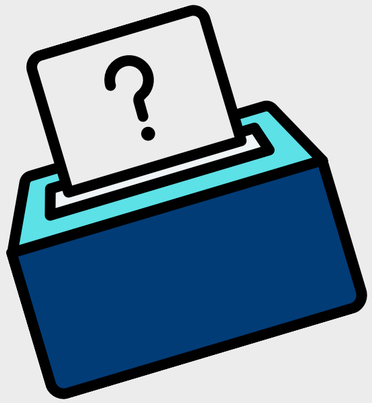
# Building the future with Synthetic Biology

## iGEM Thessaloniki 2026

# Why should a student take part?

- Soft/Technical Skills
- Networking
- Participation in an innovative project
- Representing the university in a global competition





# “Ask us anything” Box

# Histology

# Histology is an imaging science

**Utilizes microscopy techniques:**

- **For observing the composition (cellular and protein) of the 4 types of tissues found in the human body**
- **The microscopic architecture of the organs of the human organism**

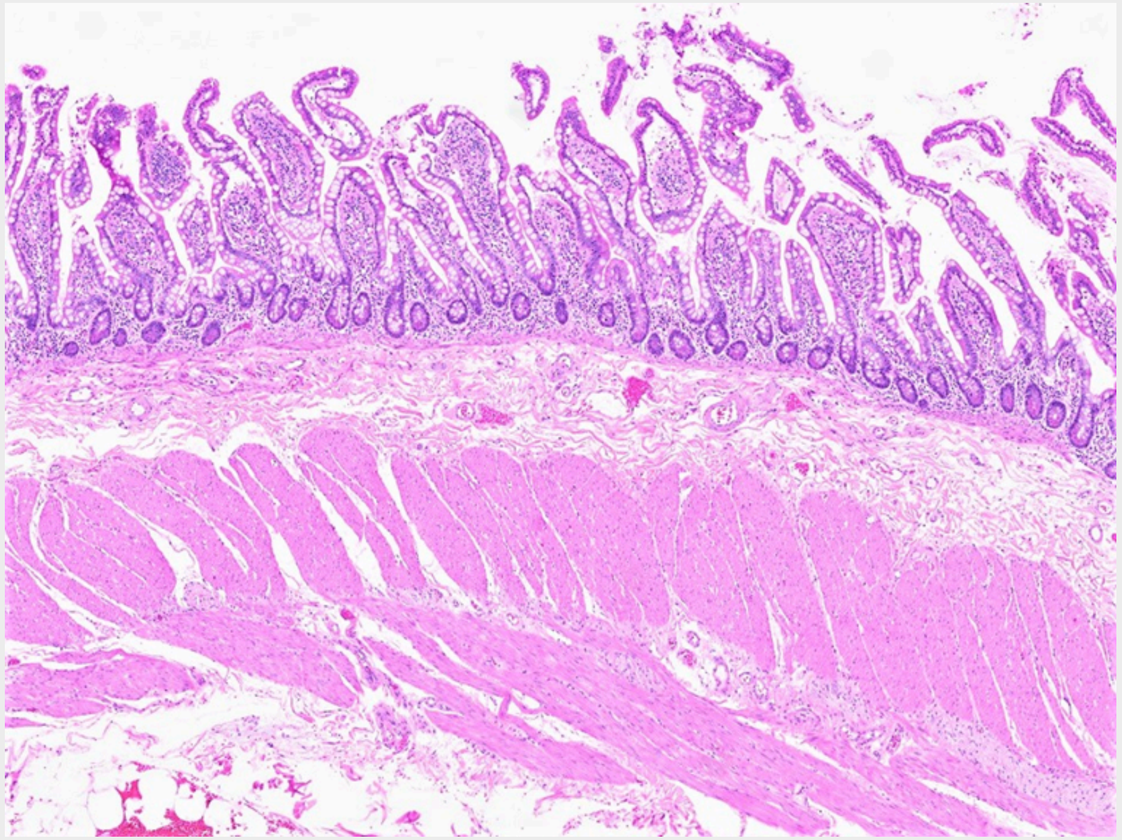
## For this reason

**We utilize stains (chemical solutions) that, selectively or non-selectively, impart a characteristic color to various cellular and protein structures**

