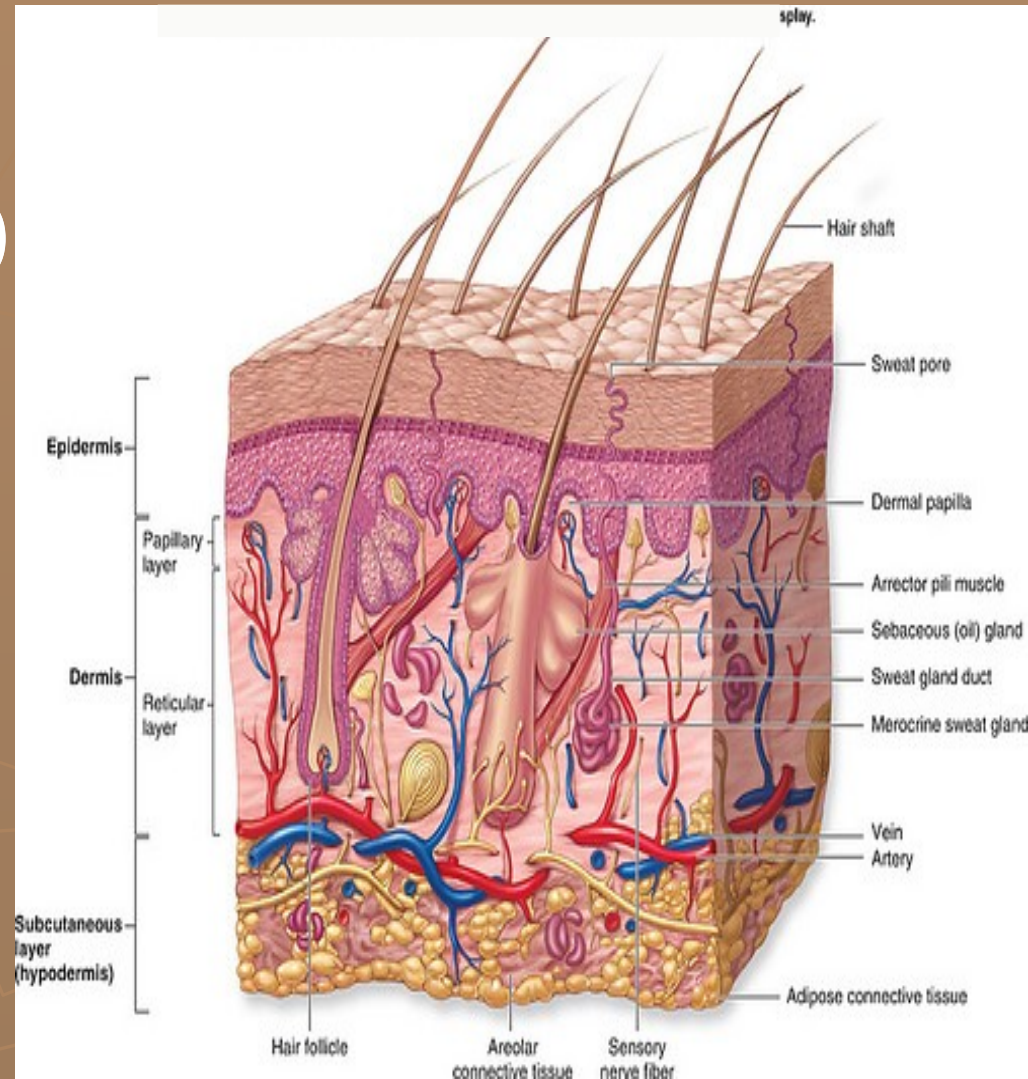




Integumentary system - skin and adnexa

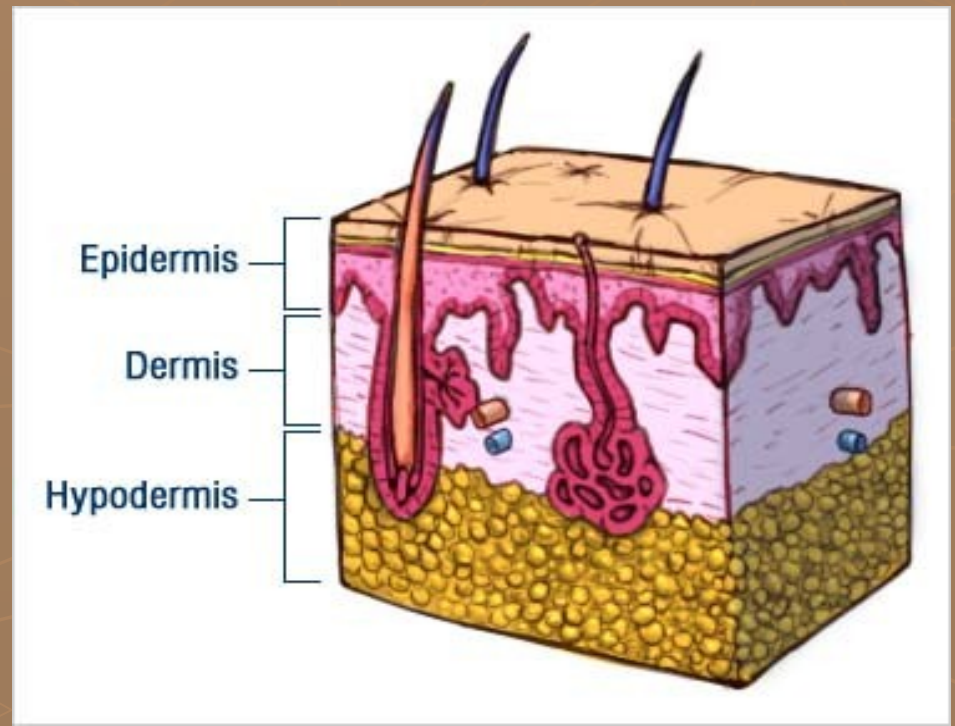
Skin and adnexa

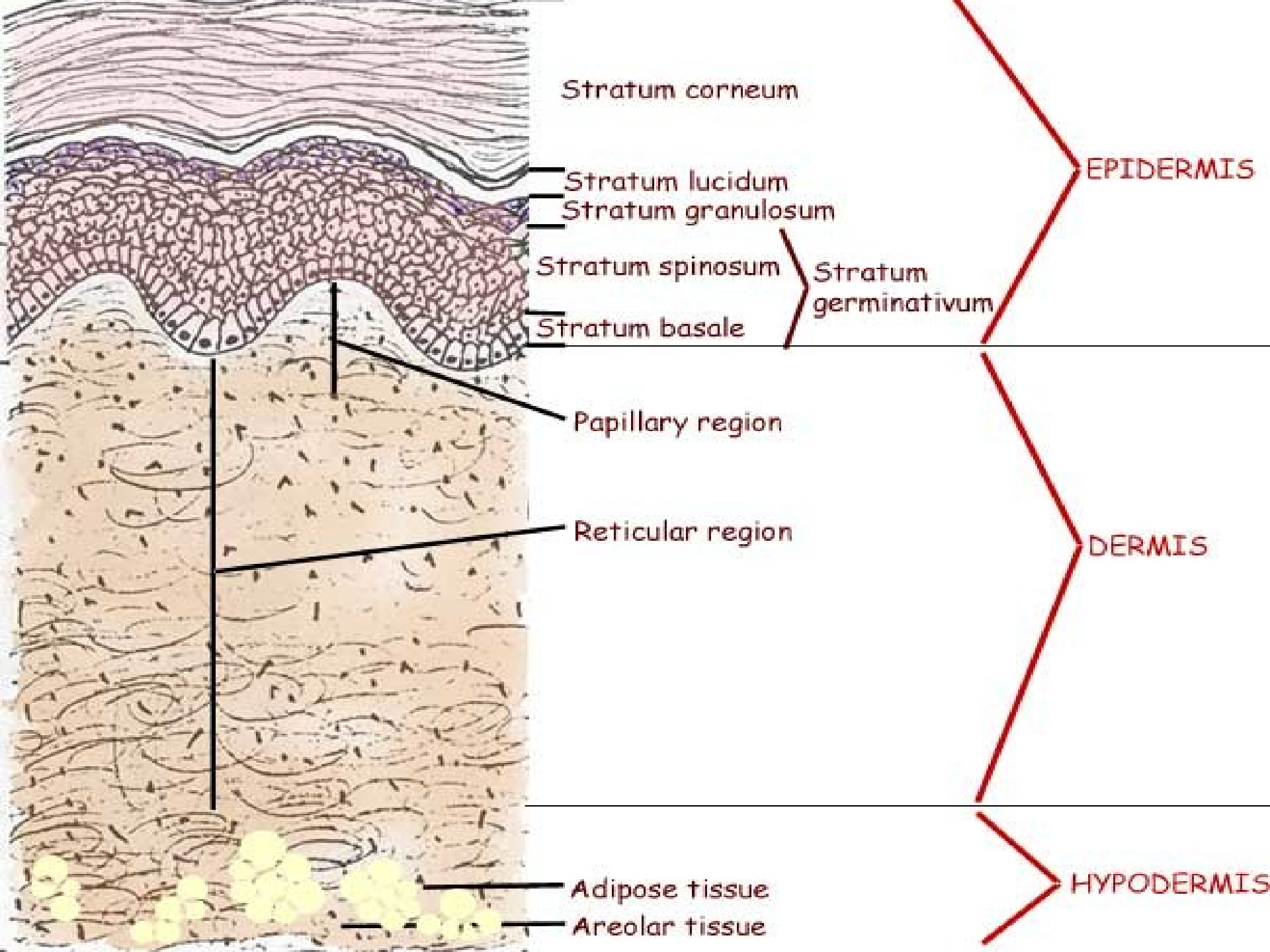
- ▶ Skin
- ▶ Adnexa (derivatives)
 - hair
 - nail
 - sebaceous glands
 - sweat glands
 - mammary glands



Skin (cutis): structure

- ▶ **epidermis** – stratified squamous keratinized epithelium
 - ▶ **dermis** (*corium*) – connective tissue + adnexa
 - ▶ **hypodermis** (*tela subcutanea*) – dense c.t. + adipocytes (panniculus adiposus)
-
- ▶ *area 1.5 – 2.5 m²*
 - ▶ *weight 16 % of b.w.*
 - ▶ *Thickness 1 – 5 mm*



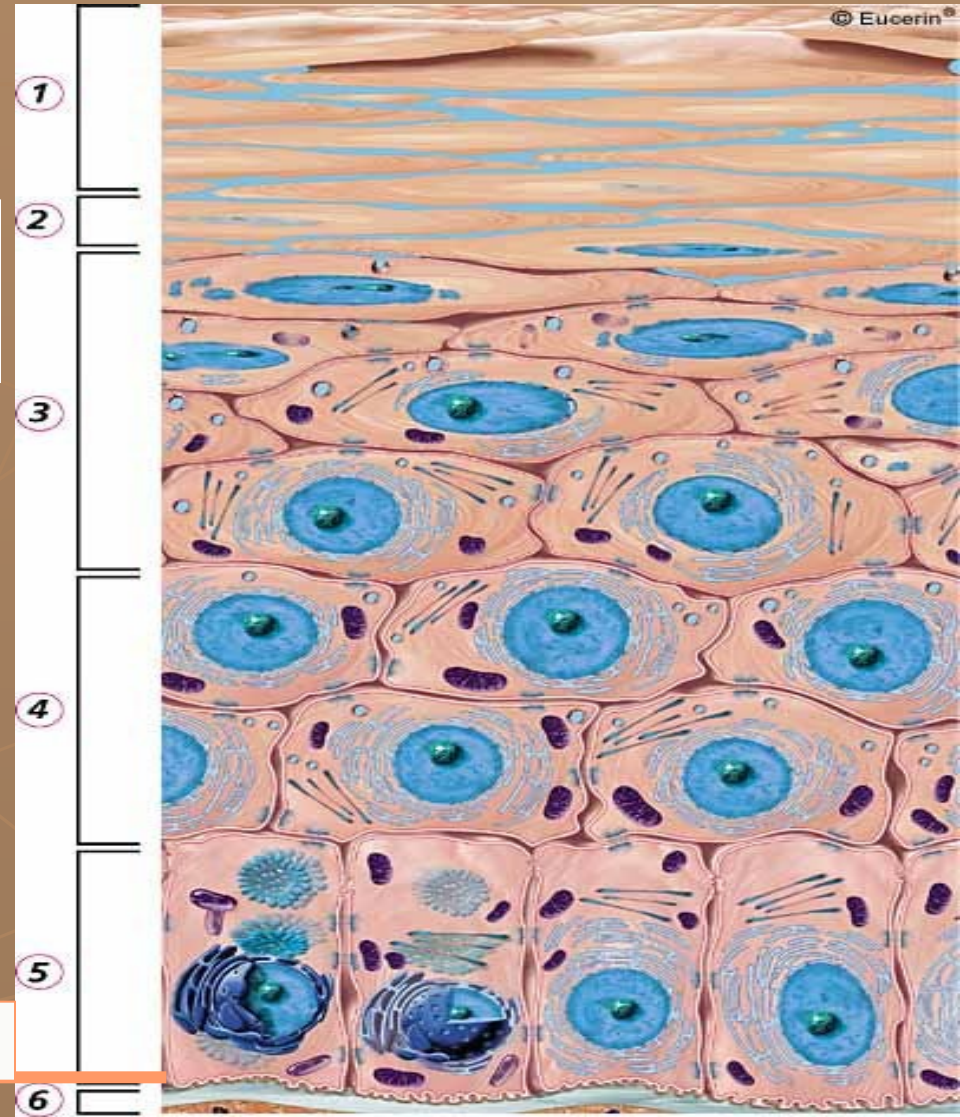


Epidermis

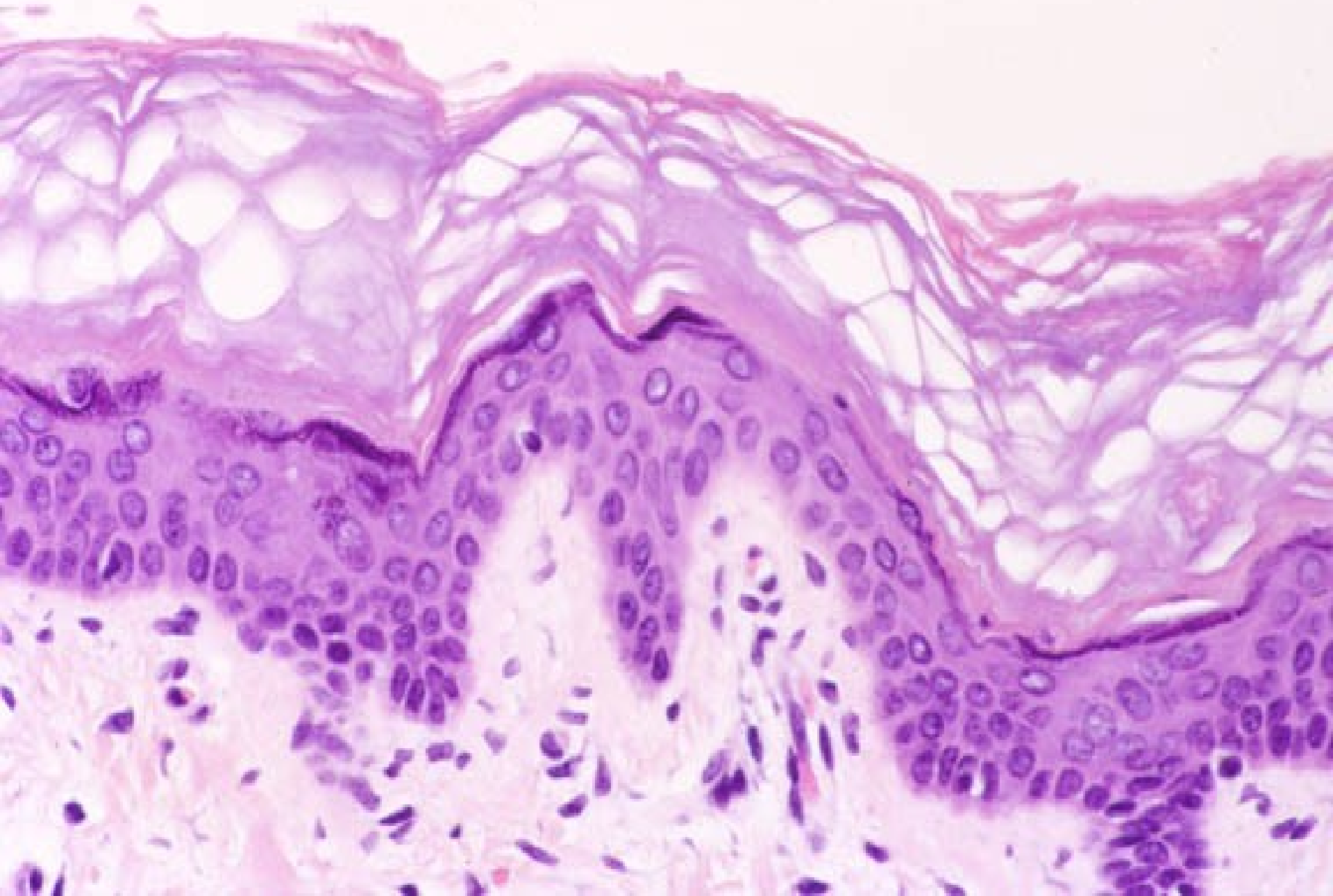
(stratif. squamous keratinized ep.)

