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Release Notes

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TRANSITION TO WINDOWS 10 / NEW JENOPTIK CAMERAS

Microsoft discontinued support of Windows 7 on January 14, 2020. As of 2020, BIOQUANT requires Windows 10 64-bit.

AS OF 2020: BIOQUANT LIFE SCIENCE DOES NOT SUPPORT WINDOWS 7

As of 2020, BIOQUANT Life Science no longer supports Windows 7. Microsoft discontinued support of Windows 7 on January 14, 2020. BIOQUANT Life Science 2021 requires Windows 10 64-bit.

UPDATED COMPUTER REQUIREMENTS

When upgrading to BIOQUANT Life Science 2021, consider whether your computer should be updated. Although older computers might run BIOQUANT Life Science 2021, those that don't meet current specifications will be slower, especially when considering core clock speed.

Here are the current computer requirements and recommendations:

OPERATING SYSTEM REQUIREMENTS

- Windows 10 64bit Pro, Education, or Enterprise. (Windows 8, Windows 7, Windows XP, Mac OS not supported.)

MINIMUM COMPUTER SPECIFICATIONS

- Dell Precision Series Mini-Tower Chassis
- Multi-core Intel Processor: I7 processor or better
- 3.5 GHz core clock speed
- NVIDIA Quadro K620 GPU or better
- 16 GB RAM
- Chassis with room for 1/2 height & 1/2 length PCIe 1X board
- Monitor that supports a 1920x1200 desktop resolution

RECOMMENDED COMPUTER SPECIFICATIONS

- Dell Precision 5000 Series Mini-tower Chassis
- Multi-core Intel Processor: Xeon processor
- 4.0 GHz or higher core clock speed
- NVIDIA Quadro P1000 GPU or better
- 32 GB RAM or more
- Chassis with room for 1/2 height & 1/2 length PCIe 1X board
- Monitor that supports a 1920x1200 desktop resolution

LEGACY QIMAGING CAMERA SUPPORT

QImaging does not support their FireWire cameras under Windows 10.

BIOQUANT will make every effort to support legacy QIMAGING cameras with the current BIOQUANT Life Science 2021 release. However, please be aware that our capacity to help is limited due to those outside constraints.

For the long-term stability of your system, we encourage you to consider upgrading to one of the recommended Jenoptik Gryphax cameras listed below.

JENOPTIK NEXT-GENERATION SCMOS CAMERA SUPPORT

NEW JENOPTIK CAMERA SUPPORT



The graphic features the Jenoptik logo at the top center. Below it, the text 'PROGRES GRYPHAX® PROKYON' is displayed. To the right, three camera models are shown: a square-shaped camera, a smaller cube-shaped camera, and a larger cube-shaped camera. Below the camera images, the text 'Technical data' is followed by a list of 'KEY FACTS'.

Technical data

Explore the micro universe with the flagship.

KEY FACTS

- True color microscope camera 70.719.212.3 MPix
- 60 fps at 7.3 MPix
- Pixel size 5.86 x 5.86 µm
- Dynamic range 73.3 dB
- 1/1.2" SONY sensor (back-illuminated)
- Global shutter
- Software included

JENOPTIK GRYPHAX® CAMERAS

We are excited to announce support for the **biggest camera technology upgrade** since the introduction of the first high resolution digital cameras.

BIOQUANT now supports the PROKYON, KAPELLA, and SUBRA cameras from Jenoptik.

These Jenoptik cameras all use a next generation **scientific CMOS** sensor that eliminate the compromises inherent in all the prior CCD sensor cameras.

These cameras can deliver a full 1920x1200 resolution image at between 30 and 60 frames per second. This is **2X to 4X faster** than current cameras at **4X the resolution**.

In BIOQUANT, supported Jenoptik cameras provide a live image at **1280x960** to the Image Window with optional **1920x1200** image capture. The PROKYON camera model adds additional capture sizes of **3840 x 2400** and **5760 x 3600**.

THREE AVAILABLE MODELS TO FIT ANY BUDGET

The flagship **Prokyon** model offers a special 20 megapixel mode through pixel-shifting in addition to the native live image at 1920x1200 60 fps with fan-less cooling. The **Kapella** camera keeps the fan-less cooling but saves money by removing the 20 megapixel imaging mode. The **Subra** model is even more economical than the Kapella by removing the fan-less cooling.

	JENOPTIK PROKYON	JENOPTIK KAPELLA	JENOPTIK SUBRA
Model Number	KIT1-PRO	KIT1-KAP	KIT1-SUB
Sensor Specifications			
Sensor Model	Sony IMX174	Sony IMX174	Sony IMX174
Sensor Design	Scientific CMOS	Scientific CMOS	Scientific CMOS
Sensor Size	1920x1200	1920x1200	1920x1200
Frame Rate	60fps	60fps	30fps
Pixel Size	5.8 microns	5.8 microns	5.8 microns
Image Specifications			
Capture Resolutions	5760x3600 3840x2400 1920x1200	1920x1200	1920x1200
Exposure Control	26 us to 60 s	26 us to 60 s	26 us - 30 s
Cooling	Fanless	Fanless	N/A
Gain Control	1X - 30X	1X - 30X	1X - 10X
Exposure Control	Auto Exposure	Auto Exposure	Auto Exposure
Color Correction	Auto White Balance	Auto White Balance	Auto White Balance
Data and Power Interface Specifications			
Bit Depth	8bits / channel + HDR	8bits / channel + HDR	8bits / channel + HDR
Bus Type & Power	USB3.0 + 4.5W	USB3.0 + 4.5W	USB3.0 + 4.5W
Physical Specifications			
Mount Type	C-Mount	C-Mount	C-Mount
Dimensions	85mm x 75mm x 50mm	85mm x 75mm x 50mm	85mm x 75mm x 50mm
Warranty Information			
Warranty Term	24 months	24 months	24 months

Contact us for Pricing and Upgrade Discounts.

LIMITED TIME CAMERA TRADE-IN DISCOUNT PROMOTION

BIOQUANT and Jenoptik offer a trade-in discount for QIMAGING cameras toward the purchase of a new Jenoptik camera. Every QIMAGING camera sold with a BIOQUANT system, and many others, qualifies for this trade-in discount promotion. Discount amounts range from **\$690 to \$1990** depending on the Jenoptik camera model purchased. Please act quickly, this is a limited time promotion.

