Histology I

Practical book

First year physical students

Name of the student……..

Section……

Prepared by
Dr. Tahani Abbass Abd Allah
Lecturer of Histology
Faculty of Medicine
South Valley University

MICROSCOPE

-It is an instrument that magnifies an image and allow visualization of details that can not be seen by unaided human eye.

Types of the microscope:

1-Light microscope (LM): Commonly used in teaching labs.

2- Electron microscope (EM): include Transmission EM and scanning EM.

Parts of LM: It consists of

1- A light source for illumination of a specimen such as day light or lamp.

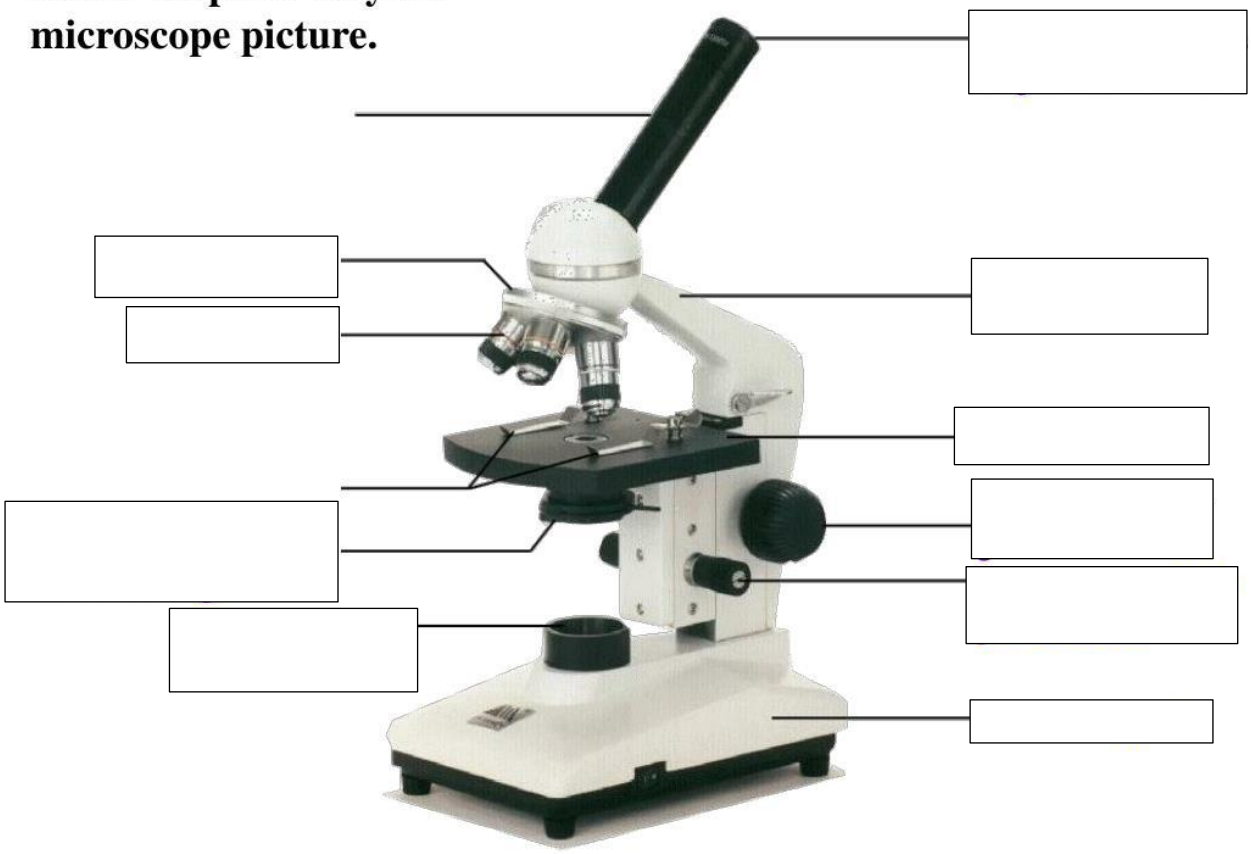
2-Acondenser to focus the beam of light at the level of specimen.

3-Astage to place the slide on it.

4-Ocular lens (eye piece) may be one in uniocular microscope or 2 lens in binocular microscope.

5-Objective lens to gather the light that has passed through the specimen. There is various magnification power of objective lens such as ×4, ×10, ×40, ×100.

Label the parts on your microscope picture.



Tissue preparation

1-Hematoxylinand Eosin(Hx&E) staining with formalin fixation

-Most of slides you will study in the lab are formalin fixed, paraffin embedded, and Hx&E stained sections.

-**Special staining methods** are used to demonstrate special cell and tissue components such as silver stain for demonstrating Golgi complex, PAS for demonstrating glycogen, iron Hx for demonstrating mitochondria and Sudan III for demonstrating lipid droplets.

Steps:

1-Sampling: the sample may taken from animal labs such as mice and rats or human beings for diagnosis of the diseases.