1. **Stratum corneum proprium** thick layer, keratin, desmosome disjunction
2. **(Stratum lucidum)** cells – no nucleus; tonofilaments, eleidin
3. **Stratum granulosum** picnotic cell nuclei, granules with glykolipids and keratohyalin
4. **Stratum spinosum** „prickle-cell“ or spiny layer, tonofilaments
5. **Stratum basale** cuboida-columnar cells, mitosis + melanocytes

basement membrane



Epidermis



Epidermis

Sweat duct



Stratum corneum

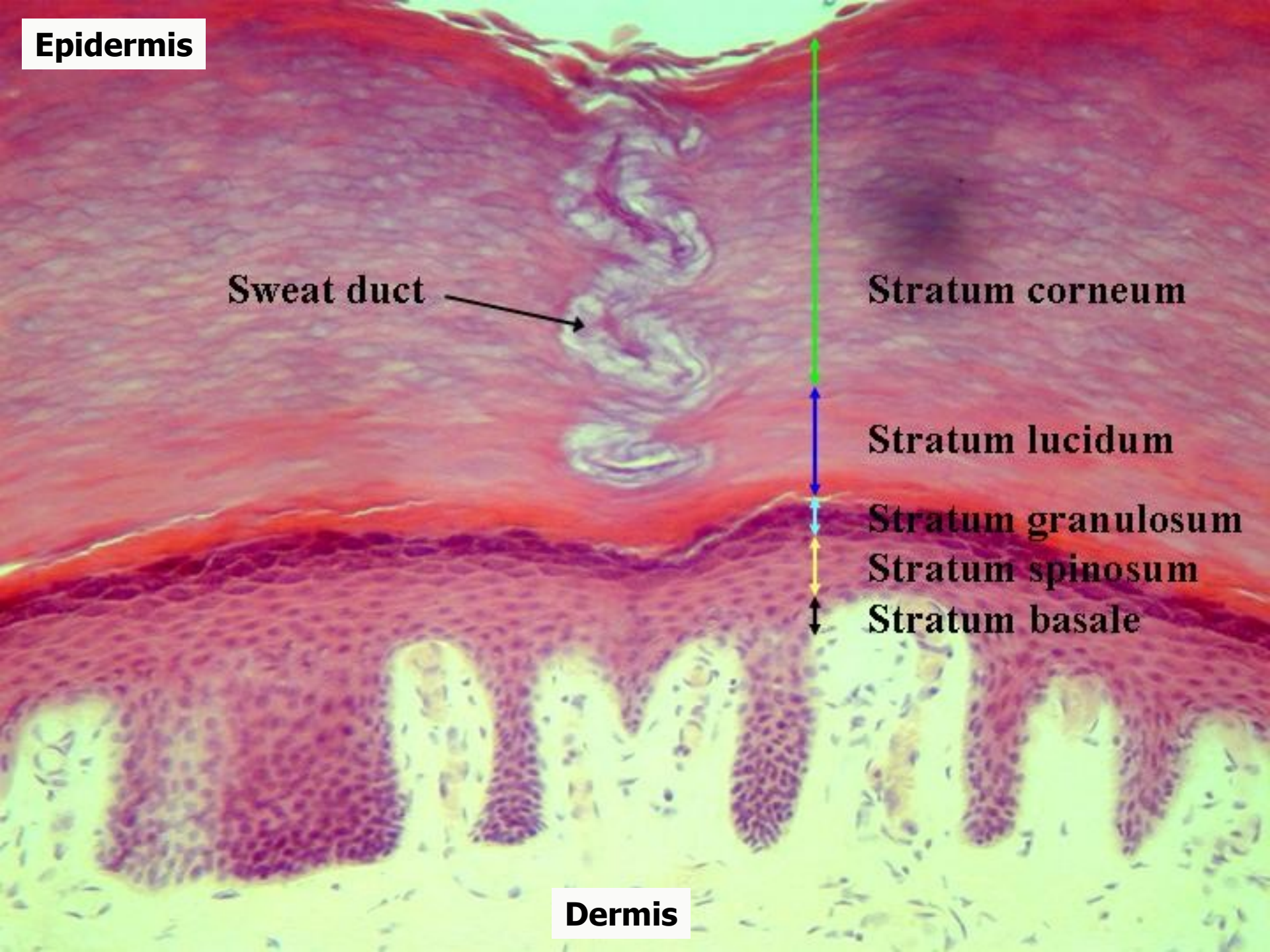
Stratum lucidum

Stratum granulosum

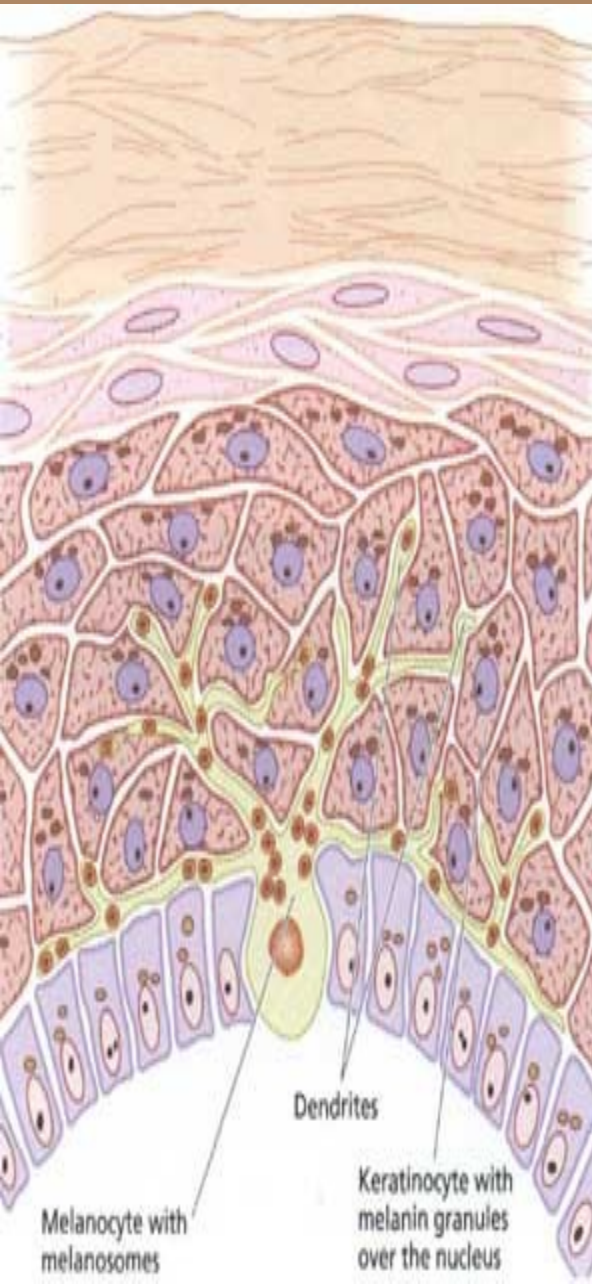
Stratum spinosum

Stratum basale

Dermis



Epidermis (cells = keratinocytes)



stratum corneum



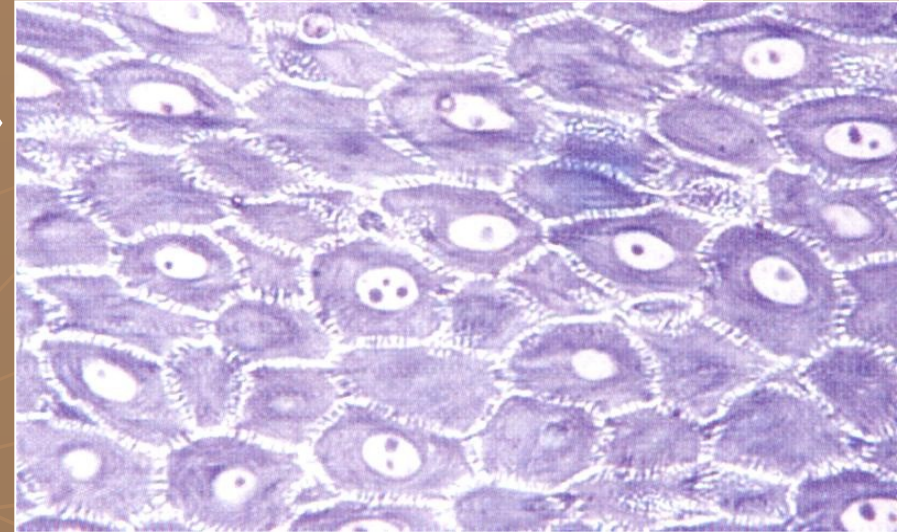
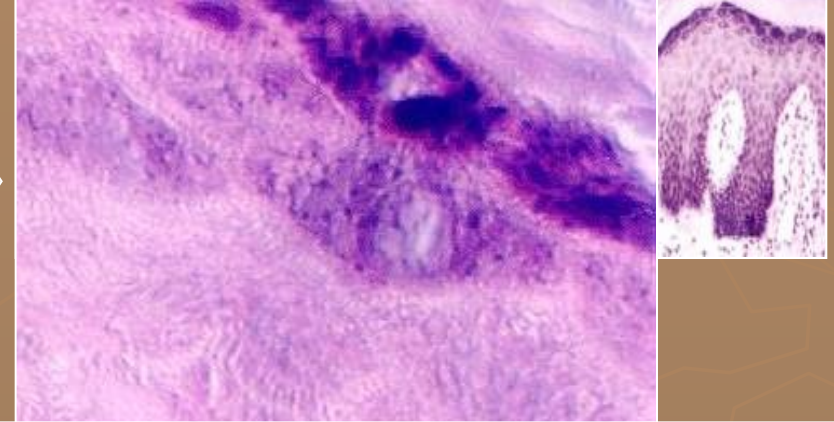
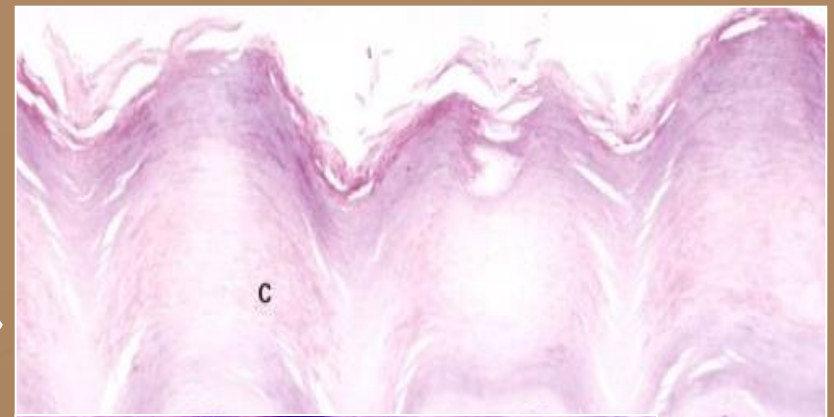
stratum granulosum



stratum spinosum



stratum basale



Another cells in epidermis

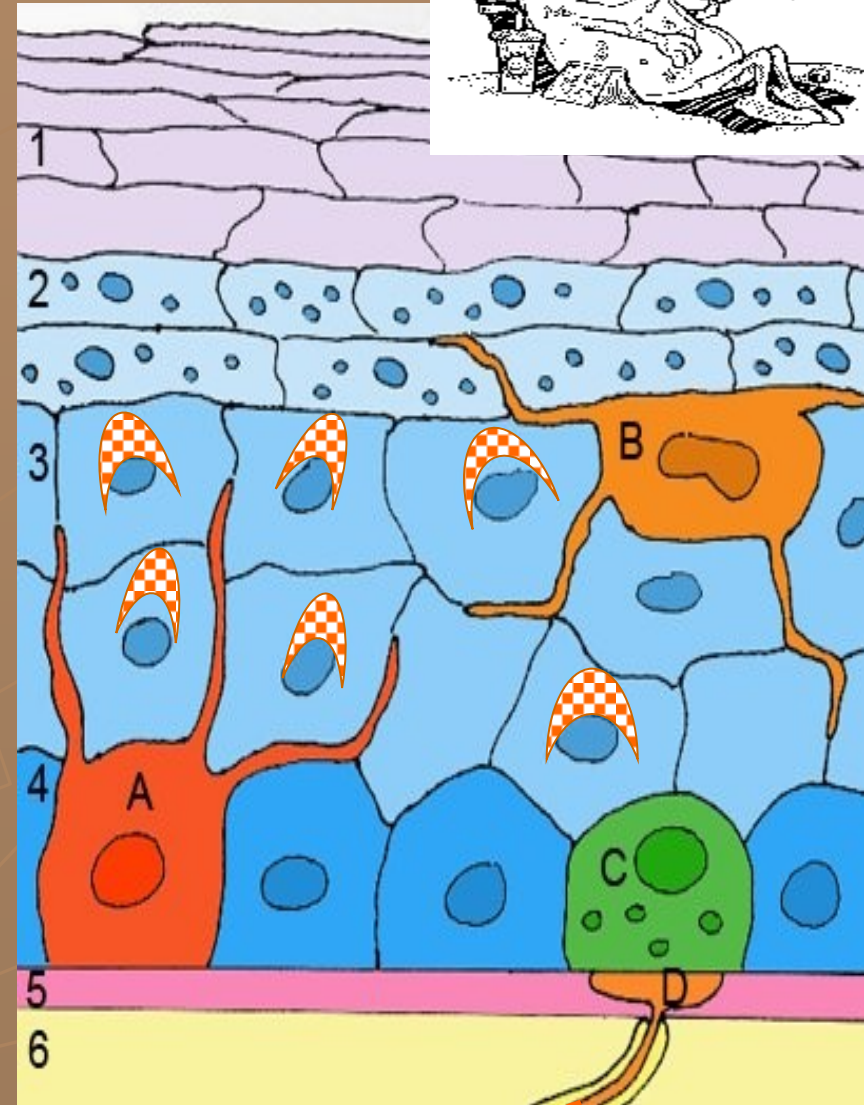


- ▶ **A = melanocytes**

„supranuklear cap“
- granules of pigment melanin



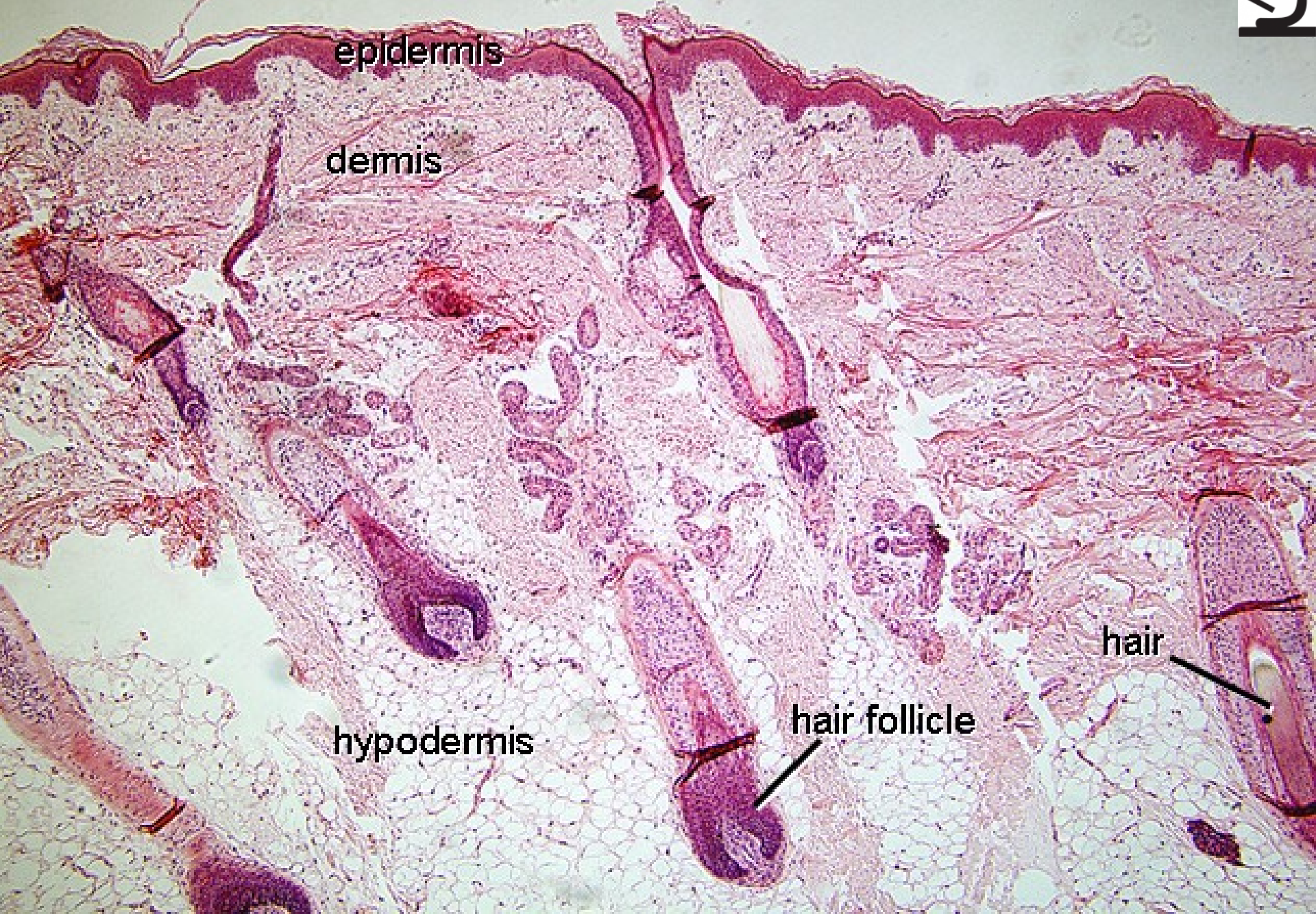
- ▶ **B = Langerhans' cells**
(antigen presenting)
- ▶ **C = Merkel's cells**
(receptors)



Types of skin

- ▶ **Thin 0.5-5.0 mm**
epidermis 70 – 100 μ m
4 layers,
+ all adnexa
- ▶ **Thick 0.8-1.5 mm**
400 – 800 μ m,
5 layers of epidermis,
without hair follicles
- ▶ Occurrence: all over
body, except in glans
penis and labia minora
+ vestibulum vaginae
- ▶ Occurrence:
 - palma manus
 - planta pedis

