

Type FL
**STUDENT
MICROSCOPE**

Reference Manual



BAUSCH & LOMB
OPTICAL COMPANY
ROCHESTER 2, NEW YORK

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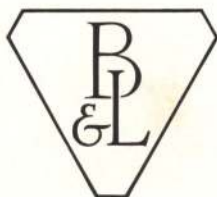
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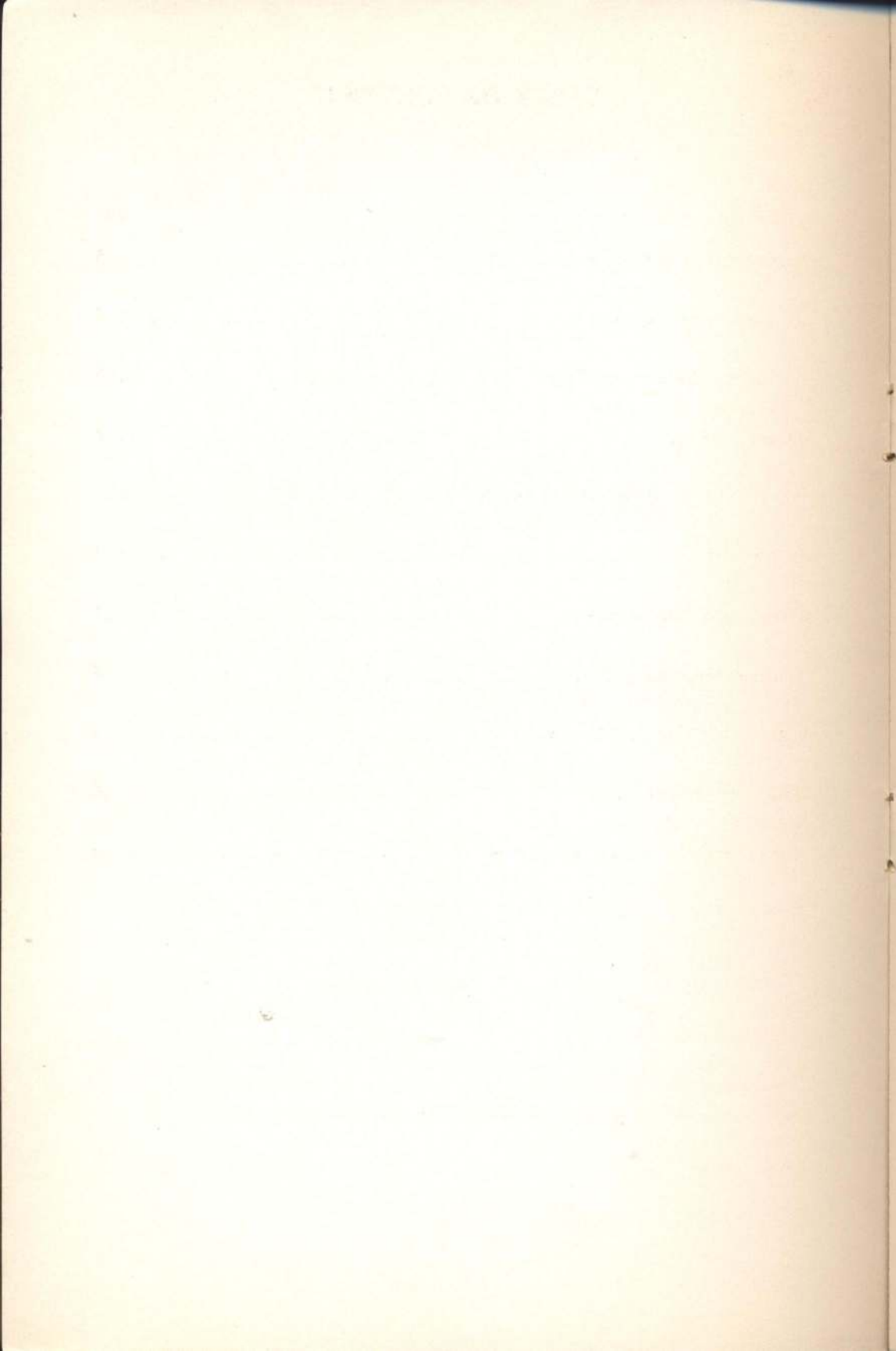
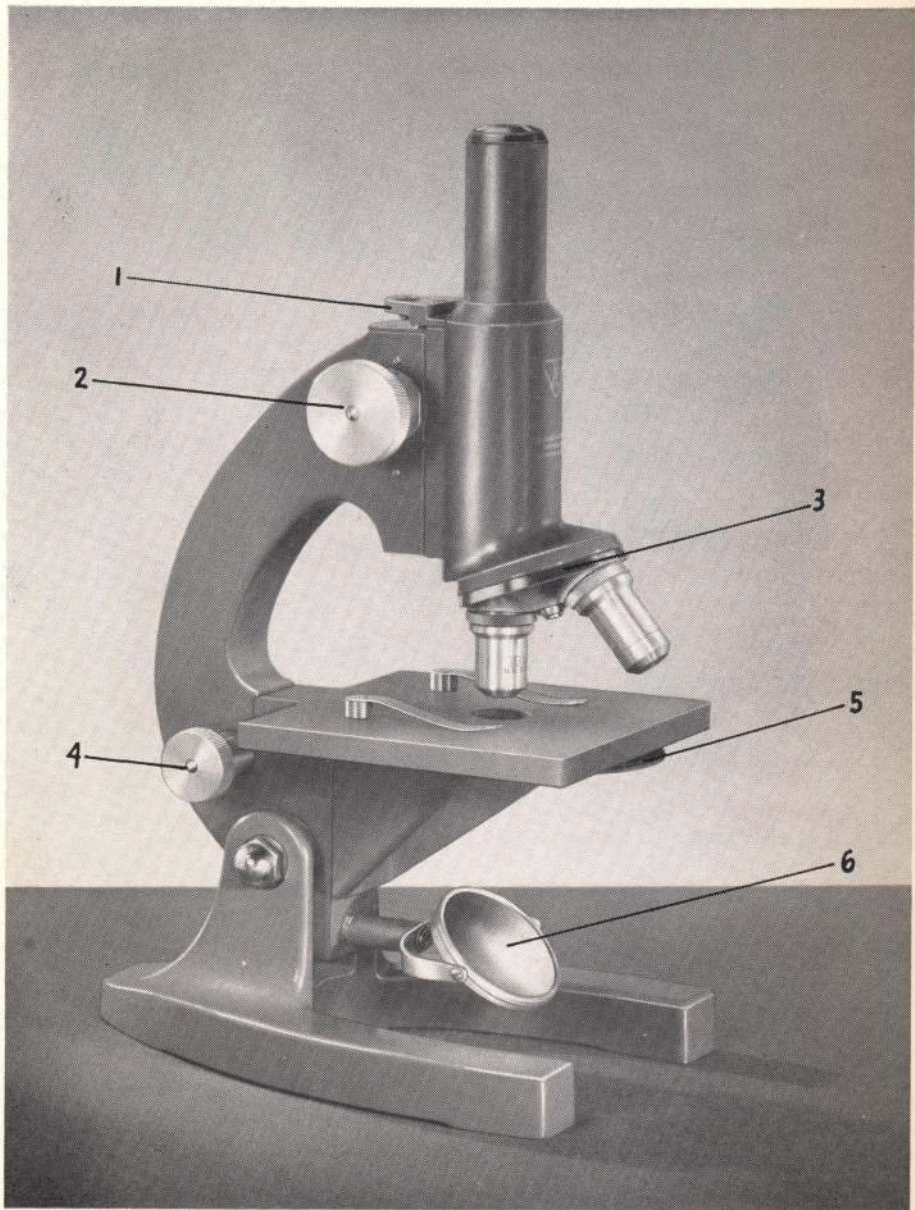


