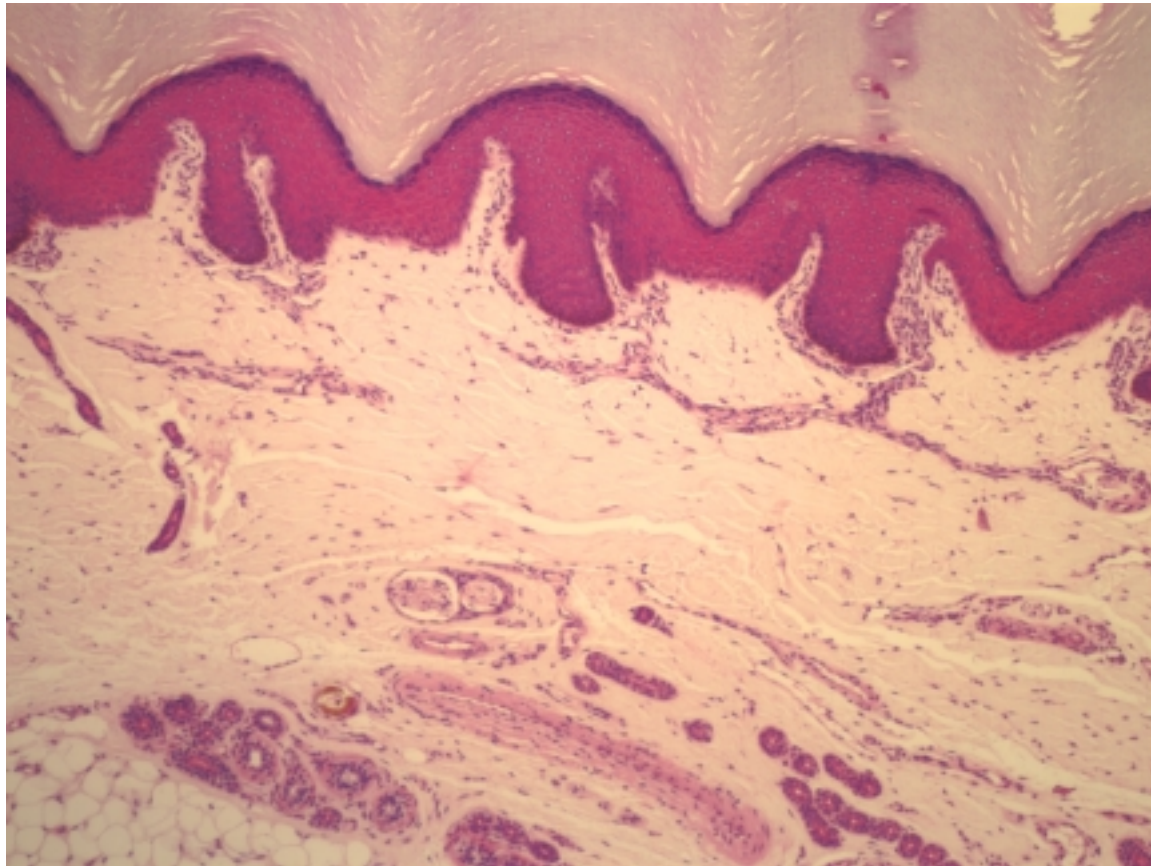


# Basic Skin Histology & Wound Healing

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*Protection*

*Sensation*

*Thermoregulation*

*Metabolism*

# Layers of Skin

## 1) Epidermis

➔ stratified squamous epithelium

➔ epidermal ridges

## 2) Dermis

### a) papillary layer

small blood vessels, lymph & nerves

fine collagen & elastic fibers

### b) reticular layer

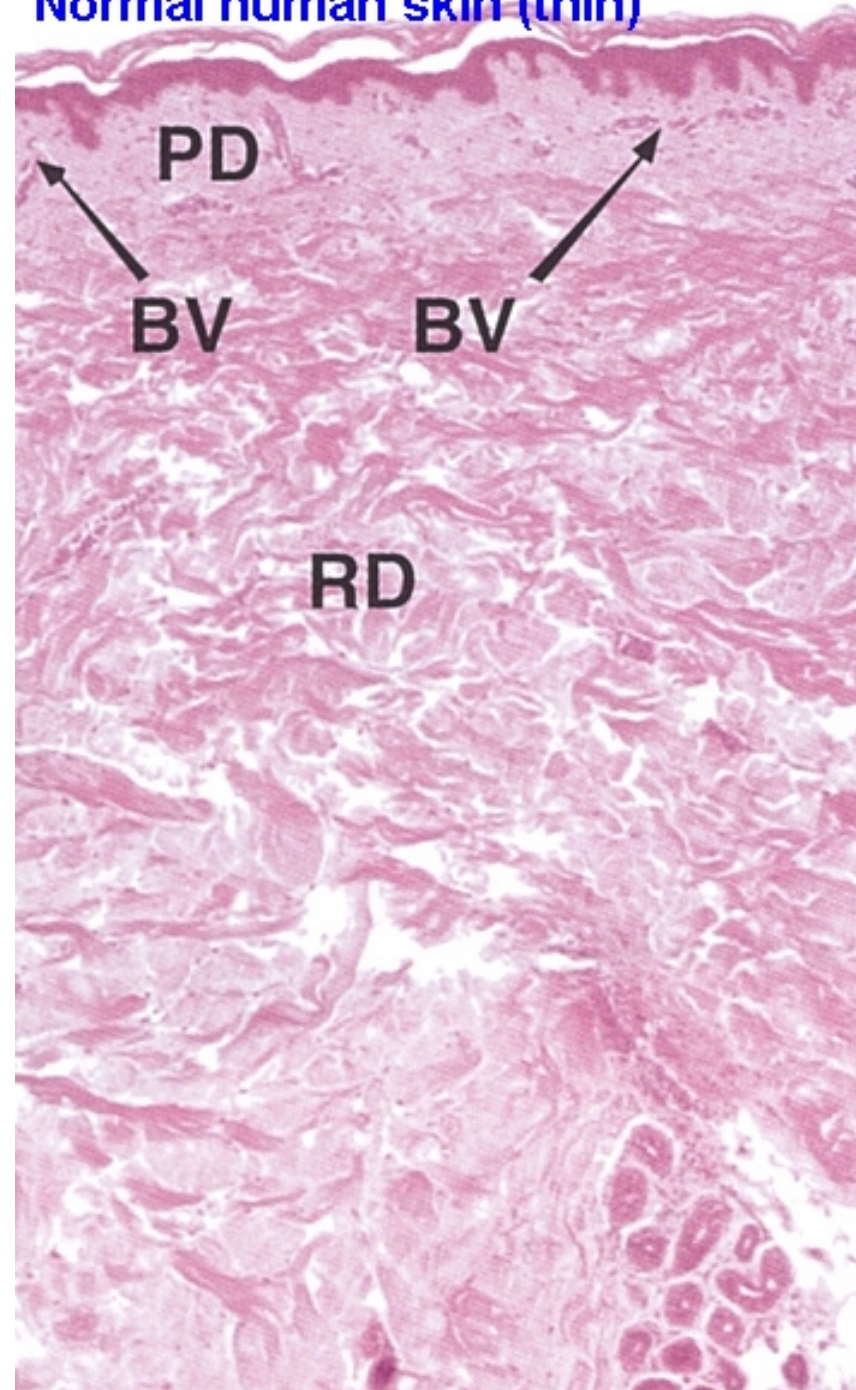
vascular plexus, lymph, nerves & appendages

