

The Integumentary System



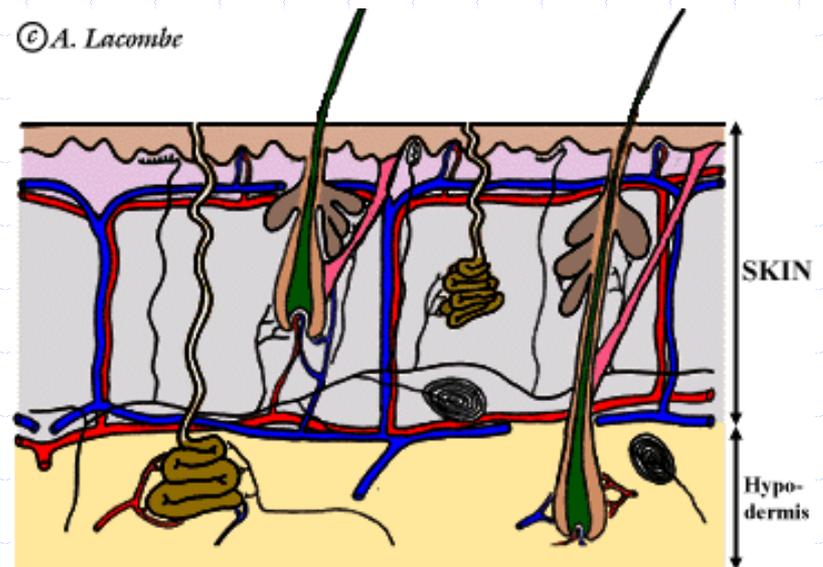
Adriaan van de Spiegel
1627

Skin Facts (1 of 3)

- ◆ The largest organ in the body.
- ◆ You have 2 square yards or 15% of your weight.
- ◆ Each square inch has: 625 sweat glands, 65 hair follicles, 19000 sensory glands.

Skin Facts (2 of 3)

- ◆ The thinnest part is your eyelid, the thickest part is the bottom of your feet.
- ◆ Is waterproof.
- ◆ You lose 9 pounds of skin each year.

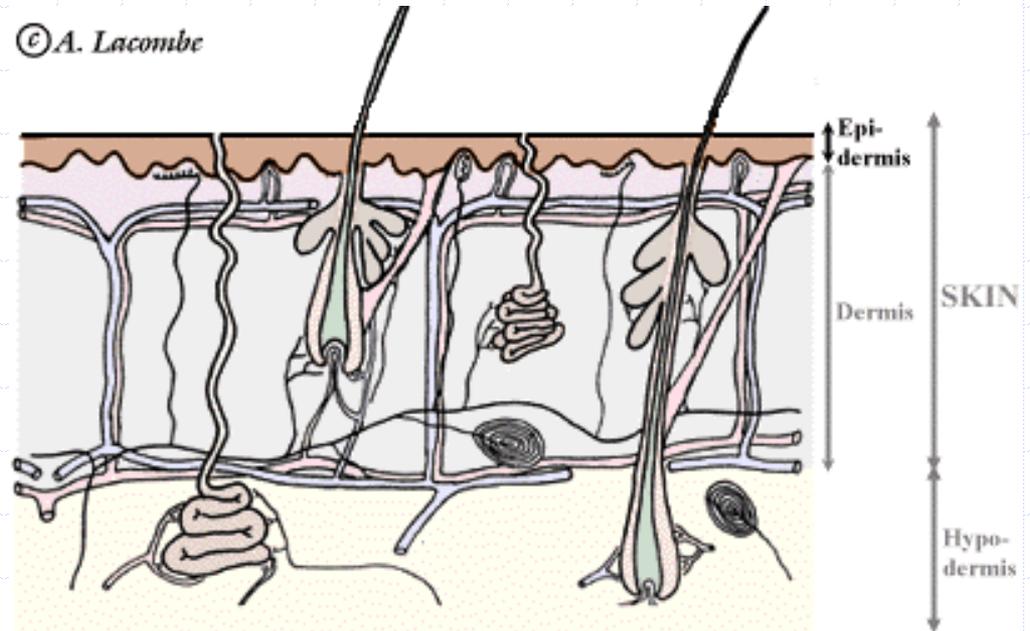


Skin Facts (3 of 3)

