



DEVELOPMENT OF THE SKIN

DR. ILAGAN-GUINTO | 08/20/2026

OUTLINE

I. Learning Objectives	VII. Sweat Glands
II. Skin	A. Eccrine Sweat Glands
III. Epidermis	B. Apocrine Sweat Glands
IV. Dermis	VIII. Mammary Glands
V. Skin	
VI. Fingernails and Toenails	

SUMMARY OF ABBREVIATIONS

AOG	At the fourth month of age of gestation.
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LEGENDS

Must know	Lecturer	Book	Presentation	Old Trans
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LEARNING OBJECTIVES

At the end of the lecture, the student should be able to:

- ✓ To be able to know how the integumentary skin developed
- ✓ To be able to know what the different skin appendages are
- ✓ To be able to know how the different skin appendages are developed

SKIN

- The largest organ in the body
- Dual origin:
 - Surface ectoderm - **Epidermis**
 - Mesenchyme - **Dermis**

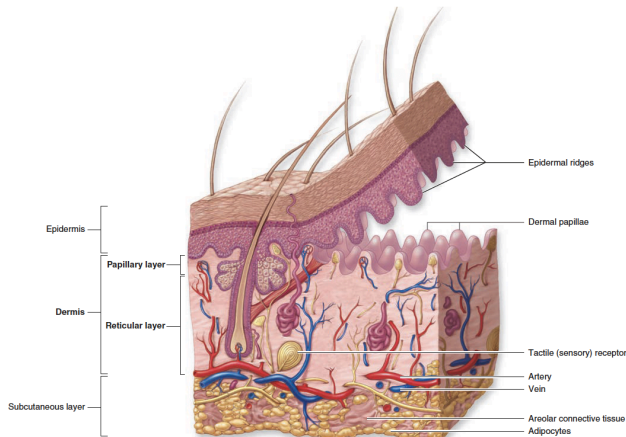


Figure 1. Layers of The Skin

- **Epidermis**
 - First month
 - The embryo is covered by a single layer of ectoderm.

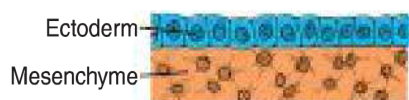


Figure 2. Skin formation at 5th week AOG

- 2nd month AOG
 - The ectoderm divides to form the **Periderm/epitrichium** on the

surface



Figure 3. Skin formation at 7th week AOG

- 4th month AOG
 - Basal layer proliferates - formation of **intermediate zone**

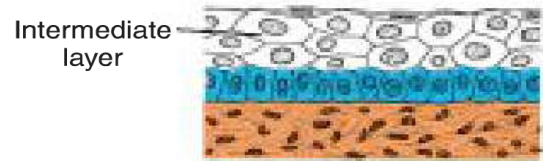


Figure 4. Skin formation at 4th month AOG

- At the end of the 4th month, the epidermis acquires a definite arrangement, and 4 layers can be distinguished:
 - Basal layer/Germinal layer
 - Spinous Layer
 - Granular layer
 - Horny layer

EPIDERMIS

- Layers of Epidermis:
 - **Basal layer/ Germinal layer**
 - Responsible for the production of new cells.
 - Forms ridges and hollows, which are reflected on the surface of the skin in the **fingerprint**.
 - **Spinous Layer**
 - Large polyhedral-shaped cells containing fine **tonofibrils**.
 - **Granular Layer**
 - Contains **keratohyalin granules**.
 - **Horny Layer**
 - Tough scale-like surface
 - Made up of closely packed dead cells containing **keratin**.

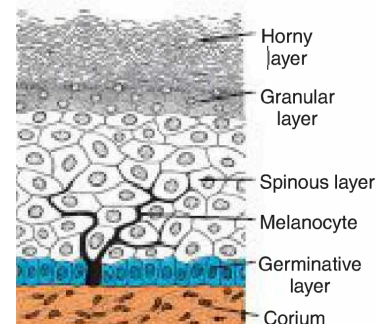


Figure 5. Skin formation at birth

- In the first trimester, the epidermis is invaded by cells from the **neural crest**
 - These synthesize melanin pigment in melanosomes → transported to the dendritic processes of melanocytes → transferred intracellularly to the keratinocytes of the skin and hair bulb
 - Pigmentation of the hair and skin