MAJOR NEW FEATURES

BIOQUANT LIFE SCIENCE: NEW EXPANDED OME-TIF SUPPORT

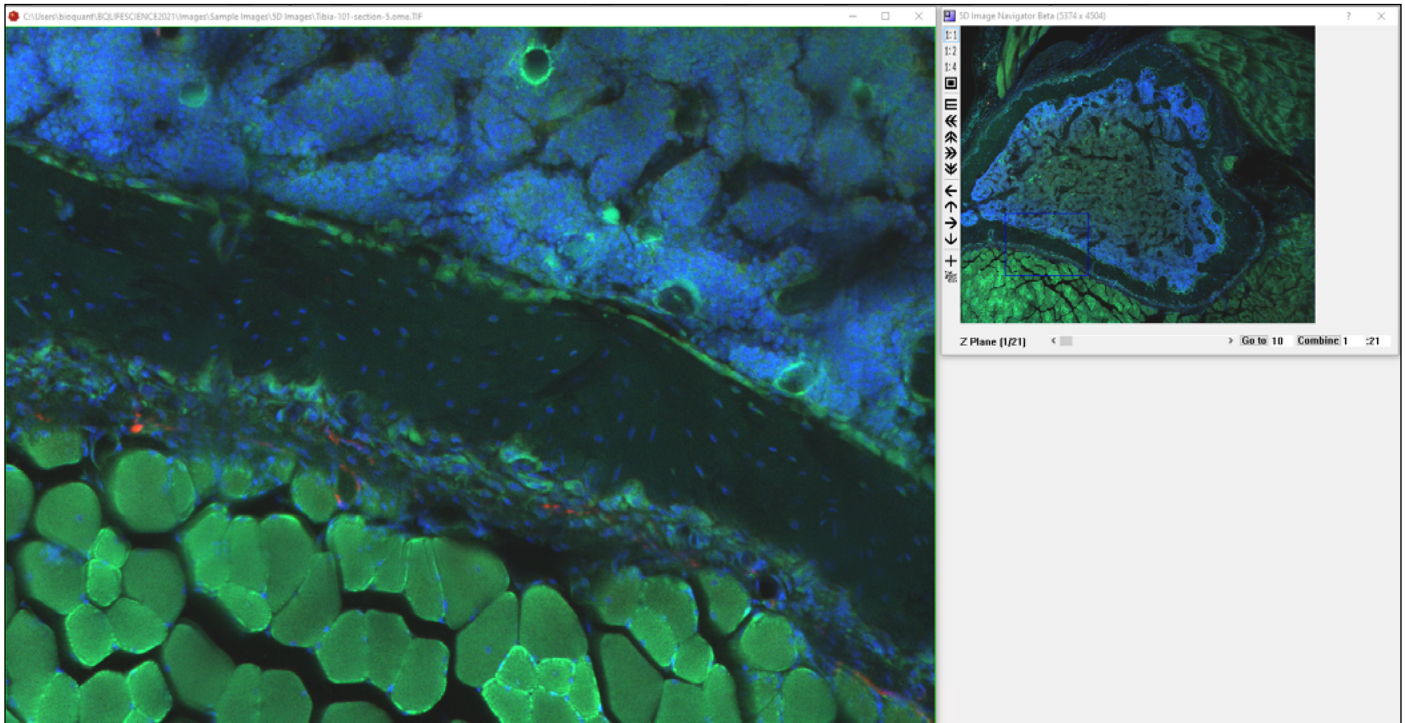
BIOQUANT has expanded support for multi-dimensional image data from confocal and light sheet microscopes. BIOQUANT 2021 now supports both single file and multiple file OME-TIFs.

ABOUT CONFOCAL AND LIGHT SHEET DATA

New optical clearing techniques for in-tact bone have made the use of confocal microscopy possible in previously inaccessible bone samples. Labs are now leveraging confocal microscopy in bone to explore solutions to previously intractable questions.

Simultaneously, a new generation of microscope systems called Light sheet microscopes are starting to collect enormous image data sets of entire bones with multiple fluorescent labels and multiple Z depths at sub-micron resolutions.

5D IMAGE NAVIGATOR - CORTICAL BONE INNERVATION.OME.TIF*



A high magnification view of a cortical bone cross-section showing nerve distribution along the periostium and across the cortical bone. Composite image of 5 Z planes and 3 different fluorescent labels.

* CORTICAL BONE INNERVATION.OME.TIF

Multi-channel Confocal Stack of Cortical Bone Innervation by Erica Scheller and Washington University in St. Louis (<https://sites.wustl.edu/schellerlab/>) is licensed under CC BY 4.0. To view a copy of this license, visit <https://creativecommons.org/licenses/by/4.0>.

THE DETAILS OF 5D IMAGING

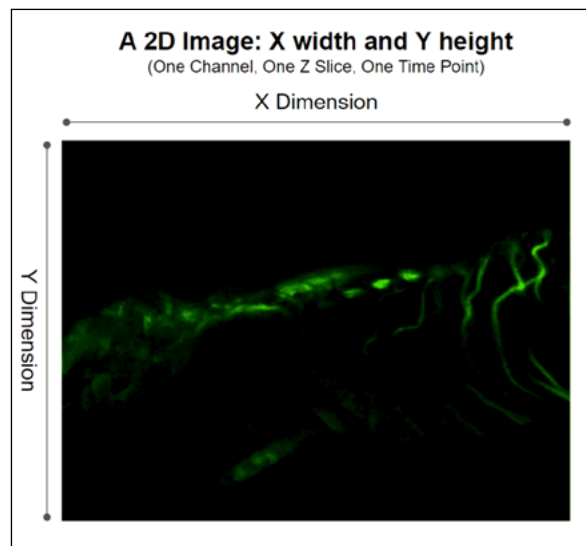
NEED AN INTRODUCTION TO 5D IMAGING?

Watch the “Introduction to 5D Imaging Video.” In the Image region, click the > button to open the Tutorial Videos.

5D imaging is a strategy for organizing images of fluorescent samples. The 5 dimensions we’re talking about are x width, y height, c fluorescent channel, z focal plane, and t time point.

