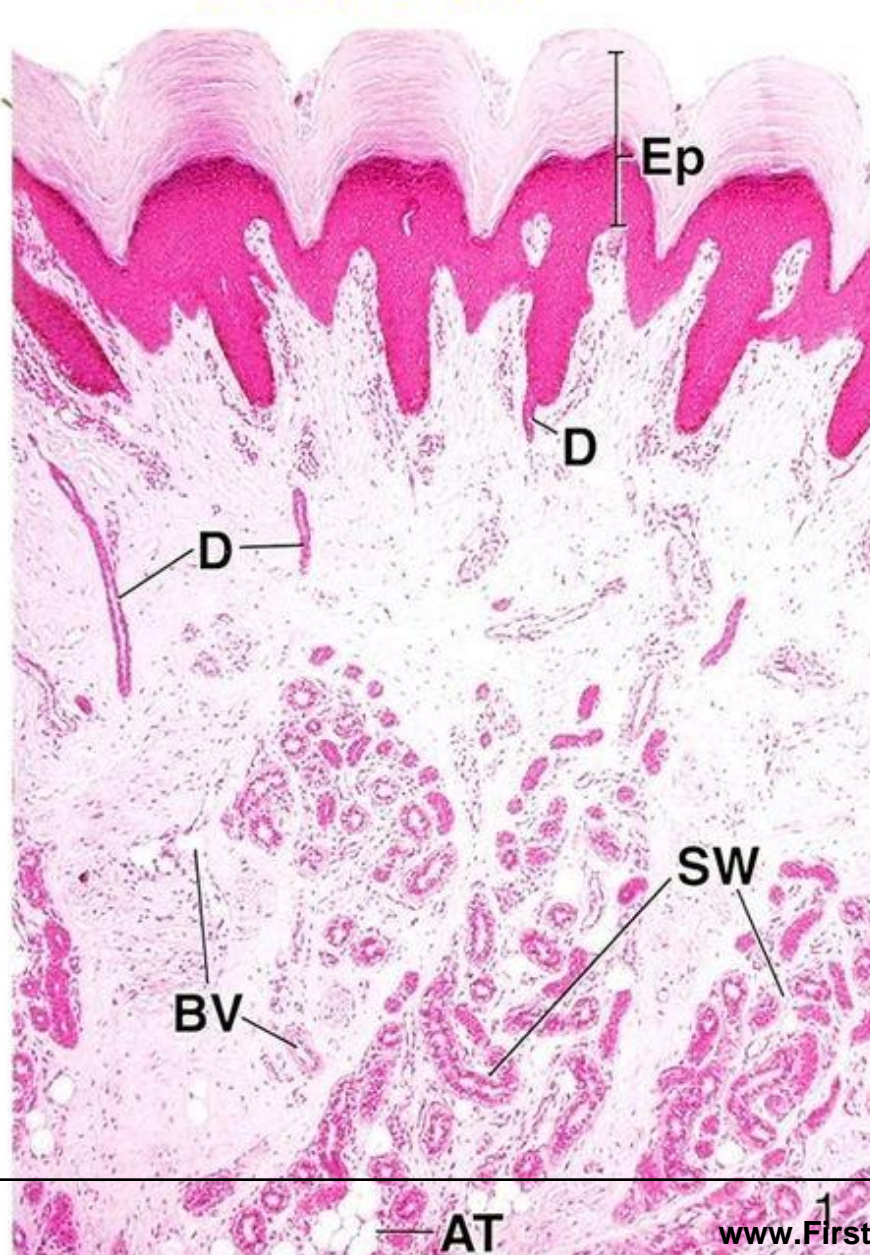
- TWO DISTINCT LAYERS
  - \* EPIDERMIS
  - \* DERMIS
- EPIDERMIS : SUPERFICIAL AND AVASCULAR
- DERMIS : DEEP AND VASCULAR



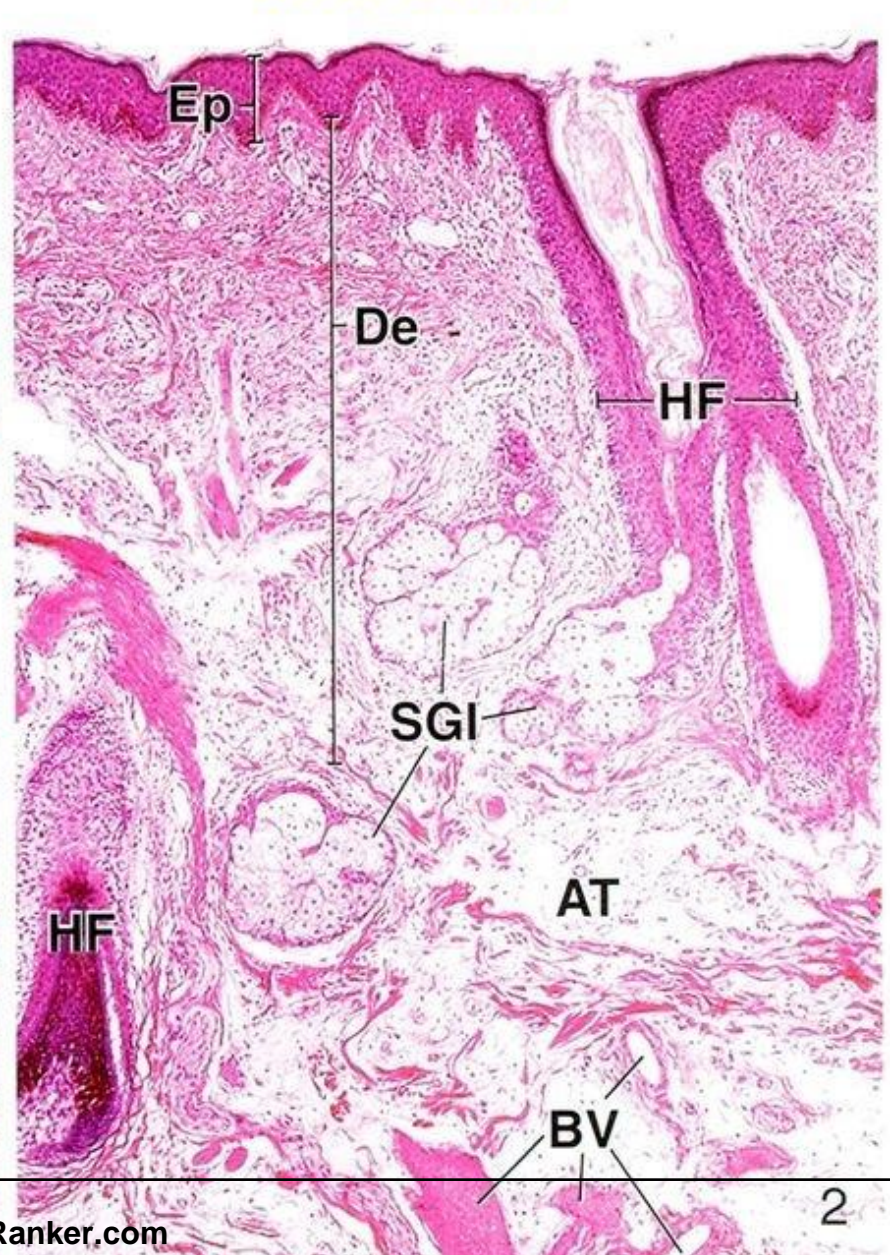
# TYPES OF SKIN

- THICK SKIN - EPIDERMIS VERY THICK  
USUALLY HAIRLESS ON  
PALMS OF HAND & SOLES  
OF FEET
- THIN SKIN – COVERS GREATER PART OF  
BODY & IS USUALLY HAIRY
- EXCEPTION – SCALP : THICK AND HAIRY

**thick skin**



**thin skin**





# Layers Of Skin

## Epidermis:

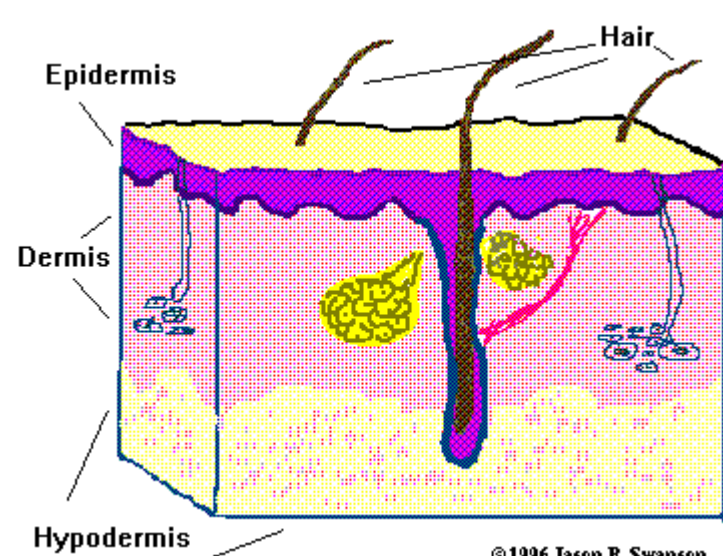
- Composed of keratinized stratified squamous epithelium.

## Dermis:

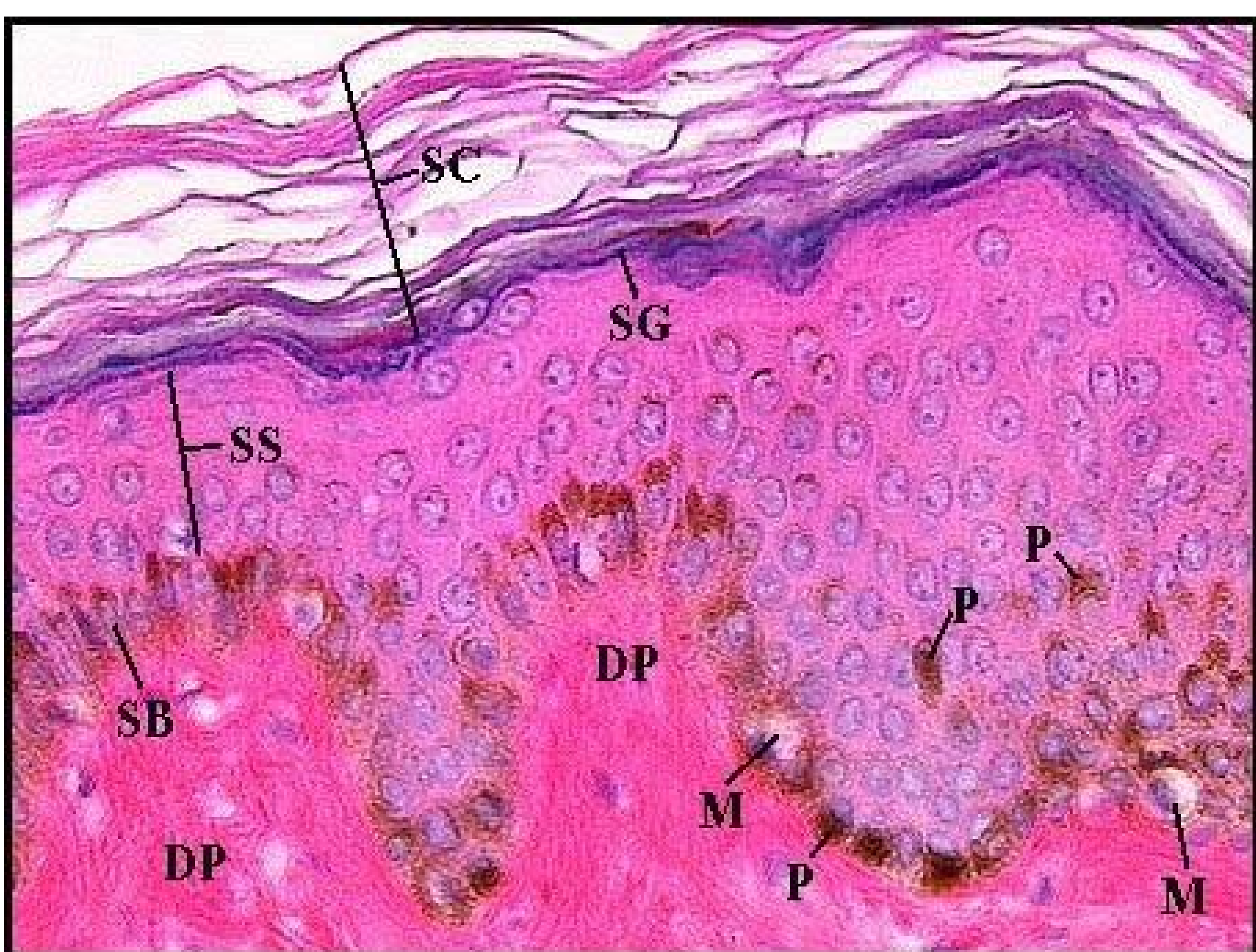
- Papillary region composed of loose connective tissue.
- Reticular region composed of dense irregular connective tissue.

