

**OLYMPUS
STUDENT
MICROSCOPES
INSTRUCTIONS**

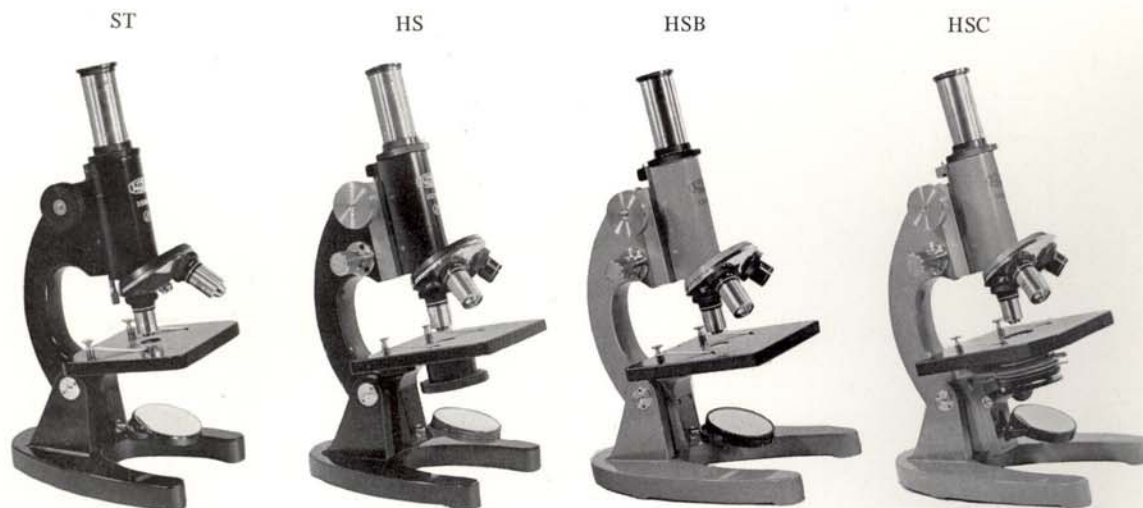
**MODEL S ST. HS.
HSB & HSC**



OLYMPUS

OLYMPUS MICROSCOPES MODELS ST, HS, HSB, HSC

This booklet describes the common features and functions of Models ST, HS, HSB and HSC of biological microscopes for educational use. We always hope to offer the best possible products and for this reason each product we place on the market is accompanied with an inspection certificate.