Skin with hair



epidermis

dermis

hypodermis

hair follicle

hair

Skin from finger tip



Keratin layer

Cellular layers of epidermis

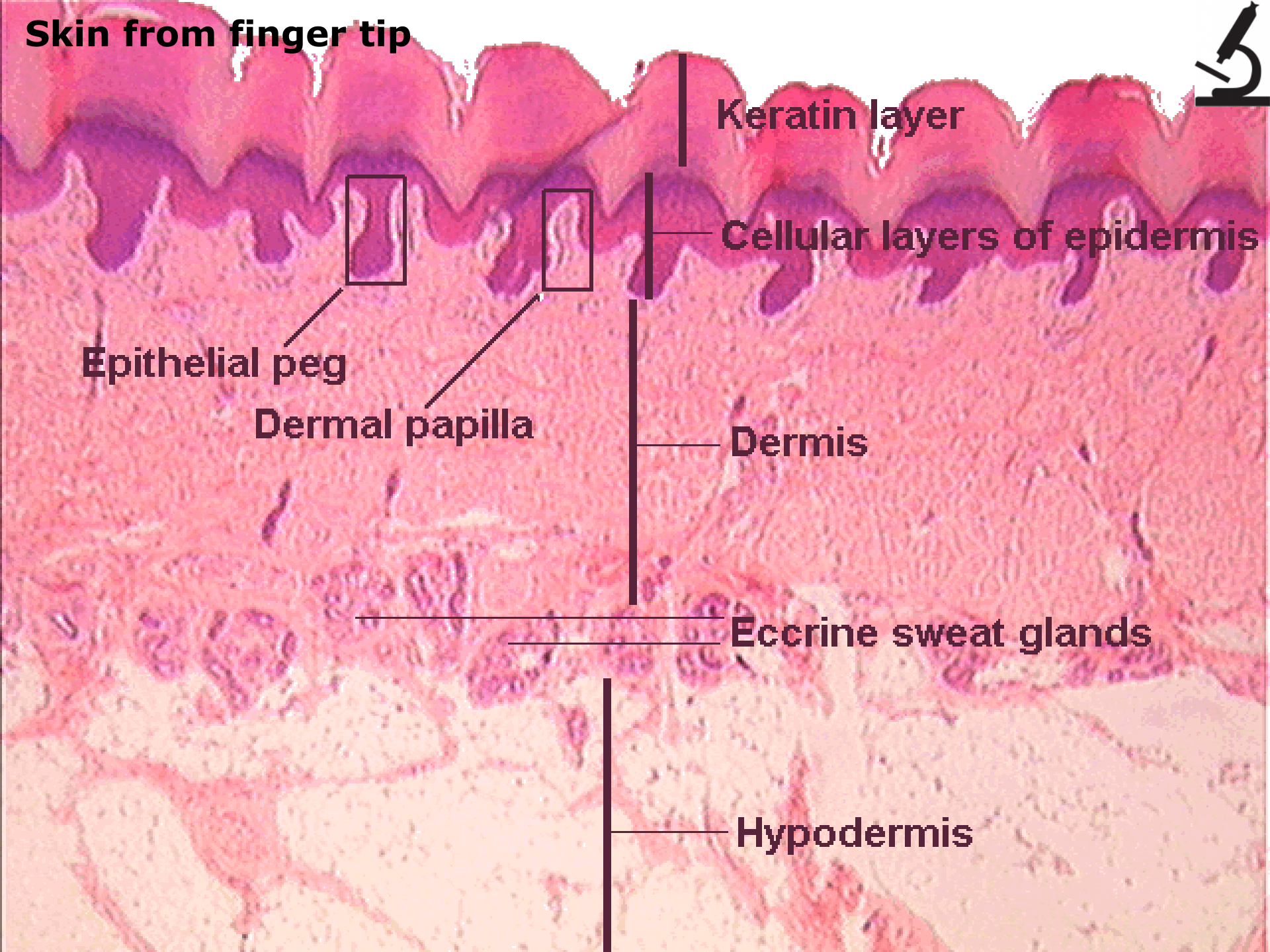
Dermis

Eccrine sweat glands

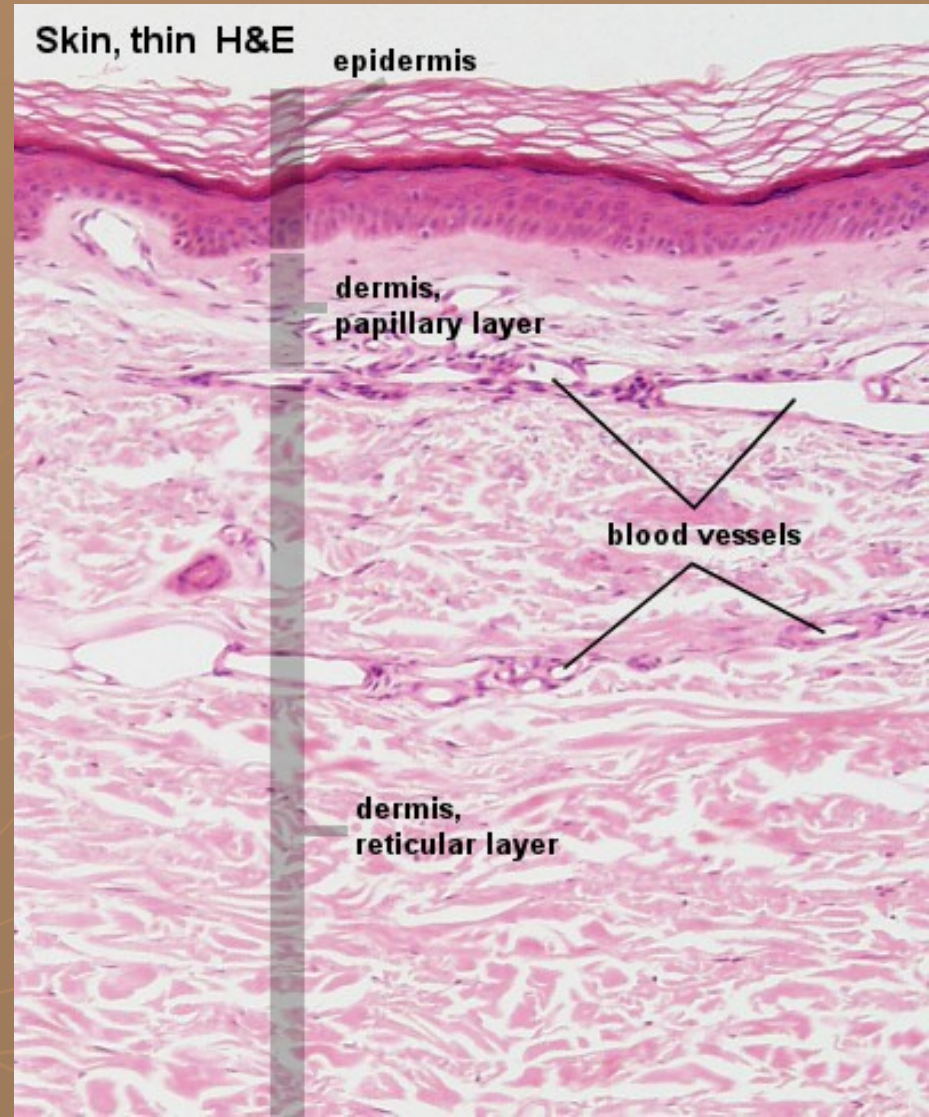
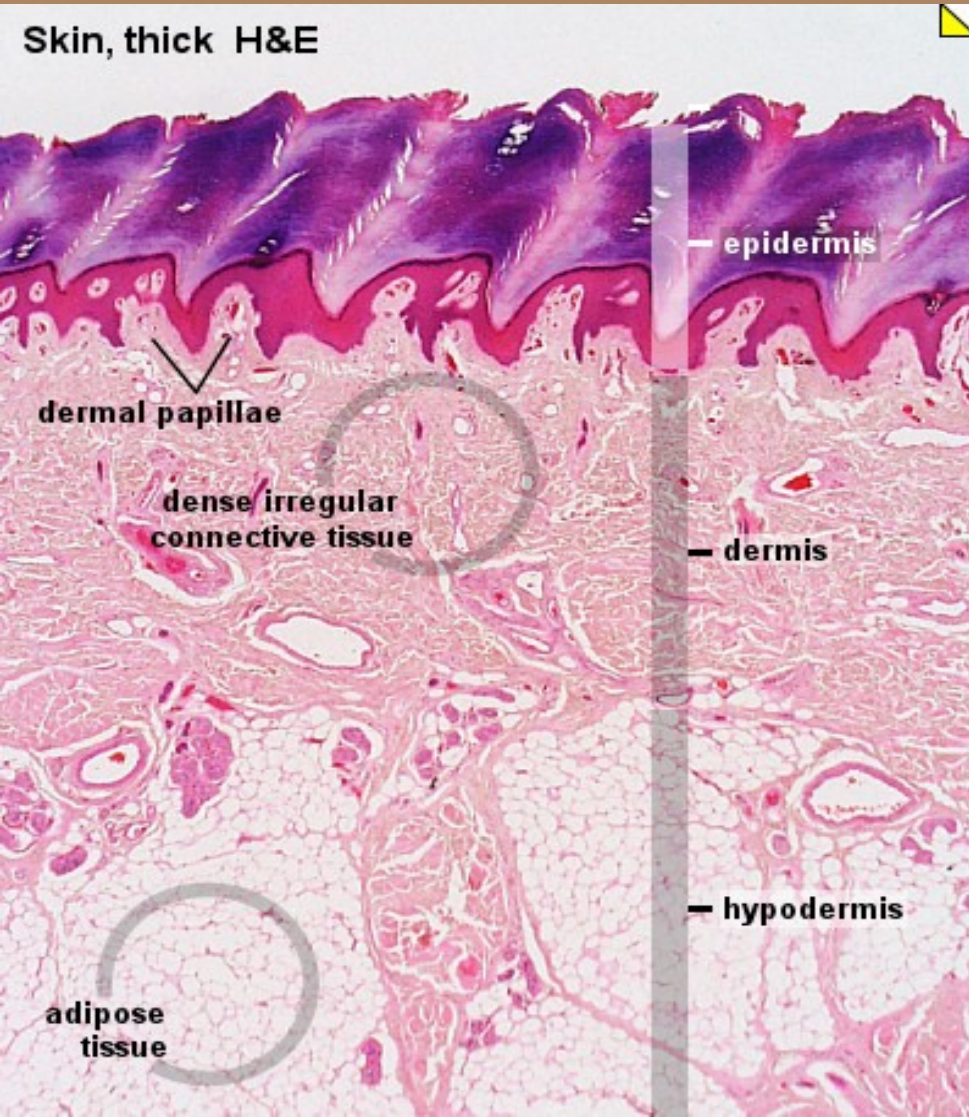
Hypodermis

Epithelial peg

Dermal papilla



Skin types



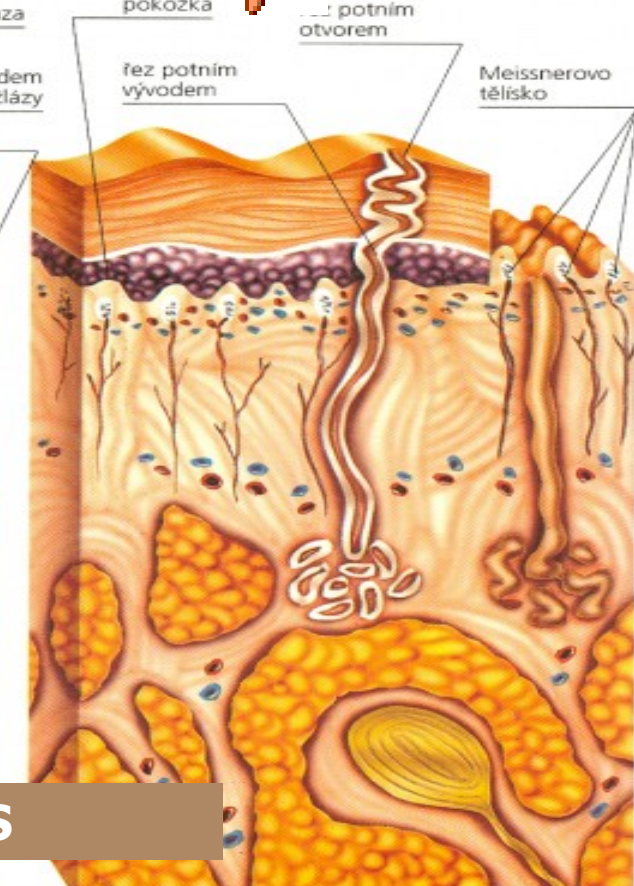
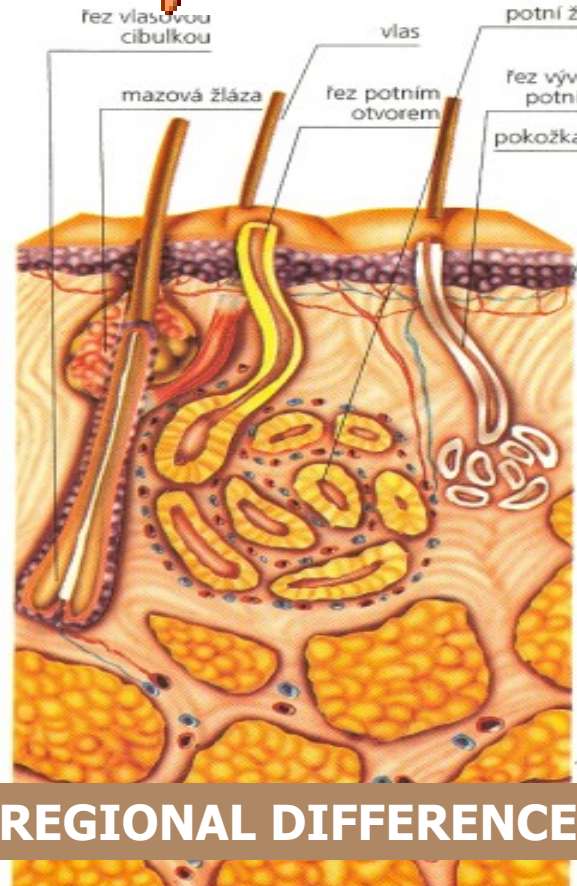
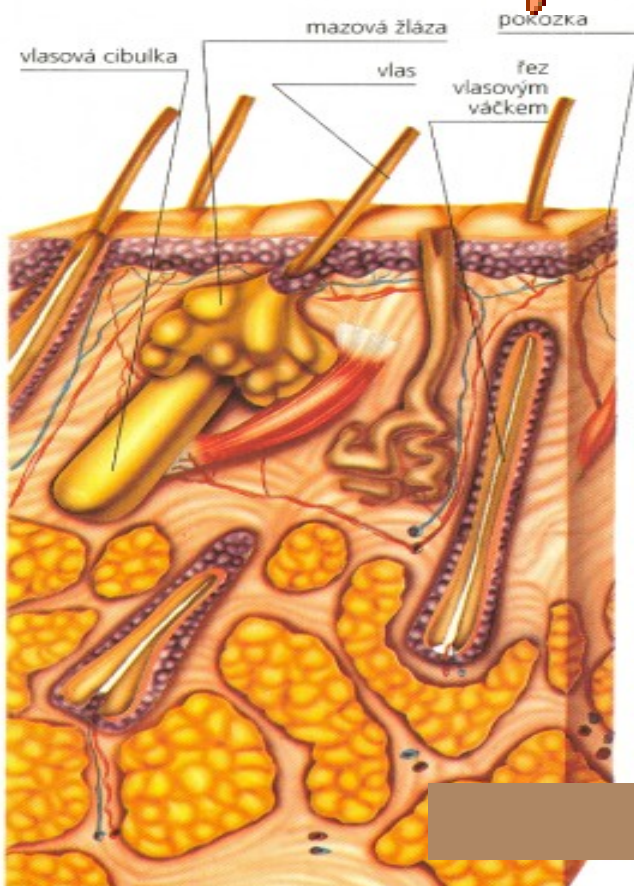
Skin type:



thin



thick



REGIONAL DIFFERENCES

Skin with hair

Skin from axilla

Skin from tip of finger

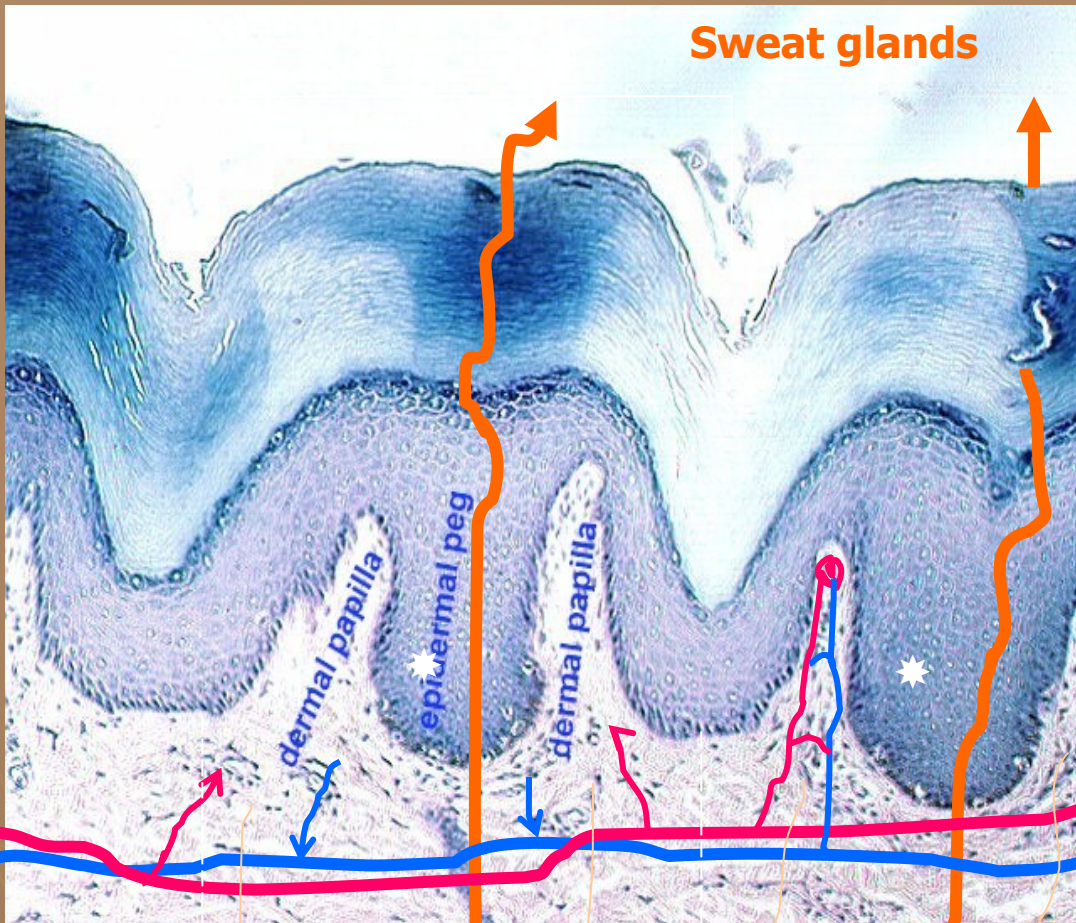
NO! apocrine sweat glands

YES!

ONLY eccrine sweat glands
hair follicles, sebaceous gl.
NO!

Epidermis of thick skin

Cristae et sulci cutis:
papillary lines (dermatoglyphic
patterns = fingerprints)



Sweat glands

dermal papilla

epidermal peg

dermal papilla

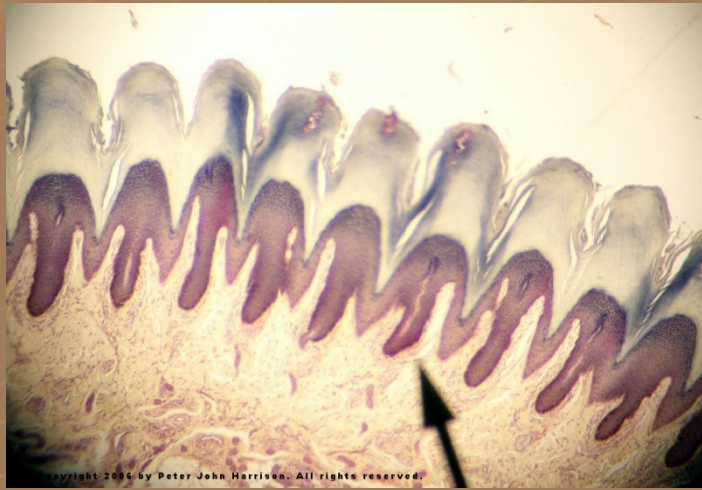
nerv fibers

dermal papillae

crista intermedia *
= epidermal peg



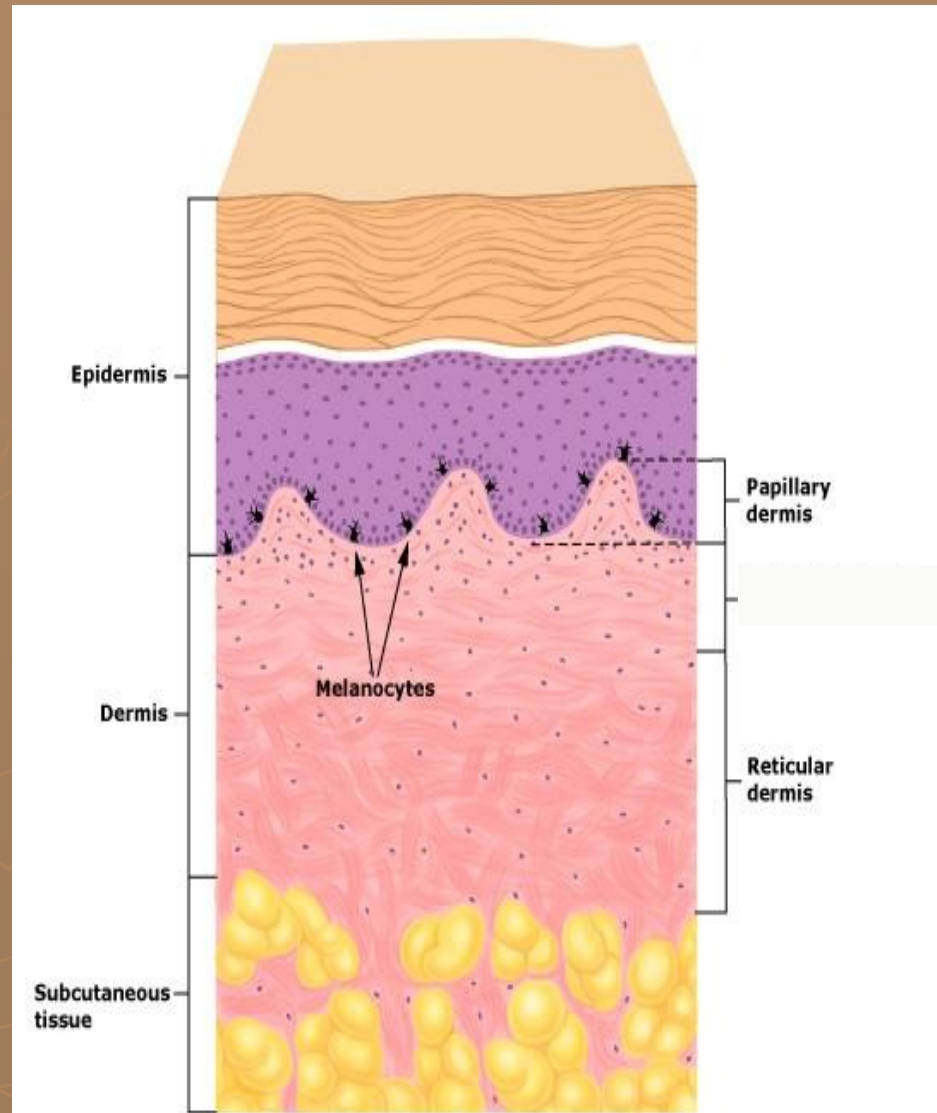
vessels of subpapillary plexus



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Dermis

- ▶ **Stratum papillare**
dermal papillae – loose connective tissue + capillary loops and nerve endings
- ▶ **Stratum reticulare**
irregular dense c.t. (dermatansulphate) with solitary smooth muscle cells, + SKIN ADNEXA



