

**OLYMPUS**



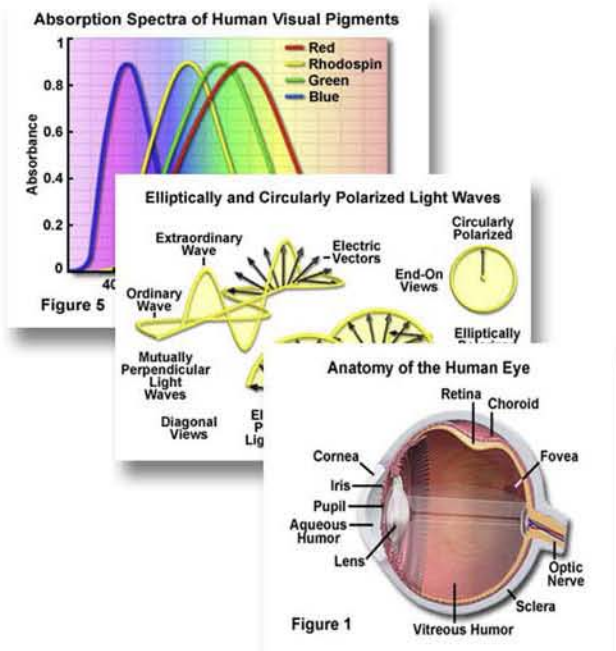
# Digital Microscope MIC-D

## Quick Start Guide

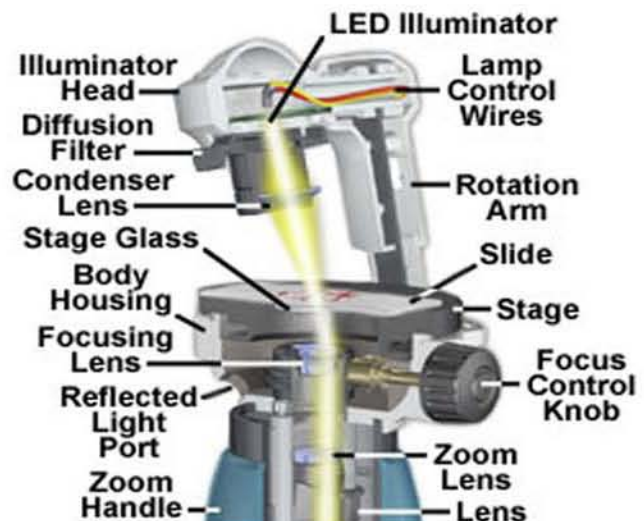


# www.mic-d.com

Learn more about your MIC-D, down-load free software and explore vast image libraries at the Olympus MIC-D website.



## MIC-D Oblique Illumination Mode



Detailed software installation instructions may also be found at the MIC-D Website