## Hypodermis:

- Composed of areolar tissue with abundant adipocytes

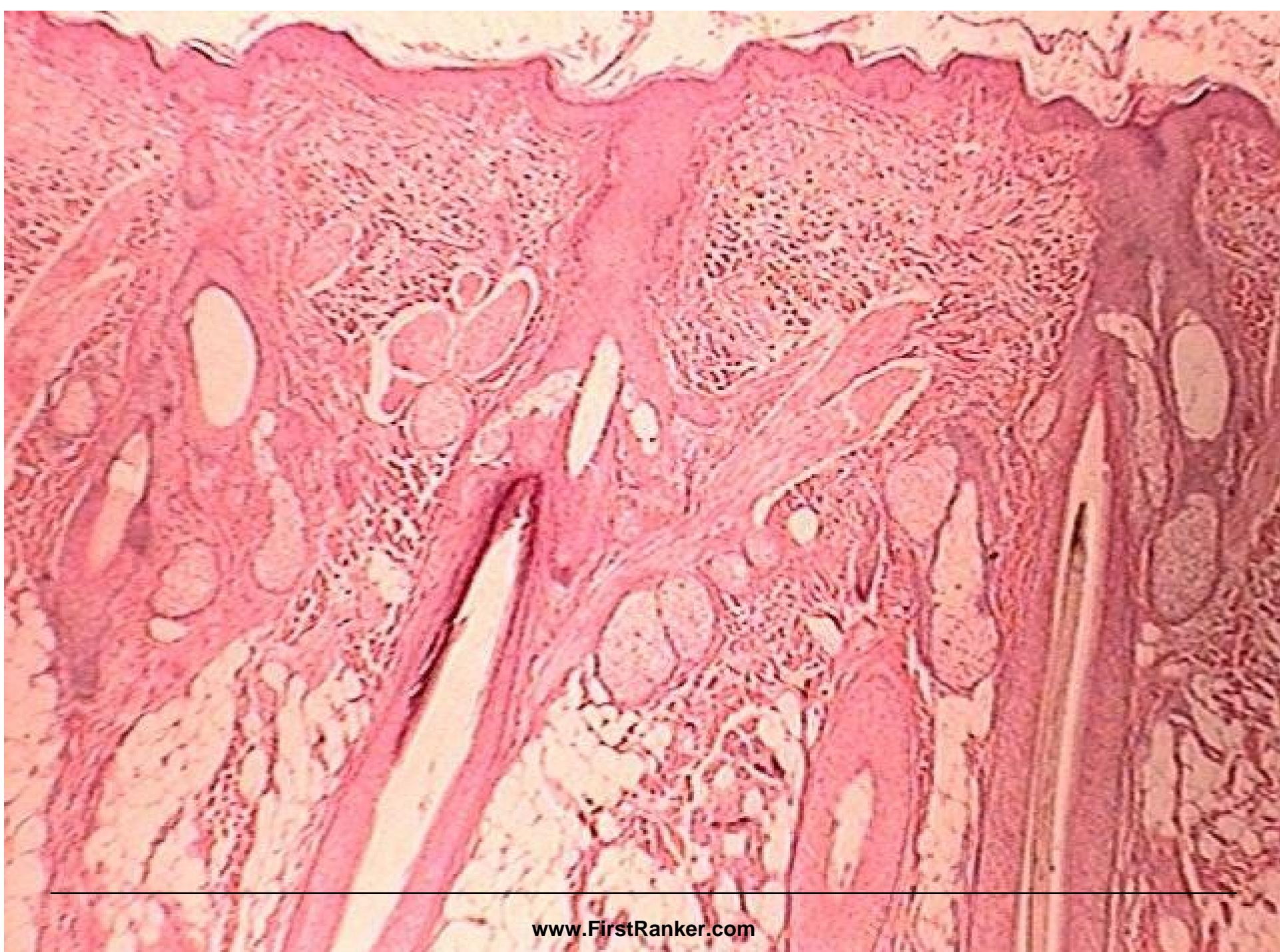


©1996 Jason R. Swanson



## Cells

- Keratinocytes
- Melanocytes-pigment forming cells from neural crest cells
- Merkel cells-sensory mechanoreceptors
- Langerhans cells-antigen presenting cells from bone marrow
- Free nerve endings





## LAYERS OF THE EPIDERMIS

### Stratum Basale (Germinal/ Malpighian layer):

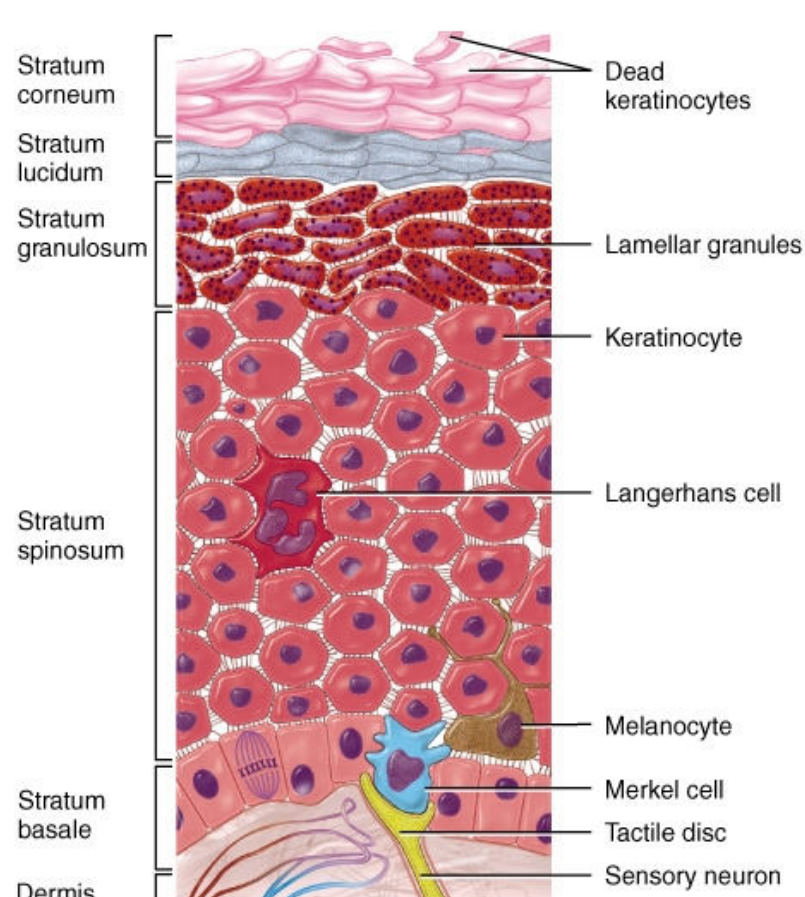
- Single layer of cuboidal cells resting on basement membrane.
- High mitotic activity.

### Stratum Spinosum:

- Several layers of polygonal cells.
- Cells are held together by desmosomes.

### Stratum Granulosum:

- 3-5 layers of flattened polygonal cells.
- Cells contain keratohyaline granules.



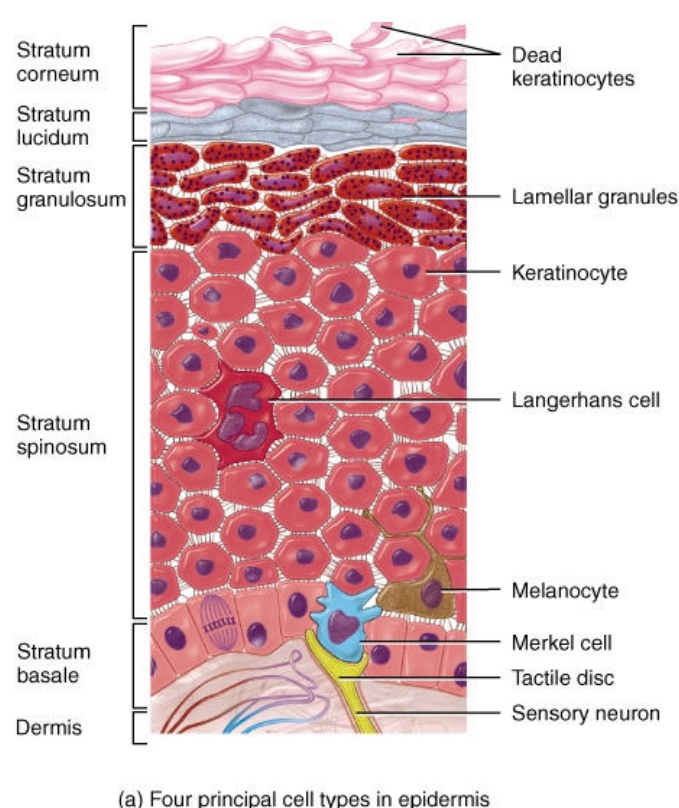
contd....

### Stratum Lucidum:

- Seen only in non-hairy or thick skin.
- Cells are flattened, translucent, eosinophilic with indistinct boundaries & nucleus.
- Contains a product of keratohyaline i.e. eleidin.

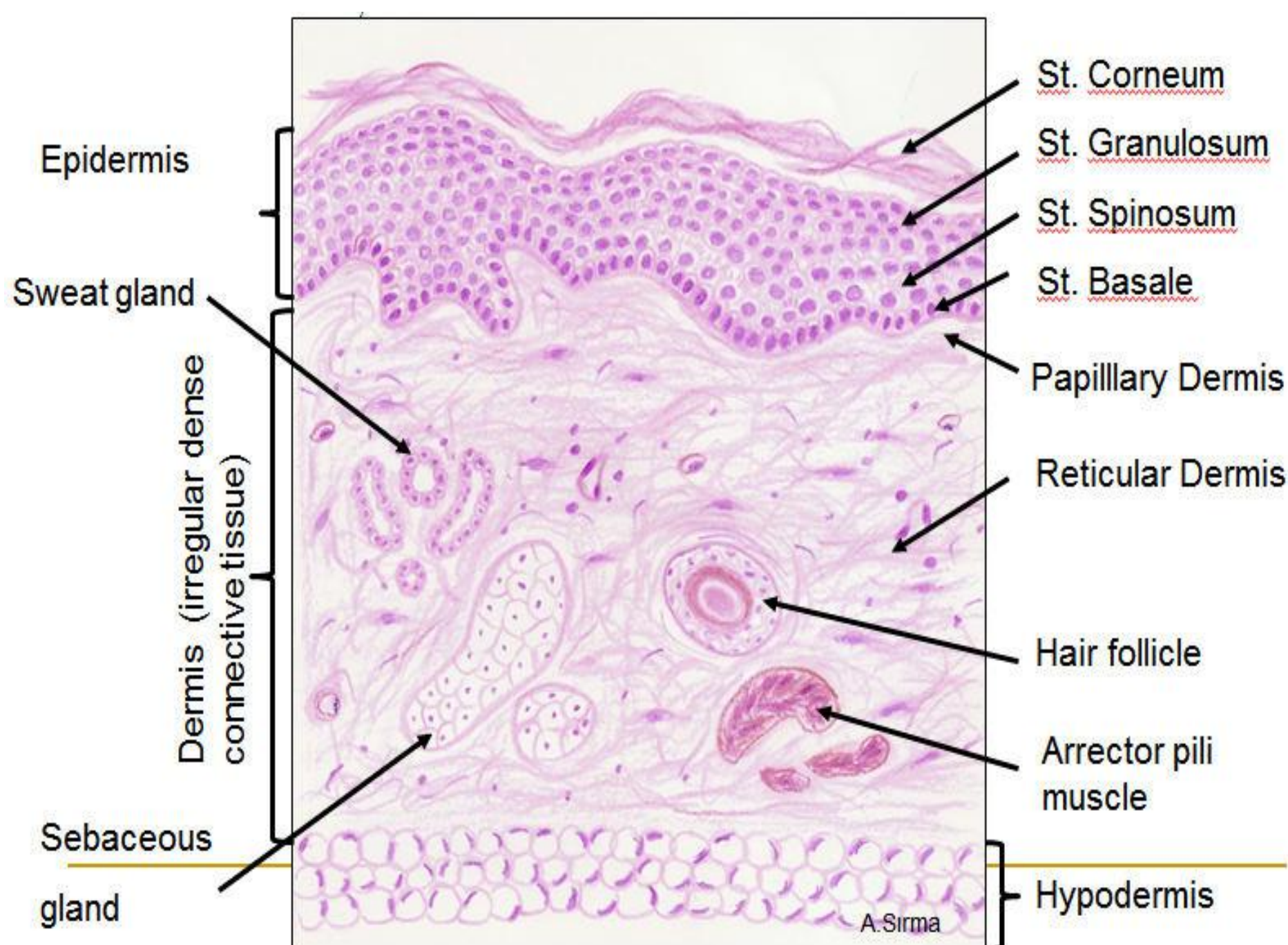
### Stratum Corneum:

- Composed of structureless dehydrated dead cells.
- Flattened & scale-like.
- Filled with keratin.
- Superficial layer is continuously sloughed off.



(a) Four principal cell types in epidermis

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Stratum Basale





Stratum Spinosum

This histological section shows the stratum spinosum, a layer of the epidermis characterized by its thick, wavy appearance. It is composed of several layers of polygonal cells connected by desmosomes, giving it a "spiny" texture. The layer is situated above the stratum granulosum and below the stratum corneum. A double-headed vertical arrow indicates the thickness of this layer.



Stratum Granulosum

This histological section shows the stratum granulosum, a thin layer of the epidermis located just above the stratum corneum. It is characterized by a dense layer of cells containing dark, granular keratohyalin granules. A double-headed vertical arrow indicates the thickness of this layer.



Stratum Lucidum

This histological section shows the stratum lucidum, a thin, translucent layer of the epidermis located between the stratum granulosum and the stratum corneum. It is composed of a dense layer of cells and is characterized by its wavy, undulating appearance. A double-headed vertical arrow indicates the thickness of this layer.

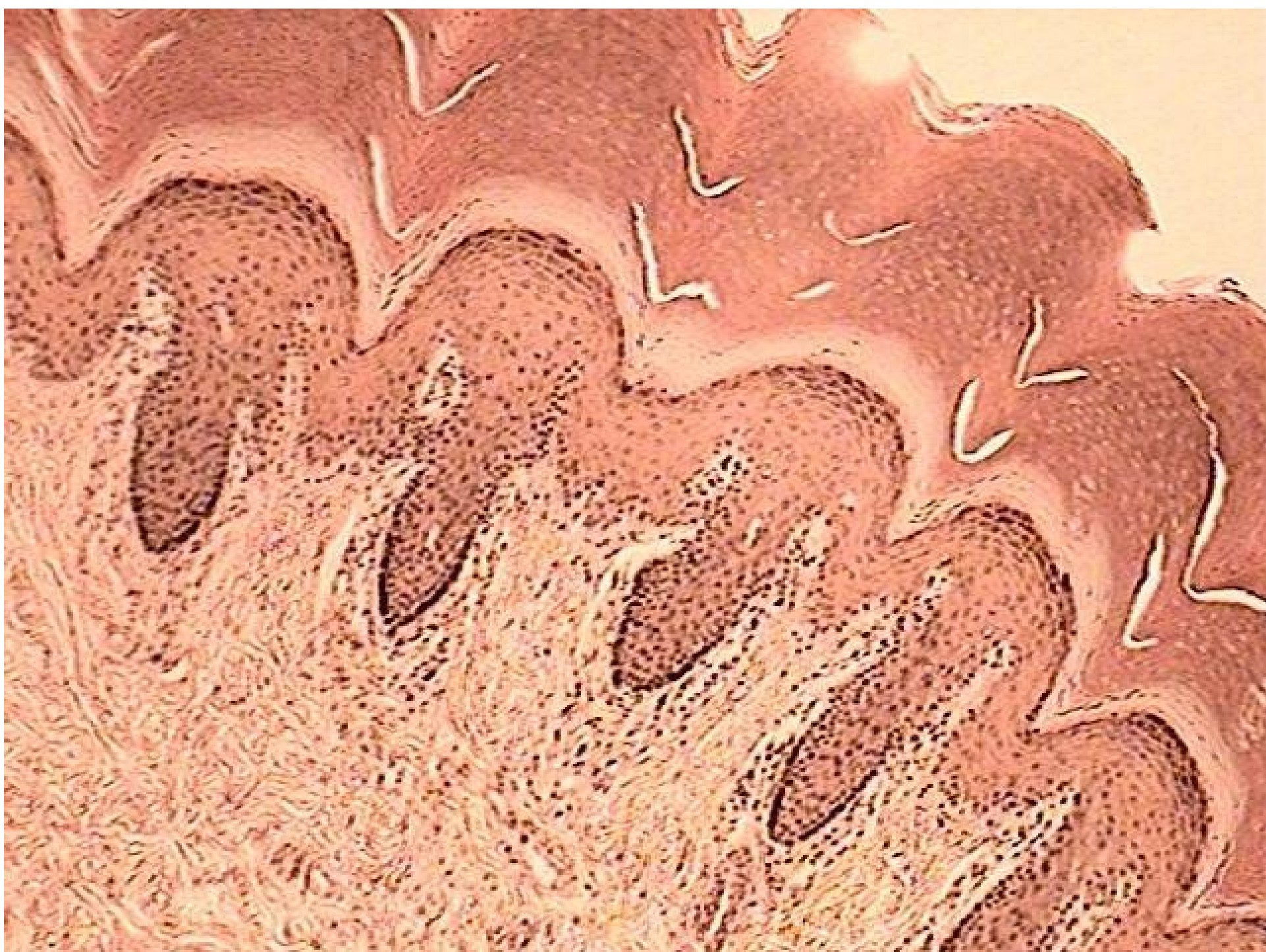


Stratum Corneum

This histological section shows the stratum corneum, the thickest layer of the epidermis. It is composed of many layers of dead, flattened cells that are highly keratinized, giving it a wavy, undulating appearance. A double-headed vertical arrow indicates the thickness of this layer.

