ISG International School of Gemology

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Microscopes Part 2

Introduction

Over the past 41 years in this business I have had the opportunity to own many microscopes, and have learned much from that experience. From the GIA Gemolite Mark VI seen at far left, to the Meiji Techno model sold under the Gem

Instruments name also at left, to the very cost effective student model seen at right, I have learned one important fact: it's not the cost of the microscope that's important, it's the training of the person using the microscope that makes the difference. The quality of the gemology that any microscope can produce is directly proportional to the training and expertise of the person using that scope. And I am not talking about rocket scientists using microscopes; I am talking about us plain folks who got into this business just because it is fun and exciting. After all, with their millions of combined dollars of equipment and PhD staff members, the GIA, AGTA and ICA all missed the Tibet andesine hoax for years…..years!

It took what to uncover this hoax? All of you grass roots folks of this industry who had the one element that the big organizations do not have…..grass roots knowledge and training, and sharing of information. I know, I know….there is a famous "rock star" level gemologist on some of the forums

making fun and calling us foolish for our concept of “grass roots” gemology. But remember, this same “rock star gemologist” ….with the full weight of the AGTA GTC….. is one of the big establishment gemologists who could not identify the Tibet andesine as diffusion treated, while a stay-at-home Mom from Washington State nailed it. (Thank you Lisa Brooks-Pike who is now President of the Jewelers Ethics Association). So exactly who is the bigger fool in all of this? The grass roots level folks who used grass roots level gemology to uncover the thing….or the big rock star gemologist with the full weight and resources of the industry who missed it? I will let you answer that one. But the issue is that the Tibet andesine fiasco proved that it’s not the cost of the equipment that matters, it’s the determination and training of the people using the equipment that makes the difference. In the case of the Tibet andesine fraud, the microscope and its potentials were paramount in our being able to prove the issue when so many others with so many resources in their grasp were so inept in using those resources.

The bottom line is that it doesn’t matter how expensive or inexpensive your microscope: if you learn how to use it properly you can get rock star level gemology out of it and hopefully, be able to utilize it better than some of those we have seen in the recent past.

Setting up your microscope

Before we get started, go look at your microscope. If it does not look like the one at left you are already in a degree of trouble with your set up. No, I am not talking about the design, I am talking about the dust cover. Keep your microscope covered when not in use. Dust in the air can be 80% quartz which is why things wear out just from cleaning, like your glasses lens. Same for your microscope. Keep the dust cover on the scope to keep the optics as clean as possible without having to clean them. It’s the cleaning process that causes the problems. The less you have to clean, the better quality your optics for the long term.

NO SMOKING!

Cigarette smoke contains carbon that coats an oily film on optical surfaces (and your lungs). Smoking around your microscope will coat the optics and get very, very hard to clean…particularly the inside of the scope head where you cannot clean. Stop smoking to begin with. But if you just have to, don’t smoke anywhere near a microscope or any gemological equipment. The worst I have seen was a gemologist who complained that the optics of their microscope had deteriorated over time, and become hazy. He blamed the microscope. You guessed it…..smoker. The cigarette smoke coated the lenses so bad that it required a lot of work to clean it, so stop smoking around your microscope. If you don’t, expect to have problems.

