

Management

BULLETIN

Purchasing A Microscope

Purchasing a new microscope can be an intimidating task. Any internet search will bring up many different microscope types such as compound, stereo, digital, confocal and scanning electron. The cost can range from hundreds to thousands of dollars. The choices can be confusing. This article will attempt to lend a little help and education in the purchase process.

Breakdown your microscope search by asking yourself a series of questions.

1. What kind of microscope do I need?
2. What type of microscope construction do I want?
3. What type of optics do I need?
4. What kind of lighting system is best?
5. What other microscope components do I need?
6. What's next?

What kind of microscope do I need?

Microscopes are classified into two basic categories: stereo and compound. Stereo microscopes, often referred to as dissecting scopes, are used for viewing larger items such as tissue and are of lower magnification, typically under 100x. Compound microscopes are used for viewing small specimens such as blood and bacteria requiring a higher magnification of up to 100x.

Answer: The typical clinical laboratory uses an upright compound light microscope.



What type of microscope construction do I want?

The term, “you get what you pay for,” should come to mind when considering quality of microscope construction. You should consider microscopes with sturdy, well-built frames. The best frames are made of metallic alloys that minimize vibration and temperature variations. Avoid plastic! In addition, you should look for metal gears fastened with metal screws, a reagent resistant paint finish, and ball bearings in moving parts. A good tip to use when shopping online or in a catalog is to compare weights and measurements, which gives an indication of size and sturdiness. In most instances, the heavier the better.

Answer: Look for a sturdy, metal frame microscope.

What type of optics do I need?

Quality objective lenses and eyepieces are an important consideration in your microscope purchase. Objective lenses are designed to be achromatic or color corrected, which prevent optical distortions and create a flatter specimen image. At higher magnifications, the achromatic lens field of view will appear to curve up out of focus. Selecting a microscope with plan (also known as planar, semi-plan, semi-planar, or microplan) chromatic lenses corrects for the field curvature creating a flat viewing field free of aberrations.

In addition to selecting the appropriate quality of objective lenses, you also need to consider objective configuration to provide the optimal range of magnifications. The recommended configuration is 10x/40x dry objectives and 100x oil-immersion. It is also advisable to have objectives with a spring-loaded retractable front lens assembly that protect the lens and the specimen from collision damage. The objectives should be threaded and easily attached to a revolving, ball-bearing nosepiece that has a firm, audible click when an objective is engaged into the working position.

The final considerations in optical quality are the microscope oculars or eyepieces. Look for a microscope that has wide field eyepieces that widen the field of view, an interchangeable, inclined binocular head, and interpupillary distance control.

Answer: Select achromatic objectives or plan achromatic objectives for a superior viewing field. Objective configuration should be at least 10/40/100x and the binocular head should have eyepieces that are wide field, interchangeable, and adjustable.



What kind of lighting is best?

The lighting system is another important part of your microscope. In the past, most clinical microscopes were equipped with halogen lamps. Halogen lamps provide a very white, bright concentrated light. With the evolution of LED (Light Emitting Diode) lighting, microscopes equipped with these lamps are becoming more common. LEDs consume very little power, provide a cool white light, and bulbs last thousands of hours. In addition to your lighting, your microscope should come with a built-in illuminator and a rheostat or dimmer to decrease heat emitted.

Answer: Select halogen or LED lighting with dimmers, built-in illuminator, and rheostat.

What other microscope components do I need?

Shop for microscopes that have a diaphragm. The microscope diaphragm refines the stream of light that passes through the object being viewed. Most microscopes have either a simpler and less costly disk diaphragm or an iris diaphragm. Like its name indicates, disk diaphragms refine light by rotating a disk through a series of progressively smaller holes. There are a set number of settings, and you select the one that makes your specimen look best. An iris diaphragm adjusts the light through a lever that opens and closes the iris much like the pupil in your eye. A diaphragm of this type gives you an almost infinite number of settings as opposed to a set number.

Your microscope search should also contain a substage movable condenser with an aperture iris diaphragm. The movable condenser is the glass lens built under the stage. The condenser gathers light from the microscope light source and concentrates it into a cone of light that illuminates the specimen with uniform intensity. The Abbe Condenser is the most common. The condenser should have a numerical aperture of at least 1.25 if the microscope is equipped with a 100x objective.

Finally, shop for a microscope with a mechanical stage and stage clips. These are a must when viewing a slide. The mechanical stage has two knobs that move

the slide, which is held in place by stage clips. One knob moves the slide up and back, while the other moves the slide from left to right. These controls allow for a slow and precise control of the slide position.

Answer: Look for microscopes with an iris diaphragm and a movable condenser with a numerical aperture of 1.25. A mechanical stage and clips give precise control of slide viewing.

What's next?

When you have completed your research and answered all your questions, it is now time to buy your microscope. Although you can search the internet for microscopes or buy through your supply distributor, the smartest choice would be to contact a microscope company directly. A microscope company service or sales representative will often come onsite and help you select the best microscope for you based on your needs, types of work, and budget. They are the technical experts. In addition, they will often let you try out a microscope before you make your purchase.

Lastly, think additional costs such as annual service or maintenance contracts. A new microscope will often come with a mechanical and electrical warranty. Your warranty, however, will only cover manufacturer defects. Be a savvy shopper and ask about extended warranties, parts replacements, and annual services and factor these additional costs in your budget.

When purchasing a microscope, think long term. Your new microscope is an investment that should last your laboratory for many years. Avoid purchasing the wrong microscope by doing your homework. Use the tips above in your decision-making process and contact a microscope sales representative. They are the ultimate experts. If you need information on various microscope companies, contact your regional laboratory consultant or the Lab Improvement Unit at the North Carolina State Laboratory of Public Health.

Happy shopping!

References:

Lind, John. "How to Buy the Right Microscope." GreatScopes. <https://www.greatscopes.com/microscope.htm>. Accessed February 18, 2020.

"How to Buy a Microscope." Microscope Central, February 18, 2020. <https://microscopecentral.com/pages/how-to-buy-a-microscope>.

North Carolina State Laboratory of Public Health. "Microscopy: Viewing & Reviewing. Appendix 3: Microscope Purchase Tips." 12/20/18.



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