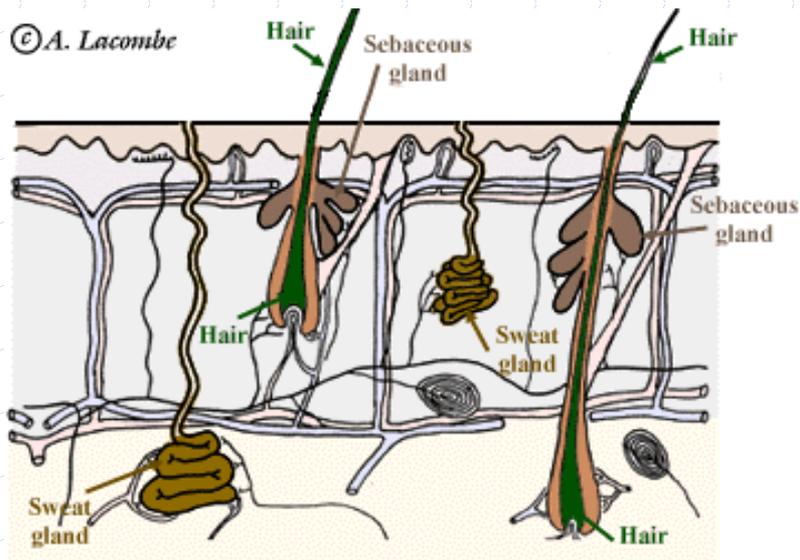
- ◆ The skin covers all of the exposed surface of the body
- ◆ and is continuous with the mucous membranes lining openings into the body surface, such as those of the digestive, respiratory and urogenital systems.

2 Layers of Skin

- ◆ - 1 - the outer epidermis
- ◆ - 2 - the inner dermis



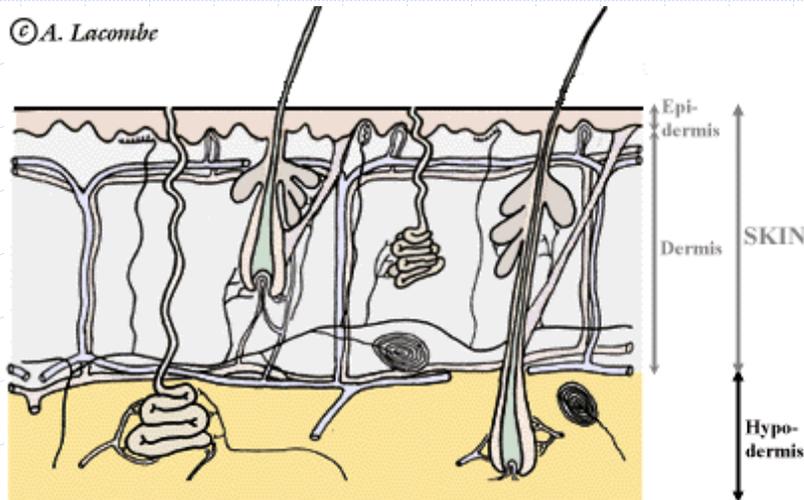
Appendages of the Skin



- ◆ Hair
- ◆ Nails
- ◆ Sebaceous glands
- ◆ Sweat glands

Beneath the Dermis

- ◆ Beneath the dermis is the hypodermis (=subcutaneous tissue = superficial fascia) which anchors the skin loosely to underlying tissues (mainly muscles).



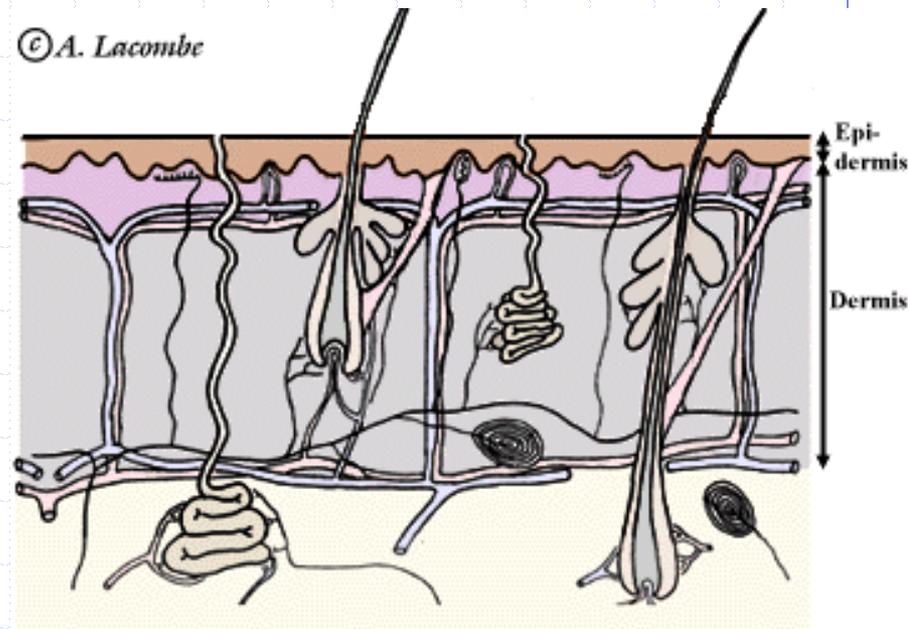
Note: The hypodermis is not part of the skin

Functions of the Skin

- ◆ - 1 - Protection: barrier against the outside
- ◆ - 2 - Protection against dehydration
- ◆ - 3 - Body Temperature Regulation
- ◆ - 4 - Cutaneous Sensation
- ◆ - 5 - Metabolic Functions
- ◆ - 6 - Blood Reservoir
- ◆ - 7 - Excretion

The Epidermis

- ◆ The **epidermis** is a **keratinized stratified squamous epithelium** consisting of **four distinct cell types** and **five distinct layers**.