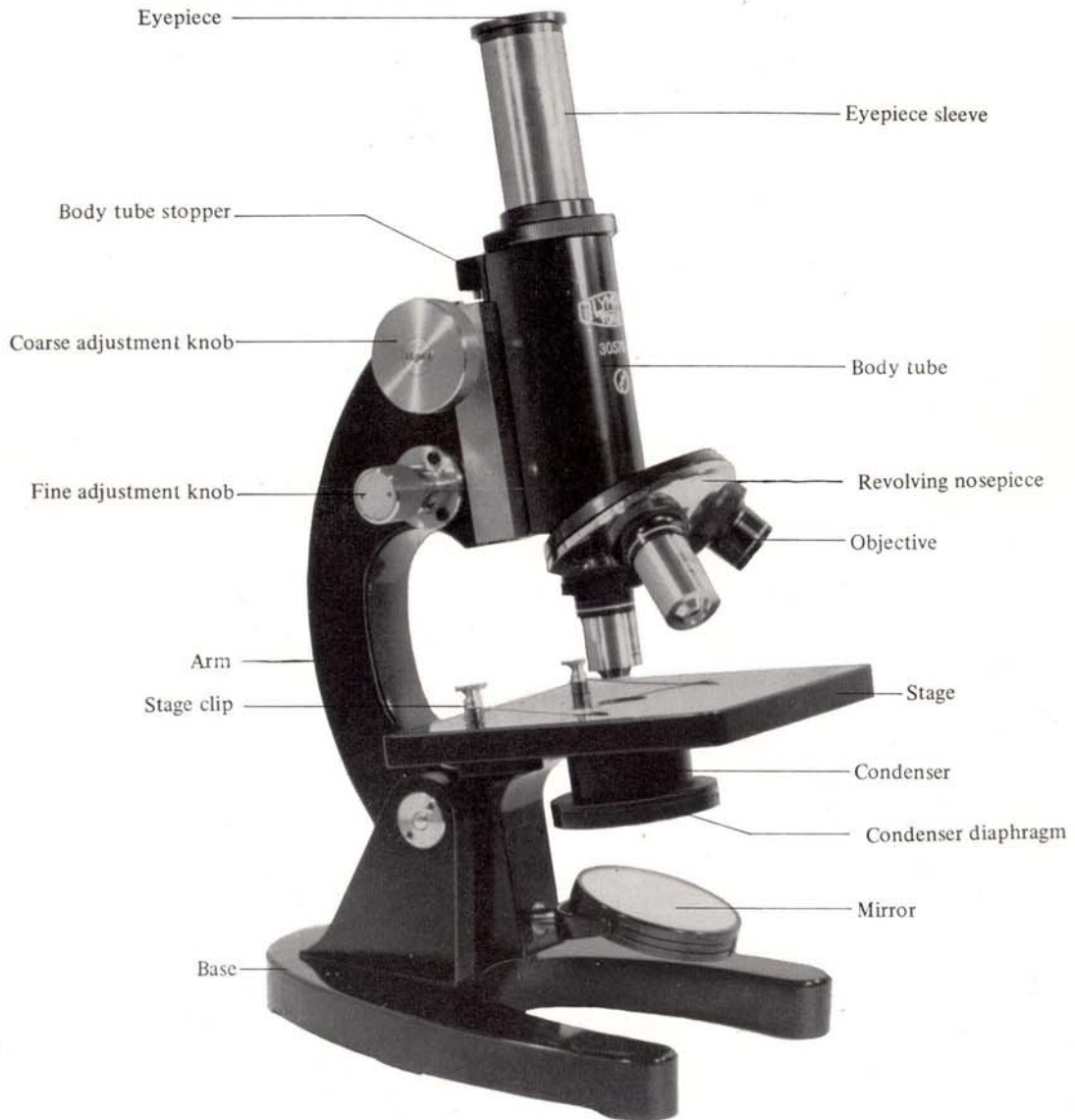
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I Name of Parts