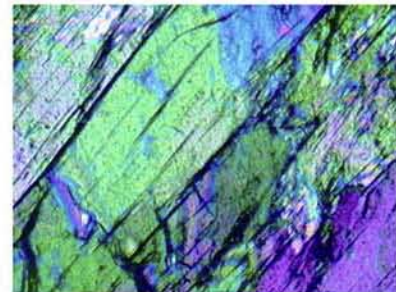


# Digital Microscope MIC-D

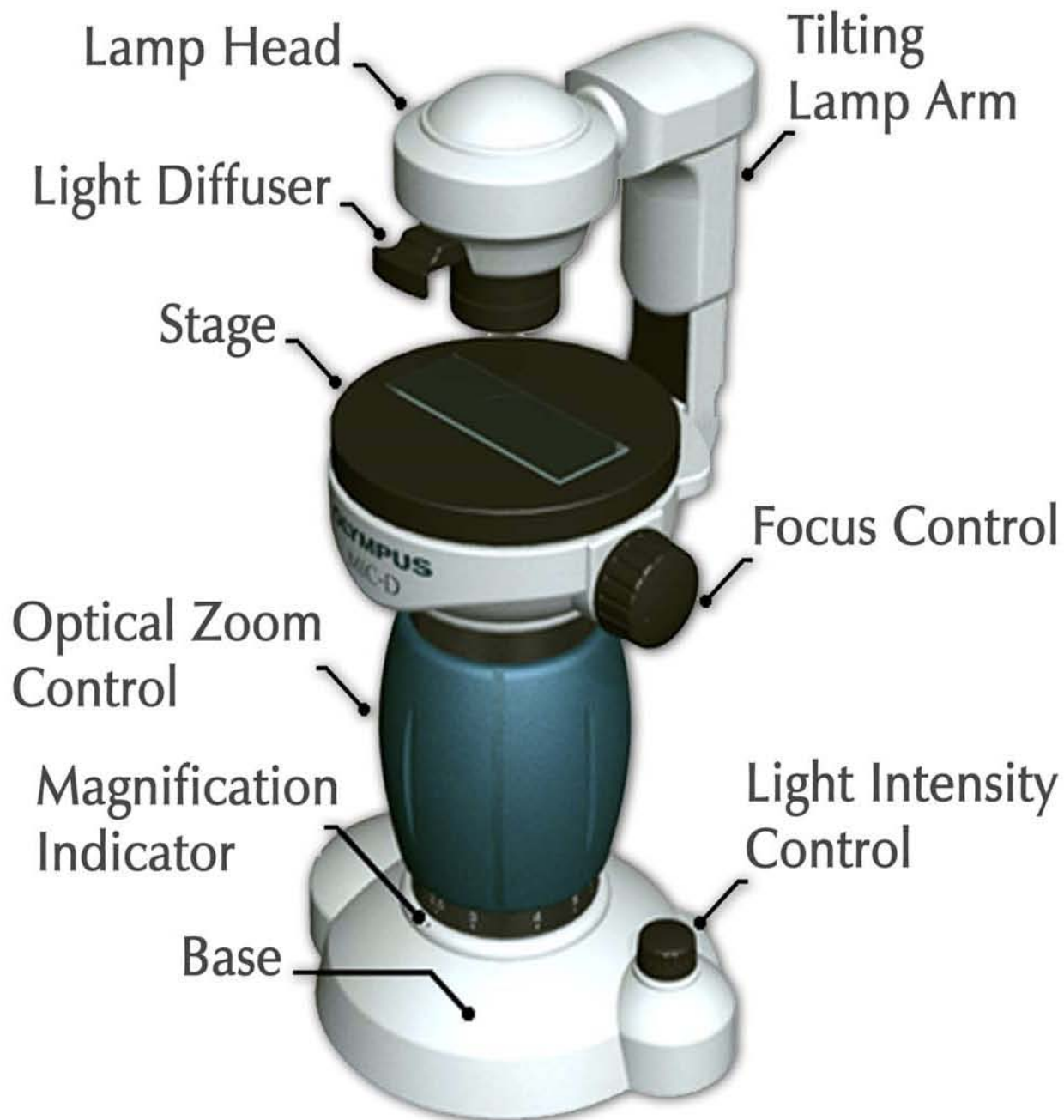
## Quick Start Guide

In the lab or in the field, the Olympus MIC-D portable digital microscope captures still and moving images instantly. This Quick Start Guide will introduce you to the MIC-D's innovative design and spectacular imaging capabilities, so you'll be up and taking pictures in no time.

<u>Topic</u>	<u>Pages</u>
MIC-D Parts Explained	2-3
MIC-D Software Introduction	4-5
Choosing Your Specimen	6
MIC-D Basic Controls	7
Illumination Technique	8-9
<u>Image Capture Window</u>	
- Still Images and Movies	10-11
- Time Lapse Movies	12-13
- Saving Images	14
<u>Library Window</u>	
- Viewing Captured Images	15-18
<u>Image Processing Window</u>	19
- Line Drawing and Annotation	20
- Image Manipulation and Adjustments	21-22
- Polarized Light Kit	23



# Get To Know The MIC-D





## **Lamp Head**

The Lamp Head contains an extremely bright white L.E.D. This device is brighter than an ordinary bulb and uses less power. The Lamp Head rotates slightly to allow fine tuning to the illumination angle. Make sure that it is rotated all the way clockwise for Transmitted Light work (Brightfield) and all the way counter clockwise for Reflected Light work.

## **Light Diffuser**

The Light Diffuser can be pushed in and pulled out. Keep the Diffuser all the way in during Transmitted Light Illumination, and all the way out for Reflected Light Illumination. Vary as needed for Oblique and Darkfield settings.

## **Tilting Lamp Arm**

Adjustments to the angle of the Lamp Arm are the key to the different illumination techniques. Use the live image to guide adjustments. The Arm should be set to the vertical position for Transmitted Light, to 11 o'clock for Oblique Illumination and to about 10:30 for Darkfield. The arm should be rotated all the way counter clockwise for the Reflected Light Setting.

## **Gliding Stage**

The Gliding Stage is the platform to place specimens or samples for observation. The MIC-D's Stage glides 5mm in any horizontal direction, and can be rotated 360 degrees. Use the Gliding Stage to adjust the specimen position. Remember that up, down and rotational movements are inverted.

## **Zoom Control**

The MIC-D boasts an all glass optical zoom lens to enable continuous magnification changes. The magnification range is an amazing 22x to 255x.

## **Magnification Indicator**

Use the Magnification Scale to read the zoom power, by aligning the scale markings on the blue zoom handle to the spot below. Adjust the Magnification Slide Bar in the Image Capture software window to match the setting on the MIC-D, in order to calibrate the scale marking in the live image window and captured image.

## **Light Intensity Control**

Light intensity (and focus) should be initially set with the zoom at minimum power to prevent under exposure. The MIC-D's exposure setting will then be automatically adjusted to maintain consistent brightness in the live image. For Reflected Light Illumination turn the Light Intensity Control to maximum.

## **Focus Control**

Rotate this knob to bring specimens and samples into clear focus. The MIC-D's lens can focus on surfaces up to 5mm above the stage.

# MIC-D Software

Image Capture Window



Library Window



Image Processing Window





# MIC-D Software

The MIC-D Software enables you to view, capture, process and annotate images in three simple windows.

## Image Capture Window



Capture and save still and moving images viewed in the Live Image Window with the simple click of a mouse button. You can view all of your captured images in the tile bar below the live window. The scale bar, light intensity and image format may also be adjusted here.

## Library Window



The Library Window is where you can view your captured images as thumbnails or in full size. Still images may be displayed side by side for comparison purposes. Moving images may also viewed here.

## Image Processing Window



Annotation, color and brightness adjustments are performed in this window. Digital zooming as well as white and black balancing functions are available for selection.

# Choose Your Specimen or Sample

With the MIC-D's inverted lens design, you can image just about any sample, regardless of its shape or whether light can pass through it - thanks to the Reflected Light capacity. Microscope slide preparations and thin, translucent specimens can be viewed in Brightfield, Oblique or Darkfield. Use Oblique Illumination to highlight structural details and Darkfield for low contrast specimens. Oblique Illumination will shade rises and depressions in your specimen or sample. Darkfield can be used to emphasize color. Use Reflected Light for anything large and opaque. Don't forget that for field work you can use the MIC-D anywhere you can take a laptop computer.

