Wild Microscope M20, part 2. Michael Wilkman, Finland

At first I want to correct a mistake in the first part. The M20 was not the first microscope with a revolver for six objectives. At least the Steindorff Microbe Hunter (about 1947) had one.

My M20 has now been utilized for a couple of seasons. The K-stage has been made rotatable and can in a moment be replaced with a simple sliding stage for following moving objects, especially when recording videos. Of the different kinds of grease I have tried, the old Wild MS2a seems unbeatable for smooth movement. BTW, there is no magnetism in Wild microscopes. The sliding surfaces are held together by the grease.

The stage and the condenser movement have been serviced, but not the focusing mechanisms according to the old rule: “if it works, don’t fix it”. This rule I have applied to other fields too, but sometimes deviated from it to prevent breakdowns, especially at sea.

The tube is a Zeiss trinocular one with 100/0 and 0/100 % light transmission and no magnifying factor. The Wild tube has 1,25x (and a couple of prisms). I now have nothing (except air) between the objective and the photo ocular and the ocular and the camera sensor with the possible exception of an analyzer above the objectives. The effect of a correcting lens above the ocular I have after some tests (with a lens from an old Wild camera) found insignificant, except for a small magnification difference, but I use it because it makes the focus difference between observing and recording smaller.

The bellows unit is a sturdy old Exakta one from my treasure chest, the focusing magnifier is made from various parts including a vitamin pill jar and slid onto the camera screen.

As for the lighting system, I still use tungsten bulbs, as I have several in stock and for which the microscope is made. The LED is interesting, but it seems I never get the time for experimenting and there are some factors to consider, making the matter somewhat complicated.

The optics is the same I used on previous microscopes (Fluotar 10, 20, 40x and the corresponding phase objectives). I have the Plan-Fluotars 3 and 6x too, which I use very seldom and some Lomo Apos, but they are shorter than the 37 mm Wild objectives (which again are shorter than the present standard of 45 mm).

Once I improvised a phase version of the Plan 6x and even of the 3x, but that was quite complicated. Ph Pl Fluotars 6x have occasionally appeared on eBay.

The oculars are Wide Field 10x for observing and Compensating 6, 10 and 15x for photo.
The condenser is a Wild achromatic-aplanatic one, with home-made phase ring holders.

Wild (like Leitz) used a rather low phase contrast absorption (70-80%) which reduces the optical disturbances, but they once used a higher contrast (like Zeiss) which gives more dramatic pictures. Nowadays the contrast is easy to change with a picture processing program.

The optics have been bought new with the exception of the Phase Fluotar 20x which I bought used on eBay, but I was not satisfied with the contrast. Later I bought another one, but the contrast was quite similar. This rises the question: do phase rings fade with use?

The transformer is old. With it I can change from observing voltage to photo voltage with a foot switch. This was more important when I used film. I prefer an ammeter to a voltmeter. A voltmeter just shows the voltage supposed to go to the bulb, but an ammeter shows every poor contact or other disturbance in the circuit.

The medium (in my case water) between the object and the cover slip (sometimes unavoidable in a mixed biological sample), can impair the best of objectives. There are remedies: using an objective with cover slip thickness compensation or an immersion objective (messy), picking out organisms under a stereo microscope or rearing them, the switching to an inverted microscope a last resort. I would bet Hilda Canter-Lund uses an inverted microscope, but she has been depicted beside a normal, upright one.

Another problem is that some algae, for instance the *Micrasterias* species, seldom lie flat on the slide so one edge always is out of focus. Once I had to tilt a permanent slide and have even thought of making a tiltable stage, but it would have limited use and I prefer to use the time for looking for flat lying specimens instead.

Still another problem are thick organisms and there only stacking helps, but it is a demanding and time consuming job so I abstain. - Long ago I heard a rumour of a vibrating objective, increasing the depth of field. Does anyone know about it?

I use 32x24 or 18x18 mm cover slips. Thickness varies between 0,14 and 0,18 mm. I have picked out a couple of 0,17 mm ones, but am not convinced of the usefulness because of the water factor mentioned above. Before I sometimes used 50x24mm, but they increase the risk of turning an objective into the slide holder, now when the stage can be rotated. I try to make a habit of always observing the objectives when turning the revolver.