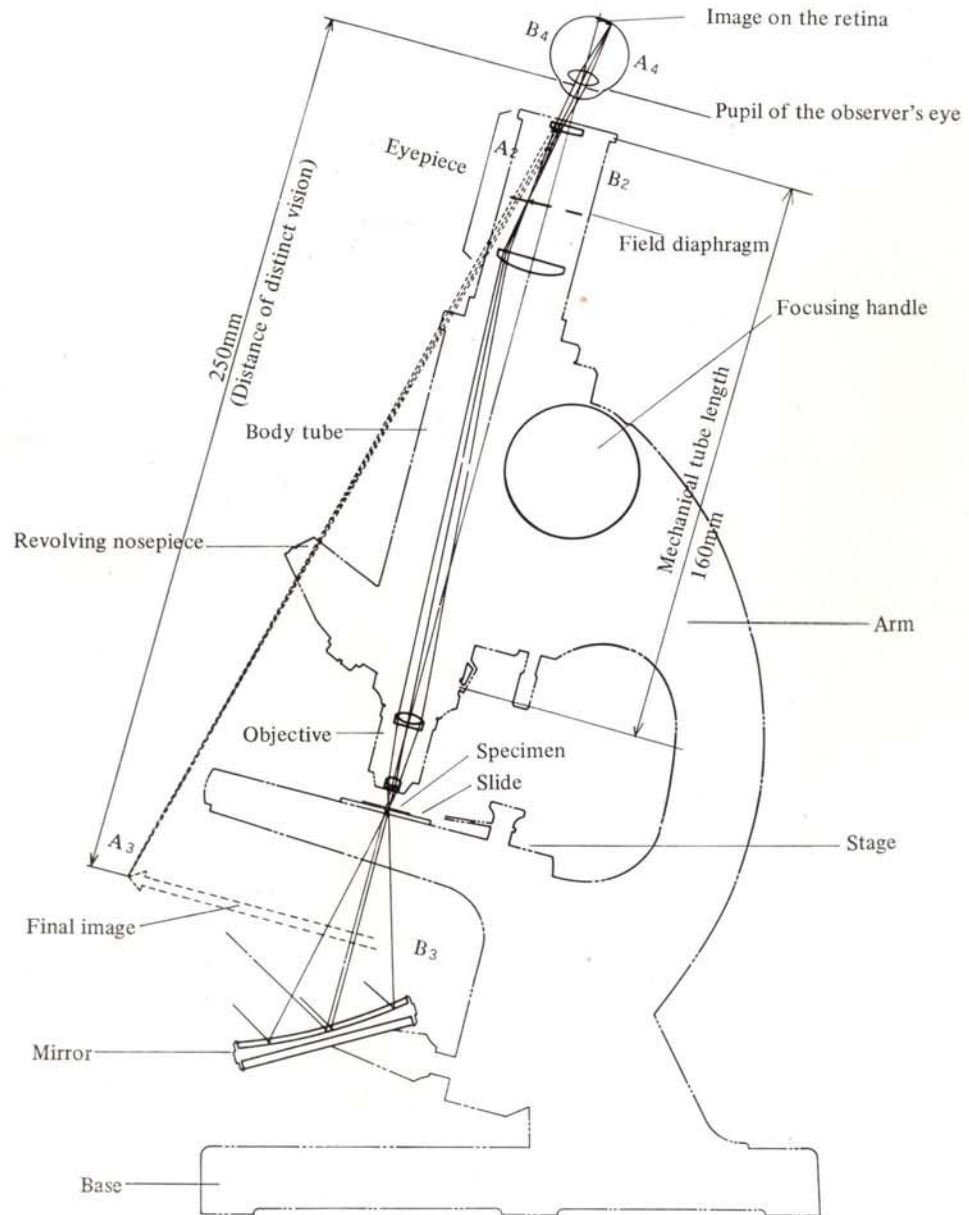
The principal parts of the microscope are given below with Model HS as an example.

(Model HS)



II Optical Path

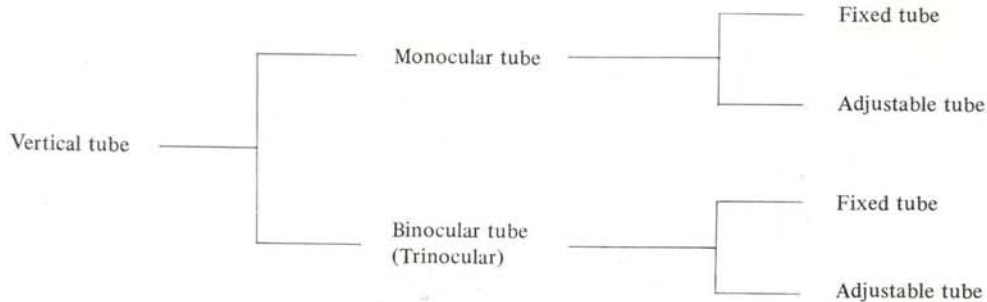
(Model ST)



III Construction

1. Body tube

Body tubes can be classified as follows by form and function.



The fixed body tube has a constant length, that is, the unchangeable distance between the eyepiece and the objective. In Olympus biological microscopes the tube length is fixed at 160 millimeters. With a mechanical tube length of 160mm, if the microscope is focused with a 10X objective and then the nosepiece is turned to set a 40X objective in place, it is also focused to such an extent that accurate focusing can be done only by operating the fine adjustment knob.

When the objectives are used on a body tube with a mechanical length other than 160mm, it will be impossible to obtain the rated magnifications, the resolving powers and the par-focality.

