

The Microscope and the Cell

Units of Measurement in Metric system are meter, grams, liter, °C etc.

Metric system is based on units of 10.

1 millimeter (mm)/1000 = 1 micrometer

1 micrometer (µm)/1000= 1 nanometer

- Compound microscope- high magnification use
- Stereo microscope- large and opaque objects

Taking Care of the microscope

- Carry microscope with two hands
 - Clean lenses with lens paper before use
 - Lower the scanning objective to its lowest position after use
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The compound Microscope

- The major parts of the microscope Fig.1

Your microscope has

- Movable body tube

- Iris diaphragm - to regulate the light intensity
- Revolving nosepiece with 3 objectives, scanning, low power and high power.
- Parfocal lenses - Once an object is in sharp focus with one objective, it will almost be in focus with the other objectives.

Compound microscope lenses

Ocular lens or eye piece has magnifying power of 10x

Objective lenses: Scanning- 4x Low power- 10x High power- 43x

Stereo microscope lenses:

Ocular lens or eye piece has magnifying power of 10x

Objective lenses- have magnifying power of 1x, 3x

Total magnification = magnifying power of the ocular X objective

- **Focusing** •Use coarse focusing knob for 4x objective,
Never use coarse focusing knob with 43x objective.
 - Fine focusing knob is used to bring object in sharp focus.
- **Always start viewing an object with 4x objective and work up to the 43x objective.**
- Working distance-distance between the objective lens and object
- Resolving power-clarity of the image
- Diameter of the field -size of the field
- Depth of the field- the thickness of the specimen which may be seen in focus at one time.

Preparation of the slide

Prepared slide-permanent slide,
it has dried specimen with
attached cover glass

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- Orientation of the image _____(see assignment 2,6)

As magnification increases

- Light intensity_____ (see assignment 1)
 - Working distance _____
 - Diameter of the field____ (see assignment 4)
 - Depth of the field____(see assignment 5)
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Wet-mount slide-temporary slide which has specimen mounted in liquid, covered with a cover glass.

Assignment 1: Use unstained and transparent specimen (use wet mount slide)

Assignment 2 : Use letter 'e'-prepared slide. Follow steps 4,5,6,7,8,9

Assignment 4: Diameter of the field. Follow steps 1,2,3.

Objective	objective magnification	total magnification	diameter of the field
Scanning	4x	40x	'a' mm (no. of spaces of ruler)
Low power	10x	100x	40/100 X 'a' mm
High power	43x	430x	40/430 X 'a' mm

Assignment 5- Use two crossed threads.

Assignment 6- Use stereo microscope- Make observations using a coin or an 'e' slide and measure the diameter of the field using clear plastic ruler.

The Cell

Prepare wet mount slide and draw pictures of your observations.

Assignment - 3. Onion Epidermal (skin) cells (use iodine) (fig 4).

Observe cell wall and nucleus. Follow steps 2 and 3.

Estimate size of the cell in micrometer (optional).

Assignment - 4 *Elodea* leaf cells (fig.6).

Observe cell wall and chloroplast. Follow step 2.

Estimate size of the chloroplast (optional).

Assignment - 5 Human epithelial (Cheek) cells (fig. 8).

Observe cell membrane, nucleus and cytoplasm. Follow steps 2 and 3. (use safranin dye).

Estimate size of the nucleus in nanometer (optional).

Eukaryotic organisms like plants and animals are familiar to you. Eukaryotic cells have a nucleus and other membrane bound organelles. e.g. chloroplast, mitochondria etc.

Assignment – 2 Observe, pond water, herb infusion, hay infusion and pepper infusion samples. Refer to fig. 8 of “The Microscope” lab and observe the organisms found in these samples.

Plant cells like *elodea* leaf cells, have cell wall (made of cellulose), central vacuole and plastids. Plastids are organelles involved in food synthesis and storage. Chloroplasts are plastids, which contain chlorophyll and are sites of photosynthesis.

Animal cells- They are surrounded by cell membrane. e.g. *Paramecium* and your cheek cells.

Paramecia and *Euglena*: These are unicellular organisms. They have organelles for locomotion such as cilia and flagella. Cilia are tiny hair like structures present on *Paramecia*. Flagella are long whip like structures. Unicellular algae such as *Euglena* show presence of single flagellum.