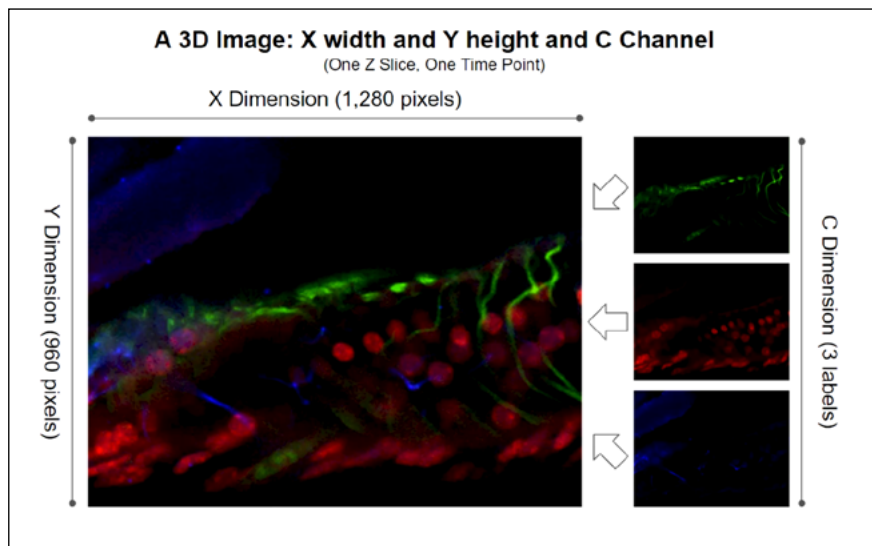
The simplest images is an area of a sample with a single fluorescent label at a single focal plane at a particular time. As you add more fluorescent channels, add more Z planes, and add more time points, the number of dimensions expands from 2 to 5. The following series of diagrams helps to explain.

DETAILS OF 5D IMAGING: A 2D IMAGE



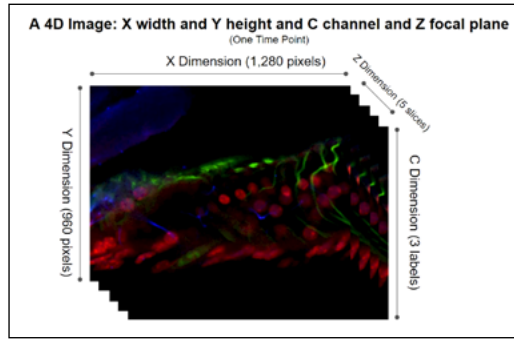
A single fluorescent label at a single focal point at a particular time creates a 2D image.

DETAILS OF 5D IMAGING: A 3D IMAGE



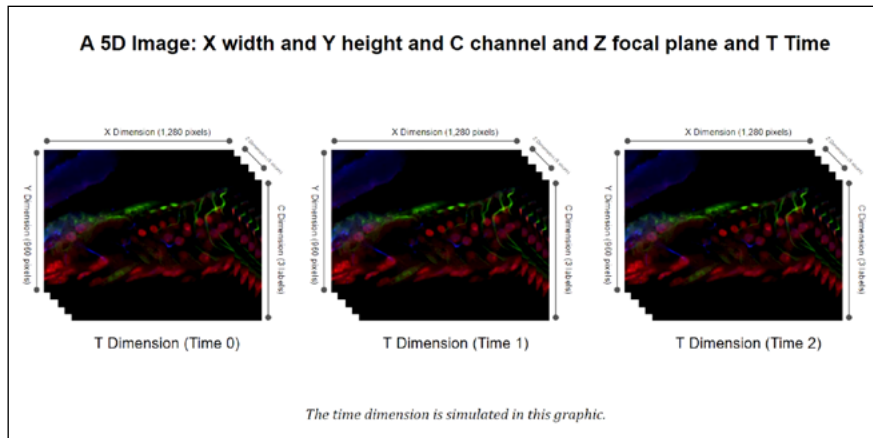
Three fluorescent labels at a single focal point at a particular time create a 3D image.

DETAILS OF 5D IMAGING: A 4D IMAGE



Three fluorescent label at a five focal points at a particular time creates a 4D image.

DETAILS OF 5D IMAGING: A 5D IMAGE



Three fluorescent label at a five focal points at 3 distinct time points creates a 5D image.

Confocal and light sheet microscopes can collect many images of a sample each representing different combinations of XYZ, and T. These images can easily reach multiple gigabytes in size.

To simplify moving all that data around, a few different solutions have emerged.

- **Confocal and light sheet companies made their own proprietary file formats.**
- **ImageJ created Hyperstacks using the TIF format. Hyperstacks are a way to store 5D data in TIF files.**

Missing from ImageJ's approach was a more complete way to store the necessary information describing all the various images in the file. So the folks at the Open Microscopy Environment project created OME-TIF.

- **OME-TIF uses the basic idea of storing multiple images in a single TIF file, but adds a formal framework for storing all the necessary information about those images in the same TIF file. This information is called metadata.**

The BIOQUANT 5D Image Navigator supports the OME-TIF format.

We chose this format because the Open Microscopy Environment project also made a free ImageJ plugin called BIO-FORMATS which can convert just about every other 5D format into OME-TIF. That allows BIOQUANT to support the broadest array of 5D data.

BIOQUANT LIFE SCIENCE EXPANDED SUPPORT FOR THE OME-TIF FORMAT

BIOQUANT Life Science now supports both single file and multiple file OME-TIFs. The previous version of BIOQUANT only supported single file OME-TIFs.

CONVERT TO SINGLE FILE OME-TIF

To create a single file OME-TIF, use the BIO-FORMATS exporter in Image J to convert the image file(s) from your light sheet or confocal microscope to an single OME-TIF by NOT checking each of the three “write to separate file” check boxes.

Currently BIOQUANT can open OME-TIF files up to 4 GB. For a video, see “5D Image Navigator: Converting to the OME-TIF Format” below.

CONVERT TO MULTIPLE FILE OME-TIF

To create a multiple file OME-TIF, use the BIO-FORMATS exporter in Image J to convert the image file(s) from your light sheet or confocal microscope to an OME-TIF sequence by checking each of the three “write to separate file” check boxes.

Currently BIOQUANT can open OME-TIF sequences where the total size of all images is less than 4 GB.