[www.FirstRanker.com](http://www.FirstRanker.com)





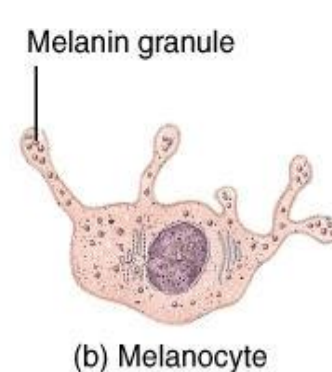
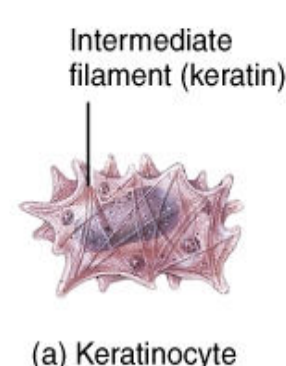
## SPECIALIZED CELLS OF THE EPIDERMIS

### Keratinocytes:

- Most common cells of the epidermis.
- Provides protection and waterproofing sealant.

### Melanocytes:

- Rounded cells with dendrite-like branches.
- Present in Stratum basale.
- Produces melanin pigment responsible for the colour of skin.
- Melanin is a brown/black pigment that absorbs UV-light.



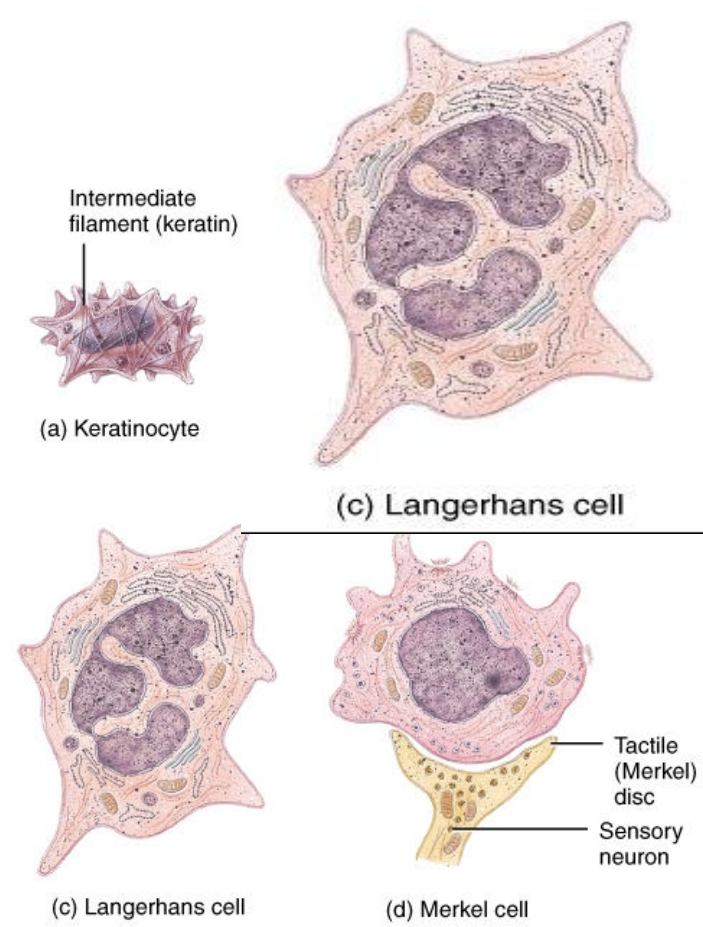
## SPECIALIZED CELLS OF THE EPIDERMIS

### Langerhans Cells (antigen presenting cells):

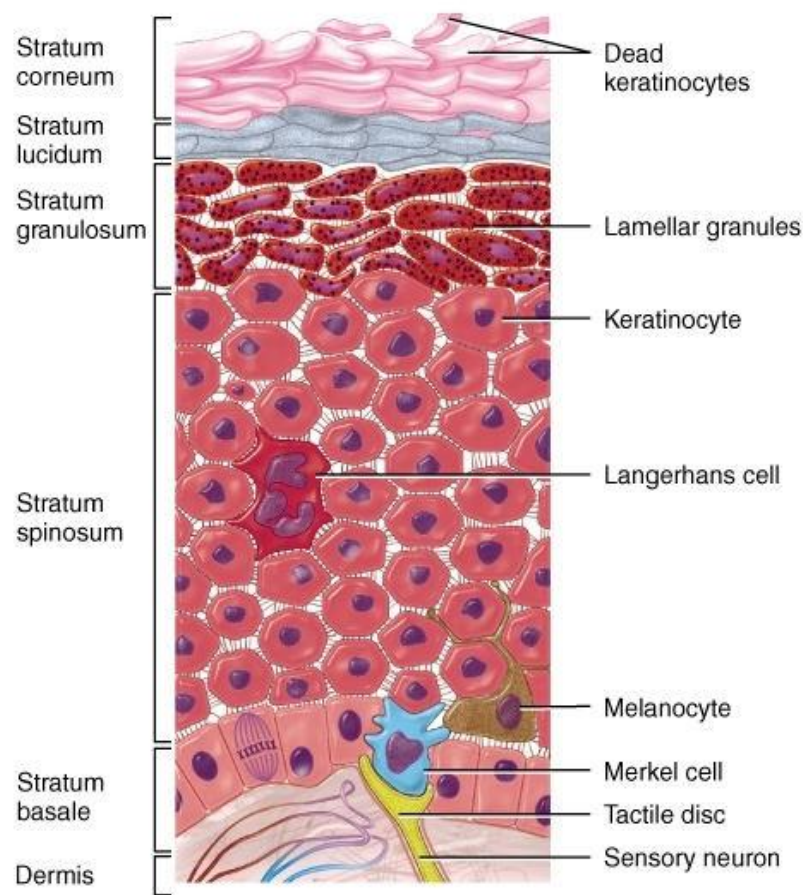
- Non-pigmented granular dendrocytes.
- Present in Stratum spinosum.
- Nucleus is indented at many places & cytoplasm contains rod-shaped granules.
- They participate in immune responses against bacteria and viruses.

### Merkel Cells:

- Found in Stratum basale.
- Sensory cells innervated by sensory nerves.
- Abundant in fingertips, oral mucosa & hair follicles.
- Function as mechanoreceptors.

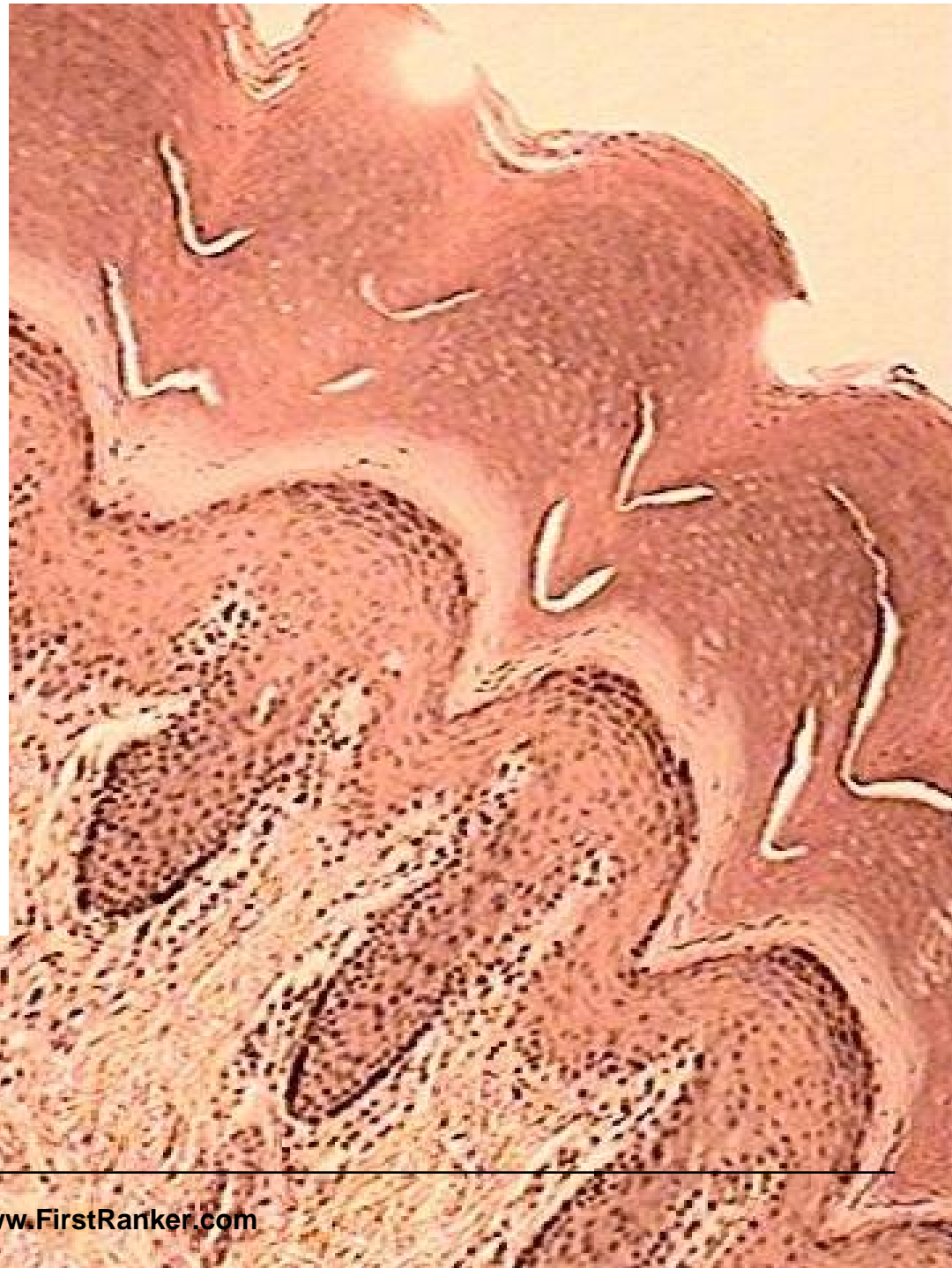


Adapted from Ira Telford and Charles Bridgman, Introduction to Functional Histology, Second Edition, p. 84, p. 261, p. 262 (New York: HarperCollins, 1995), ©1995 HarperCollins College Publishers. By permission of Addison Wesley Longman. © John Wiley & Sons, Inc.



(a) Four principal cell types in epidermis

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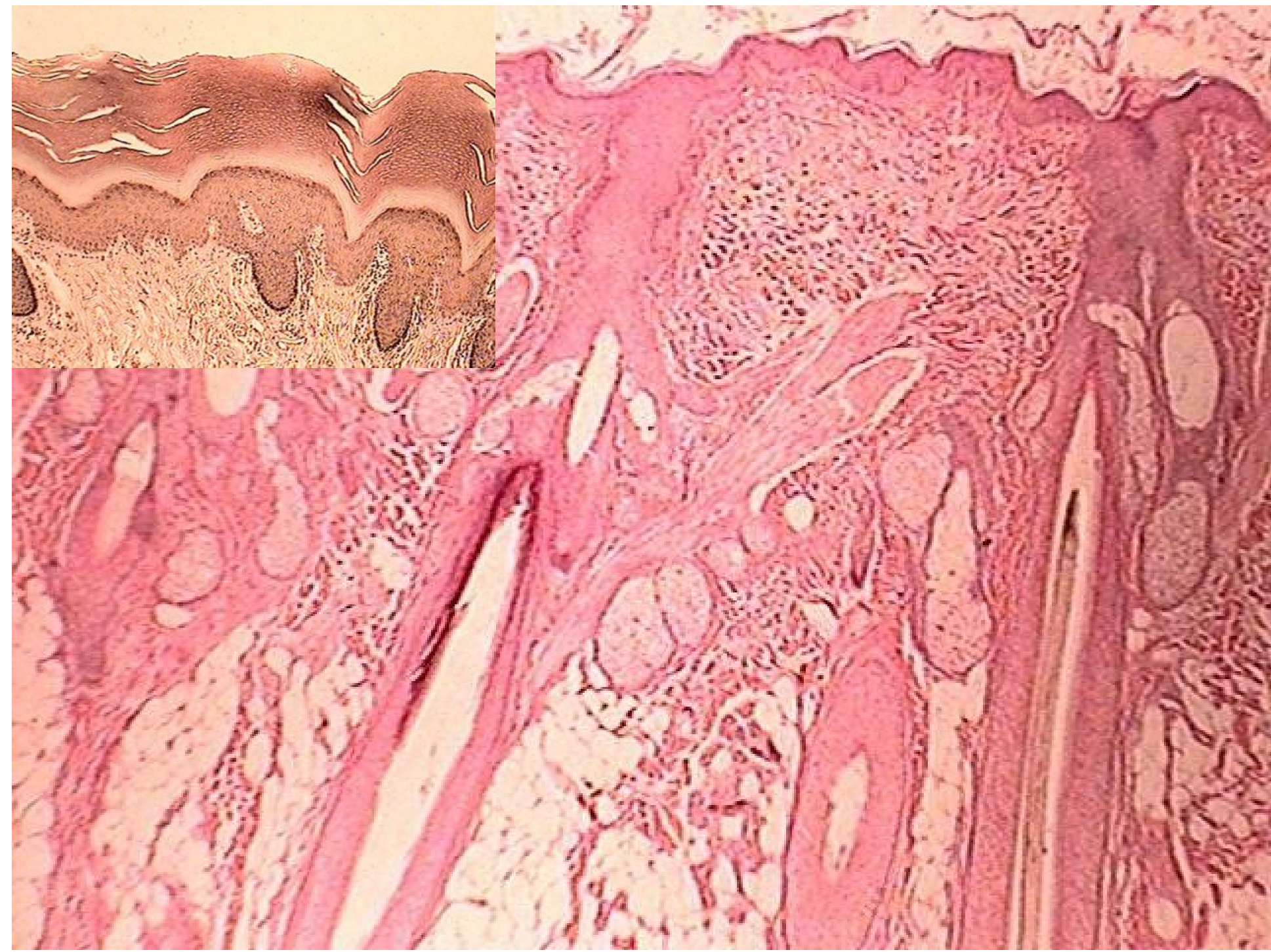
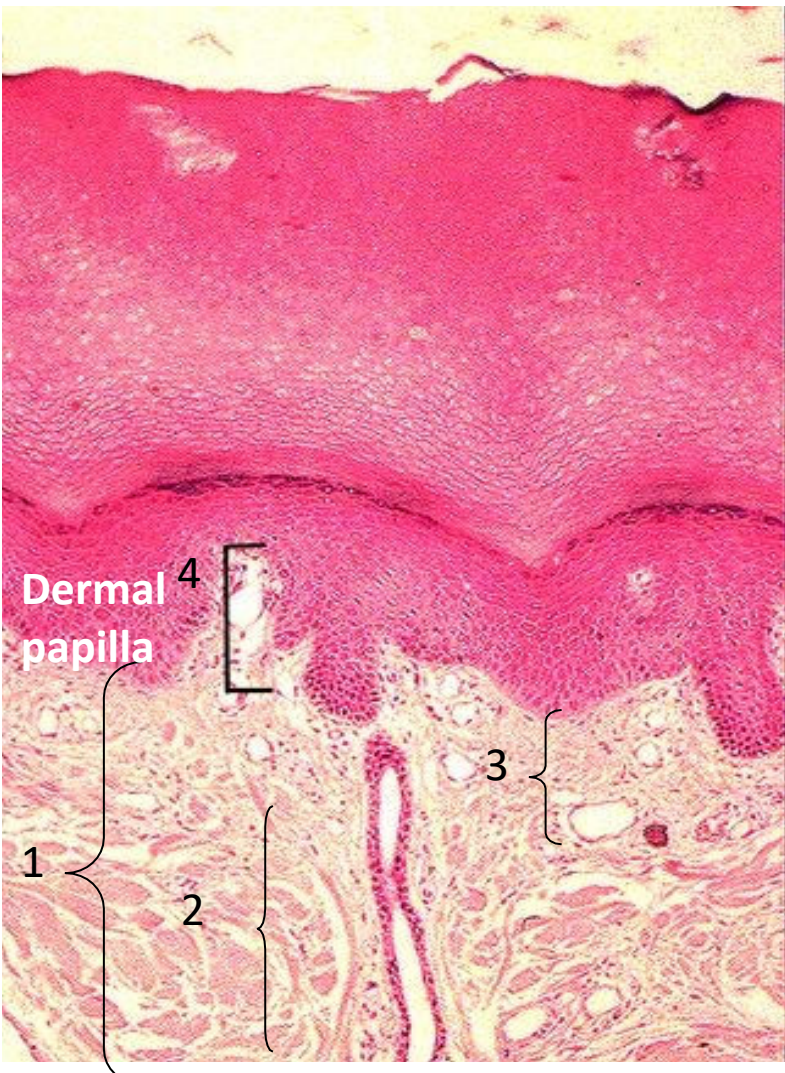
## PIGMENTATION OF SKIN

