

**KİM 425**  
**KİMYACILAR İÇİN HÜCREBİLİM**

**DERS XII-XIV**

# HÜCRENİN GENEL ÖZELLİKLERİ

## Fonksiyonel Özellikleri

- ⌘ Hücreler ortamdan ham materyali alırlar.
- ⌘ Enerji üretirler: Bu enerji iç ortam dengesini sağlamak, ve sentez reaksiyonlarını yürütmek için gereklidir. Termodinamiğin 2. Kanununa karşı koymak ancak enerji ile mümkündür.
- ⌘ Kendi moleküllerini sentez ederler.
- ⌘ Organize bir şekilde büyürler.
- ⌘ Çevreden gelen uyarılara cevap verirler.
- ⌘ Çoğalırlar (bazı istisnalar haricinde).

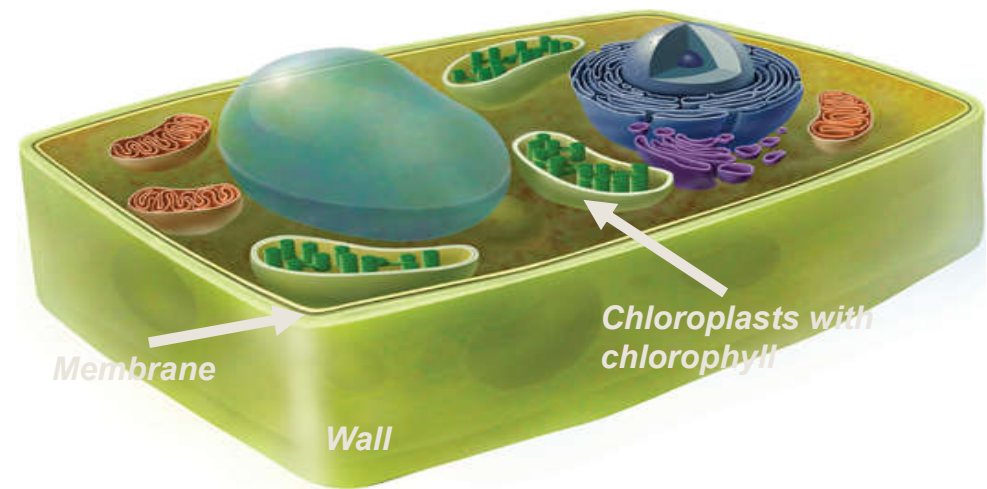
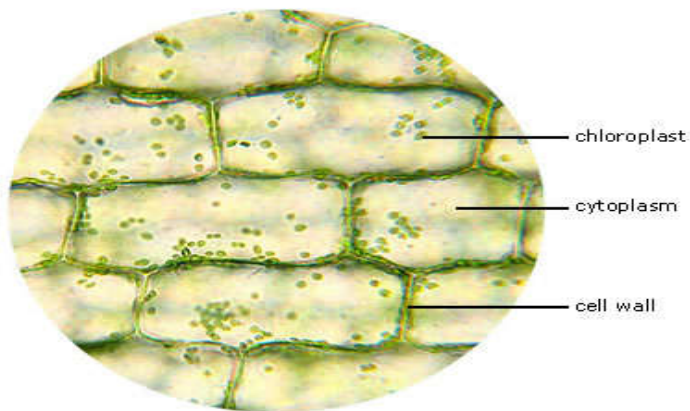
## Yapısal Özellikleri

- ⌘ Kalıtsal bilgiler DNA içinde saklanır.
- ⌘ Genetik kod temelde aynıdır.
- ⌘ Bilgi DNA dan proteinlere RNA aracılığı ile geçer.
- ⌘ Proteinler ribozomlar tarafından yapılır.
- ⌘ Proteinler hücrenin fonksiyon ve yapısını düzenlerler.
- ⌘ Bütün hücreler seçici geçirgen bir zar olan plazma membranı ile çevrilmiştir.

# Plant Cells

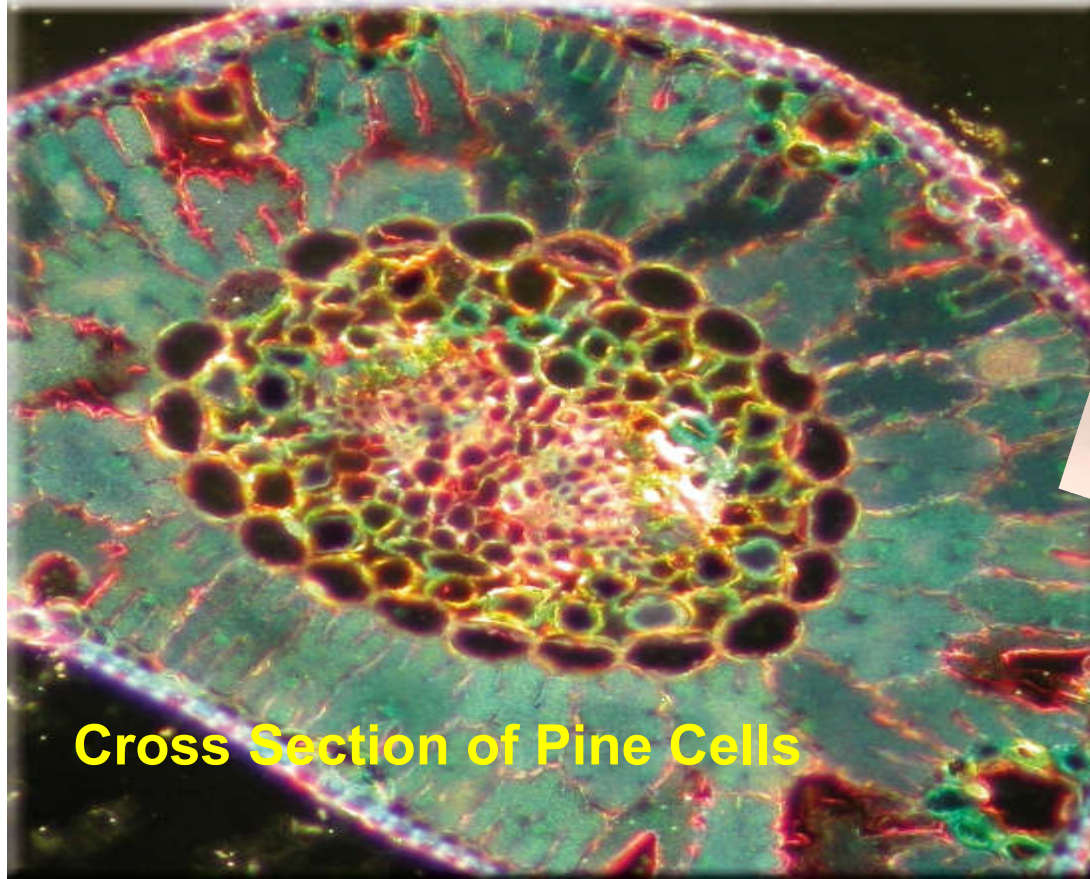


Plant cells have a cell membrane and a more regular shape due to a stiff cell wall. They have chloroplasts with chlorophyll to help plants make their own food.



Images provided by Science: A Closer Look (Maryland), Toolkit CD and page 30 (MacMillan/McGraw-Hill, 2008)

## Plant Cell Example



**Cross Section of Pine Cells**

## Pine Needle Cells



# Plant Cell Example

# Onion Cells

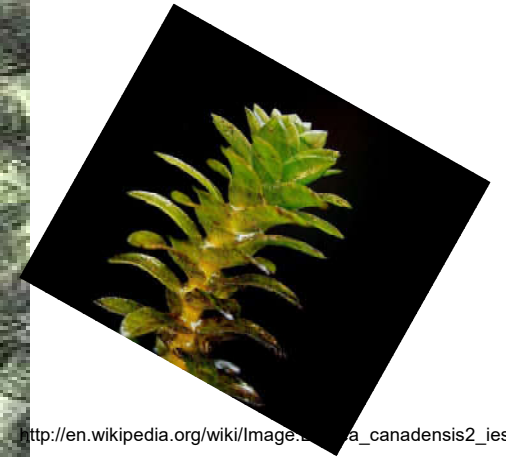
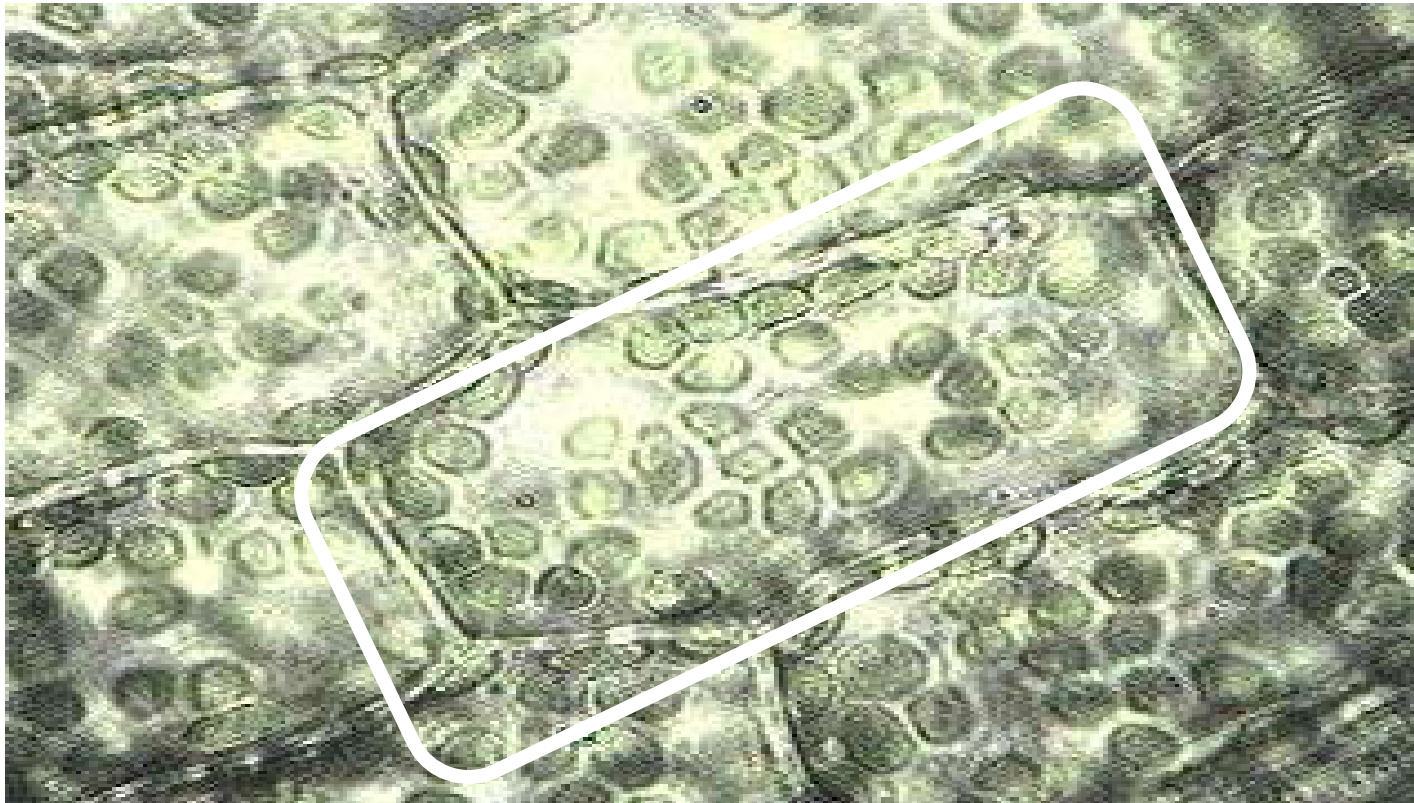


<http://upload.wikimedia.org/wikipedia/commons/1/1b/Onions.jpg>

<http://www.uleth.ca/bio/bio1010/bio1010.htm>

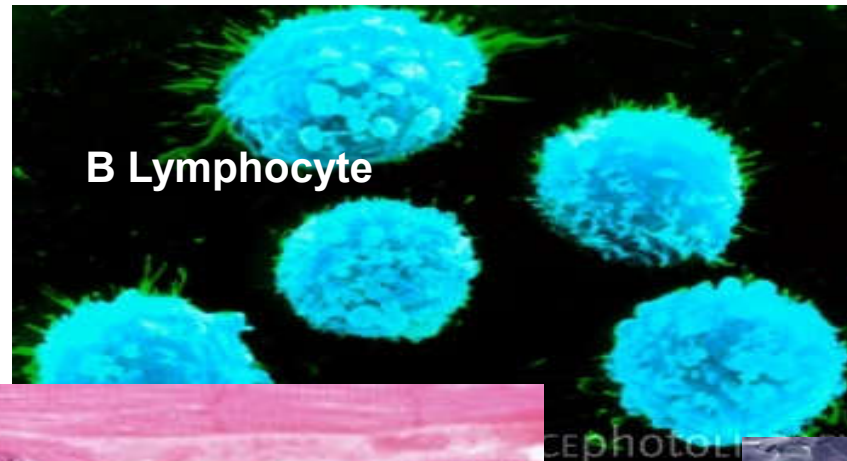
## Plant Cell Example

## Elodea Cells



[http://en.wikipedia.org/wiki/Image:Elodea\\_canadensis2\\_ies.jpg](http://en.wikipedia.org/wiki/Image:Elodea_canadensis2_ies.jpg)