DERMIS

- Derived from the mesenchyme
- Sources:
 - Lateral plate mesoderm - dermis in the limbs and body wall
 - Paraaxial mesoderm - dermis in the back
 - Neural crest cells - dermis in the face and neck
 - At 3rd - 4th months: corium dermal papillae
 - Dermal papillae – irregular papillary structures projecting upward into the epidermis. Most of these
 - *papillae contain a small capillary or a sensory nerve end organ.*
 - **Subcorium** - a deeper layer of the dermis that contains fatty tissue
 - At birth, **vernix caseosa** protects the skin against the macerating action of amniotic fluid
 - **Vernix caseosa** is from the secretions of sebaceous glands, degenerated epidermal cells, and hairs

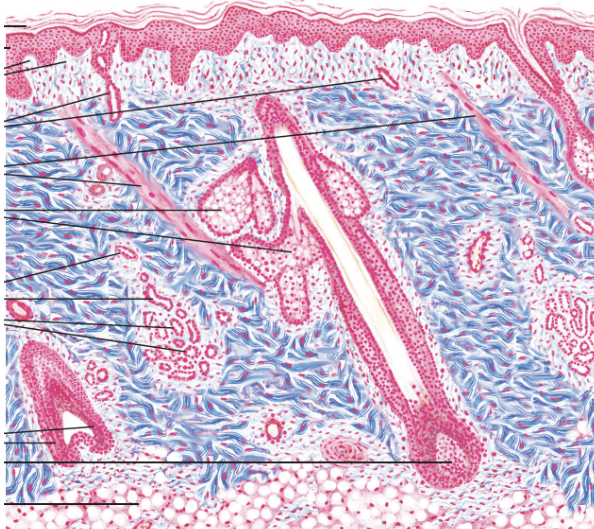


Figure 6. Developmental and structural layers of the skin.

- **Vernix caseosa** protects the skin against the macerating action of amniotic fluid.
 - from the secretions from sebaceous glands, degenerated epidermal cells, and hairs



Figure 7. Vernix caseosa

HAIR

- Develop as a solid epidermal proliferation from the germinative layer → penetrates the dermis.
 - Hair papillae- rapidly filled with mesoderm in which vessels and nerve endings develop
- Cells in the center of the hair buds → hair shaft
- Peripheral cells → epithelial hair sheath
- Surrounding mesenchyme → Dermal root sheath & arrector pili muscle
- Continuous proliferation of epithelial cells at the base of the shaft pushes the hair upward
- **Lanugo hair** (first hairs) appear on the region of the eyebrow and upper lip at the **end of the 3rd month**
 - It is shed at about the time of birth and replaced by coarser hairs arising from new hair follicles
- The epithelial wall of the hair follicle → small bud penetrating the surrounding mesoderm → sebaceous glands
- Cells from the central region of the gland degenerate → **sebum** → secreted into the hair follicle

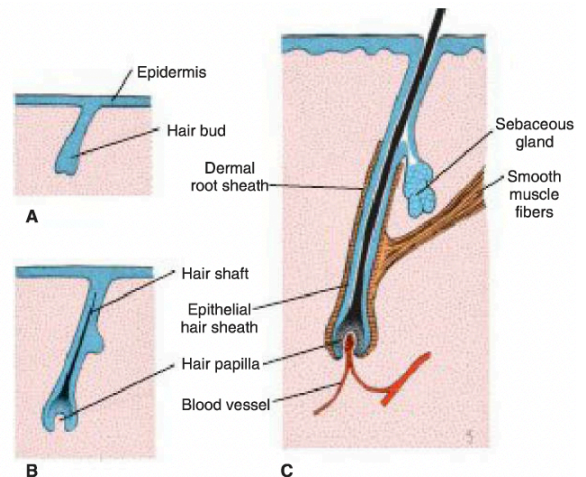


Figure 8. Development of a hair and sebaceous gland. **A.** 4 months. **B.** 6 months. **C.** Newborn,



Figure 9. Development of Lanugo hair (the first hairs)

FINGERNAILS AND TOENAILS

- **Nail fields** (thickenings in the epidermis) appear at the tips of the digits by the end of the 3rd month
- These fields migrate to the dorsal side of each digit and grow proximally → forming the **nail root**
- From the nail root, epidermis differentiates into fingernails and toenails that do not reach the tips of the digits until the 9th month of development

SWEAT GLANDS

ECCRINE SWEAT GLANDS

- Form in the skin over most parts of the body
- Germinative layer of the epidermis → into the dermis → their end coils to form the secretory parts of the glands
- Smooth muscle cells associated with the glands also develop from the epidermal buds
- Function by merocrine mechanisms (**exocytosis**)
- Involved in temperature control