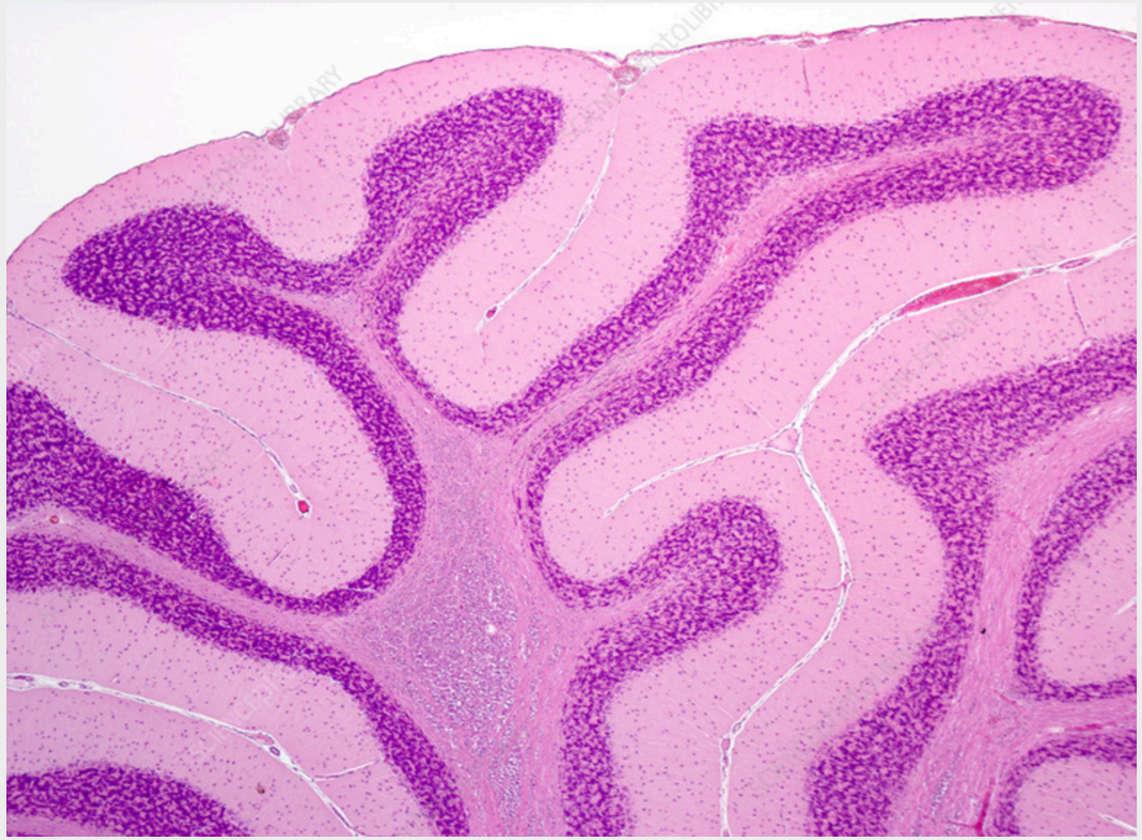
**They allow the analysis of the normal cellular and tissue architecture of various anatomical structures**

# Hematoxylin and Eosin (H&E)

- It is the 'queen' of histochemical stains.
- It prevailed as the dominant stain through which histological structures are predominantly studied.
- Hematoxylin, as a basic dye, stains acidic components (nucleic acids - cell nucleus) violet or deep blue.
- Eosin, as an acidic dye, stains basic components (intracellular and extracellular proteins - collagen) red or pink.