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The Bausch & Lomb Student Microscope

1—*Prefocusing Gage*

2—*Coarse Adjustment Focusing Knob*

3—*Revolving Nosepiece*

4—*Fine Adjustment Focusing Knob*

5—*Substage Diaphragm Disc*

6—*Concave Mirror*

The Bausch & Lomb

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The Bausch & Lomb Student Microscope has been designed to meet the need of a precision built microscope for use in elementary and college science courses. It embodies practically all of the features found on the more expensive laboratory microscopes—coarse and fine adjustments, double revolving nosepiece with parfocalized objectives, 160mm tube length, Society thread, standard diameter eyepieces, reagent resistant stage, etc.

Identification of Objectives

The two objectives which are supplied with this microscope are color coded for quick and easy identification. The knurled ring on the upper part of the objective body is colored green for the low power ($10\times$) objective and yellow for the high power ($43\times$) objective. In addition, the engraved markings of the objectives are colored as indicated above. As a result, it is a simple matter to determine at a glance which objective is swung in position for use.

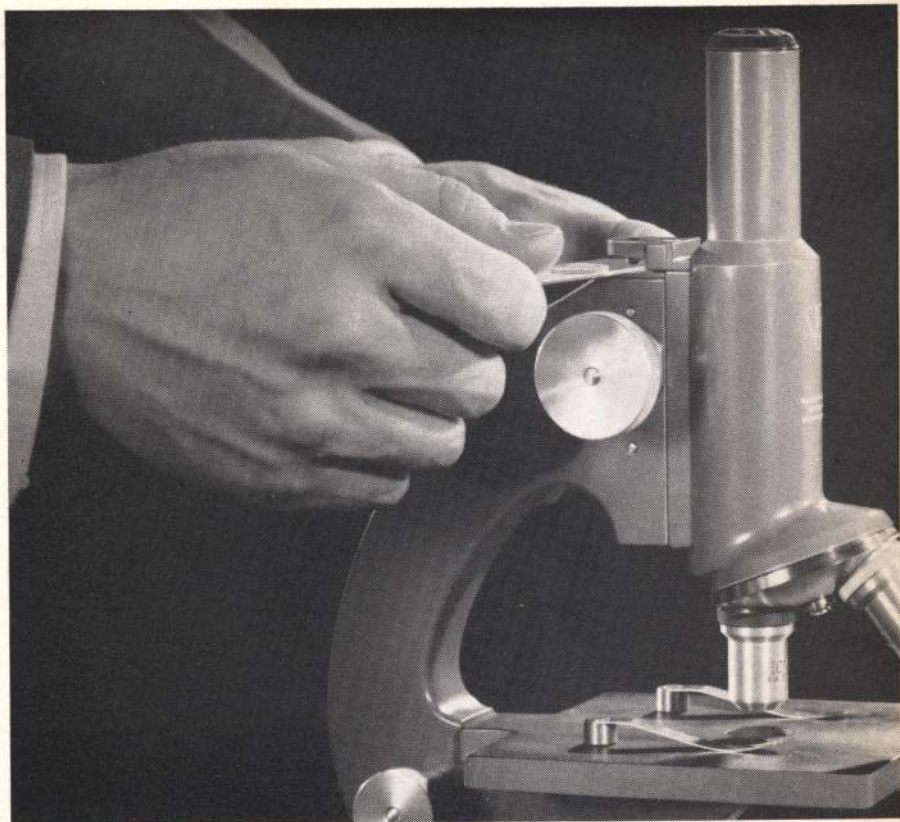
To Illuminate the Object

This is an extremely important detail, and should always be carefully done, as one may easily fail to obtain the best results, or be led to wrong conclusions.

Daylight may be used as a source of illumination, although the constancy and convenience of an electric illuminator is to be preferred. If daylight must be used, place the microscope as near directly in front of a north window as possible. Direct sunlight is intolerably bright and if it falls on the table anywhere near the microscope, the glare is exceedingly uncomfortable and is fatal to good observation.

The microscope is equipped with a concave mirror which focuses the parallel illuminating rays from the light source upon the object under examination. Preliminary adjustment of the illumination can be accomplished more quickly at the outset by observing the object without looking through the microscope, keeping the head for this purpose at one side of the tube. After an approximate adjustment of the mirror has been made in this way, look through the microscope (after focusing upon the object) and adjust the mirror until the field of view is evenly illuminated.

There are four apertures in the substage diaphragm disc. By rotating the disc and going from a larger to a smaller opening, the contrast and depth of focus may be increased; however, one must realize that definition is lost in so doing.



Use of the Prefocusing Gage

When working with transparent specimens and with slides of varying thicknesses, the microscopist often has difficulty in finding and focusing the object. The Bausch & Lomb Prefocusing Gage (Pat. applied for) eliminates lengthy searches by the students and automatically gives quick and accurate focus for any thickness slide. Prefocusing is possible only on this Bausch & Lomb Student Microscope.

Simply place the slide under the gage as shown in the illustration.

Using the coarse adjustment button, rack the microscope body down until the stop on the gage makes light contact with the slide. Without moving the coarse adjustment, remove the slide from the gage, and place it on the stage--you're in focus. For critical focus, a light touch of the fine adjustment may be desired.

To assure accurate prefocusing and protection of the specimen, be certain that the stop on the gage makes contact with a free area of the slide and not on the cover glass or areas covered by labels.

Direct Focusing

Should one wish to omit the use of the prefocusing gage for special applications the following procedure should be used to focus the microscope. Place the object on the stage and bring the low power (green knurled ring) objective into position. Using the coarse adjustment, lower the microscope tube as far as it will go. Looking through the microscope and using the coarse adjustment, raise the tube until the image comes into focus. Should greater magnification be desired bring the high power (yellow knurled ring) objective into position. Only a slight adjustment of the fine adjustment will be necessary to bring the image into sharp focus.

A low power objective permits the observer to see a much greater area of the specimen than one can see with a high power objective. Therefore, it is useful as a "finder." The specimen may be examined with a low power objective and some particular point of interest in the specimen located and moved to the center of the field of view. Then, if greater magnification is desired, the high power objective may be brought into use by means of the revolving nose-piece.

The Use of the Revolving Nose-piece

This is provided in order to enable rapid, convenient exchange of one objective for another. To effect this change, grasp the objectives between the thumb and forefinger of the right hand and rotate until the desired objective is brought into line with the axis of the body tube. It is very important that exact alignment be obtained. The correct setting is indicated by a slight click which indicates the stop for each objective.

