ROATAN 15 – What have I got here? And other indoor musings

G Joseph Wilhelm – Roatan Honduras (But still American)

With the rainy season fully upon us here in Roatan, my wife and I are engaged in devising clever ways to outwit the rain in order to accomplish something constructive outside. Our solutions rarely rise to the bar of “clever”, or even “functional”, but we have at last, finally achieved the pinnacle of failure, which is just plain “dumb” i.e., a US Navy Ordnance Master Chief when he says, “Here, hold my beer and watch this!!!”.

Now, wishing to heal from the contusions, bruises and scrapes suffered when stowing or covering tools and projects from the rain in a frenzied panic, we have moved inside. Did you know that the rain here can deluge you with an inch of water about five minutes before there is any hint of a downpour? It’s amazing!

Rain, rain and rain. So, to make progress with the lab, I’m making myself useful by unpacking some boxes of kit in order to properly size shelves and compartments. While doing so, I found this project worthy, incomplete Zeiss-Winkel inverted scope that I bought at a bargain right before making the Roatan move. Due to the frantic schedule at that juncture, a thorough perusal of this instrument was not performed. I hardly even looked at it before packing it up. It was an inverted scope with no stage, that’s all I knew. This is really the first light of day the scope has seen since 2021. Here’s how the story transpired.

After finally looking it over, I am really confused (an easy-to-achieve mental state these days). It is capable of transmitted light from above and Epi illumination from below. Hmmm…intriguing.

An iris, lens, polarizer (Something?!) fits in this centering prism fixture here. The EPI condenser is directly above and contains an Iris

Above: These are the eBay “for sale” photos.

Below: The “as delivered” scope. Obviously not the right light.

The scope came with a binocular head and a latter model Zeiss (Opton?) inverted light, mounted on the vertical bar above the (missing) obviously centering and probably rotatable stage.

A fabrication of such a stage from scratch is doable for me as soon as I refurbish my lathe. (See *Micscape Issue 171: January 2010* *The novitiate's odyssey part 3. A few words on creation*) The light standoff distance from the upright "pole" will have to be shortened/modified to center the light over the objective. The bulb carrier fits perfectly into the base behind the arm for the Epi effect. The objective turret accepts the RMS thread so my Zeiss Epiplan HD lenses with the M24x0.75 screw thread will not fit.

So, other than inverted, what type of microscope is this and what objectives?

I have been searching my usual sources for weeks for information, a manual, pictures or article, but alas, very little has been forthcoming. I found some pictures but not of the exact model I have. I wish to fabricate any necessary parts / accessories to make the scope functional. But again, functional for exactly what? Without a reference manual or picture, I'm "Dancing in the dark."

I have included below the pictures I was able to locate of similar scopes with objectives. I was able to research the objectives and pull back the curtain a little on this scope and offer some of my logical deductions, but, no firm conclusions.

This is the closest picture that I could find but no accompanying information.

Notice, this particular scope is set up for epi illumination only, with no provision for transmitted light. The base light prism/field iris here looks to be the standard GFL setup. The stage does not appear to be centering or rotating capable, but has a mechanical stage. The turret carries the objectives pictured below.

These are the objectives

I went to my late 60s Zeiss Optical Systems catalog and tried to look these up but the magnification and NA did not match up on two of them, but I could identify the type.

The one on the left is an Epiplan StM 80X, / 0.95 NA as designed for the Zeiss Standard UM inverted metallurgical microscope. The other two are older (Early 1950s?) Zeiss Epiplan lenses designed for the UNIVERSAL microscope, PHOTOMICROSCOPE and the ULTRAPHOT camera microscope for metallographic observations.

It seems this stand I have is for inverted metallurgical work, for which I have no need nor understanding. What is the advantage of viewing a solid object, inverted, with Epi illumination? I have no Epi lenses that will fit, so begs the question, can I adapt this to view an inverted live well or sediment chamber of a pond sample with transmitted light and regular Plan objectives? I'm pretty sure I can.

I hate to waste the Epi feature. I know the Epi lenses are corrected for no cover glass. So, a second query:
Will Epi illumination work thru a normal lens if viewing thru a live well cover glass from below?