Longitudinal section of the small intestine



Longitudinal section of the cerebellum

**Stain: H&E**

# Tissue and organ

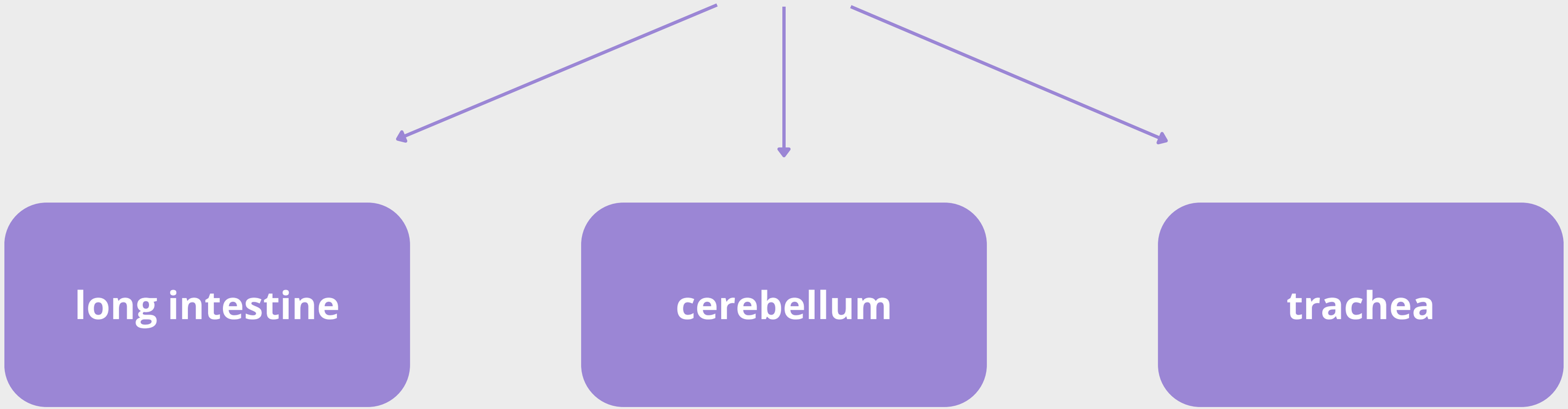
Tissue consists of two components:

- Various cell types
- Extracellular matrix: fibrous proteins and amorphous ground substance (protein elements)

An organ consists of:

- The interaction of various tissue types within a solid anatomical entity

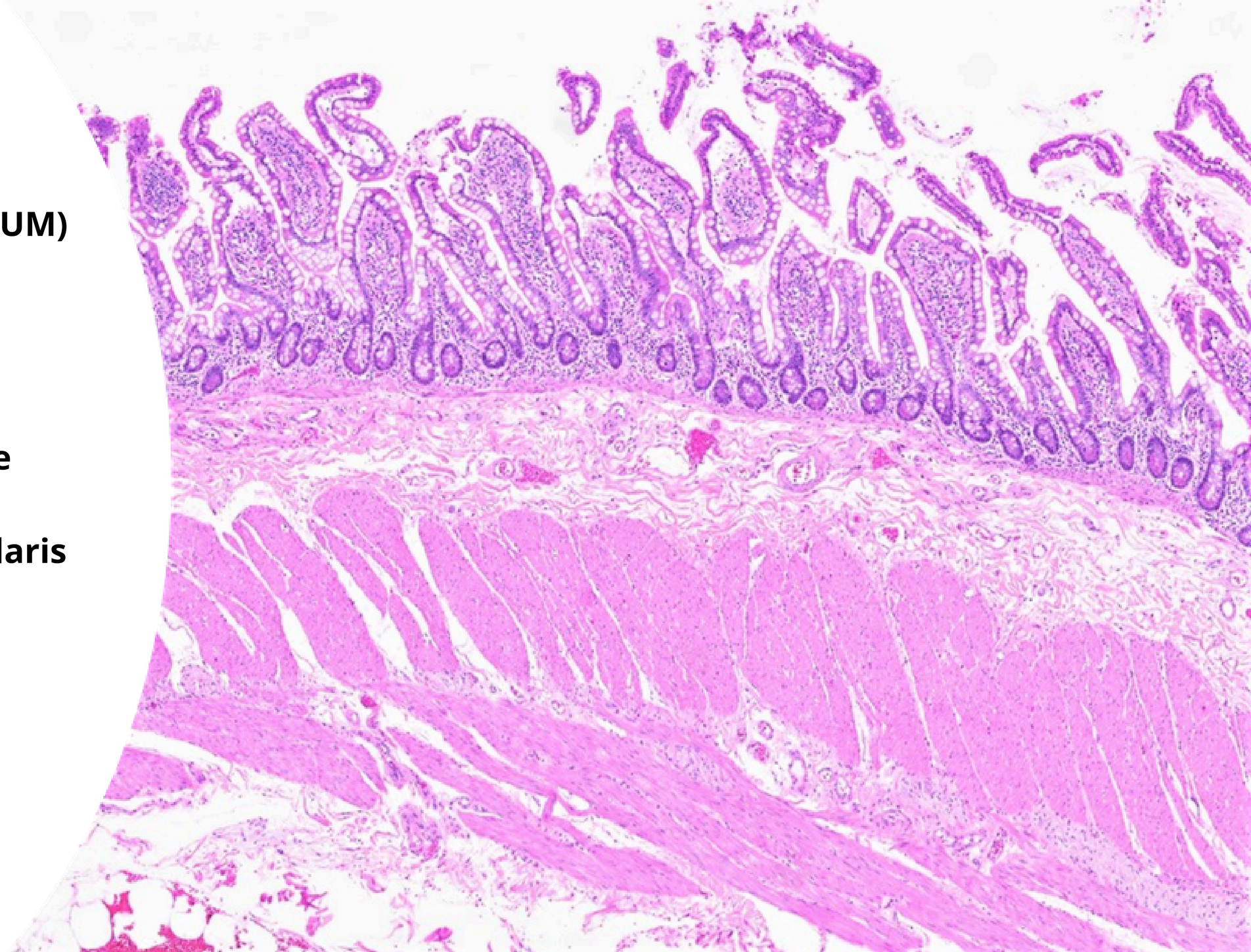
# Slide Demonstration



**SMALL INTESTINE (JEJUNUM)**

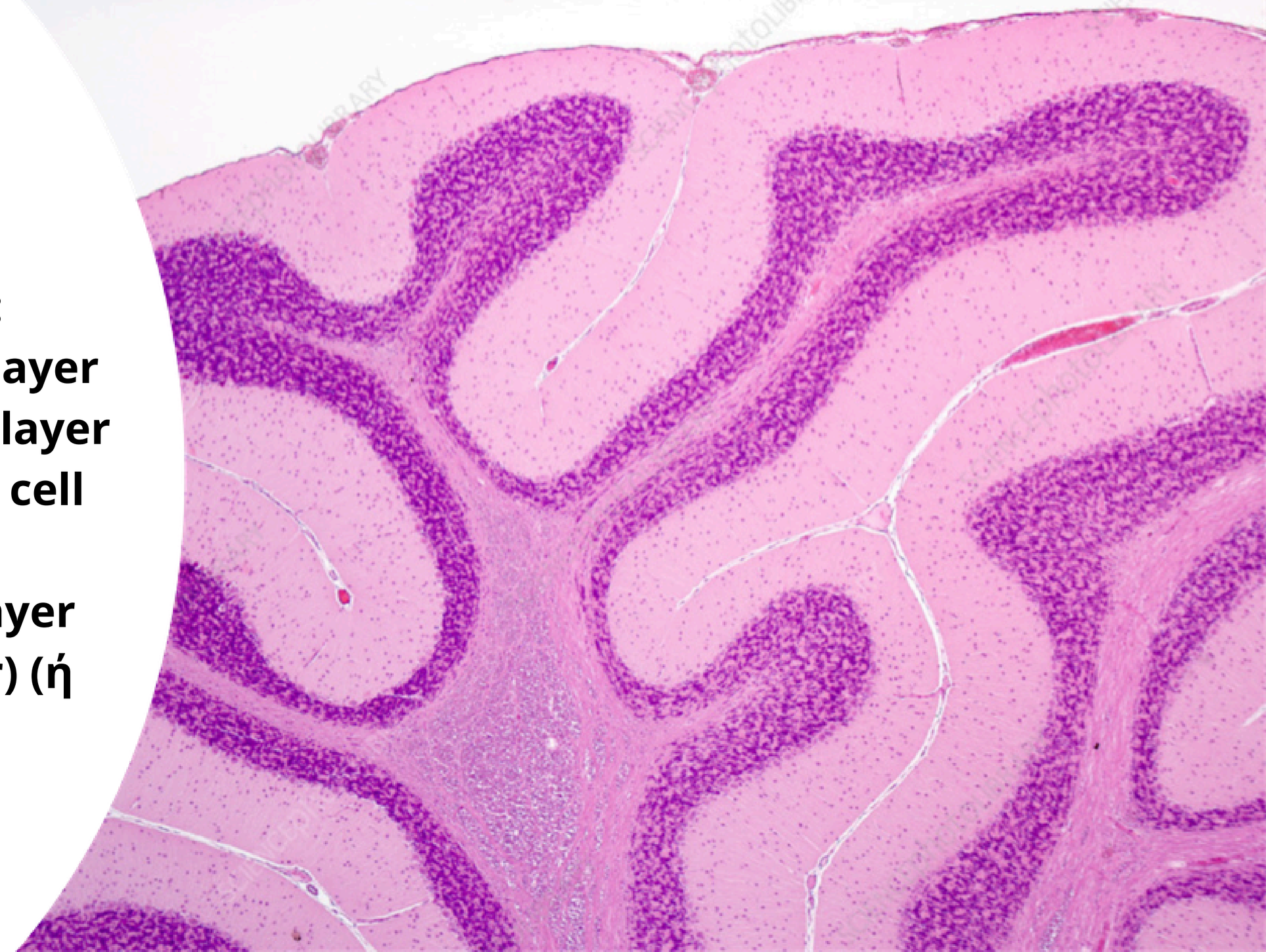