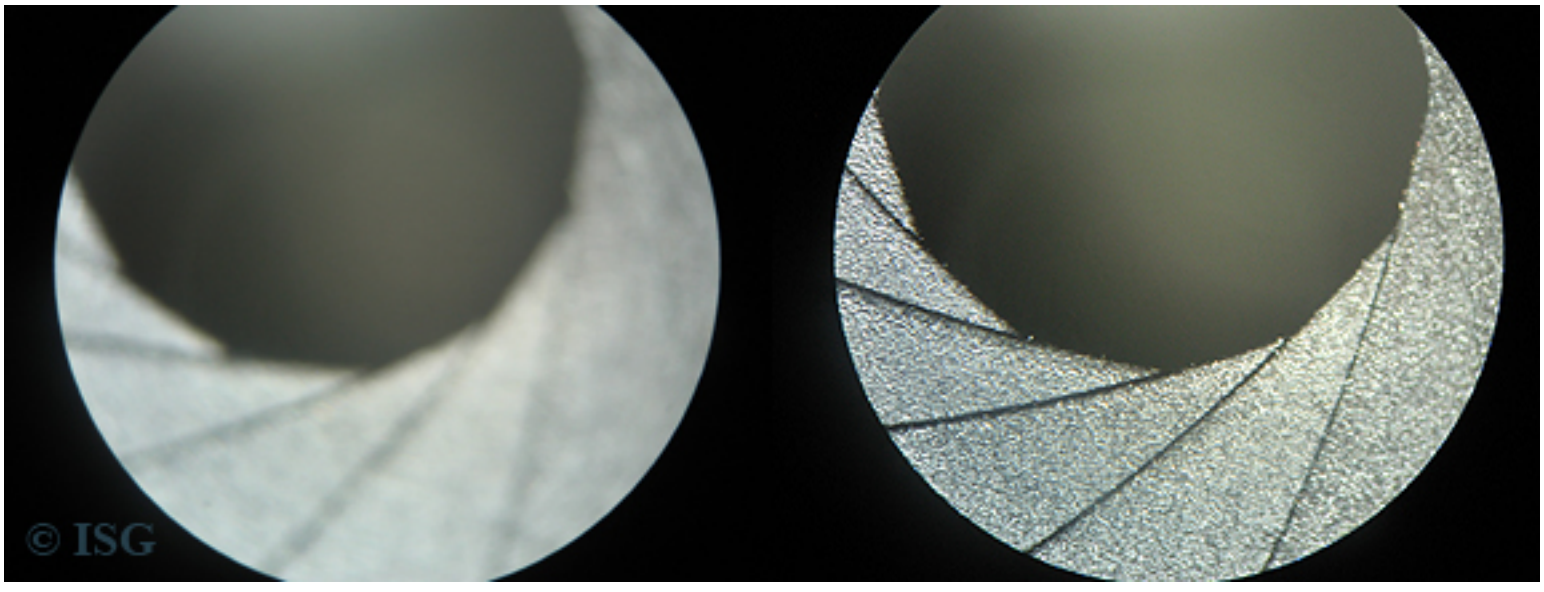
Let's next talk about setting up the microscope. There is a reason why we old guys in the business don't let anyone use our microscopes. We are tired of people walking over and changing the settings, and when we go to use it we cannot see. We have enough problems seeing as it is, but when someone goes over and starts monkeying around with our microscope's interpupillary distance and dioptic adjustment, it just riles us. OK, those are pretty strange terms, so in plain language…. don't screw around with the eyepieces of our microscope because they have to be reset every time. For all of you who are new to the industry and want to show off your new microscope, this will last for a while and you will eventually start telling everyone "hands off my microscope" when anyone starts looking like they are going to use it. Here is why….

Setting the Interpupillary Distance

This is a big term for simply setting the eyepieces of your microscope to the correct distance of the pupils of your eye. You must have this set to the distance of your own eyes. It is difficult to see properly if it is not set correctly. And when someone else wants to use your scope they have to set this to their eyes, knowingly or not, they always reach up and change the setting to their own eyes. When you are ready to use your scope, its reset time. So be aware of this in case others use your scope. But as you can see below, the adjustment is fairly easy and must be set so that the eye pieces of the microscope are the same as the distance of the pupils of your eyes.

Diopter Adjustment

This has to do with the fact that your eyes are not perfectly matched for acuity of vision. One eye will see a bit different than the other. Proper microscopes will have what is called **diopter adjustment**, meaning the ability to focus the eyepieces individually to meet the needs of your eyes. To test this, close the iris on your dark field or put something in place in the viewing area of your microscope. Get in position to view with your microscope and look in the right eyepiece with your right eye, and cover your left eye. Then do the same with the left eye. If you have something that looks like the images below, you need to work with your diopter adjustment.