compact collagen fibers & thick elastic fibers

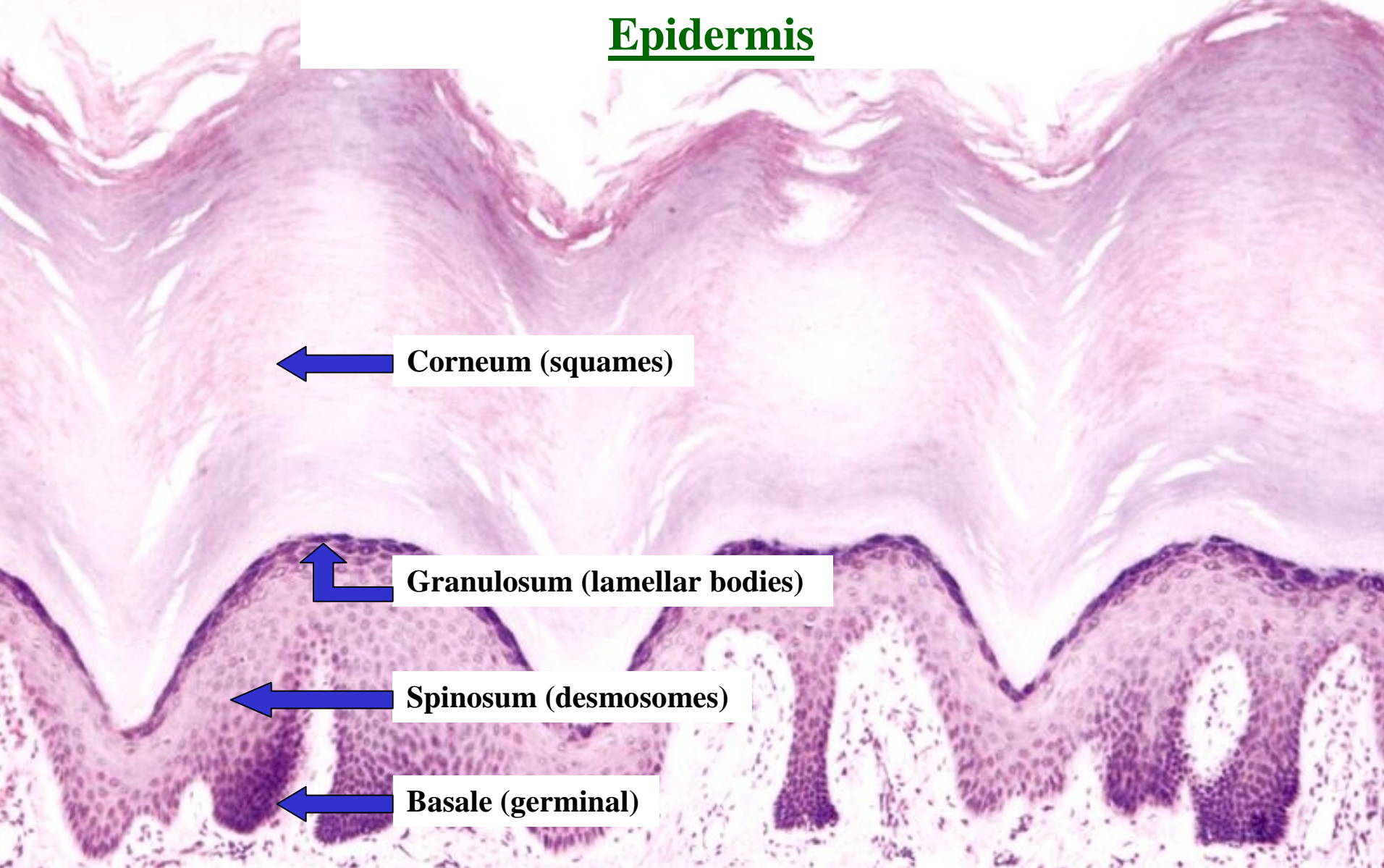
## 3) Hypodermis (subcutaneous)

➔ mainly adipose tissue

Normal human skin (thin)



# Epidermis



← Corneum (squames)

↙ Granulosum (lamellar bodies)

← Spinosum (desmosomes)

← Basale (germinal)

4 distinct cell types: 1) Keratinocyte, 2) Melanocyte, 3) Langerhans cell, 4) Merkel cell

## Dermo-epidermal Junction

### 1) Hemidesmosome

#### a) germinal cell

- keratin filaments
- cytoplasmic plaque
- plasma membrane
- transmembrane linkers