-Sample taken by surgical excision of a living human called **biopsy.**

- Sample taken postmortem called **autopsy.**

-Size of the sample is usually small 0.5 cm *1.0 cm or less.

-It should be fixed as soon as possible to avoid postmortem changes(putrefaction &autolysis).

2-Fixation:

-It prevents postmortem changes.

-It makes the tissue easy to be processed and stained.

-Most commonly used fixative is 10% formalin.

-Other types of fixatives can be used such as Bouin's solution.

3-Washing to remove excess fixative/

4-Dehydration (removal of water) by using ascending grades of ethyl alcohol to avoid shrinkage of the cell.

5- Clearing by using organic solvent such as xylol. Xylol removes alcohol before infiltration of specimen by melted paraffin.

6-Impergnation means infilteration of the specimen with melted paraffin wax.Melting point of paraffin is 58 c. This step is done in hot air oven.

7-Pouring the melted paraffin and specimen in special blocks and let it to hardens in room temperature.

8-Sectioning means slicing the tissue blocks into 5-10 micron thickness of the section by a microtome.

9-Mounting: The sections are allowed to float in warm water bath and then collected on a clean glass slides to be stained.

10-staining:

-We stain the tissue to allow visualization of cells.

-Hx&E is the general histological stain(staining most of the cells in the same way.

- Hx&E is a water soluble stain consist of 2 components

1-Hematoxylin is a basic dye: it stains acidic(basophilic)structure which appear blue in color. Nucleic acids are acidic so bind to basic dye(basophilic).**2-Eosin is an acidic dye:** it stains basic(acidophilic) structure which appears red in

Cytoplasmic proteins are basic so bind to acidic dye(acidophilic).

CUTTING

- using the microtome

Cytology

I-Membranous organelles

1-Cell membrane

Composed of proteins, lipids and carbohydartes:

1-Types of proteins are:

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2-Types of lipids are

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3-Function of carbohydrates in PM

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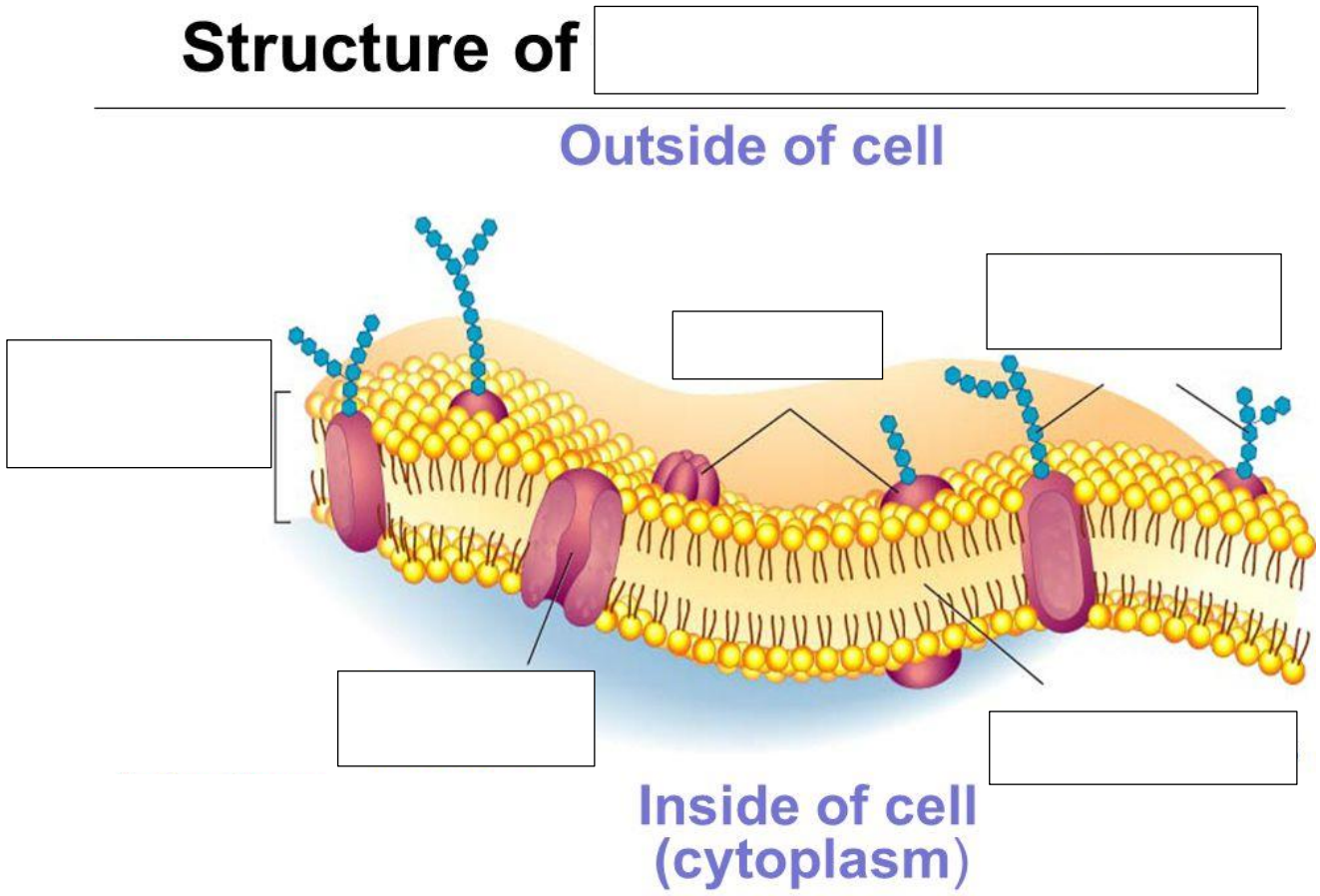
4-Label the diagram