OPENING AN OME-TIF FILE/FILE SET

Multi-dimensional image data in the OME-TIF format is loaded into the 5D Navigator using with one of the following options:

- **In the Image region, from the Sequence menu, choose “Open OME TIF File to 5D Image Navigator” menu item to open a single OME-TIF file.**
- **In the Image region, from the Sequence menu, choose “Open OME TIF Sequence to 5D Image Navigator” menu item to open a single OME-TIF file.**

5D NAVIGATOR VIDEOS AVAILABLE

To access the videos, in the Image region, click the > Video Help button.

5D IMAGE NAVIGATOR: CONVERTING TO THE OME-TIF FORMAT

.....
This video covers converting your confocal or light sheet image series to the OME-TIF format using the BIO-FORMATS exporter in Image J.

5D IMAGE NAVIGATOR: INTRODUCTION AND OPENING AN OME-TIF FILE

.....
This video covers opening the OME-TIF file/sequence into the 5D Image Navigator.

5D IMAGE NAVIGATOR: MEASUREMENT OVERVIEW

.....
This video walks you through a sample measurement protocol using the 5D Image Navigator.

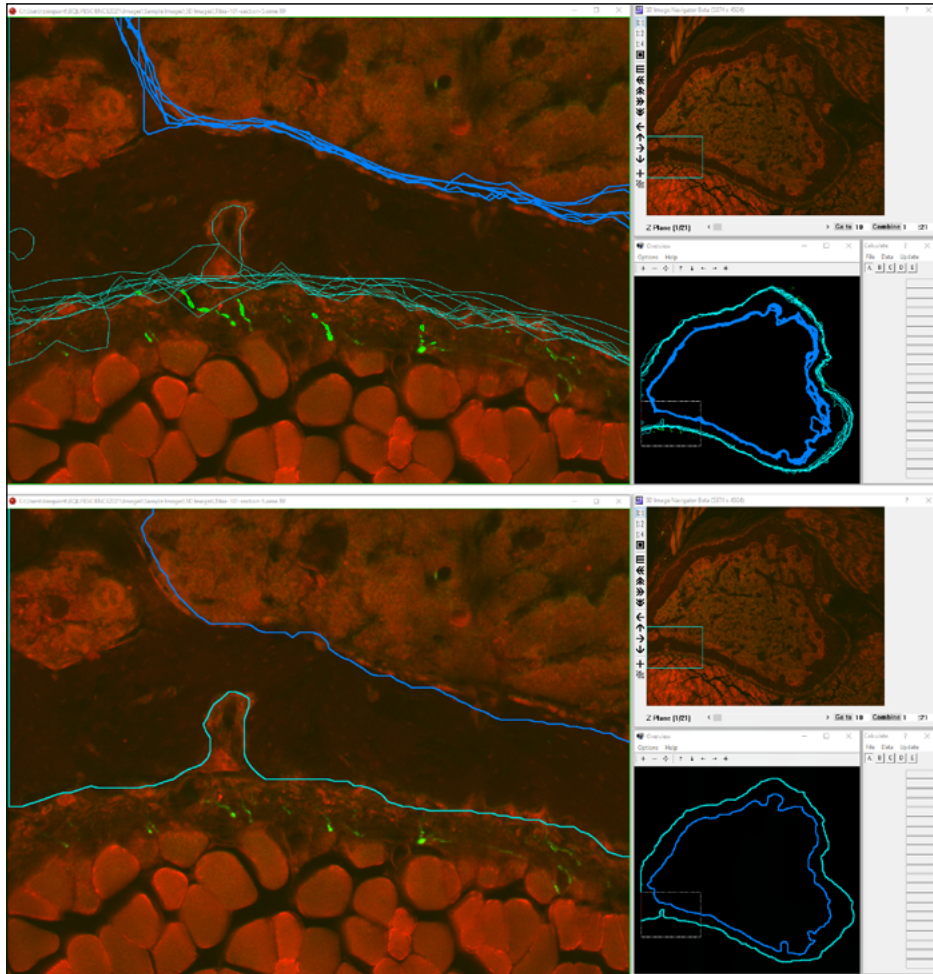
BIOQUANT LIFE SCIENCE: NEW REDRAW / OVERVIEW Z OFFSET SUPPORT

The following new Redraw menu items and Overview window menus make it easier to navigate 5D image data by only showing the measurement tracings for the current Z position. The current Z position is shown in the Parameters region, in the Z Offset field.

This feature can also be used to redraw at different Z positions in physical sections, as well as to redraw at different Z Positions in the Dicom Navigator.

NEW REDRAW MENU ITEMS FOR Z OFFSET

BEFORE AND AFTER REDRAW CURRENT Z OFFSET



Top: all tracings appear. Bottom: only the tracings from the current Z position appear.

- **Topography> Assign System Redraw> All at Current Z Offset**

Assigns the Image region Redraw button to redraw all the measurement tracings at the current Z Offset in the Parameters region that were measured into the current Topo array. The current Z Offset and current Topo Array are designated in the Parameters region.

If Topography> Assign System Redraw> Clear All + Redraw is also checked, then existing thresholds and tracings are cleared before the measurement tracings located at the current Z

position are displayed. This option is checked by default.

This feature is useful when navigating through the Z Planes of a confocal or light sheet image set loaded into the 5D Image Navigator because it keeps measurement tracings from other Z positions from overlapping the measurements tracings of the current Z position. Likewise, this feature also supports navigating through the Z Offset of physical serial sections and navigating through Z Positions in the Dicom Navigator.

- **Topography> Redraw> All at Current Z Offset**

The Topography> Redraw> All at Current Z Offset menu item redraws measurement tracings at the current Z Offset for all sections in the current Topo array. The current Z Offset and current Topo Array are designated in the Parameters region. It does not clear away other tracings first. (For this capability, use the Topography> Assign System Redraw>All at Current Z Offset menu above.)

This command is useful when you want to redraw the tracings measured at the current Z Offset on an image without clearing its threshold or other tracings.

NEW OVERVIEW MENU ITEM FOR Z OFFSET

- **Overview Window> Options Menu> Redraw Current Z Offset**

When this option is on, the Overview window displays only the measurement tracings located at the current Z offset on the Parameters region. If this option is off, then all the tracings are displayed in the Overview window.

This feature is useful when navigating through the Z Planes of a confocal or light sheet image set loaded into the 5D Image Navigator because it keeps measurement tracings from other Z positions from overlapping the measurements tracings of the current Z position. Likewise, this feature also supports navigating through the Z Offset of physical serial sections, as well as Z Positions in the Dicom Navigator.