2. Revolving nosepiece

It is customary for the objectives to be mounted on the nosepiece in a manner in which higher powers can be obtained when the nosepiece is turned clockwise with the right hand while looking through the eyepiece.

3. Stage

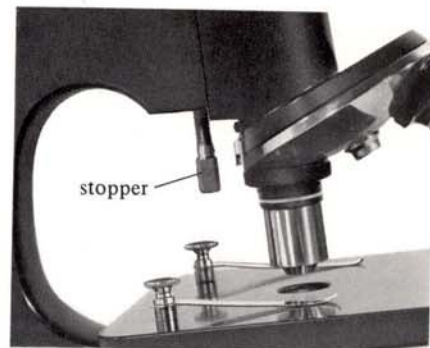
Square fixed stage. Mechanical stage can be fitted on HS, HSB and HSC.

4. Focusing mechanism

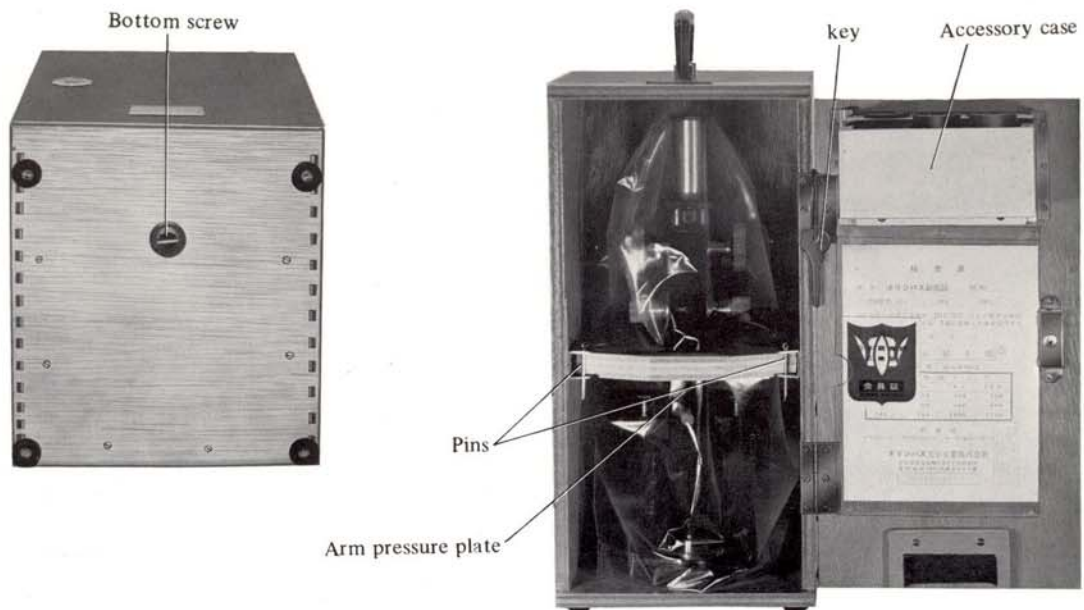
The coarse adjustment mechanism consists of a rack and a pinion by which the body tube is racked up and down. Models HS, HSB and HSC have double-lever fine adjustment mechanism.

