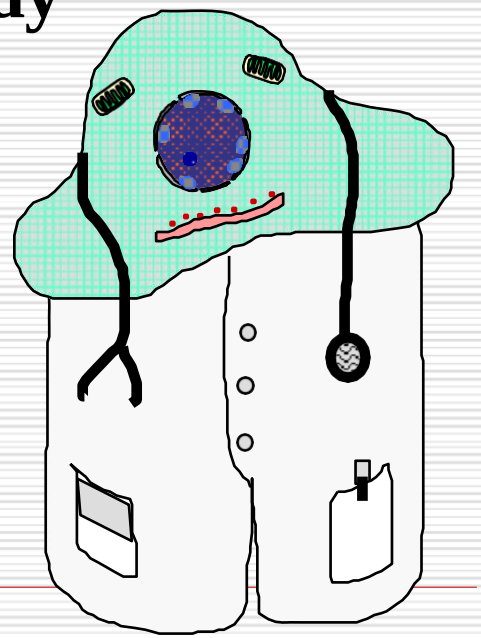
Why to study histology

- **Anatomy: macrostructure**
- **Biochemistry: chemical compounds and processes**
- **Pathology: the relation between disease and the structures and functions of the body**

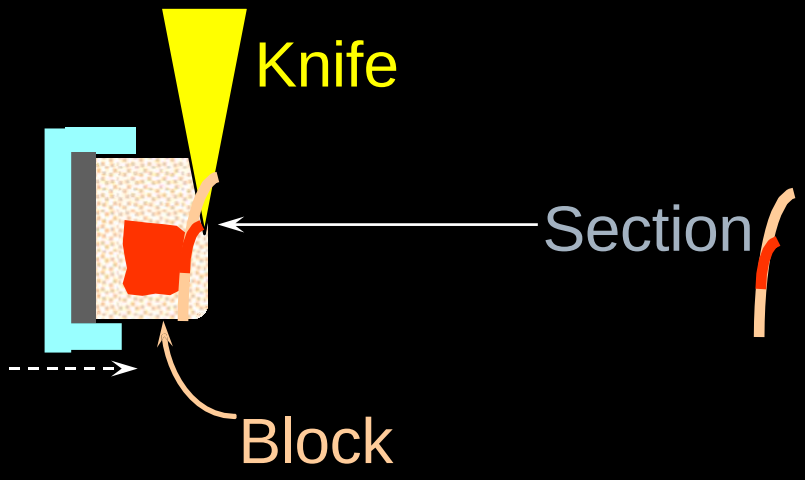
***Although most medical students are not going to become histologists, a thorough knowledge of histology is fundamental for you as future doctors*.**