BIOQUANT LIFE SCIENCE: NEW AUTO SURFACE MEASUREMENT TYPE

NEW MEASUREMENT TYPE: AUTO SURFACE

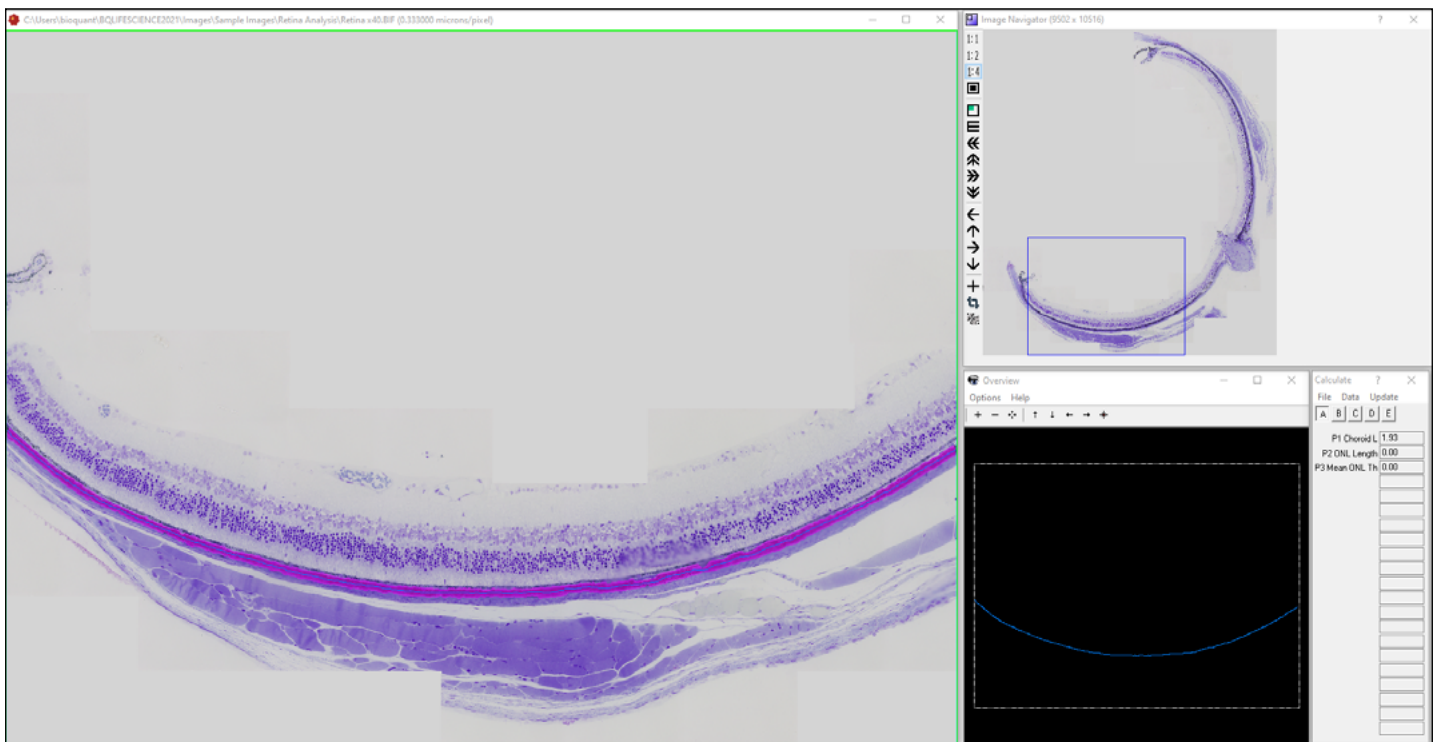
Auto Surface is a new Measurement Type. It automatically generates length measurements for on thresholded objects. Previously, to measure the length of an object, the standard solution was to measure the perimeter of the object and divide by 2. With Auto Surface, BIOQUANT directly measures the length along the mid-line of an object.

AUTO SURFACE TUTORIAL: RETINA ANALYSIS

Once common use of the Auto Surface tool is to measure the length of a complex layer using either automatic or manual thresholding. This reduces the amount of manual tracing required to collect data. This tutorial is useful for all applications to learn how the Auto Surface works.

1. In the Data region, click the Data Set button and choose Open Tutorial Data Set.
2. Open the “Auto Surface - Retina” data set.
3. Follow the tutorial script to see how Auto Surface works.

AUTO SURFACE MEASUREMENTS IN THE RETINA



The pink threshold on the choroid layer of the retina was computed automatically. Auto Surface traced and measured the line running down the middle of the layer.

BIOQUANT SCAN: NEW SCAN MULTIPLE AREAS & SKIP EMPTY FIELDS

A new method, “Scan by Topo” has been introduced. It allows for quickly defining multiple scan areas using area tracings made at low magnification.

SCAN BY TOPO: SCAN MULTIPLE SECTIONS FASTER

This method allows scan areas to be quickly marked out using the lowest power objective on the microscope, then automatically scanned with you preferred imaging objective, usually 20X or 40X.

Up to 8 different scan areas can be scanned in one session.

This also means that BIOQUANT SCAN now skips all fields of view that are not in the scan area, significantly speeding up scan times. Previously, BIOQUANT SCAN collected an image of each field of view in a rectangle that contained the scan area. Since tissue sections are rarely rectangular, a lot of those fields of view were blank.