Skin derivatives (adnexa)

- ▶ Keratinized type:
 - hair
 - nail
- ▶ Non-keratinized type:
 - sweat gland
 - sebaceous gland
 - mammary gland

Hair (pilus)

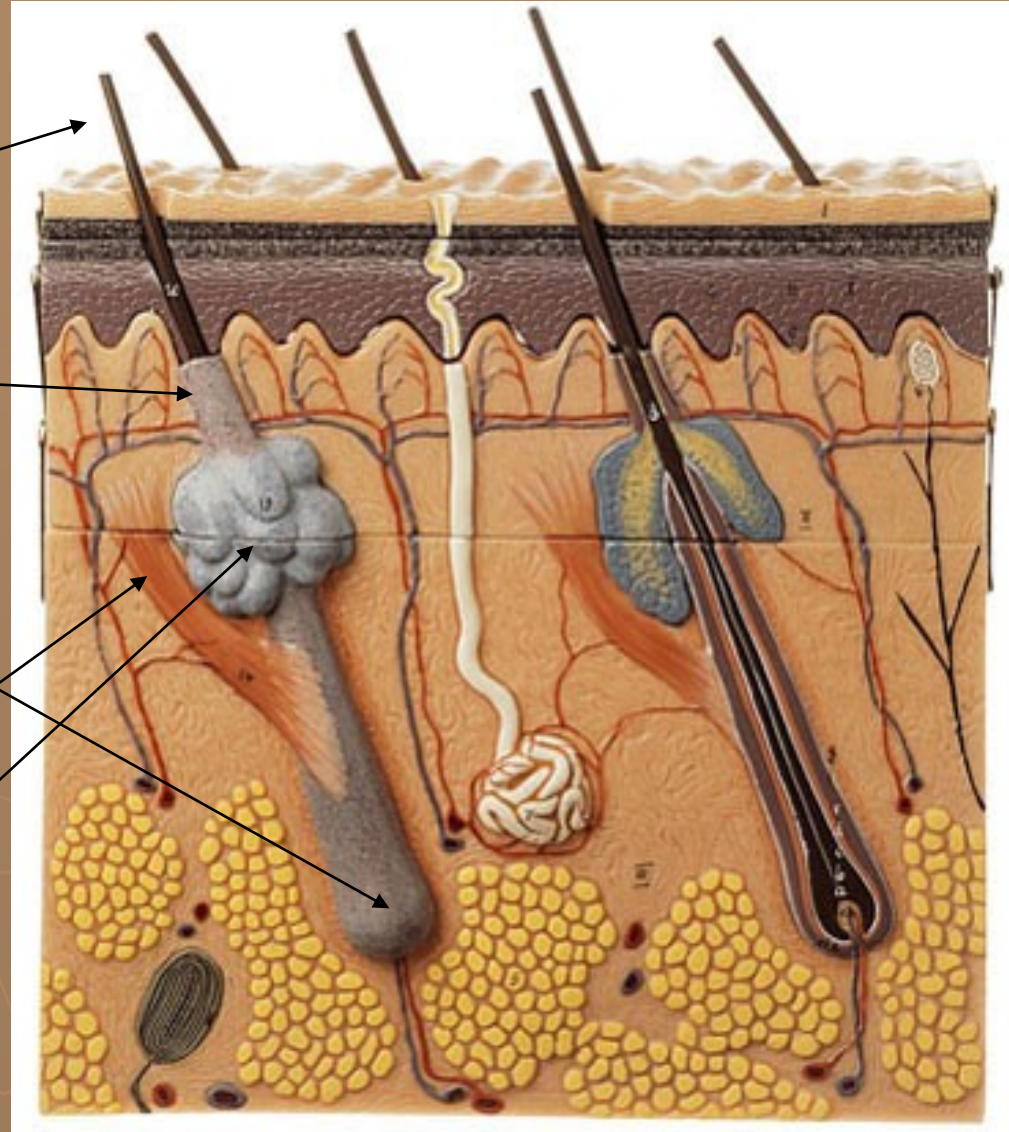
▶ Scapus

▶ Radix

▶ Bulbus

▶ M. arrector pili

▶ Gl. sebacecea



Hair and hair follicle:

Scapus pili

Radix pili

kutikula
kůra
dřeň

Zevní kořenová pochva

Vnitřní kořenová pochva

Vazivová pochva

Vazivová papila
(papilla pili)

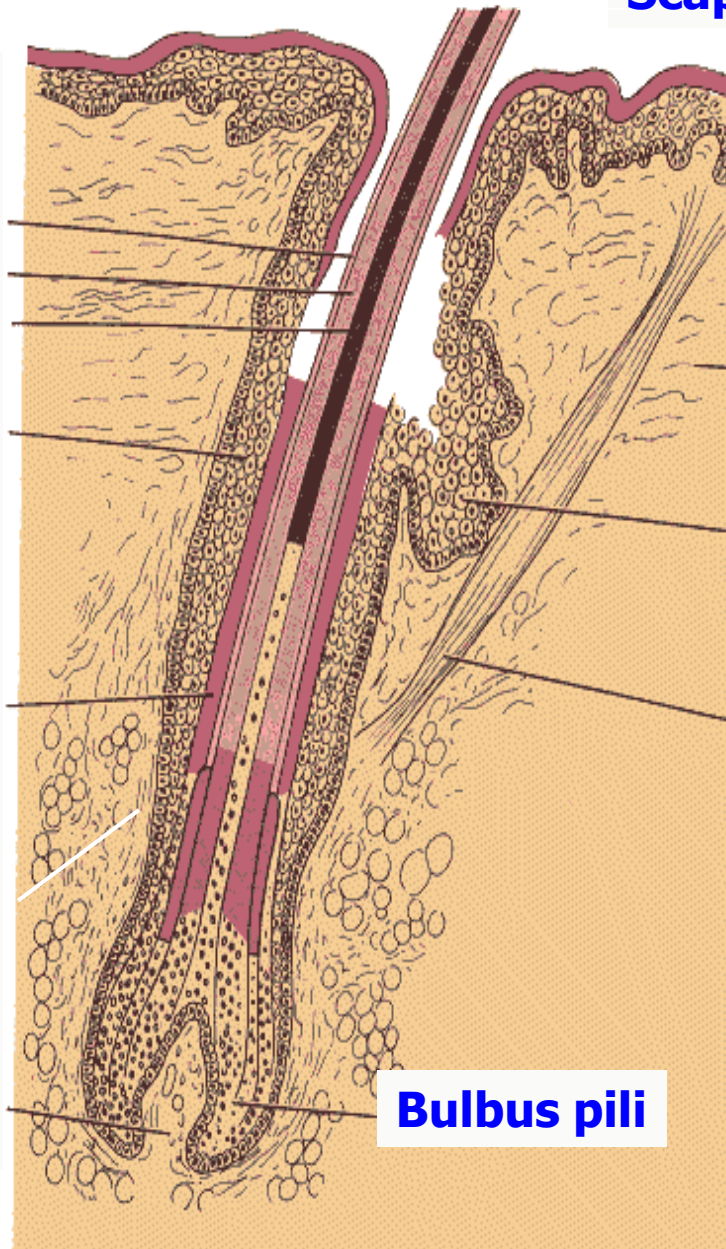
epidermis

dermis

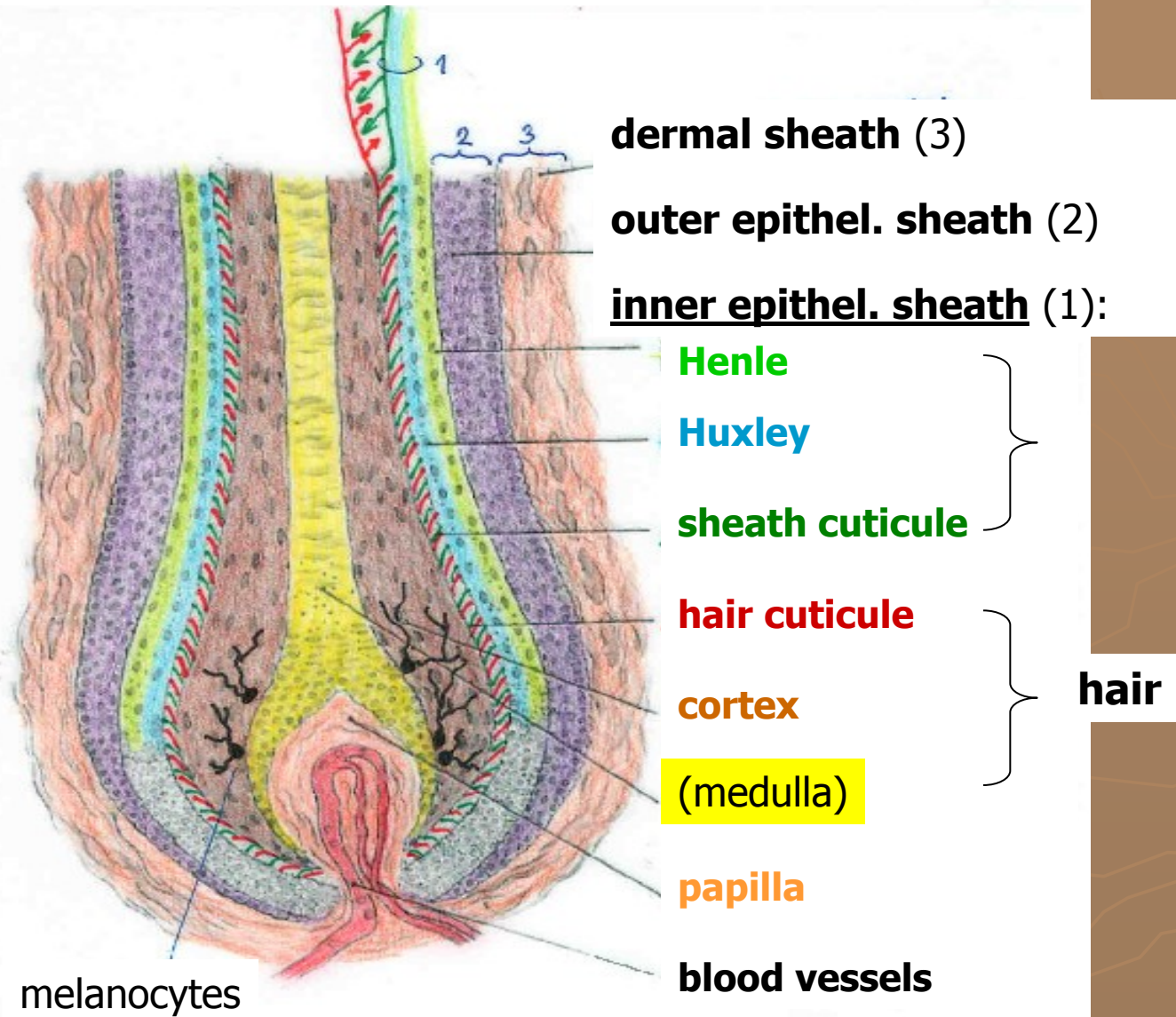
gl. sebacea

m. arrector pili

Bulbus pili



Hair / pilus



Skin with hair (HES)

m. arrector pili



Skin with hair (HEŠ)