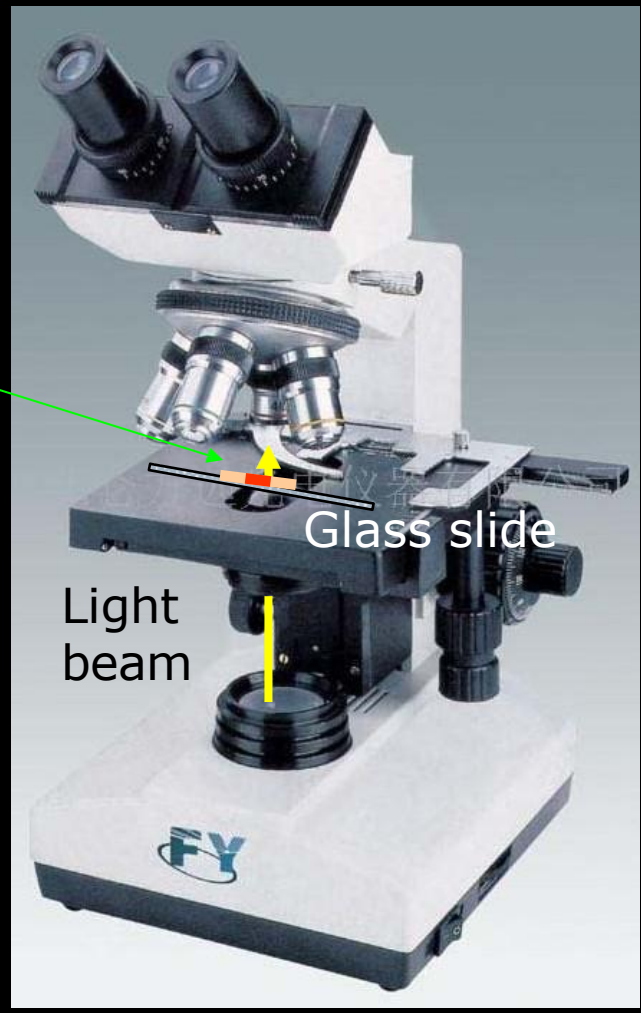
How to research on histology

- Preparation of tissue for microscopic examination
  - Paraffin section
  - Frozen section
- Microscopy
- Problems in the interpretation of tissue sections

How to research on histology



MICROTOME - a fancy meat-slicer - holds the wax block, & cuts off thin slices, as the block is slowly advanced mechanically