### 2) Basal lamina

#### a) lamina lucida

- anchoring proteins

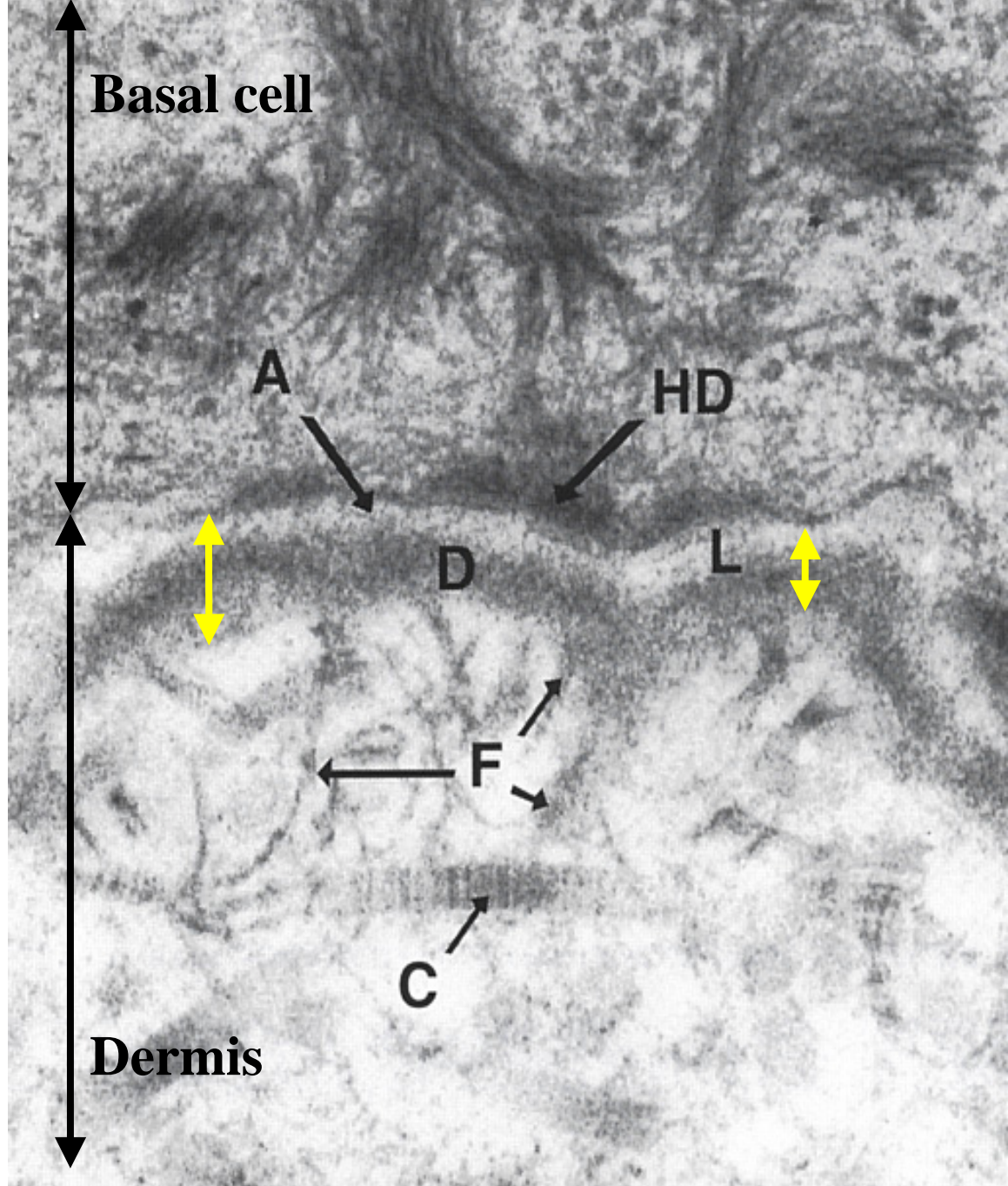
#### b) lamina densa

- crosslinking fibrils

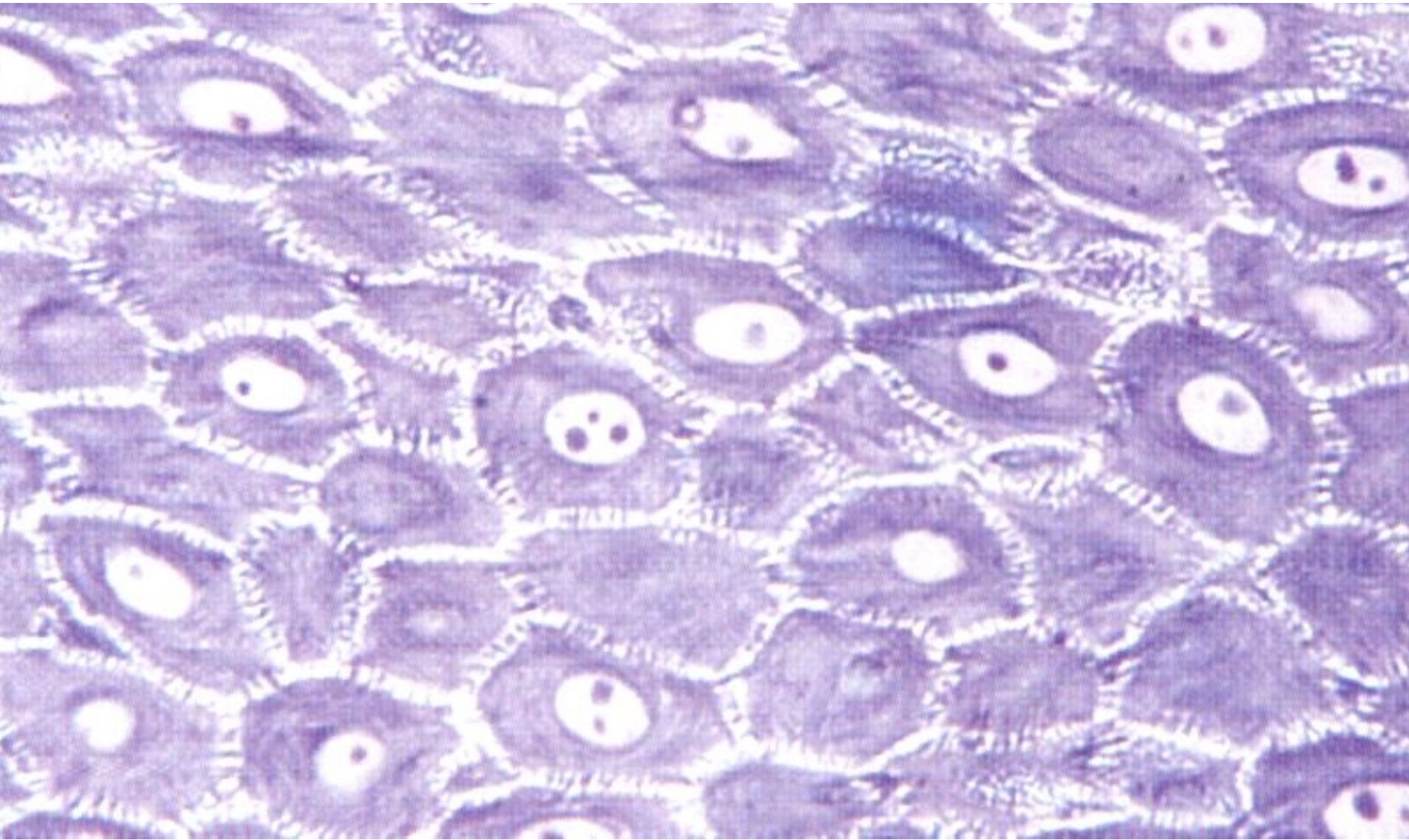
### 3) Subjacent connective tissue

#### a) collagen fibers

#### b) elastic fibers

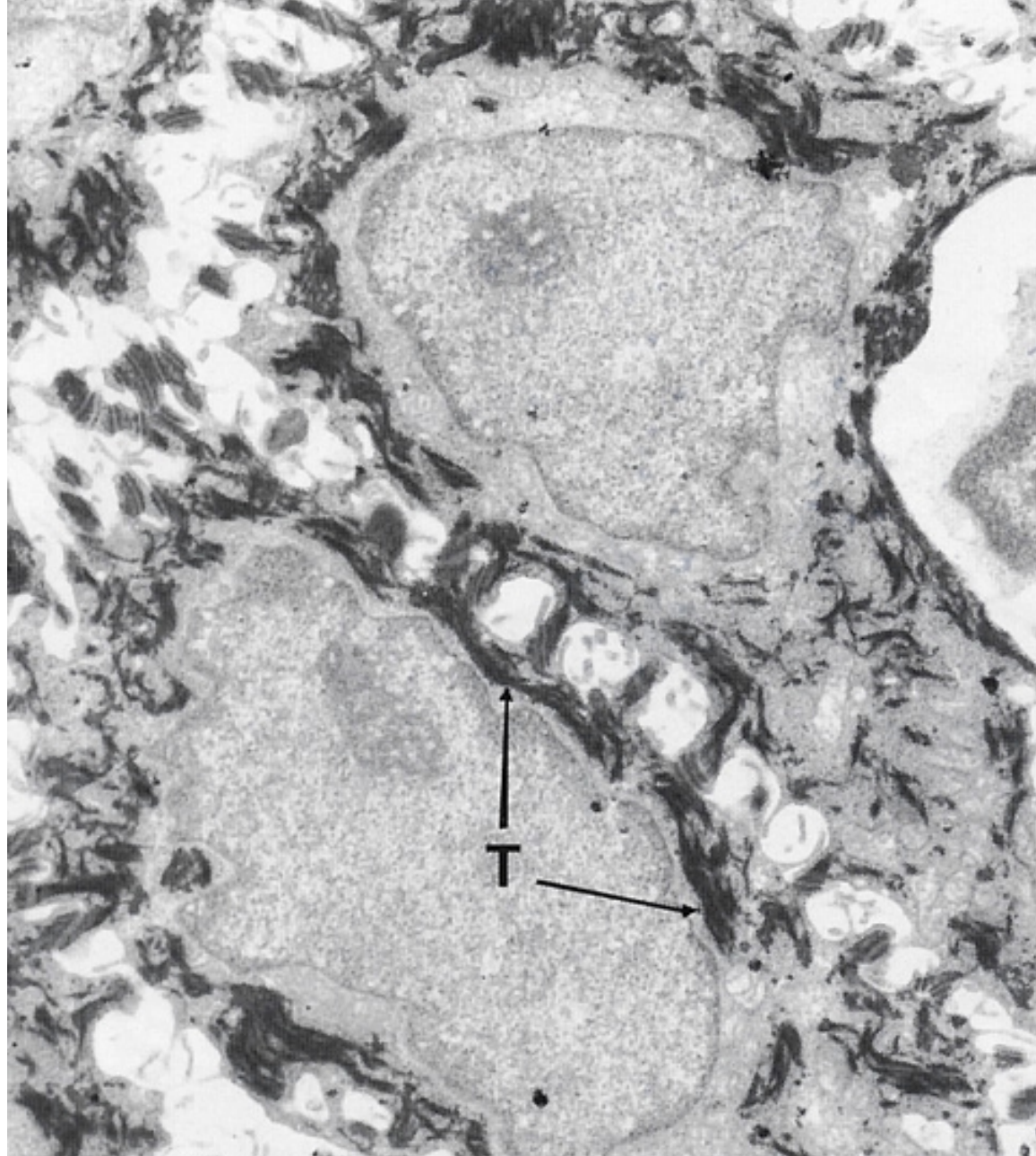


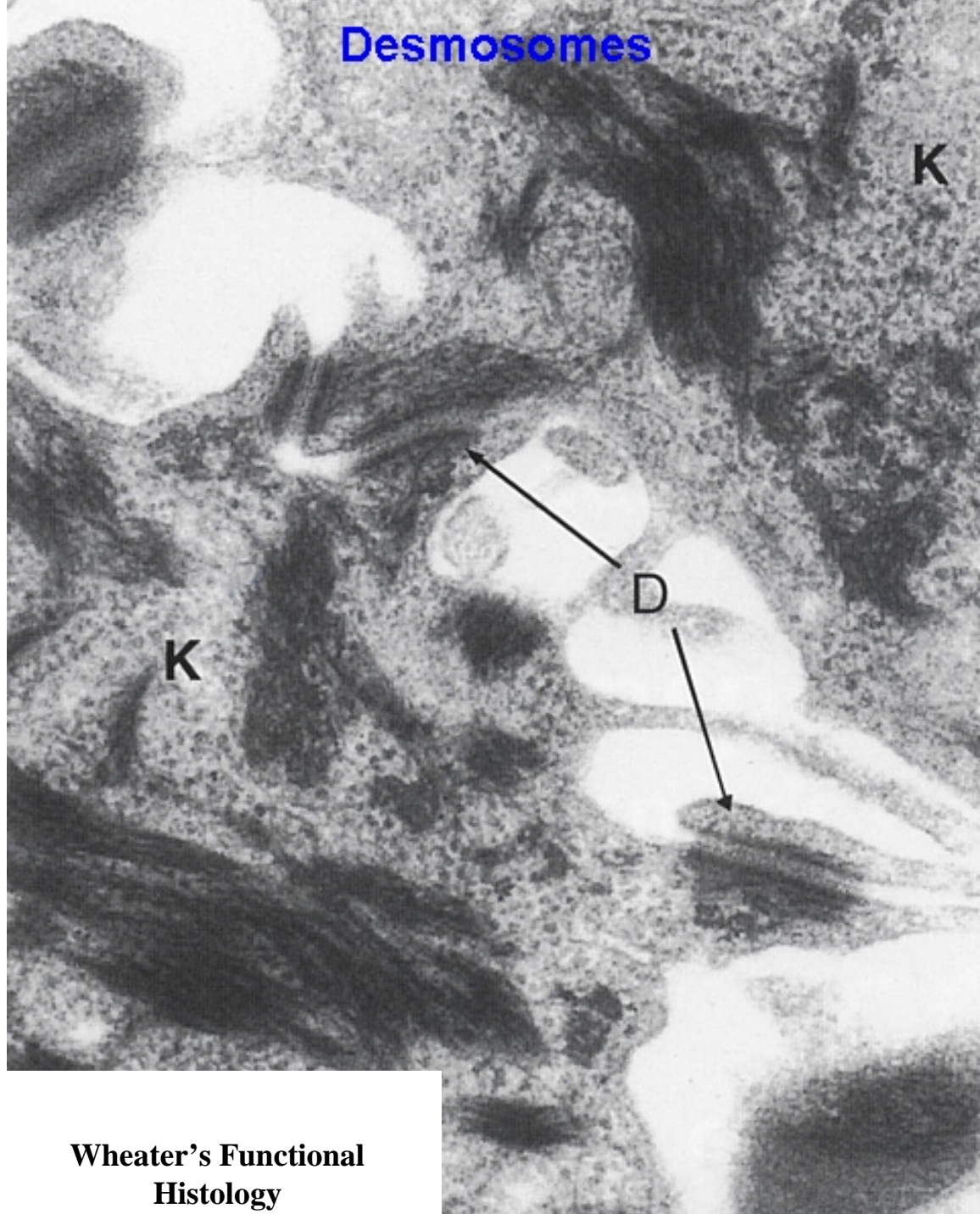
## Intercellular Junctions: Stratum Spinosum



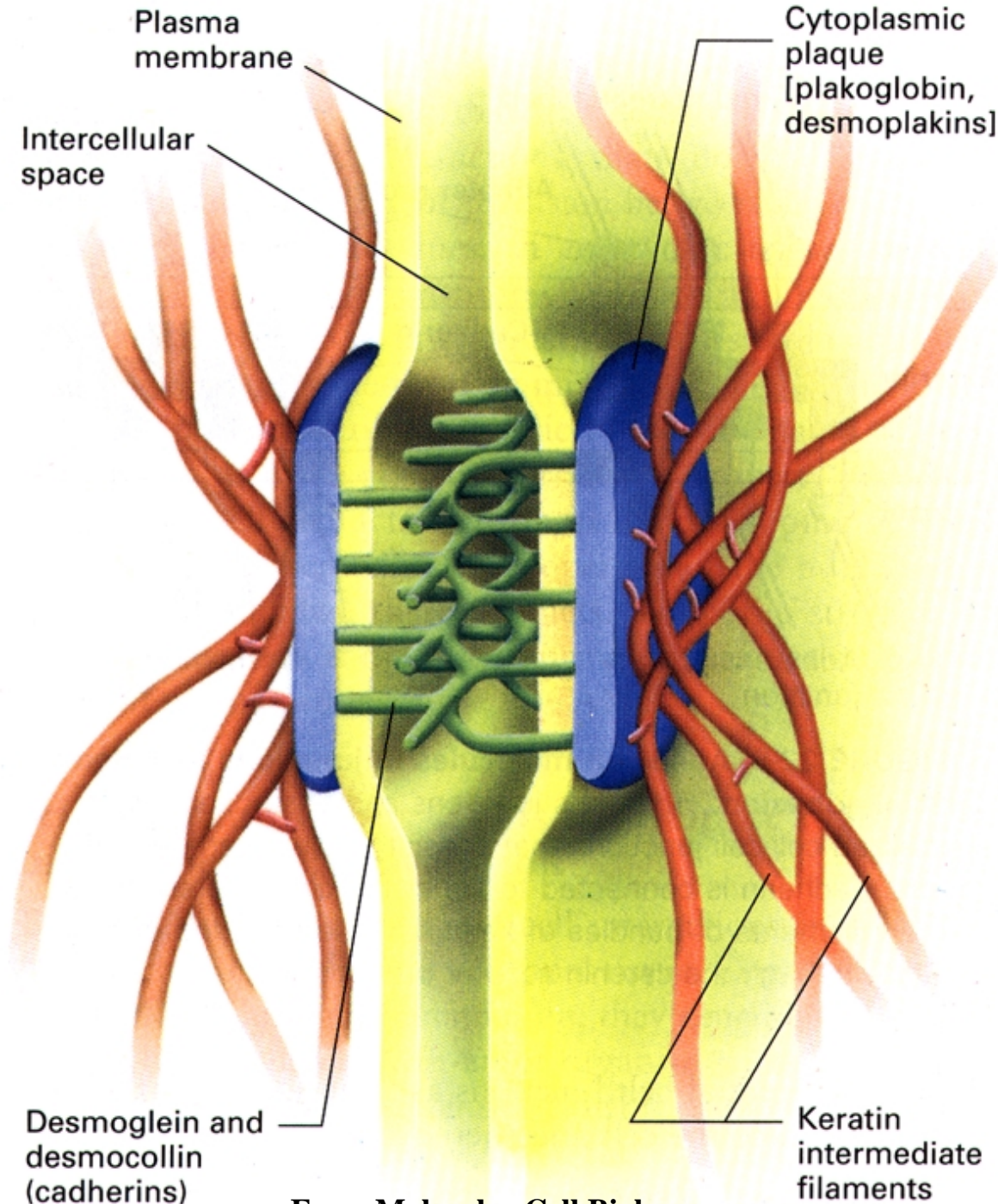
## Keratin Filaments

- dense cytoplasmic bundles
- crosslinked by filaggrin to form large aggregates
- concentrated at cell periphery in projections that terminate at desmosomal junctions
- crucial for structural integrity, stability, and continuity of the epithelium





## Desmosome Structure



1) adaptor proteins (e.g. plakoglobin) attach keratin filaments to the cytoplasmic plaque