2-Mitochondria

-Slide: Mitochondria in the liver cell(hepatocyte) stained by Iron Hematoxylin

Identification criteria of the slide:

1- Stained by (Iron Hematoxylin) special stain so the section appears black in color.
2- Central vein(CV) appear as color less rounded structure in the center of the slide.
3- Hexagonal cells (liver cell)radiate from the CV with area around nucleus studded with few black granules(mitochondria) and central black stained nucleus.

-Enumerate membranous organelles

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-Structure of mitochondria by EM

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Slide: Golgi bodies in the epididmys by silver stain

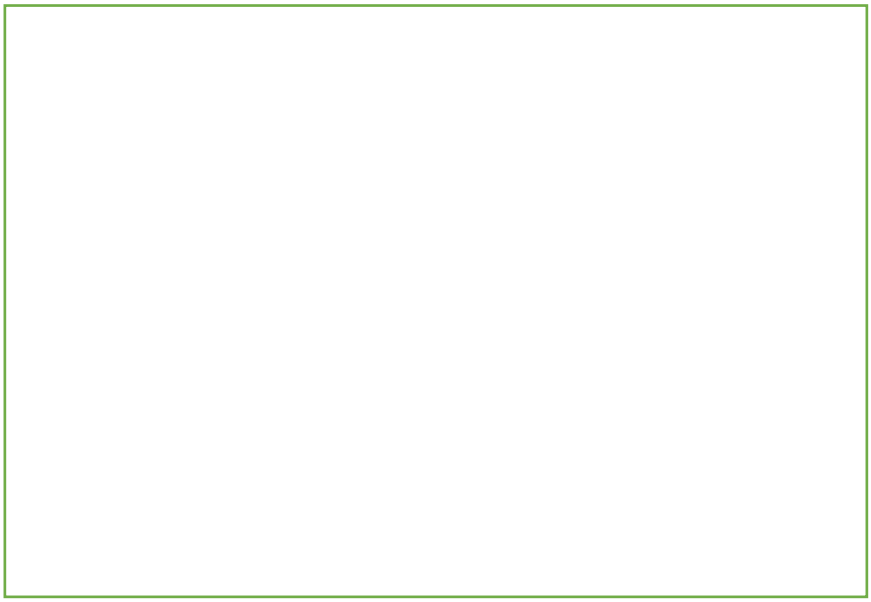
Identification criteria:

1-The sections shows rounded and oval shapes represents sections in the tube of the epididmys

2- Apices of the cells lined the tubule occupied by drak brown granules represent Golgi bodies. The cytoplasm of the cell show yellowish background.

3-The section takes brown and black color as it was stained by silver stain(special stain).

Draw the section by colors



Enumerate 3 functions of Golgi apparatus

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3-Rough endoplasmic reticulum

Slide: Rough endoplasmi reticulum spotty distribution (Nissl granules) in nerve cell by Hx&E

1-The section show variable shape of cell(rounded,pyramidal).

2-Identify the cell by its nucleus.

3-Nucleus is central rounded vesicular basophilic in color(blue).

4-Cytoplasm is acidophilic(red) with numerous basophilic granules(blue) mainly in the nerve cell body (around nucleus).These granules represent Nissl granules.

Draw and label the slide of Rough endoplasmic reticulum spotty distribution (Nissl granules) in nerve cell by Hx&E.(by using colors)

Slide: Rough endoplasmi reticulum spotty distribution (Nissl granules) in nerve cell by Toluidine blue

1-The section show variable shape of cell(rounded,pyramidal).

2-Identify the cell by its nucleus.

3-Nucleus is central rounded vesicular blue in color.

4-Cytoplasm is colorless with numerous basophilic granules(blue) mainly in the nerve cell body (around nucleus). These granules represent Nissl granules.

5-The section take the blue color due to use of Toluidin blue stain(special stain).

Draw and label the slide of Rough endoplasmi reticulum spotty distribution (Nissl granules) in nerve cell by Hx&E.(by using colors) and by Toluidine blue

Slide: Rough endoplasmic reticulum localized distribution in pancreatic acini by Hx&E.

Identification criteria:

1-The section is stained by Hx&E so appear with red and blue colors.

2-The section mainly formed of pancreatic acini which appear as small rounded structures.