# Somatic cells



**B Lymphocyte**

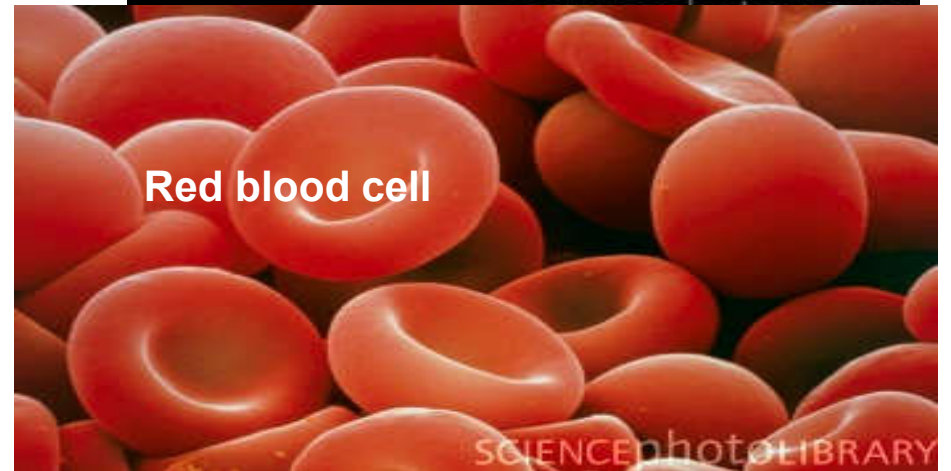
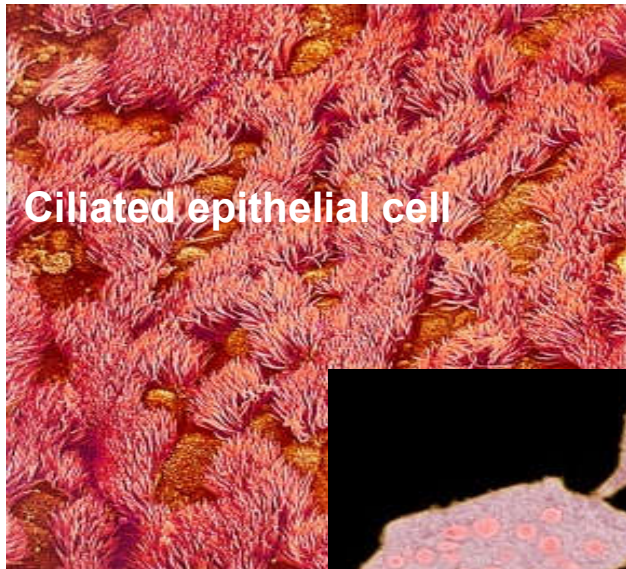


**Smooth muscle**



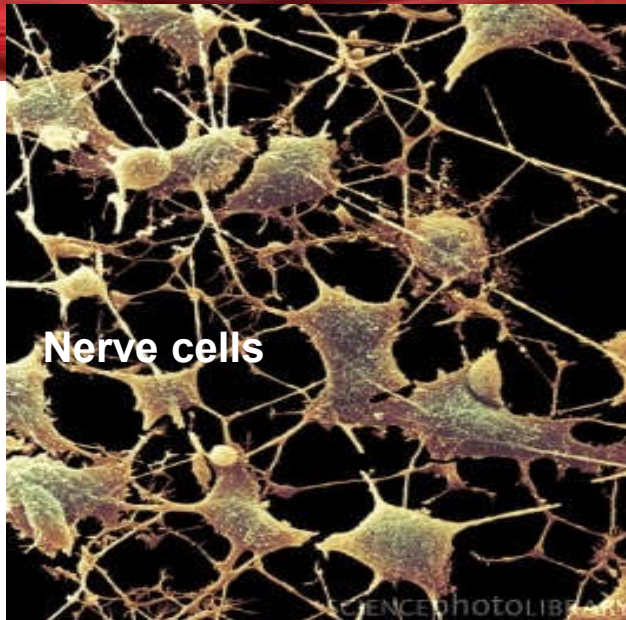
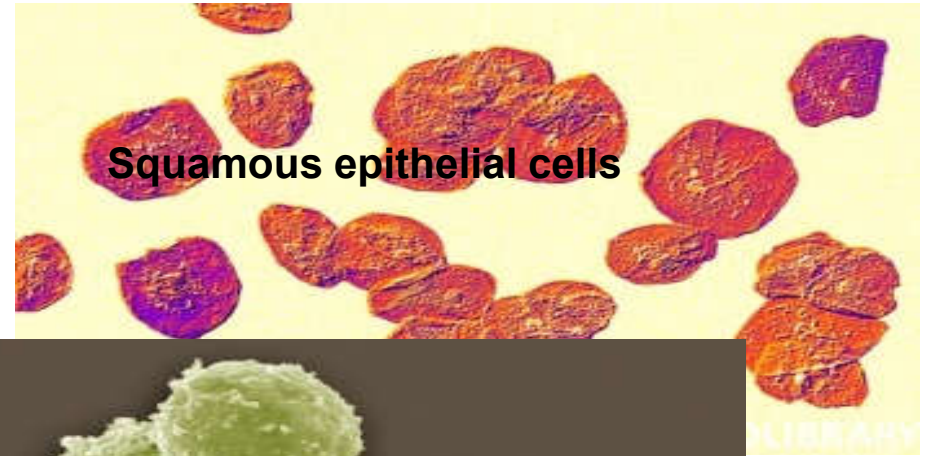
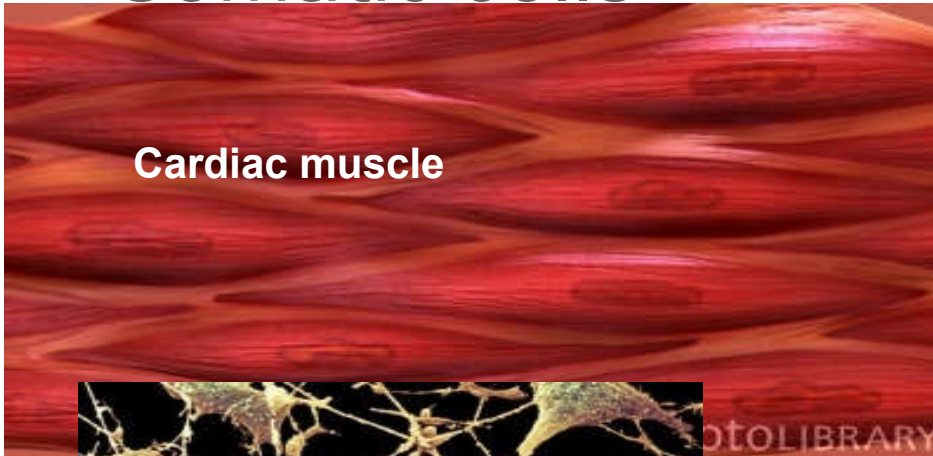
**Hyaline cartilage**

# Somatic cells



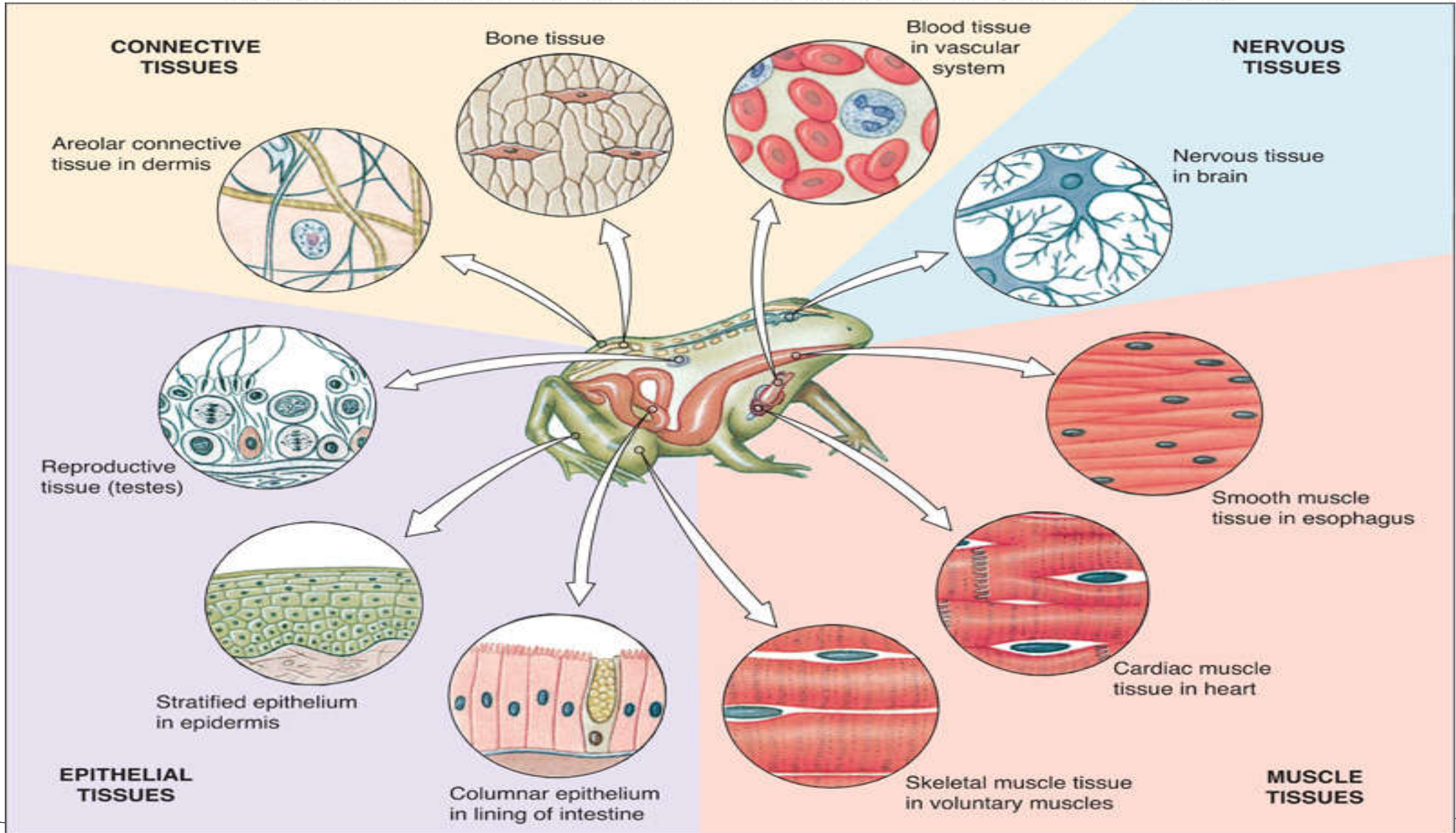


# Somatic cells



# Basic Tissue Types

- Epithelial
- Connective
- Muscle
- Nervous



# Epithelial Types

- Simple Epithelium
  - Simple squamous – inside blood vessels
  - Simple cuboidal – lines ducts, ex. Kidney tubules, mucous glands
  - Simple columnar – lining of small intestine
  - Pseudostratified Columnar – trachea, bronchi

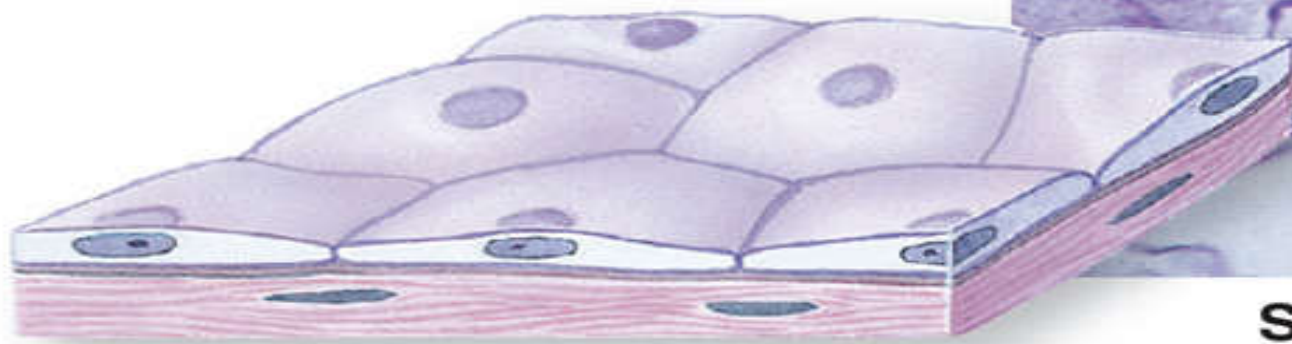
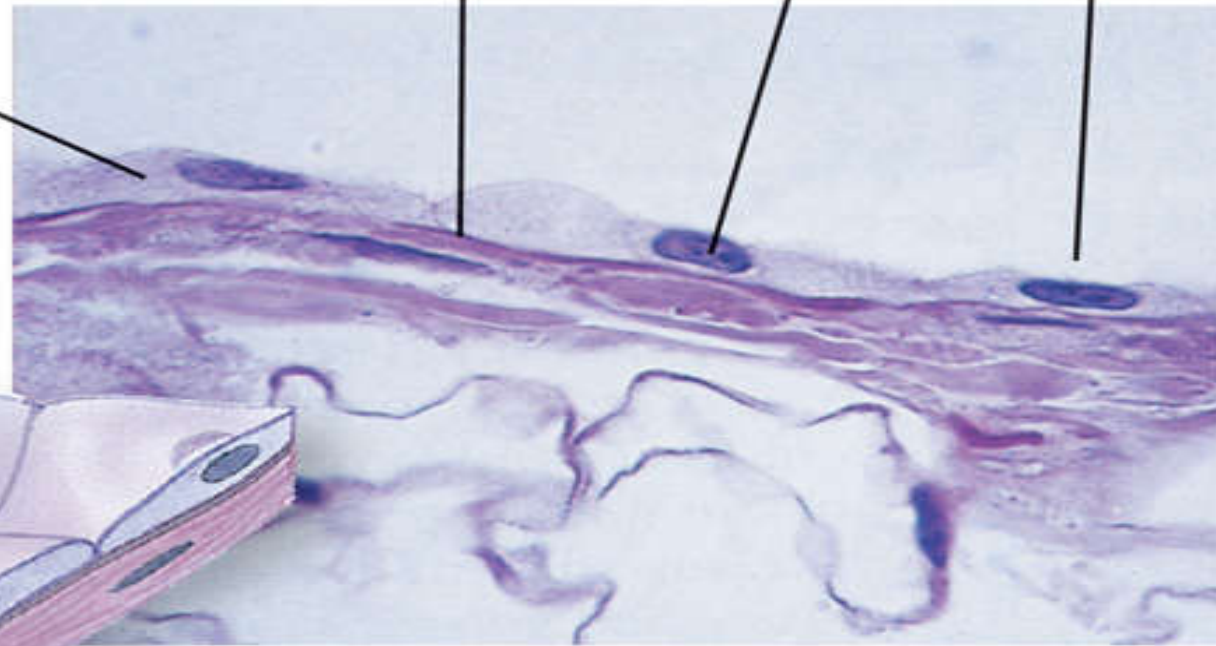
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Simple squamous epithelial cell