Faced with these problems, I now resorted to my long-standing engineering career practice of asking people smarter than me for the answer. Come to think of it, I did that a lot in school.

I referred my quandary to Mr. David Walker, who was generous with his time and opinion. He also forwarded my conundrum to a Zeiss Microscope Users group on Facebook for possible help. Not wishing to paraphrase their analysis, I have included their remarks on the scope below:

From Mr. David Walker:

Thanks for your interesting query. I'm not too familiar with that era of Zeiss scopes but after browsing the Web a bit and inspecting the stand offer some thoughts.

- the majority of these inverted designs seem to be either transmitted or reflected but yours seems to offer both.

- inverted metallurgical with epi are quite common as means can have one flat face to inspect from below but the subject can be any thickness when placed on top. Designs where the metallurgical was reflected the focusing limb would have limited travel for large subjects.

- would expect a field iris on the base as when in epi mode recall an iris here acts in the same way as that in a condenser for transmitted so controls the NA. But see below, it is for epi phase apparently hence the centering feature.

- I think epi would be the best designs for transmitted mode to as you say focus through dishes etc.

- there is a Zeiss Microscope Users group on Facebook so posted some of your images. The following a verbatim reply from Thomas Pletsch who offers some useful insight.

Hope this helps.

with regards
David.

Mr. Thomas Pletsch's reply:

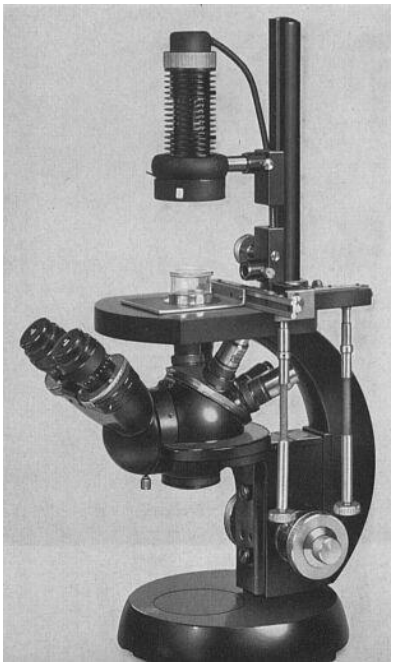
"Weird breed of a ZW 'Metallmikroskop', based on a modified GF (the 'L' wasn't used during the times of the ZW branding) stand. Judging from the matte, pointed conical shape of the objective turret, it probably dates to first half of the 1950s. These stands had a gliding stage whose gliding upper part, along with a specimen fixture, is often missing, because it is not mechanically fixed to its support, by default.

The transmitted light equipment belongs to the 'Plankton-Mikroskop nach Utermöhl', but its mechanical stage (with a far more retracted flange for that long 'pole') is missing here. The Zeiss Opton light source is much younger (post 1971; labeled like this for COMECON and Commonwealth markets). It would be interesting to see more detailed pics about how it was mounted onto the stand or the gliding stage.

The centring base fitting is a receptacle for (episcopic!) phase contrast drop-in diaphragms, matched to a limited range of (episcopic!) phase contrast objectives.

Episcopic phase contrast was an "emerging" metallographic technique for only a few years in the 1950s, before it became outdated by the advent of differential interference contrast (DIC/DIK)."

My thanks to Mr. Walker and Mr. Pletsch for their contribution.



Left: Another example of metallurgical Epi only but I can only assume the objectives are Epi

Right: Viewing thru a live well/sediment chamber? Notice this one has the large cap on the base where the centering fixture is on mine. No Epi condenser, but looks as if one could be mounted. Correct light with short stand-off. Seems to have the gliding stage. I really like the extended drop-down stage controls, a feature I may try to replicate.