3-Acini is lined by pyramidal cells with rounded vesicular nucleus near the center. The Centre of the acini is acidophilic(red) and the periphery is basophilic (rosette shape of the acini).

Draw the section with colors

Nucleus

Slide: Vesicular nucleus in liver cells by Hx&E .

Identification criteria of the slide:

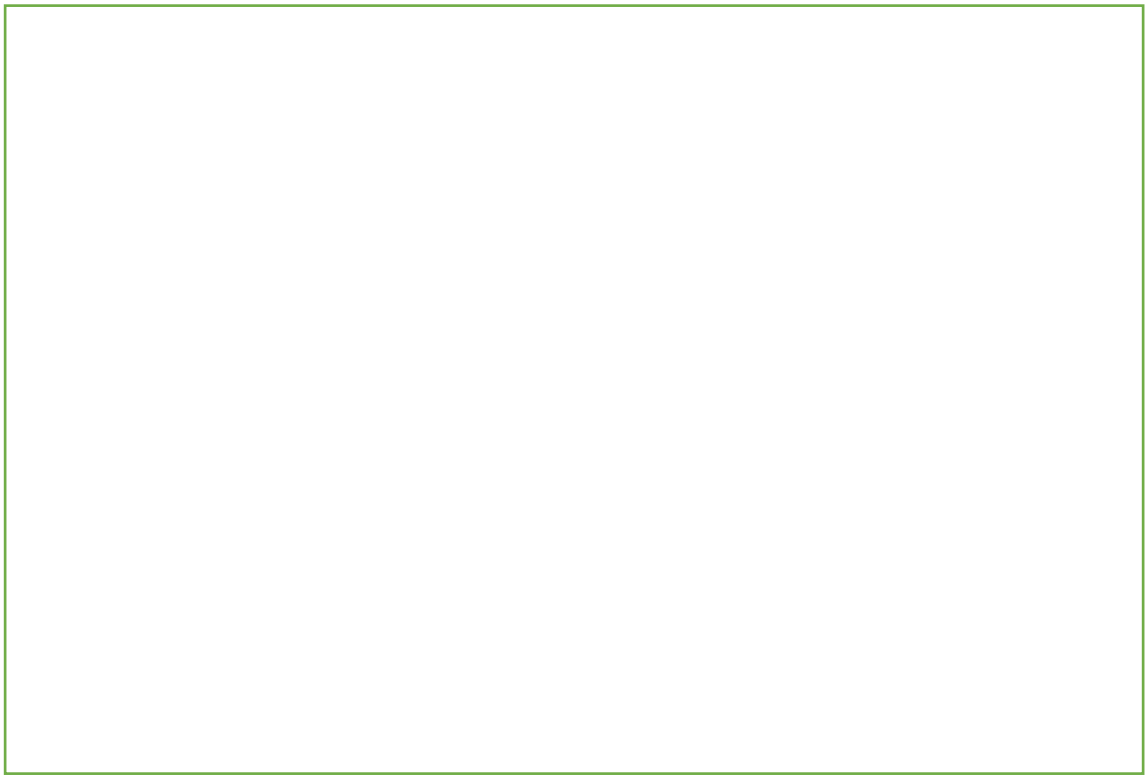
1-Stained by Hx&E So the section appears in red and blue colors.

2-Central vein (CV) appear as color less rounded structure in the center of the slide.

3-Hexagonal cells (liver cell) radiate from the CV with central roundednucleus (basophilic=blue color) surrounded with acidophilic cytoplasm(red).

4-The basophilic nucleus contain nucleolus and chromatin.

Draw the slide by colors



Slide: Dense nucleus in small lymphocyte in blood film by Hx&E:

1-Section staine by Hx&E so appear in red and blue colors.

2-RBCs appear as many rounded acidophilic (red) structures between them few small rounded basophilic (blue) cells which are lymphocyte.

3-The basophilic nucleus of small lymohocyte appears dense with no details inside it can appear.

Draw the slide with colors.

Enumerate types of chromain?

1……..

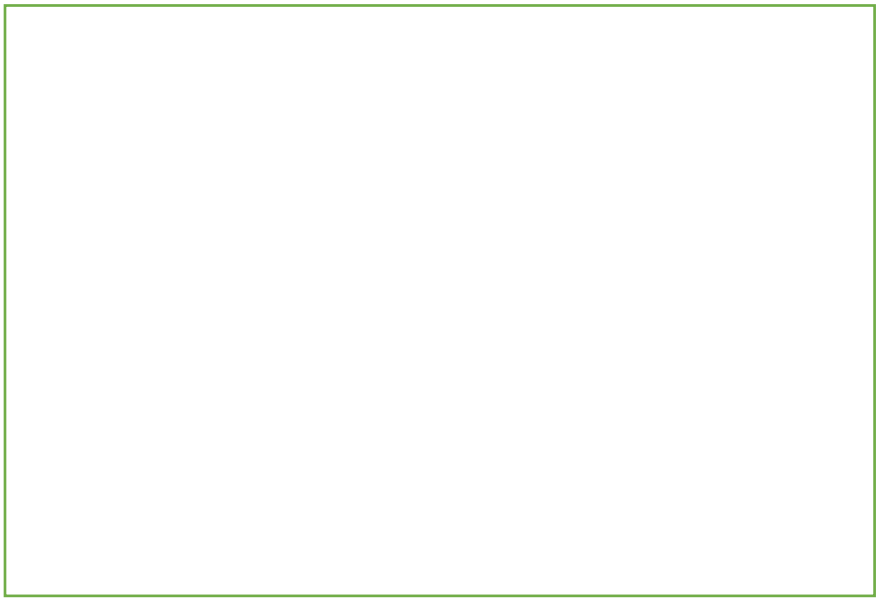
2……..