The colour of skin depends upon following factors:

- **Carotene:** yellow-orange pigment (precursor of vitamin A) found in stratum corneum & dermis.
- **Melanin:** produced in epidermis by melanocytes gives black colour to the skin.
- **Hemoglobin** (in blood vessels of dermis): gives pink colour to the skin.

## LAYERS OF THE DERMIS

- **Papillary layer:**
  - Narrow band of loose connective tissue.
  - In contact with basement membrane of stratum basale.
  - Dermal papillae** (finger- like processes)
  - provide mechanical anchorage and supply nerves and blood vessels
- **Reticular layer:**
  - Dense irregular connective tissue.
  - Thick elastic fibres.
  - may be involved in development of skin lines



## TYPES OF SKIN

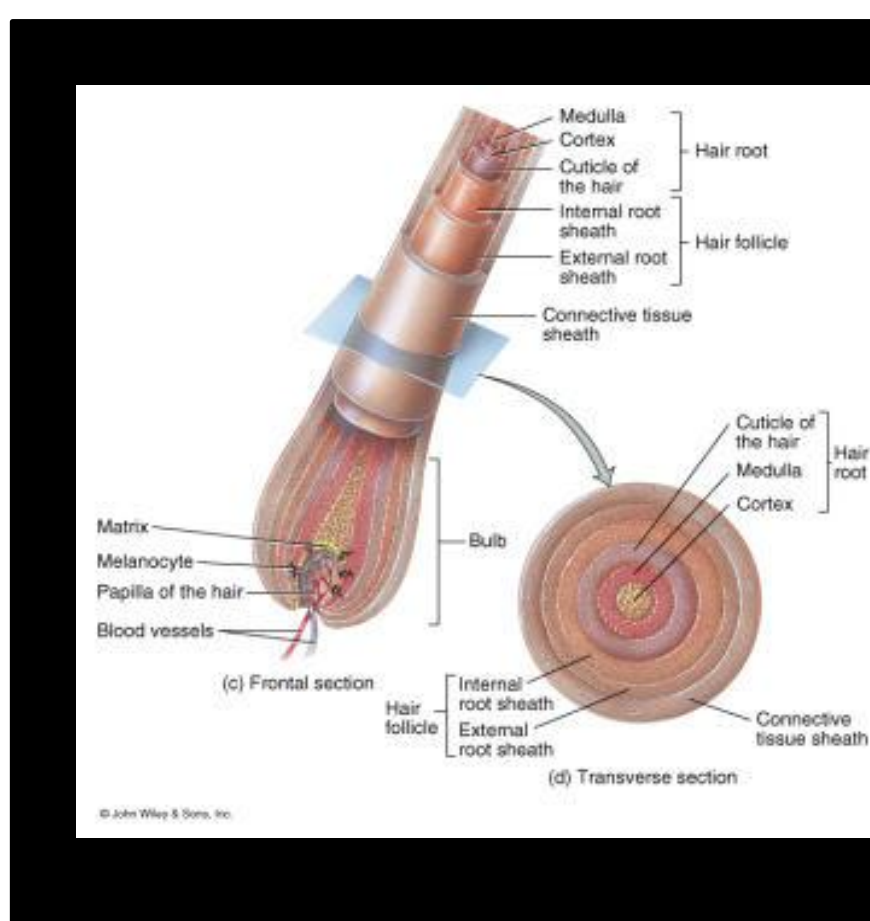
	Thin Skin	Thick Skin
<b>Layers of epidermis</b>	St. corneum & spinosum are thin while <b>lucidum is absent.</b>	St. corneum & spinosum are thick while <b>lucidum is present.</b>
<b>Thickness of epidermis</b>	0.10-0.15 mm	0.6-4.5 mm
<b>Epidermal ridges</b>	Absent	Present (well developed dermal papillae)
<b>Hair follicles, arrector pili muscle &amp; sebaceous gland</b>	Present	Absent
<b>Sweat glands</b>	Few	Many
<b>Sensory receptors</b>	Less	More
<b>Distribution</b>	Covers all parts of body except palms & soles	Present in palms, palmar surface of digits & soles



# APPENDAGES OF THE SKIN

## HAIRS:

- Keratinized filaments derived from invagination of the basal layer of epidermis into the dermis.
- **Parts-**
  - a) Root: enclosed by hair follicle.
  - b) Shaft: projects above the surface.
- **Hair follicle:** tubular invagination, partly epidermal and partly dermal in origin.



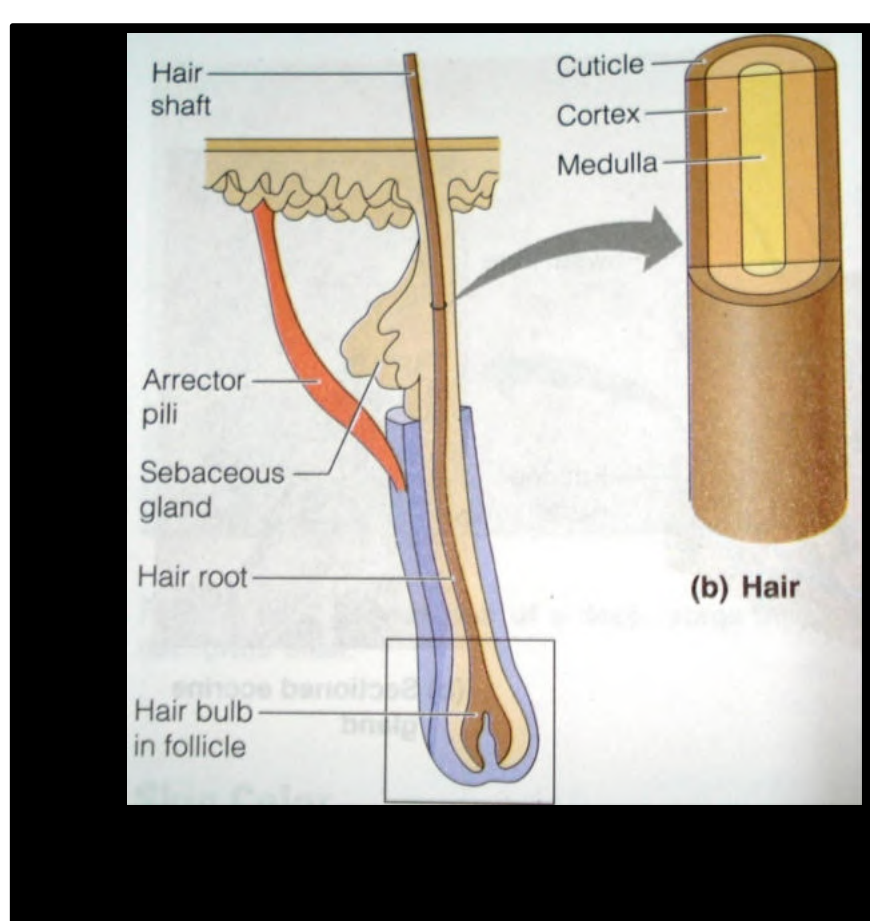
## contd.....

### Structure of shaft and root:

- **Medulla**
- **Cortex**
- **Cuticle**

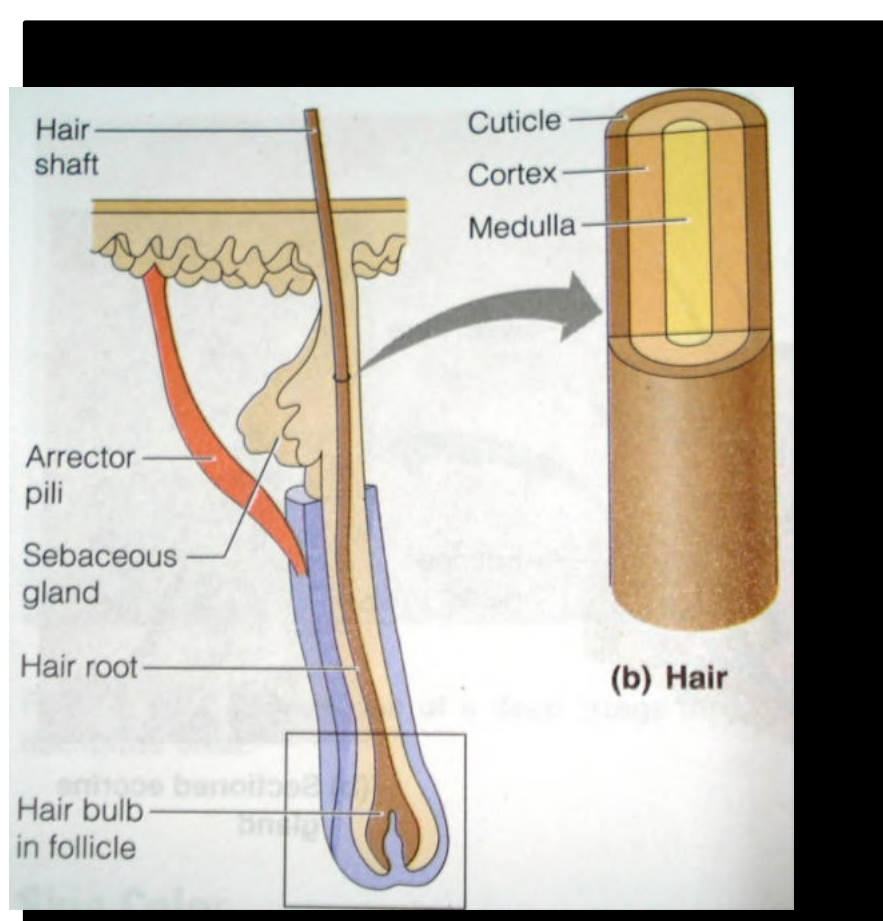
### Hair follicle:

- Tubular invagination of epidermis & dermis in which hair root resides.
- Layers: 3 (inner root sheath, outer root sheath, connective tissue sheath).



## contd.....

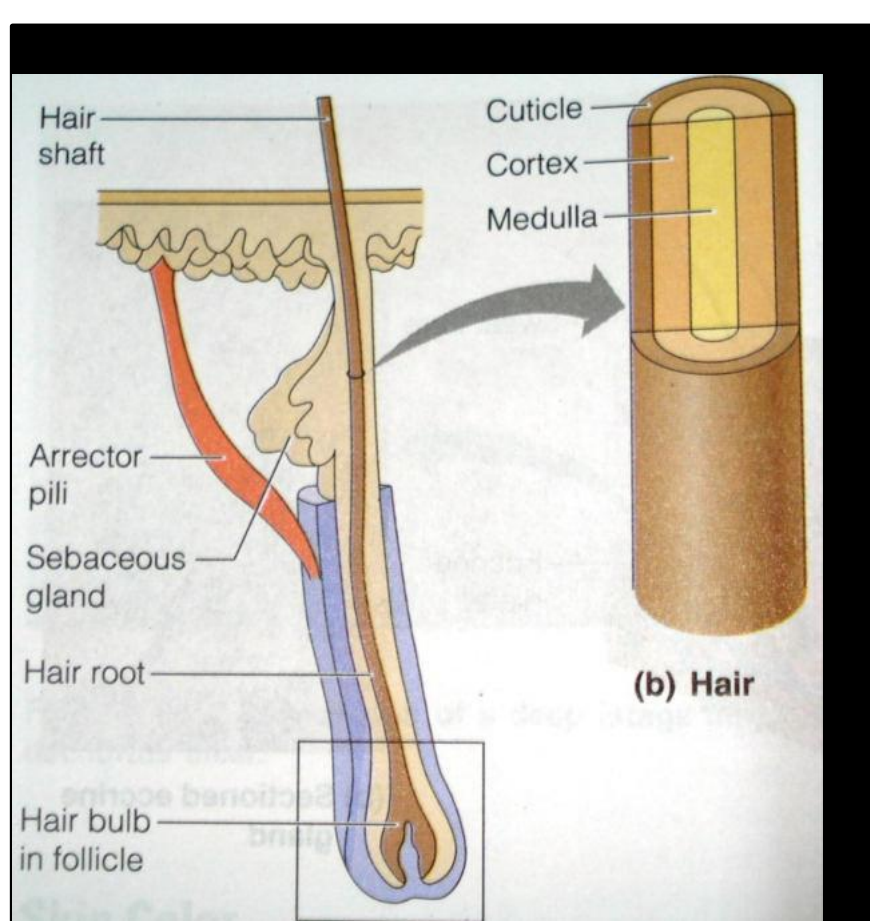
- **Hair bulb:** lower expanded end of hair follicle.
- **Hair papilla:** the indentation at the base of hair bulb by part of the dermis.