2) transmembrane linkers (e.g. desmoglein) connect adjacent cells

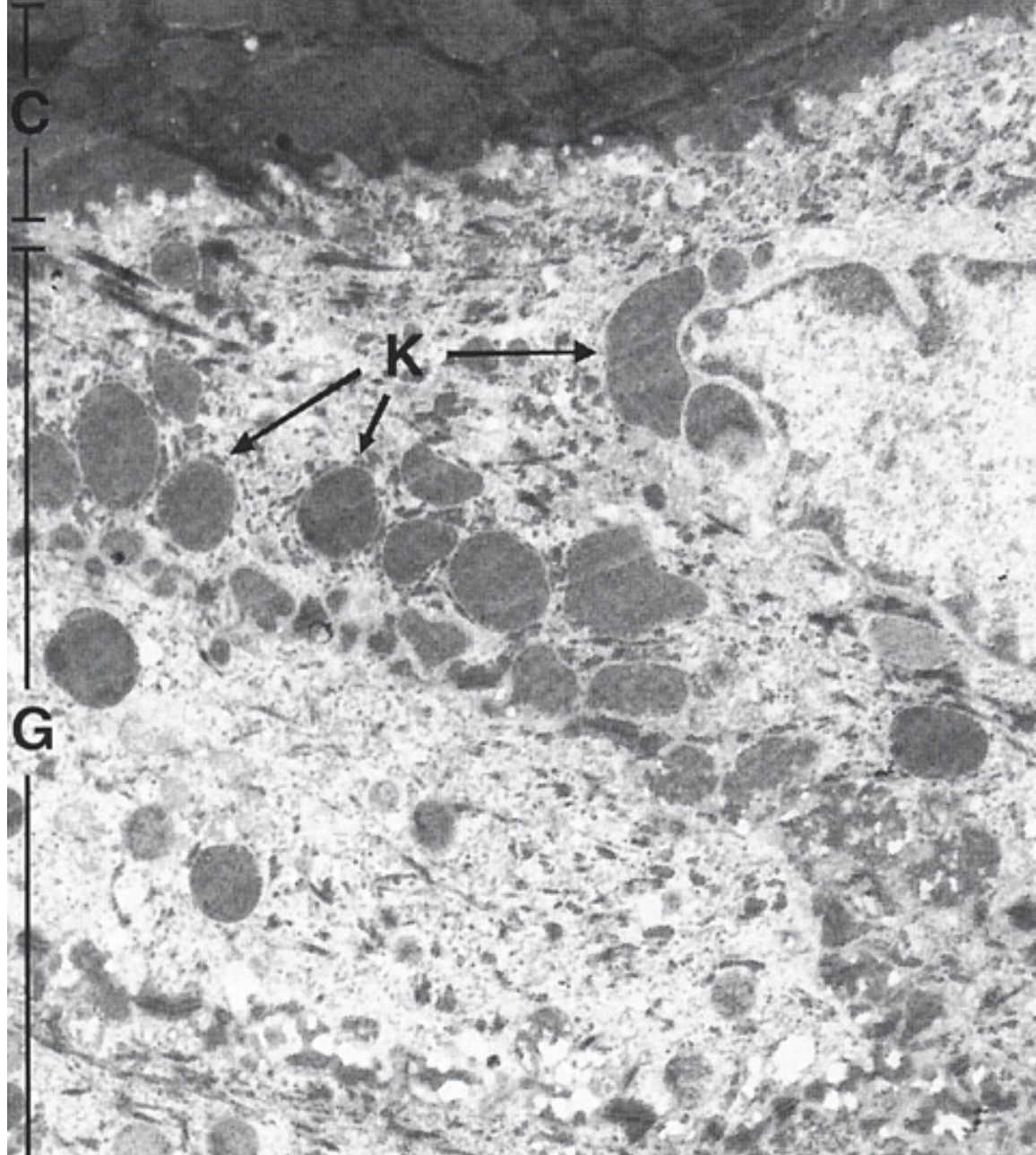
a) cytoplasmic domain binds the adaptor

b) extracellular domain associates with linker on opposing cell (via homophilic interaction)