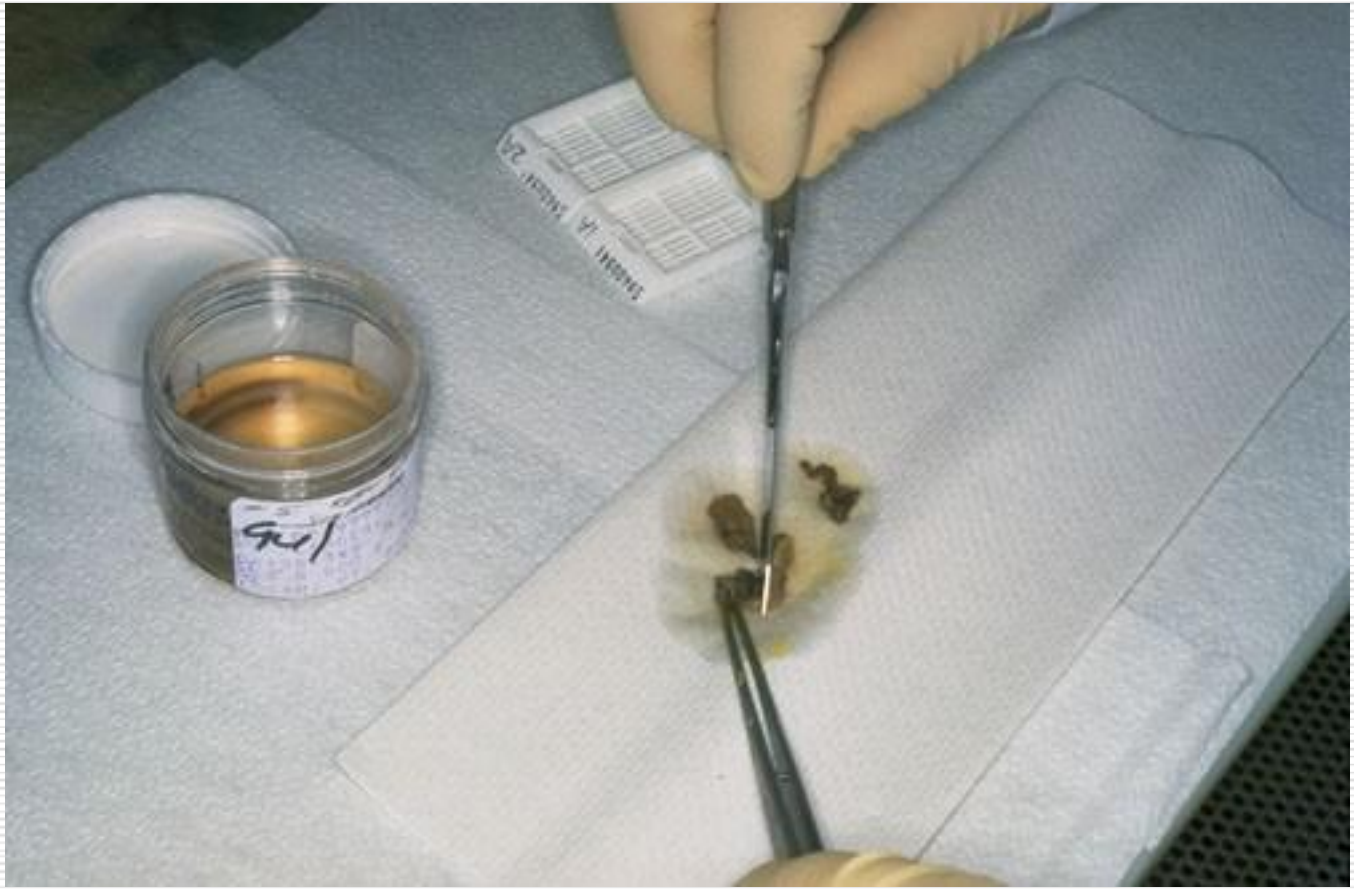


Light microscope

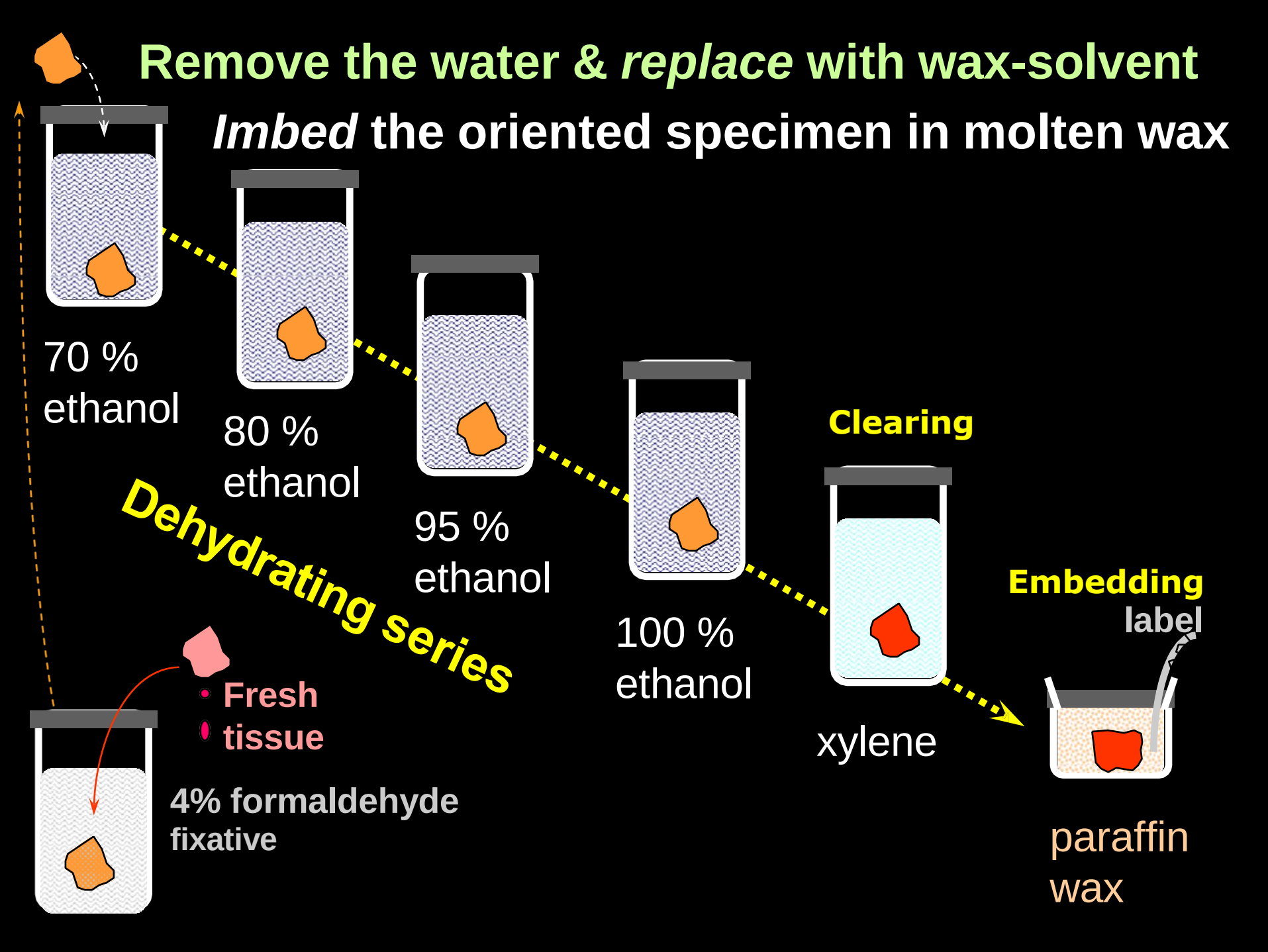
Paraffin section

- Obtaining the specimen
- Fixation
- Dehydration
- Clearing
- Embedding
- Sectioning
- Staining

Obtaining the specimen



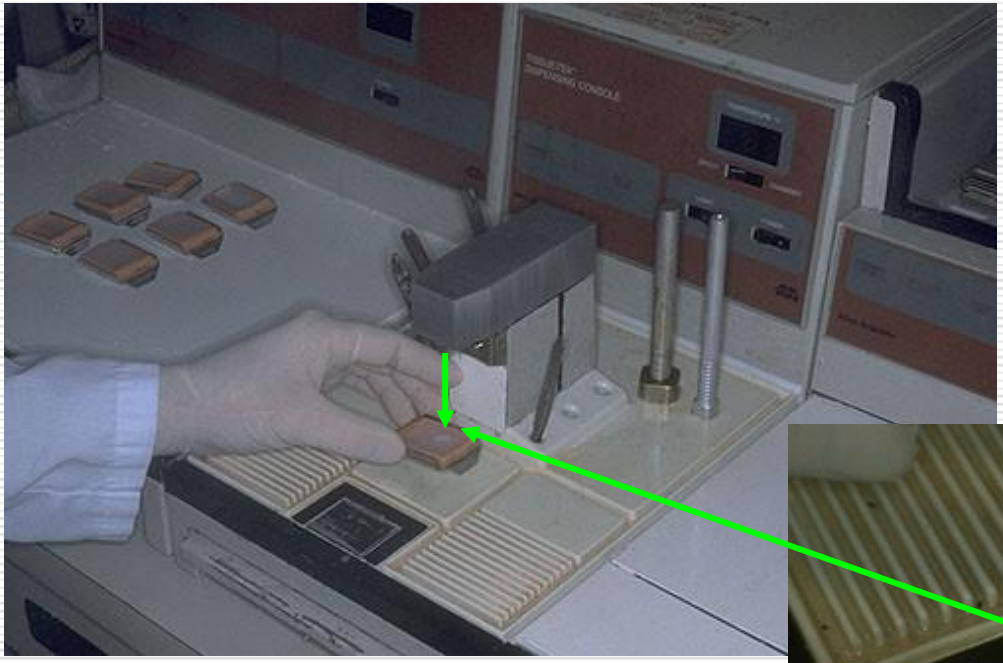
fresh as possible and small pieces


Remove the water & *replace* with wax-solvent
Imbed the oriented specimen in molten wax
70 % ethanol
80 % ethanol
95 % ethanol
100 % ethanol
Dehydrating series
Clearing
xylene
Embedding label
paraffin wax
Fresh tissue
4% formaldehyde fixative