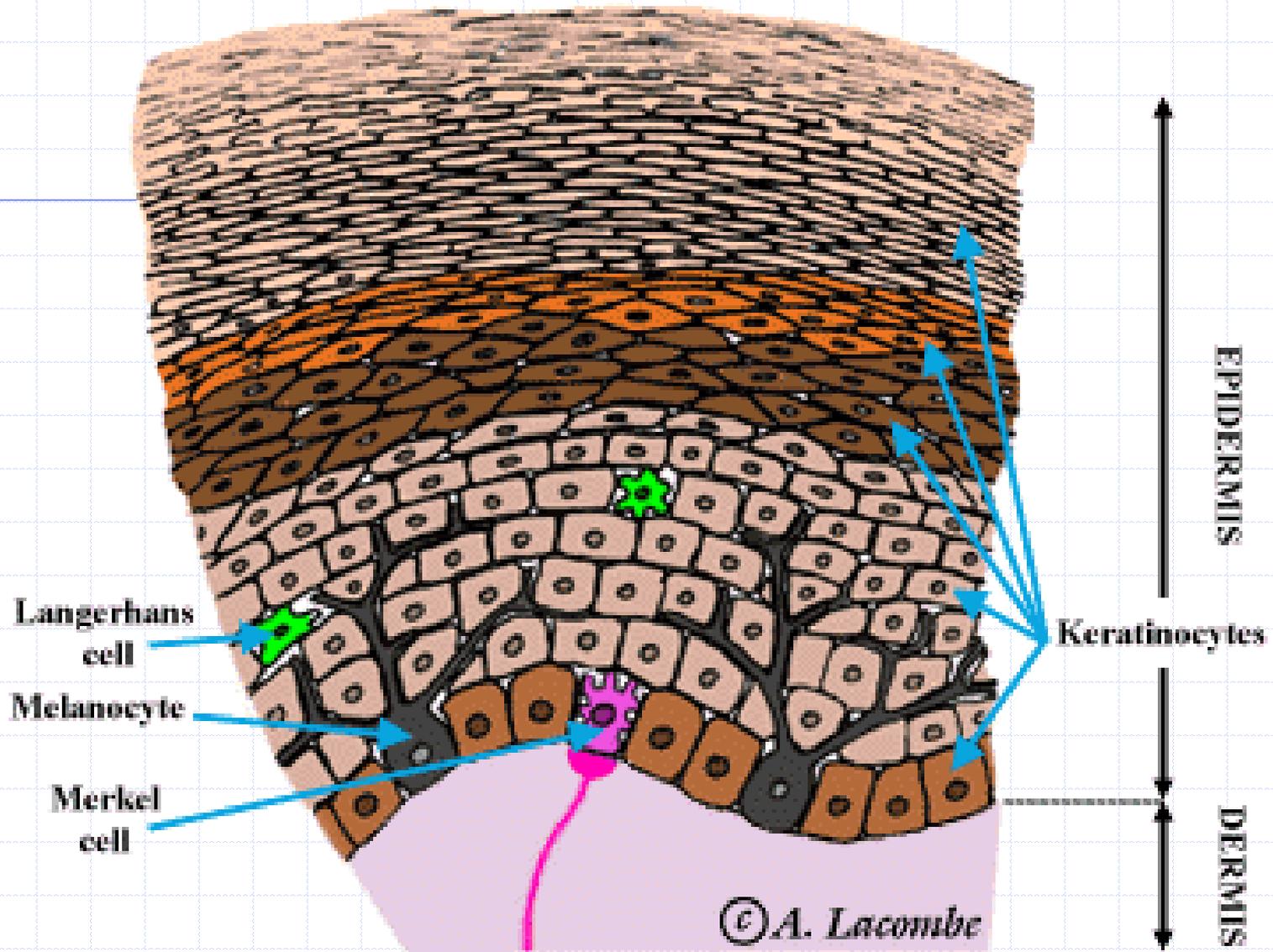


The Epidermis

- ◆ Its thickness varies: 0.07-0.12 mm over most of the body to 0.8 mm on the palms and 1.4 mm on the soles.
- ◆ Its surface layer, consisting of dead cells, is rich in keratin, a protein which renders it dry and more or less waterproof, thus resisting surface evaporation and preventing excessive water loss.