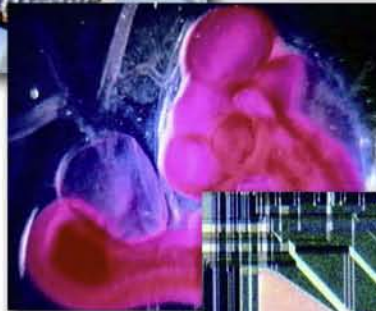
*Transmitted  
Light  
(Brightfield)*



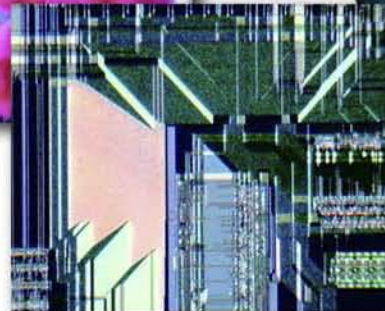
*Oblique Illumination*



*Darkfield*



*Reflected  
Light*





# MIC-D Basic Controls

Let's start by getting familiar with the basic hardware controls. Keep an eye on the Live Image Window as you manipulate the MIC-D controls.

1

Make sure that the Light Diffuser is pushed in, the Illumination Arm is in the vertical position and the lamp head is rotated fully clockwise. Turn the MIC-D's light source on and increase the light intensity by turning the control clockwise, about one half as far as it will go. The MIC-D will automatically make adjustments to the light intensity after it is initially set.

2

Turn the Optical Zoom Control to a minimum setting. The Optical Zoom Control enables the user to physically adjust the position of the microscope's lens to obtain magnification powers from 22x to 255x!

3

Bring the specimen into focus in the Live Image Window by rotating the Focus Control Knob. Make any final adjustments to the light intensity.

4

Notice that the Gliding Stage Moves freely in any direction. Moving the Gliding Stage instead of the specimen or sample will allow you to scroll the image smoothly, even at high magnification. When you have found an interesting detail, center it in the Live Image Window and zoom in. Continue to make adjustments to the focus as needed.

# Illumination Technique

There are four different illumination techniques that you can use to view your specimen or sample

## Transmitted Light

Use this technique to view conventional microscope slides or especially thin specimens. This technique is also known as 'Brightfield'.

1. Rotate the Illumination Arm fully clockwise to the vertical position.
2. Rotate the Lamp Head fully counter clockwise.
3. Push in the Light Diffuser



## Oblique and Darkfield Illumination

Use either of these techniques on any transmitted light specimen or sample to emphasize contrast. Use Oblique Illumination to highlight structural detail by shadowing the 'hills' and 'valleys'. Use Darkfield to create a black background and to emphasize specimen color.

1. Rotate the Lamp Head counter-clockwise.
2. Pull out the Light Diffuser. Adjustments to the light diffuser position may be required.
3. Slowly rotate the Illumination Arm counter-clockwise:
  - For Oblique Illumination rotate the arm until the background just begins to darken. Three dimensional details should display a shadowing effect.
  - For Darkfield Illumination rotate the Illumination Arm further counter-clockwise. Stop when the background turns black. Best results are achieved at high magnification.





# Illumination Technique

4. Make any final adjustments to the Illumination Arm and Lamp Head angle so that the background appears evenly lit.

## Reflected Light

Use the Reflected Light Illumination setting to view opaque specimens and samples- i.e. a circuit board or a frog's skin.

1. Rotate the Illumination Arm fully counter-clockwise.
2. Rotate the Lamp Head fully clockwise.
3. Pull out the Light Diffuser and turn the Light Intensity Control all the way up.



# MIC-D Software

## Image Capture Window



The screenshot shows the MIC-D software window with a blue border. The main area is a large 'Live Image Window' displaying a grayscale micrograph of a textured surface. To the right of the main window is a vertical toolbar containing icons for 'Capture Image', 'Save Image', and 'Time Lapse'. Below these are buttons for 'Record Movie' and 'Set Scale'. A 'Manual Exposure Setting' slider is also present. At the bottom of the main window is a 'Captured Images Film Strip' showing a sequence of images, with one image circled to indicate the 'Selected Image (circled)'. To the right of the film strip is an 'Erase Selected Captured Image' button. Below the film strip are settings for 'Still Image Format' (JPEG) and 'Moving Image Format' (MP4). A 'Resolution Adjustment' dropdown menu is also visible. A yellow arrow points to the 'Live Image Window' label. Another yellow arrow points to the 'Capture Image, Save Image and Time Lapse Tabs' label. A third yellow arrow points to the 'Last Captured Image' label. A fourth yellow arrow points to the 'Image Capture' label. A fifth yellow arrow points to the 'Record Movie' label. A sixth yellow arrow points to the 'Set Scale' label. A seventh yellow arrow points to the 'Manual Exposure Setting' label. An eighth yellow arrow points to the 'Save To' Directory label. A ninth yellow arrow points to the 'Resolution Adjustment' label. A tenth yellow arrow points to the 'Still Image Format' label. A eleventh yellow arrow points to the 'Moving Image Format' label. A twelfth yellow arrow points to the 'Erase Selected Captured Image' label. A thirteenth yellow arrow points to the 'Selected Image (circled)' label. A fourteenth yellow arrow points to the 'Captured Images Film Strip' label. A fifteenth yellow arrow points to the 'Double Click on the Live Image Window to go to Full Screen Mode!' label.