DIC is only a dream, but a flash would be very useful. However, microscopy is only one of my time-consuming interests and when the time comes my heirs will already have problems getting rid of the present junk, hopefully at some profit, not to mention my several other, mostly unused microscopes, at least one of them (a Lomo) firmly seized.

At first, when using a Canon A3200 camera I had to stand, rather uncomfortable, so I added a mirror, but it reversed the y-axis, which was very confusing when following moving objects (a prism as used on 6x6 SLR cameras would have reversed the x-axis instead). To eliminate the problem I bought a Canon EOS 600D camera (with an articulated screen), but got other problems instead.

It has separate releases for photo and video. To keep my hands free for handling the microscope I use foot switches. The screen blocks the photo contact so I have to use an angled plug without its shell. For video I use a pneumatic release, but as it is quite soft I intend to switch to an IR one.

The camera has no 25 fps HD video, only 50 fps for some obscure reason. It uses as much kB as Full HD, so to save on kB I have to use the SD setting (0.3 MP). It should be fully adequate for microscopy work, but the picture size is 4:3, again for some obscure reason. It could have been at least 3:2. The HD versions are 16:9. Some micro-organisms are quite long and narrow, especially *Bacillaria* when performing its antics. As a schoolboy I found this fascinating diatom in a lake in southern Finland and have later been looking for it, finally finding it in brackish water a five minute walk from my present home! - But I have to admit that many micro-organisms fit well into 4:3. It is the mixing of formats that I find

disturbing. But saving kB is a small problem. The card is easy to change, but on my A3200 outfit I had to remove the camera for card change. BTW, the A3200 has 30 fps HD!

Nikon has had a model with the screen hinge at the lower edge that looks ideal, but I have only seen pictures, not the real thing and slander has it that it too lacks 25 fps HD.

In the *Microbe Hunter* Magazine there has been a short article with a couple of pictures (originally in “Photography”), that maintains that for photomicrography “there is practically no visible difference between 3 MP and 12 MP”. I have checked the matter on some diatoms between settings L and S3 (17,9 and 0,35 MP) on my camera and found no difference, but the S3 is impractical because of its smaller picture size (again for some obscure reason or perhaps no reason at all) so the pictures have to be enlarged 210 % to be comparable. I therefore use the S2 setting (to play safe too).

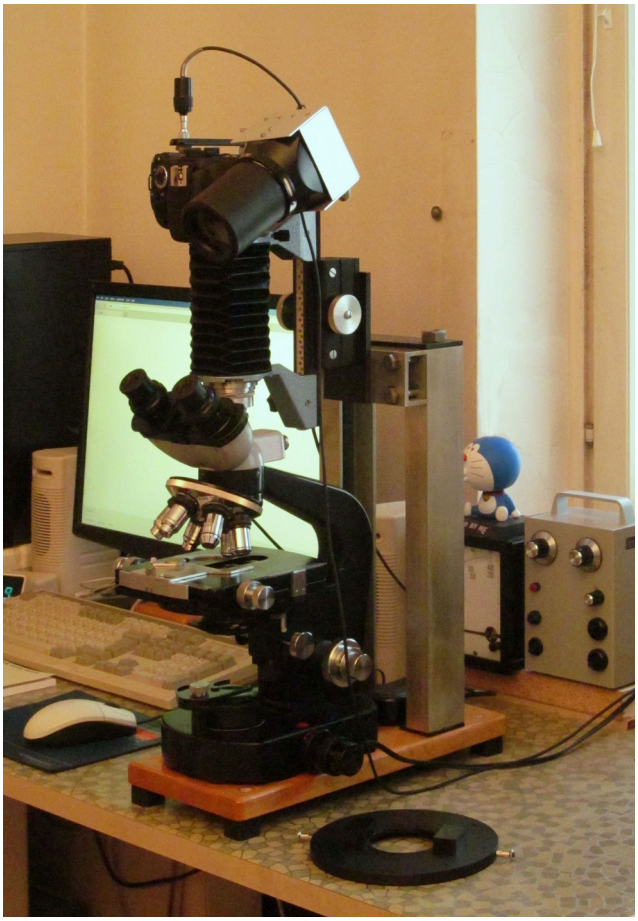
Servicing the M20: parts of the focusing systems are not fixed with steel pins in addition to screws (as in Zeiss for instance) so after servicing the parts may have to be aligned, using a couple of guides; a T-shaped part screwed into one of the revolver openings for aligning the stage and a dummy condenser for centering the condenser holder. I have made such a dummy and use a piece of plastic with parallel edges for the stage. - The M 20 uses a steel ball race for the fine focusing. - A general rule: the fewer screws loosened, the better.