## contd.....

### Arrector Pili Muscle:

- Smooth muscle innervated by sympathetic nerves.
- Extends from papillary layer of dermis to the connective tissue sheath of a hair follicle.
- Contraction of muscle presses the sebaceous gland which squeezes out sebum.
- Formation of "goose flesh".

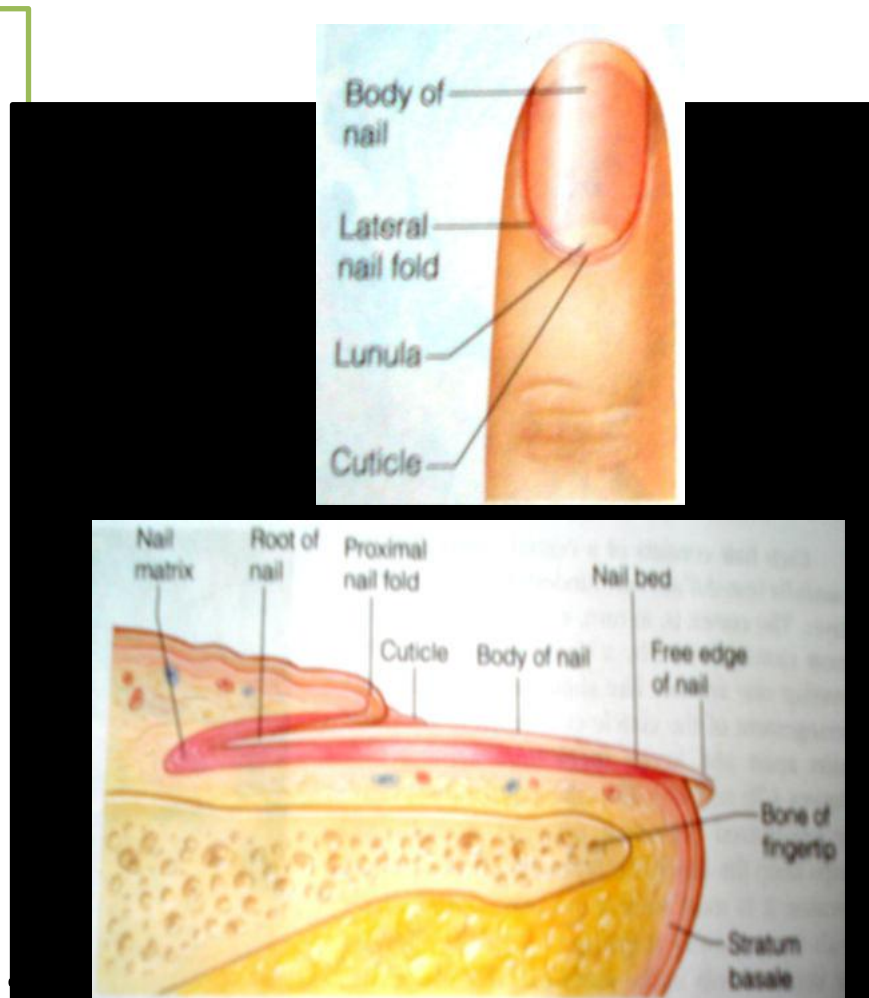




## APPENDAGES OF THE SKIN

### NAILS:

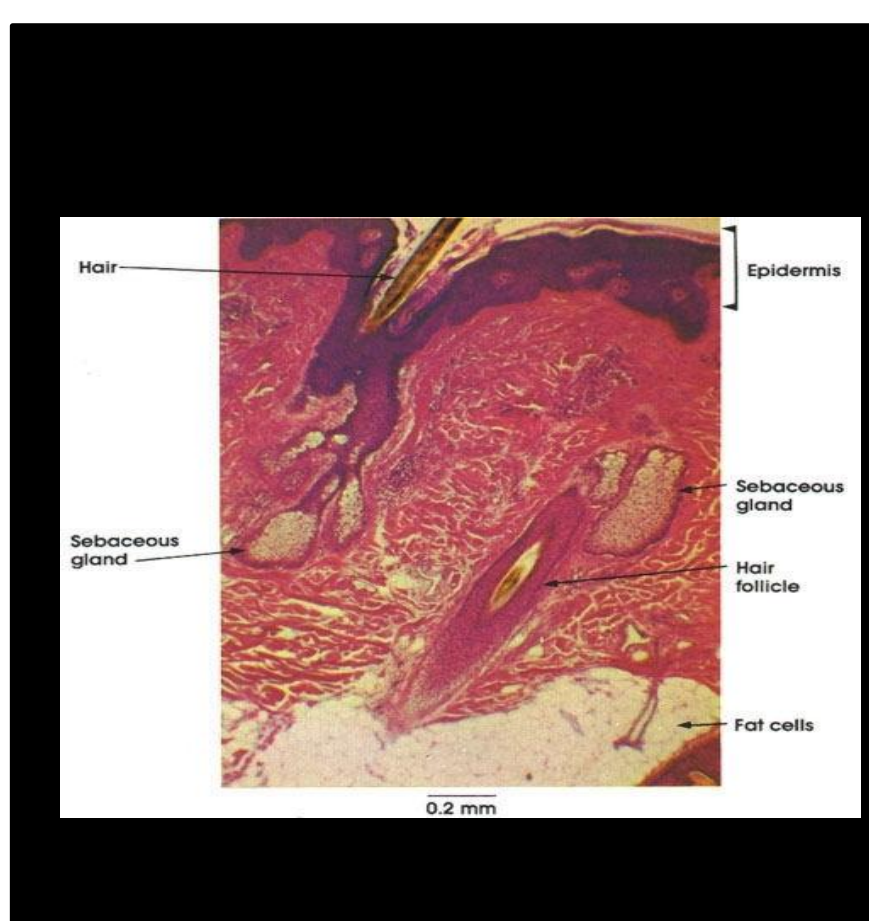
- Hardened keratin plates on the dorsal surface of the tips of fingers & toes.
- Parts:
  - a) Root
  - b) Free border
  - c) Body
- **Nail bed:** tissue on which the nail rests. Made up of stratum basale & spinosum.



## APPENDAGES OF THE SKIN

### SEBACEOUS GLANDS:

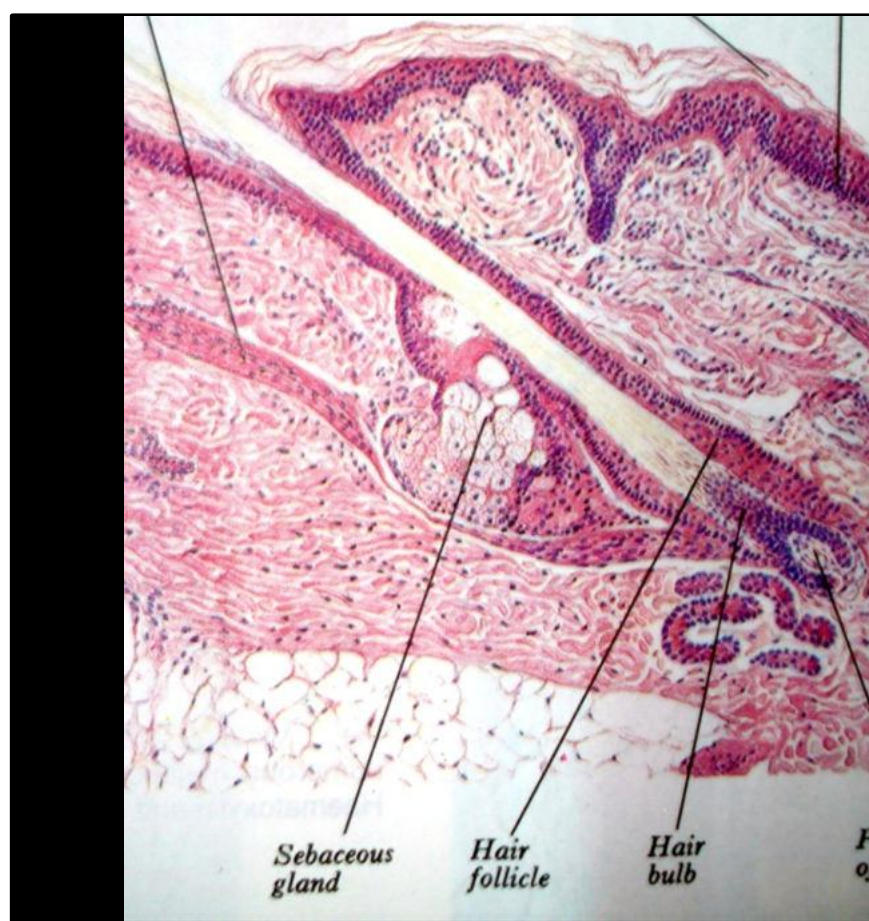
- Distributed all over the dermis of the skin, except for the palms & soles.
- Abundant in the scalp, face, around the apertures of the ear, nose, mouth & anus.



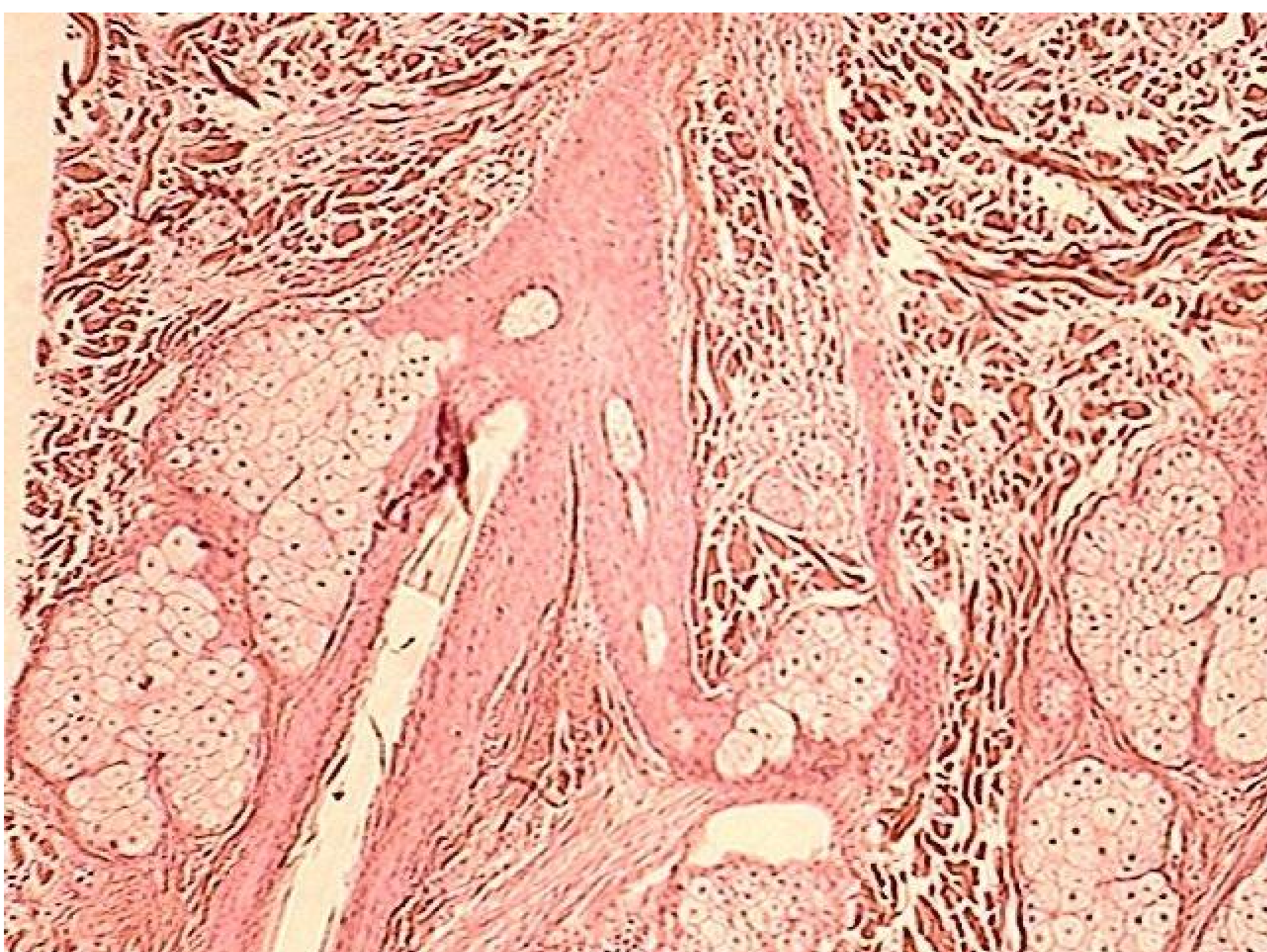
## APPENDAGES OF THE SKIN

### SEBACEOUS GLANDS:

- Holocrine in nature.
- Number of alveoli connected to broad duct that opens into hair follicle.
- Produces an oily secretion called sebum.







## SWEAT GLANDS (SUDORIFEROUS GLANDS)

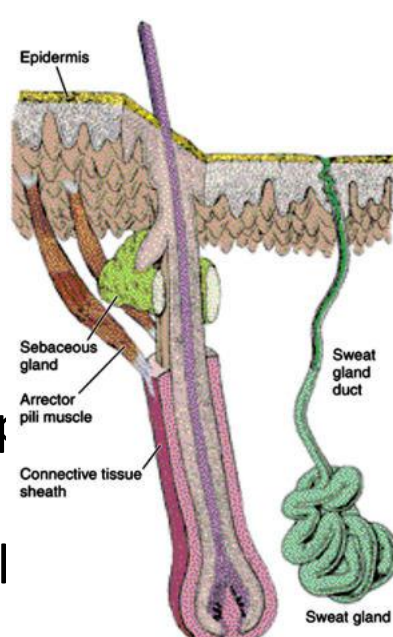
- Absent from lips, glans & nail bed.
- Mode of secretion: merocrine
- Simple tubular gland
- 2 parts:
  - (a) Secretory portion
  - (b) Excretory duct

### Secretory portion:

- Twisted coil like structure with simple cuboidal epithelium.
- 3 types of cells: clear cells, dark cell myoepithelial cells.

### Excretory duct:

- Long & extends from secretory portion to surface of epidermis.



Relationships between the skin hair follicle, arrector pili muscle, and sebaceous and sweat glands. The arrector pili muscle originates in the connective tissue sheath of the hair follicle and inserts into the papillary layer of the dermis, where it ends.

