

PREFACE

Biology is a natural science concerned with the study of life and living organisms, including their structure, function, growth, origin, evolution, distribution and taxonomy. It provides detailed information about the zoological as well as botanical aspects of life with intensive study of different species of plants and animals, internal structure of human body, physical and chemical functions of tissues, organs and organ systems, and many other aspects.

Practical application of biology is of utmost importance in the field of physiology, neurology, biochemistry, cardiology, zoology, pisciculture, apiculture, sericulture etc. Therefore it is necessary to have a firm grip over such an extensive subject and its practical application. Hence we bring to you “**STD XI Sci. - BIOLOGY PRACTICAL HANDBOOK**” a handbook which is a complete and thorough guide of different biology practicals.

This handbook written according to the needs and requirement of the board exam and helps the student to score high. It covers the entire syllabus with different sets of practicals written in a systematic and comprehensive manner. The diagrams included are neat, labelled and well drawn to provide an imagination of what they look like in real. The handbook also includes all the necessary information regarding the practical. It also includes a skeleton paper of examination.

And lastly, we would like to thank all those who have helped us in preparing this book. There is always room for improvement and hence we welcome all suggestions and regret any errors that may have occurred in the making of this book.

A book affects eternity; one can never tell where its influence stops.

Best of luck to all the aspirants!

Yours faithfully

Publisher

SYLLABUS

(A) List of Experiments

1. Study of parts of compound microscope.
2. Preparation of T.S. of dicot (sunflower) and monocot roots and stem to study different plant tissues.
3. Study and describe three locally available flowering plants from the families-Solanaceae, Fabaceae and Liliaceae with respect to types of root – (tap and adventitious), stem (herbaceous and woody), leaf (arrangement, shape, venation, simple and compound) and floral characters.
4. Study of plasmolysis in epidermal peels.
5. Study of osmosis by Potato osmometer.
6. Study of structure and distribution of stomata in upper and lower surface of leaf.
7. To test the presence of sugar, starch, proteins and fats from suitable plant and animal materials.
8. To study the digestion of starch by salivary amylase under different conditions of temperature and pH.

(B) Study / Observation of the following (Spotting)

1. Study of specimens and identification with reasons:
Bacteria, Amoeba, Oscillatoria, Spirogyra, Rhizopus, Yeast, Agaricus, Usnea, Riccia, Funaria, Nephrolepis, Cycas, sunflower and maize.
2. comparative study of rates of transpiration in upper and lower surface of leaf.
3. Study of different modifications of root (fusiform root, parasitic root, epiphytic root and pneumatophores).
4. Study of different modifications of stem (stem tuber, runner, and tendril).
5. Study of different modification of leaf (leaflet and stipular tendril), leaf Spines, phyllode).
6. Study of imbibition of speeds/raisins.
7. Study and identification of different types of inflorescence.

8. Study of tissues and diversity in shapes and sizes of plant and animal cells – palisade cells, guard cells, parenchyma, collenchyma, sclerenchyma, xylem, phloem, squamous epithelium, muscle fibres, mammalian blood smear, through temporary or permanent slides.
9. Observation and comments on experimental set up on:
 - a. Phototropism
 - b. Suction due to transpiration
 - c. Apical bud removal
10. Study of specimens and their identification with reasons - *Sycon*, *Hydra*, liverfluke, *Ascaris*, Leech, Earthworm, Prawn, Silkworm, Honey bee, Snail, Star-fish, *Balanoglossus*, Shark, Rohu, Frog, Lizard, Pigeon and Rat.
11. Study of human skeleton (except skull, hand bones and foot bones) and different types of joints (synovial, cartilaginous and fibrous joint with one suitable example).
12. Study of external morphology of earthworm, cockroach and frog through models.
13. Study of mitosis in onion roots tips and animal cells (grasshopper) from permanent slides.

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A-01

To study the parts of a compound microscope**Aim:**

To study compound microscope and its parts.

A microscope is an instrument which magnifies or enlarges the image of extremely small object which cannot be seen with naked eyes.

The compound microscope consists of two main parts.

1. Lens systems (optical parts)
2. Mechanical parts.

1. Lens systems (optical parts):

There are three types of lens systems.

