Al-Mustaqbal University Faculty of Science Department of Biochemistry	-Biology- First Stage	Prepared by Assist. Lect Summer Hussein Al-Mamouri

Lab 2

Observation and Identification of Organisms under Microscope

1-What Is the Microscope?

A microscope is an optical instrument used to magnify very small objects so that they can be seen clearly by the human eye. In biological laboratories, the compound light microscope is the most commonly used type. It uses visible light and a system of lenses to produce a magnified image of microscopic specimens such as cells and microorganisms.

2-Main Components of the Compound Light Microscope

1 .Eyepiece (Ocular Lens)

The eyepiece is the lens through which the specimen is viewed. It usually provides a magnification of 10.×

2 .Objective Lenses

Objective lenses are located on the revolving nosepiece and provide different magnifications, commonly 4×, 10×, and 40×. They are responsible for the primary magnification of the specimen.

3 .Revolving Nosepiece

This part holds the objective lenses and allows the user to switch between different magnifications.

4 .Stage

The stage is a flat platform that supports the microscope slide. It contains stage clips to hold the slide in place.

5 .Condenser

The condenser focuses light onto the specimen, improving image clarity and resolution.

6 .Diaphragm

The diaphragm controls the amount of light reaching the specimen. Adjusting it helps obtain better contrast.

7 .Coarse Adjustment Knob

This knob is used for rough focusing and should only be used with low-power objectives.

8 .Fine Adjustment Knob

The fine adjustment knob is used for precise focusing, especially under high magnification.

9 .Light Source

The light source provides illumination for viewing the specimen. It may be a built-in lamp or a mirror.

10 .Arm

The arm supports the upper part of the microscope and is used when carrying it.

11 .Base

The base supports the microscope and provides stability.

3-Materials and Equipment

- Compound light microscope.
- Glass slides and cover slips.
- Dropper or pipette.
- Distilled water.
- Prepared slides (e.g., plant cells, animal cells, microorganisms).
- Fresh samples (pond water or yeast suspension, if available).
- Tissue paper or lens paper.

4-Procedure

1- Place the microscope on a stable, flat surface and ensure it is clean.

2-Turn on the light source and adjust the mirror or condenser if necessary.

3- Start with the lowest power objective lens (4× or 10×).

4- Place the prepared slide on the stage and secure it using stage clips.

5-Adjust the coarse focus knob until the specimen becomes visible.

6-Use the fine focus knob to sharpen the image.

7-Adjust the diaphragm to control the amount of light.

8- Observe the specimen carefully and note its shape, size and structure.

9- Switch to higher magnification (40×) if needed and refocus using only the fine adjustment knob.

10-Repeat the observation for different slides or samples.

Note: Through microscopic observation, clear differences will identify between various types of cells and microorganisms based on their structural characteristics.

5-What types of organisms can be seen under a Microscope?

1-Animal Cells

During microscopic examination, animal cells were observed to have an irregular or rounded shape. This appearance is due to the absence of a rigid cell wall, as animal cells are surrounded only by a flexible cell membrane. The nucleus clearly visible in most cells, while the cytoplasm appeared transparent.