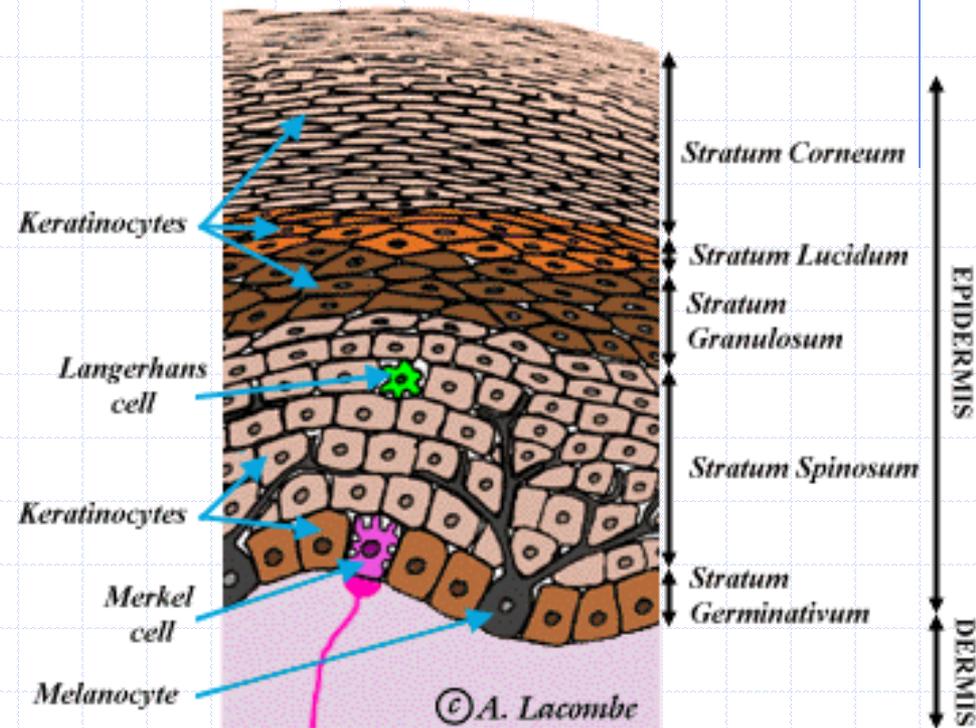
Cells of the Epidermis

1. the **keratinocytes**: compose most of the epidermis. They produce a protein: the keratin.
2. the **Merkel cells**: sensory receptors (touch).
3. the **melanocytes**: synthesize the melanin pigments which protect the skin against ultraviolet damage.
4. the **Langerhans cells**: macrophages used in the defense against microorganisms.



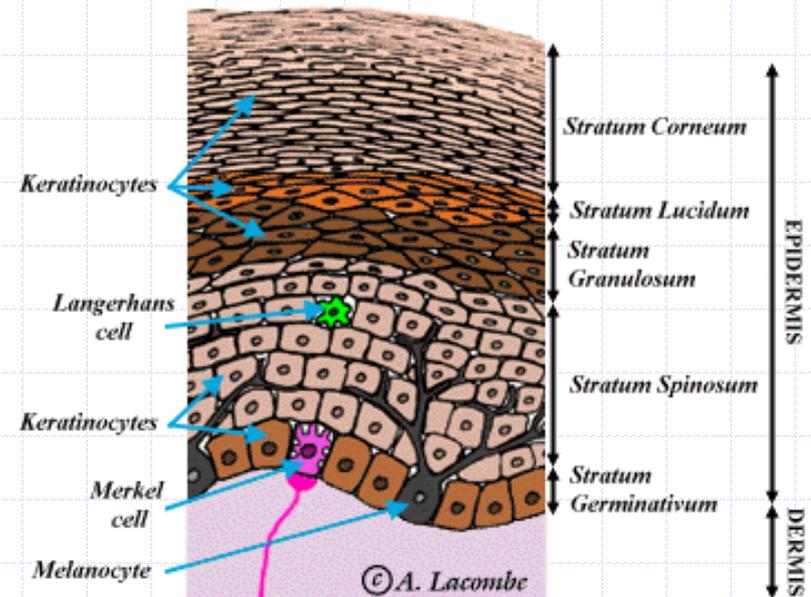
Layers of the Epidermis

- ◆ The epidermis consists of several layers of cells
- ◆ From the deepest to the most superficial...



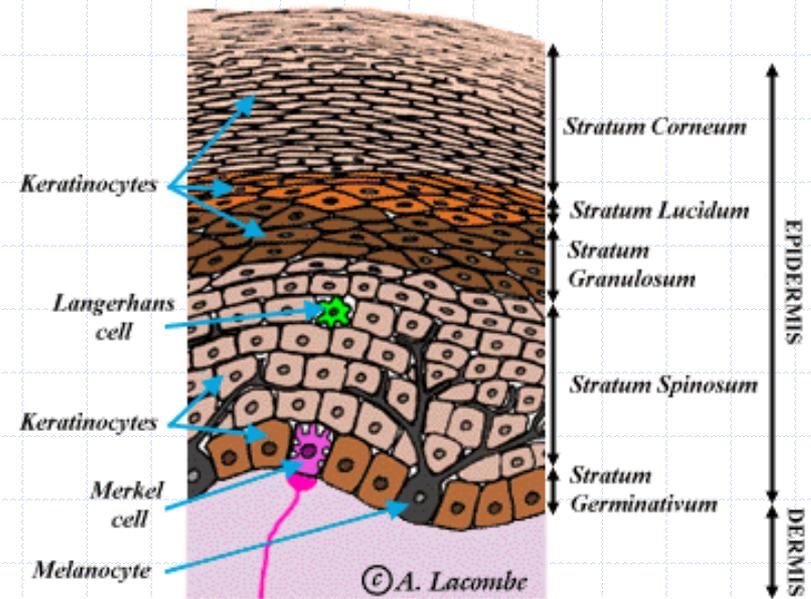
#1; Stratum basale (or stratum germinativum)

- ◆ is the deepest epidermal layer.
- ◆ It consists of one row of cuboidal to columnar shaped cells.