Live Image Window

Capture Image, Save Image and Time Lapse Tabs

Last Captured Image

Image Capture

Record Movie

Set Scale

Manual Exposure Setting

'Save To' Directory

Resolution Adjustment

Still Image Format

Moving Image Format

Erase Selected Captured Image

Selected Image (circled)

Captured Images Film Strip

Double Click on the Live Image Window to go to Full Screen Mode!



# MIC-D Software

## Image Capture Window

The Image Capture Window is where you 'take' or 'capture' still and moving images viewed in the Live Image Window. Capturing images is as simple as clicking on the Image Capture button  to capture a photo, or clicking on the Record Movie button  to record a movie - one click to start recording and another to finish. After you click to finish recording the computer will take a moment to load the new movie.

The last image that was captured will be displayed in the Last Image Captured Window. Other images captured in the same session are displayed in the Film Strip at the bottom of the screen.



In the bottom right corner of the Live Image Window there is a Scale Bar. This needs to be adjusted to match the optical zoom level of the microscope. To do this, first read the zoom level from the scale below the Optical Zoom Control of the microscope, then set the Slide Bar in the Image Capture Window to the same value. The software will adjust the Scale bar in the Live Image Window.



The MIC-D Software will automatically set the camera exposure setting to match the zoom level when 'Auto-Exposure' is selected. De-select 'Auto Exposure' to adjust the exposure manually using the slide bar.



To save images, first give them a name and then select a folder to save them to. It is recommended that you do not use the default Library Folder. Instead, create a special folder for MIC-D images on your hard drive.



The format and resolution of captured still and moving images may also be changed. Still images can be saved in either JPEG, TIFF or BMP formats. Moving Images may be saved in either MPEG or AVI formats.

# MIC-D Software

## Time Lapse Movie Recording



Time Lapse  
Movie Recording  
Tab

Record Movie-  
Start/Stop

Timelapse:  
Select On/Off

Integral Select-  
Seconds

Integral Select-  
Minutes

Number Of Frames  
Select



# MIC-D Software

## Time Lapse Movies Explained

Time Lapse Movies are 'fast-motion' movies, where a moving image sequence is created by rapidly playing back several still images that are taken in sequence over a period of time. Each individual still image comprises a single frame of the finished movie. Time Lapse Movies appear faster than life because the time between each frame of the finished movie when it is played back is shorter than the time that passed between each frame being captured. The amount of time that passes between the capture of each still image is called the integral, and it can be measured in minutes or seconds. The longer the integral, the speedier the movie will appear. So, to make a relatively short, fast motion movie of a process that takes a very long time, like root growth, an integral of many minutes should be chosen. To make a movie of a relatively fast process, such as salt crystals dissolving in cool water, an integral of a few seconds should be chosen.

### Time Lapse Movie Record Tab

Click on this tab to pull up the Time Lapse Movie Recording Window

### Time Lapse Select On/Of

When this button is blue, the Time Lapse function is off, and pressing the Record Movie will record a normal video sequence in real time. Click on this button to turn the Time Lapse function on. The button will turn red. Clicking on the button again will exit Time Lapse Mode.

### Integral Select, Minutes

Use this pull-down menu to select an integral measured in minutes. For instance, if this integral is set to '2', then one frame will be captured every two minutes.

### Integral Select, Seconds

Use this pull-down menu to select an integral measured in seconds. If the minutes integral is also set, then add the selected number of seconds to the minutes. For instance, if 2 is displayed under minutes and 25 is displayed under seconds, then one frame will be captured every 2 minutes and 25 seconds.

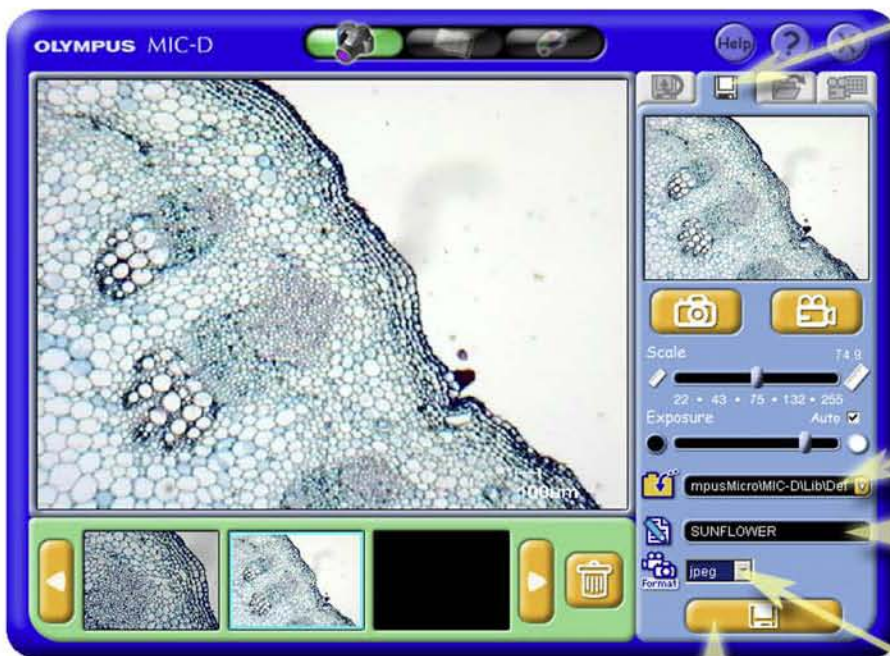
### Number Of Frames Select

Enter the number of frames that you want to be included in your movie here. Entering more frames will create longer movies with larger file sizes. The length of the finished movie is displayed here also. You may stop a recording at any time.