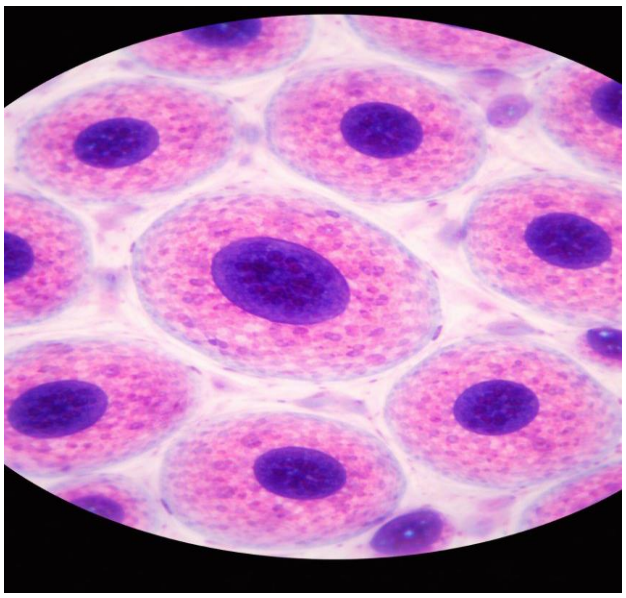

Figure 1: The image shows animal cells (Epithelial cells) under a light microscope. The cells appear round with a visible nucleus and no cell wall

2 .Plant Cells

plant cells appear regularly shaped and mostly rectangular. This regular shape is attributed to the presence of a rigid cell wall, which provides structural support. The cell wall was clearly distinguished from the cell membrane. In green plant samples, chloroplasts were observed, giving the cells a green coloration.

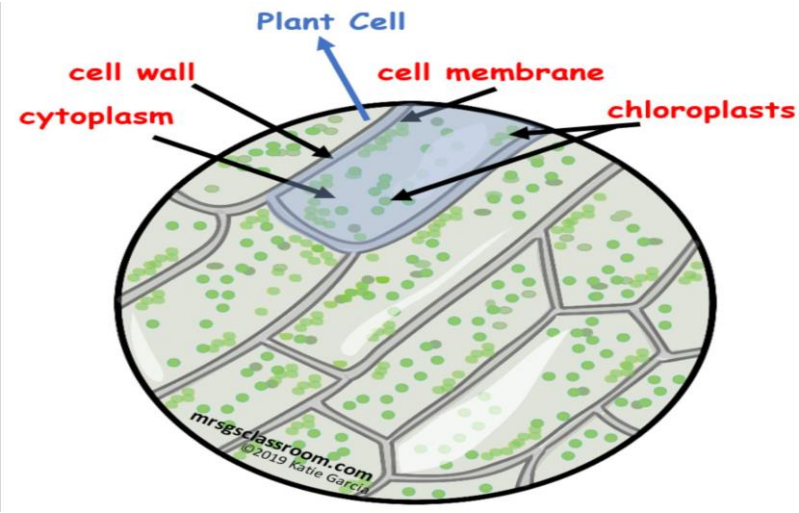

Figure 2: The image shows plant cell under a light microscope with its components

3.Microorganisms

Microscopic observation of microorganisms shows wide variation in shape and size. Some microorganisms appeared spherical, rod-shaped, or irregular. These differences are related to the diversity of microorganism types. Due to their very small size, microorganisms required higher magnification for clear observation.

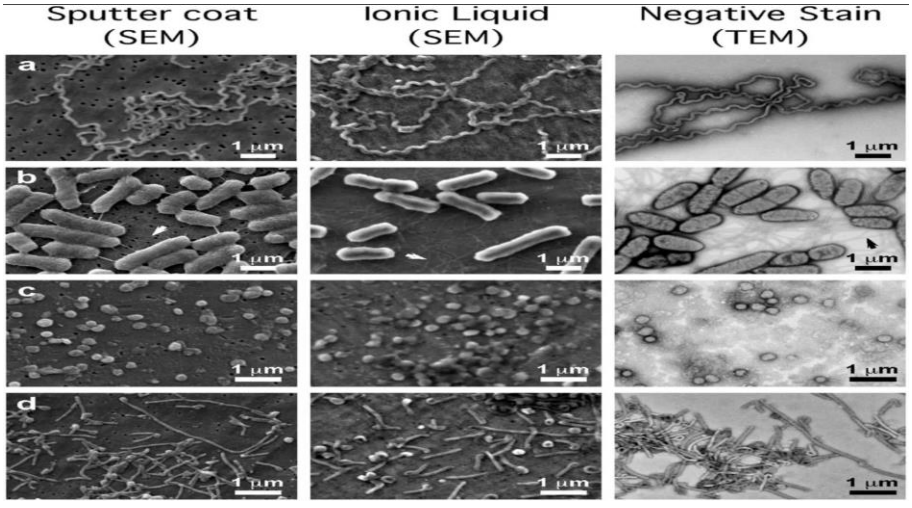

Figure 3: **Bacteria** are single-celled microorganisms that typically range in size from 0.5 to 5 micrometres, and appear under a microscope in simple geometric shapes (spherical, rod-shaped, spiral).