The objectives will be so nearly parfocal that, if the microscope is focused for either of them, it will be

possible to swing the other objective into place without touching the coarse adjustment and with only a slight turn of the fine adjustment required to restore perfect focusing.

Cover Glass

It must not be forgotten that in microscopical work we are dealing with minute things and this applies especially to cover glass.

In preliminary examinations of solid objects with low powers, a cover glass may be dispensed with, but where fluids are used, whether with low or high power, it should always be used. A drop or small quantity of fluid placed upon a slide assumes a spherical form and, on viewing it with a low power, it will be found to give a distorted field and cause disagreeable reflections and shadows. For high power examination the front lenses will be so close to the fluid that capillary attraction will cause an adhesion to the front surface of the objective if the front lens once touches the liquid. By merely dropping a cover glass upon it, these objections are overcome.

The objectives were designed for use with a cover glass 0.18mm in thickness. For satisfactory performance, use a cover glass as close to this thickness as possible.

Care of the Microscope

Besides acquiring the ability to use an instrument properly with its accessories, it is important to know how to keep it in the best working condition. It may be said without reserve that an instrument properly made at the outset and judiciously used should hardly show any signs of wear, either in appearance or in its working parts, even after the most protracted use.

Especial care should be given to the optical parts; in fact, such care that they will remain in as good con-

dition as when first received, after any amount of use.

Care of the Stand

Keep free from dust is one of the first rules to be observed. When not in use, place the microscope in a cabinet, or cover with a plastic cover, bell jar or close-mesh cloth, such as cotton flannel or velvet, which should reach to the table.

When handling the stand, grasp it by the arm and base, in order to achieve a firm support.

Avoid sudden jars, such as placing upon the table with force.

If the inclination joint should become loose so as to prevent the arm from being set at any angle of inclination, it should be tightened by drawing up on the two opposing nuts in opposite directions.

Care of the Coarse Adjustment

Do not keep hold of the coarse adjustment knobs while operating the fine adjustment, as the former must be free to rotate.

The coarse adjustment, slides, and rack and pinion are necessarily exposed and the lubricant is apt to catch dust and also to gum. The tube should be occasionally withdrawn from the arm and the slides carefully wiped with a cloth moistened with Xylol. Lubricate by applying a small quantity of paraffine oil to a cloth and wiping well over the surfaces, removing the superfluous amount with a dry cloth. The teeth of neither rack nor pinion should ever be lubricated. An occasional cleaning with a toothbrush is advisable.

Occasionally lubricate the pinion shank on both sides of the arm with a very minute quantity of paraffine oil.

Fine Adjustment

The fine adjustment mechanism is sturdily constructed and should

work satisfactorily throughout the life of the instrument. Should the fine adjustment become damaged or cease to work satisfactorily, the instrument should be returned to the factory for repair.

The fine adjustment mechanism on this instrument has a relatively short range of motion. Care should be exercised that the operator does not attempt to force it beyond its limits. It would be well, before each focusing operation, to set the fine adjustment at the mid-point of its range of motion. This may be accomplished by setting the fine adjustment operating button so that the screw located on the knurled surface lies on top.

Be sure to release the coarse adjustment buttons while operating the fine adjustment.

Care of Objectives and Eyepieces

The user should supply himself with a camel's hair brush and a well washed piece of linen. Chamois skin is desirable, but only after it has been repeatedly washed. No dust should be permitted to settle upon the lenses nor should the finger come into contact with any of the surfaces.

The objectives should be left attached to the microscope, and the eyepiece left in the tube, so that no dust can enter and settle upon the rear lens of the objective.

If dust has settled on the eye-lens of the eyepiece, it will appear as dark, indistinct spots upon the field of view. To remove the dust, brush it off with a camel's hair brush and then wipe with a well washed chamois skin or piece of linen. Use the camel's hair brush again to remove any lint.

Never separate the systems, even if they can be unscrewed, as they are liable to become decentered and dust may enter.

RESPONSIBILITY FOR DELIVERY. Every shipment of Bausch & Lomb products is in perfect condition when it leaves the factory. The transportation company, when it accepts the shipment, becomes the consignee's agent and is responsible for safe delivery.

If shipment shows evidence of rough handling, have the agent note on the receipt "Received in bad order"; or if "concealed damage" is revealed after unpacking, call the representative of the transportation company within 48 hours and have him make out a "Bad order" report. Unless this procedure is followed, you lose all right to recovery from the carrier. —*Bausch & Lomb Optical Co.*



Sketched below are the main offices and works of the Bausch & Lomb Optical Co., at Rochester, New York. There are other Bausch & Lomb plants in Rochester and Wellsville, N. Y.; Midland, Ontario, Canada; and Rio de Janeiro, Brazil. Sales offices are in many of the larger cities.

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