Basement membrane

Nucleus

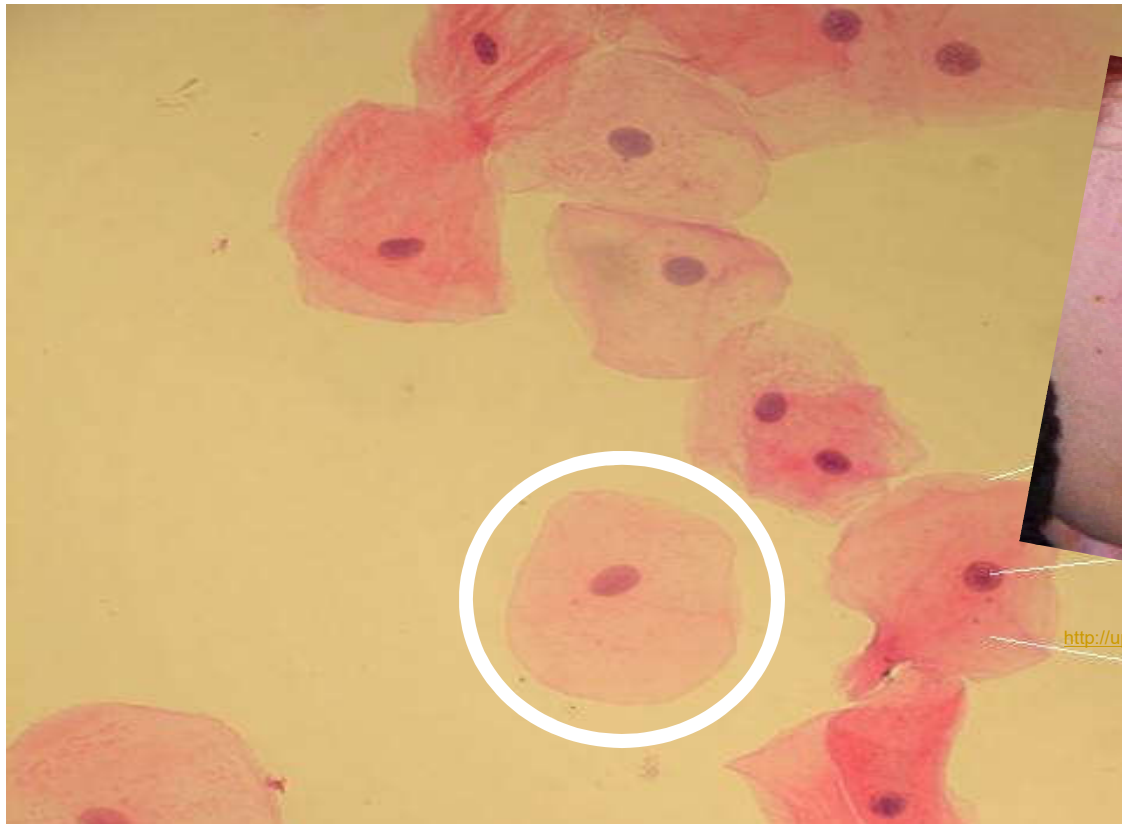
Free surface



**Simple squamous epithelium**

**A**

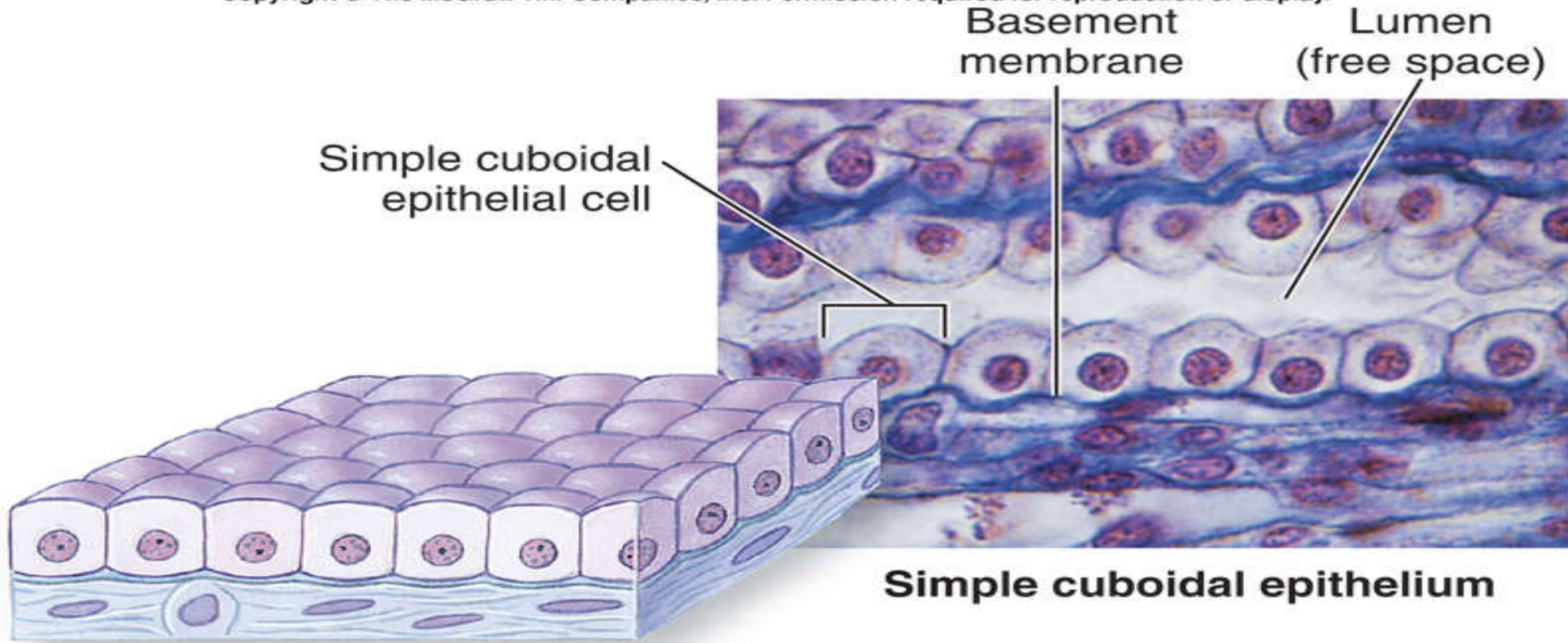
Skin (Epithelial) Cell cover the body in a thin layer. They regenerate quickly.



[http://upload.wikimedia.org/wikipedia/commons/a/a9/Cheek\\_cell.jpg](http://upload.wikimedia.org/wikipedia/commons/a/a9/Cheek_cell.jpg)

[http://sac.edu/HomePages/nigro\\_dan/Cheek\\_cell.jpg](http://sac.edu/HomePages/nigro_dan/Cheek_cell.jpg)

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**B**

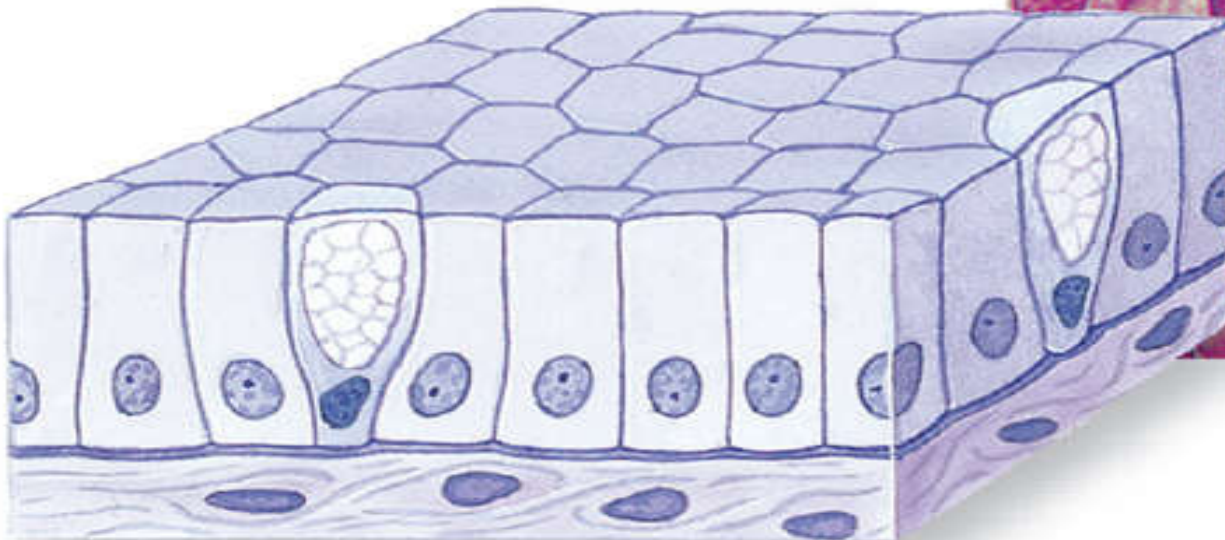
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Basement  
membrane