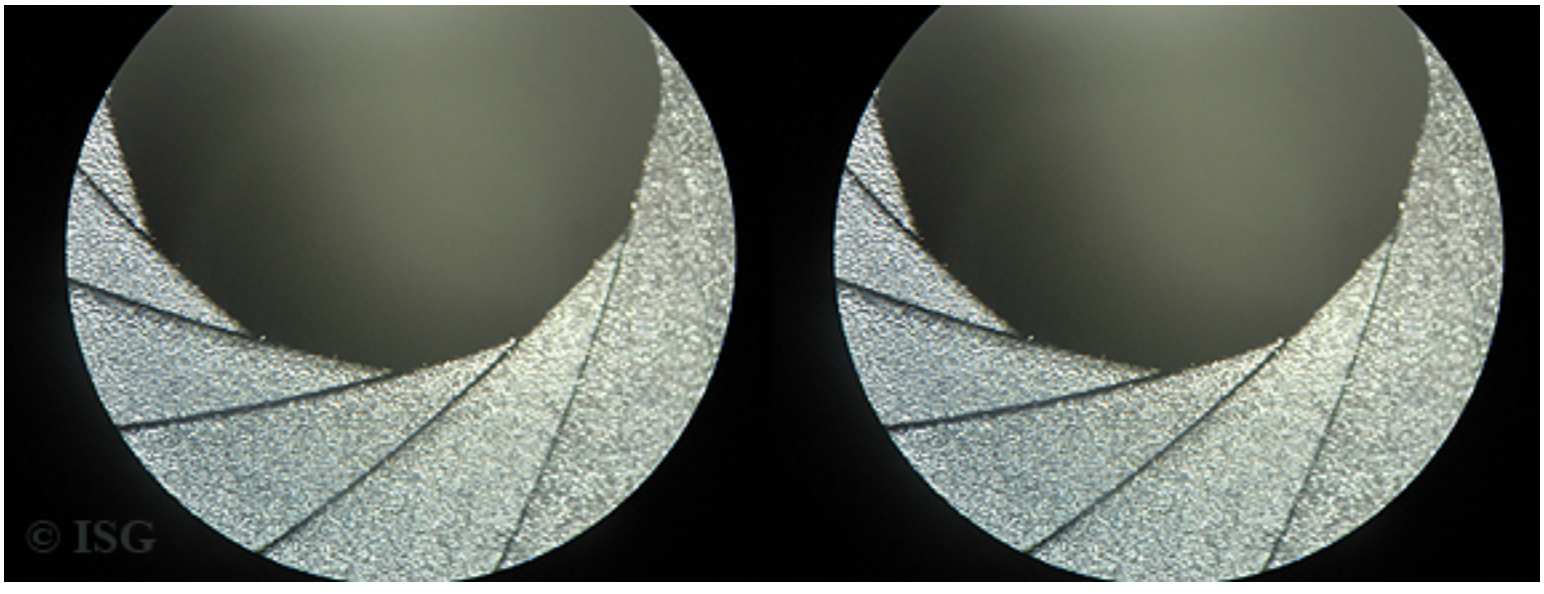


If the above is what you are seeing, then look on the eyepieces for this feature you see at right.