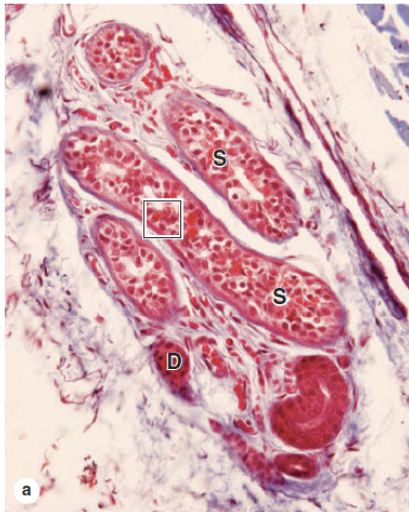


Figure 10. Eccrine Sweat Glands

APOCRINE SWEAT GLANDS

- Develop anywhere there is body hair
- Begin to develop during puberty
- Arise from the same epidermal buds that produce hair follicles
- Sweat produced contains lipids, proteins, and pheromones
- Odor from this sweat is due to the bacteria that break down these products

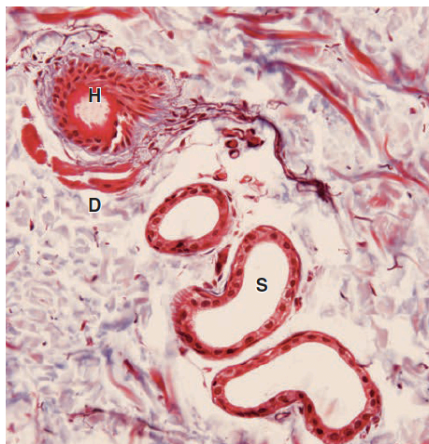


Figure 11. Apocrine Sweat Glands

MAMMARY GLAND

- **Modified sweat glands**
- First appear as **bilateral bands of thickened epidermis** called the **mammary lines or mammary ridges**.
 - **At the 7th week:** these lines extend on each side of the body from the forelimb to the hindlimb
 - A small portion in the thoracic region persists and penetrates the underlying mesenchyme
 - **Forms 16 to 24 sprouts** give rise to small, solid buds.
 - **At the end of prenatal life:** the epithelial sprouts are canalized and form the lactiferous ducts.
 - The **lactiferous ducts open into a small epithelial pit**.
 - Shortly **after birth**, this pit is transformed into the **nipple**
 - **At birth**, lactiferous ducts have no alveoli and therefore no secretory apparatus.
 - **At puberty**, increased **estrogen and progesterone** stimulate branching from the ducts to form alveoli and secretory cells.

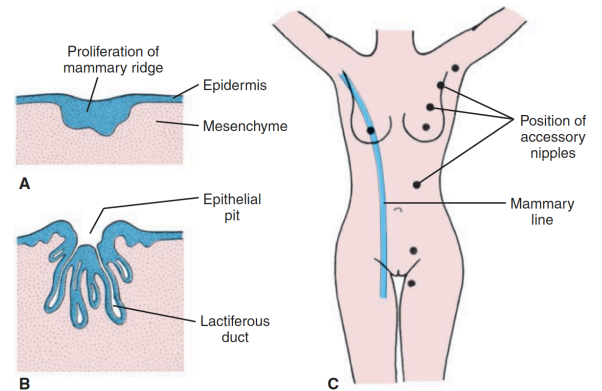


Figure 21.5 A,B. Sections through the developing mammary gland at the third and eighth months, respectively. C. Positions of accessory nipples (blue line, mammary line).

Figure 12. Mammary gland

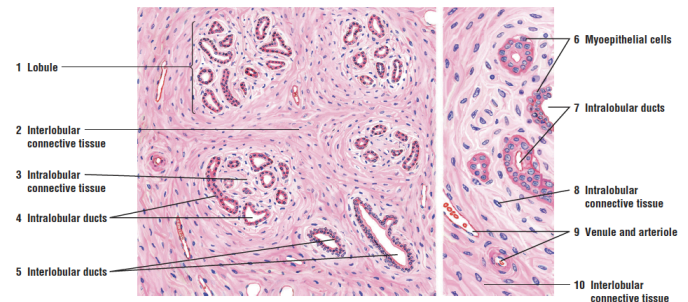


Figure 13. Histology of the mammary gland

REFERENCES

- Eroschenko, V.P. (2017). Atlas of histology with functional correlations (13th ed.). Wolters Kluwer
- Doc Guinto PPT
- Trans 2024