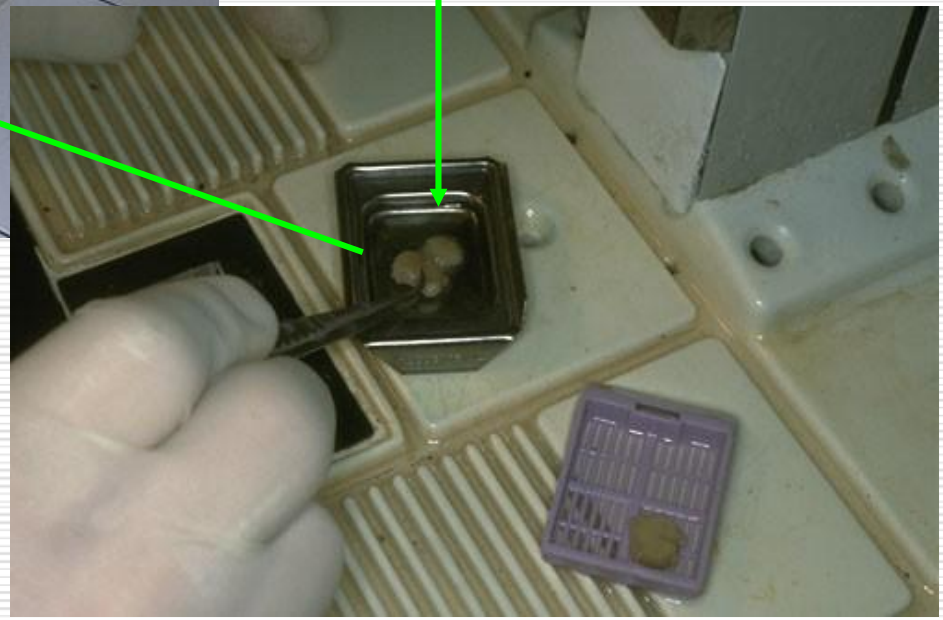
Tissue processor

Automatic tissues processor moves the tissues around through the various agents on a preset time scale.

Tissue embedding

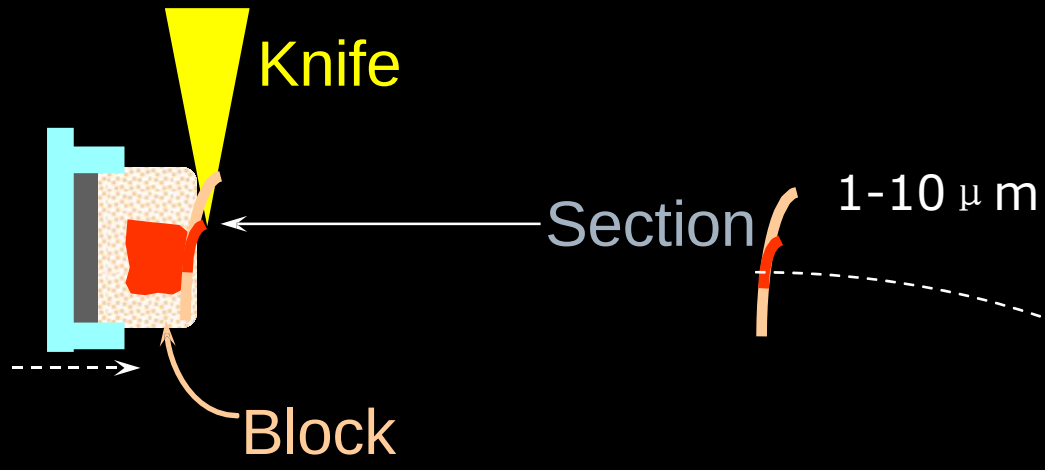


Tissues are infiltrated in molten wax to replace the xyline.