## contd....

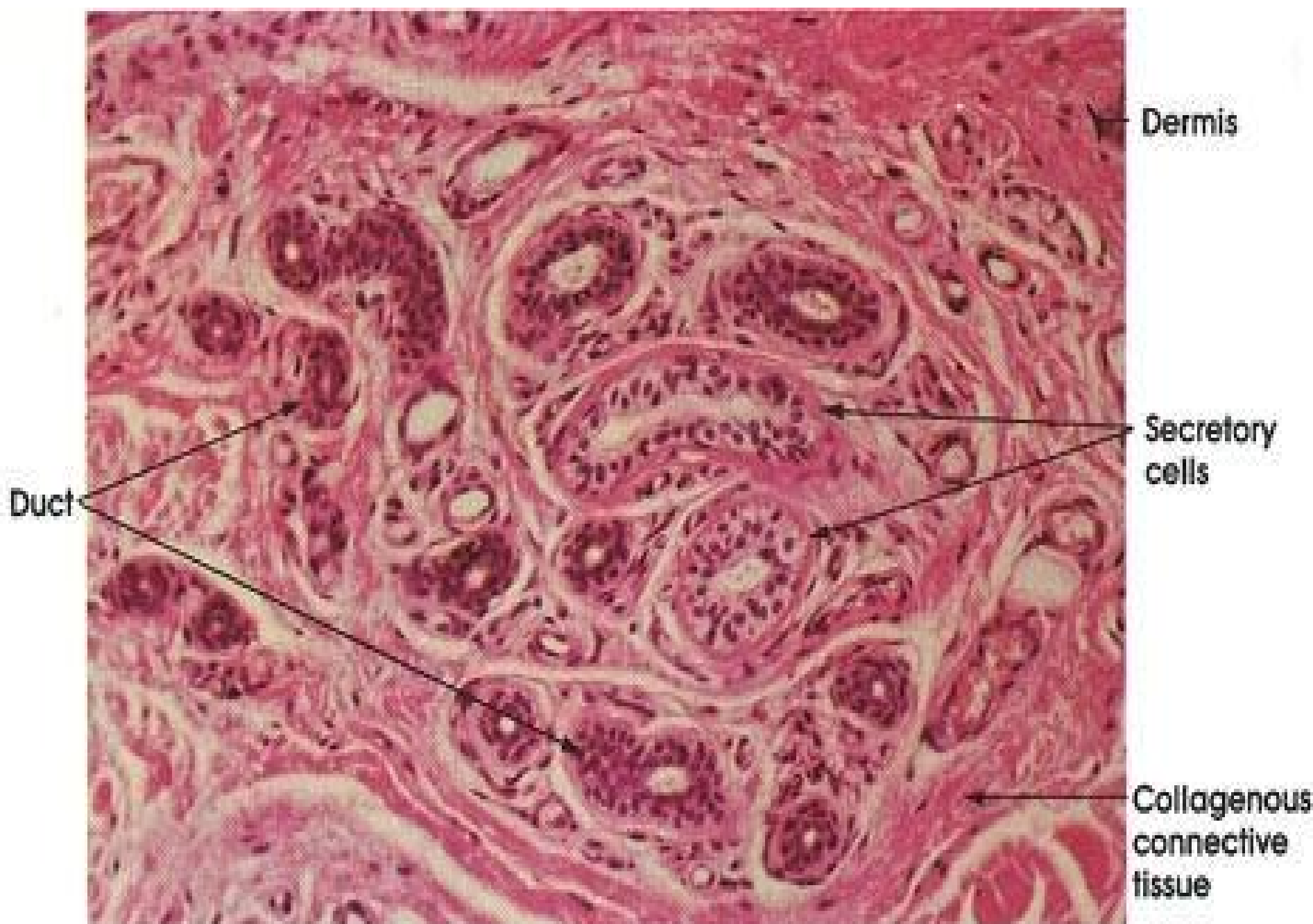
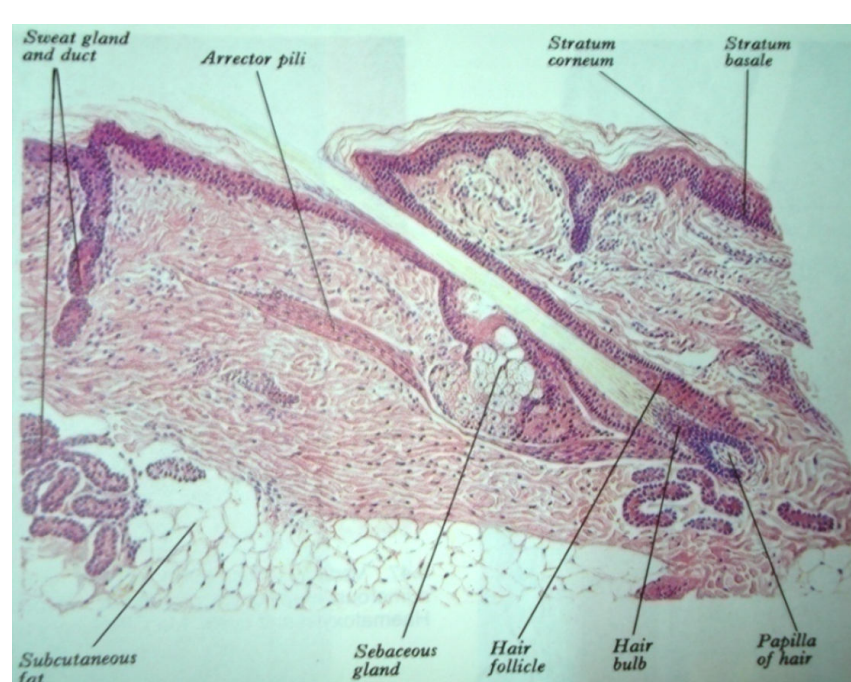
### 2 types:

#### Eccrine:

- Most numerous in the soles & palms.
- Produces thin watery secretion.

#### Apocrine:

- Confined to axilla, eyelids (Moll's glands), nipple & areola of breast, perianal region, and the external genitalia.
- Produces thick odourous secretion.
- Ceruminous glands & lactating mammary glands are modified apocrine sweat glands.





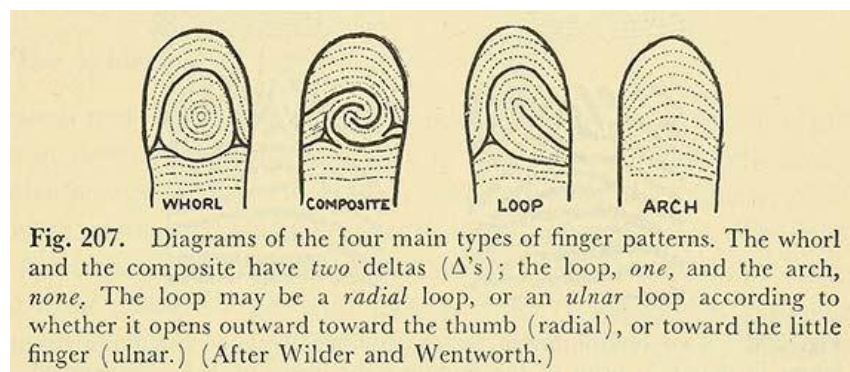
## SURFACE IRREGULARITIES

- **FLEXURE LINES** - Permanent lines along which the skin folds during habitual movements of joints
- **CLEAVAGE LINES** - According to arrangement of fibres in deep fascia, horizontal in trunk, in old age fibres atrophy and skin wrinkles

## PAPILLARY RIDGES

### PAPILLARY RIDGES

- Palms and soles and digits
- Form narrow ridges separated by fine parallel grooves,
- correspond to dermal papillae
- Study is called dermatoglyphics
- Pattern of finger prints- loops , whorls and arches and composite

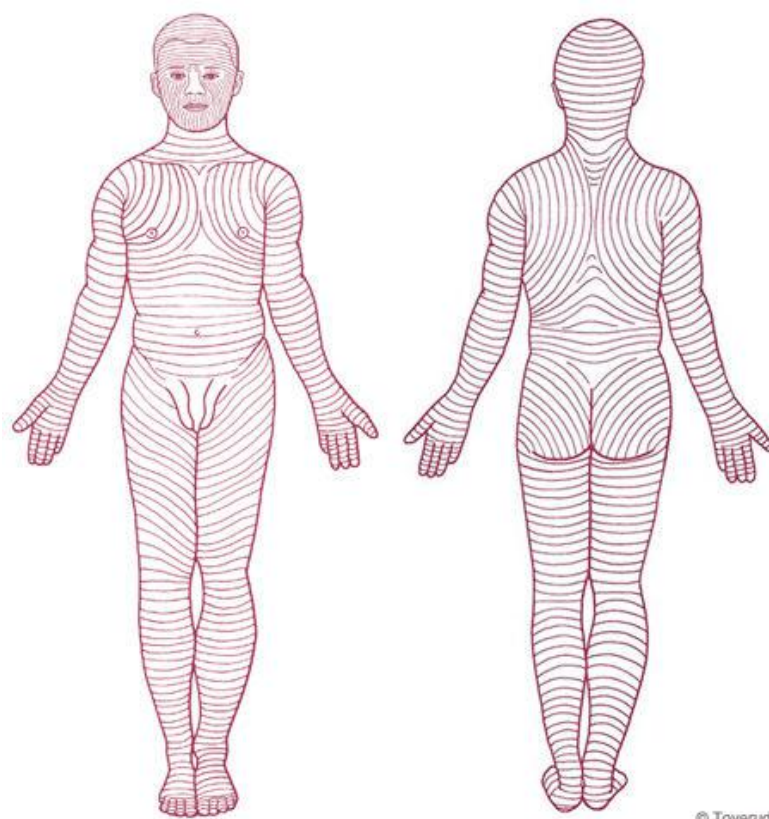


### Langer's lines(Cleavage lines)

- **Langer lines of skin tension**, or sometimes called **cleavage lines**
- Correspond to the natural orientation of [collagen](#) fibers in the [dermis](#),
- Are generally parallel to the orientation of the underlying muscle fibers.
- Langer's lines have relevance to forensic science and the development of surgical techniques

### Langer's lines

- Langer lines of skin tension, or sometimes called cleavage lines
- Correspond to the natural orientation of collagen fibers in the dermis,
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- Langer's lines have relevance to forensic science and the development of surgical techniques





## Applications of Langer Lines

- Incisions made parallel to Langer's lines may heal better and produce less scarring than those that cut across. Conversely, incisions perpendicular to Langer's lines have a tendency to pucker and remain obvious, although sometimes this is unavoidable
- In old age, elastic fibres atrophy and skin becomes wrinkled

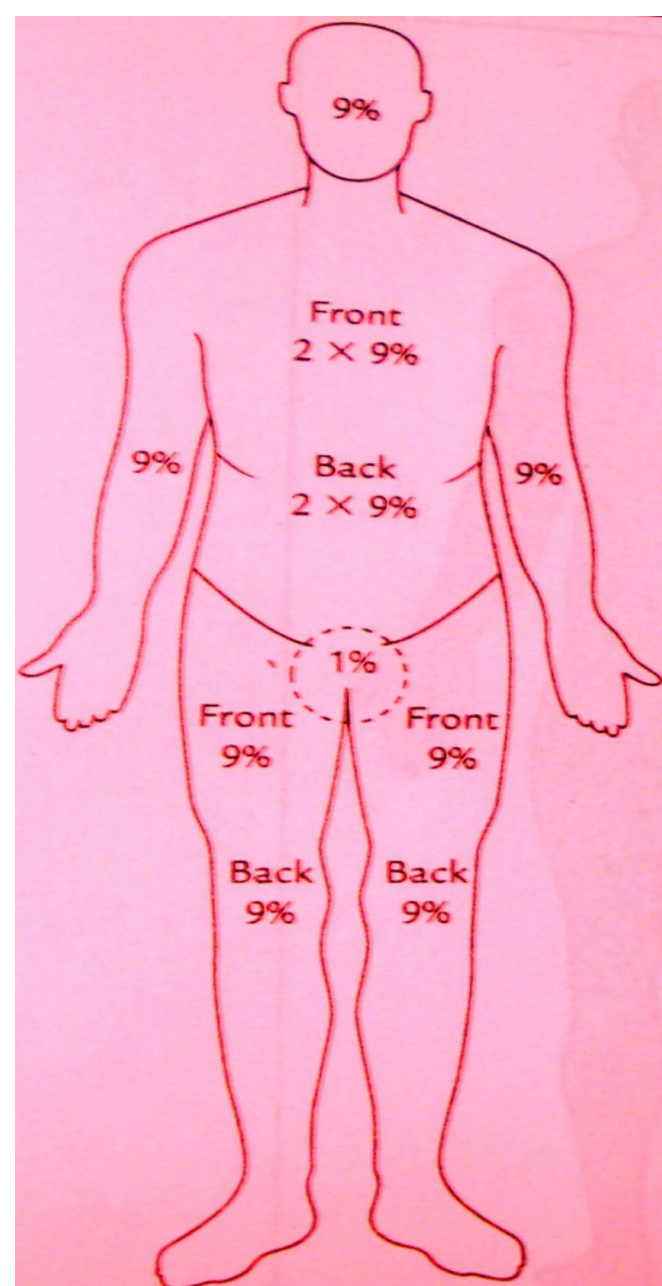
## Linea gravidarum

- Rupture of fibre bundles of dermis due to excessive stretching result in prominent white lines.
- Seen in anterior abdominal wall in pregnancy.



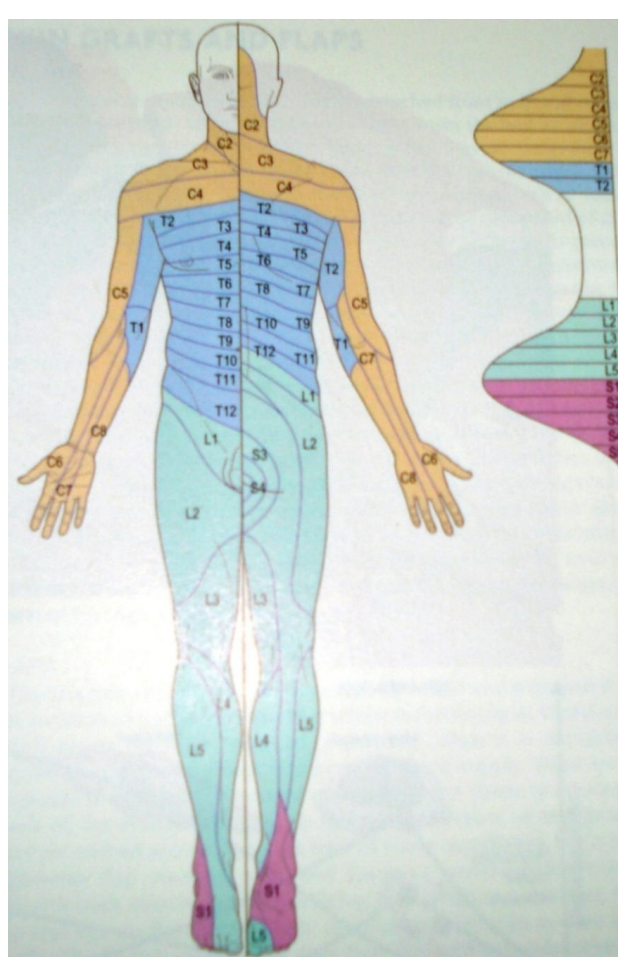
**Rule of Nine:** To estimate the extent of damaged skin in burn injuries.

