Digital Camera Adaptation for an Olympus BH-2 James Gregory McHone, PhD, CPG

I have an Olympus PM-10 automated film camera (35 mm) and a digital camera for my Olympus BH-2 BHS polarizing microscope. Olympus produced an excellent film camera which continues to work well, as they designed all the trickiness out of it long ago. Film has rich color saturation, fine grain, good light sensitivity, and with the automated system it is easy to use. Photomicro film systems were originally quite expensive, but as many users have switched to digital cameras, they have become dirt cheap on eBay. If you still appreciate the merits of film images, by all means get one that was made for your microscope.

This description concerns my adaptation of a digital camera for my BH-2, using its trinocular head with the 23.2 mm eyepiece interior photo tube. The original intention a few years back was to adapt my Olympus C-740 to this microscope, but after buying an expensive kit and messing with it a long time, it just never worked well. The C-740 is a great consumer camera with a large 10x zoom lens, but it is a lousy microscope camera. My thrifty Scotch-Irish genes prevent me from doing this the easy and logical way, which would be to buy a high-quality custom made camera adapter from someone who knows what works best. So, I kept looking for the cheap way. The best advice I found was from internet and journal articles written by Ted Clark and Gordon Cougar, and by the many messages on this topic posted in the Yahoo Microscope Group. Also on Micscape Magazine.

The photo eyepieces produced by Olympus are designed to project a perfectly focused image at the right size and distance to fit the film inside the camera back. This is quite different from a digital image chip in a consumer camera that also has a fixed zoom lens. So, the film photo relay lenses will not work. The digital camera lens does what your eye does, so what you need to use is a regular eyepiece, not a photo relay lens.

Olympus designed eyepieces that compensate for the color aberrations of its objectives, which in my case are DPlans. Same for SPlans and other objectives made for the BH-2 model, I am sure. The eyepieces are designated WK or WHK and come in 8x, 10x, 12.5x and 15x powers. As determined by Ted Clark, the best projection eyepiece for my digital cameras is the WHK 8x (W indicates wide field, H is high eyepoint, and K means color corrected).

But, the Olympus WHK 8x is hard to find! In my experience, the Zeiss Kpl 8x also works quite well except for a small fringe around the outer rim of the view, which is not much in the camera view anyway. The Zeiss lens has an advantage of being small enough to fit inside the camera adapter that I am using. Another common photo eyepiece for older Nikon digital cameras is the Leitz Periplan 10x high-eyepoint eyepiece, the later model that had a screw-on rubber eye guard. After removing the eye guard, the threads on the eyepiece match the filter thread on the Nikon CP-900 series digital cameras, just by good luck. So no adapter is needed – just screw the Leitz eyepiece onto the camera, slide it into the eyepiece tube, and snap away.

I have used that combination with great success on Leitz, Nikon, and several other microscopes, which seem to have objectives that work well with the Leitz eyepiece as far as color corrections and focus. But, it does not work particularly well with my Olympus DPlans, unfortunately.

Eventually, I did obtain an Olympus WHK 8x eyepiece and I use that now. It works great.

I bought a used Nikon Coolpix 990 on eBay for about $110, and also some accessories for it such as CompactFlash memory cards, a card reader for my computer, an AC power adapter (EH-52), and a remote shutter release MC-EU1, also from eBay. From Zarf Enterprises I bought an adapter that is specifically made to fit this camera (or its close relatives the CP 995 and 4500) to the BH-2 trinoc head. But not the eyepiece relay lens, which would have added a lot to the cost.

The Zeiss eyepiece keeps the Zarf adapter from having a very snug fit, but it worked pretty well, and it all looks very good on the scope. Here is a photo of the CP-990 mounted on my BH-2:

The CP990 is a great microscope camera because its fixed lens is small enough to take in the eyepiece projection well, and it has a view screen that swivels so you can focus while sitting normally at your microscope. Plus it has a simple menu, a manual focus button, uses regular AA batteries, and it is relatively free of artifacts that show up in some other models. It has only 3.34 megapixels of resolution, but that is plenty enough for most uses, even publications. Using a small photo lens such as the Zeiss Kpl 8x, it is close to parfocal with the viewing eyepieces, which is very nice.

The Olympus WHK-8x is much larger than the Zeiss Kpl 8x eyepiece, so it was a challenge to make it fit my Zarf adapter. After running some black tape around the upper part of the eyepiece, I got it to fit the Zarf adapter very snugly so it is on center and does not move.

After using the Nikon CP990 with my Olympus BH-2 for two years (I still like it a lot), I had the opportunity to switch to a CP5000. The CP5000 has higher resolution and seems to be sturdier than the CP990, but it has a smaller swivel view screen. It needs a Nikon UR-E6 adapter to allow the Zarf adapter to fit (or a Leitz Periplan, if you wish). The Nikon Remote MC-EU1 zoom and shutter release cord that I had for the CP990 also works well on the CP5000. As the adapters put the camera farther from the head, a lot of zoom is required to fill the screen. This extra distance also made the camera focus far pretty far from the normal eyepiece focus.

The special battery in the CP5000 is less convenient than the regular AAs used in the CP990, but I use a power adapter anyway. The control buttons are no longer as easy to reach as with the CP990. Another disadvantage is the smaller view screen of the 5000, which I also find to be harder to use for exact focus. A video out cord to a TV might solve that, but I found that with practice you can do pretty well anyway (look very close to the screen).

Here are the pieces:

On the left is the Zarf Enterprises BH-2 adapter. The UR-E6 adapter is on the right. In the middle is the Olympus WHK-8x eyepiece, with a band of tape around the tube to make it fit the Zarf adapter. In the back is the CP-5000 camera and remote control.

Here they are assembled and mounted on my BH-2.

You can see how the adapters have moved the camera higher up than the CP-990, and so it is no longer parfocal with the eyepieces. Also, the view screen is kind of small, so it is trickier to get a precise focus, and the manual buttons are not as conveniently placed.

But, it is a great camera that produces very fine images, and it is easy to use, so this is a keeper. For now anyway.