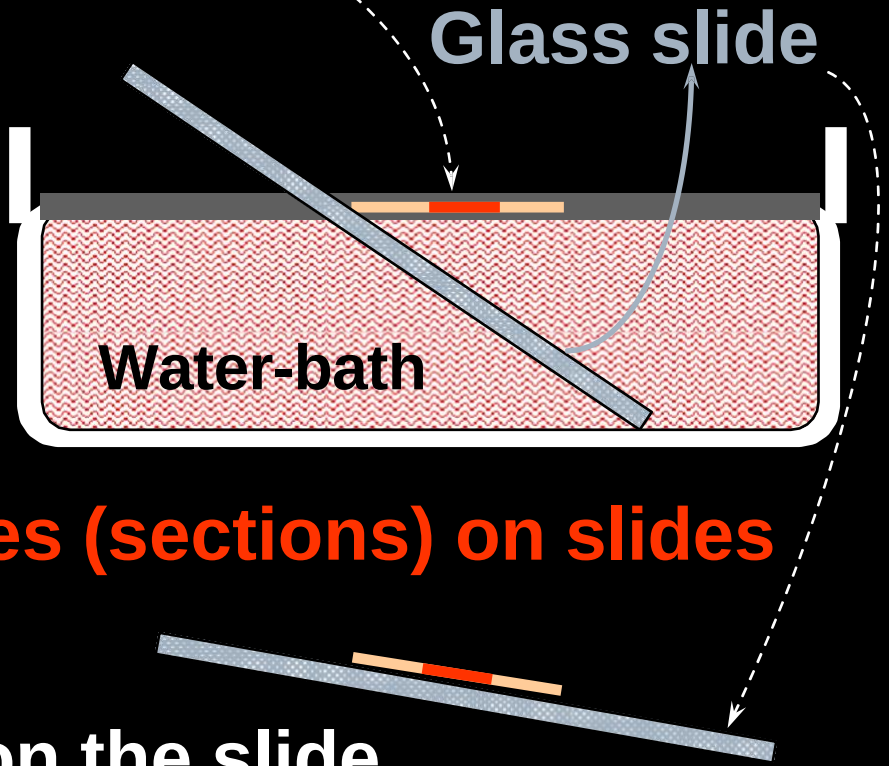


The molten wax drop into a plastic box; then Put the tissues into the box. The molten wax solidify into a block with the tissue inside.

After it is solid, hold the wax block & *cut* slices



MICROTOME - a fancy meat-slicer - holds the wax block, & cuts off thin slices, as the block is slowly advanced mechanically



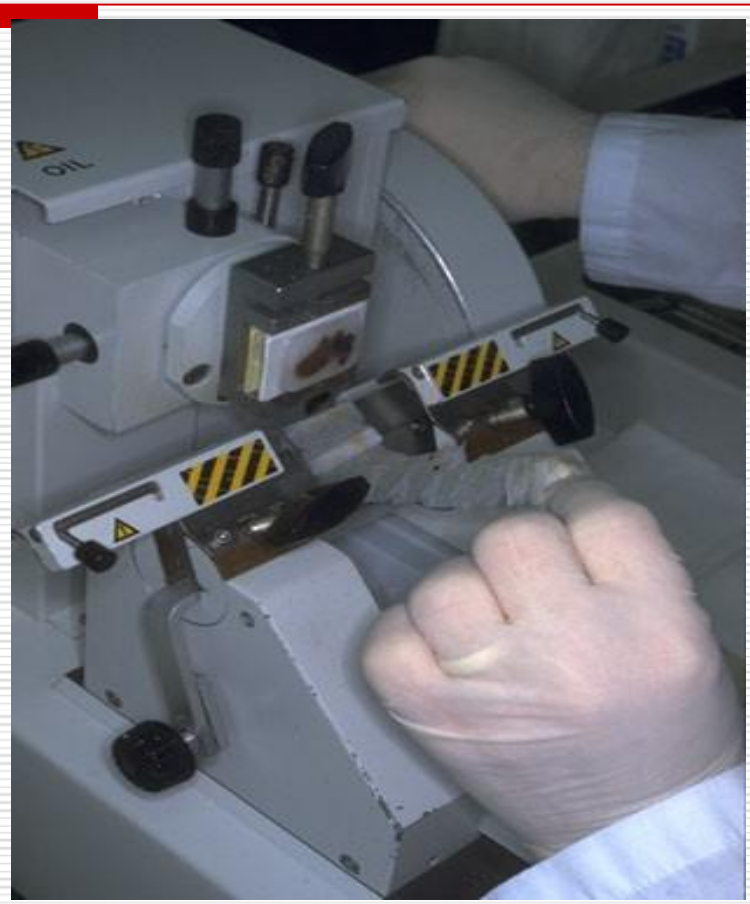
Mount **the thin slices (sections) on slides**

Lift out floating section on the slide

Sectioning with microtome

Rotation of the drive wheel moves the tissue-block holder up and down. Each turn of the drive wheel advances the specimen holder a controlled distance. After each forward move, the tissue block passes over the knife edge, which cuts the sections.

Sectioning with microtome



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Picking sections up from water bath

sections are floated on a warm water bath that helps remove wrinkles.