Epithelium

I-Covering and lining epithelium

Slide: Simple squamous epithelium lining the parietal layer of Bowmans capsule.

Draw the section with colors



Simple cuboidal epithelium in renal tubules by Hx&E

Draw the section with colors

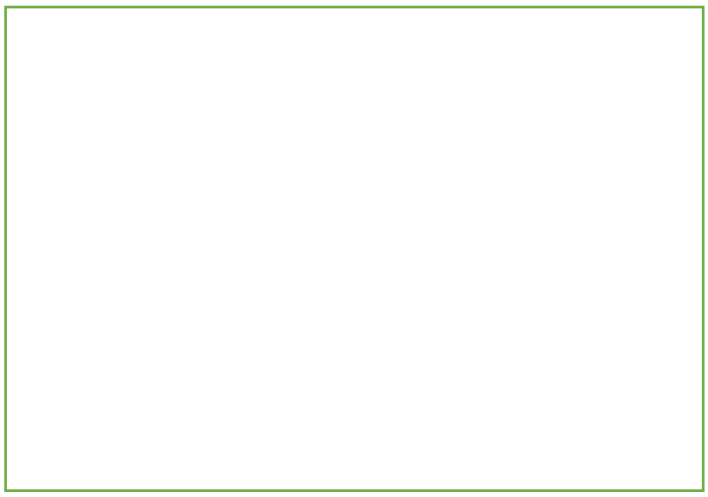
Draw the section with colors

Pseudostratified columnar ciliated epithelium with goblet cells byHx&E

Draw the section with colors

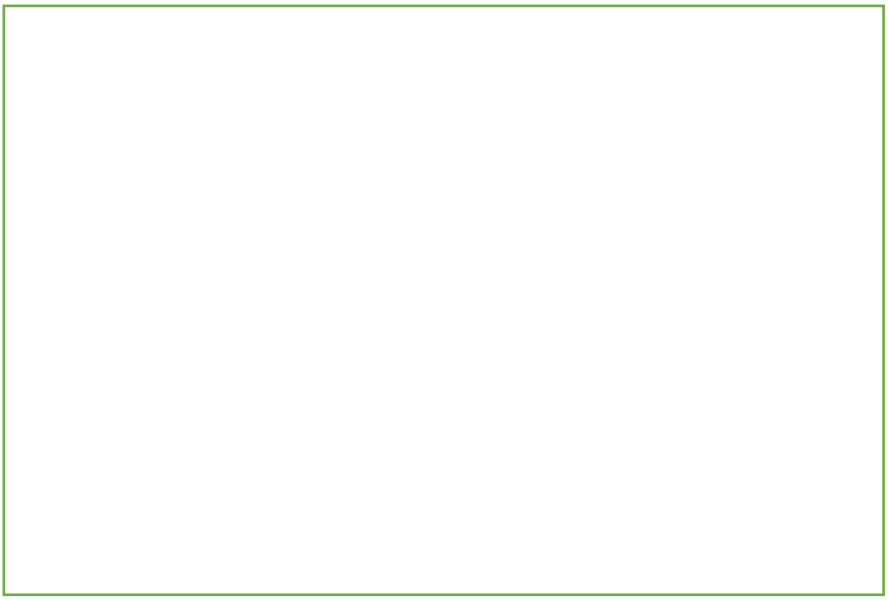
Transitional epithelium(urothelim) in the urinary bladder by Hx&E

Draw the section with colors.