**Four Layers :**

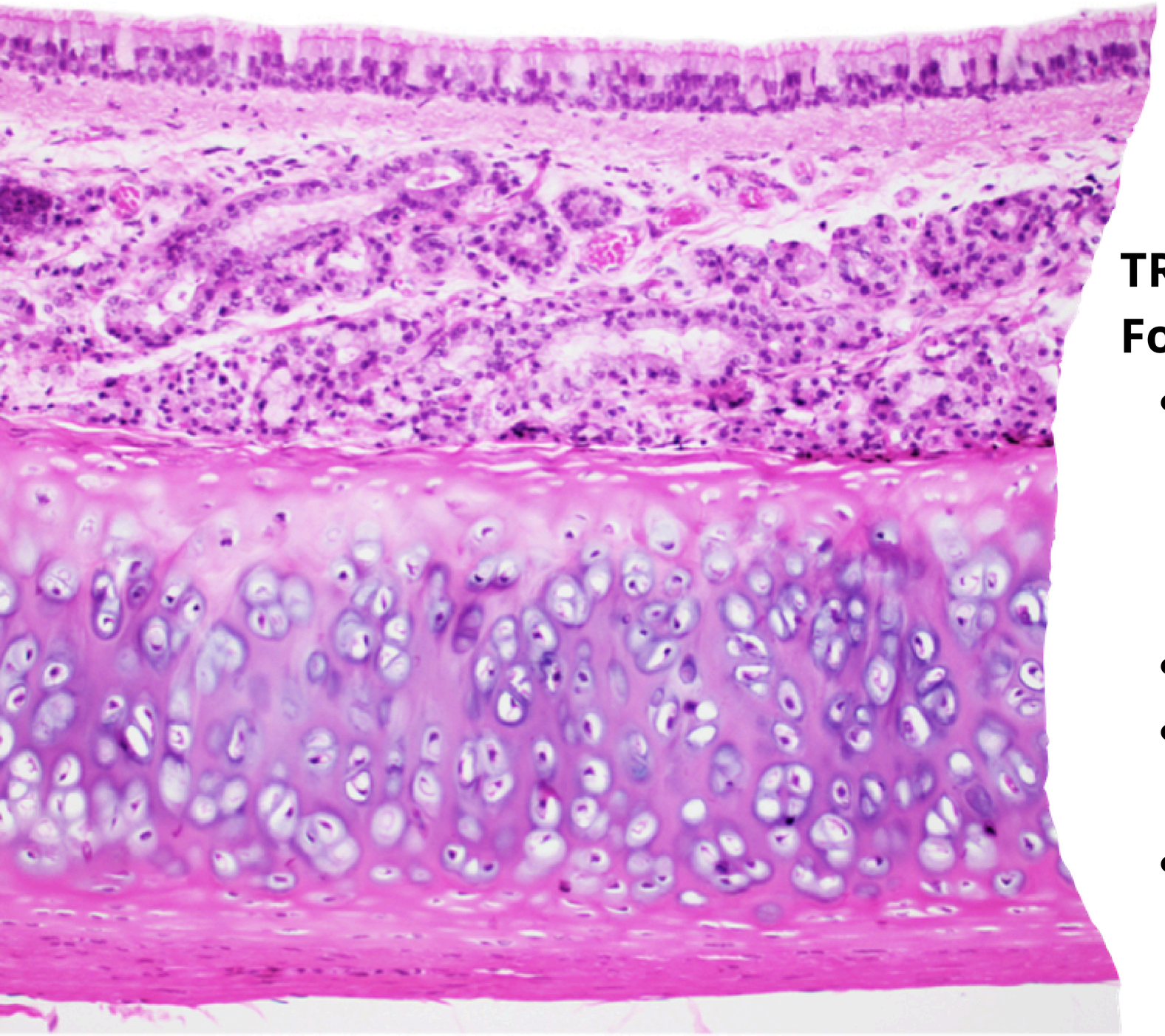
- **Mucosa**
- **- Epithelium**
- **- Lamina propria**
- **- Muscularis mucosae**
- **Submucosa**
- **Muscularis (ή Muscularis externa)**
- **Serosa**