# MIC-D Software

## Saving Images

Click on the 'Save Image Tab' to save a captured still or moving image. First, select a folder to save your images to. Remember that images in the Default Folder risk being erased when the software is closed or opened. You should save your images to a special folder that you create, such as 'My MIC-D Photos' on your Hard Drive. The small downward pointing arrow on the right side of the 'Folder Select/Browse' bar opens up a directory so that you can browse for a pre-existing folder. Don't forget to give your images a name in the 'Image Name' bar. Use a name that will help you identify the image if you don't have it open, such as 'Tomato Seed, 50x Mag.' Finally, select the format that you want to save the image in. Use either JPEG, BMP or TIFF for still images and AVI or MPEG for moving images (including time-lapse movies). Don't forget to click on the 'Save' button after you have entered your settings.



Save Image Tab

Folder  
Select/Browse

Image Name

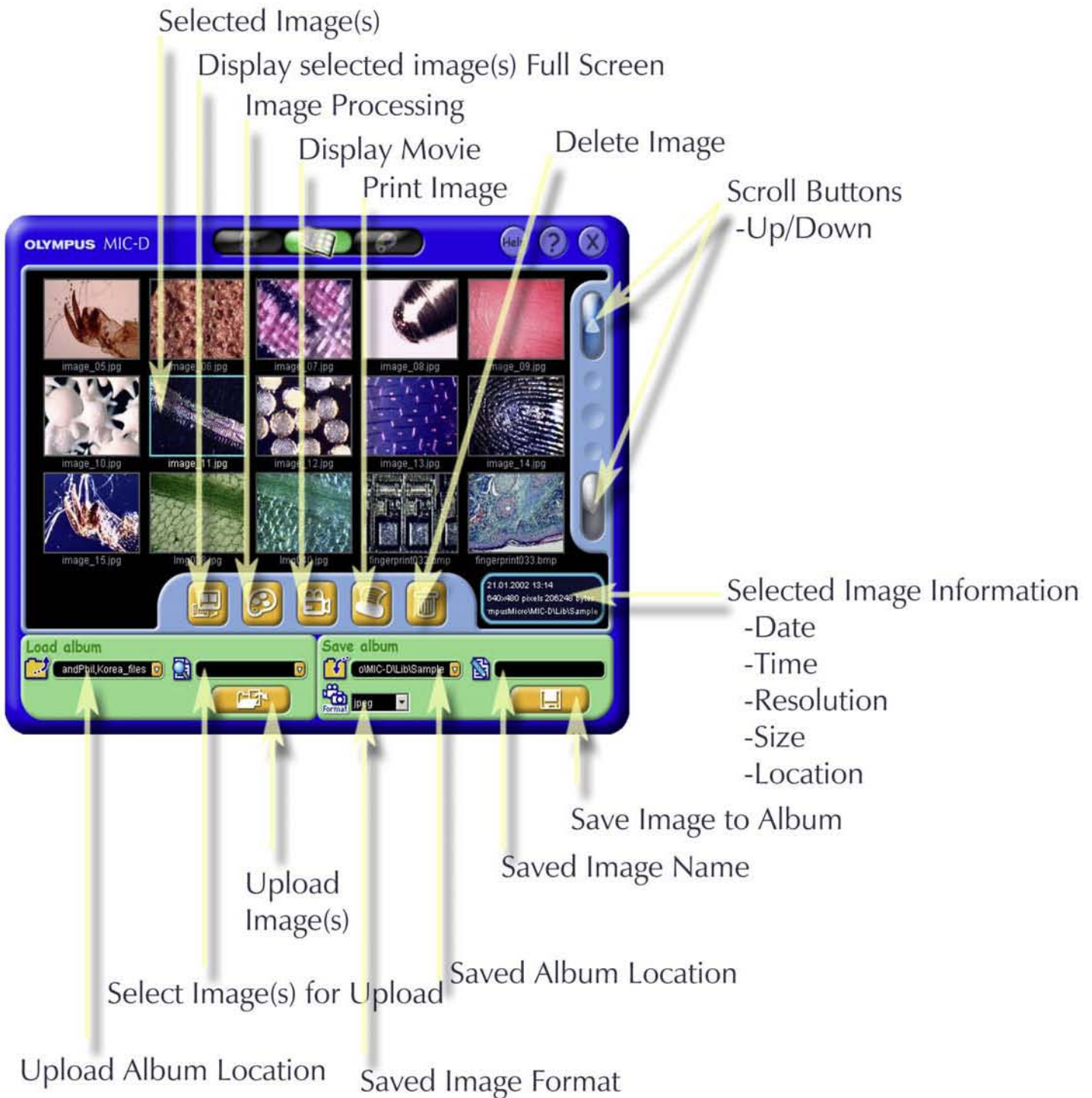
Image Format  
Select

Click To Save



# MIC-D Software

## Library Window



# MIC-D Software

## **Selected Images**

Click on an Image Thumbnail to select it. Movie Thumbnails will be displayed with a movie icon in the bottom right hand corner. Hold down the shift key while clicking on several Thumbnails to select multiple still images for side by side comparison. Bring the images into full view by clicking on the 'Display Selected Images' button, or by double clicking on a single image.

