



Proper Use & Care of Microscopes

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Microscopes are used daily in veterinary practice to view various biologic products (eg, blood, urine, fecal material, fluid aspirates, skin scrapings, ear cerumen). Team members should be familiar with proper techniques for viewing different specimens and the use of each lens objective (eg, 4x, 10x, 40x, 100x). The microscope ocular lenses, objective lenses, stage, and stage clips should be cleaned after each use, and the body of the microscope should be wiped down and inspected at the end of each shift after its last use of the day.

See related article, **The Surprising Cost of Skipping Practice Equipment Maintenance**, page 34

Microscope Supplies

The following are suggested cleaning supplies for daily microscope care.

- Cotton tip applicator
- Distilled water
- Suction bulb or ear balloon
- Kimwipes or lens tissue
- Microfiber or other soft cloth
- Optical cleaning solutions
- Soft brush

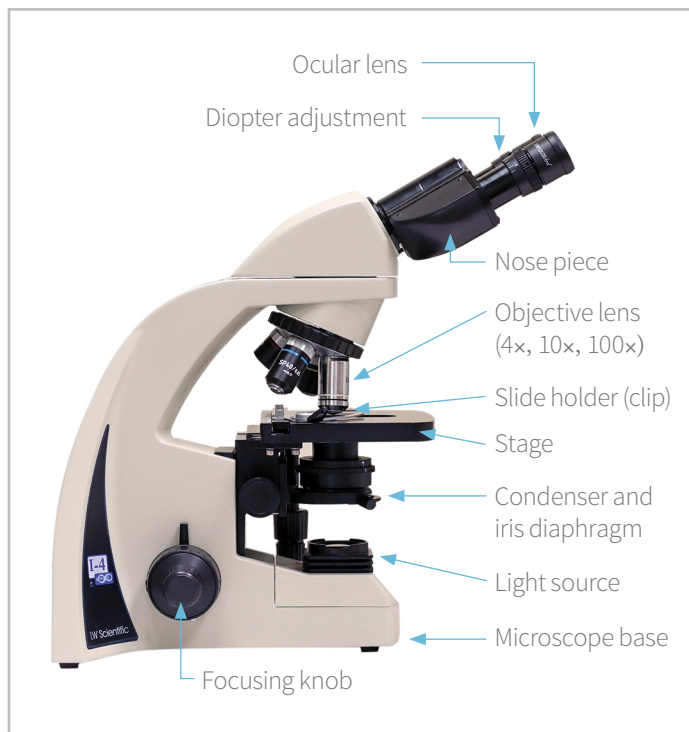
Samples viewed on an improperly cleaned microscope are at risk for contamination, which can lead to erroneous results and misdiagnosis. Because samples may contain transmissible disease organisms, veterinary team members should wear gloves when handling slides, and slides should be disposed of according to practice protocol.

Microscope Basics

Microscopes in veterinary practice typically use 10× ocular lenses with 4×, 10×, 40×, and 100× (oil immersion) objective lenses. Microscopes may have multiple eyepieces to allow more than one team member to view the same slide simultaneously. Objective lenses are housed in a nosepiece that can be rotated to select each lens. Slides are placed on the stage below the objective lens and held in place with metal clips. (See **Figure 1**.)

Examination of Samples

Blood, urine, and fecal material are some of the most common substances viewed under the microscope at a veterinary practice. Blood prepared as a smear is stained to view cell morphology. Stained blood smears must be completely dry before examination under oil immersion. Begin by examining cells at 10× and graduate through the objectives, stopping at each to focus using the fine focus dial and light adjustment for sharp results. The iris should be open to allow good lighting of the specimen but may need to be adjusted periodically during scanning. Identifying certain cells at 10× or 40× may be possible, but the 100× oil immersion lens likely will be used to evaluate individual cells. When using a hemocytometer, blood is most often diluted to visualize and count cells manually using 10× or 40×, and light should be adjusted to a lower standard to show contrast between cells and background.



▲ **FIGURE 1** Parts of a microscope

A damaged microscope should be removed from service immediately to prevent injury to team members.

Fecal material is prepared as a coverslipped wet mount and examined for intestinal parasites and ova using a direct smear or concentration (ie, flotation or sedimentation) technique. For any preparation, begin at 10×, focus, and then move to 40×. Using the oil objective lens is not necessary.

Urine sediment is prepared as a coverslipped wet mount and examined to identify cells, crystals, casts, parasitic ova, or blood in the same manner as fecal evaluations (10×, 40×). Staining is discouraged because many of the available stains readily grow bacteria and form crystals that can be misleading when evaluating the sediment.^{1,2}

Solid materials (eg, skin scrapings, cerumen) are suspended in a small drop of mineral oil on a slide with a coverslip. The 4× or 10× objectives are used to identify skin or ear mites. Skin and ear cytology preparations to evaluate for bacteria, fungi, and cell morphology should be reviewed using the 10× and 40× objectives.²

Cytologic and microbial samples (eg, vaginal cytology, tissue and bone marrow aspirates, fluid aspirates) can be visualized microscopically for diagnostic purposes similarly to blood smears, beginning at 10× and working toward 100× oil immersion. (See **Table 1**.)

Cleaning the Microscope

The ocular lens, objective lenses, stage, and stage clips should be cleaned after every slide, and the entire microscope should be thoroughly examined and cleaned at the end of the day or at the beginning or end of each shift. Storing all the necessary cleaning supplies in one central location near the microscope helps ensure

that cleaning is completed as scheduled. (See **Microscope Supplies**.)