5. Body tube stopper

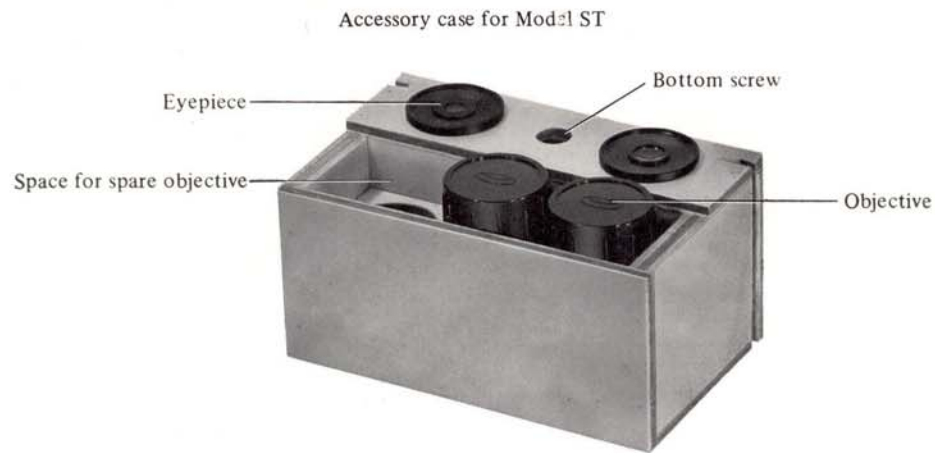
This stopper is used for preventing the body tube from sliding down farther than a pre-set point. If the stopper is fastened tightly when the body tube has been adjusted at a desired level, the tube can be racked up and down only above the pre-set level but never come down below it. This arrangement prevents a damaging collision between the objective and the specimen on the stage.



IV Unpacking and Assembling



1. First, open the front door of the carrying case with the key hanging from the knob. Unfasten and remove the screw on the bottom of the box using a screw driver.
2. Depress the arm pressure plate and remove the pins at both ends of the plate. Remove the pressure plate and take out the microscope.
3. In case of Model HS, operate the coarse adjustment knob so that the body tube is raised up, and then take out a piece of wood behind the nosepiece in the direction of the arrow.
4. Mount the objectives on the nosepiece. The objectives are usually so arranged that higher powers can be obtained when the nosepiece is turned clockwise as viewed from above.
5. Insert a desired eyepiece into the eyepiece sleeve. The total magnification of the microscope is (magnification of the objective) x (magnification of the eyepiece).



V How to Use the Microscope

1. Illumination

What is most important in a microscopic work is illumination, because the light source and condenser greatly influence the resolving power of the microscope lenses.

For microscope illumination, natural daylight or artificial light source is used. Normally it is sufficient to use natural light coming through a window. However, in some cases such as photomicrography, a specially designed microscope illuminator is used.

When daylight is used

Avoid the direct rays of the sun. It is most desirable that the microscope is placed by a window facing north. Usually the plane mirror is used but the concave side is used when annoying reflections of the window frame or trees come into the field of view.



When an illuminator is used

A low-voltage bulb is used for microscope illumination. Olympus puts on the market a specially designed microscope illuminator LSD (using a 6V, 5A transformer, optical accessory). When this illumination apparatus is used, the beam of light must be adjusted by adjusting the position of the bulb and the plane side of the mirror should be used. The accessory daylight filter (cobalt color) should be inserted into the filter holder.

Centering

When a microscope illuminator is used, adjust it so that the axis of the illuminating system falls in the center of the mirror. Next, rack the body tube up and down so that it may be roughly in a position in which the microscope is used for observing the specimen.

Remove the eyepiece and look through the eyepiece sleeve, and you will see the back lens of the objective. Adjust the mirror so that the back lens is evenly illuminated.

Similar procedures must be adopted when daylight is used.

Slide glass and cover glass

Our microscopes are designed to use the slide glass and cover glass of the following thicknesses.

Slide glass:	0.8 - 1.0mm
Cover glass:	0.16 - 0.18mm

Use slide and cover glasses that satisfy these requirements.

2. Focusing

After completion of the centering of the illuminating system, place the specimen on the stage and focus the microscope on the specimen. If you move the body tube up and down while looking through the eyepiece, you may jam the objective down on to the specimen, and you could quite easily crack the specimen and the front lens as well. **First, use a low-power objective, and operate the coarse adjustment knob to lower the body tube until the tip of the objective comes close to the specimen. All this must be done while looking at the microscope from the side. Next, look into the eyepiece and raise the body tube to roughly focus the microscope on the specimen, and fasten the stopper at this point.** Next, turn the nosepiece to change to an objective with a desired magnification. Use the fine adjustment knob to get the specimen sharply in focus. Move the specimen by hand or operate the mechanical stage to bring the target area of the specimen into the center of the field of view.