Microvilli on  
cell surface

Nuclei

Epithelial  
cells

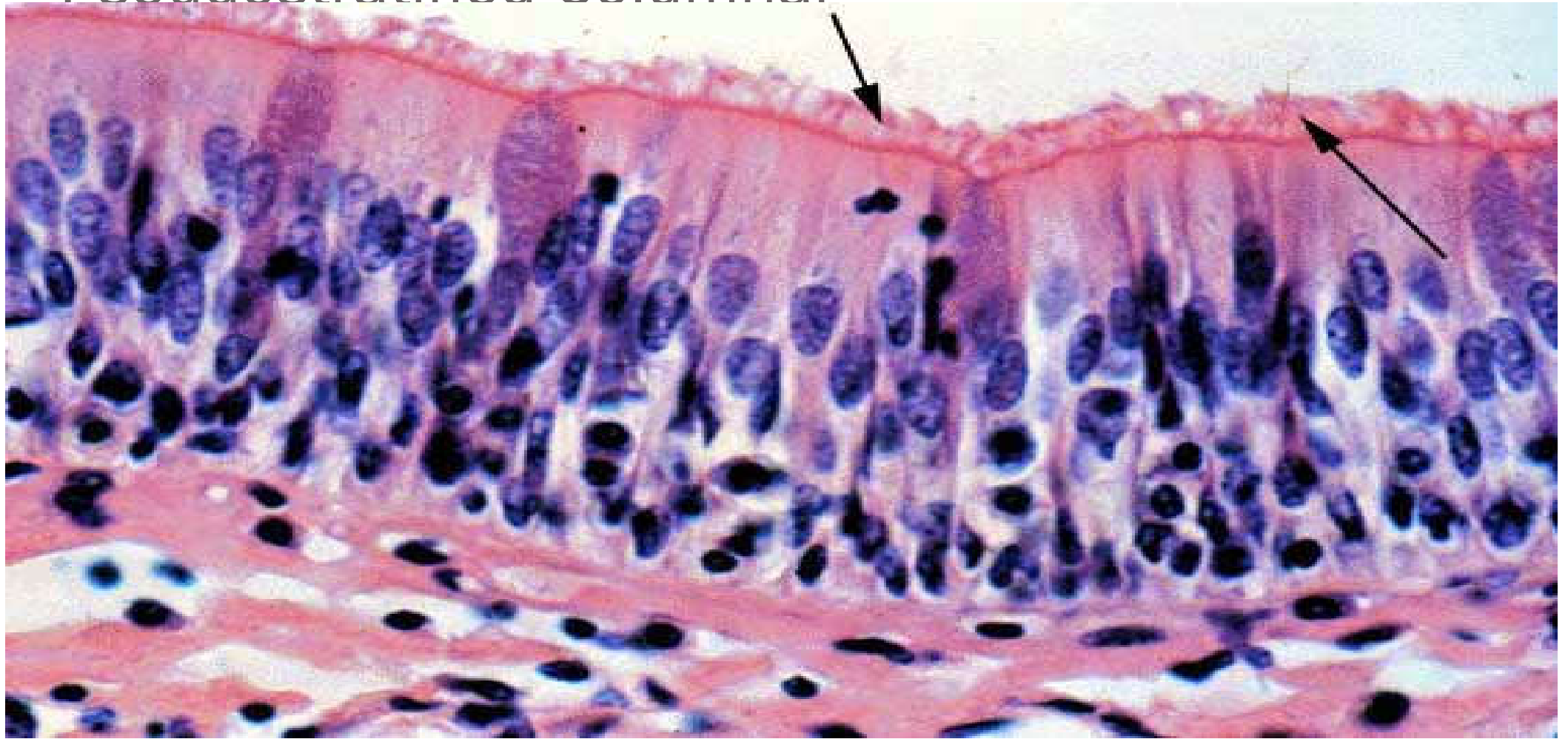


**Simple columnar epithelium**

C



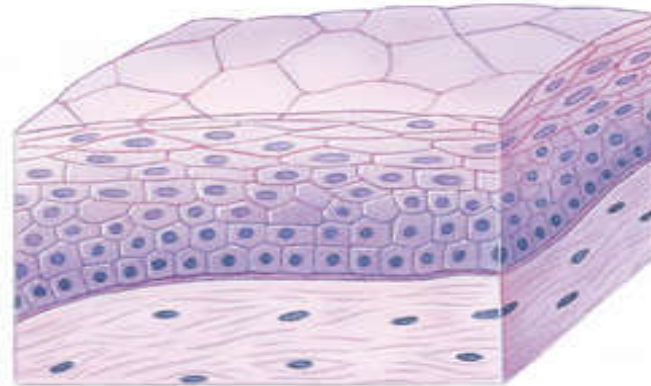
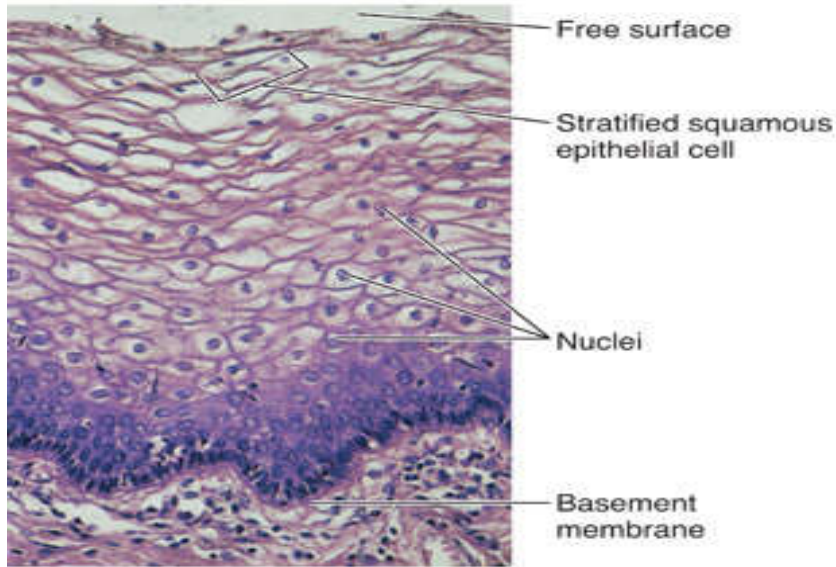
# Pseudostratified Columnar



# Epithelial Types

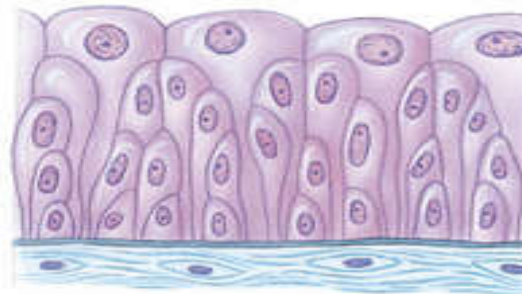
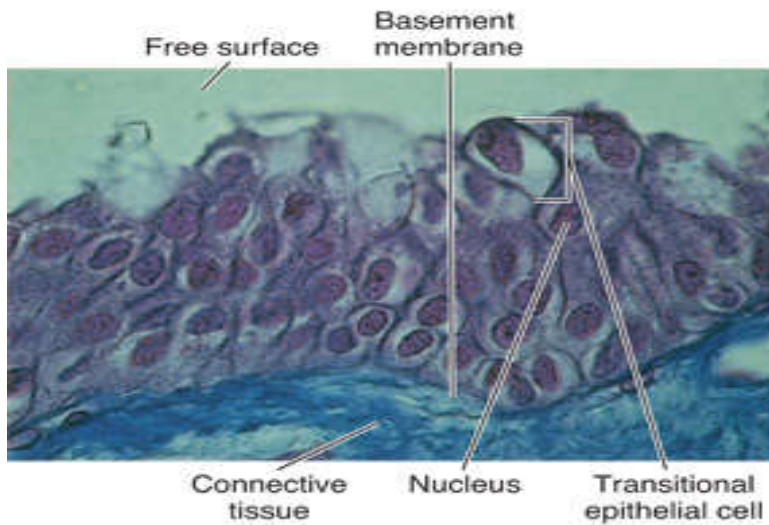
- Stratified Epithelium
  - Stratified squamous - skin
  - Transitional – urinary tract and bladder

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Stratified squamous epithelium

**Stratified squamous epithelium** consists of two to many layers of cells adapted to withstand mild mechanical abrasion and distortion. The basal layer of cells undergoes continuous mitotic divisions, producing cells that are pushed toward the surface where they are sloughed off and replaced by new cells from beneath. This type of epithelium lines the oral cavity, esophagus, and anal canal of many vertebrates, and the vagina of mammals.

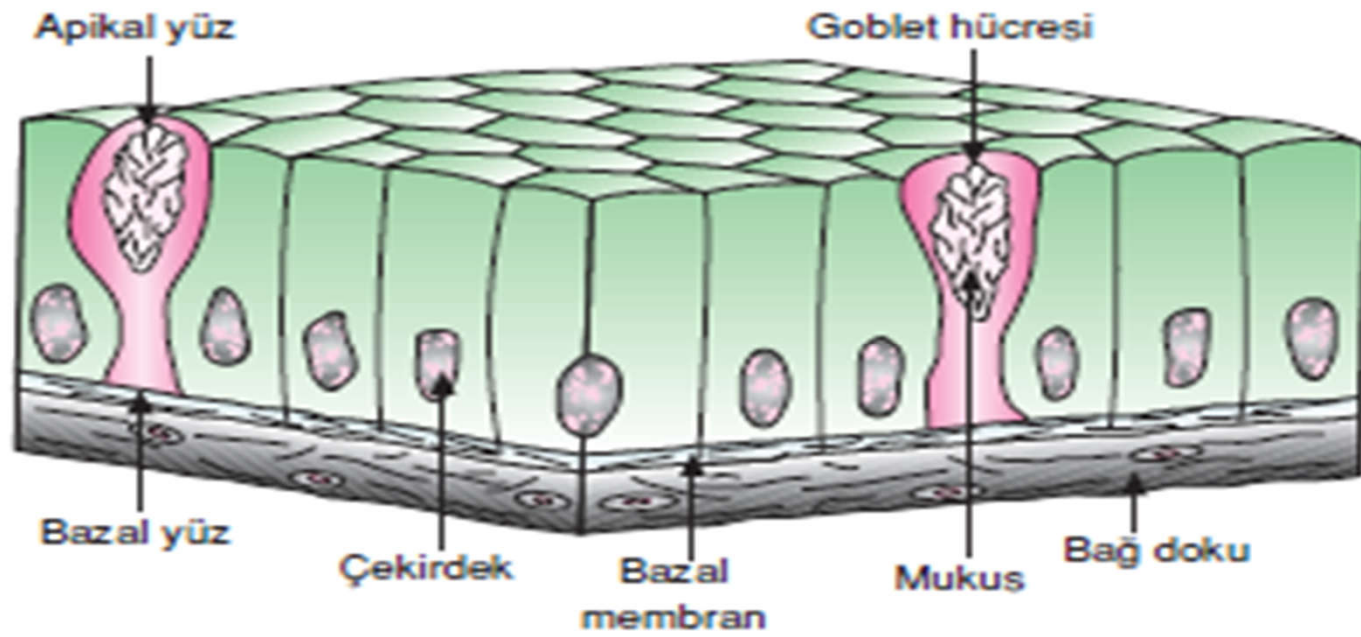


Transitional epithelium—unstretched

**Transitional epithelium** is a type of stratified epithelium specialized to accommodate great stretching. This type of epithelium is found in the urinary tract and bladder of vertebrates. In the relaxed state it appears to be four or five cell layers thick, but when stretched it appears to have only two or three layers of extremely flattened cells.



Transitional epithelium—Stretched

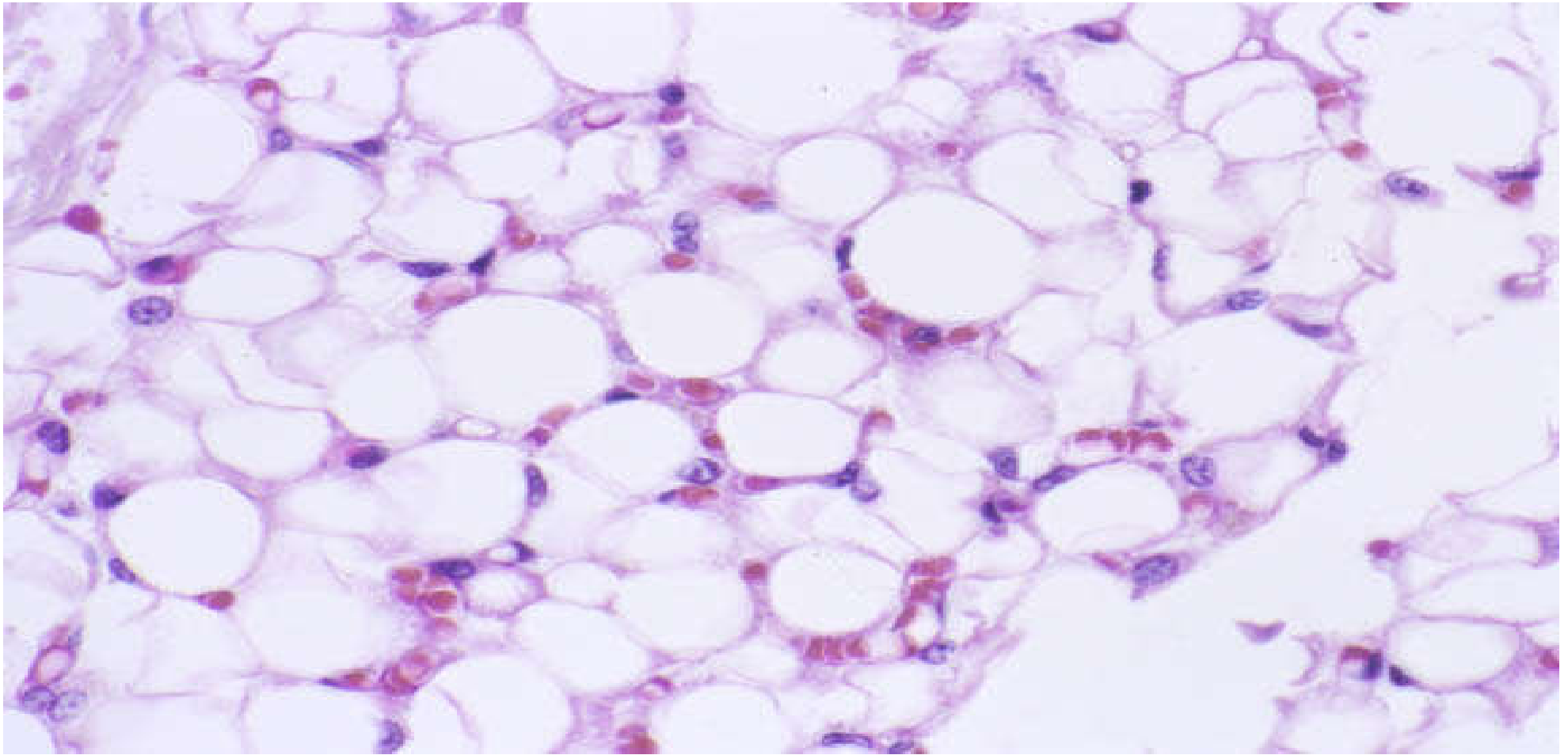


**Salgı Epiteli**

# Connective Tissue

- Tissue that connects
  - Loose connective tissue
    - adipose (fat)
  - Dense connective tissue
    - cartilage
    - Bone
  - Vascular tissue
    - Erythrocytes: Red Blood Cells – carry oxygen
    - Leucocytes: White Blood Cells – part of the immune system
    - Platelets - clotting

# Adipose



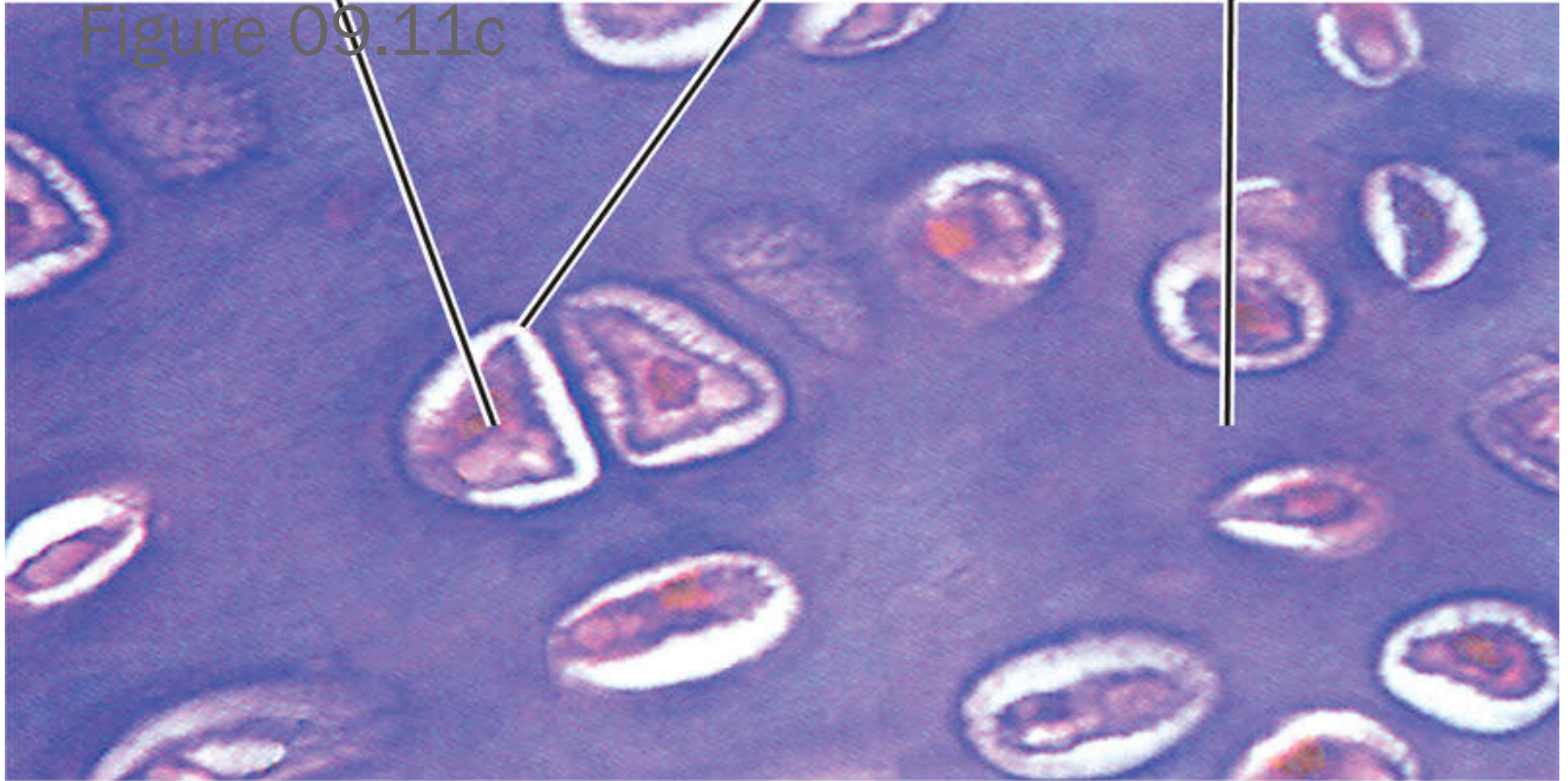
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**Chondrocyte**

