STEREOSCOPIC VISION WITH THE MONOBJECTIVE BINOCULAR MICROSCOPE

The single objective binocular microscope provides a more comfortable means of observation by employing both eyes instead of only one and thus lessens fatigue and eye strain. When protracted observations must be made, it is much to be preferred over the monocular microscope.

An important and little known capacity of the modern monobjective binocular microscope is the ability to render suitable objects in true three-dimensional relief.

(Stereoscopic vision may be illustrated as follows: hold a finger up at arm's length while sighting at a more distant object. Alternately close first one eye and then the other while looking at the finger. Note that the left eye and right eye images do not coincide—the left eye sees a shift of the background to the left and the right eye to the right. When these dissimilar images are combined by employing both eyes simultaneously, the finger appears to occupy a position at a definite distance in space. If, however, a horizontal wire is placed at arm's length and eye level height from the observer, there is no depth perception because the image seen by each eye is similar. It is only when dissimilar images are combined in the brain that stereoscopic vision results.)

The above may serve to illustrate the fact that using both eyes with the monobjective binocular microscope does not give stereoscopic vision (except when accidental slight lateral movements of the head occur) because both images are the same. Actually, the brain image resulting from the fusion of the two microscopic images appears as flat as does the single image seen with the monocular microscope.

The path of the light rays passing through the two oculars must first be modified so that each ocular passes rays from opposite zones of the objective. It is relatively easy to accomplish this change by blocking off the inside half of each ocular with half-discs of opaque material. These ocular diaphragms may be placed directly on the top of the eyepiece lens or on a cap (such as the eyepiece shield for the protection of spectacles, No. 325A631). If the latter is used the stops may be permanently fastened to the caps—requiring only the placing of the caps over the eyepieces to obtain stereoscopic vision. Actual observation will indicate the optimum position of the stops. If more than half of the exit pupil is covered, the field will be restricted, and if much less than half is covered, the image loses plasticity. By the use of this technique it is possible to obtain stereoscopic vision with the oil immersion objective also. In this case it is helpful to place a two hole diaphragm under the substage condenser parallel to the oculars.

Another method of effecting the same end is to decrease the distance between the oculars and thus compel observation through the outer half of each eyepiece circle.

The more adventurous microscopist will be curious to see what happens when the outer instead of the inner halves of the oculars are covered. Pseudo-scopic vision results and elevations then appear as depressions and vice versa.

The above procedures cause some reduction in aperture and resolution. If the observation requires a greater working aperture and a somewhat lessened stereoscopic effect is not objectionable, it is sufficient to cap only one eyepiece with the semi-circular diaphragm—leaving the uncapped ocular for the eye generally employed for observations (this is frequently the right eye).

The writer does not advocate using the binocular monobjective microscope as a stereoscopic instrument for routine work. Nevertheless, it will be a revelation to many microscopists to see plastic images and perceive spatial relationships of different object planes for the first time.

When used stereoscopically the monobjective binocular microscope allows three-dimensional vision at much higher magnifications than does the twin objective binocular microscope. The former gives an inverted image, but this should cause no unusual difficulty even for low power dissecting work.

Objects which have considerable depth, such as deep cell preparations of living infusoria, are especially suitable for low powers. With greater magnifications the preparations should be correspondingly thinner.

For the sake of the photomicrographically inclined reader it might be well to point out that excellent stereo-photomicrographs can be made with a monocular microscope by employing a substage diaphragm and alternately blocking out the rays through one half and then the other half of the objective, (as seen by observing the back lens of the objective after withdrawing the ocular) and exposing a negative each time. Of course, the two prints must be visually combined in a stereoscope before the three-dimensional effect can be observed.

It is probably not out of place to mention here that superb stereo-photographs can be made with a single camera—providing there is no movement in the scene. The technique is simple: select a distant point for the center of the scene and photograph it twice (two negatives) but from points on the same horizontal plane about three inches apart. Mount the two prints on a card and view through a stereoscope. Care must be taken to get the pictures in the correct order—inspection will tell which is left and right. Pictures of this type never cease to evoke plenty of enthusiasm and interest. Both stereo-photomicrographs and stereo-photographs make excellent teaching aids.

—A. C. Lonert

TURTOX TAXIDERMY POWDER

This product replaces the old arsenic powder and the arsenical paste, both of which were admittedly dangerous to those not skilled in taxidermy methods. The Turtox Taxidermy Powder may be used as a dusting powder or as a solution (4 ounces of powder makes one gallon of solution) for the preservation and mothproofing of skins, furs and similar materials.

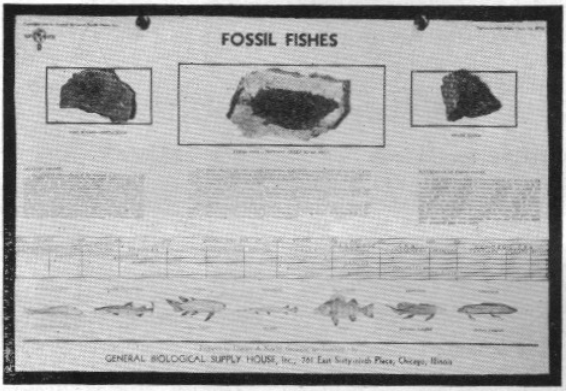
Complete with instructions, per pound $0.50

Five pounds 2.00

NEW C-R CHARTS

See your copy of the new Turtox Catalog No. 11 (published August, 1944) for many new subjects in the Turtox Series of Class-Room Charts. All of these new charts are now available for prompt delivery.

SERIES III OF THE TURTOX-NEWBY FOSSIL CHARTS



8F701

These large display and teaching units are more than charts, for each preparation consists of (1) drawings (2) explanatory text and (3) the actual fossil specimens. Series III includes the following preparations:

8F612 Display Chart of Fossil Cephalopods $5.50

8F701 Display Chart of Fossil Fishes $5.00

8F715 Display Chart of Fossil Birds 4.00

These and many other plant and animal fossils are illustrated and described in our *Special Catalog No. 421,* your copy of which will be sent upon request.