Paraffin section

Unstained section on glass slide

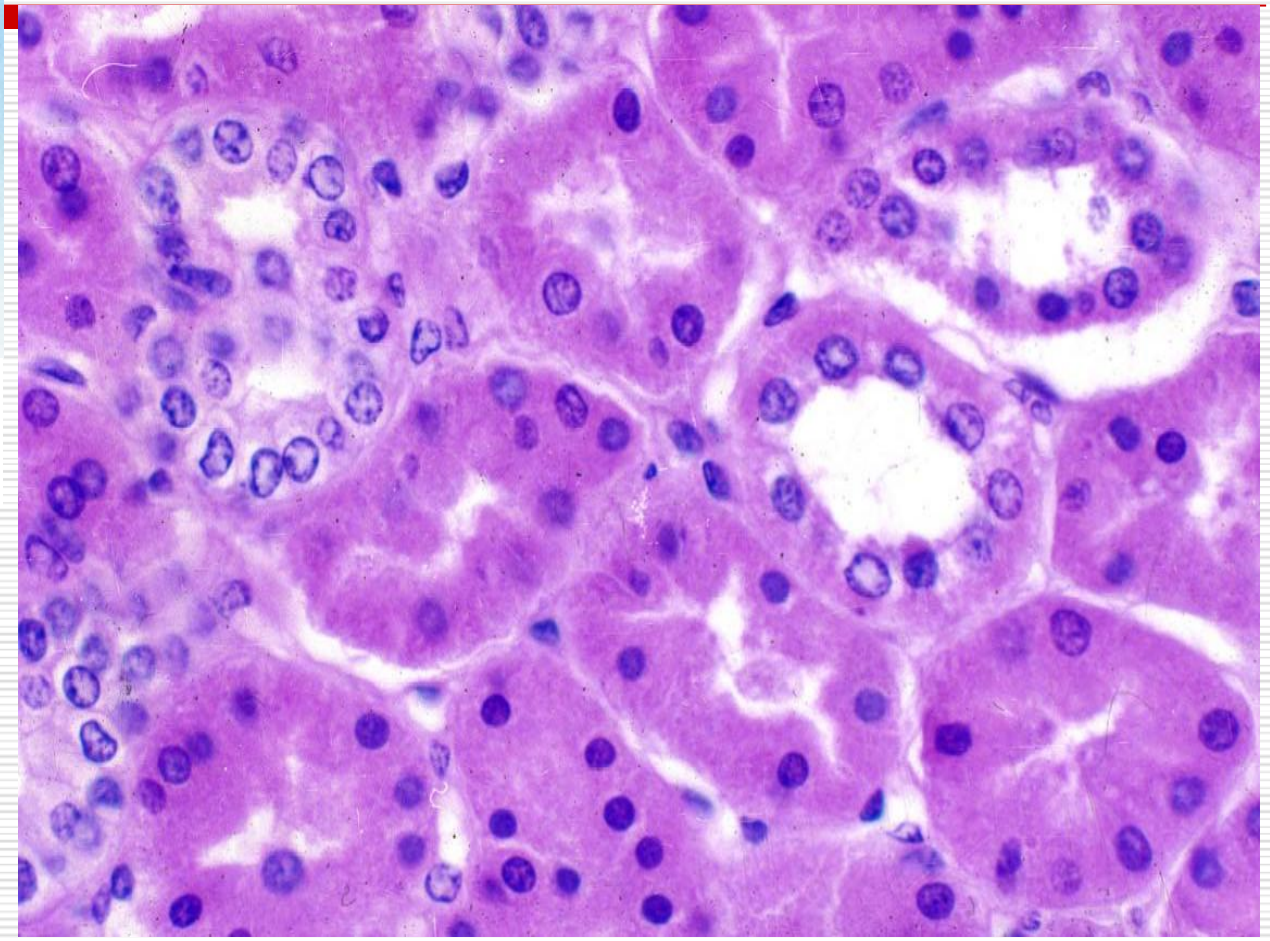
Tray of unstained slides in drying oven

Sections are picked up on a glass slide and placed in a warm oven to help the section adhere to the slide.