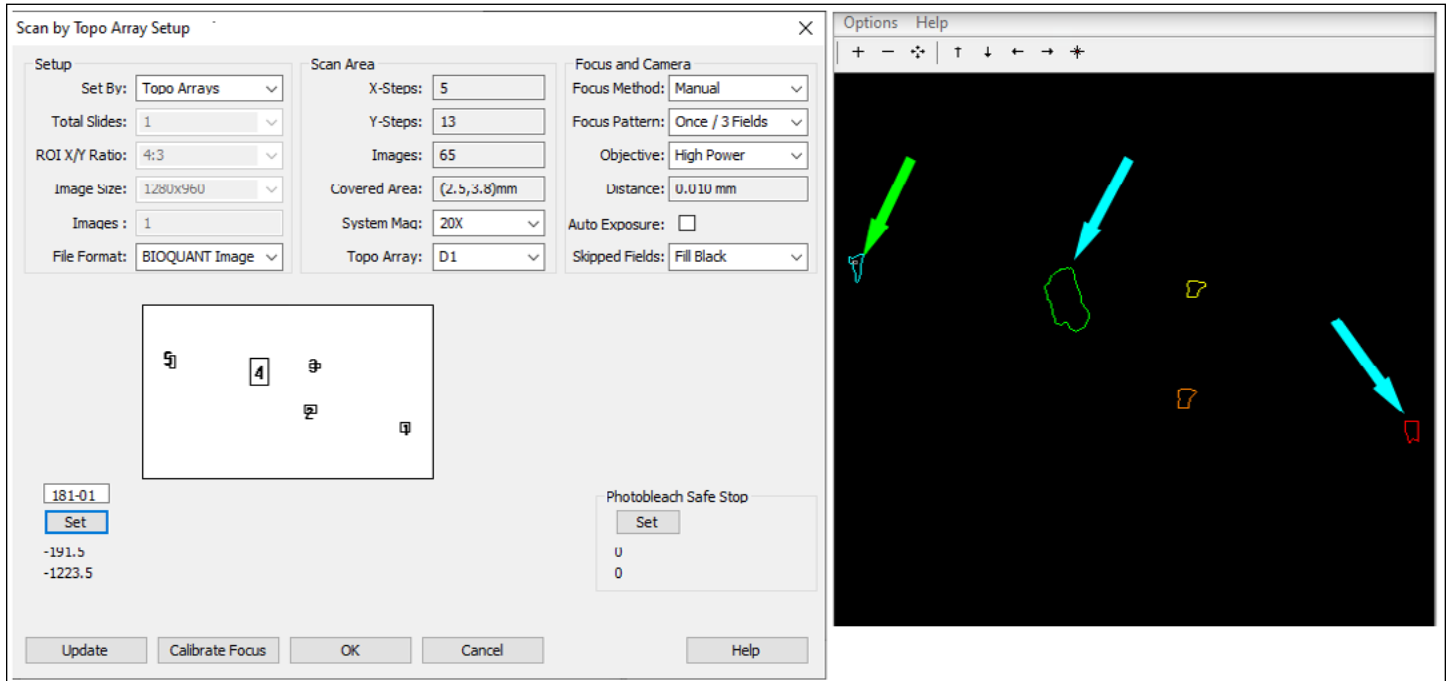
SCAN BY TOPO: A TECHNICAL EXPLANATION

BIOQUANT SCAN uses the first 8 area tracings stored in a topo array. Topo arrays are the D# arrays that store measurement tracings in BIOQUANT. These tracings are stored automatically when the Measure button is clicked in the Measurement region.

A new data set template, called the “Scan Areas Template” has been added. It has a Topo array and 8 color-coded Area arrays. The area arrays are color-coded in rainbow order: red, orange, yellow, green, cyan, blue, indigo, violet. This helps keep track of the order of the scanned areas in the Overview window.

Using a low power objective, the Manual measurement type, and a live image, it’s simple and fast to define the scan areas. The topo array is read by BIOQUANT SCAN to control the scanning algorithm.

THE SETUP BOX FOR THE NEW SCAN MODE: SET BY TOPO



Note the 5 scan areas identified in the SCAN setup preview graphic and the Overview window. They are numbered on the preview graphic and color-coded to match on the Overview window. The You are Here box on the Overview window shows the system's current location. The green arrow points to the "You are Here" box. The light blue arrows point to two of the scan areas.

QUICK PROTOCOL FOR SCAN BY TOPO: DEFINING SCAN AREAS

1. Put up to 4 slides on the stage.

The 4 slide holder fits 4 75x25mm slides vertically. The rotating slide holder holds 2 75x25 slides in any orientation.

2. Create a data set using the new "Scan Areas Template" data set.

3. Activate the stage and camera.

4. Select the lowest power objective on the microscope.

5. Adjust the exposure time and white balance.

We'll configure background correction on the high power objective, after the scan areas have been defined.

6. Using the Manual measurement type, with "Live Manual Measure" and "Spacebar to End" turned on, trace the first scan area across as many fields of view as needed. When you get close to the start of the tracing, tap the space bar to close it.

If the first scan area is larger than a field of view, use the M key on the keyboard or the joystick to move the stage. The M key is faster: You tap the M key, then click near the end of the tracing, then click where you want the tracing to move, and the stage will move. The M key is faster as

you do not have to take your hand off the mouse and the system automatically redraws after moving.

7. After the first scan area is traced move to the next scan area and repeat.

The Overview window will show a map of your current position and the scan areas that you've defined so far.

QUICK PROTOCOL FOR SCAN BY TOPO: SCANNING

1. Once the scan areas are defined, switch to the objective you want to use for scanning.

2. Move to a blank part of the slide, adjust the exposure, white balance, and enable background correction.

3. From the Scan menu, choose Scan Multiple Slides.

4. On the Scan Multiple Slides box, type in a project name and then click Setup.

5. On the Scan Multiple Slides Setup box, from the Set By drop list, choose "Topo Arrays"

6. Enter the prefix for the image file names.

The BIF files created by the scan will be named [prefix]01Montage.bif, [prefix]02Montage.bif, etc.

7. Click the Set button to read in the scan areas from the topo array.

There's a drop list that shows the topo arrays in the dataset. The scan template only has one topo array, so there's nothing to choose but you could make a custom template that has multiple topo arrays.

For example, you could make a data set that has one topo array for each group of slides scanned. Then you'd have a permanent record of the scan areas and could rescan anything you needed quickly.

8. Make any adjustments you want to the auto focus.

9. Choose white or black to fill in the empty fields of view.

10. Click OK to close the Setup box.

11. Click Start to begin scanning.

You can always click the Pause and Back buttons to have the system back up and rescan a region.

12. A message box will let you know when the scans are done.

The "You are Here" box in the Overview window acts as a progress indicator showing you where the system is relative to all the defined scan area.

BIOQUANT SCAN: NEW COOLED FLUORESCENCE ILLUMINATOR CONTROL

BIOQUANT SCAN can now control the CoolLED pE-300 White fluorescence light source.

The pE-300 is a multi-channel LED fluorescence excitation light source. Since it is an LED light source, it has an extremely long life. Since it a multi-channel light source, the excitation strength of each fluorochrome can be adjusted individually.