The previous two pictures in this article (above) were taken from a translated Zeiss history article "An overview of the microscopes from Carl Zeiss Oberkochen between 1948 to 1990" compiled by Klaus Henkel (Auto-translated from German by Chris Dreher). In this article, I also found verifying evidence the design of the scope on the left, with epi, was from Zeiss designer/biologist Kurt Michel, using construction according to the famous French chemist Henry Le Chatelier. And, on the right, the same scope without epi, from an early 1950s direct collaboration with a pioneer of plankton research, Hans Utermöhl. Not sure which came first, but mine seems to be a hybrid with tantalizing possibilities. This ties in perfectly with Mr. Thomas Pletsch's reply. Looks like lots of entertainment ahead.

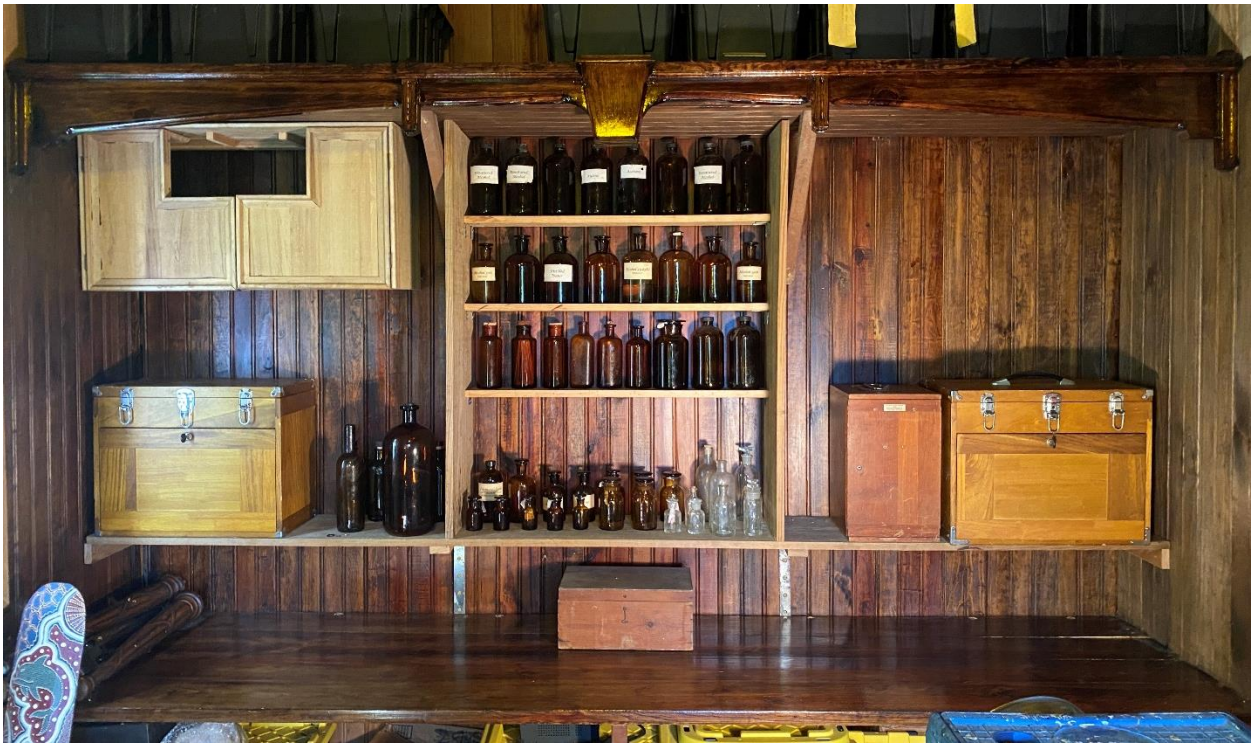
The pieces to this puzzle are coming together but I keep finding more pieces. Once I get the non-traditional rotating stage, light modification and inverted live wells built, I will be

experimenting with the epi illumination thru normal plan objectives and using transmitted and reflected illumination simultaneously, if that is even possible.

Now, with *that* settled, on to the lab challenges. As you can see, I have unpacked most of the apothecary to be housed/displayed in the center portion of the lab.

I am still missing one box of brown apothecary bottles. The ones you see with labels were used in the makeshift lab I had stateside. Not all of these will reside in the lab area proper you see here. The visual presentation is important, if only to satisfy my artistic idiosyncrasies Since this is meant to be primarily a functional lab, I don't want it cluttered up with extraneous items just for display.