**Lacuna**

**Matrix**

Figure 09.11c



**C**

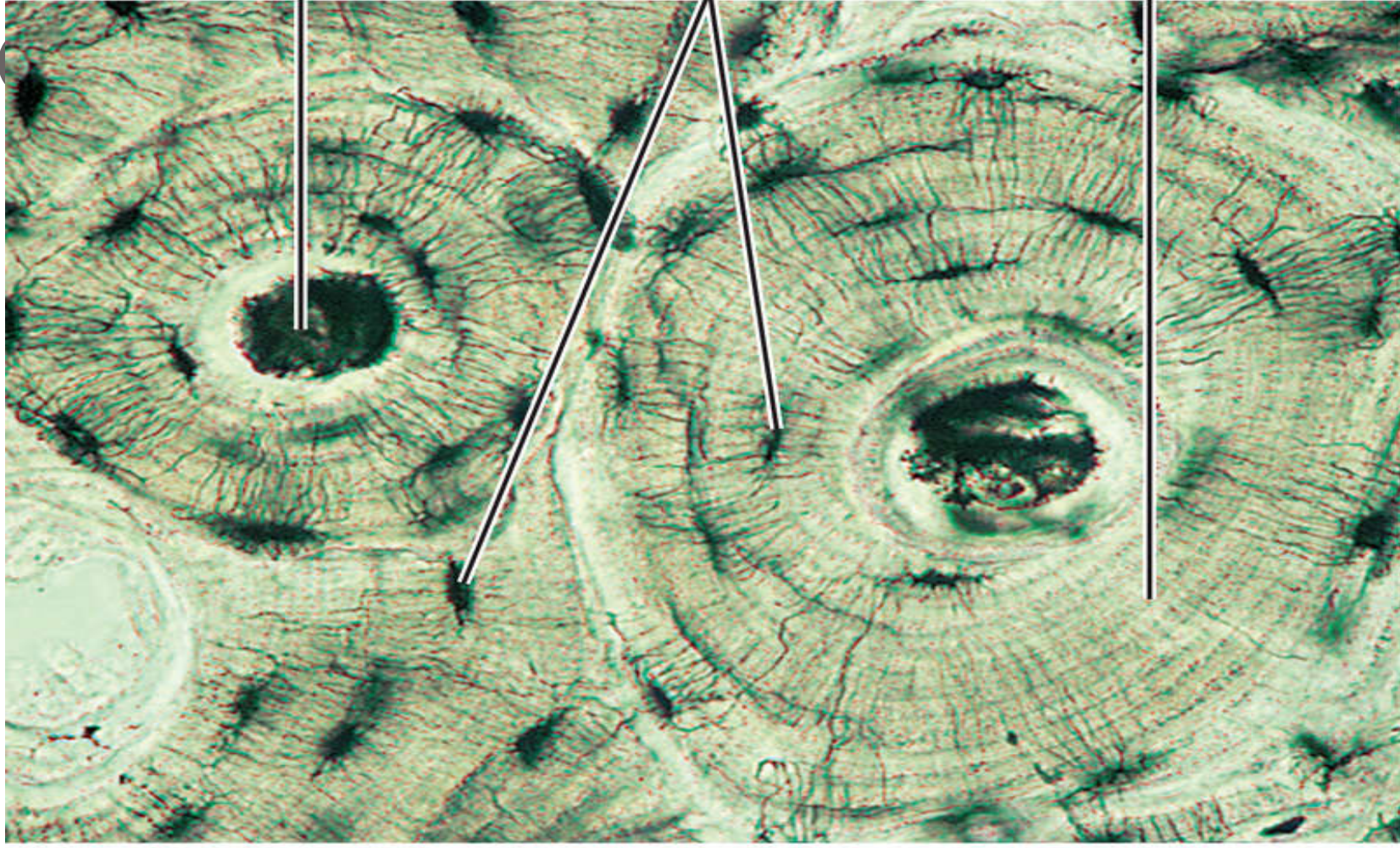
**Cartilage**

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Central  
canal

Osteocytes  
in lacunae

Mineralized  
matrix



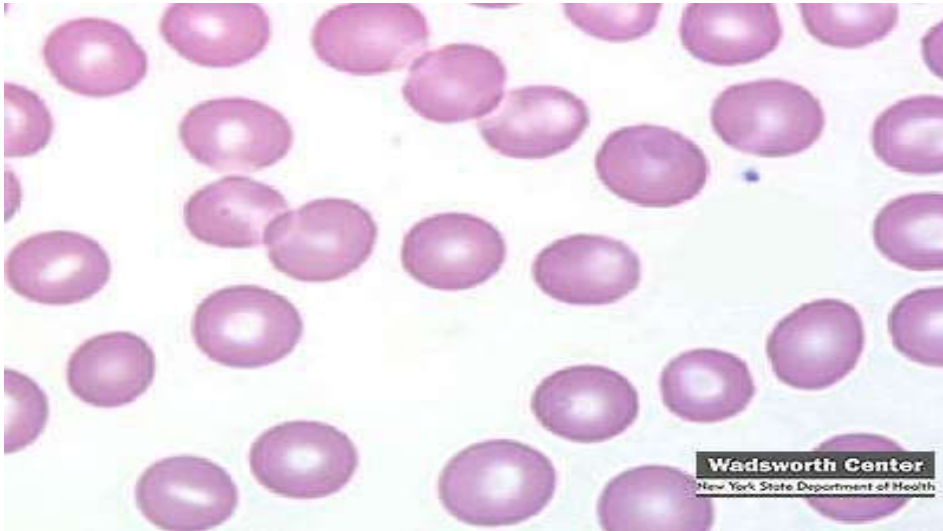
Figure

**D**

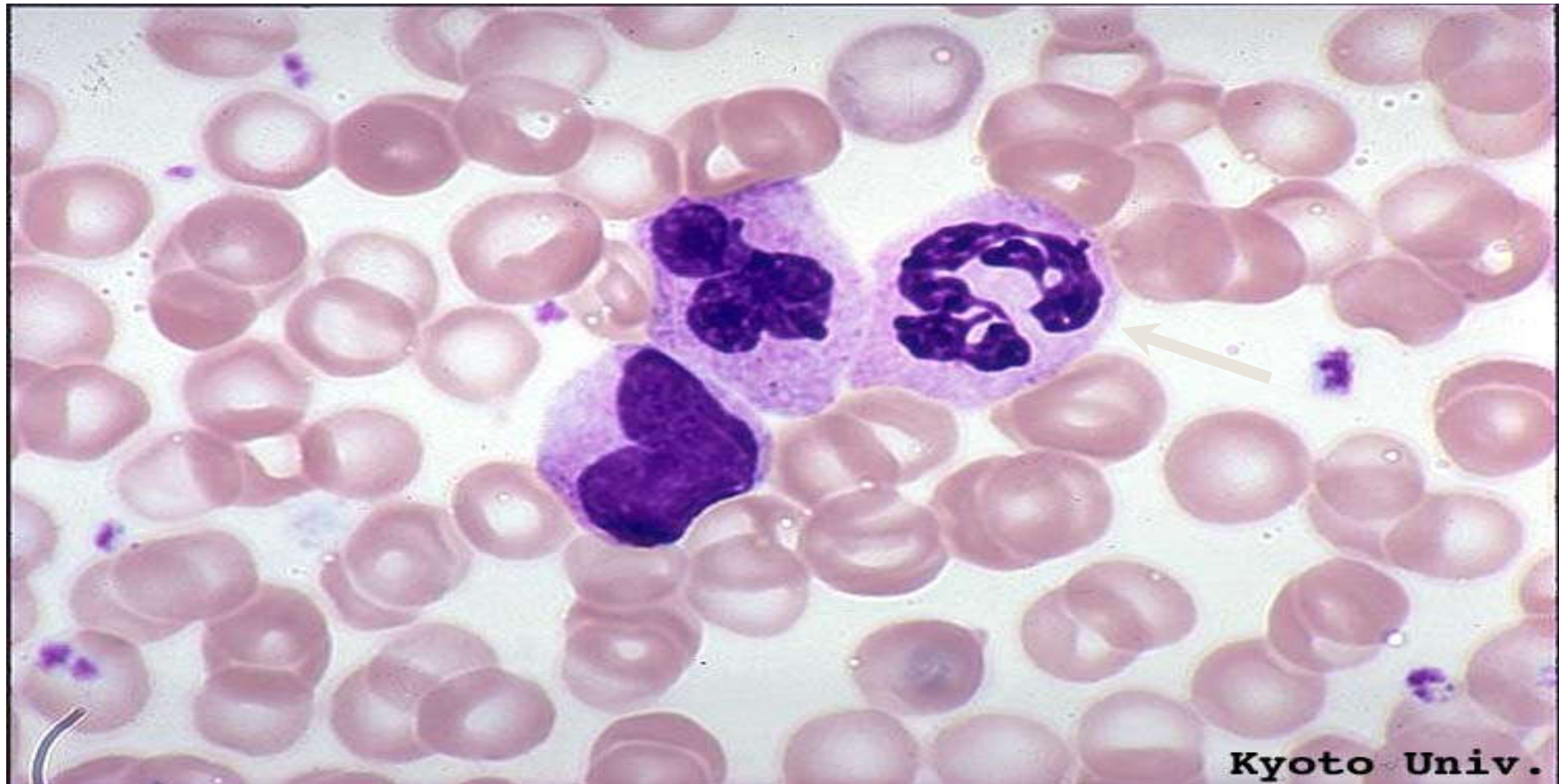
**Bone**



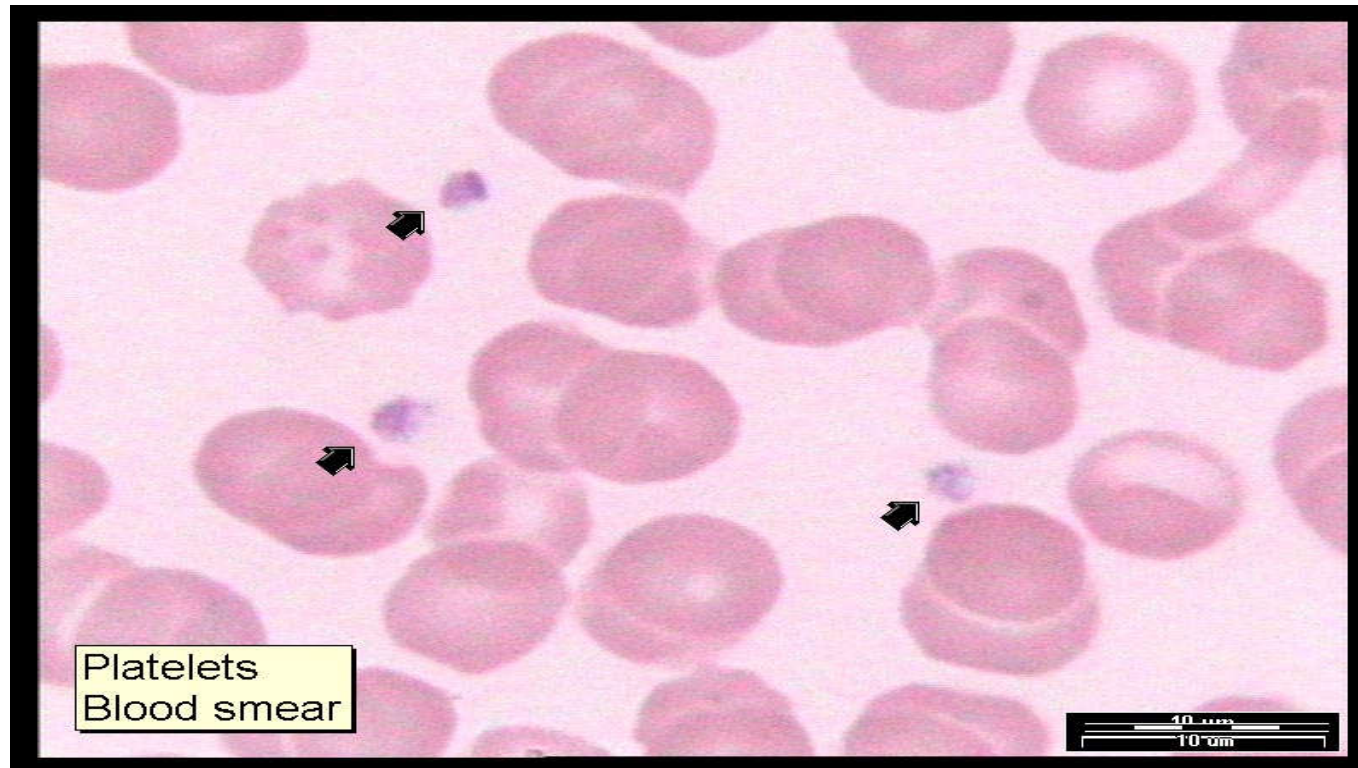
# Erythrocytes: Red Blood Cells



# Leucocytes: White Blood Cells

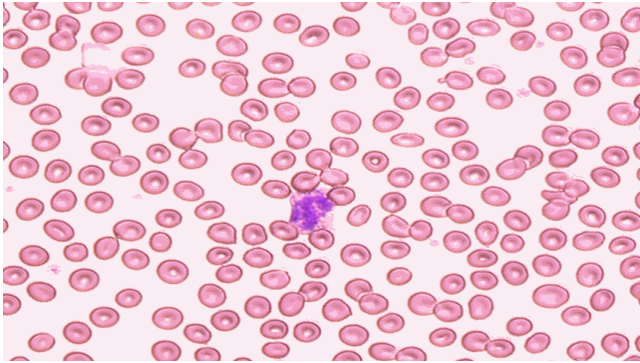


# Platelets

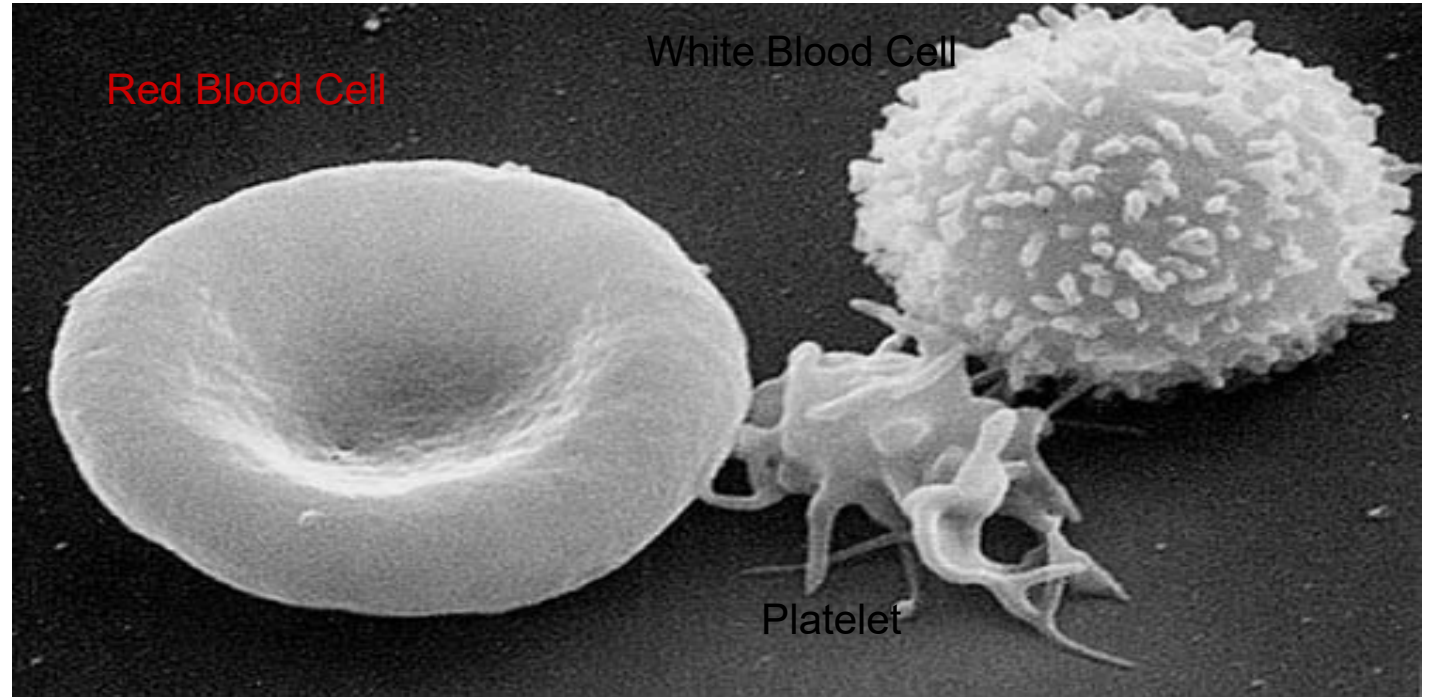


# Animal Cell Example

## Blood Cells



Red Blood  
Cells



Red Blood Cell