## **Display Selected Images Full Screen**

Use this button to display selected Image Thumbnails in the full screen mode. Selected Image Thumbnails are surrounded by a turquoise border.

## **Image Processing**

Click on this button to go to the Image Processing Window. The selected Image Thumbnail will appear in the Processing Window only.

## **Display Movie**

Click on this button to play a selected movie, or just double click on the Movie Thumbnail.

## **Print Image**

Click here to print a selected image.

## **Delete Image**

Click here to delete a selected image or movie. A confirmation window will pop up asking you if you are sure that you want to delete the image or movie.

## **Scroll Buttons**

Use these buttons to scroll through selected images. If images exist that are out of view the Scroll Buttons will be lit.

## **Selected Image Information**

If a still Image Thumbnail is selected, information about that image will be displayed here. The date, time, resolution, image file size and location are displayed.

## **Upload Album Location**

Locate the file containing the images that you would like to upload to the Library Window here. If you don't recall the location of the album you can use the browse function on the right hand side of the text bar.

## **Select Image for Upload**

After you have selected an album in the 'Upload Album Folder Directory', you can select single images for upload here.



# MIC-D Software

## Upload Image

After you have selected an image or album for upload, click here to import them into the Library Window.

## Saved Image Location

Select and locate a file or album to where you want to save selected images. It is recommended that you do not use the Default MIC-D Software folder, as images risk being erased when the program is closed or opened.

## Saved Image Name

Don't forget to name your images and movies. It helps to give images descriptive names, such as 'Earthworm, 22x mag' for locating saved images at a later date.

## Image Format

Different formats are available for still and moving images. Still images may be saved in JPEG, BMP or TIFF. Moving images may be saved in MPEG or AVI.

## Save Image

Finally, click on the 'Save Image' button to save a selected still or moving image to the folder selected in the 'Saved Image Folder' Directory.

# MIC-D Software

## Full Screen Window



Double clicking on an image thumbnail will bring it up in full screen mode. Alternatively, click on an image once so that it is highlighted and click on the 'display selected image' button. Movies playback is also in the full screen mode.

## Image Comparison Window



Holding down the shift key and clicking on two or more thumbnails allows several images to be selected. Once the images are selected click on the 'Display Selected Images' button to view the images side by side. This is a great way to compare shots that are captured using different illumination techniques.



# MIC-D Software

## Image Processing Window

The Image Processing Window contains tools that you can use to make adjustments to digital still images. Movies cannot be imported into the Image Processing Window. Adjustments that you can make to your images include:

### Image Manipulation and Adjustment

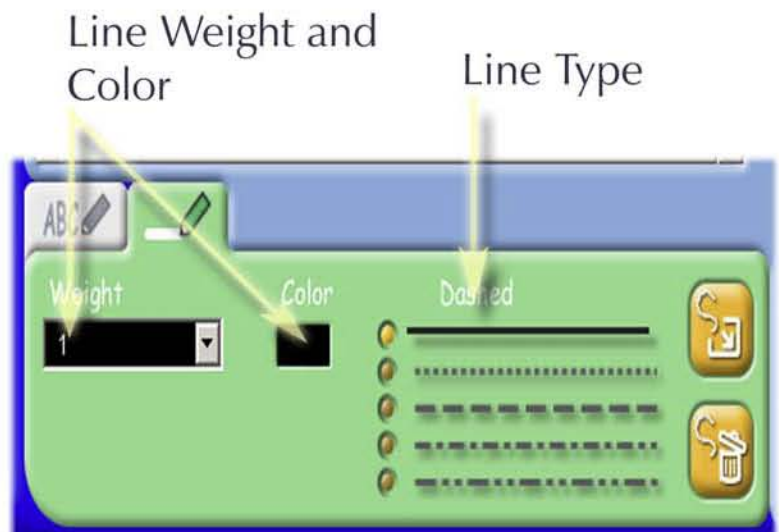
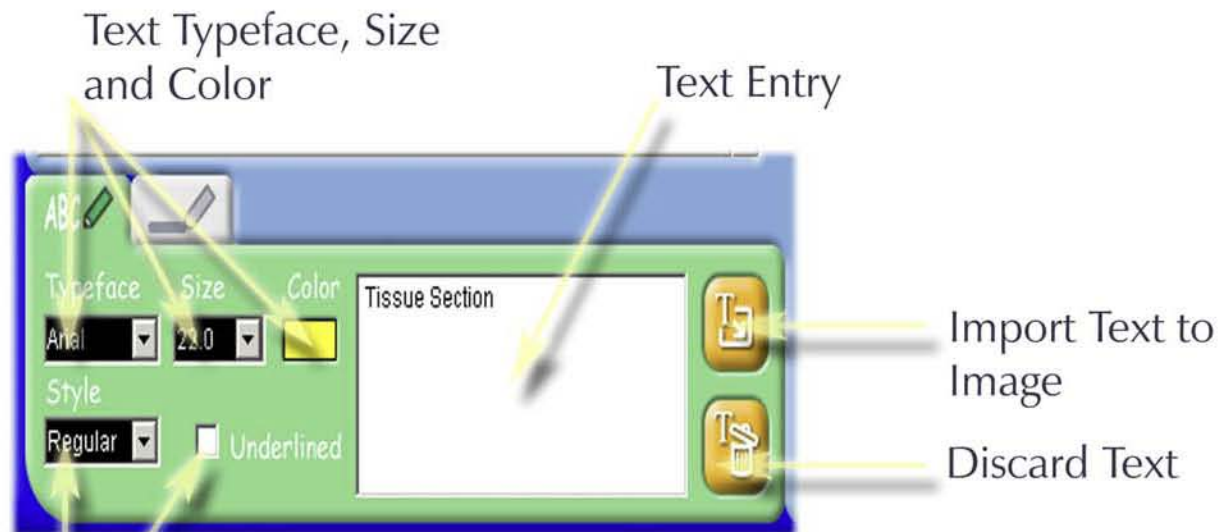