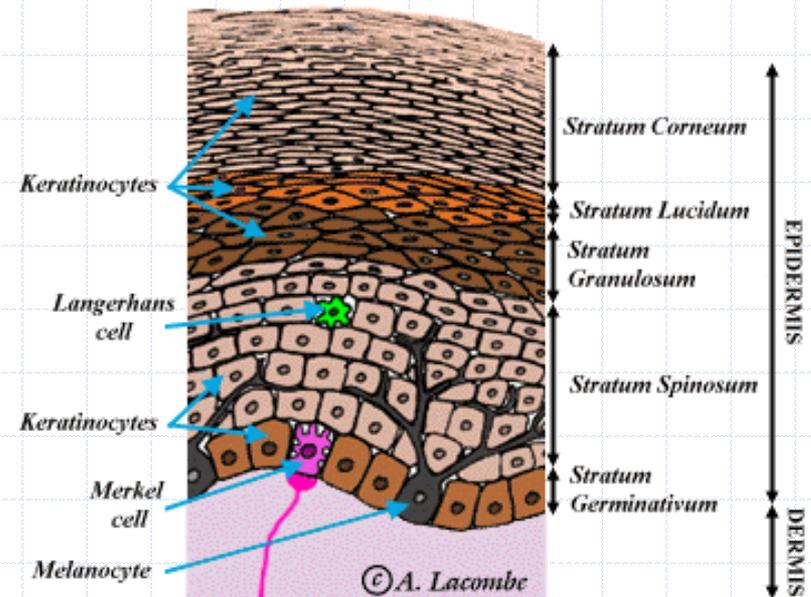
#2; Stratum spinosum

- ◆ is 8-10 layers thick. Histological preparations shrink these cells and make them look prickly hence the name of this layer: spinosum (little spine).



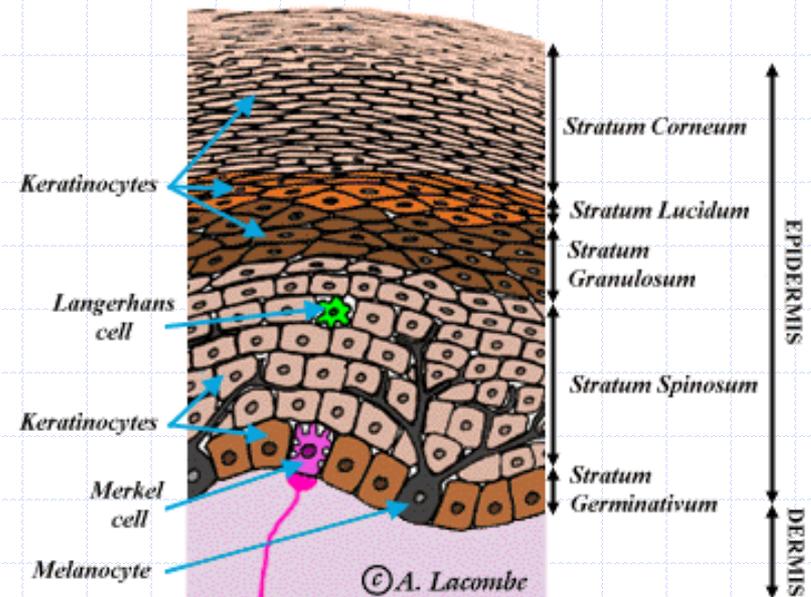
#3; Stratum granulosum

- ◆ here the keratinization process begins and the cells begin to die
 - ◆ This layer is called granulosum because the cells contain granules of the precursor of keratine



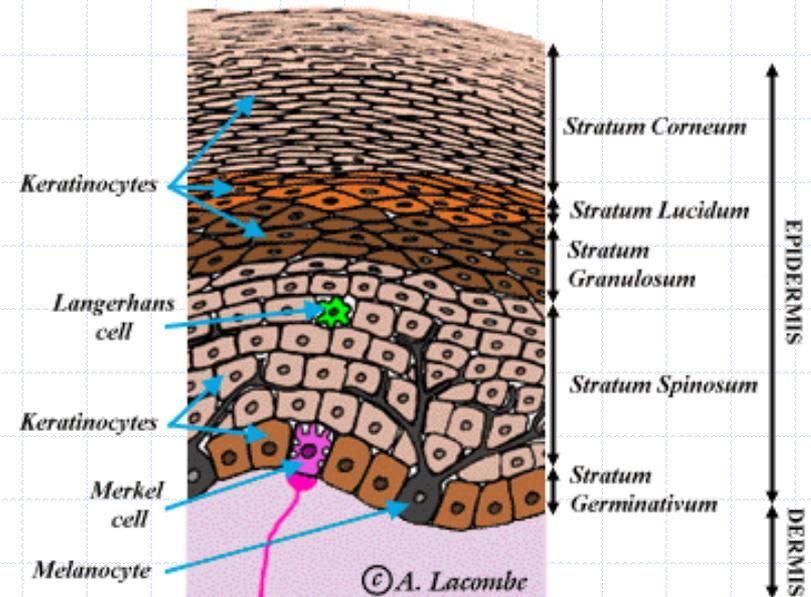
#4; Stratum lucidum

- ◆ is only found in thickened areas of the epidermis such as the sole of the feet. (appear clear thus luci, clear in latin)