- First degree burn- only epidermis.
- Second degree burn- epidermis + upper region of dermis.
- Third degree burn- entire thickness of skin.



## Dermatomes

- The strip of skin supplied by a single spinal nerve is called dermatome.





## **FUNCTIONS OF SKIN**

- Protective shield for the body
- Barrier to water
- Thermoregulation
- Important sense organ (pain, touch, temperature & pressure)
- Absorption of ultraviolet radiation from sun for the production of vitamin D

## **APPLIED ANATOMY**

---

- Skin is pale in anemia, yellow in jaundice and blue in cyanosis
- Skin incisions should be made parallel to lines of cleavage to have the smallest scar
- Sebaceous cyst is common in scalp due to obstruction to sebaceous duct

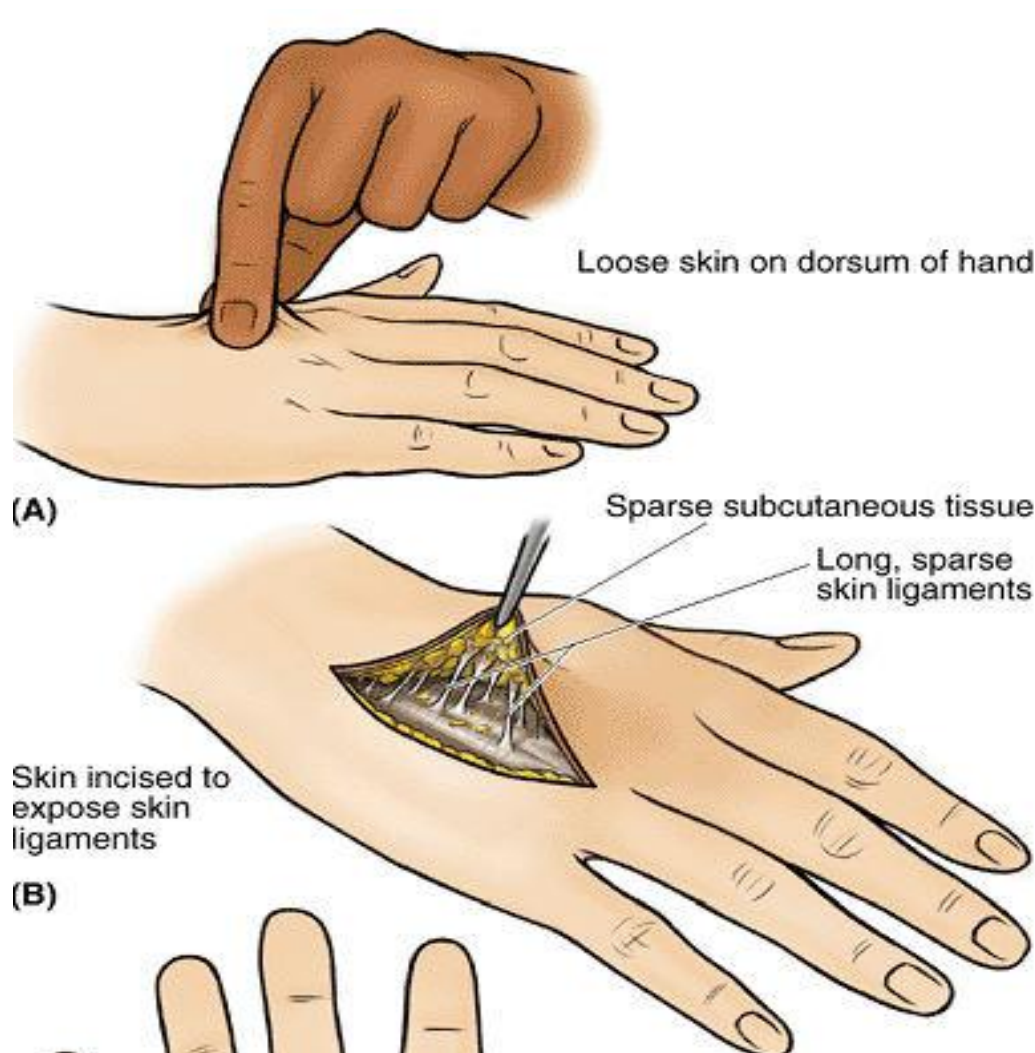
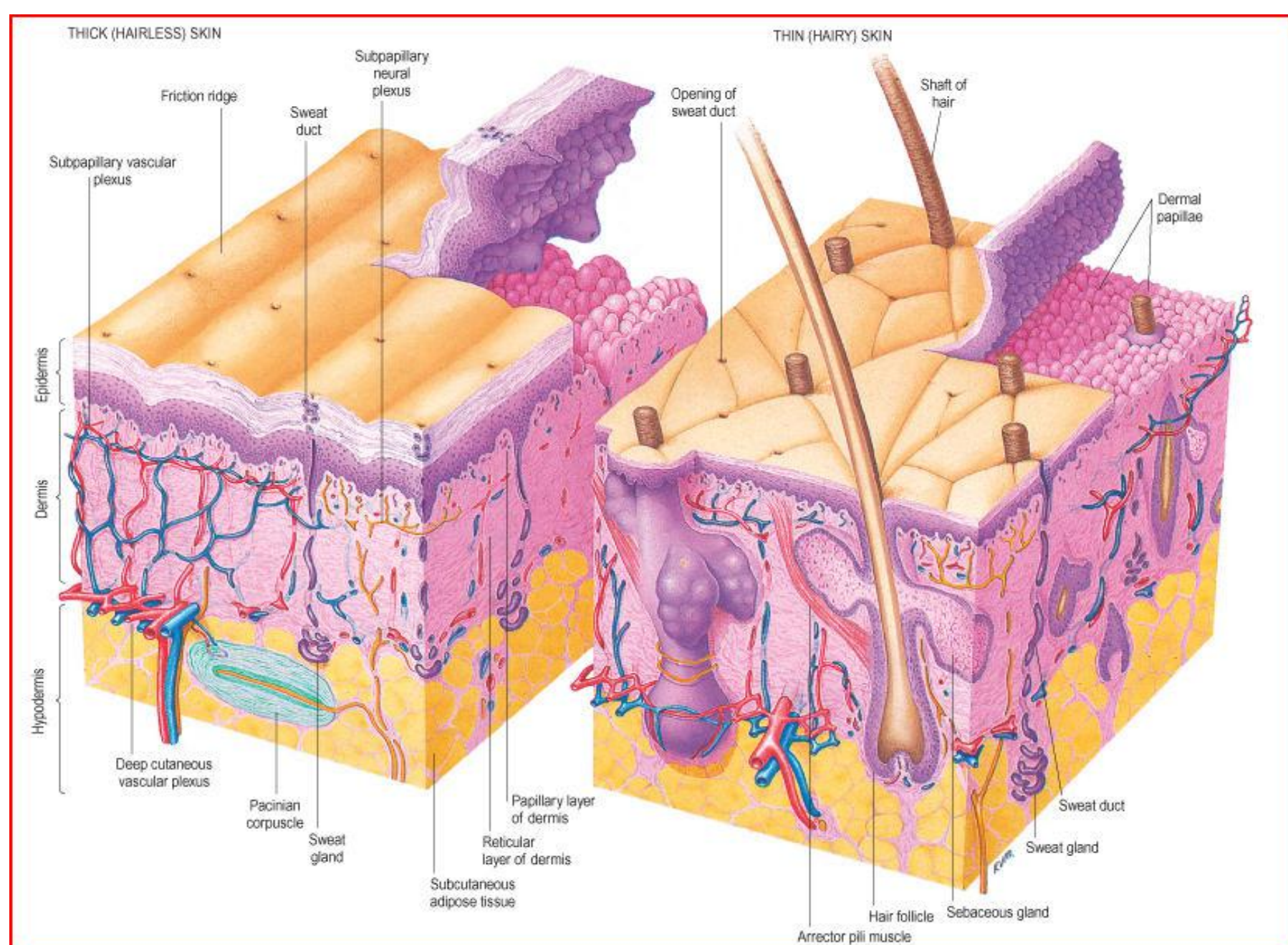
## **SUPERFICIAL FASCIA**

## **SUPERFICIAL FASCIA**

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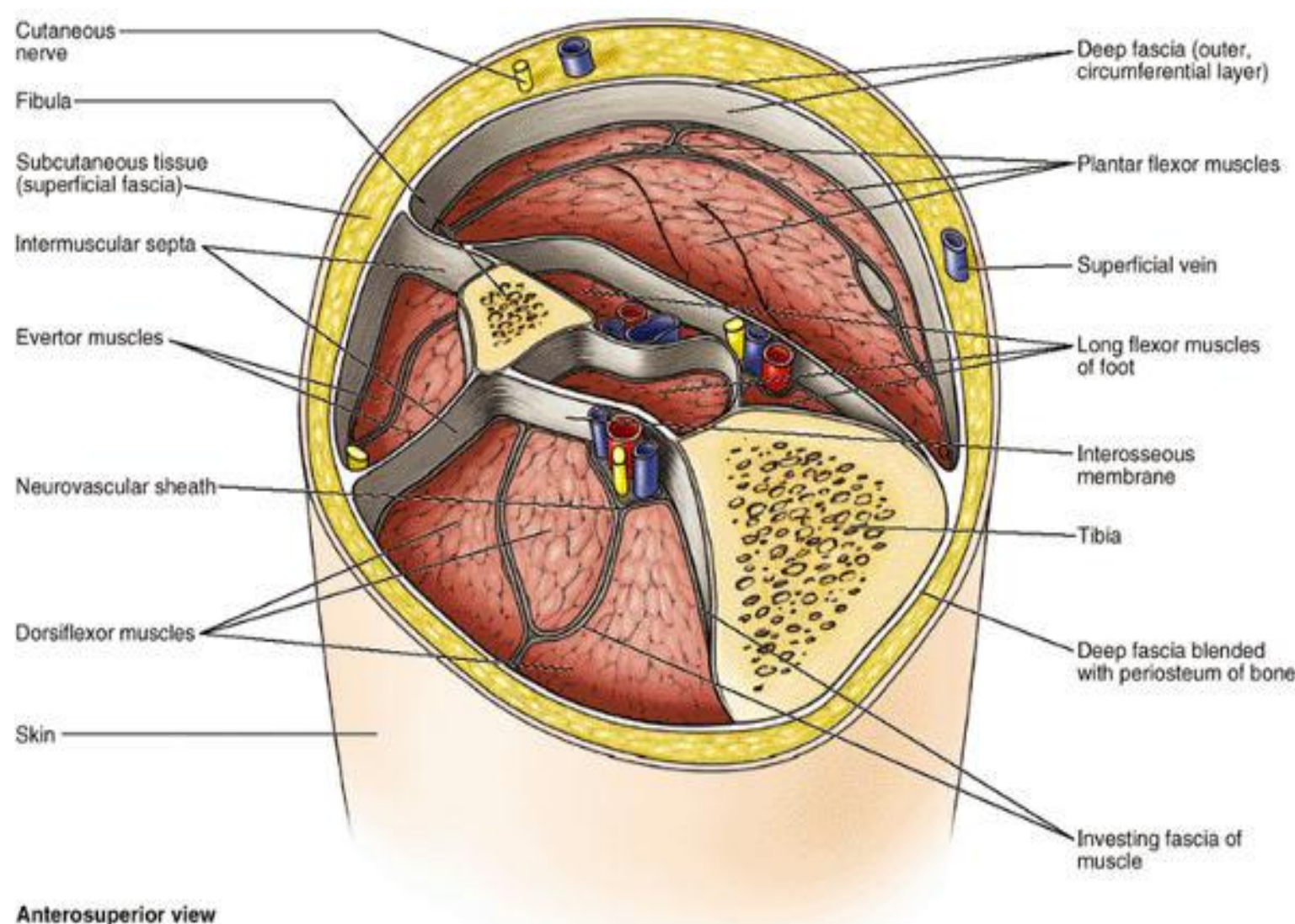
- **DEFINITION-** General coating of the body beneath the skin made up of loose areolar tissue and fat
  - **ABUNDANCE OF FAT-** Front of thigh and anterior abdominal wall
  - **ABSENCE OF FAT-** Eyelids & external ear
  - In females there is more fat and it is evenly distributed
-





## IMPORTANT FEATURES

- Most distinct in lower part of *anterior abdominal wall & limbs*
- Very thin on *dorsal aspect of hands & feet, sides of neck, face.*
- Very dense in *scalp, palms and soles.*





# IMPORTANT FEATURES

## ■ IT CONTAINS

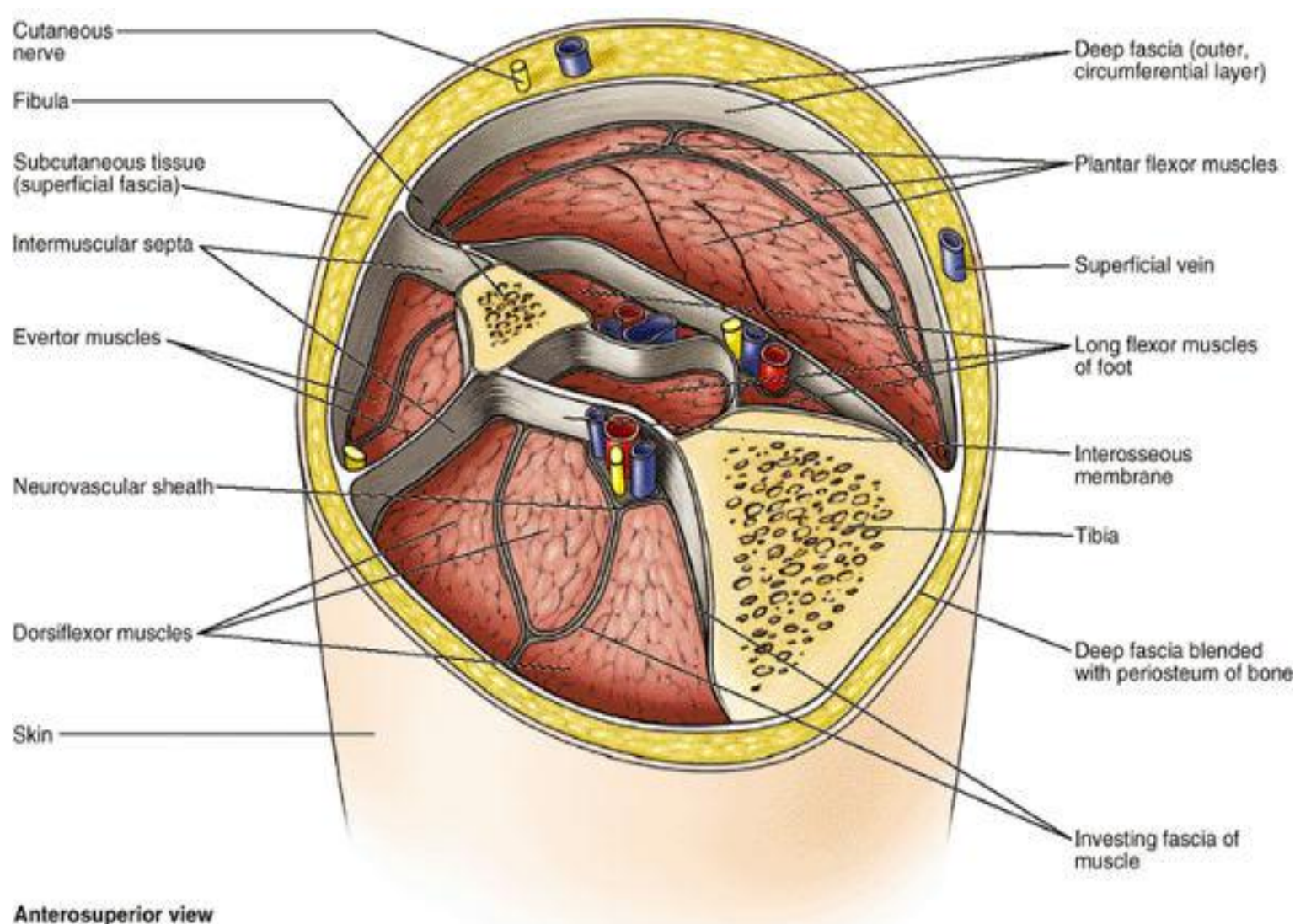
- 1. Cutaneous nerves & vessels***
- 2. Groups of lymph nodes***
- 3. Subcutaneous muscle in neck***