**CEREBELLUM**

- **Cortex (outer):**
  - **Molecular layer**
  - **Ganglionic layer (ή Purkinje cell layer)**
  - **Granular layer**
- **Medulla (inner) (ή White matter)**





**TRACHEA**

**Four Layers :**

- **Mucosa:**
  - **Epithelium (typical respiratory epithelium)**
  - **Lamina propria**
- **Submucosa**
- **Fibromusculocartilaginous layer**
- **Adventitia**

# Experiment 1

Πείραμα #1

# Observation of Allium cepa (onion) plant cells and cell plasmolysis

Can a cell “sense” that something around it has changed?

We test it with a simple experiment:

- We observe onion cells
- We change their environment with salt water
- We see the reaction in real time





Πείραμα #1

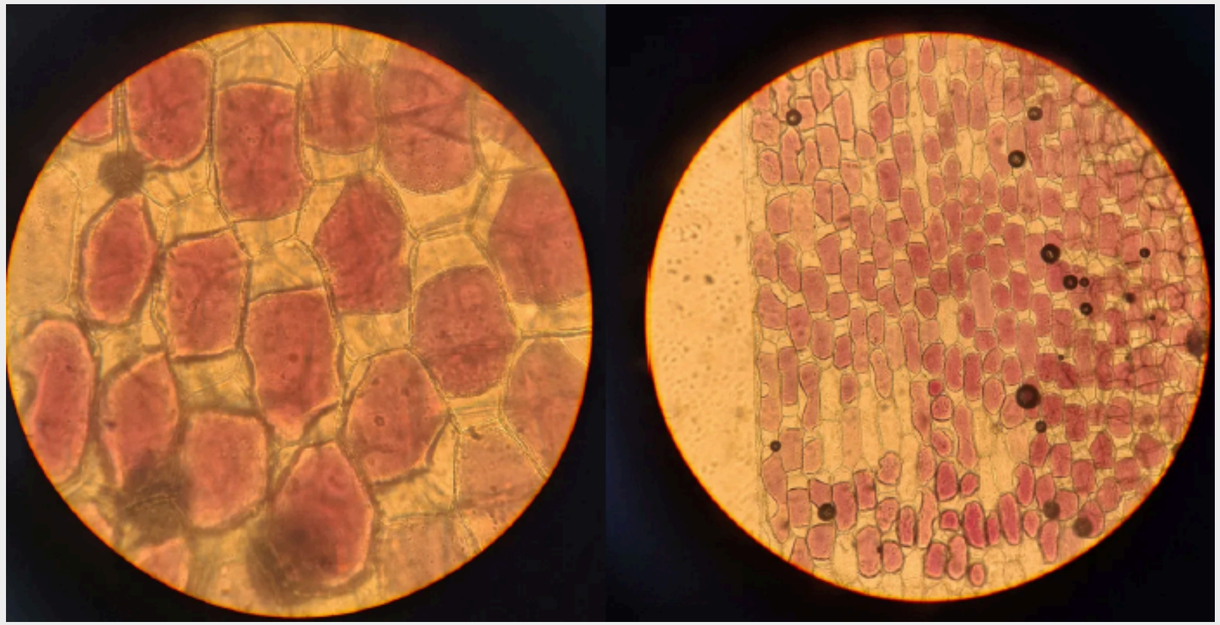
# Observation of Allium cepa (onion) plant cells and cell plasmolysis

**Observe the structure of the cell. Do you see the membrane being “pulled” inward, leaving a gap from the cell wall?**

*Observation of Allium cepa (onion) plant cell*



*"Plasmolysis in Allium cepa (onion)*

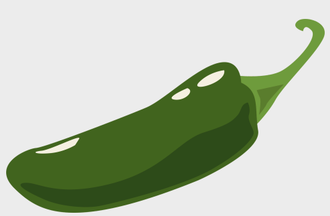


# Experiment 2

Πείραμα #2

**What is hidden behind the vibrant colors of the bell pepper?**
**Today, we will find out through a simple experiment**

1. We cut a very thin piece from the skin of a red bell pepper.
2. We carefully transfer it onto a microscope slide.
3. We observe the specimen under the microscope and look for the pigmented structures!"