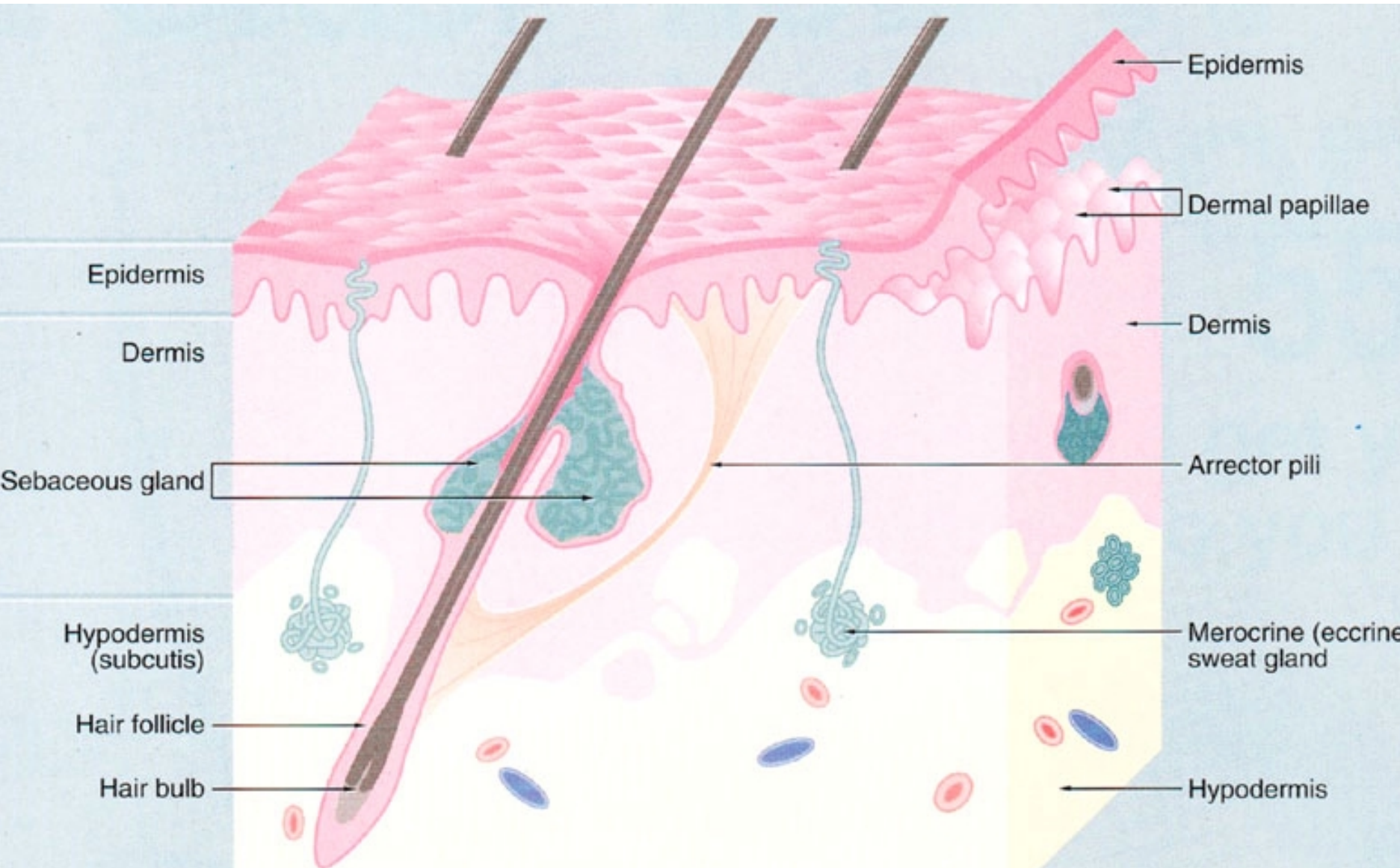


## Keratohyaline Granules

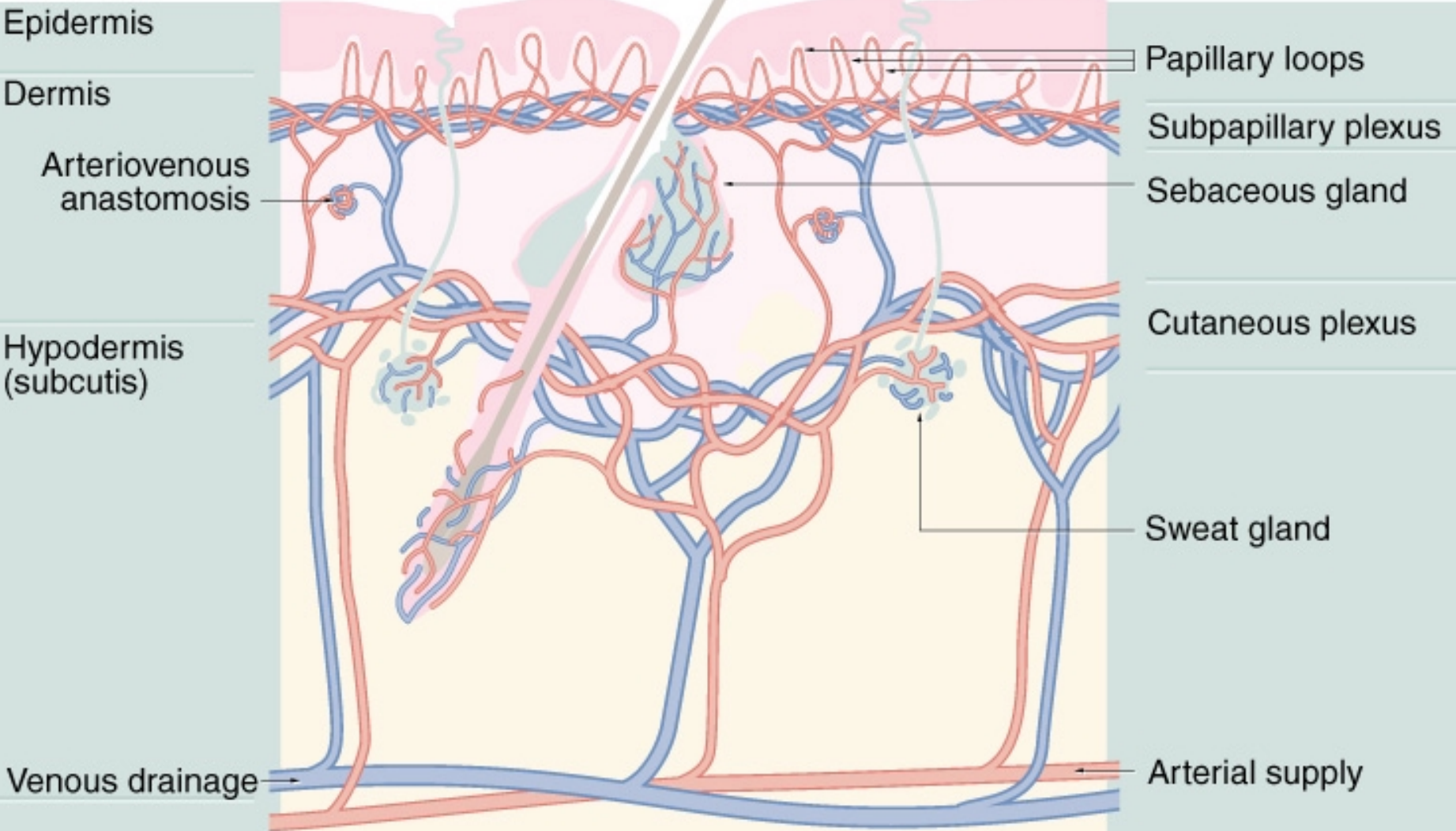
- membrane-bound
- rich in sulfated amino acids (cysteine)
- contain lamellar bodies consisting of lipids
- eventually secreted and deposited between keratinocytes



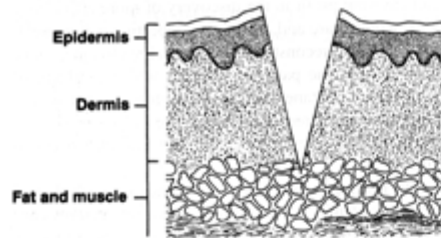
# Skin Appendages



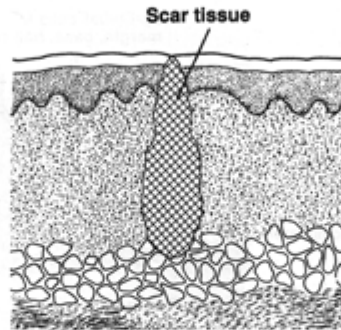
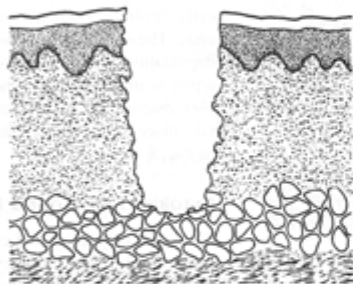
# Circulation



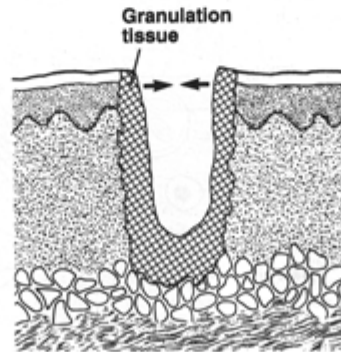
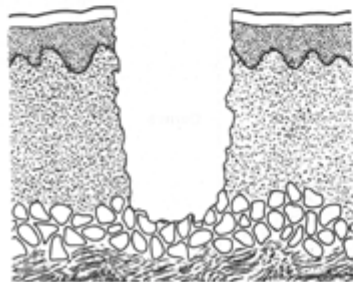
# Types of Wound Closure-I



**Primary**



**Delayed Primary**



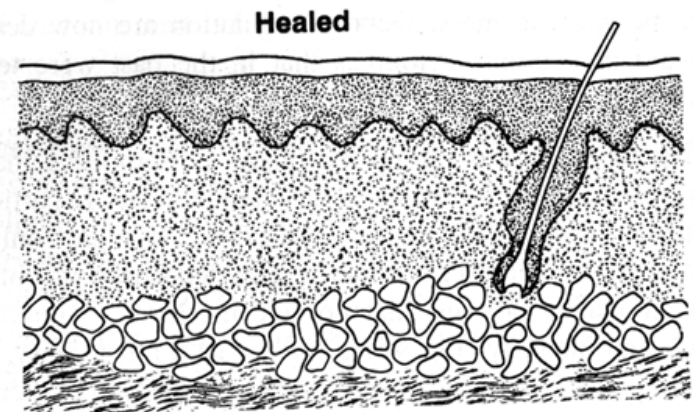
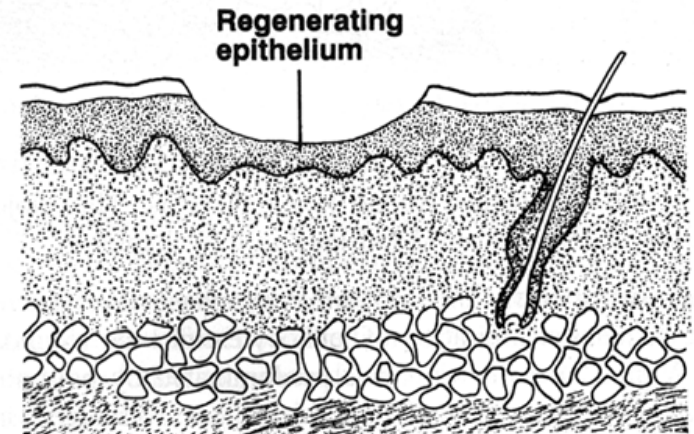
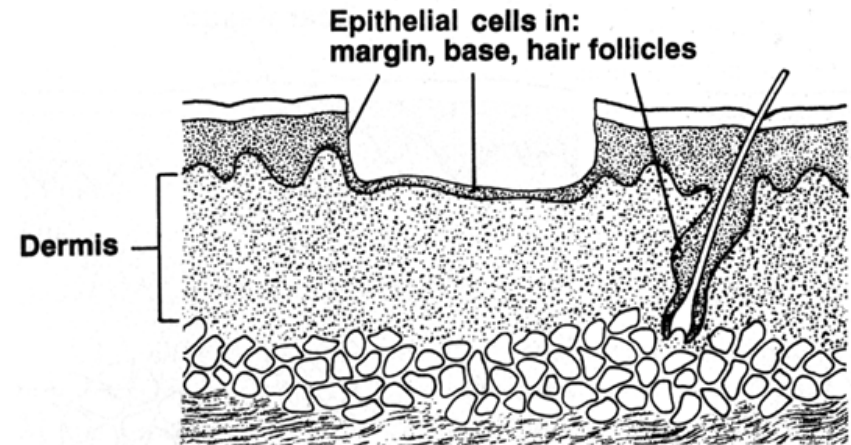
**Secondary  
(spontaneous)**