White Blood Cell

Platelet

[http://upload.wikimedia.org/wikipedia/commons/2/24/Red\\_White\\_Blood\\_cells.jpg](http://upload.wikimedia.org/wikipedia/commons/2/24/Red_White_Blood_cells.jpg)

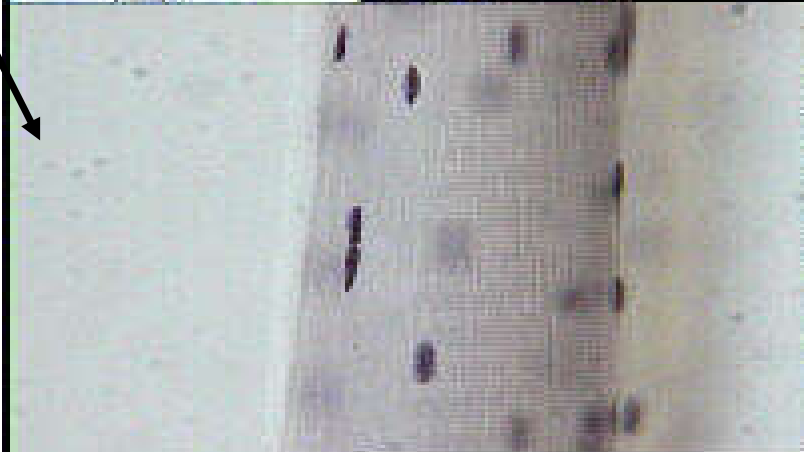
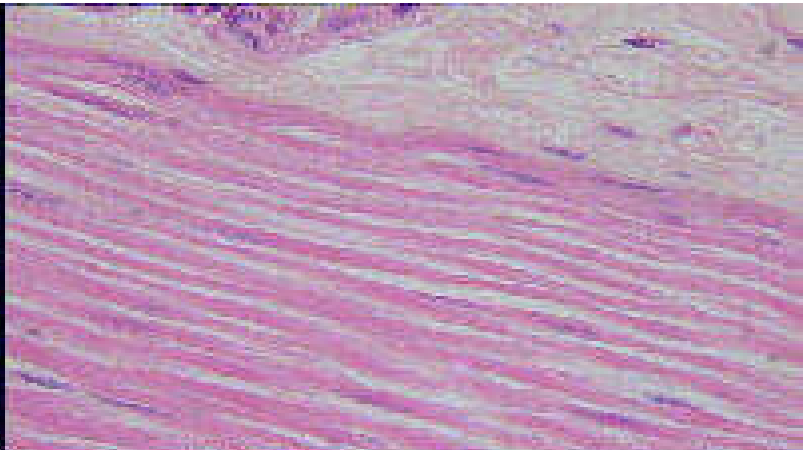
[http://upload.wikimedia.org/wikipedia/commons/e/e6/Bleeding\\_finger.jpg](http://upload.wikimedia.org/wikipedia/commons/e/e6/Bleeding_finger.jpg)

# Muscle Tissue Types

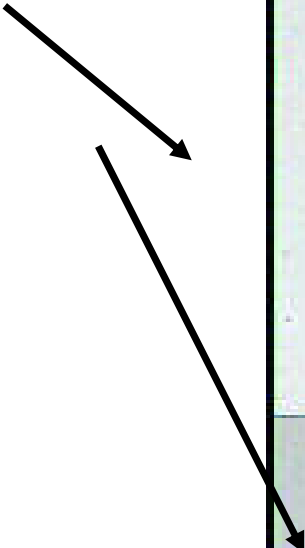
- Smooth Muscle (=Involuntary Muscle)
  - Ex. Small intestine
- Skeletal Muscel (=Voluntary Muscle)
  - Ex. Large muscles of body
- Cardiac Muscle