In the 1970’s Wild bought a majority in Leitz, but appeared to be the losing part. The Wild microscopes (apart from the stereo microscopes) with accessories, optics and spare parts were withdrawn and I have even heard they were quite actively running down that part of their programme. A planned large microscope, the M30, never got past the wood model stage. But the Fluotars were taken up by the new company, later confusingly named Leica. To read about all this with the proliferation, mergers and changes in ownership is bewildering.

There certainly are thousands of Wild microscopes in working order (or would be with proper service) in the world. A gross mismanagement of a vast capital.

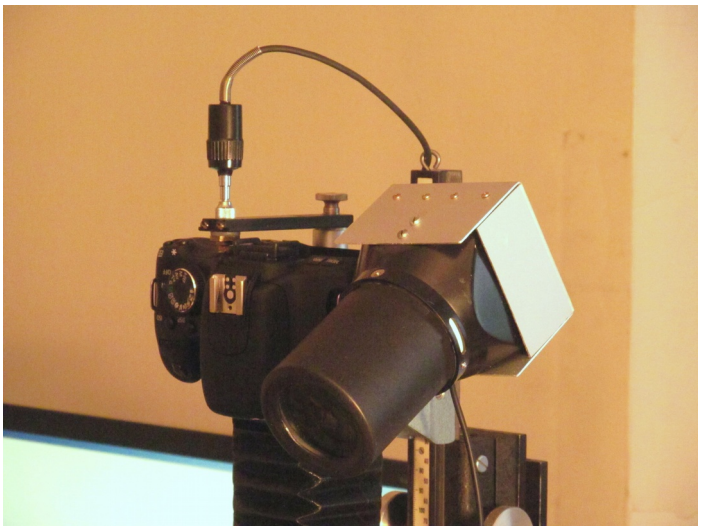
August 2018.
jan.m.wilkman@gmail.com

Pictures next page.

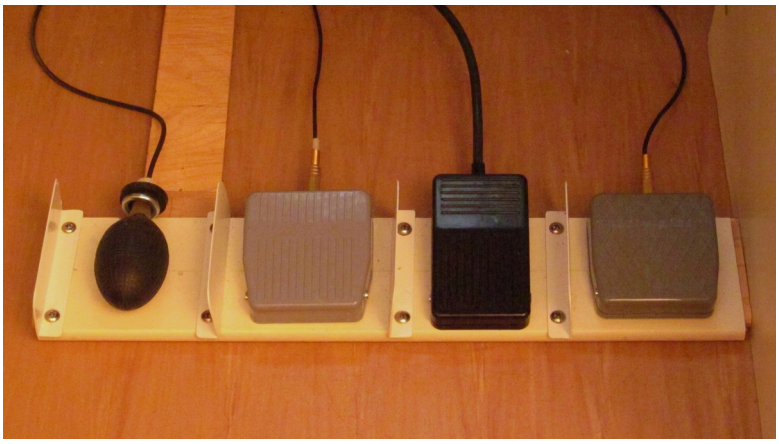


Picture 1 (left above)**:** The M20 with Wild phototube and Canon camera A3200 with mirror and focusing magnifier (October 2015).

Picture 2 (right above)**:** The M20 with alternative sliding stage (in front), Zeiss phototube, Exakta bellows and Canon camera EOS 600D with focusing magnifier and pneumatic release (September 2018).



Picture 3: The camera.



Picture 4: The foot switches.

Published in the September 2018 issue of *Micscape* Magazine.
www.micscape.org