- i. Eye piece
- ii. Objective
- iii. Mirror

i. Eye piece:

Eye piece lies at the top of the body tube. It can be replaced.

They are generally of 5X, 10X, 15X magnification.

ii. Objective:

Objectives are attached to the nose piece.

They are of different magnifications as 10X (low power) and other of high power (45X) and 100X for oil immersion.

The most commonly used objective is 10X.

Condenser:

It consists of condensed lens system which receives the light rays coming from the mirror and converges them at the level of the stage.

iii. Mirror:

It is movable, detachable and fitted below the stage.

It has one concave and one flat surface.

It reflects light upward through the diaphragm.

2. Mechanical parts:

Compound microscope is made up of following parts:

i. Base:

It is the lowermost part of microscope. It bears the weight. It is 'U' or triangular shaped.

It supports the body of microscope.

ii. Body tube:

It is a body of microscope and made up of tube hence called body tube.

It can move in vertical direction i.e. up and down movement.

It bears two lenses viz. eye piece and objective at suitable distance.

iii. Inclination joint:

It joins the lower and upper parts of microscope. The upper part of microscope can be tilted to suit the eye-level of the observer.

iv. Fine adjustment knob:

It is small - sized screw.

It is attached to the body tube. It moves the body tube up and down and exact focussing can be made.

v. Coarse adjustment:

It is attached to the body tube which can be moved up and down for focussing.

vi. Stage with clips:

It is platform with circular hole in the middle on which slide is placed and fixed with clips.

vii. Nose-piece:

It is a circular metallic structure attached below the body tube.

It is revolving part for the adjustment of objectives. There are three or four objectives fitted in the nose-piece with lens.

viii. Body arm (limb):

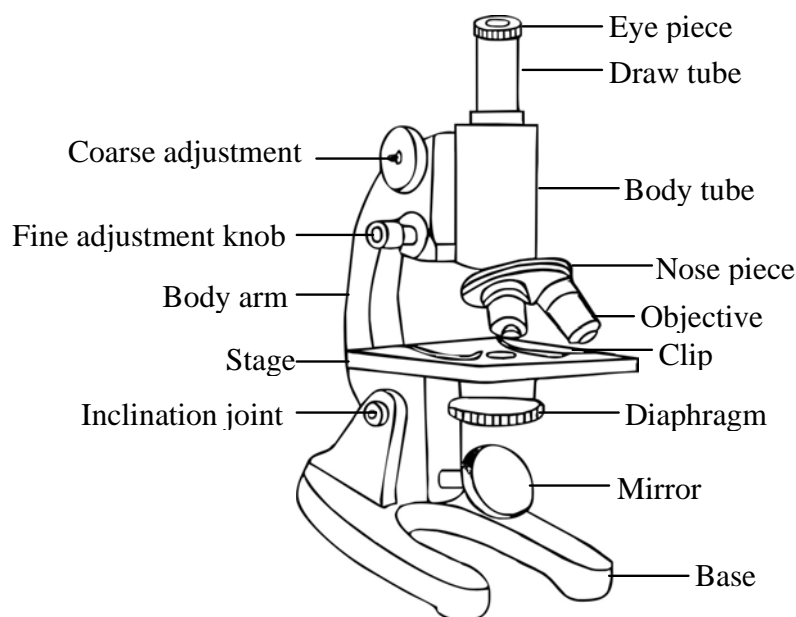
It supports the body tube. It is usually curved. It is used to hold the microscope.

ix. Diaphragm:

It is fitted below the stage. It controls the amount of light incident on the condenser lens.

Instructions / Precautions while using the microscope.

- i. Place the microscope in maximum diffused light.
- ii. Fix first the low power for observation.
- iii. Use concave mirror to adjust the light.
- iv. Always clean the lenses or mirror with muslin cloth or soft handkerchief.
- v. Slide should be clean and dry.
- vi. Use diaphragm to adjust proper light.
- vii. Do not touch the lens, objective, mirror or diaphragm with hands.
- viii. Always observe with both eyes open.
- ix. Never leave a slide on stage after use.
- x. Hold the microscope with both hands.



Compound Microscope