Dermal sheath

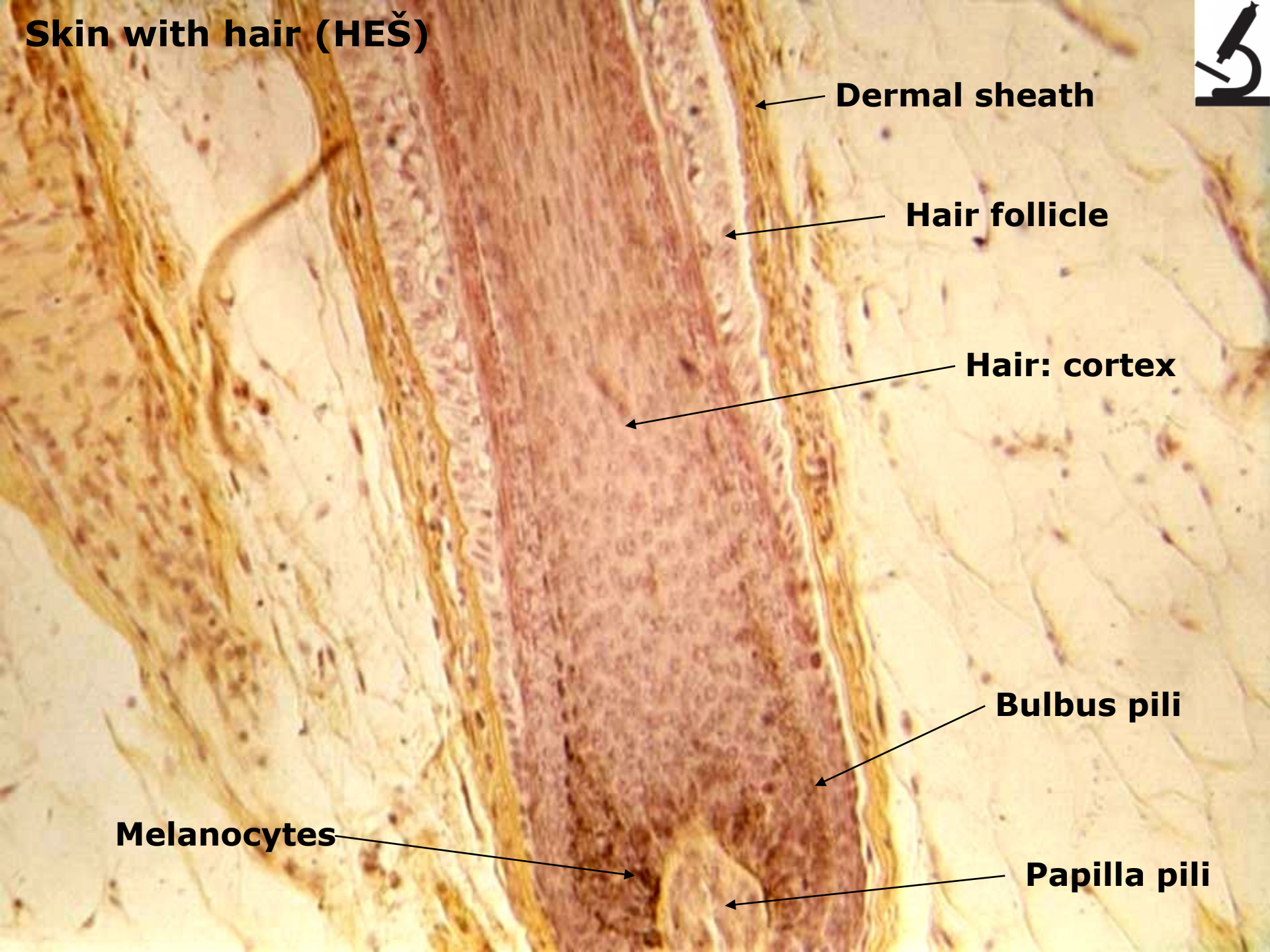
Hair follicle

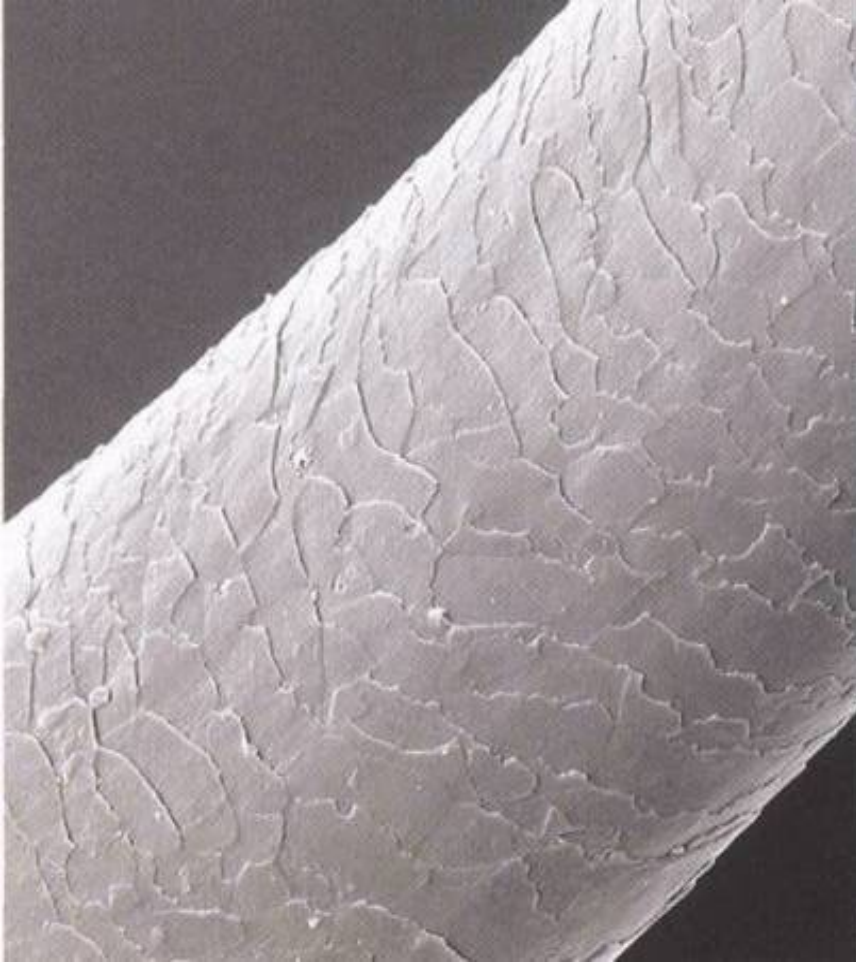
Hair: cortex

Bulbus pili

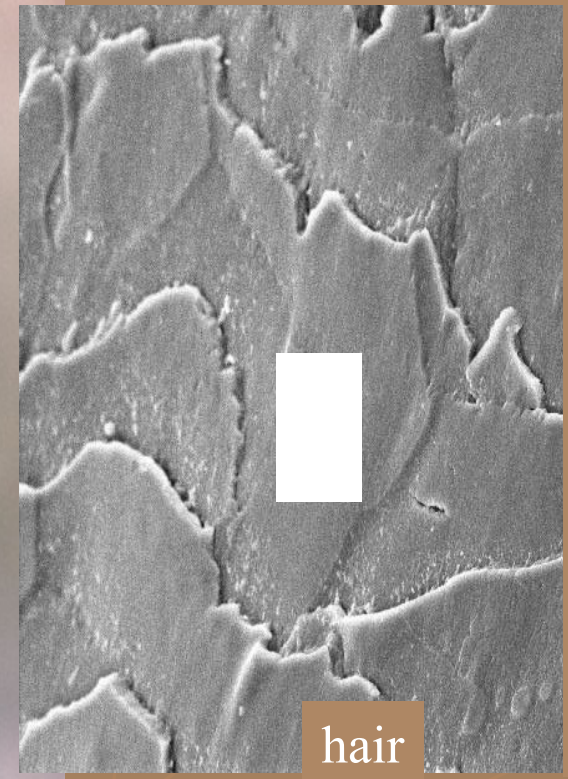
Melanocytes

Papilla pili



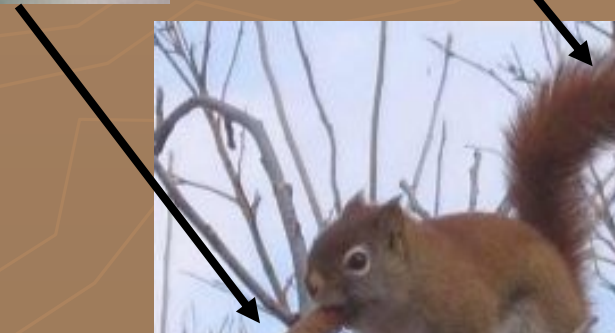


spruce-cone



hair

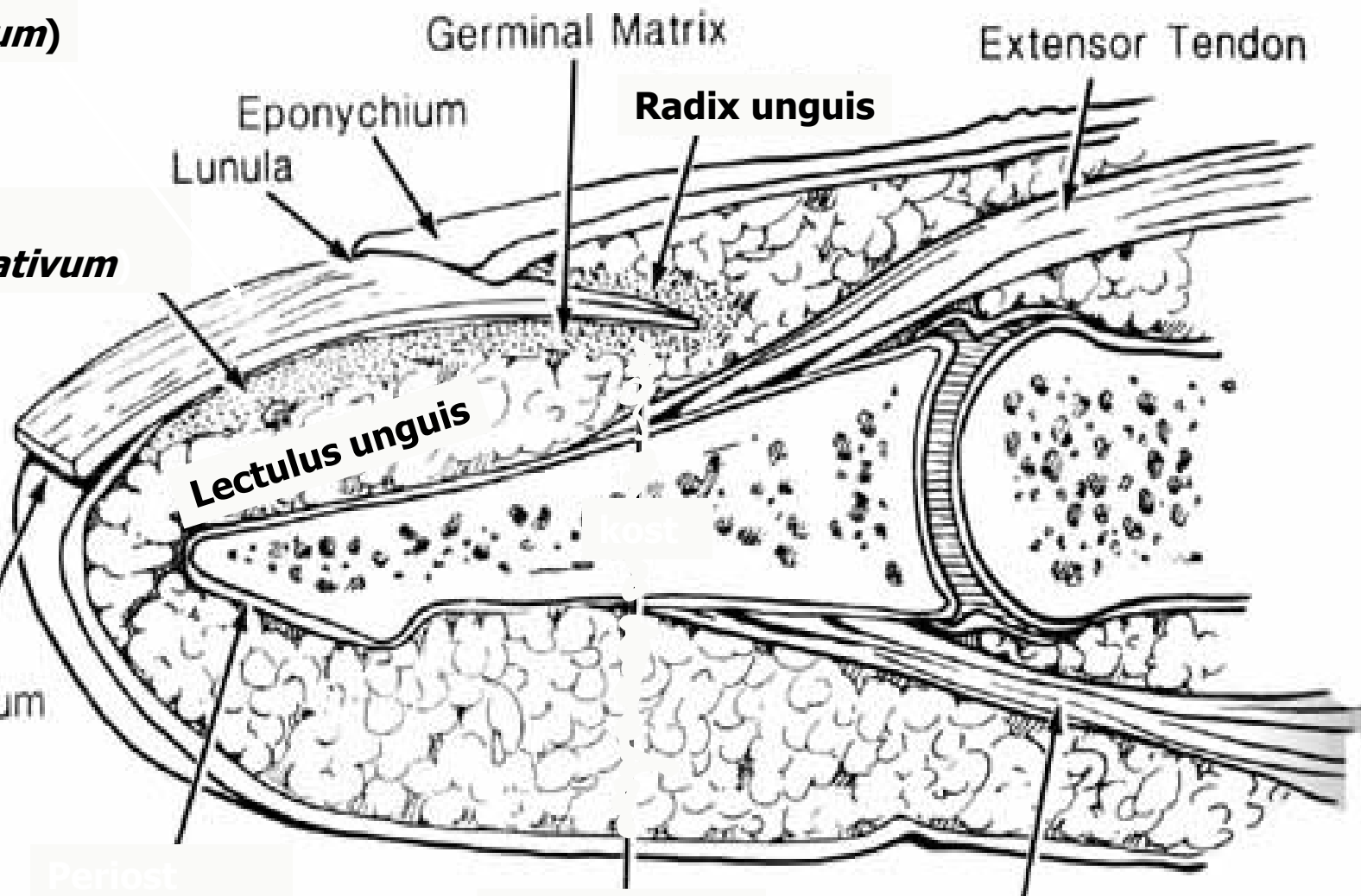
Hair cuticle



Nail (unguis)

Nail plate
(str. corneum)

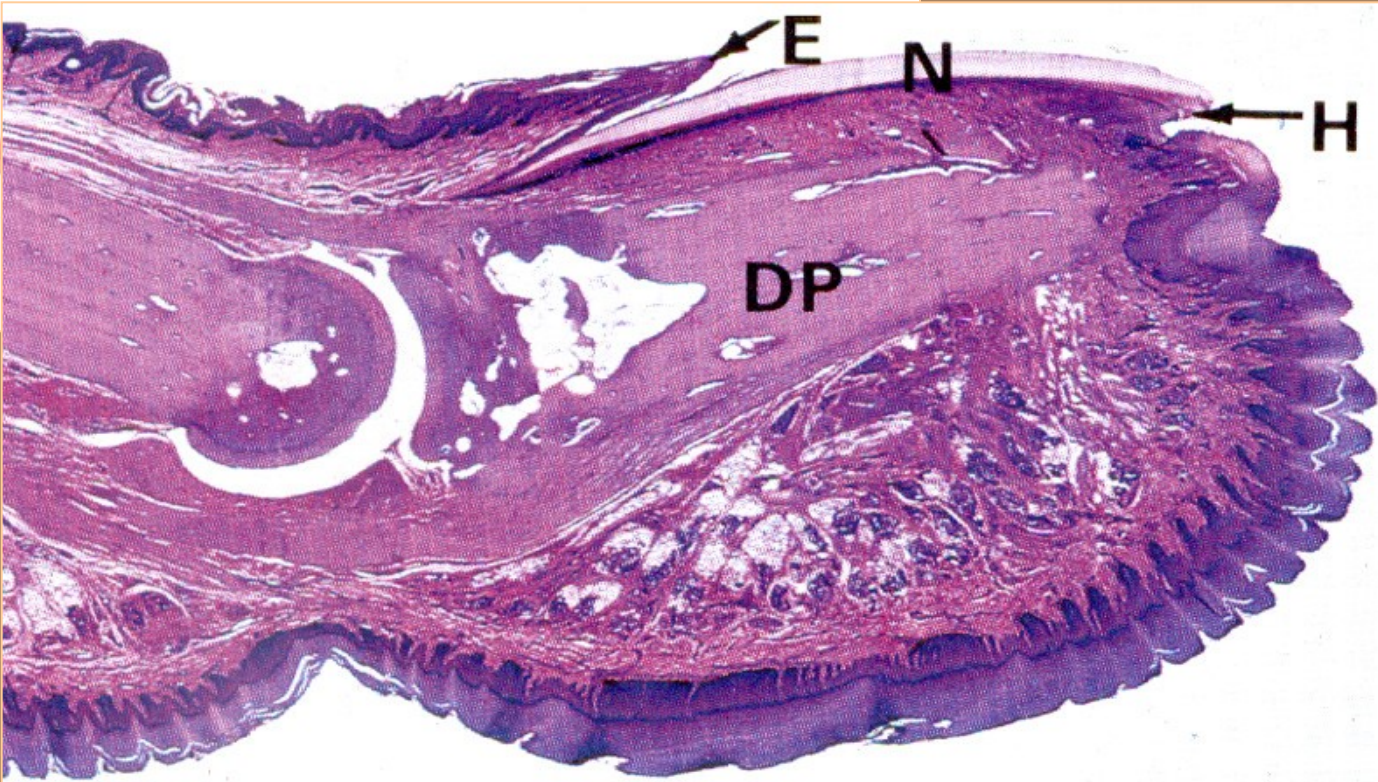
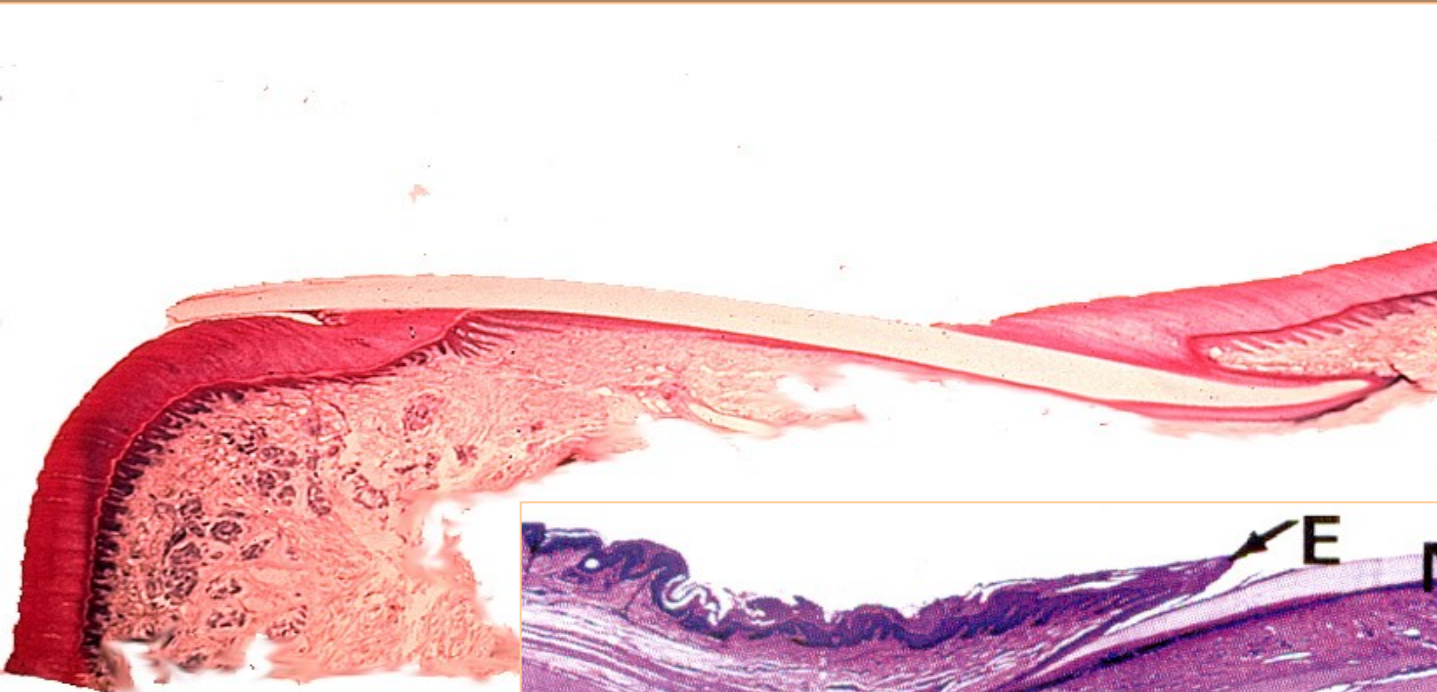
Epithelial bed
(str. germinativum)



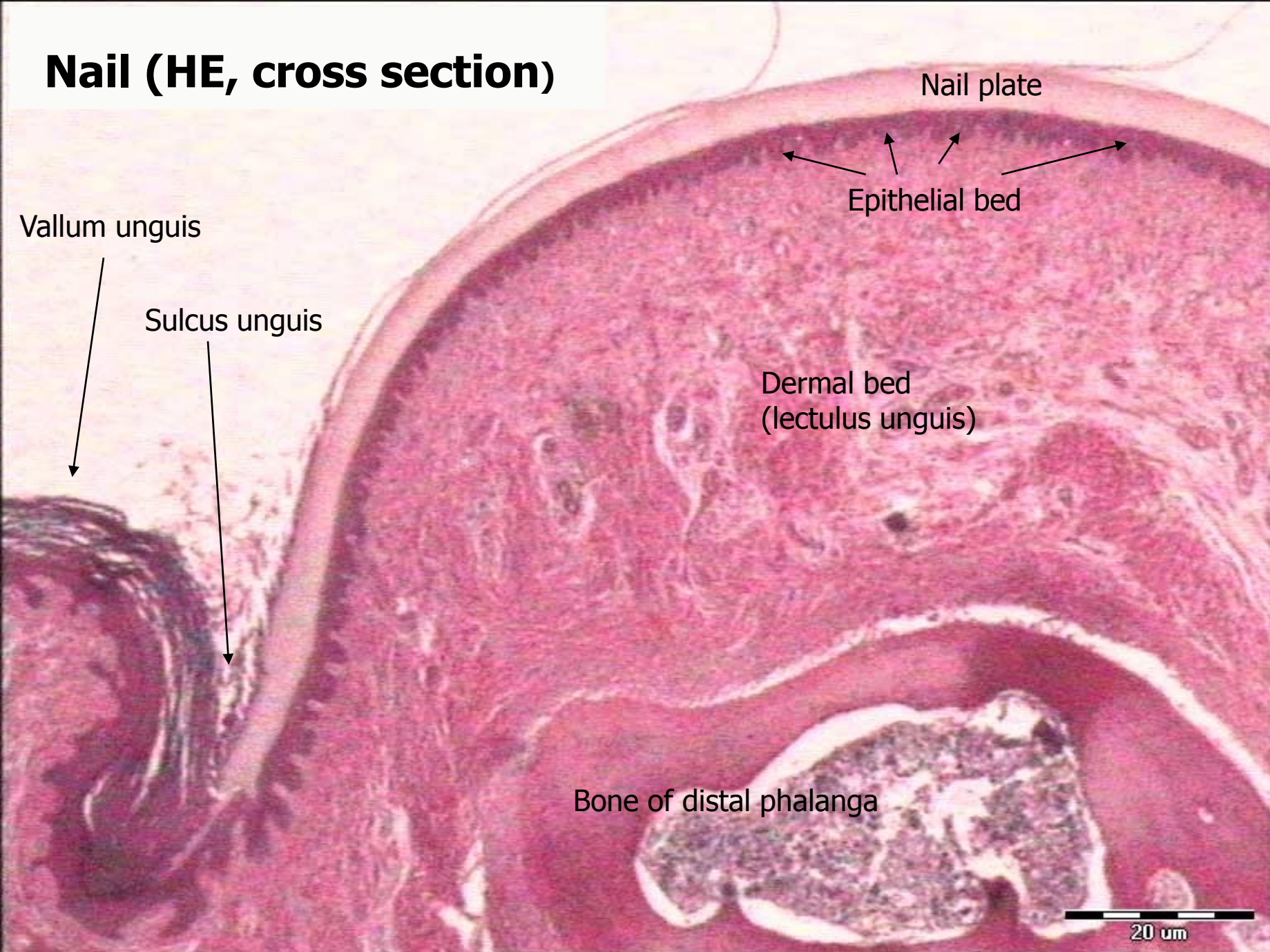
že brška prstu

Flexor Tendon

Nail (HE, longitudinal section)



Nail (HE, cross section)



Nail plate

Epithelial bed

Dermal bed
(lectulus unguis)

Bone of distal phalanga

20 μ m

Vallum unguis

Sulcus unguis

Skin glands

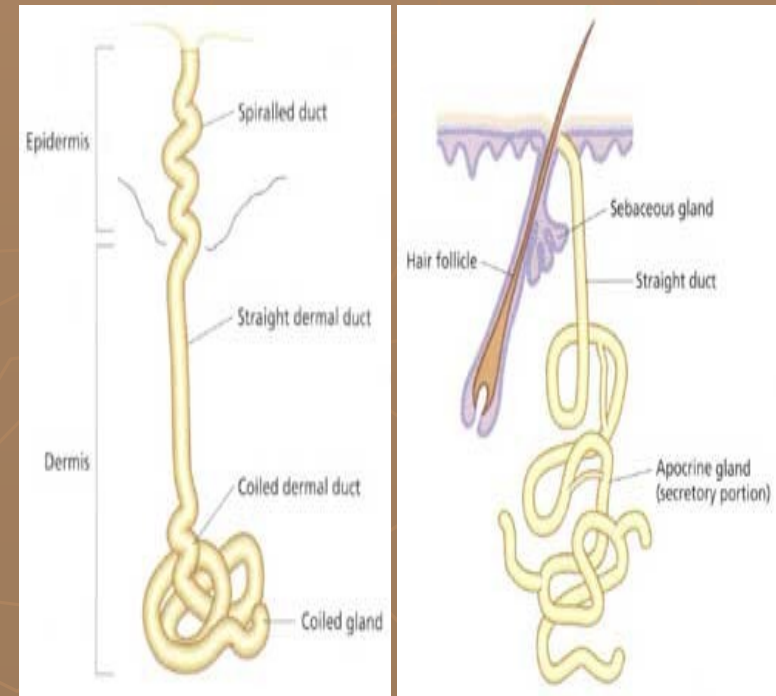
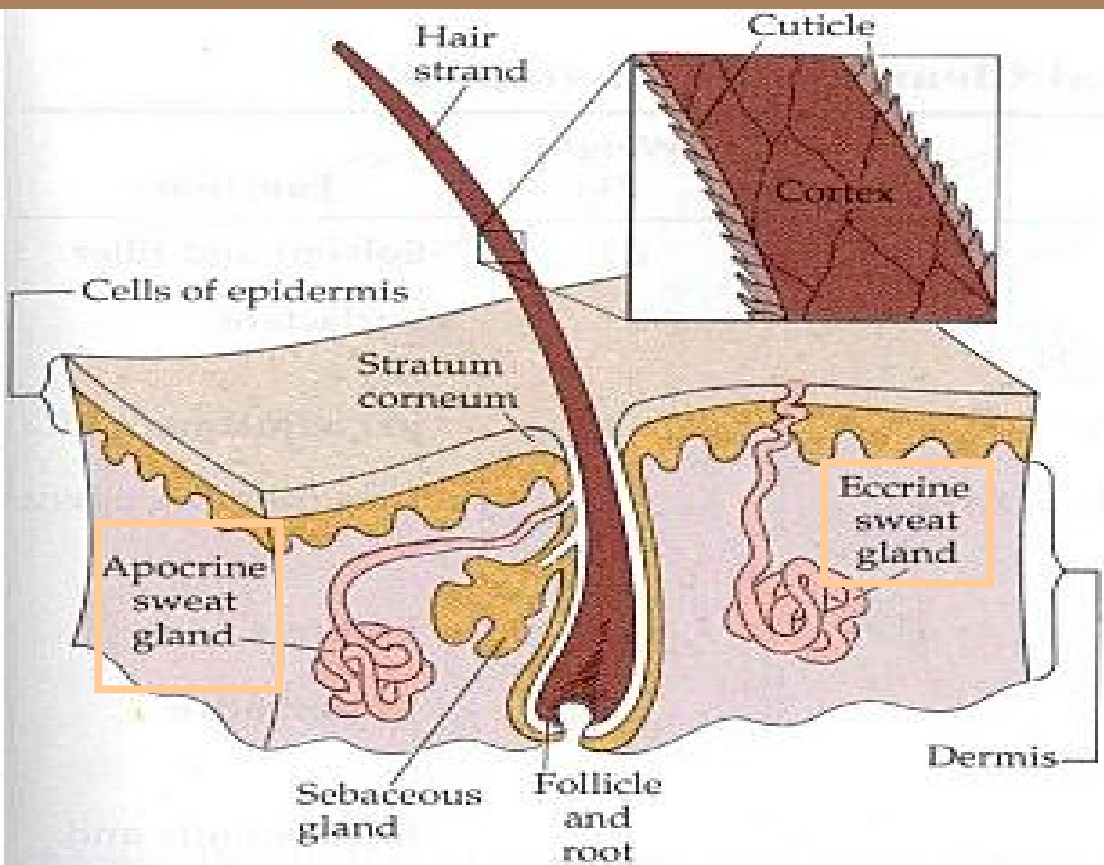
- ▶ **sweat gland**
 - small – *tubular eccrine*
 - large – *tuboalveolar apocrine*
- ▶ **sebaceous gland** – *alveolar holocrine*
- ▶ **mammary gland** – *tuboalveolar*

Sweat glands gll. sudoriferae

- ▶ **Eccrine** (eccrinae) – small,
- ▶ **Apocrine** (apocrinae) – large, aromatic

Tubular glands:

- secretory portion
- duct
- epidermal canal



eccrine

apocrine

Sweat glands

- ▶ duct: in epidermis – intraepidermal canal
in dermis – 2layered squamous epithelium
- ▶ Secretory portion: „glomerulus“