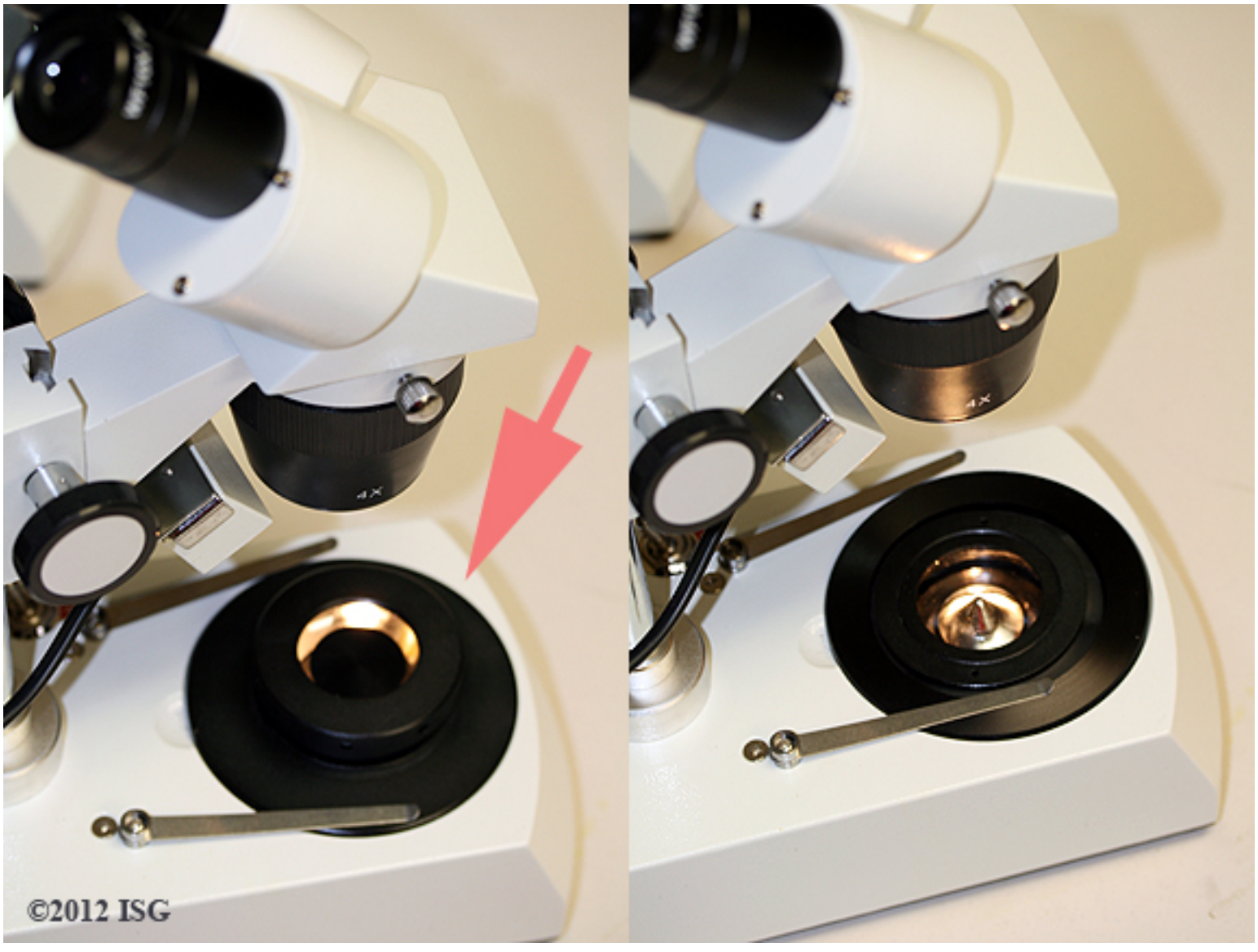
As you will notice, one is plain the other has a dial on it. The one with the dial is adjustable. It may be on the left or right, it does not matter. The key issue is to focus with the plain eyepiece with your regular microscope focus knob to focus the image using that eye. Then, use the dial on the other eyepiece to focus the image with that eye looking through the eyepiece to focus that eyepiece.

The result should be that rather than having the view you see above, you get the view you see below. If you cover one eye and look through one eyepiece at a time for each side, you should have both sides in focus if you use the dioptic adjustment feature on your microscope. Do this. It's important.