## FUNCTIONS

- Helps in movements of skin
- Allows for the passage of the vessels & nerves to the skin
- Conserves body heat as fat is a bad conductor of heat
- Fat fills hollow spaces like axilla & orbits

## DEEP FASCIA

- **Deep fascia is a fibrous sheet which covers the body beneath the superficial fascia.**
- **It is devoid of fat, and is usually inelastic and tough**





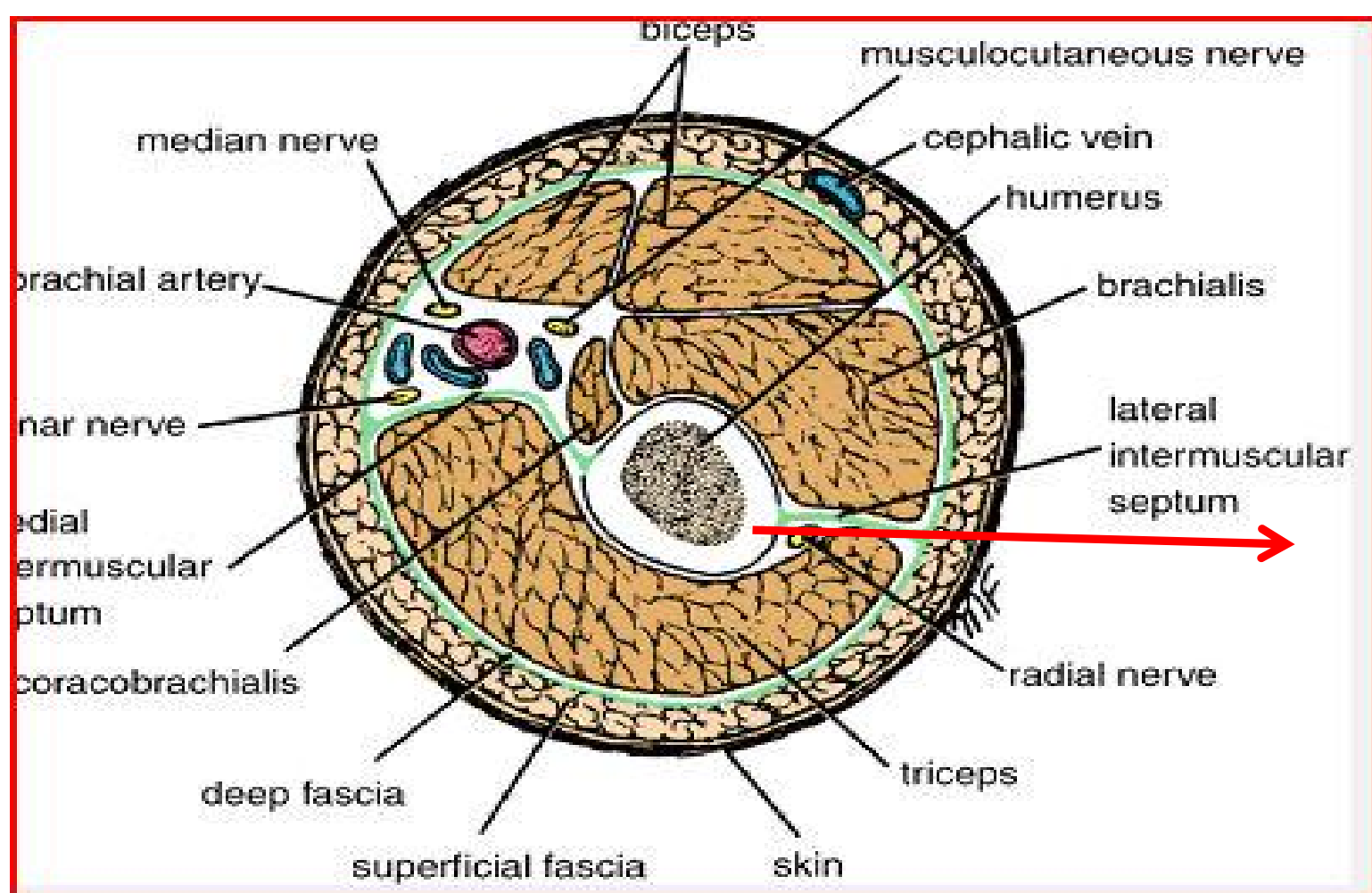
## DISTRIBUTION OF DEEP FASCIA

- Best seen in limbs where it forms tough and tight sleeves
- Well defined in the neck where it
- forms a collar
- Not well formed on the trunk and face
- Blends with periosteum of a subcutaneous bone

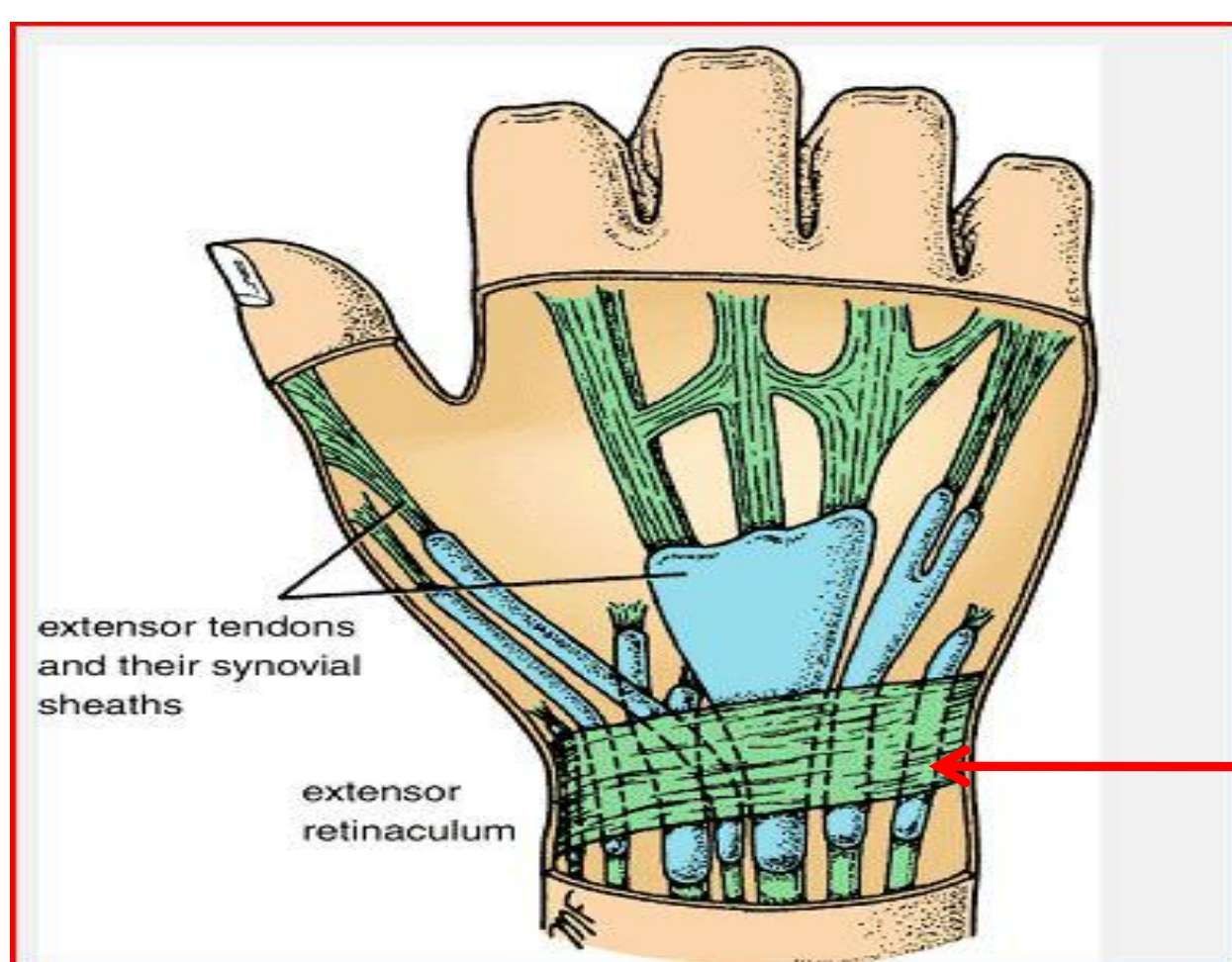
## MODIFICATIONS OF DEEP FASCIA

- **Inter muscular septa** which divides limbs into compartments
- **Thickenings form retinacula** around joints like wrist and ankle
- Forms sheath around large arteries
- In palms & soles form **aponeurosis**
- Form **investing layer of fascia** in region of neck giving it shape.

## INTERMUSCULAR SEPTA

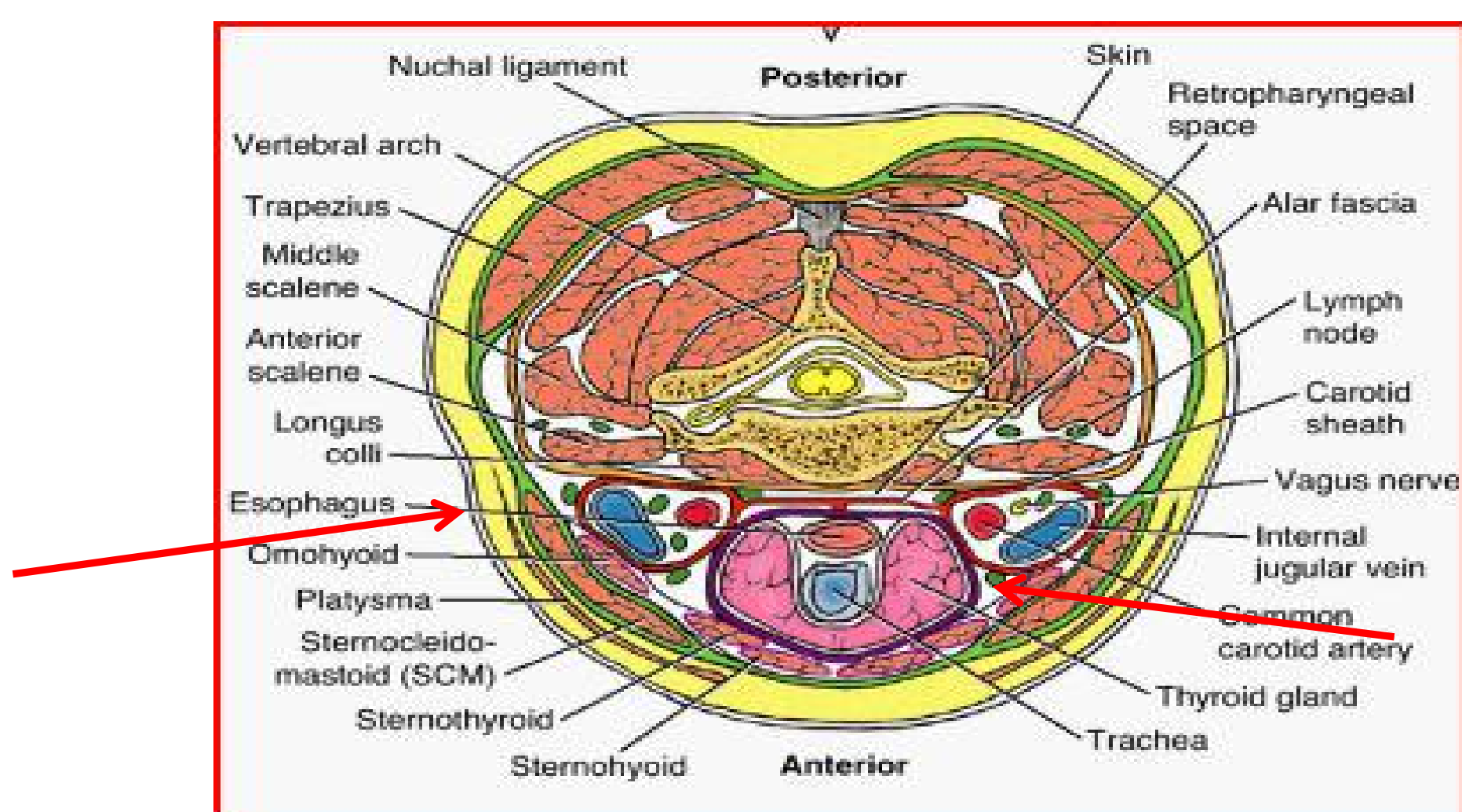


## RETINACULA





# INVESTING LAYER OF FASCIA



## FUNCTIONS

- Keeps underlying structures in position
- Provides extra surface for muscle attachment
- Helps in venous return
- Helps muscles in action by applying tension and pressure
- Retinacula keep tendons in position

## MCQ

Q1. Which layer is present only in thick skin:

- Stratum basale
- Stratum spinosum
- Stratum granulosum
- Stratum lucidum

## MCQ

Q2. The characteristic feature of reticular layer of dermis is:

- High mitotic activity
- Contains keratin granules
- Dense irregular connective tissue
- Finger like processes



## MCQ

Q3. Secretion of sebaceous glands is aided by contraction of:

- a. Arrector pilorum muscle
- b. Myoepithelial cells
- c. Papillary layer of dermis
- d. Reticular layer of dermis

## MCQ

Q4. Langerhans cells are present in:

- a. Stratum basale
- b. Stratum spinosum
- c. Stratum granulosum
- d. Stratum lucidum