**Skeletal**

**Smooth**



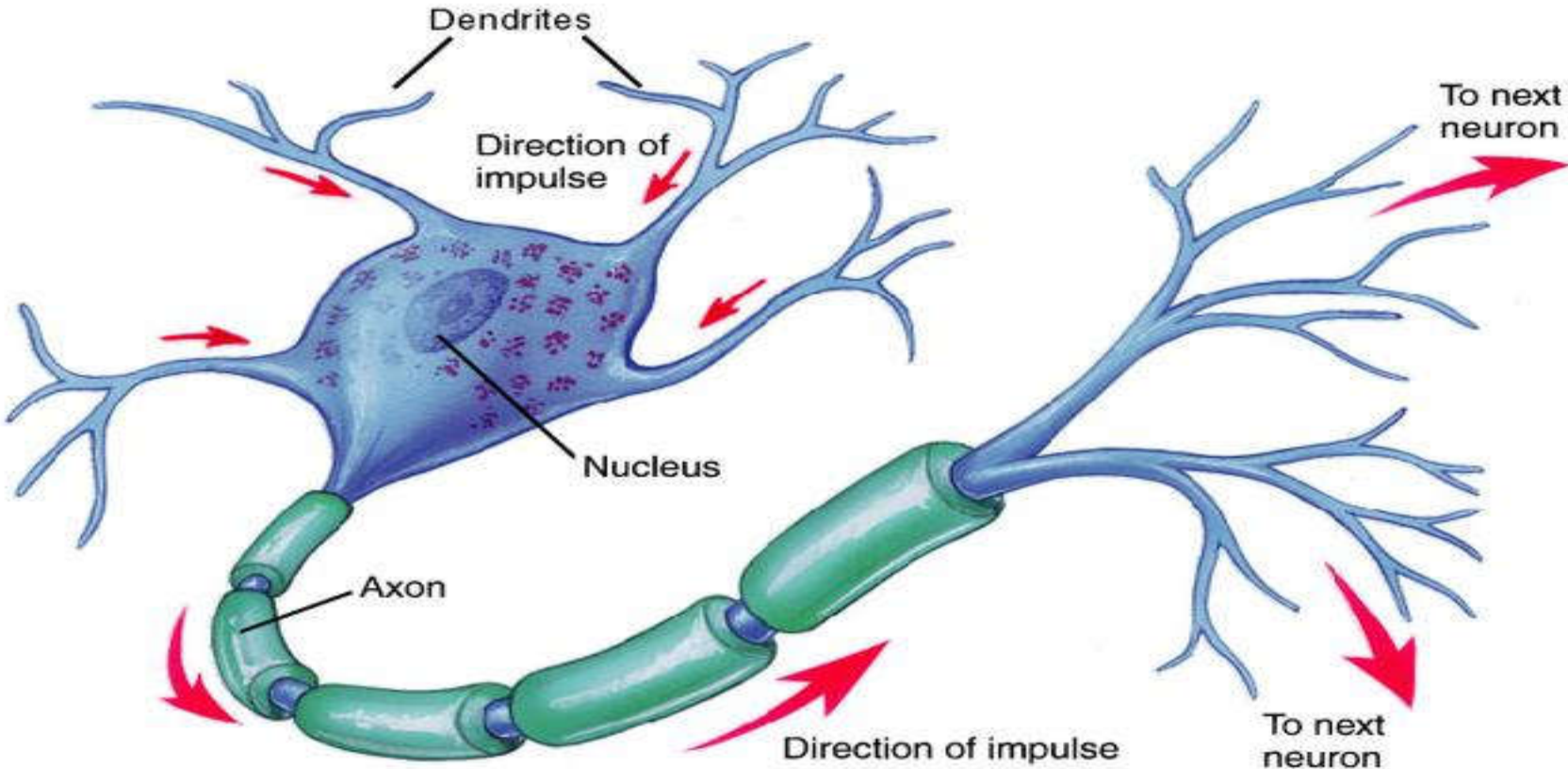
**Cardiac**



# Nervous Tissue

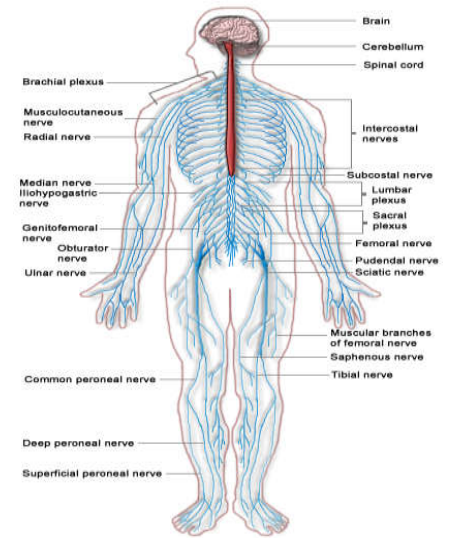
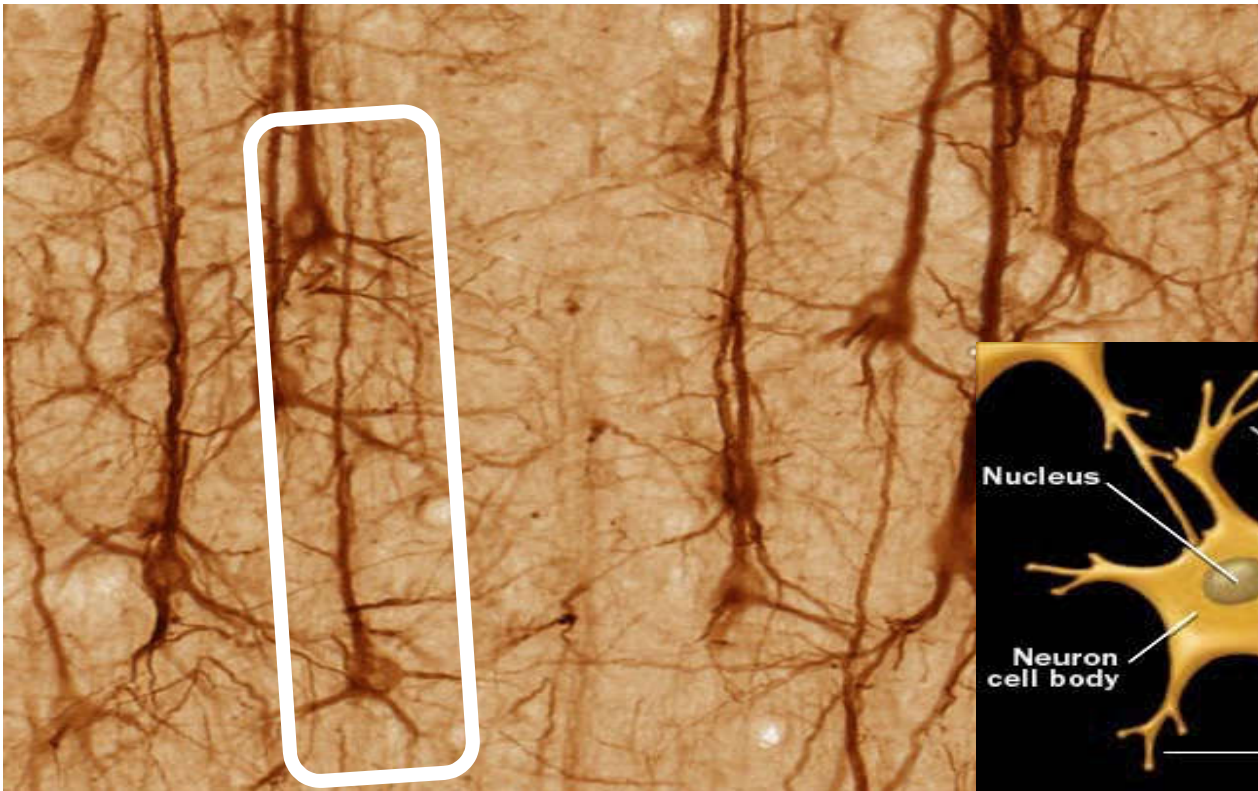
- Includes Nerves, Spinal Cord, Brain
- Cells are called neurons

# Neuron

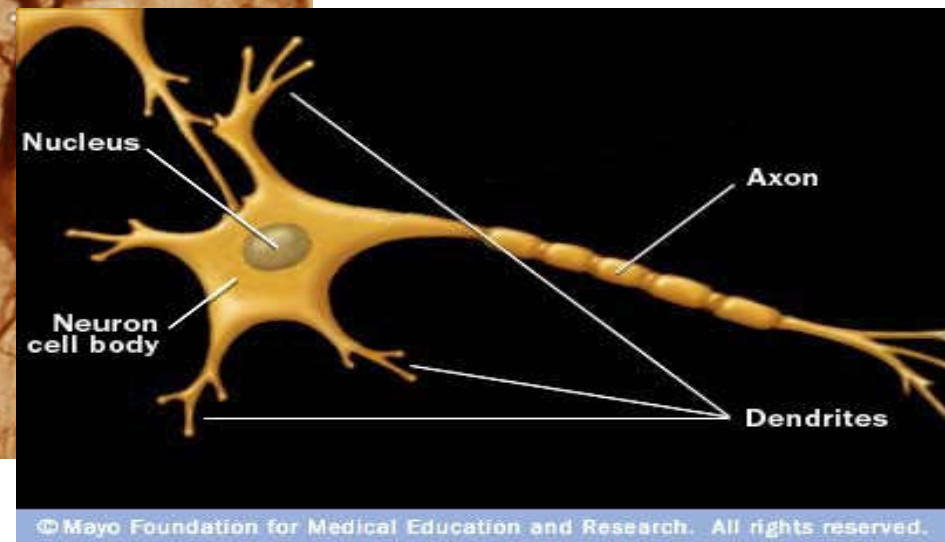




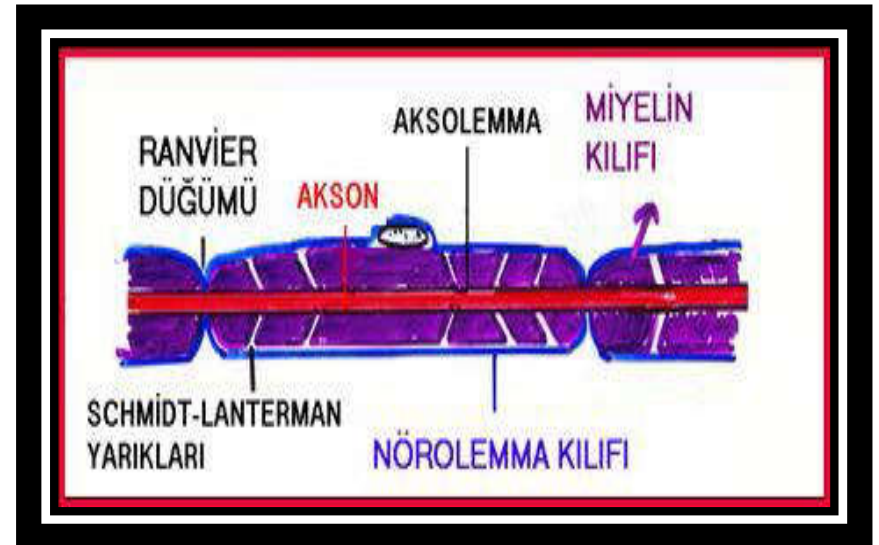
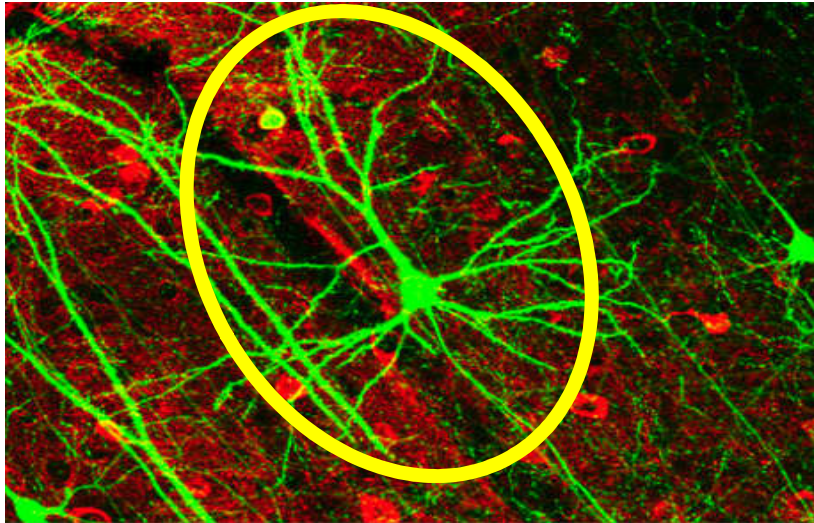
# Nerve cells send signals to the brain from the body.



[http://upload.wikimedia.org/wikipedia/commons/b/ba/Nervous\\_system\\_diagram.png](http://upload.wikimedia.org/wikipedia/commons/b/ba/Nervous_system_diagram.png)



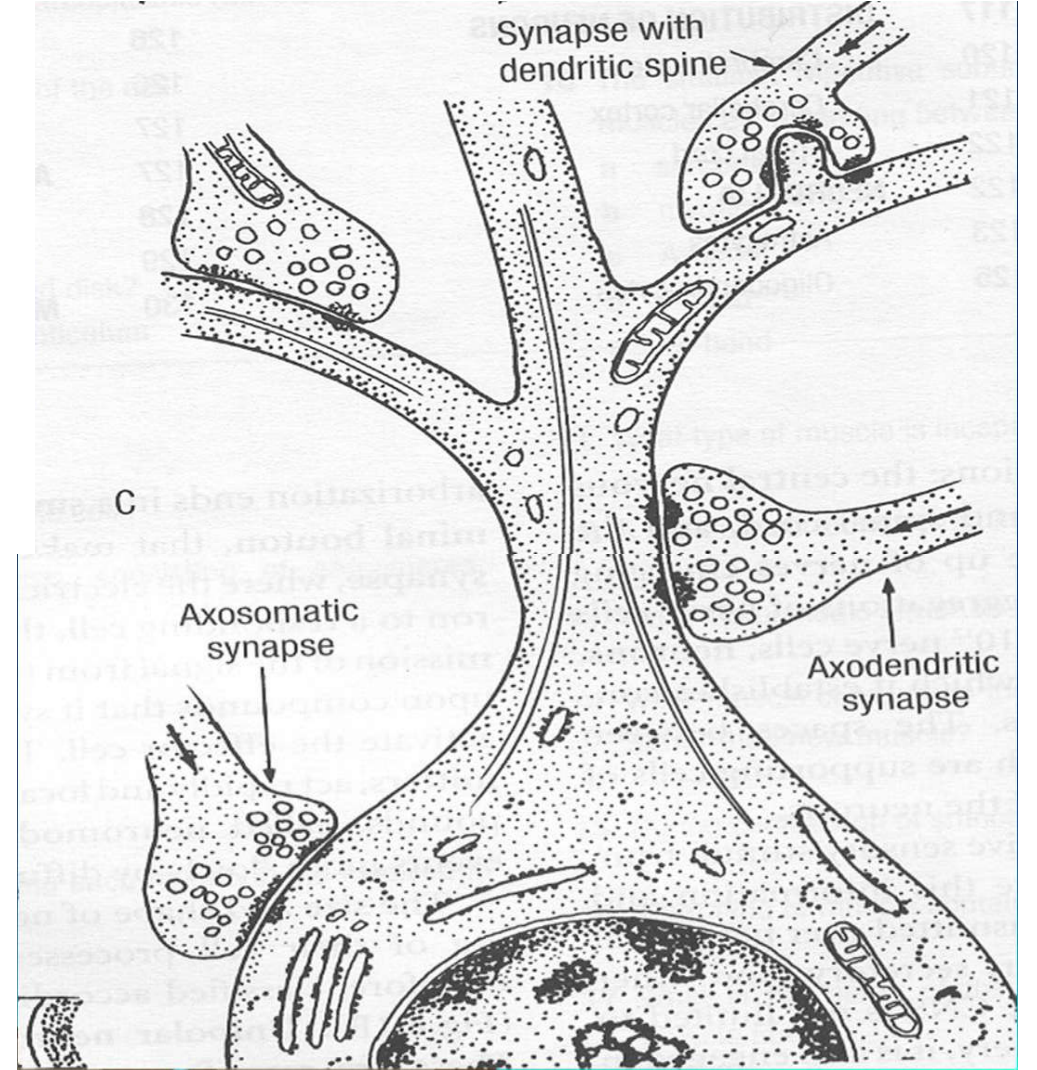
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*Nerve – Filament staining*

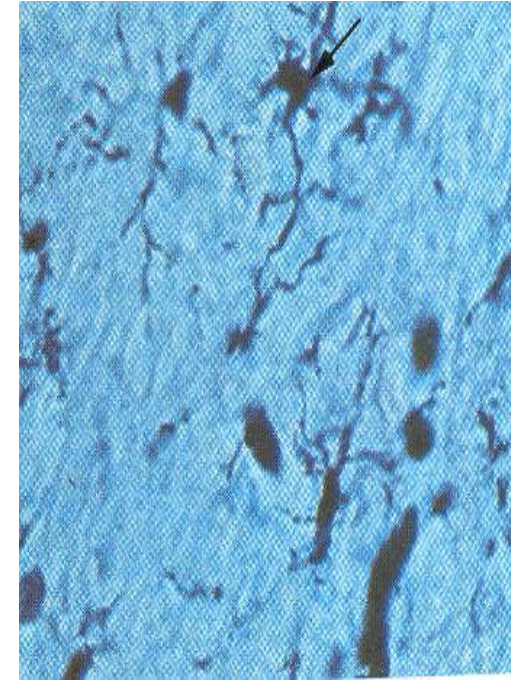
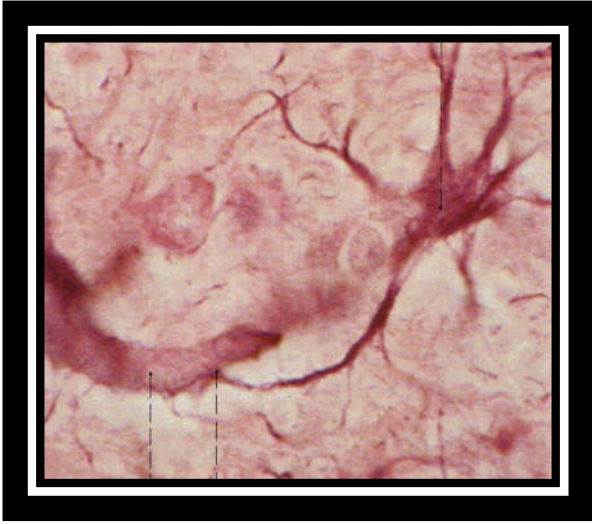
## SİNAPS

Sinaps, bir nöronun diğer bir nöronla, kas hücresi ile veya salgı hücresi ile bağlandığı yerlerdir. Yani kısaca impulsun intikal ettiği yerlerdir.