# Types of Wound Closure-II

## Partial-thickness healing:

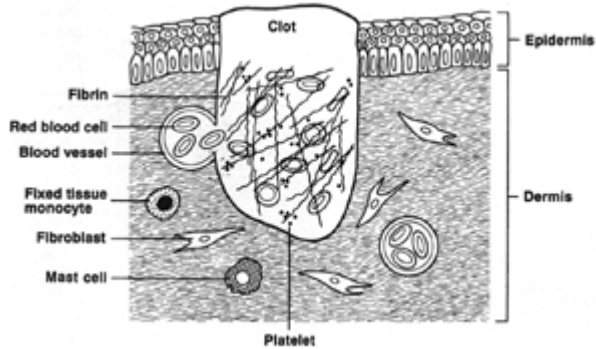
→ Superficial wounds in which the integrity of the basement membrane is preserved heal by a process of epithelialization

- 1) migration
- 2) mitosis

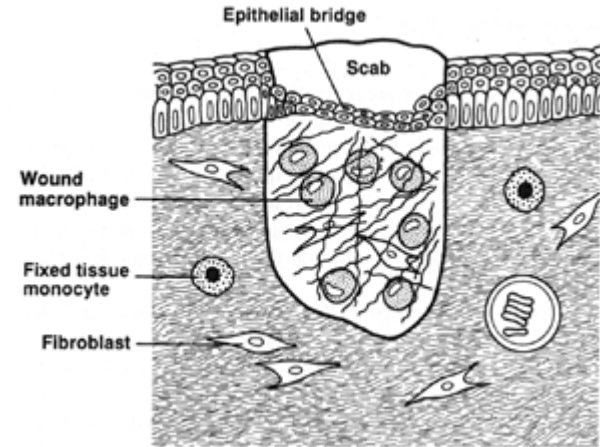


# Phases of Healing

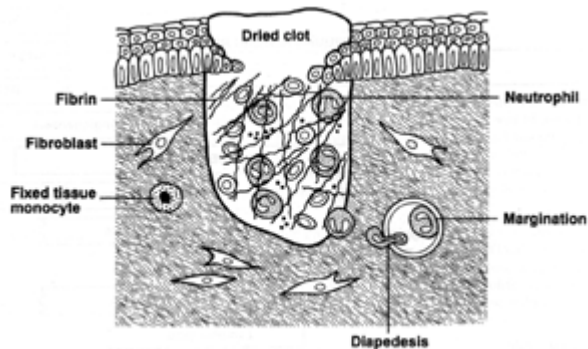
## 1) Platelet coagulation & cytokine release



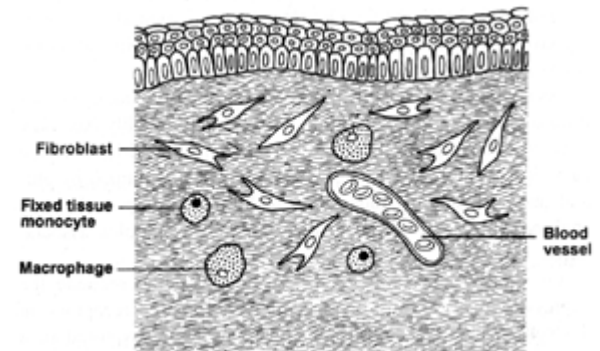
## 3) Fibroplasia: collagen synthesis & deposition