- Cropping
- Rotation
- Digital Zooming
- White & Black Balance
- Color Adjustment
- Brightness
- Contrast
- Sharpness
- Gamma Correction

# MIC-D Software

## Annotation and Line Drawing

Annotation and Line Drawing can be performed easily within the MIC-D Software Image Processing Window. Text Color, Font, Size and Style can be adjusted. Use the Text Color function to maintain contrast with the background image when you are labeling. For instance, if the picture has a black background, choose a yellow coloration. To import a text item, simply click on the 'Import Text to Image' button then click and drag the text to the desired position in the image. For line drawing, select the line style you want, click the Import button and move the mouse cursor to the image. Click once to begin the line and again where you want the line to end. Clicking and dragging imported elements allows you to position them. Clicking on an element and pressing the 'Discard' button erases that element from the image.





# MIC-D Software

## Image Adjustment and Manipulation

Select Area for Cropping/Rotation

Crop Selected Area

Rotate Selected Area

Flip Horizontal

Flip Vertical

Digital Zoom

Zoom

100% 200% 300% 400%

Scale Bar

Information

Reset Selected Function

Information and Scale Bar Color

Include Image Information

Include Scale Bar

Select Point or Area for White or Black Balance Sampling

Select White Balance

Apply White Balance

Select Black Balance

Apply Black Balance

Color Adjustments

Brightness and Contrast Adjustments

# MIC-D Software

## Image Adjustment and Manipulation

Most images that you take will require very little if any adjustment. Remember to enter the White Balance Number (WB#) from the base of the microscope to maximize color rendition. Some important features to note and understand in the Image Processing Window are:

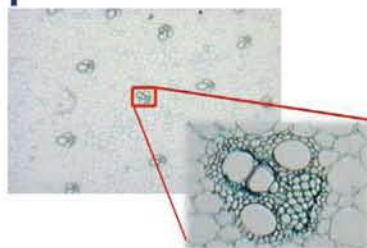
### White and Black Balance

Adjusting the White and Black Balance ensures that corresponding areas of the image are correctly interpreted by the software, so that white areas are 'seen' as being white and 'blacks' as black. To perform a White Balance operation, select an area of the image that you think should be white. This is the region you will tell the processing software it should interpret as being white in case it is tinted. If this area is very small (just a few pixels) then use the 'Point' sampling tool, which will enable you to sample a very small area or point. If the region is larger, use the 'Area' tool to draw a box over a 'white' part of the image. Next, click on the 'Select White Balance' button and draw a box over an area of the image with the cursor that you think ought to appear white. A single click of the mouse over a white area is sufficient if you are using the 'Point' sampling tool. Next, click on 'Apply White Balance'. Note the slight difference in the image. Carry out the corresponding Black Balance adjustment, if you think that there are regions of the image that ought to appear black.

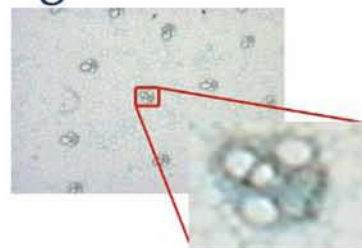
### Digital Versus Optical Zooming

The Digital Zoom is useful for zooming in on a captured image. It is important to note that digital zooming is quite different from optical zooming (performed with the MIC-D Microscope itself.) When you zoom digitally, you are merely enlarging a fixed number of pixels so that they are spread over a larger space on the computer monitor or in print. Detail is not added to the image. Existing detail is merely expanded. So, a ten pixel by ten pixel digital image (100 pixel area) that is blown up two times will still only contain one hundred pixels worth of image information. When an Optical Zoom is increased in power, the light recieved from the actual specimen or sample (containing detail that could not be detected at a lower magnification because it was too small or too fine) is revealed. An area of a specimen that spans a 100 pixels area in the Live Image Window will be seen by four times that number of pixels after two times optical zooming, with four times as much visible detail revealed.

Optical Zoom



Vs. Digital Zoom





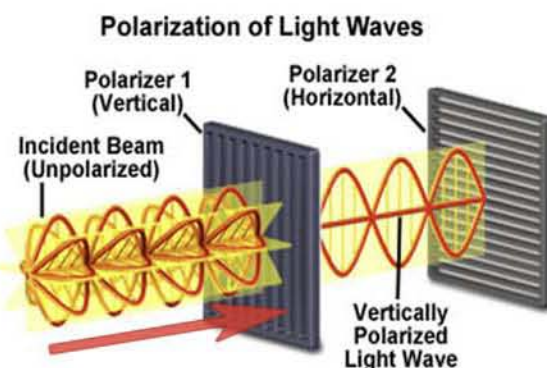
# MIC-D Software

## Polarized Light Kit



The MIC-D Polarized Light Kit consists of a Polarizer and an Analyzer, which are identical to one another. To install the Polarizer, remove the screws to the left and right of the Gliding Stage. Lift the stage from the MIC-D frame and turn it over. The Analyzer screws into the raised section on the underside of the Gliding Stage that surrounds the circular glass window. Replace the Gliding Stage and screws. To install the Polarizer, simply screw it into the threads just beneath the front lens of the Lamp Head.