- dark cells - mucopolysaccharides
- light cells – H₂O and ions
- myoepithelial cells

Secretion:
H₂O, proteins, NaCl, NH₃,
urea, uric acid

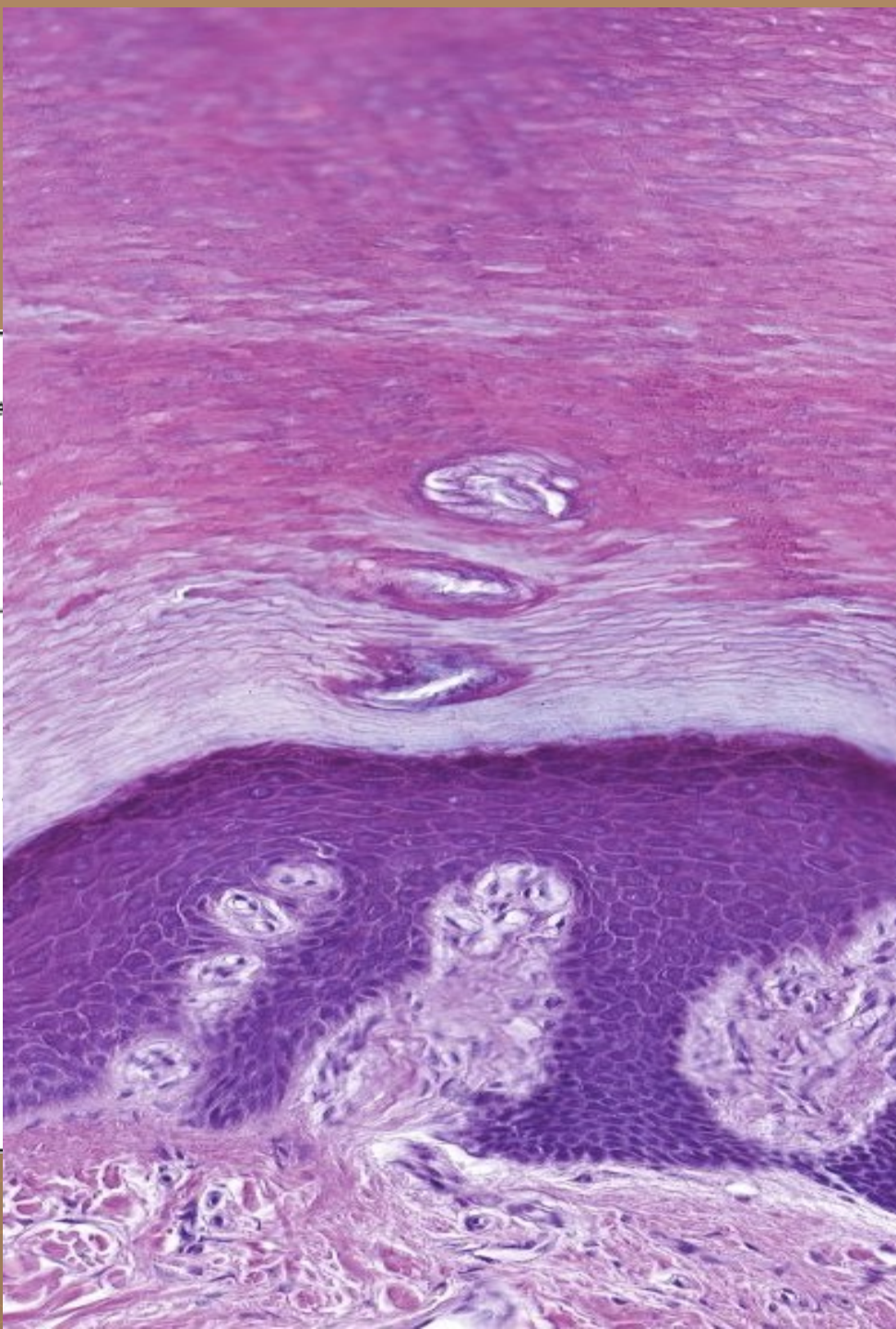
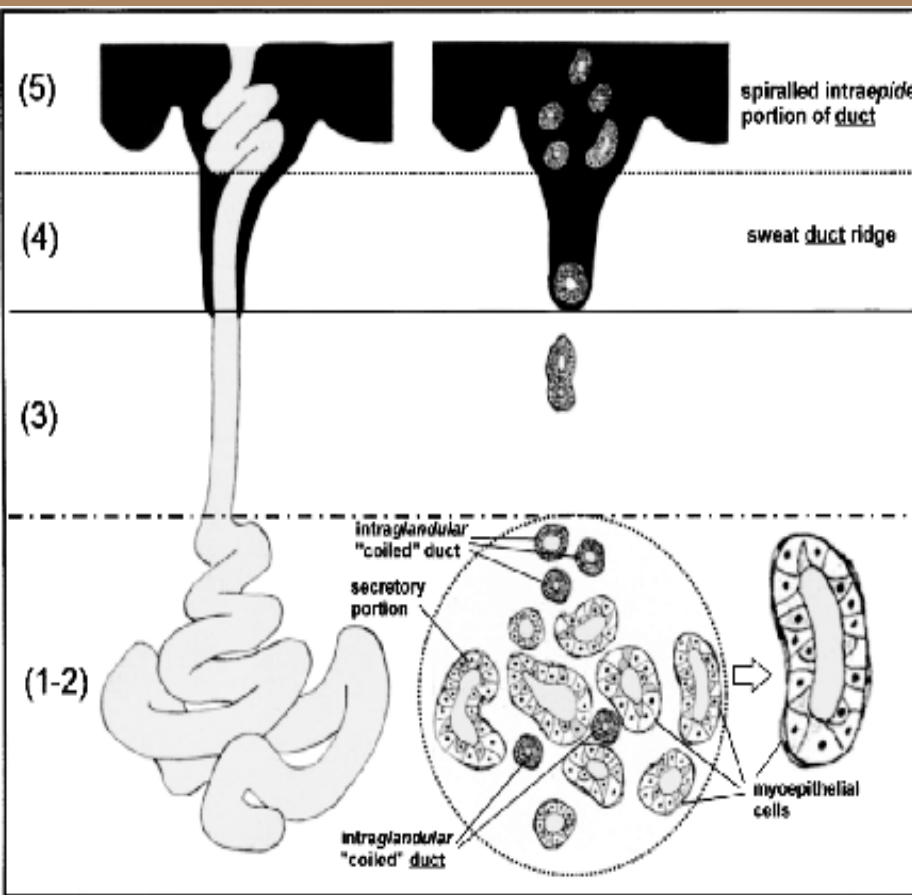


- glandular cells
- myoepithelial cells

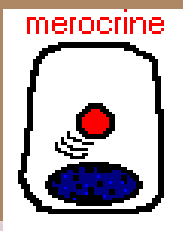
Apocrine glands - occurrence:
axilla, circumanal region, labia pudendi
minores, areola mammae, glands of Moll
In palpebra, gll. ceruminosae

Secretion: H₂O, proteins, steroids

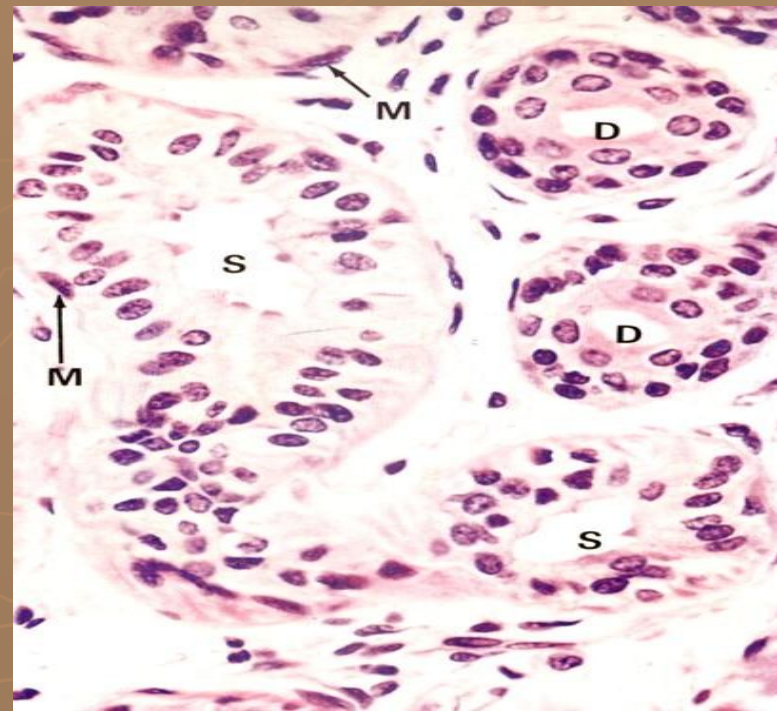
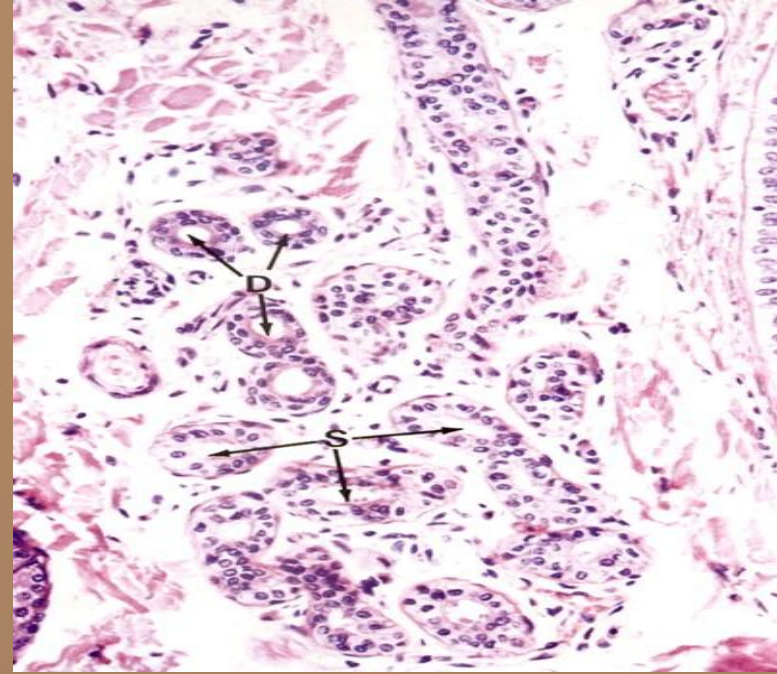
Epidermal canal of sweat gland:



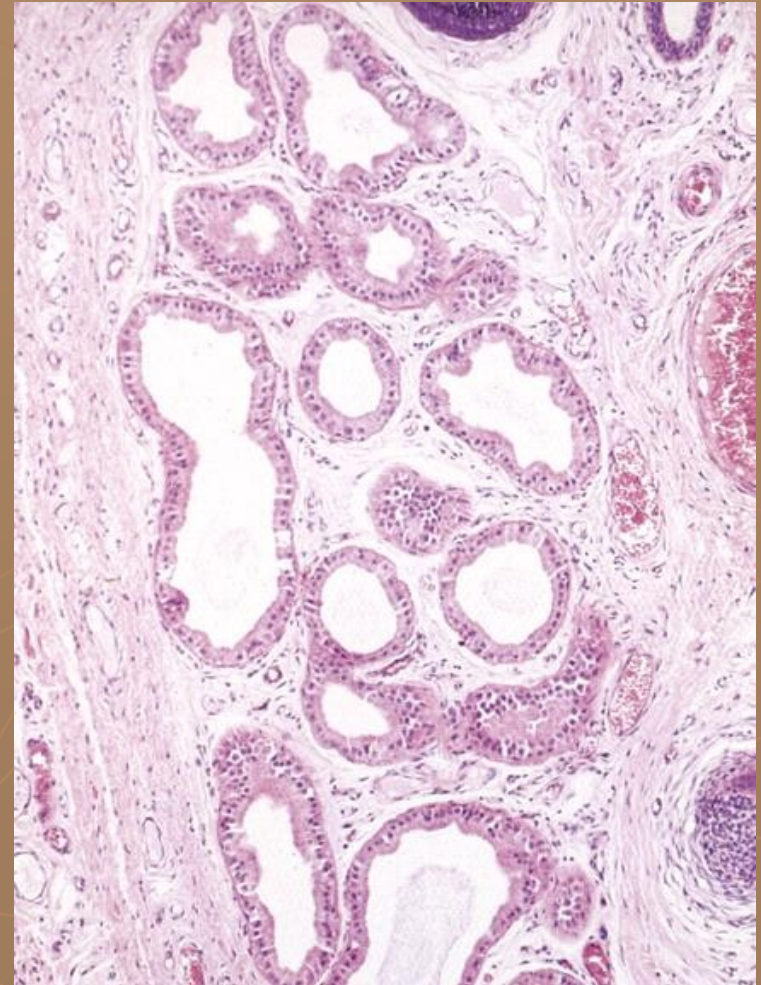
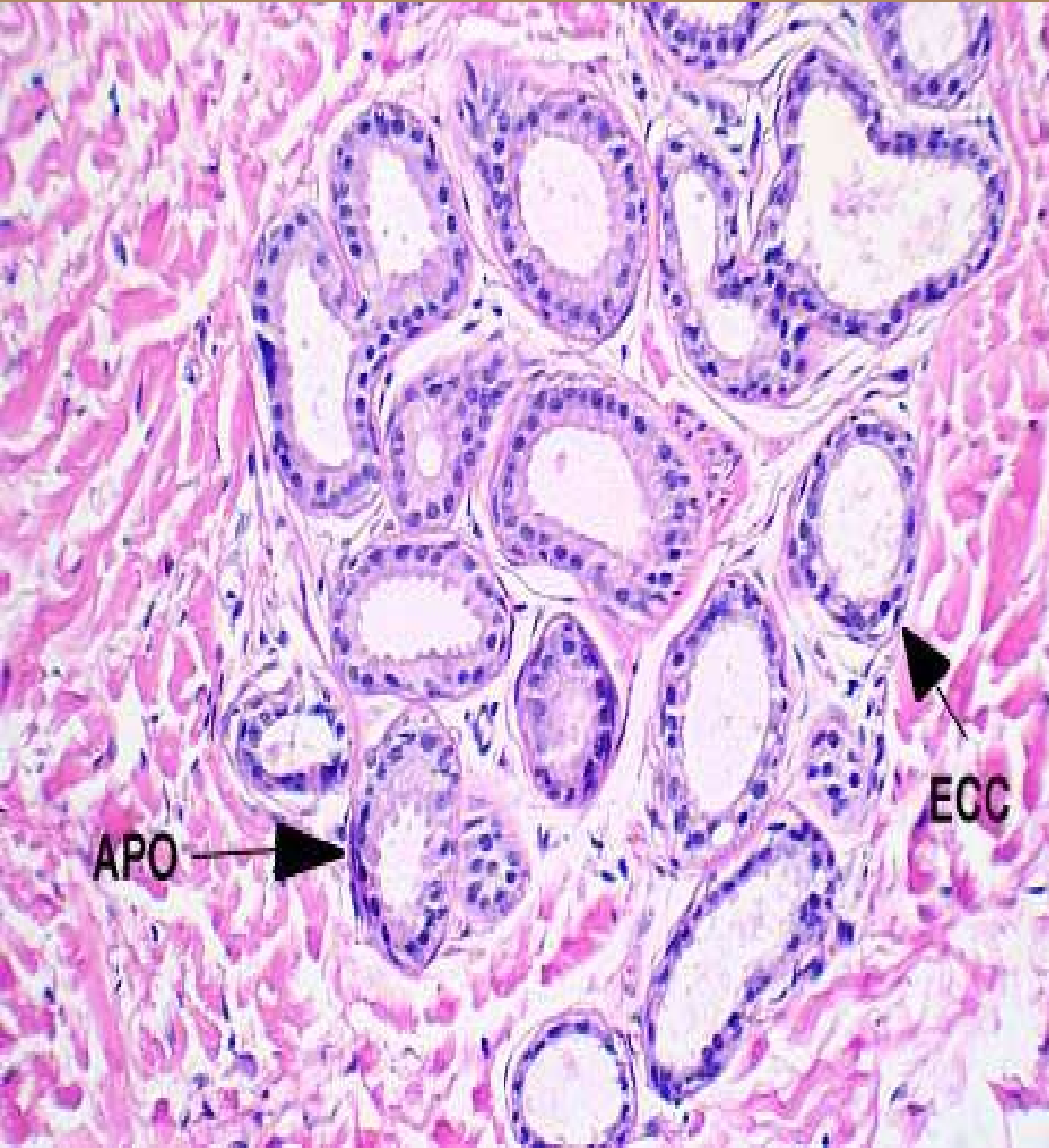
Merocrine sweat glands



Skin, thick H&E

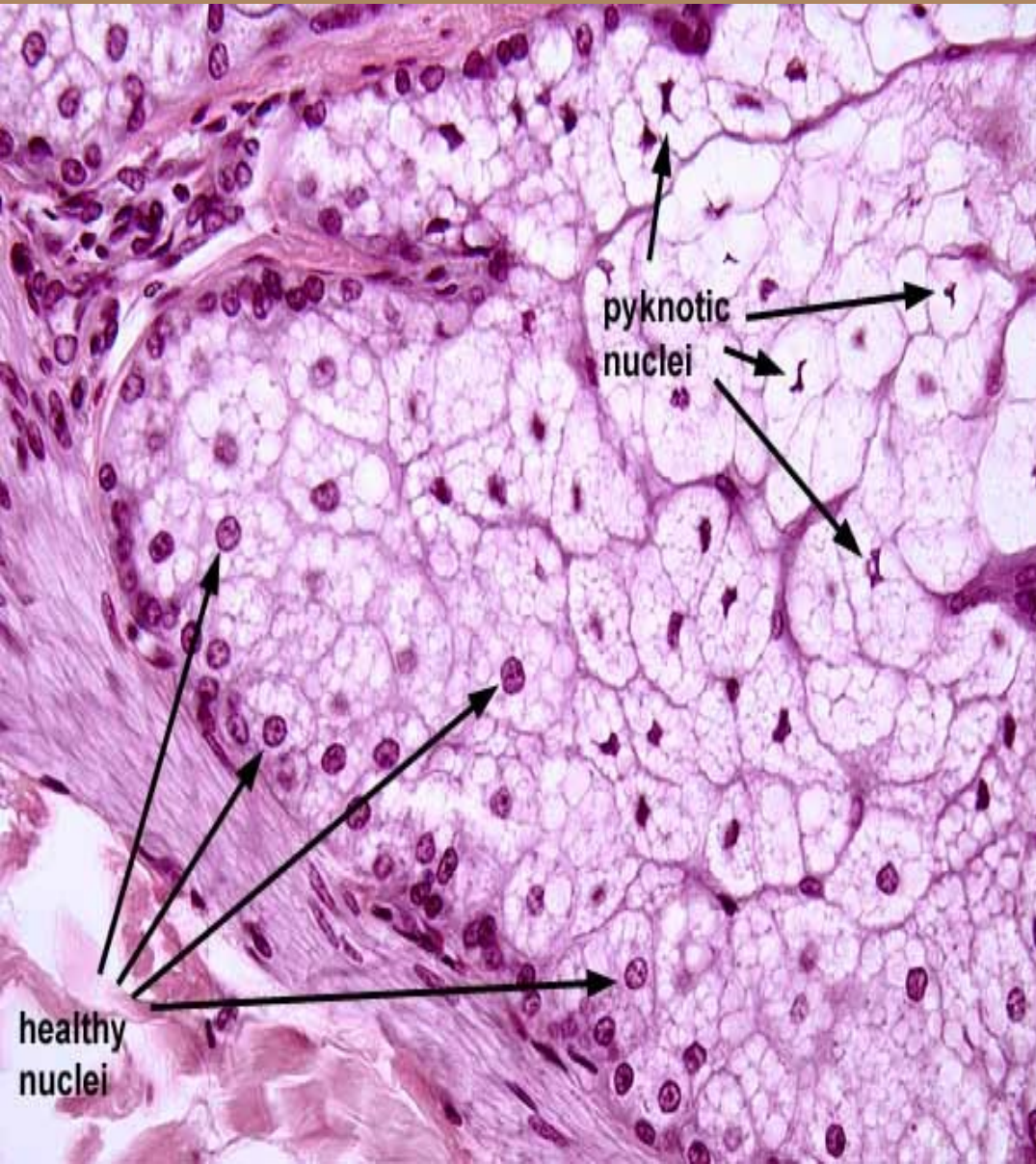
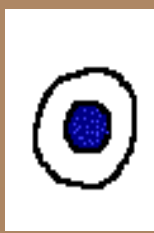