3. Change of magnification

The magnifying power of the microscope is changed either by changing the eyepiece or by changing the objective.

1) Change of the eyepiece

Eyepieces with different magnifications are inserted into the eyepiece sleeve to change the magnifying power of the microscope. In this case, the microscope remains roughly in focus but further focusing is required to obtain a sharply focused image.

2) Change of the objective

When the objective is changed to change the magnification of the microscope, you first focus the microscope with a low-power objective and then turn the nosepiece to change to a higher-power objective. In Model HS you need only operate the fine adjustment knob to obtain an accurate focus.

4. Resolving Power

The resolving power of a microscope depends solely on that of the objective and has nothing to do with the eyepiece. The only function of the eyepiece is to magnify the image resolved by the objective. This means that no matter how much the final magnification may be increased by using a high-power eyepiece, you will never see what is not shown in the image that is formed by the objective. For example, you get the same magnification of 800X by using a 40X objective and a 20X eyepiece, and also by using a 100X objective and a 8X eyepiece. However, the latter combination has a resolving power twice higher and show more details than the former combination.

VI Accessories

■ Microscope Illuminator MODEL LSD

- A radiator cover is provided.
- Provided with a condenser and diffused light, a parallel light and convergent light can be obtained.
- Can be used for photographing and polarizing microscopes as well as all other types of microscope observation.



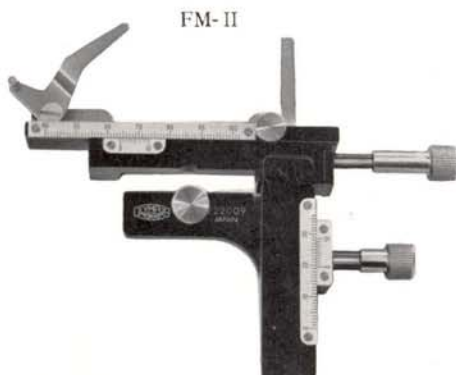
■ Simple Illuminator MODEL LSK

- This illuminator is used in place of the mirror of the microscope.
- Easily detachable and directly connectable to a household outlet of electric power supply.
- 15W bulb is used and there is no need for a transformer.
- A blue filter is provided.
- When you place an order for this illuminator, please specify that it is to be used for Model ST or Model HS.



■ Mechanical Stages

Attachable to the plain stage of a microscope



Graduated mechanical stage Model FM-II
Range of operation: 50x25mm
Vernier scale: read to 0.1 mm



Ungraduated mechanical stage Model KM
Range of operation: 75x25mm

VII Important Points in Storing the Microscopes

Dampness is the worst enemy to the microscope. The "soul" of any microscope is the optics, especially the objectives and eyepieces. It is desirable that these lenses are stored in a dessicator in which a drying agent (silicagel or calcium chloride) is placed.

The next worst enemy to the delicate optical instrument is dust. Dust is apt to gather upon the surfaces of lenses, the condenser and mirror under the stage. Use a very soft brush (with a fine point, not starched) to get rid of dust. When the eyepiece is removed, never fail to put the dust cover on the top of the eyepiece sleeve. If the eyepiece sleeve is left open, dust will fall through the tube and gather upon the back lens of the objective and it will greatly impair the performance of the lens. All the moving parts (such as the coarse adjustment mechanism, the condenser, the mechanical stage) are properly lubricated with a special grease so that they may move smoothly. Avoid using watch-oil or machine oil on these parts. A microscope, including the objectives, is such a delicate precision instrument that you never try to disassemble any part of it. If you find something wrong with your microscope, better leave it to experts. When you clean the lenses, you must be very careful not to scratch them. When dust enters inside objectives, etc., try to blow it off using a rubber blower or brush it away with a clean feather or the like.

As we are continually improving and developing our products, the equipment supplied may not agree in all details with the descriptions and/or illustrations shown in this instructions.

OLYMPUS OPTICAL CO., LTD.



7, 3-CHOME, KANDA-OGAWAMACHI, CHIYODA-KU,
TOKYO, JAPAN

