

B.Sc. III Year (Theory)
Semester –VI
Paper XX (C)
Microbiology and Disease Management

Unit-1
B. Micrometry

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B) MICROMETRY:

Micrometry is the measurement of the microorganisms. Since microorganisms can be seen only under a microscope, a suitable scale for their measurements should be somewhere in the microscope itself. Usually the micrometer is of two types a) ocular micrometer and b) stage micrometer.

a) Ocular micrometer: Ocular micrometer serves as a scale or rule. Ocular micrometer is simply a disc of glass upon which are lines. These are usually 100 equally spaced divisions marked 0 to 10 upon ocular micrometer. When placed in the ocular (eye piece) the ruled lines superimpose certain distance markers on the microscope field. However, the scale on ocular micrometer does not have any standard value. We can find out the value of one division of this unknown scale by calibrating it with a known scale. Thus actual value of one division of ocular micrometer is found by using stage micrometer.

b) Stage micrometer: Stage micrometer is a microscope glass slide having in its center a known (1mm) distance etched in to 100 equally spaced divisions. This 1 mm (1000 μ m) distance is encircled and mounted by a cover glass. Thus each division of stage micrometer is equal to 0.01m or 10 μ m. the distance of each division of stage micrometer becomes correspondingly enlarged under high power and oil emulsion objectives of the microscope.

Ocular micrometer is there fore calibrated under different objective lens system of the microscope. By determining how many divisions of ocular micrometer superimpose a known distance on the stage micrometer, we may find out the exact value of 1 division of ocular micrometer in the microscope field. Once calibrated, the ocular micrometer can be used to measure the size of various microbes in terms of length, breadth and diameter.

Procedure:

1. It is noted that which objective lens is in use on the microscope
2. Remove the ocular (eye piece) lens and insert the ocular micrometer on the circular shelf.
3. Remove the eye piece and mount in the microscope and observe, there will be seen scale lines ocular micrometer in sharp focus, the lines and distance will remain unchanged under different objectives.
4. Mount the stage micrometer on the microscope stage and bring its scales in the center of microscope field under a sharp focus. This is done first low power objective there after high and oil immersion objectives.

5. The eye piece is rotated in such a way that the ocular scales and stage micrometer scales are parallel.
6. The stage micrometer is moved so that the first division marks of the two scales are in line. One can now see how many divisions on the eye piece as well as on the stage micrometer scale correspond to each other.
7. Since 1 division on the stage micrometer equal to $10\text{ }\mu\text{m}$ one can find the value of one division of the eye piece scale.
8. Calculate the value of one division of ocular micrometer for different objective.

e. g. 100 divisions of stage micrometer = 1mm = 1000 μm

1 division of stage micrometer = 0.01mm = 10 μm

If 40 divisions of ocular micrometer = 60 divisions of stage micrometer
= 60 X 10 μm = 600 μm

1 division of ocular micrometer = 15 μm .

e.g. 6 ocular divisions = 8 stage micrometer divisions.

6 ocular divisions = 0.8mm

$$1 \text{ ocular division} = \frac{0.8}{6} \text{ mm} = \frac{0.8 \times 1000}{6} = 13.3 \mu\text{m}$$

Thus the microscope is calibrated for different combinations of eye piece and objective lens and kept for record.

Use: Having calibrated the eye piece scale for all the objective lenses on the microscope, one can use it to measure the dimensions on cellular and subcellular structures e.g. Bacteria, fungi, epidermal cells.

Thank You