#5; Stratum corneum

- ◆ is the outermost layer composed of dead, flat, keratinized cells which are being sloughed off
 - ◆ they are your dandruff and the flakes that slouch off dry skin



An easy trick to remember these 5 epidermal layers

◆ in order from the most superficial to the deepest:

"Can Little Girls Speak German" (*given by Lizzy and Jamie - L01 1997*)

Easy Trick

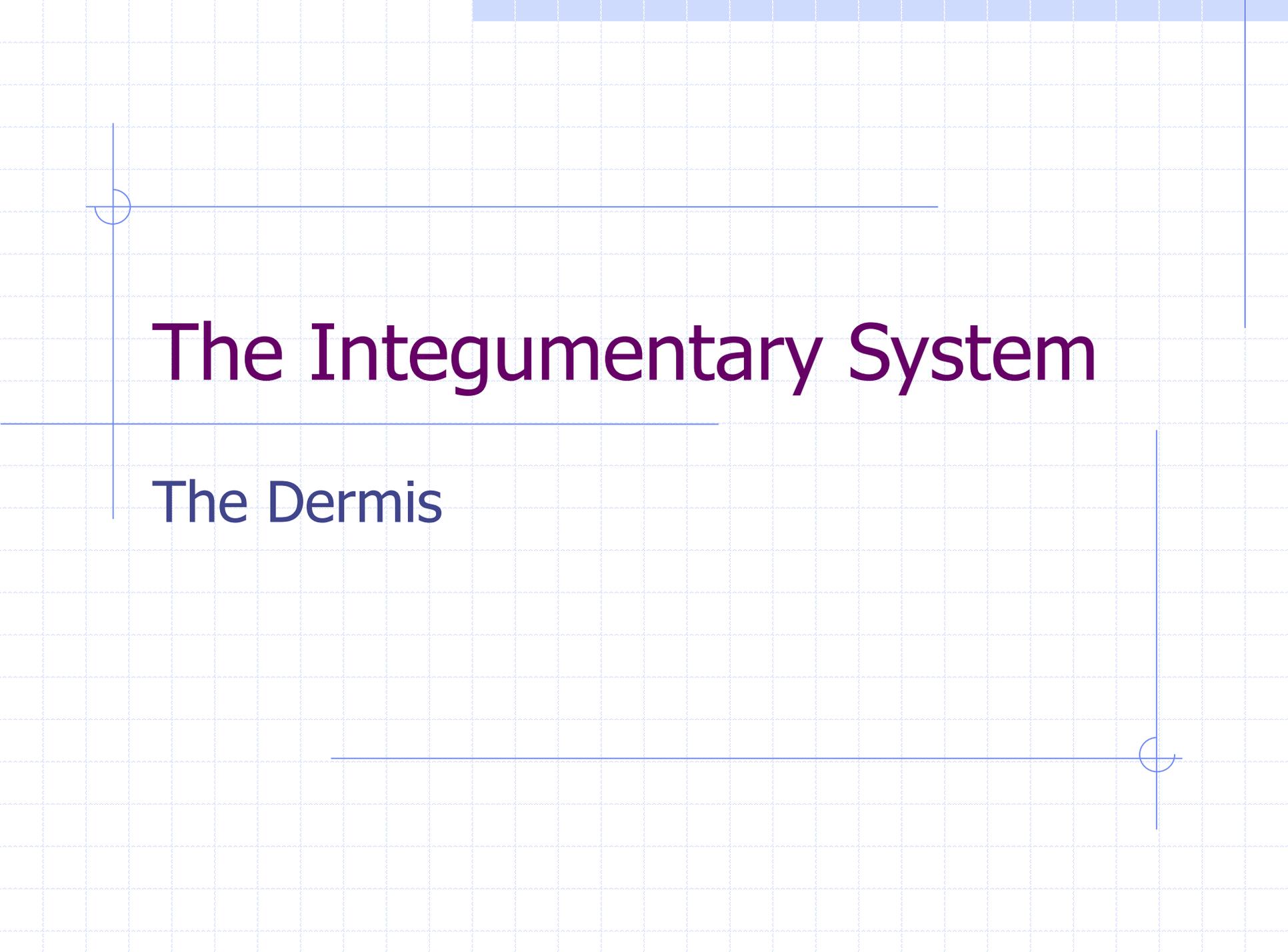
Can ----- Corneum

Little ----- Lucidum

GiRls ----- GRanulosum