Apocrine sweat glands



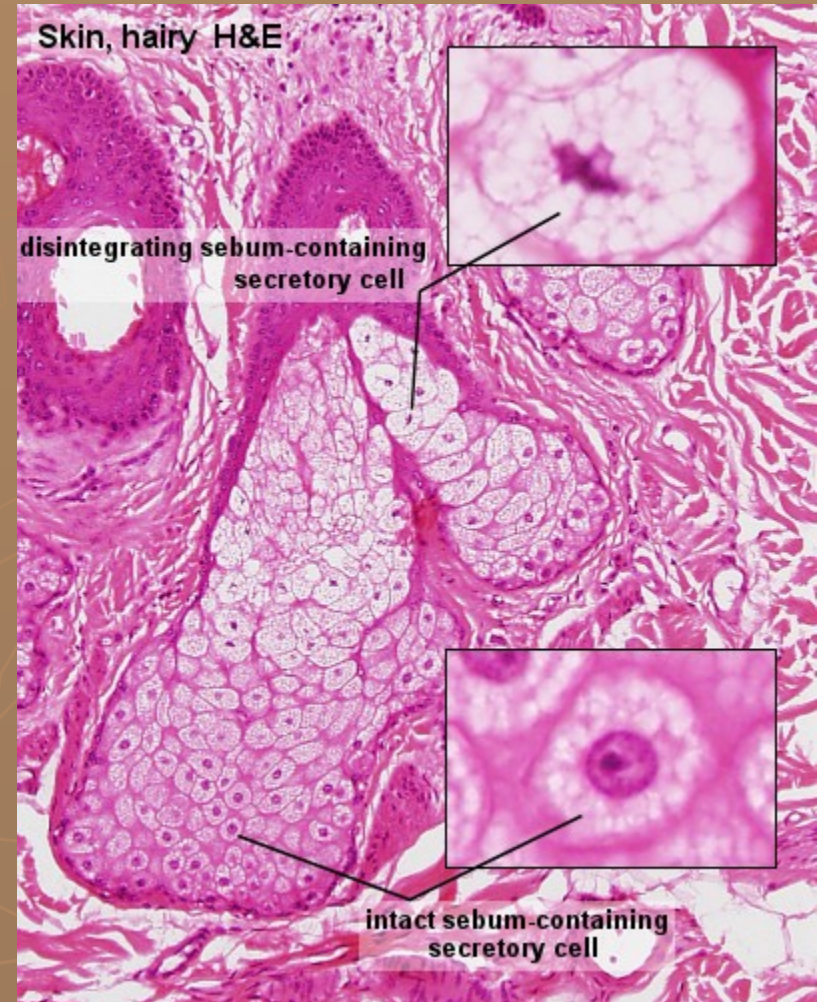
Sebaceous glands

alveolar, holocrine

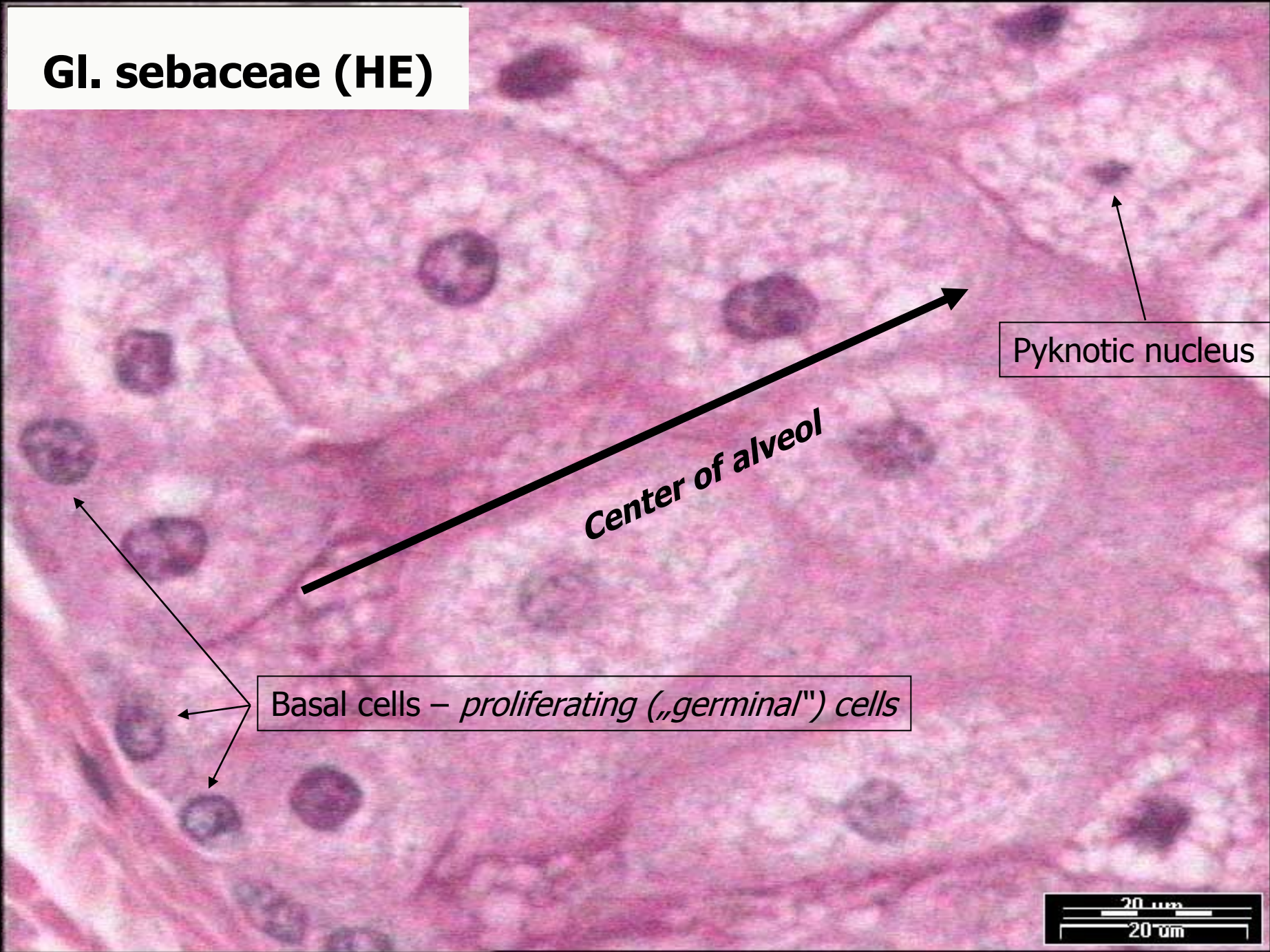


duct: stratified squamous ep.
Secretory portion – filled with cells

Secretion: triacylglycerol,
cholesterol, squalene



Gl. sebaceae (HE)



Pyknotic nucleus

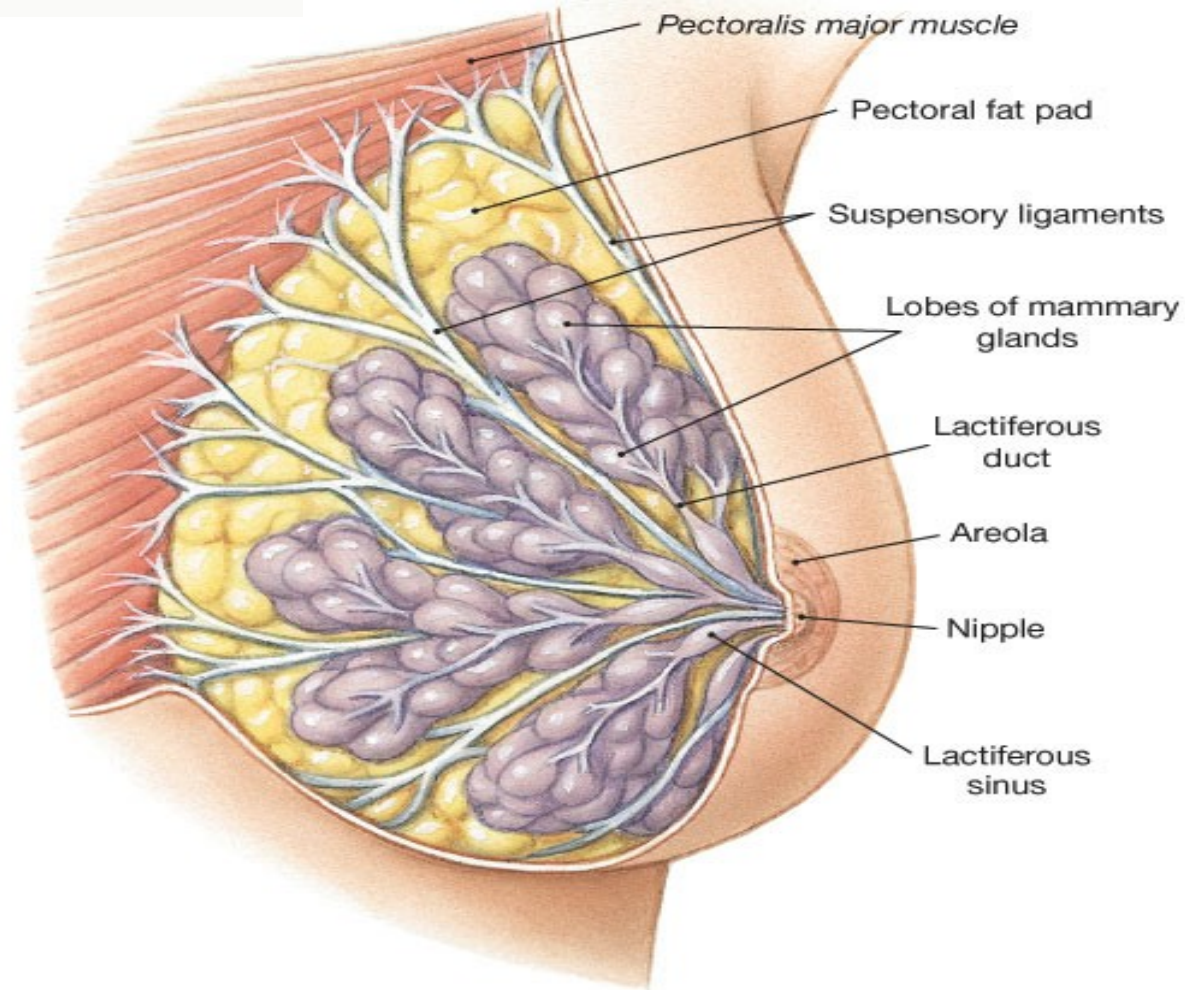
Center of alveol

Basal cells – *proliferating („germinal“) cells*

20 μm
20 μm

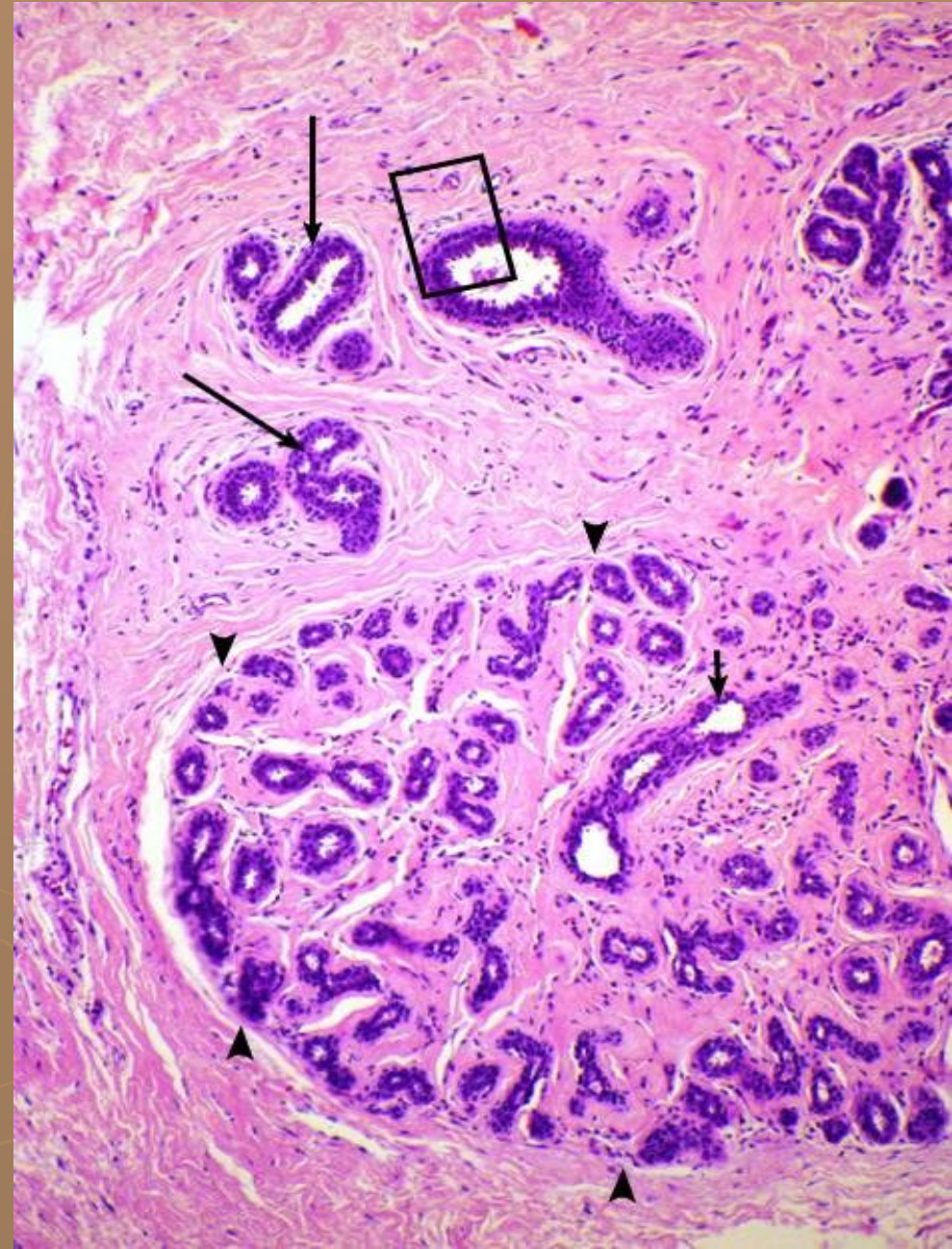
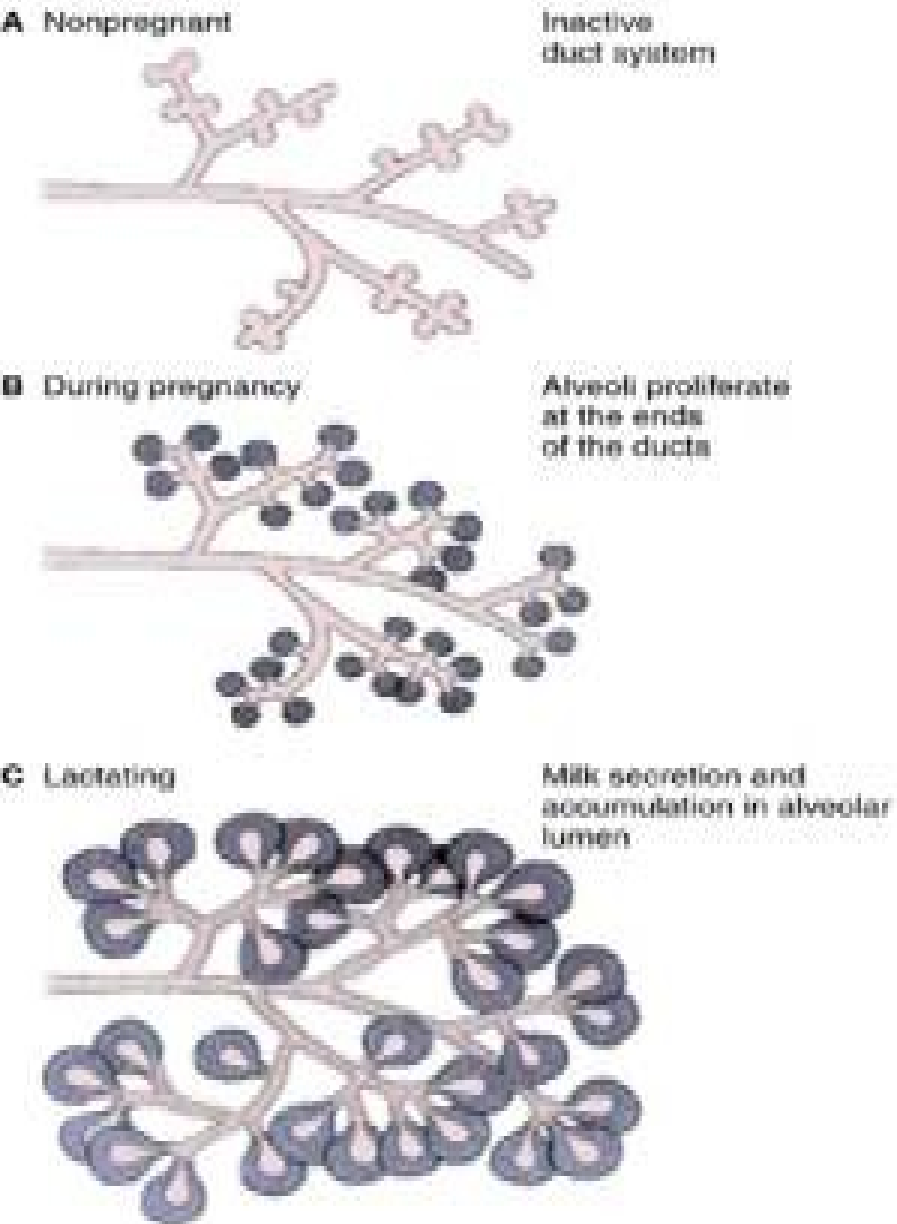
Mammary gland gl. mammae