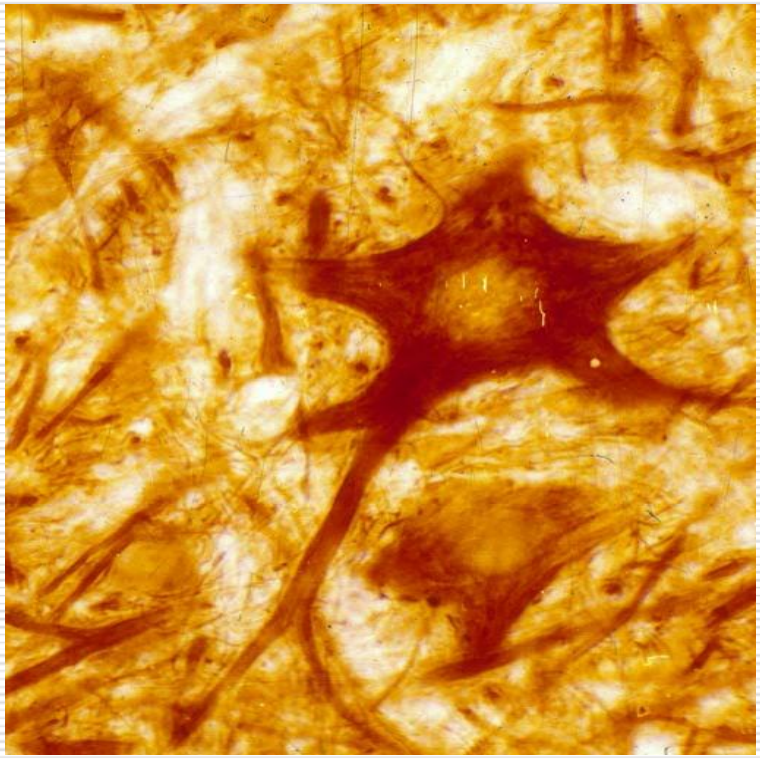
Staining

- Deparaffinized： running through xylene to alcohol to water
- Dye: acidic or basic compounds; electrostatic linkages with tissues
- Hematoxylin & Eosin (H & E) staining
  - Hematoxylin: stains cell nucleus and other acidic structure blue
  - Eosin: stains the cytoplasm and collagen pink
  - Basophilia: affinity for basic dyes
  - Acidophilia: affinity for acid dyes
  - Neutrophilia

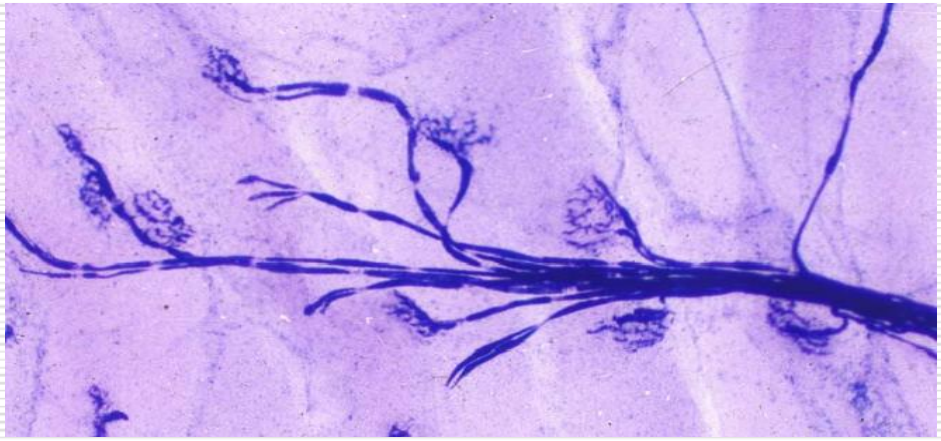
Light Microscope



It is a cross-section of kidney medullar which is made up of lots of tubules. The wall of them is epithelial cells. The cell nucleus is basophilic (blue) and the cytoplasm is acidophilic (pink). HE staining.



Silver staining



Gold staining

Frozen section

- Snap frozen in a cold liquid or cold environment
  Frozen sections are performed with a cryostat.

cryostat

Cutting a frozen section

Frozen section

- It is necessary to get a rapid diagnosis of a pathologic process.
- It is also effective in the histochemical study of very sensitive enzymes or small molecules.