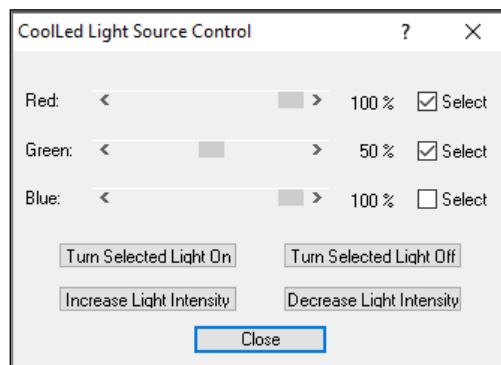
This means that when working with multi-label mineralizing surfaces, you can turn down the brightness of the calcein label and turn up the brightness of the alizarin red label **at the light source**. This helps preserve the sample and simplifies camera settings. There no need now to use camera settings to adjust the relative brightness of labels in the image.

THE COOLED PE-300 WHITE FLUORESCENCE ILLUMINATOR



The brightness of each fluorochrome (red, green, blue) can be adjusted in the light source. This significantly simplifies imaging.

COOLED SETUP BOX



The excitation brightness for each fluorochrome is adjustable. Each fluorochrome can be turned on and off individually. All the light can be turned on and off.

QUICK PROTOCOL FOR COOLED SETUP

1. From the Scan menu choose, Cooled Setup.
2. Move the sliders to adjust the brightness of the excitation for each fluorochrome.
3. Alternatively, use the remote control pod to make comparable adjustments.

MAJOR ENHANCEMENTS

BIOQUANT LIFE SCIENCE: “M” TOOLBAR ENHANCEMENTS

The following enhancements have been made to the Motorized Stage “M” toolbar.

ENHANCEMENT: MOTORIZED STAGE TOOLBAR IS LARGER

The Motorized Stage “M” Toolbar is larger, making the icons easier to click.

M TOOLBAR



Icons are now larger.

To open the “M” Toolbar, you need a supported motorized stage.

From the Topography menu, choose “Open Motorized Stage Toolbar...” to open the toolbar.

ENHANCEMENT: COARSE / FINE MOVE STAGE NOW REDRAWS TOPO

The Coarse Move, Fine Move, and “Move Stage by Clicking Two Points” tools (the first 9 buttons) on the M Toolbar now automatically redraw the Topo data after the stage finishes moving.

The Stereology move tools (last four icons) already redraw the stereology grid and dissection.

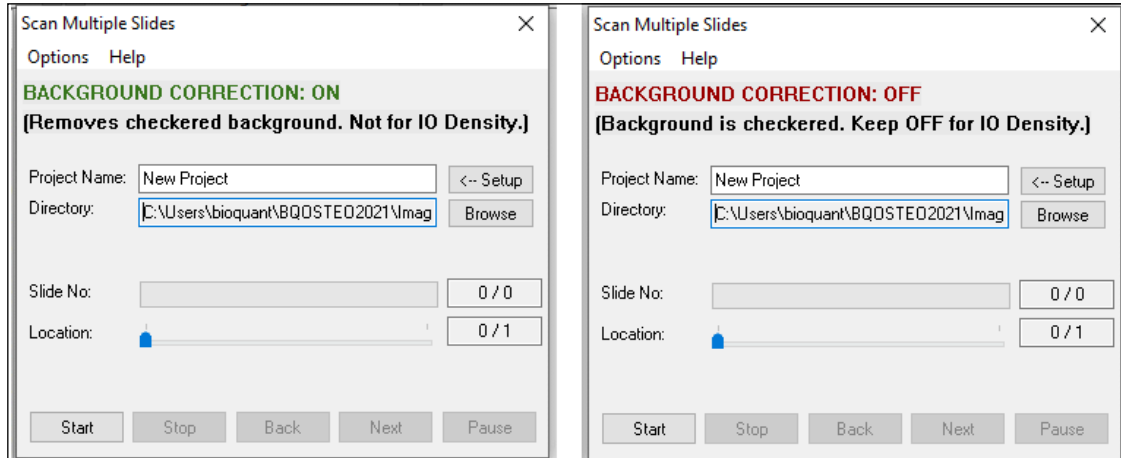
BIOQUANT SCAN: BACKGROUND CORRECTION INDICATOR ENHANCEMENT

The following enhancements have been made to the BIOQUANT SCAN add-on.

BACKGROUND CORRECTION INDICATOR ENHANCEMENT

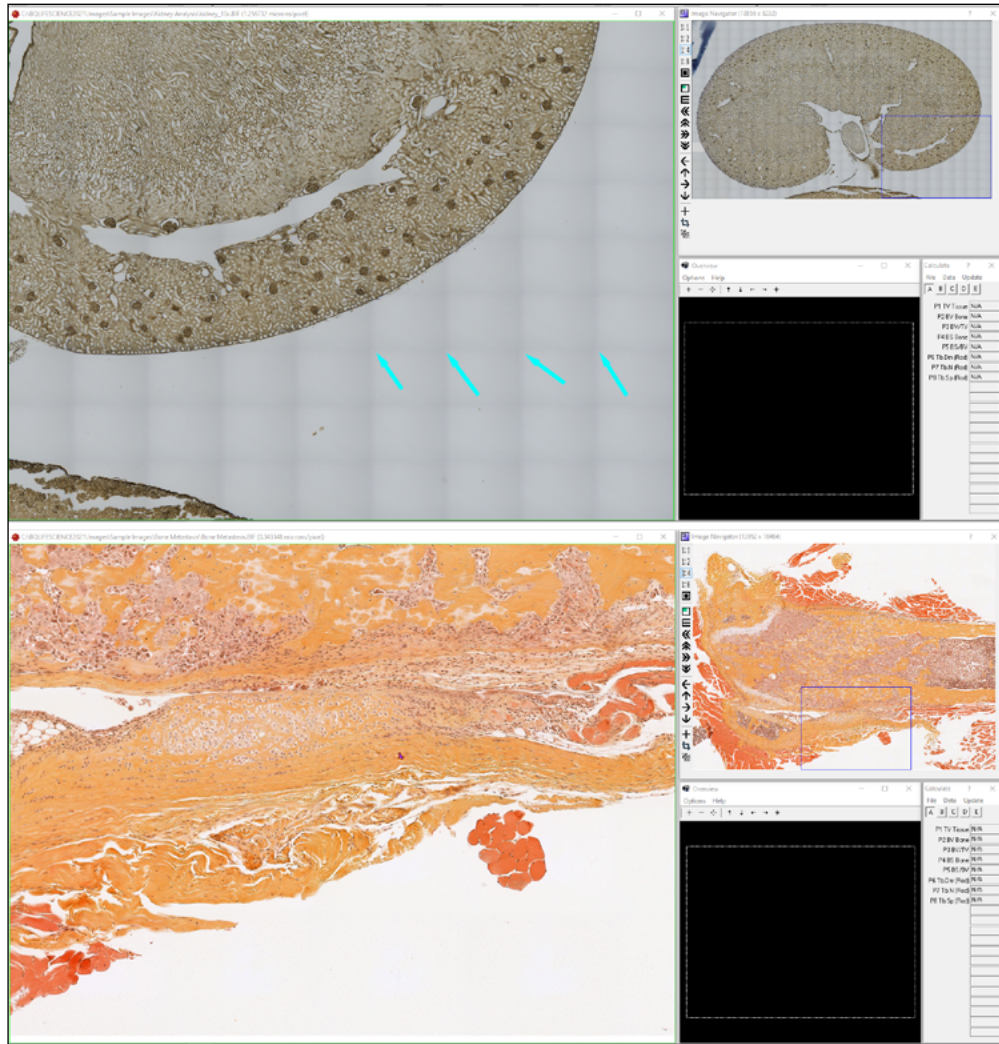
For bright field scans, the Scan Multiple Slides and Scan Well Plate boxes now have a Background Correction indicator that reminds you to save a background image and turn on Activate Capture Correction on the Background box.