We went from this ……



To this. It's starting to resemble a lab.

Here we have the back shelves temporarily fixed and sized for the larger bottles, period correct screw cap Boston rounds, wide mouth and narrow mouth ground glass stoppered reagent bottles of various sizes and miscellaneous cork/rubber stoppered brown and clear glass bottles. The movers did not empty the labeled bottle contents before packing but thankfully they arrived intact.

Speaking of safety, if you purchase reproduction glass stoppered reagent bottles like mine, check the stopper-to-bottle seal before using them for volatile organic compounds (VOCs) like Acetone or Alcohols. The grind/fit can be a bit crude. For a test, I put some Acetone in the bottle and mark the level. After a week if the level is the same you are good to go. Otherwise use a screw top or rubber stoppered bottle. Sometimes, you can hand lap the stopper to the bottle to cure any bypass evaporation.

There will be glass fronted doors with shelves attached to enclose these back shelves and will house the smaller brown and clear glass bottles you see on the bottom shelf., which should give me enough storage capacity for any and all chemicals I will ever need, liquid and solid. Now that I know it fits, the shelves and uprights will be removed and the whole thing constructed as a one-piece cabinet and fit back into place. I will still need to find the missing bottles to finish this properly.

Where those small bottles sit right now will be:

The power station feature:

In the very center, under the apothecary, will be a power station. These are just a few in my collection of functional vintage electric meters.

The assortment of microscope illuminating fixtures and lights (incandescent, halogen, fluorescent and LED) that I have amassed, run the gamut of electrical requirements. The goal is to monitor the line-in current for voltage and amperes and present them as a functional era display, and do the same for variable AC output to the scopes/instruments. Available power: 0-120 VAC @ 20 amps, line-in voltage, dimmer attenuated. 0-6 VAC @ 7 Volt Amps (VA) transformer supplied rheostat attenuated and 0-19 VAC @ 7 VA, rectifier supplied, dimmer attenuated.

For DC current, I have 0-17 VDC @ 7 VA, rectifier supplied, rheostat attenuated. This will allow for duplication of light levels and putzing around (engineering technical term) with different lighting techniques for comparative viewing. This is a rough idea of the gauge space required on a panel, plus switches dials and terminals that will be housed in a nicely finished wood panel electric box.

While on the subject of electricity, sometime back, I made a 22,000-volt Jacobs ladder. It's a climbing arc generating machine, like the ones in the Frankenstein movies. Steve Martin just refers to them as "The ZZZZZZZZZZZZZZZZZZTTTTTTTTT!!!!! Machine". I just found it. I last used in a Halloween set up to scare small children and gullible adults. These machines serve absolutely no practical purpose other than the visual and audible experience. Although, it might be, as we said in the theatre, an "in character" display for the lab? Just sayin'.

Another find:
Basically, you will see a pattern here. Over the years, I have self-educated myself to the degree of "Savant of intellectual brilliance about microscopy". I just don't remember all of it. During that time, if I came across an accessory that I did not yet possess the mental acuity to comprehend, I would buy it. It was placed in the "ask someone smarter than you pile", promptly forgotten and now found.