Tuboalveolar gland

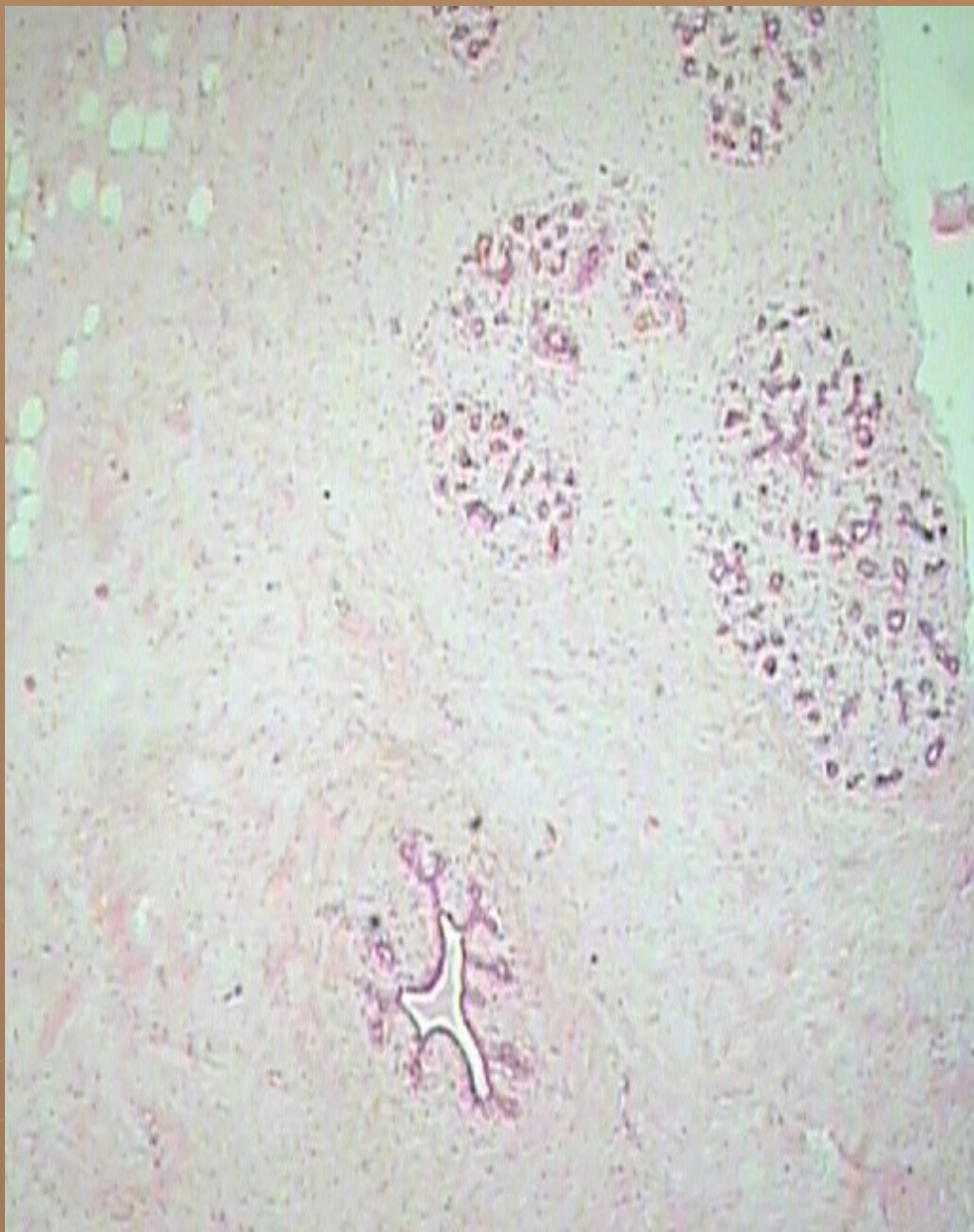
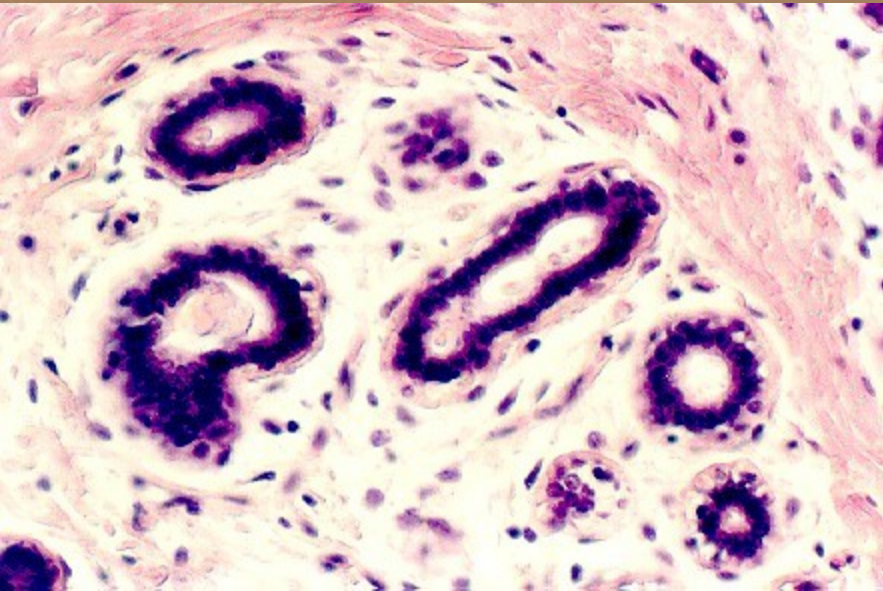
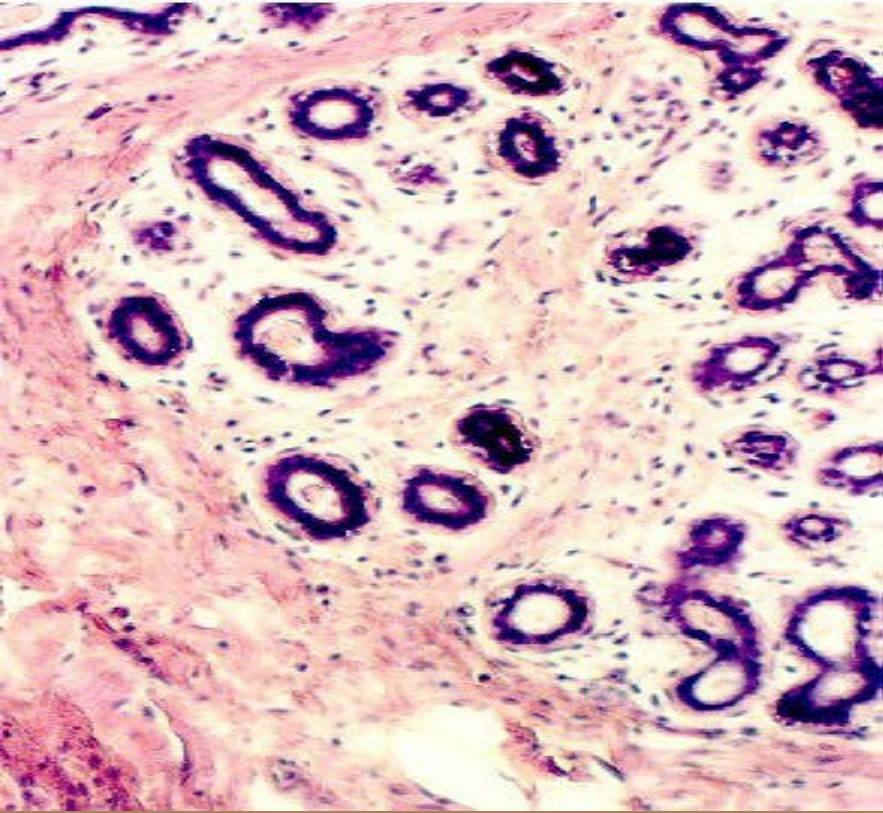


(a) Left breast

Age and functional differences of mammary gland structure



Mamma non lactans

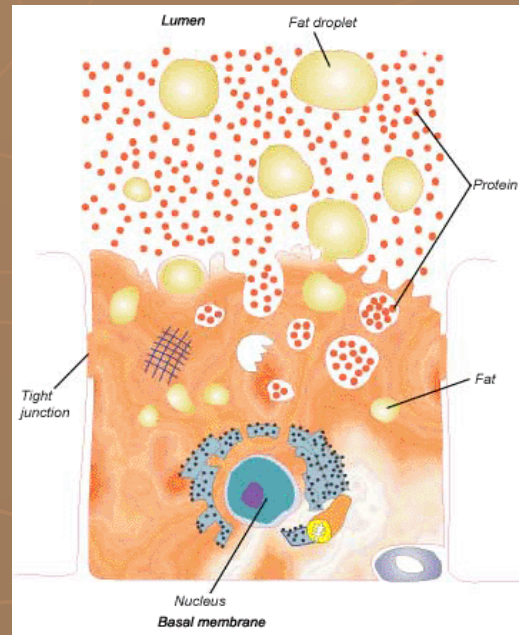
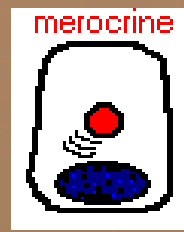
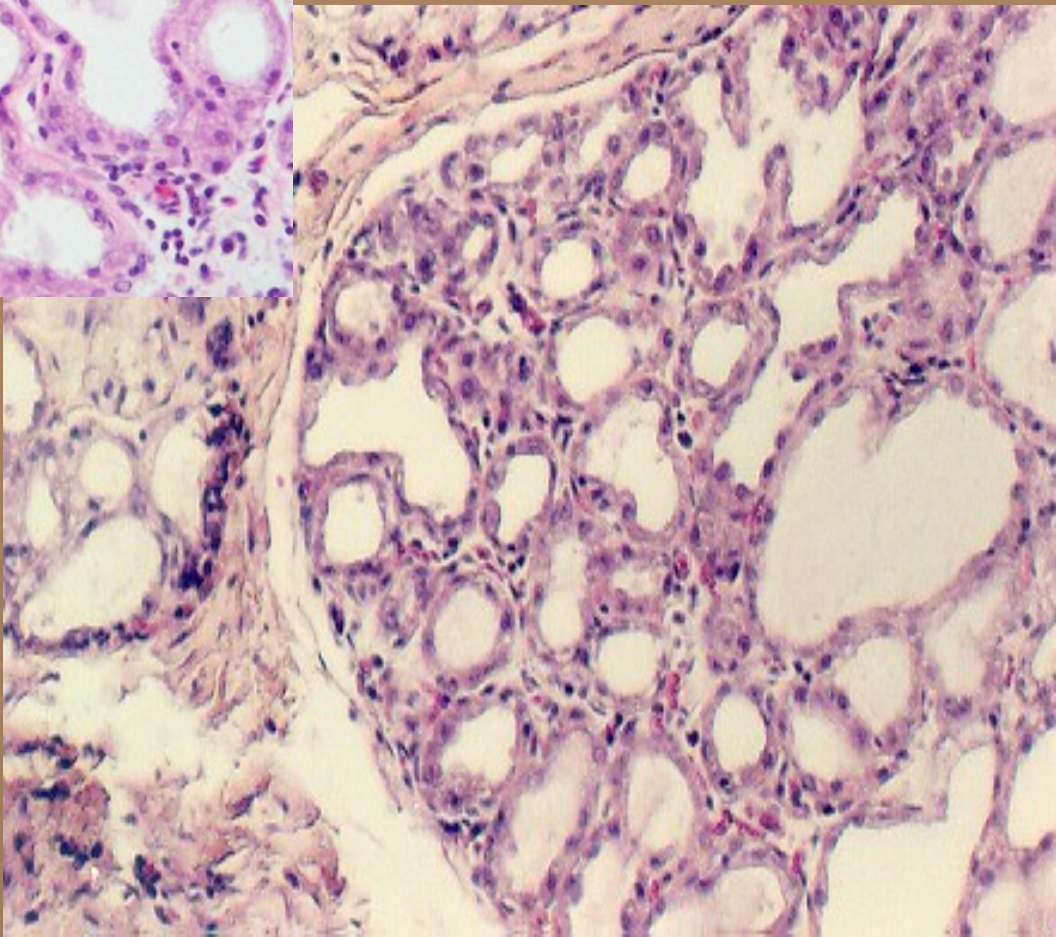


Lactating Mammary Gland. H&E

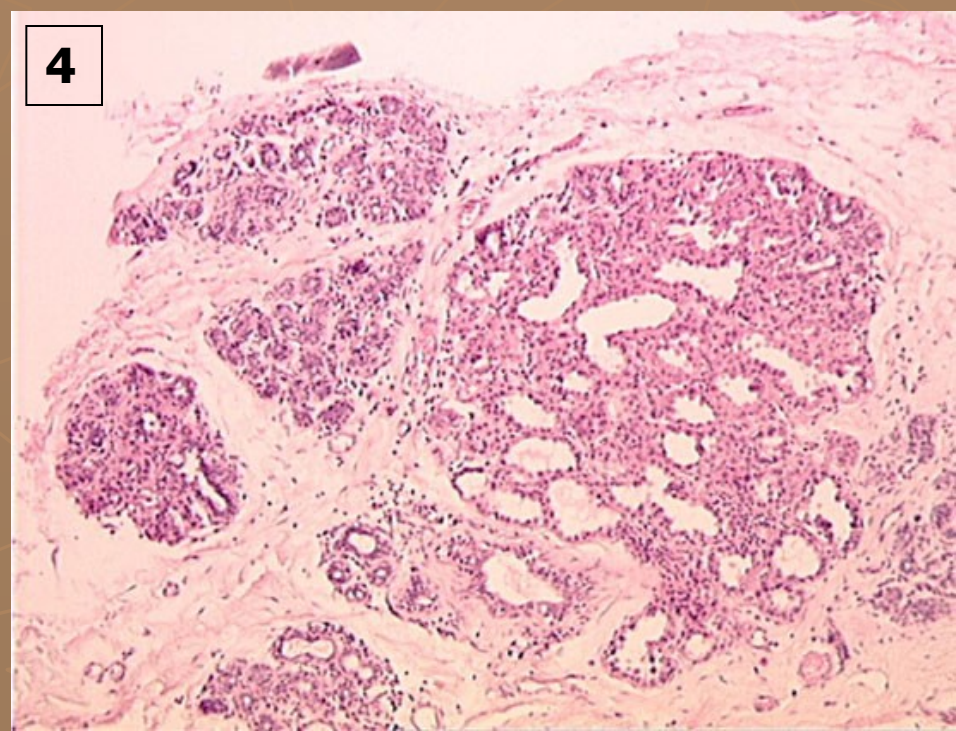
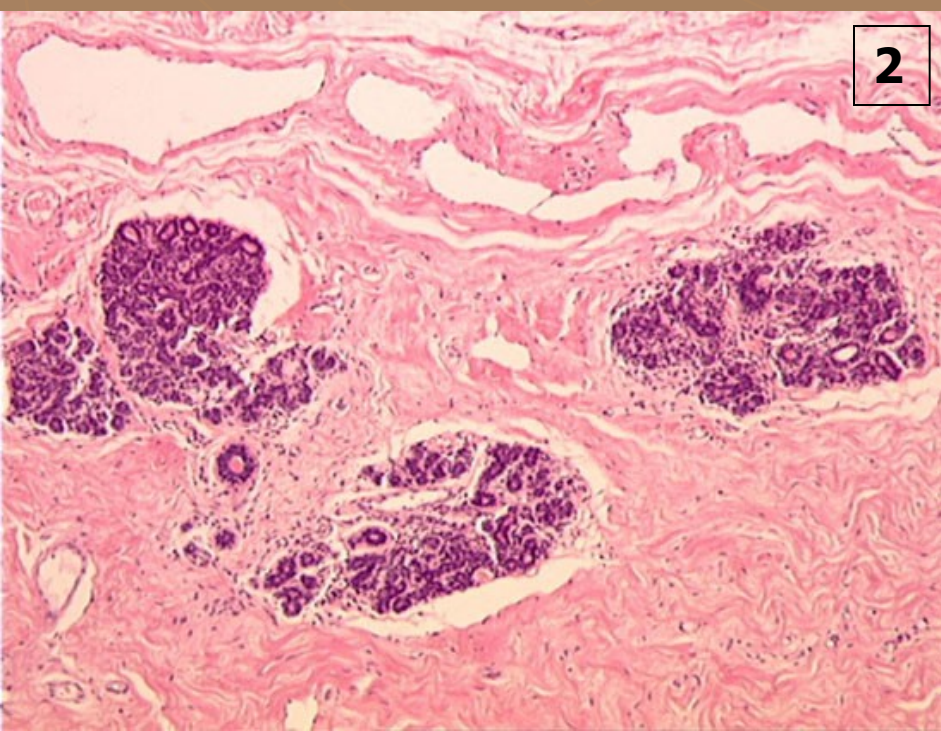
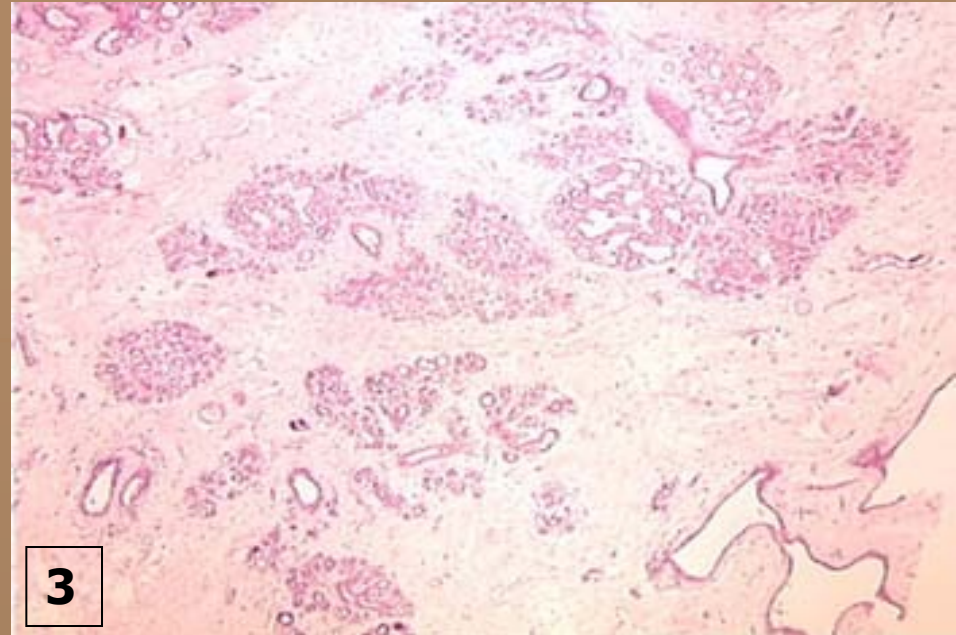
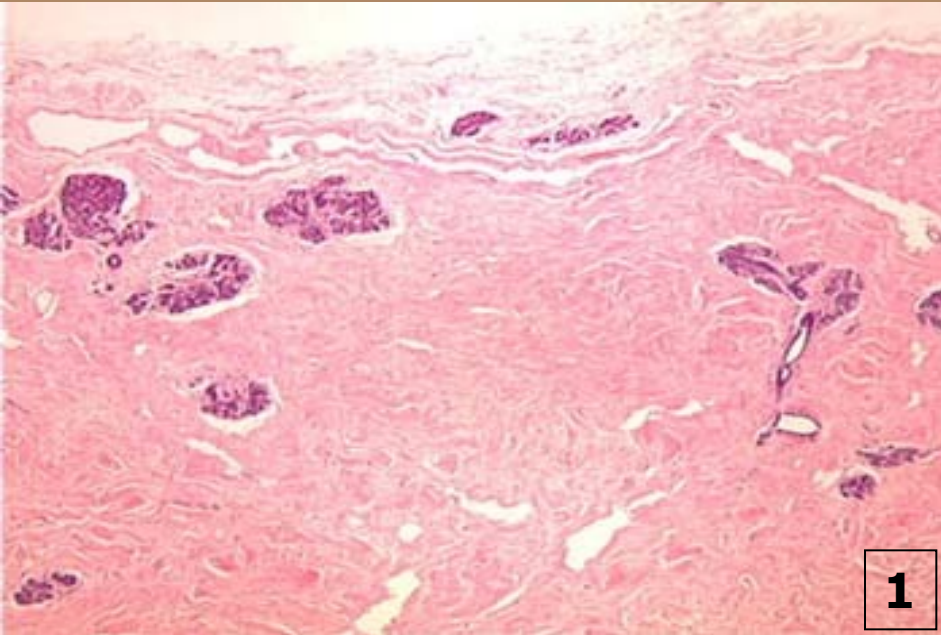
interlobular connective tissue



Mamma lactans



Mamma non lactans (1, 2) and mamma lactans (3,4)



Intergumentary system



Slides:

- ▶ 69. Skin from tip of finger (HE)
- ▶ 70. Skin from axilla (HE)
- ▶ 71. Skin with hair (HE)
- ▶ 72. Nail (HE, longitudinal or cross section)
- ▶ 73. Mamma non lactans (HE)
- ▶ 74. Mamma lactans (HE)