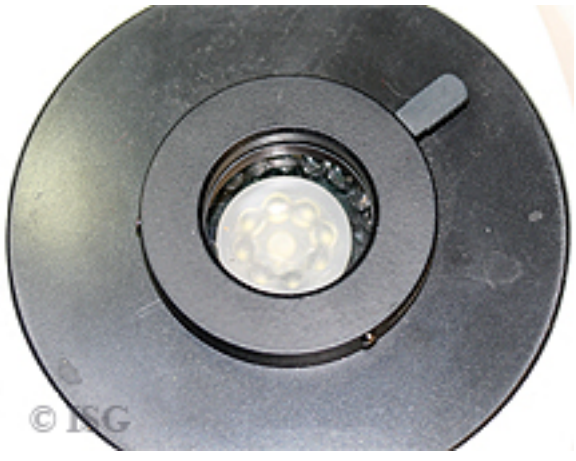
And it's also why you will eventually become **Attila the Hun** if anyone tries to use your microscope and mess around with the settings.



OK, we have the eyepieces set, now to understand how the rest of the microscope works.

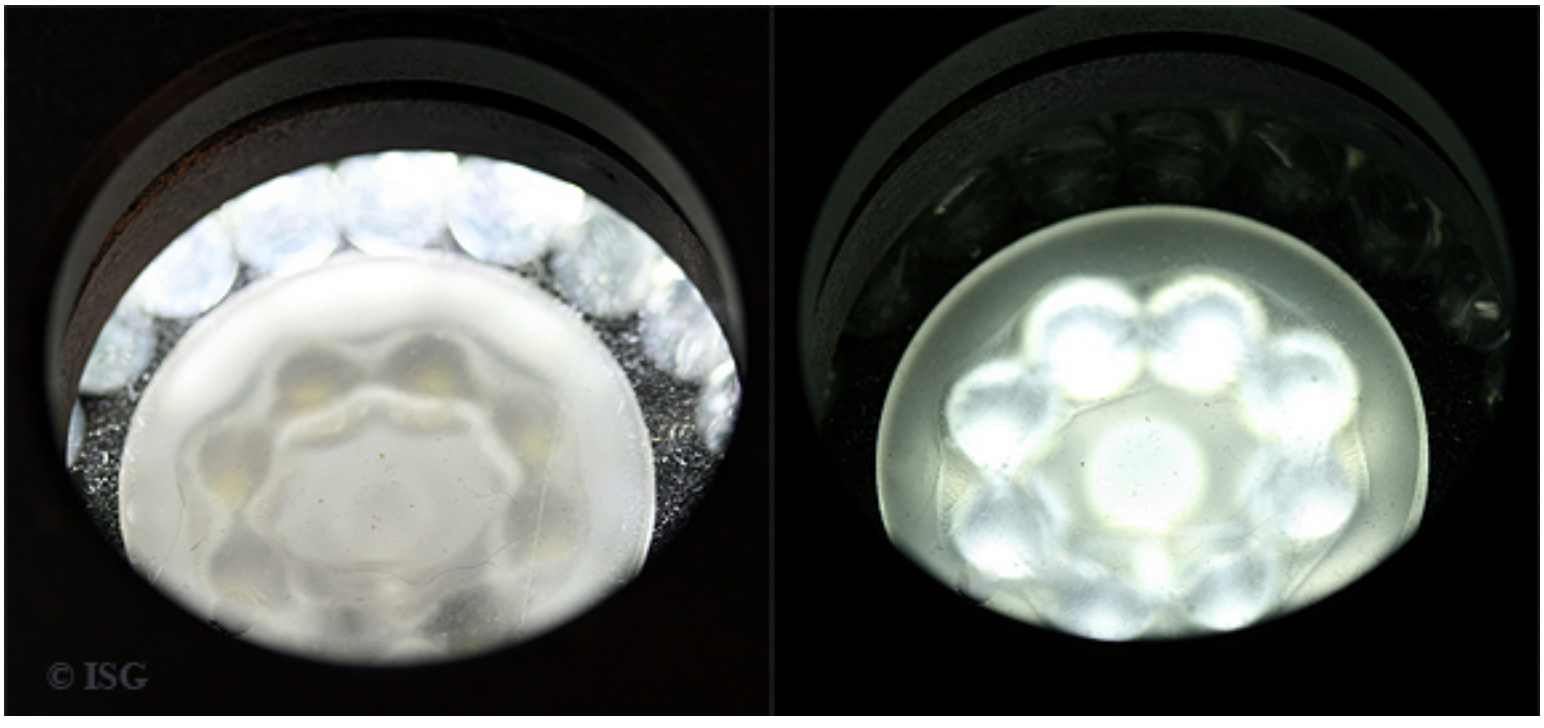


Some microscopes will have a darkfield and brightfield as part of a reversible plate that fits into the well as seen above. This piece comes out and will turn over, darkfield on one side (above left) and brightfield on the other side (above right). In my 41 years in this business, I think I have used a brightfield lighting maybe twice, and both to read a paper in the dark gem lab room. So don't get too caught up about brightfield lighting. But this is just one type of darkfield and brightfield lighting you may see.