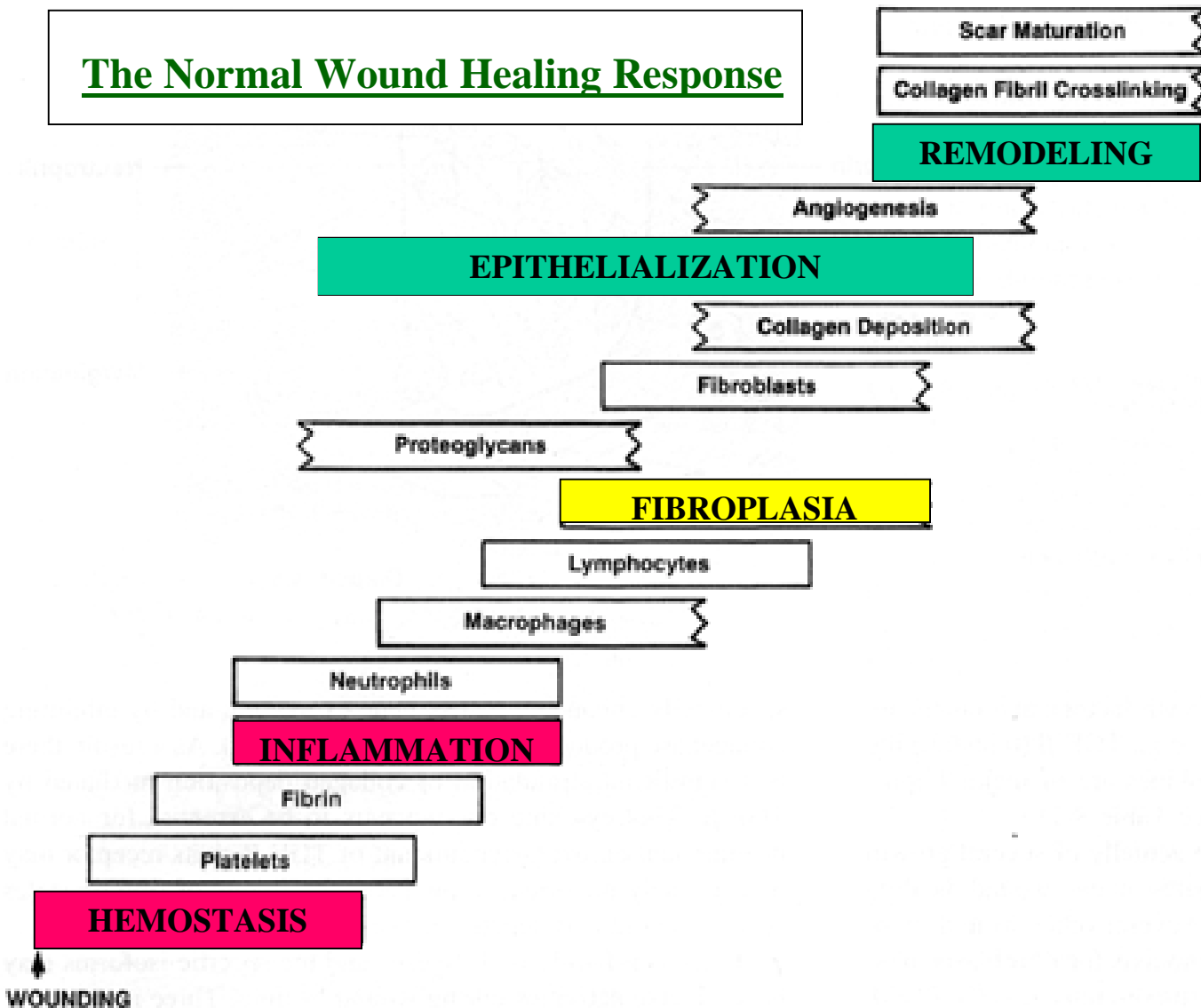
## 2) Inflammation



## 4) Remodeling



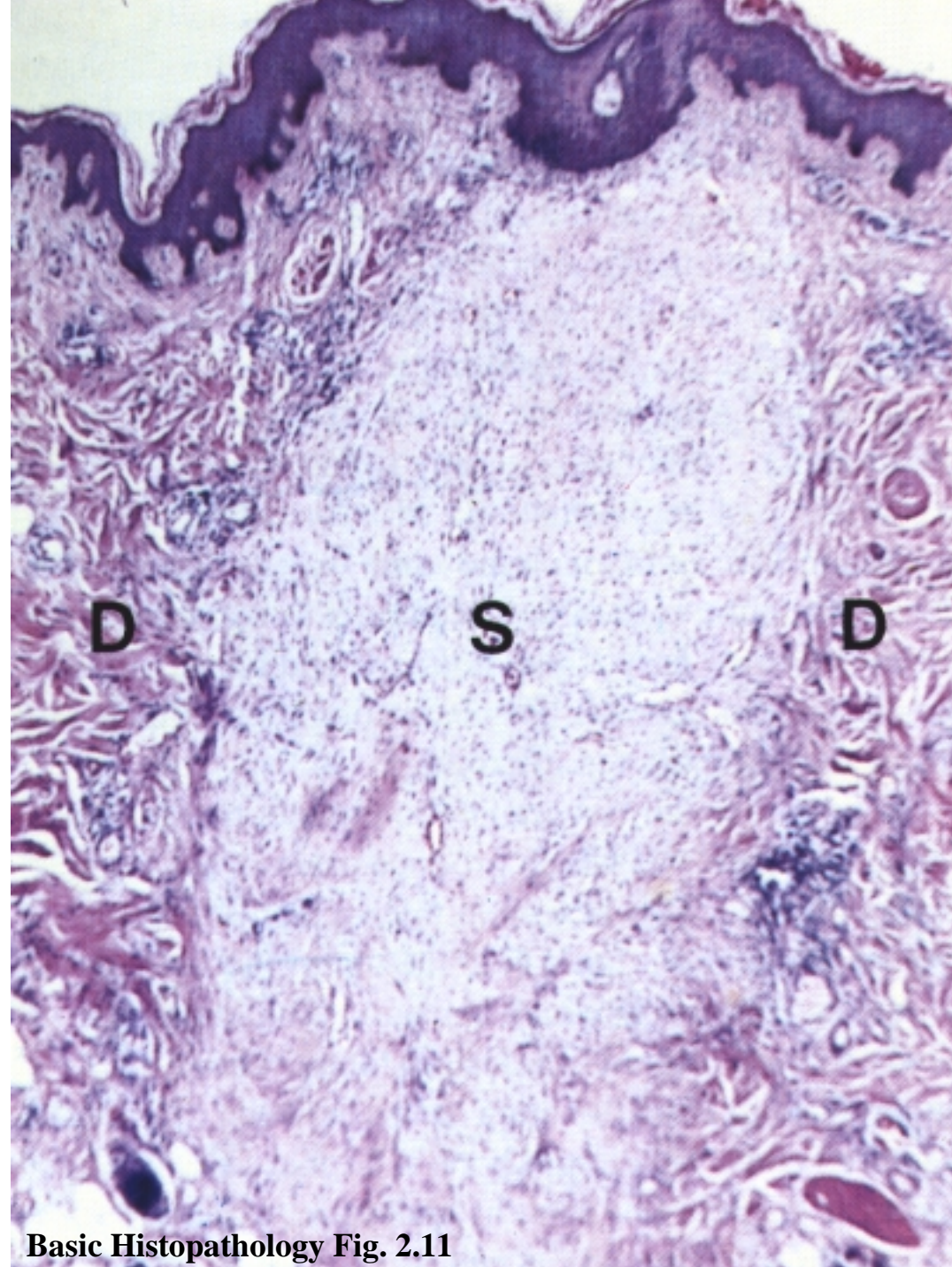
# The Normal Wound Healing Response



**FIG. 8-9.** Sequence of events in wound healing. (Modified from: Mast BA: *The skin*, in Cohen IK, Diegelmann RF, Lindblad WJ (eds): *Wound Healing: Biochemical and Clinical Aspects*, chap 22. Philadelphia, WB Saunders, 1992, with permission.)

## Skin Scar from Biopsy

- ▀ fibroelastic tissue forms scar
- ▀ no skin appendages
- ▀ progressive reduction in cellularity
- ▀ progressive loss of capillaries
- ▀ contraction of scar

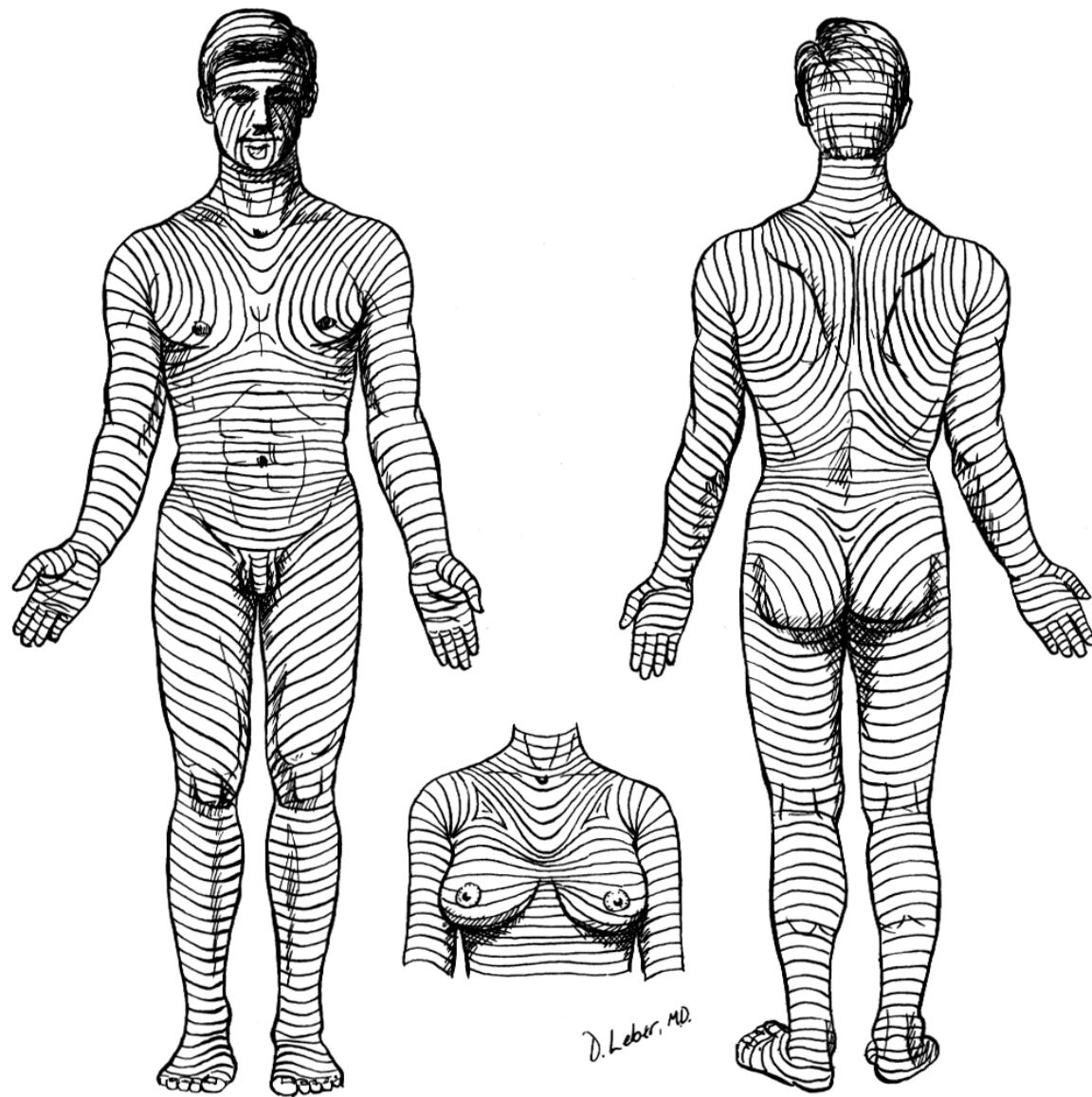


Basic Histopathology Fig. 2.11



## Langer's Lines

- minimal tension
- reduced scarring
- accelerated healing



**FIG. 43-1.** The lines of minimum tension generally lie perpendicular to the direction of pull of the underlying muscles. Correct incision lines for the sternal, deltoid, and interscapular regions are difficult to determine. Incisions should be made parallel to the lines of minimum tension.  
**From Principles of Surgery**

## **REFERENCES**

- 1) Wheater's Functional Histology (2000). Young & Heath, eds. Fourth edition. Churchill Livingstone.
  
- 2) Principles of Surgery (1999). Schwartz, Shires, Spencer, Daly, Fischer & Galloway, eds. Seventh edition. McGraw-Hill.
  
- 3) Molecular Cell Biology (1999). Lodish, Berk, Zipursky, Matsudaira, Baltimore & Darnell, eds. Fourth edition. W.H. Freeman & Co.
  
- 4) Basic Histopathology (1991). Wheater, Burkitt, Stevens & Lowe, eds. Second edition. Churchill Livingstone.