25
STUDENT MICROSCOPES

Color the heading Standard Light Microscope. Then color titles and structures A through G in the upper drawing.

The most familiar type of microscope is the standard light microscope shown in the upper half of this plate. The *base, pillar,* and *arm* are usually one single piece of cast metal, but the different regions are called by these three names. The arm is the correct place to grip the microscope when carrying it; the palm of your other hand should support the base. The *stage* is the platform that supports the specimen to be observed. The stage has a hole in its center to allow light to pass through, so specimens must be supported on a thin piece of glass called a *slide.* Usually, the specimen is covered by an extremely thin piece of glass called a *cover glass* (or cover slip). Since any slight movement of the specimen is magnified many times, the slide is usually held down by a pair of *stage clips,* which press it flat against the stage.

Now color the heading Light Path and the titles and elements of the light path, H through L.

A student microscope is usually equipped with a *concave mirror* to concentrate the light on the specimen mounted on the slide. The light may be from a lamp or from the sky. *Never* use direct sunlight unless you want to burn a hole in your eye. If a light is built into the base, no mirror is necessary.

After the light has passed through the specimen, it enters the objective lens (often called just "objective" for short). The shorter of the two objective lenses is the *low-power objective lens,* which is almost always made to produce a magnification of 10 times, designated as 10X. The *high-power objective lens* nearly always has a magnification in the range of 40X to 45X. The *tube* allows the light from the objective lens to pass upward to form the first magnified image; that image is then magnified further by the *eyepiece* (also called the *ocular*). The eyepiece is usually 10X. The total magnification obtained is the product of the separate magnifications of the objective lens and the eyepiece. Thus a 40X objective and a 10X eyepiece will give a total magnification of 400X.

Color the heading Controls and titles and structures M through R.

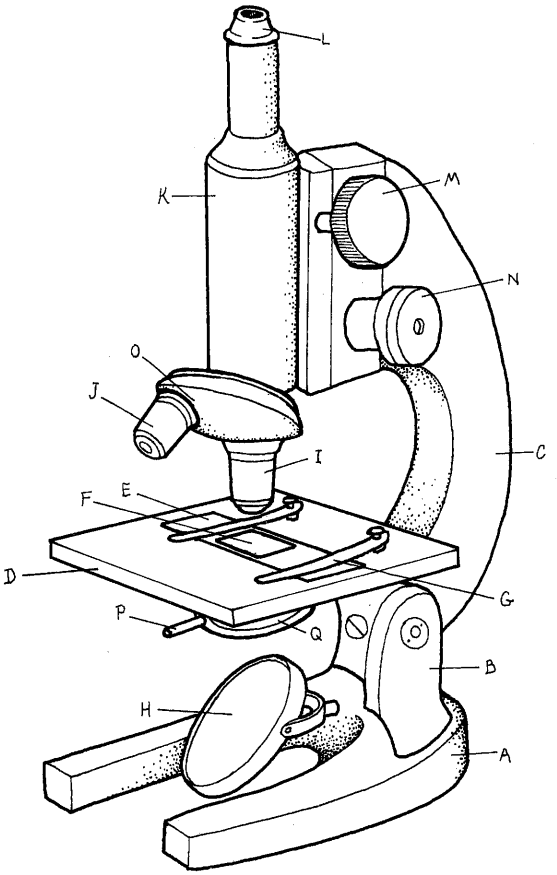
The *coarse adjustment knob* is often called the coarse focus knob because it is used to get the specimen approximately in focus. The *fine adjustment knob* (fine focus) gets it exactly in focus. The *nosepiece* can be rotated to change from one objective lens to another. The *iris diaphragm lever* operates the *iris diaphragm* (indicated open here), which consists of a dozen or so thin sheets of brass ingeniously mounted so that moving the lever opens and closes the light path through the center of the diaphragm. This increases or decreases the angular width of the light beam passing up through the stage, which influences the contrast between light and dark portions of the specimen.

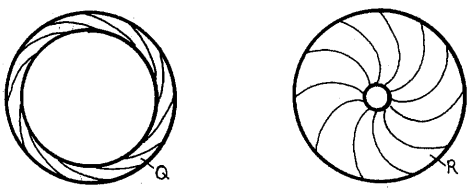
Color the heading Stereoscopic/Dissecting Microscope. Next color parts A, B, C, D, G, K, M, and O of the dissecting microscope, using the same colors you used for those parts on the standard microscope. Then color titles and structures S through W. Choose light colors for S and T. W is usually white on one surface and black on the reverse.

The stereoscopic microscope (Greek: *stereos,* "solid"; *scopic,* "vision") is so called because each eye sees the specimen from a slightly different angle, producing an image that appears to be three-dimensional. It is also commonly called a dissecting microscope, because the stereoscopic image is particularly useful for dissecting very small specimens. Magnification is always rather low—10X to 60X total—and observation is usually with incident light (light shining down onto the specimen) rather than transmitted light (light passed up through the specimen). To produce the stereoscopic effect there must be a completely separate optical system for each eye. Thus we have *two low-power lenses* (one for the right eye and one for the left) in a single *mounting* and *two high-power objective lenses* in another *mounting.* The *binocular head* allows the distance between the *two eyepieces* to be adjusted to accommodate different users. The *stage* usually has a *reversible plate* that is white on one surface and black on the reverse to allow choice of a background that will render the subject most visible. Stage clips are usually attached in such a position that they can be used or swung out of the way, as desired.

STUDENT MICROSCOPES.

STANDARD LIGHT MICROSCOPE★
BASE$_A$
PILLAR$_B$
ARM$_C$
STAGE$_D$
SLIDE$_E$
COVER GLASS$_F$
STAGE CLIPS$_G$
LIGHT PATH★
CONCAVE MIRROR$_H$
LOW-POWER OBJECTIVE LENS$_I$
HIGH-POWER OBJECTIVE LENS$_J$
TUBE$_K$
EYEPIECE/OCULAR$_L$
CONTROLS★
COARSE ADJUSTMENT KNOB$_M$
FINE ADJUSTMENT KNOB$_N$
NOSEPIECE$_O$
IRIS DIAPHRAGM LEVER$_P$
IRIS DIAPHRAGM OPEN$_Q$/
CLOSED$_R$





STEREOSCOPIC/DISSECTING
MICROSCOPE★
PAIRED LOW-POWER
OBJECTIVE LENSES$_S$/
MOUNTING$_{S'}$
PAIRED HIGH-POWER
OBJECTIVE LENSES$_T$/
MOUNTING$_{T'}$
BINOCULAR HEAD$_U$
PAIRED EYEPIECES/OCULARS$_V$
REVERSIBLE STAGE PLATE$_W$