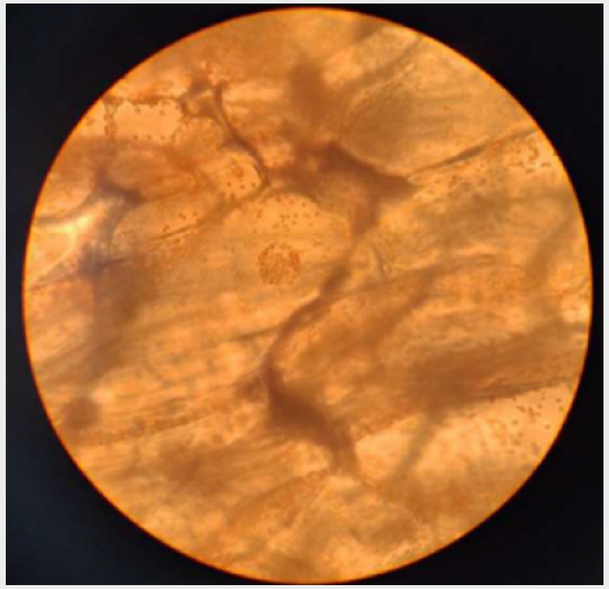


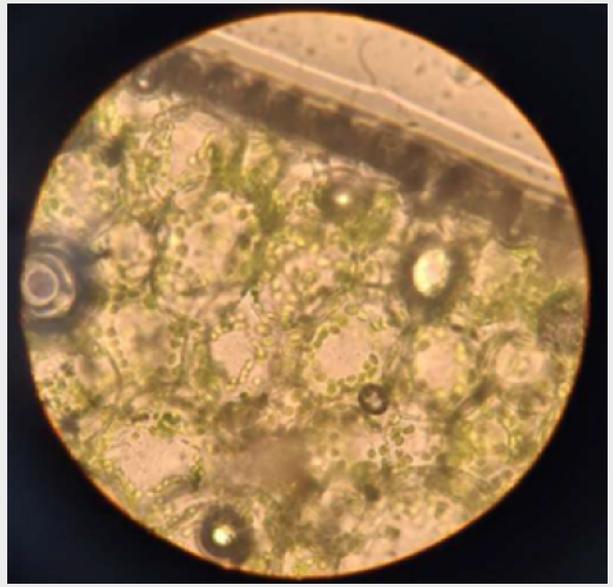


Πείραμα #2

**What is hidden behind the vibrant colors of the bell pepper? Today, we will find out through a simple experiment!**

**Observe the cells carefully: can you identify how the chromoplasts are arranged inside them? How do they differ from chloroplasts?**





# Experiment 3

Πείραμα #3

# "Time to see our DNA!"

1. **Rinse our mouth with salt water (30-60 s).**
2. **Collect the sample in a clean container.**
3. **Add a little soap to break open the cells.**
4. **Carefully pour in cold rubbing alcohol.**
5. **Observe the DNA appearing as white fibers.**





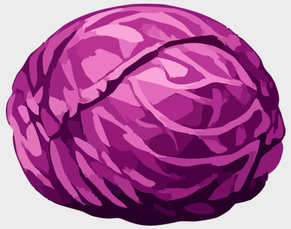
# Experiment 4

Πείραμα #4

**Have you ever wondered how we can “see” if something is acidic or basic?**
**Red cabbage hides a natural indicator inside it that changes color!**

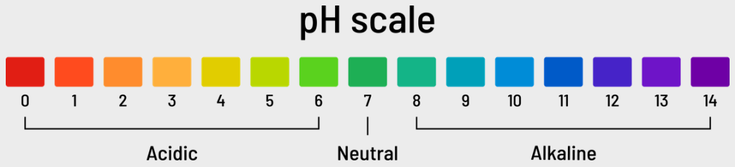
1. Cut a few red cabbage leaves into small pieces.
2. Place them in hot water so that their pigments are released.
3. Collect the purple liquid that forms.
4. Add a few drops of the indicator to different liquids, such as lemon juice, vinegar, water, or soapy water.
5. Observe the color changes!










# Thank you!

## iGEM Thessaloniki