I present to you the Pack Advanced Contrast Optic (P.A.C.O.) microscope filter

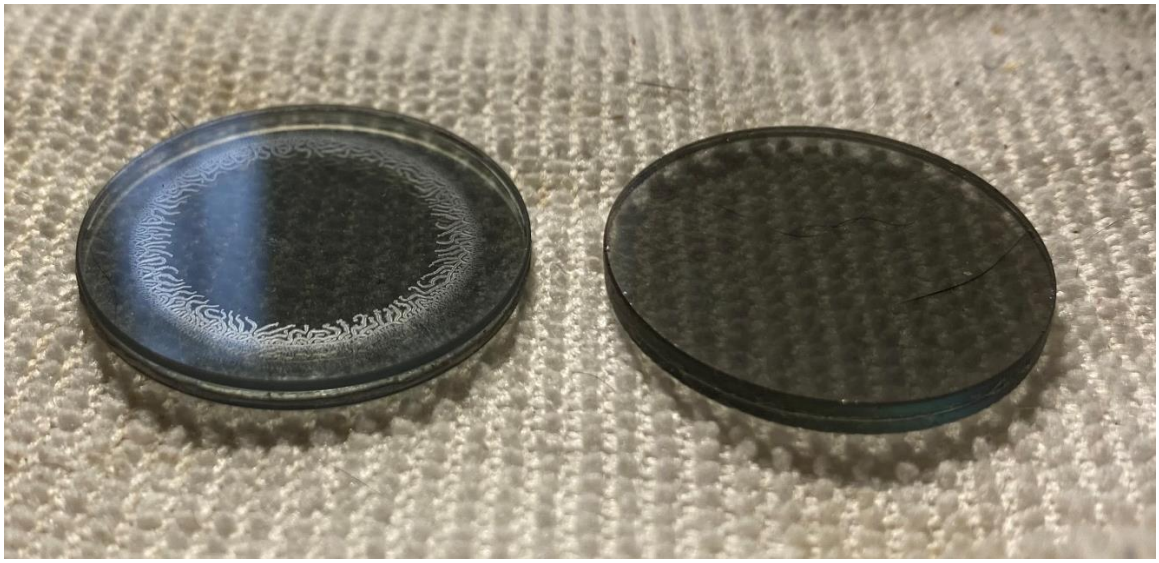
No instructions came with this and I can't find anything on-line after researching all the info on the label. Many years ago, I remember seeing a video advertisement touting this as providing "variable Rheinberg illuminating effects" which was what sold me on this.

The "Pack" consists of a below-the-condenser, magnetically attached filter carrier with three swing-out trays. Four clear plastic disks and what appears to be two neutral density filters plus a patch stop.

The construction is robust enough but the magnets are not strong enough to keep it attached to the scope when operating the swing-out trays. After fiddling around with it, I found the two gray tinted glass lenses (filters?) offered different effects depending upon orientation. Of the eight orientation possibilities, most gave some striking hues of red blue and yellow. These would change hue, sometime offering a rainbow effect when one lens was rotated. One combination even produced complete extinction or crossed polars, if you will.

The construction is ten flat “plates” sandwiched together on two screw pillars to form the trays and magnetic mount. Yes yes, I will clean the surface rust at my first opportunity.

The trays are truncated allowing a bit of the lens to protrude from the side for manual rotation when the tray is closed, albeit a sloppy fit. The patch stop, (for the Rheinberg effect?) is shown in place but, I have no idea what objective it is sized to fit.



These are the two glass “effects” lenses. When reflecting the light just right you can see a shadow ring on the left one that is not visible when viewing directly thru the lens. Except for the cross polar extinction, I am ignorant of the physics involved here to create the varied color lighting. Hello smart people out there, please ‘splain to me.

Effects lenses in trays, polars uncrossed.

Rotate either lens 180 deg (not 90) for full extinction.

I could not get a good photo of the colors effect. Without the light of further understanding, I am assuming the plastic discs offer some sort of wave plate function? This could turn out to be a fun toy!

As more and more paraphernalia come to the fore, I keep finding things that just add to my impatience, as in, I found my specimen jars! I just want to see what’s out there and do some actual microscopy. We have an area that holds runoff water and when the rain ends, I want samples before it dries up. Lots of insects, plants, you name it!

So, for my own sanity, I am going to try and set up an out of the way, or easily stowable viewing station that I can work around while finishing construction. My old Spencer stereo would do initially, I think. I am having issues with the interpupillary distance range on the new SZM stereo. Not quite being able to reduce it enough for me. (This is the *only* new microscope I have ever bought, so, go figure.)

I was able to fabricate the shelves because we finally had a day with sunshine and without rain. I sent my wife out to cut the grass. A good sign life is returning to normal here.

If anyone has more information on the scope or the P.A.C.O. accessory please contact me: gjw8844@gmail.com

Cheers everyone!

Joseph Wilhelm

Previous essays can be read in the Micscape Library.

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