Speak ----- SPinosum

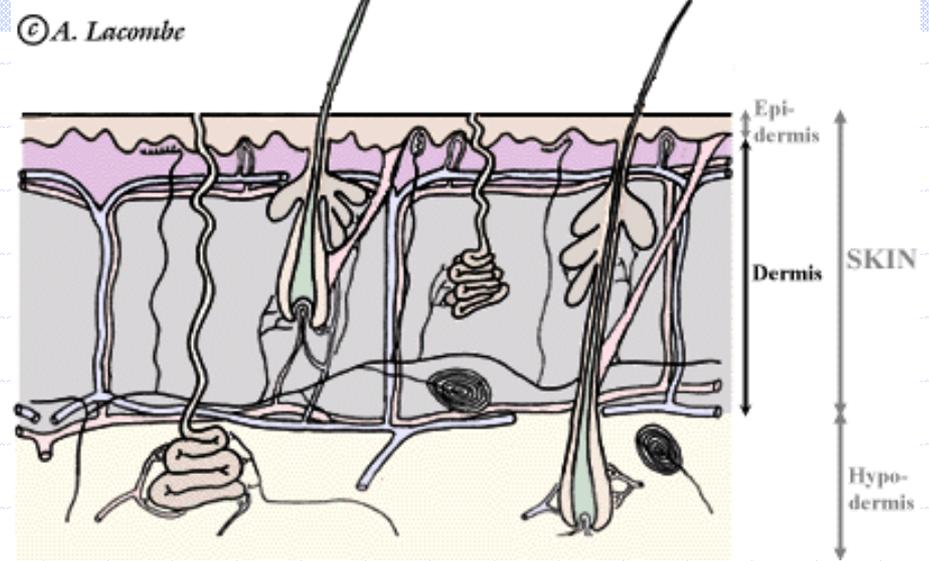
GERMan ----- GERMinativum



The Integumentary System

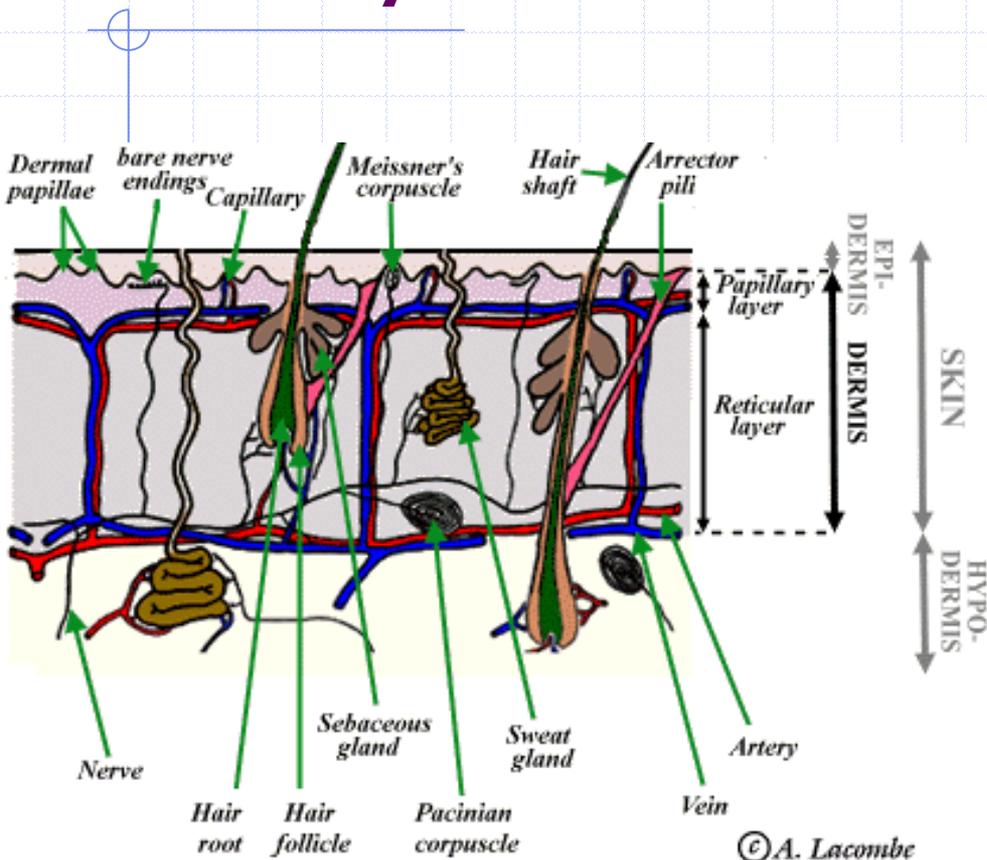
The Dermis

The Dermis



- ◆ The average thickness of the dermis is about 1 to 2 mm and varies from 0.6 mm on the eyelids to 3 mm or more on the soles and palms.
- ◆ It contains lots of nerve fibers, sensory receptors, blood and lymphatic vessels as well as the hair follicles, and the sebaceous and sweat glands.