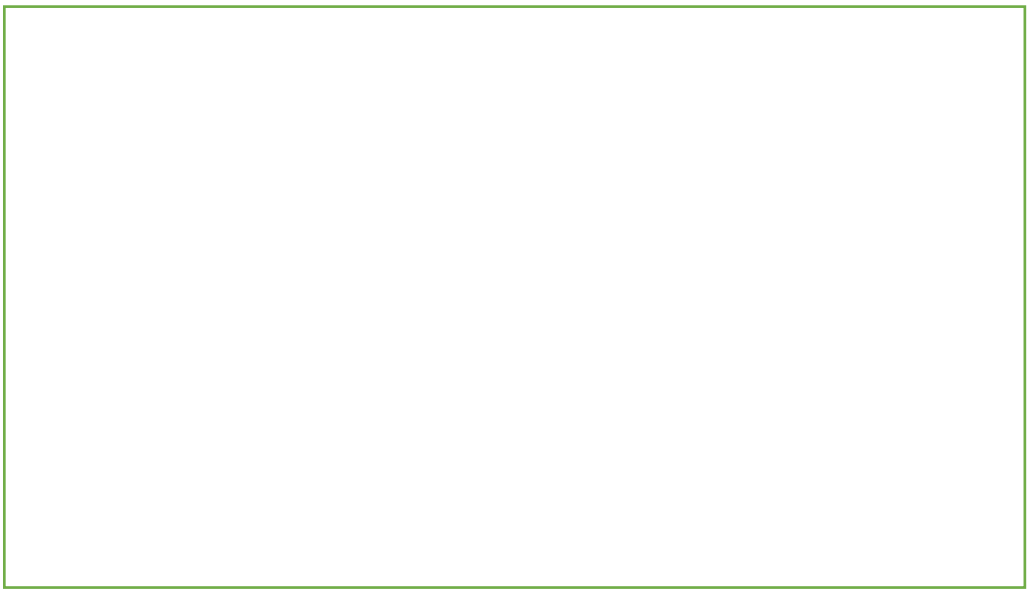
Stratified squamous epithelium-non keratinized in the esophagus by Hx &E

Draw the section with colors.



Stratified squamous epithelium-keratinized in thick skin by Hx&E

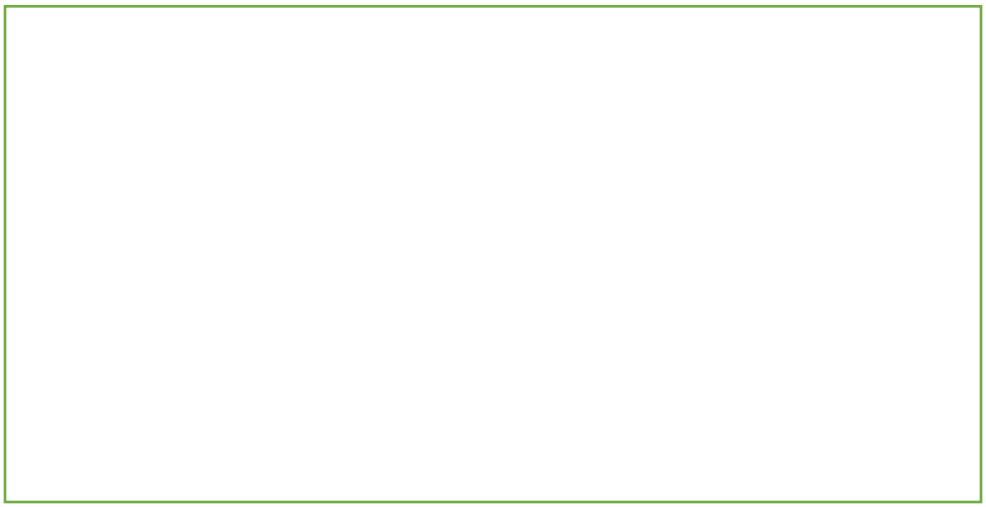
Draw the section with colors



II-Glandular epithelium

Serous acini in the pancreas by Hx&E

Draw the section with colors



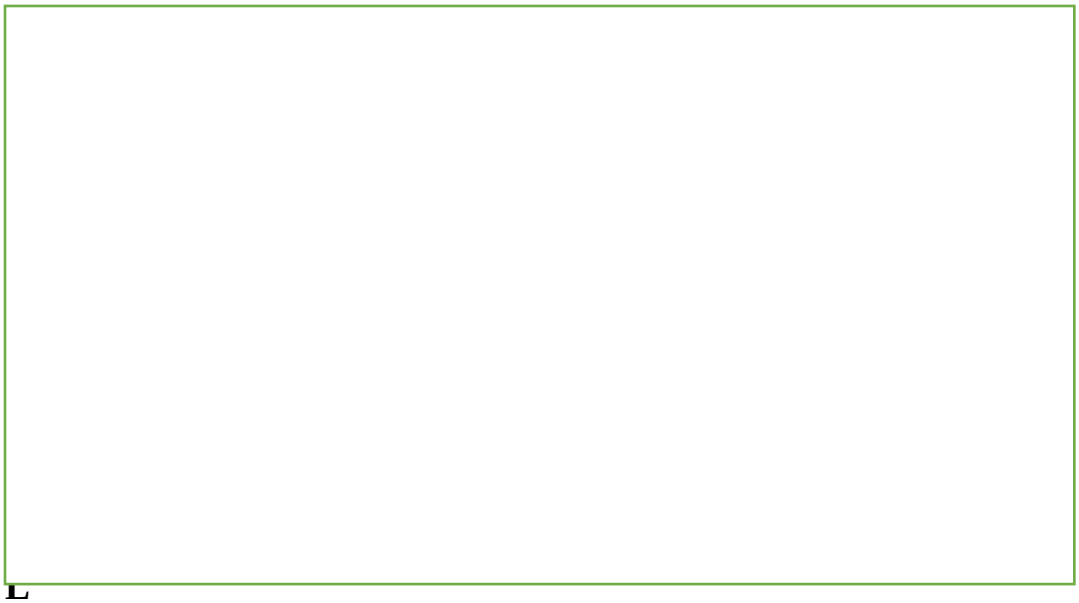
Mucus acini in the esophageal glands by Hx&E