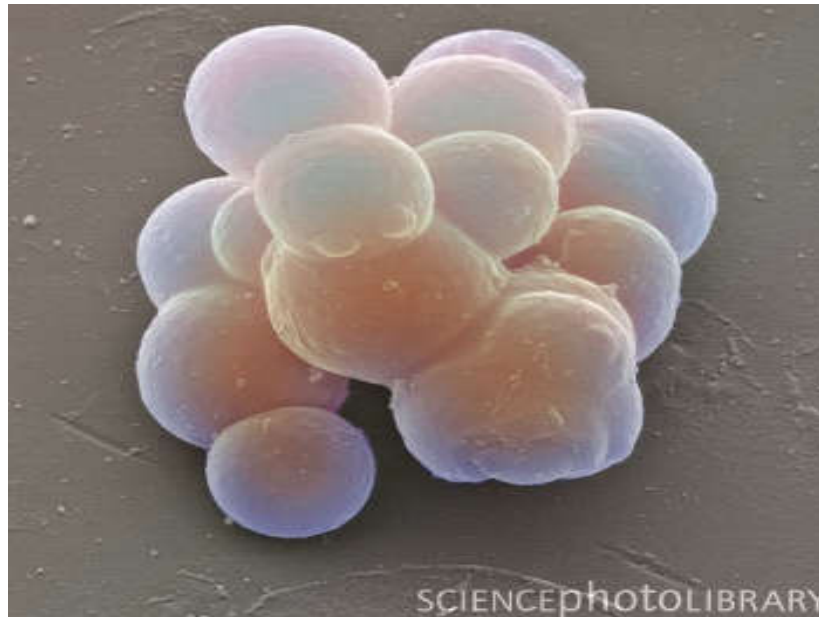
NöroGlia hücreleri sinir dokusundaki çevre ve bağ dokusuna benzer hücrelerdir ve beş çeşittir:

- 1- Protoplazmik astrositler
- 2- Fibröz astrositler
- 3- Oligodendrositler
- 4- Mikroglialar
- 5- Ependim hücreleri

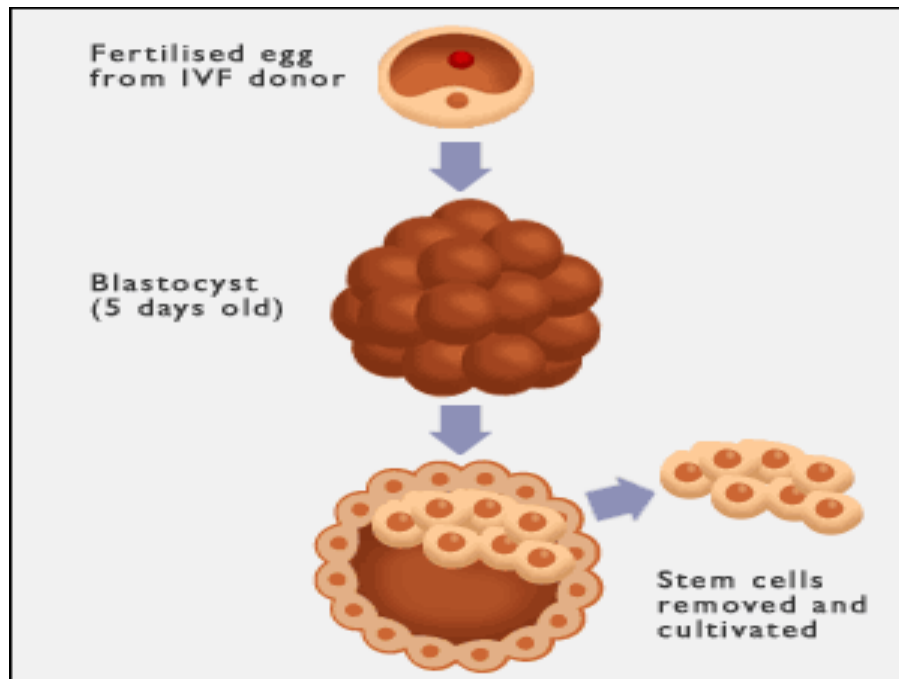


# What are stem cells?

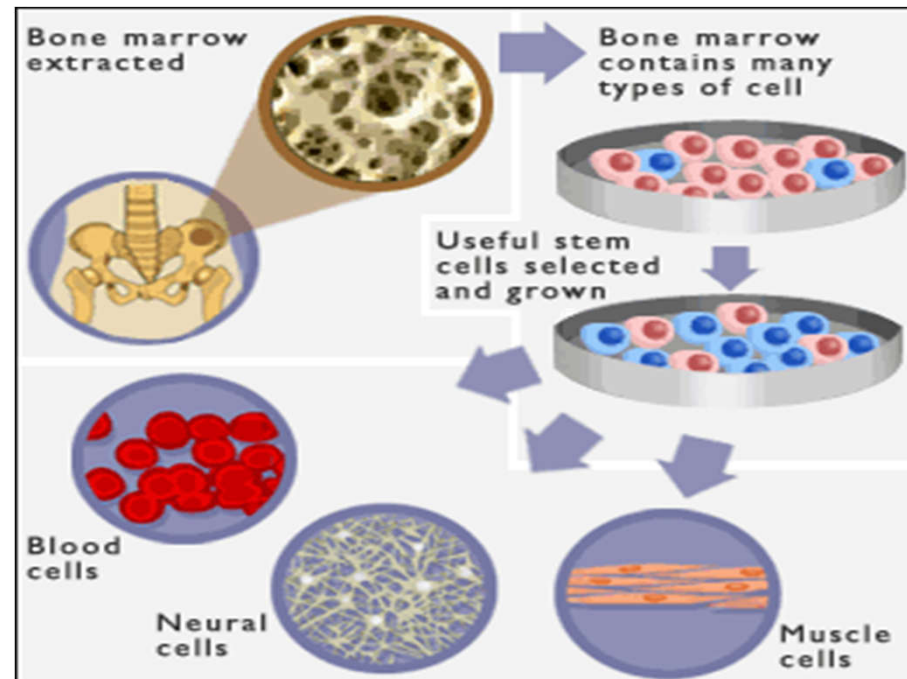
Stem cells are **unspecialised** cells that have the ability to reproduce and **differentiate** into a diverse range of **specialised cells**.



# Types of stem cells



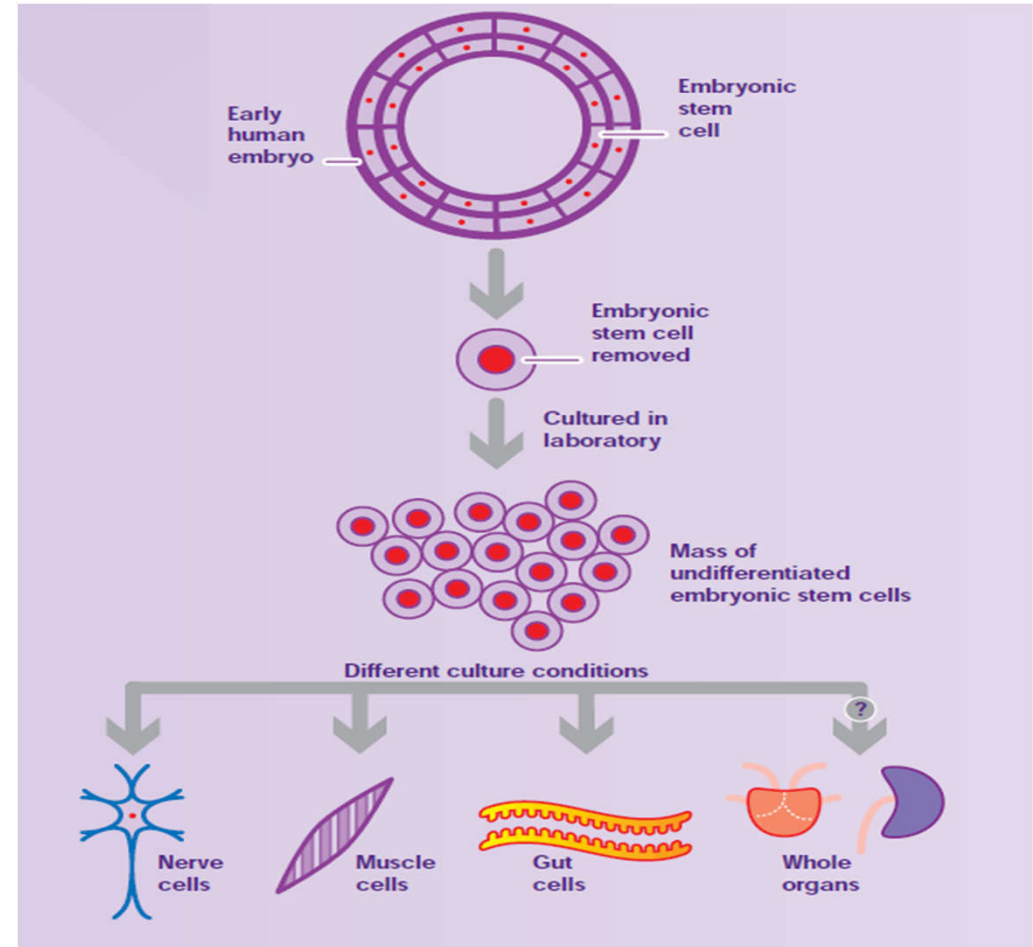
Embryonic



Adult

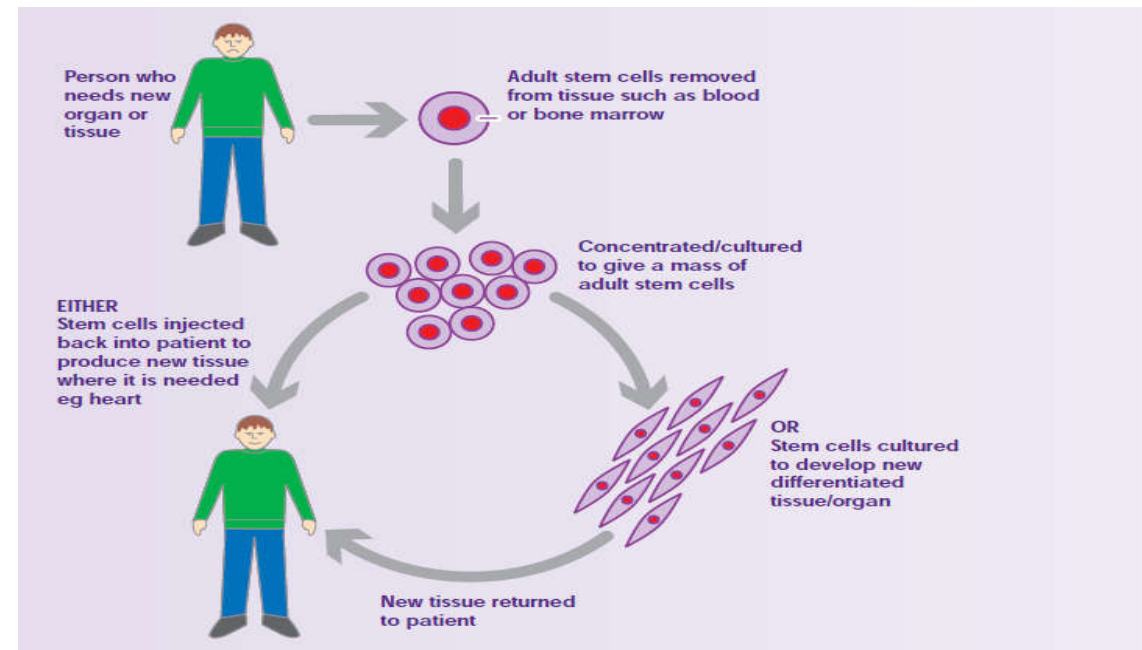
# Embryonic stem cells

- Embryonic stem cells are derived from an embryo about 4–5 days old (blastocyst).
- These cells have the ability to differentiate into all of the cell types that make up an organism.



# Adult (tissue) stem cells

- Adult or tissue stem cells are found in small numbers in the tissues and organs of adults and children, including the **brain, bone marrow, skeletal muscle** and **skin**.
- These cells give rise to a much more **limited range of cell types** and will tend to develop into cell types that are closely related to the tissue in which they are found.
- These cells **replenish differentiated cells that need replaced** in the tissues in which they are found.



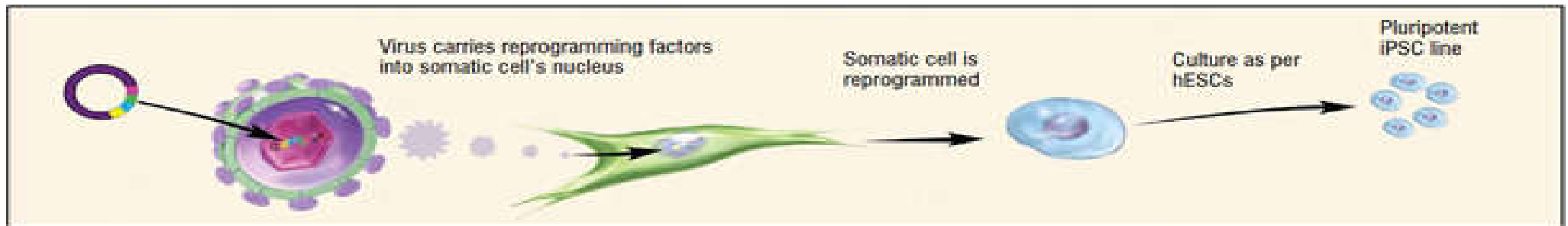


## Other types of stem cells

- Stem cells can also be taken from the umbilical cord of new babies.
- Like adult stem cells, these cells can differentiate into a limited range of specialised cells.



# Induced pluripotent stem cells



Induced pluripotent stem cells are adult cells that have been genetically reprogrammed to an embryonic stem cell-like state.