BACKGROUND CORRECTION INDICATOR



Background correction is necessary for a seamless bright field scan. It removes subtle uneven lighting from each field of view. If you'll be collecting density data, contact technical services to discuss the details.

BACKGROUND CORRECTION FIXES THE UNEVEN LIGHTING CHECKERBOARD



The image on the top shows the checkerboard pattern (light blue arrows) that's created by uneven lighting in individual fields of view.

The image on the bottom shows what a properly corrected scan should look like.

EXCEPTIONS - WHEN BACKGROUND CORRECTION SHOULD BE OFF

The indicator is for bright field scanning only. Fluorescent scans do not use Background Correction. If you are capturing fluorescent scan, the indicator should read **BACKGROUND CORRECTION: OFF** in red.

In addition, if you are measuring Integrated Optical Density, the indicator should read **BACKGROUND CORRECTION: OFF** in red. Integrated Optical Density does use the background in its calculation, and a background image should be saved. However, Enable Capture Correction must be off. You will not be able to correct for uneven lighting in your SCAN.

UPDATED DOCUMENTATION

All BIOQUANT Scan Protocols have been revised and updated in the manual. Review updated protocols to ensure that your system has been optimized for camera and lighting.

MINOR ENHANCEMENTS / ISSUE RESOLUTIONS

The following minor enhancements and issue resolutions have been made to the software.

BIOQUANT LIFE SCIENCE: MINOR CHANGES

1. **Enhancement: The 5D Navigator and Image Navigator Setup box no longer shares fields.**

Previously, the 5D Navigator and Image Navigator Setup box shared the following fields:

- Coarse Move Step (% of Pan Box)
- Fine Move Step (% of Pan Box)
- Coarse Move Step (Cells / Fibers)
- Pan Box/Cross Color

Now, these fields are unique. If you change them in the 5D Navigator Setup box, they no longer also change in the Image Navigator Setup box.

2. **Enhancement: The Option>Reset Parameters menu resets Redraw Current Z Offset options**

When you click Reset Parameters on the Options menu, the system is reset to default parameters. The following features associated with redrawing the current Z Offset are now reset:

- Topography>Assign System Redraw>Current Topo Array resets to checked.
In effect, this also unchecks Topography>Assign System Redraw>All at Current Z Offset.
- On the Overview window, the Options>Redraw Current Z Offset resets to unchecked.

3. **Issue Resolution: The Installation Program did not allow numbers or symbols as the first character in the First Name, Last Name, Position, or Institution fields.**

There have been several user facilities that have numbers as the first character in their name.

Previously, the First Name, Last Name, Position, and Institution fields were required to contain text that began with a letter.

This issue has been resolved.

4. **Issue Resolution: Measuring IO Density with background from unsaved image from the Jenoptik Camera now supported.**

Previously the system would allow Jenoptik Camera users to save a background with capture correction disabled on an **unsaved** image. However, when attempting to measure IO Density, a message would open that stated, "A Background image is required for IOD Measurement." This has been resolved.

Previously this protocol worked with QImaging Cameras. It also worked saved images from Jenoptik cameras.

5. Issue Resolution: Multi-Band Threshold: RGB values on Threshold region now update when View next to Band is clicked

On Multi-Band Threshold, next to each Band is a “View” button.

When you click the “View button” the threshold graphic overlay in the Image window updates to match that band.

However, the RGB values on the Threshold region did not update to match the graphic overlay in the Image window.

This has been resolved.

6. Issue Resolution: Multi-Band Threshold: After the New button is clicked, the MBT File field is cleared.

Previously, on Multi-Band Threshold, when the New button is clicked, the MBT File field would still display the prior loaded MBT File name, even though it was no longer open. Now, when the New button is clicked, the MBT File field is empty.

BIOQUANT TOPOGRAPHER: MINOR CHANGES

1. The default tracing colors used in BIOQUANT Life Science are now also used in the BIOQUANT Topographer add-on.

In earlier versions of BIOQUANT Life Science, the list of colors available for measurement tracings was updated to provide a broader color palette to increase contrast with different stains. The BIOQUANT Topographer add-on continued to use the original color palette.

The BIOQUANT Topographer add-on’s color palette has been updated to match BIOQUANT Life Science 2021’s color palette.

BIOQUANT SCAN: MINOR CHANGES

1. Enhancement: Scan Multiple Slides - Set by Center - Set 1 button no longer updates other center values.

On the Scan Multiple Slides box, the Set 1 button under the first slide no longer automatically sets the positions of the other slides.

Previously, when the Set 1 button was clicked, it would increment the center X value accordingly and set the centers of the other slides. If the scan centers were set from right to left, then this would overwrite the previous scan centers.