## A Bausch & Lomb Dynoptic Microscope

Michael Reese Much RMS EMS Bethlehem, Pennsylvania U.S.A.

Bausch & Lomb produced a series of microscopes known as the DynaZoom and Dynoptic Laboratory and Laboratory Research Microscopes. The series was built around a shared stand with interchangeable components, so all of the models could be set up to custom configurations. There was a choice of bodies (heads), turrets, stages, condensers and illuminators that could all be fitted to the same stand.

DynaZoom and Dynoptic microscopes can always be found on eBay, but one must be careful as to whether the instrument is a DynaZoom or a Dynoptic, since the seller might not know the difference. The DynaZoom bodies have a zoom knob on top that can vary the magnification from 1X to 2X. My copy was purchased from a seller on an online photomicrography website and was incorrectly identified as a DynaZoom whereas it was really a Dynoptic. Since the price was only \$25 plus shipping, it didn't matter to me since I was interested in obtaining and restoring the scope.



The seller was from the Rochester, New York area and the scope had been used at an Eastman Kodak quality assurance lab. It was in fair condition, missing one eyepiece, distressed paint, rusted and covered with tape and tape adhesive. Most of the movements required degreasing since the grease had hardened and some of the movement such as the interocular distance movements were rock solid.

This is what the finished instrument looks like after restoration.



Degreasing, new paint and rust and tarnish buffed off with a Dremel motor tool using fine wire brushes.

The scope head can be rotated 360 degrees. The coarse and fine focus work through the stage with the left hand fine focus knob graduated in microns. There were three sub-stage illuminators available for the

DynaZoom/Dynoptic series, as well as an inexpensive illuminator called the Optilume and a mirror assembly. This model has the Hi-Intensity Illuminator with Field Iris. The field iris can be centered and the iris is set using the large aluminum knurled ring at the front of the base.

The power transformer has five click positions to control intensity. The lamp holder slides in through an opening in the back of the base and the light is reflected upward to the field iris with a right angle mirror. The stages in the DyaZoom/Dynoptic series had a wide variety. There were five basic clip stages available and seven mechanical



stages, including circular models. My sample has an X-Y axis mechanical stage with enough movement to accommodate 2x3 inch slides.





The substage condenser is an Abbe 1.30 N.A. model. The series also included a 1.30 Simplified Abbe Condenser, a 1.40 Variable Focus Achromatic Condenser, a 1.40 Achromatic Condenser, a 1.25 Verti-Slide Condenser (it did not use rack and pinion focusing), a Darkfield Parabloid condenser, a Darkfield Cardiod condenser, and a phase contrast setup with an optional long-field condenser.



This sample has a Slide-In Lens Attachment attached to the bottom of the Abbe condenser that slides an additional condenser lens into position to fill the field of view of 3.5X and 4X objectives and at the same time match the N.A. of the objective and condenser. It also has a holder to accept 31.5 mm glass filters or a darkfield stop.

There were also three optional iris diaphragms available: two basic ones to be attached to stage without a condenser and a decenterable iris diaphragm for oblique illumination.

The DynaZoom/Dynoptic series had options for double, triple or quadruple nosepieces. If the body (head) was not a Flat Field model, an optional Disk Polarizer could be fitted between the nosepiece and viewing assembly containing the eyepiece(s) for polarized light photography. The manual also discusses a Body Tube Analyzer that apparently was a filter that was screwed into the turret on the back end of the objective.

The turret is a standard RMS mount. It appears the objectives and eyepieces for this series are fully dedicated to each other. When I received my copy, it was missing one eyepiece, so I substituted a matched pair of 10X wide field eyepieces from my collection and they appeared to work adequately with the scope and the dedicated objectives. However, when I tried objectives from outside this system, clear images could not be seen, even though the published tube length is 160mm.

For such an extensive system, I was surprised to find that there were no options for axial illumination. But, considering that the specifications for matching objectives to eyepieces ran to four pages in the manual, it probably wasn't possible.



The turret has stops color-coded for the standard color bands for objectives to see the magnification at a glance: 4X (red), 10X (yellow), 20X (green) and 40X (blue).

However, the objectives that came with this scope use the following colors: 4X (blue), 10X (green), 20X (gray) and 40X (yellow). The other markings on the lens are:

4X 0.09 N.A. FLAT FIELD 10X 0.25 N.A. PLANACHROMAT 20X 0.50 N.A. PLANACHROMAT 40X 0.65 N.A. PLANACHROMAT

All but the 4X are marked for using a cover glass of 0.18 thickness. I assumed the planachromats came from a phase contrast kit, but when I looked through them with a magnifier, I could not see any phase annular rings. In addition, planachromats are not mentioned anywhere in the manual, including the section on phase contrast microscopy.

Since this is a trinocular head, there is a camera port on the top of the body.



The knob in the foreground directs the image from the eyepieces straight up to the camera. The DynaZoom/Dynoptic system has many options for adapters for photography with 35mm cameras, Polaroid adapters and even 4X5 bellows cameras, but they would be difficult to track down today.

So, how does this scope perform with its present optics? The proof is in the imagery. Test shots were done with a Micro Four Thirds camera through the right eyepiece of the scope using a microscope adapter with a 1X relay lens. The sample is a longitudinal cross section of human skin.



4X





20X

40X

It appears the objectives are in pretty fair shape, but the patterns seen in the test photos indicate there is something in the optical path of the scope that will require further work. But, it may take disassembly far more complicated than I am willing to invest in this instrument.



It will make a very fine display piece in my collection. Maybe someday I'll get back to it.

Comments to Michael Reese Much may addressed to <u>Amoeba1@rcn.com</u>.

## References

The DynaZoom/Dynoptic manual can be found at <a href="http://www.science.info.net/docs/b-l/Dynazoom.pdf">http://www.science.info.net/docs/b-l/Dynazoom.pdf</a> The manual is very extensive. It includes descriptions of the system, precise general microscopy techniques and exploded parts diagrams of the microscopes. Published in the June 2013 issue of Micscape Magazine. <u>www.micscape.org</u>