With the Polarizer and Analyzer installed, turn on the MIC-D and set the Illumination Arm and Lamp Head to the Transmitted Light position. It is recommended that you pull out the Light Diffuser to maximize light intensity. It is also best to turn off the Auto-Exposure setting in the Live Image Window and set the Exposure and the Light Intensity manually for the next step, and to achieve the best possible polarized light image. Remove any specimen or sample from the stage. With one eye on the Live Image Window, rotate the Gliding Stage until the Live Image appears darkest. At the darkest position the Live Image should appear black. If the Live Image does not appear black, slowly reduce the Light Intensity Dial until it does. Now that the Polarizer and Analyzer are “crossed”, you have achieved “Extinction”. Place a specimen or sample that affects polarized light on the stage. Granulated Sugar is a readily available sample that will show up under polarized light. It is recommended that you place polarized light specimens on a microscope slide so that you can rotate them independently of the Gliding Stage. You can rotate the Gliding Stage slightly away from Extinction to “Partially Cross” the Polarizer and Analyzer. This will enable you to better see the entire specimen or sample against a brighter background. You can also tilt the Illumination Arm to obtain an Obliquely Polarized Light Setting.



# Notes

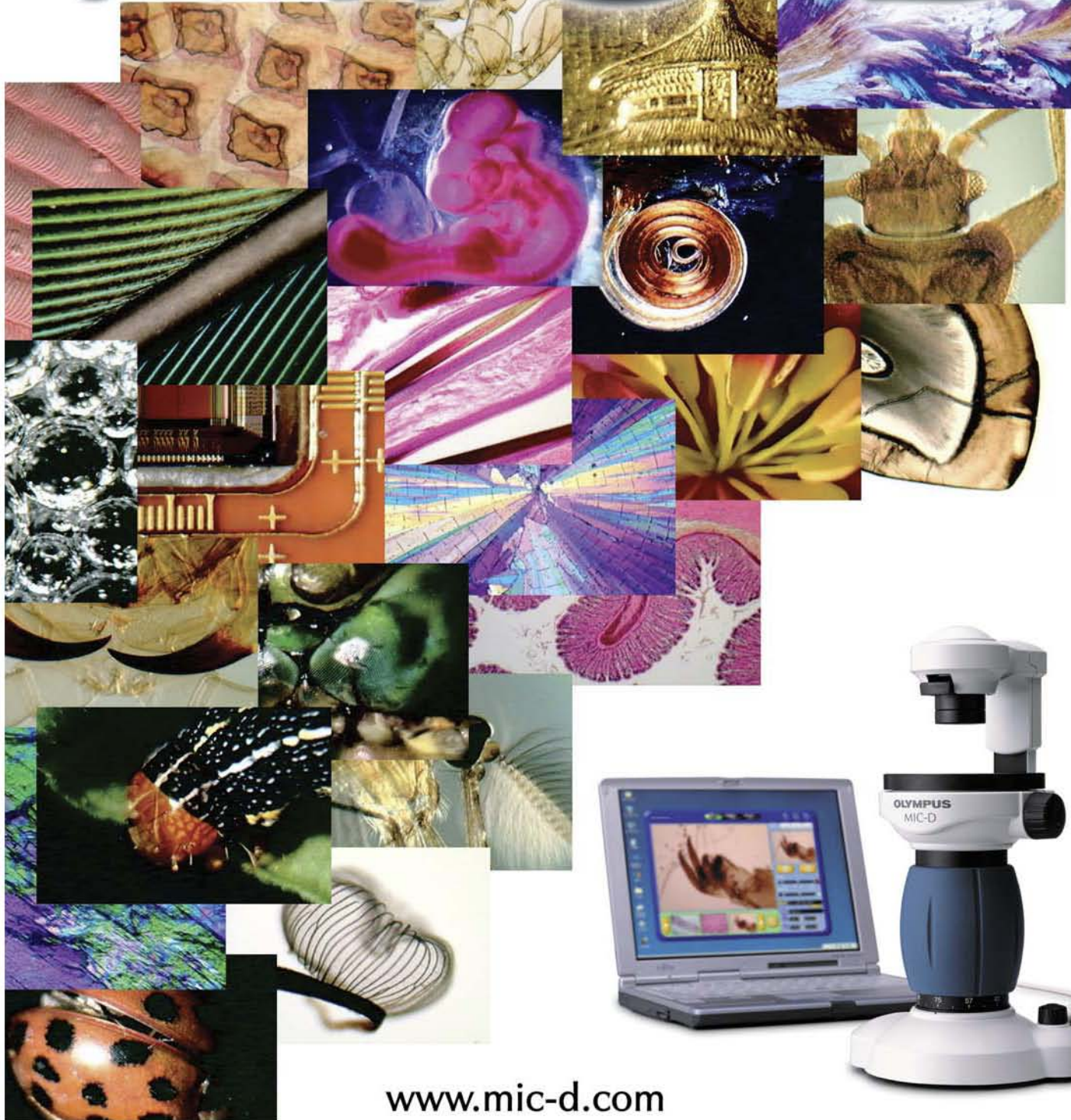
---



# Notes

---

# Digital Microscope MIC-D



[www.mic-d.com](http://www.mic-d.com)

**OLYMPUS**

**OLYMPUS AMERICA INC.**

2 Corporate Center Drive, Melville, NY 11747-3157, U.S.A.  
[www.olympusamerica.com](http://www.olympusamerica.com)