Draw the section with colors

Connective Tissue

Loose areolar CT by Hx&E

Draw the section with colors



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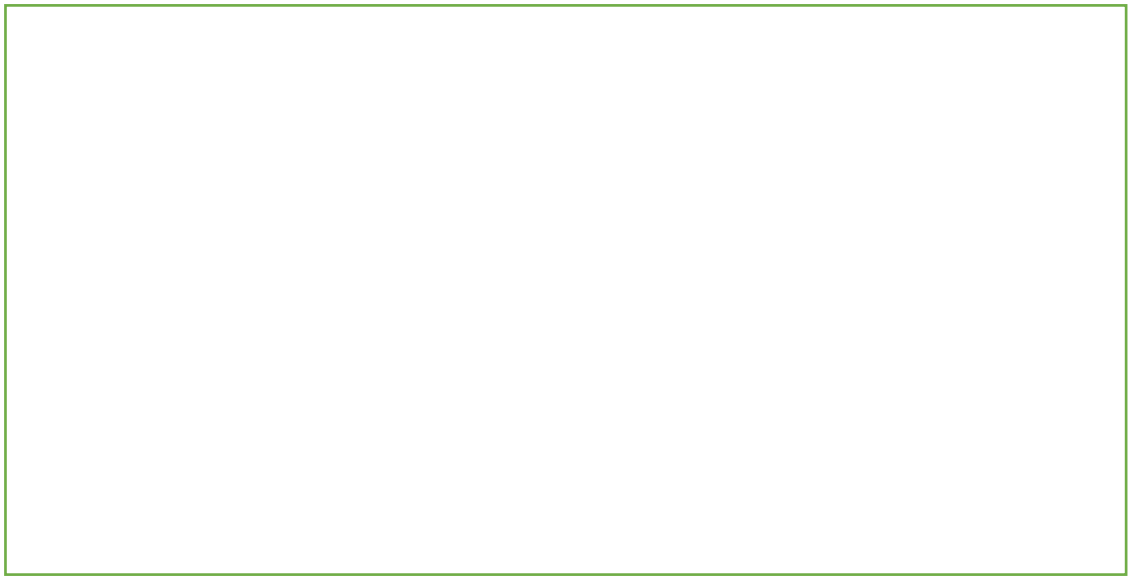
Dense white regular CT in the tendon by Hx&E.

Draw the section with colors



Dense yellow elastic irregular CT in the wall of aorta by Hx&E

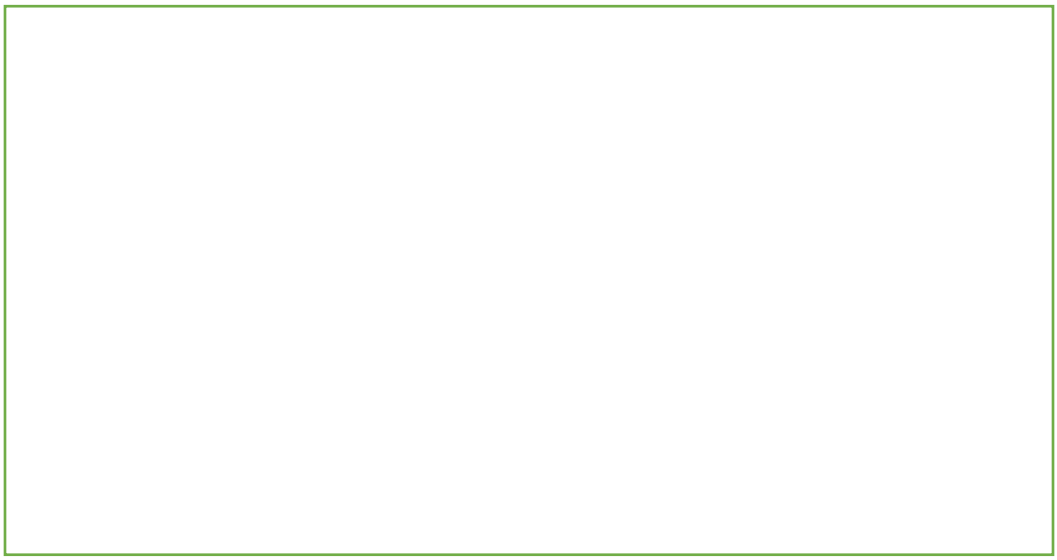
Draw the section by colors

Dense yellow elastic irregular CT in the wall of aorta by Orcien stain

Draw the section by colors

Adipose CT by Hx&E

Draw the section with colors



Cartilage

Cartilge consists of:

1-cells 2-Fibers 3-Matrix

Types:

Hyaline cartilage in costal cartilage by Hx&E

Draw the section with colors

Elastic cartilage in the ear pinna Orcien stain

*****The section will demonstrate elastic fibers only which take brown color.

Enumerate types of cartilage

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Enumerate cartilage cells

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Bone

Bone consists of cells ,fibers and matrix

Types of bone:

1-Cancellous bone (decalcified preparation)by Hx&E

Draw the section with colors

2-Compact bone (ground preparation)

Draw the section

Enumerate types of bone cells

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Enumerate types of bone

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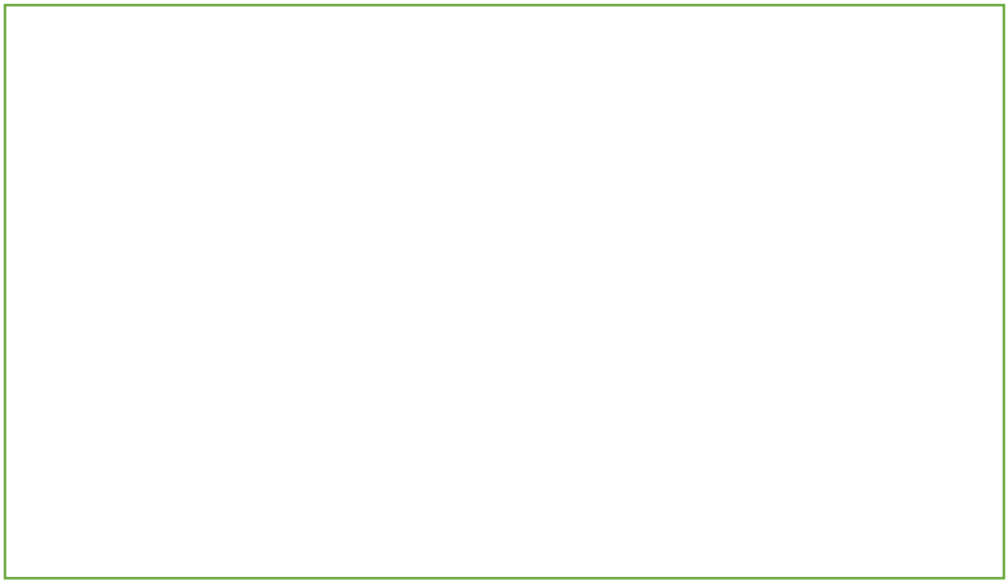
Blood

Slide: Blood film by Hx&E

Draw the section by colors



Enumerate Granular leucocytes

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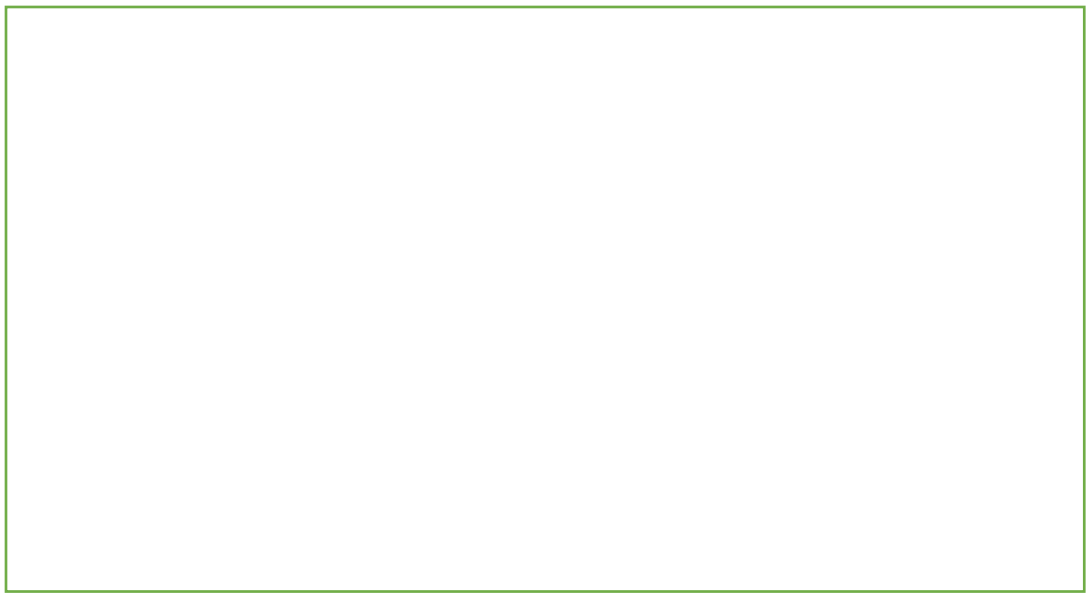
Muscular tissue

Slide: Skeletal muscle (longitudinal section) by Hx&E

Draw the section

Slide: Skeletal muscle (Transverse section) by Hx&E

Cardiac muscle by Hx&E



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