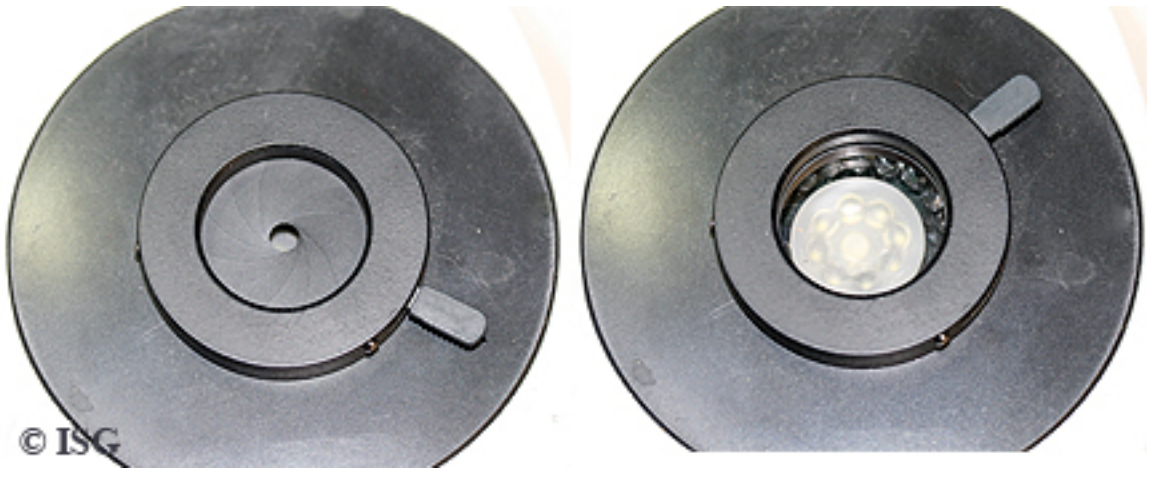


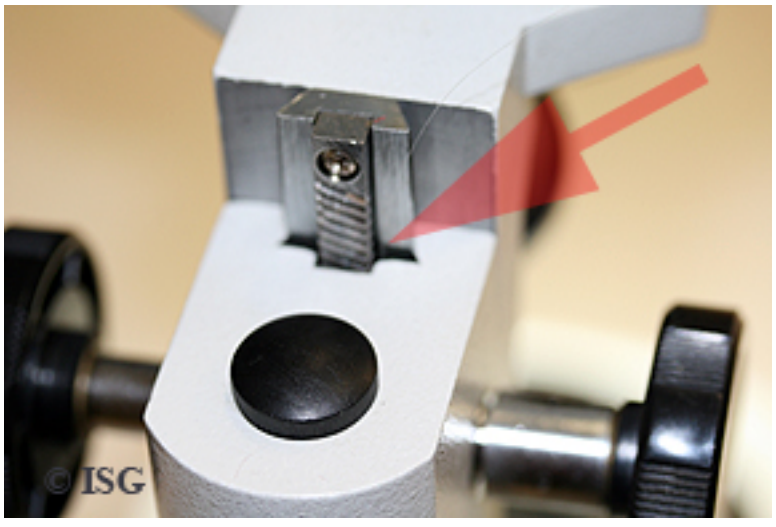
Other microscopes will have the darkfield and brightfield as different light sources that do not require changing any part. An example is at left and below. And as always, we are using our student model microscopes for demonstration purposes. There are many potentials as far as design that you may see, but if you pay attention to these basics you should have no problem with other designs.

Below is a darkfield and brightfield well that uses LED lighting. Be careful about LED lighting as these have their own spectrum and should not be used for spectroscope use as the halogen light bases can be. Above left you can see a garnet spectrum pictured on one of our first videos on the use of the spectroscope. This was taken using our Meiji Techno microscope light base as a spectroscope light base. A halogen based darkfield can be easily used for a spectroscope light base. But the LED models cannot.



One more very critical issue about the image seen below. The iris that opens and closes on many microscope darkfield wells….is fragile and cannot be repaired. If you drop a stone and reach down into the well and break out some pieces of the iris diaphragm….forget about getting it fixed, it's done. There are less than a handful of people in the world who can fix these. Best to simply order a replacement and learn the lesson. It's one lesson that you will not need to learn many times…..before you learn to avoid it.



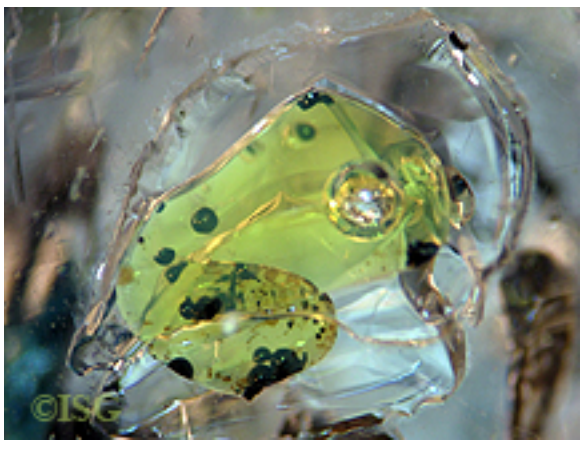


And finally a little maintenance.
Most microscopes don't need to be oiled very often but when they do it's important that you remember one word…..**oil**.

Not WD40®. WD40 is made to release rusted lug nuts on old car wheels that have flat tires. WD40 is made to help loosen corroded parts from an old John Deere tractor. **WD40 is not made to lubricate your microscope.**

This is what you need. **3-IN-ONE®**. What my grandmother used to call "sewing machine oil" that she used on her old foot crank Singer Sewing Machine. 3-IN-ONE is made for small and delicate metal parts that need to be lubricated with quality oil in order to work smoothly.

If you look at the image above, the arrow is pointing to the place that will need to be oiled once in a while. But not very often, just when the focus knob starts to feel a bit tight. And even then, just a drop or two. Too much will run out the bottom of the base.



Next week we are going to learn how to use a student microscope to find a frog in a quartz crystal.

And, how a 24 year old microscope was used to prove up a multi-million dollar gemstone fraud that the million dollar labs could not find.

It's not rocket science. And it's not reserved for the rocket scientists. You can do the same level of gemology with the proper training and some serious practice.

Don't miss the final segment of our study of microscopes…and remember…**practice, practice, practice.**

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President, ISG

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