2 Layers of Dermis



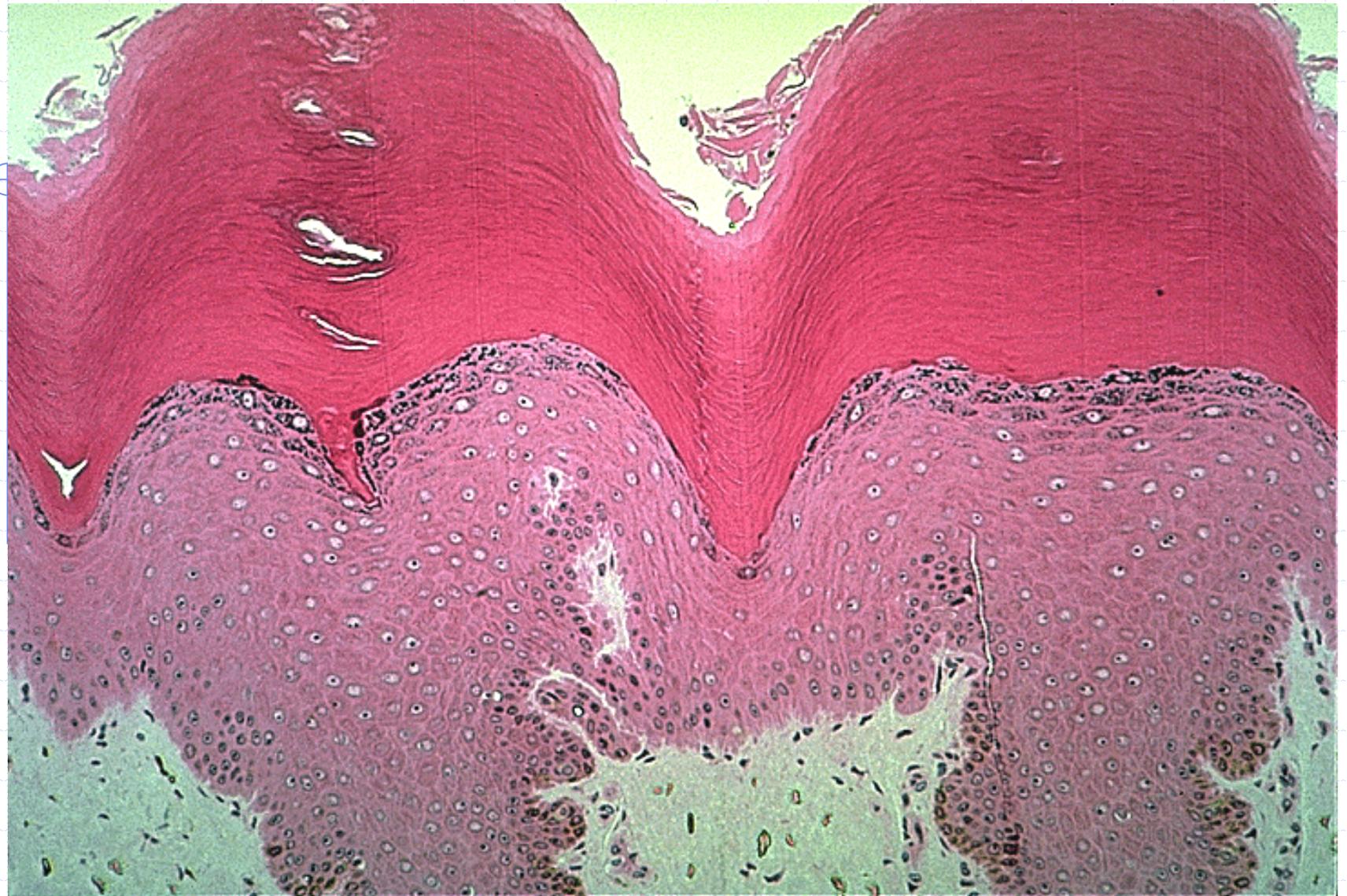
1. the Papillary layer
2. the Reticular layer

The Papillary Layer

- is the outer layer **closest to the epidermis**. It is composed of **areolar loose connective tissue proper**.
- Its superior region contains fingerlike projections called **dermal papillae**.
 - ◆ Dermal papillae contain capillaries, bare nerve endings (pain receptors), Meisner corpuscles (touch receptors: make us feel light touching) and the disclike sensory nerve endings of the Merkel disks.

The Reticular Layer

- is the **deeper layer** and the **thickest** (4/5th of the dermis). It is made of **dense irregular connective tissue proper**.
 - ◆ The reticular layer is richly supplied with blood vessels and nerves, and contains sensory endings for touch (**Pacinian corpuscle** for sensing deep pressure such as bumps), pain, heat, cold, etc.







Credit to:

- ◆ This lecture modified from Al's Online Tutorial
- ◆ Check out his web site:

<http://www.science.ubc.ca/~biomania/tutorial/tutoutln.htm>