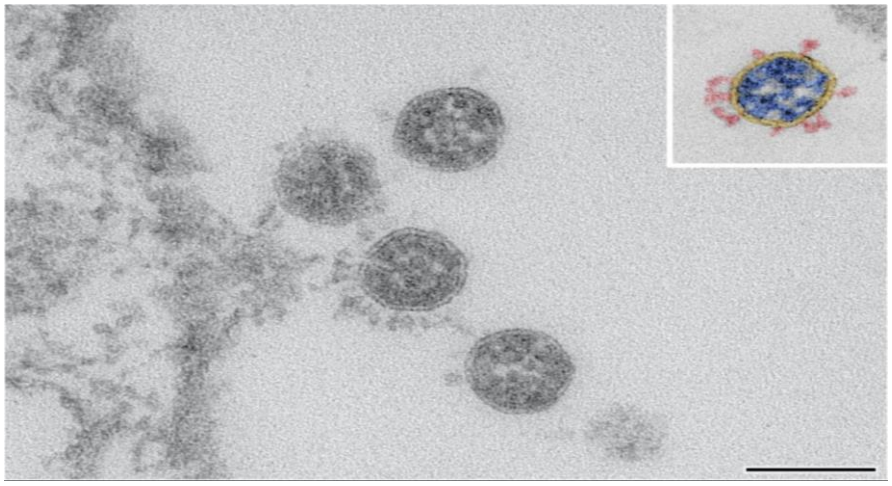

Figure 4: image showing very small **viral** particles (nanometre scale) consisting of a nucleus of genetic material (DNA or RNA) surrounded by a protein coat.

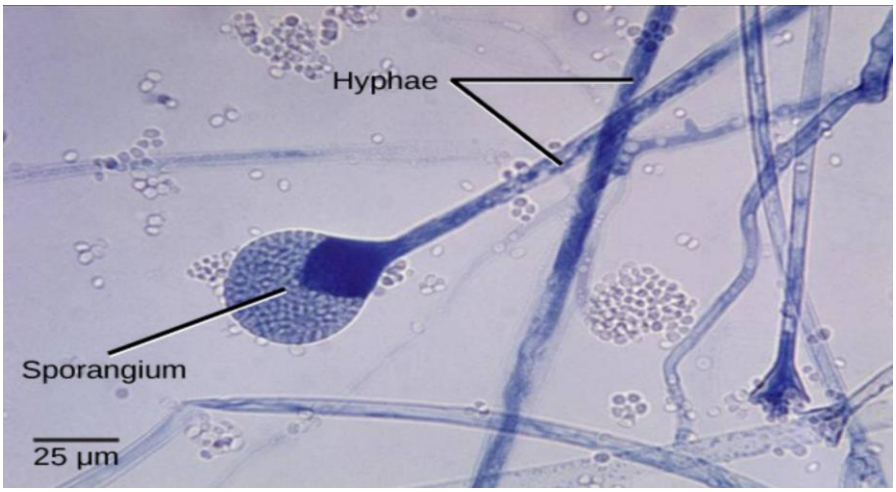

Figure 5: the image of **fungi** showing hyphae or oval cells (yeast), where the hyphae consist of long, cylindrical chains connected to form a network known as the mycelium

Safety Precautions

- Handle microscopes with care and use both hands when carrying them.
- Do not touch lenses with fingers; use lens paper only.
- Dispose of slides properly after use.
- Clean the work area after completing the experiment.