Start by inspecting the cord for frayed wires or damage. A damaged microscope should be removed from service immediately to prevent injury to team members. To gain access to the objectives for cleaning, lower the stage or raise the arm, depending on the type of microscope being used. Moisten cotton tip applicators with the appropriate cleaning solution and gently clean each objective lens and wipe dry with new lens paper.^{1,3}

TABLE 1
1 Sample Requirements for Common Microscopy Samples

Examination	Objective Lens	Coverslip (Y/N)	Staining (Y/N)
Blood smear	10×, 40×	N	Y
	100× (oil)	N	Y
Blood, diluted	10×, 40×	N (use a hemocytometer)	N
Urine sediment	10×, 40×	Y	N
Fecal material	10×, 40×	Y	N
Skin scraping	10×, 40×	Y	N
Fluid, bone marrow, and tissue aspirates; ear, skin, and other cytology samples	10×, 40×	N	Y
	100× (oil)	N	Y
Vaginal cytology	10×, 40×	Y or N ^a	Y or N ^a

^aVaginal cytology slides can be viewed after drying/fixation, after air-drying/staining and nonfixed, or examined as a stained and coverslipped wet mount.²

TABLE
2 Cleaners Recommended
 for Microscopes

Cleaning Product	Microscope Component	Indication/Notes
Cotton applicators or Kimwipes/lens tissue moistened with distilled water	Objective and ocular lenses	Water-soluble dirt
Compressed air	Ocular lens	Loose dirt and debris
Suction bulb/ear balloon/soft brush	Ocular lens	Loose dirt and debris
Xylol, acetone, 70% alcohol, or blue Windex may be used sparingly in the presence of nonwater-soluble dirt or oil; however, they may damage cemented optical components if used daily	Ocular lens	Mild to extreme nonwater-soluble dirt, oil
Ammonia solution (1 eye dropper of ammonia to ½ cup water). Do not use daily or routinely as lenses and cemented optical components may be damaged. ⁵	Objective lenses	Mild to moderate nonwater-soluble dirt
Xylol (xylene) ^a should be used only when sticky or gummy buildup requires a harsher cleanser. Do not use daily; xylol is carcinogenic and will corrode rubber and cemented optical components.	Objective lenses	Sticky, oily, waxy buildup
Commercial optical cleaning solutions	Objective and ocular lenses	Commercial optical cleaning solutions offered by microscope manufacturers are best; use daily according to manufacturer instructions
Warm, soapy water or a water-dampened cloth, and a cloth or lens paper to dry	Stage and stage clips	Best cleaned with warm water or warm soapy water and a microfiber cloth
Distilled water	Condenser/Diaphragm	Use distilled water on a microfiber cloth to wipe away dust, then dry
Dampened microfiber cloth with water and an airbrush to remove hair or fibers	Light source	Allow to cool before cleaning; do not clean while hot
Warm, soapy water	Metal body/framework	Salt, sugar, and general residue
Microfiber cloth	Body	Moistened with soapy or plain water

^aCarcinogenic—use gloves and avoid breathing fumes.

A well-maintained microscope ensures that samples are free from contamination and results are accurate.

Use distilled water to remove water-soluble debris from the microscope lenses and body, and dry with lens paper.^{1,3} Use a solvent such as blue Windex or xylol for nonwater-soluble material.³ (See **Table 2.**) Wipe the eyepiece(s) with Kimwipes or lens paper moistened, not soaked, in 70% ethanol before drying.^{1,3,4} Use a suction bulb to remove any hair or fibers to prevent scratching.

Look through the eyepiece(s) and rotate each one to ensure that no debris remains on the ocular lens. If it is necessary to remove the eyepiece to clean the inner glass surface, never “probe” into the tube housing; instead, place a lens cap or piece of aluminum foil over the opening while cleaning the eyepiece.⁵

When working with Fecasol, sugar, or other fecal floatation solutions, the microscope stage, clips, and other areas that may be splashed with solution should be cleaned with a water-moistened Kimwipe to prevent the residue from attracting pests and dust. After saturated sodium chloride is used, take care to clean the microscope because this substance will corrode and damage metal.

Wipe the entire microscope body, including the light source, with a warm, moist microfiber cloth. Center the 4× objective over the stage, turn the power off, ensure it is dry, and drape the dust cover over the microscope.

Microscopes should be serviced annually by a professional microscopy service, and lenses and bulbs should be replaced as needed.

Conclusion

All veterinary team members responsible for preparing and viewing microscopy samples should be familiar with the different components of the microscope and the viewing requirements for each biologic substance. A well-maintained microscope ensures that samples are

free from contamination and results are accurate. Daily cleaning and maintenance also protect the practice’s investment in this valuable resource. ■

References

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FUN FACT Dr. Samples’ hobbies include needlepoint, embroidery, and watercolor painting.

TAKE ACTION

- 1 Educate all team members responsible for preparing and viewing microscopy samples about a microscope’s components and the viewing requirements for each biologic substance.
- 2 Emphasize the importance of microscopes being well-maintained on a daily basis to ensure samples are contamination-free and results are accurate.
- 3 Service microscopes annually using a professional microscopy service, and replace lenses and bulbs as needed.