



# Cairn MultiSplit V3 Manual

August 3, 2017

# Contents

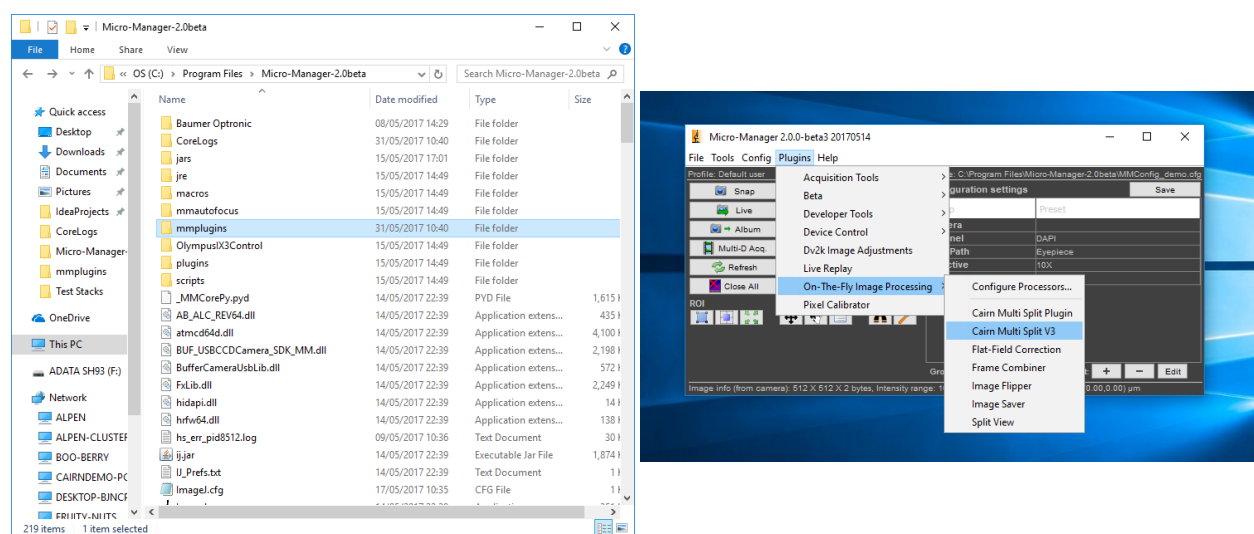
<b>1</b>	<b>Introduction</b>	<b>1</b>
<b>2</b>	<b>Installation</b>	<b>1</b>
<b>3</b>	<b>Opto-Split</b>	<b>1</b>
3.1	Basic Use . . . . .	1
3.2	AutoSplit . . . . .	3
3.3	Reset . . . . .	3
3.4	Reopen Reference/Redraw ROI . . . . .	3
3.5	Saving/Loading Splits . . . . .	3
3.6	Profiles . . . . .	3
3.7	Help . . . . .	4
<b>4</b>	<b>Twin-Cam or Multi-Cam</b>	<b>4</b>
4.1	Reset . . . . .	4
4.2	Reopen Reference/Redraw ROI . . . . .	4
4.3	Saving/Loading Splits . . . . .	4
4.4	Profiles . . . . .	4
4.5	Help . . . . .	4
<b>5</b>	<b>Licence</b>	<b>4</b>
<b>A</b>	<b>Updating the Version of ImageJ Shipped with <math>\mu</math>Manager</b>	<b>5</b>
<b>B</b>	<b>Setting up Multiple Cameras in <math>\mu</math>Manager</b>	<b>5</b>

# 1 Introduction

Cairn MultiSplit V3 is designed to provide a simple and intuitive way to process data obtained a Cairn OptoSplit, TwinCam or MultiCam from within  $\mu$ Manager 2.0.  $\mu$ Manager 2.0 is currently in beta. The Latest nightly build can be downloaded from <https://valelab4.ucsf.edu/~MM/nightlyBuilds/2.0.0-beta/Windows/>

## 2 Installation

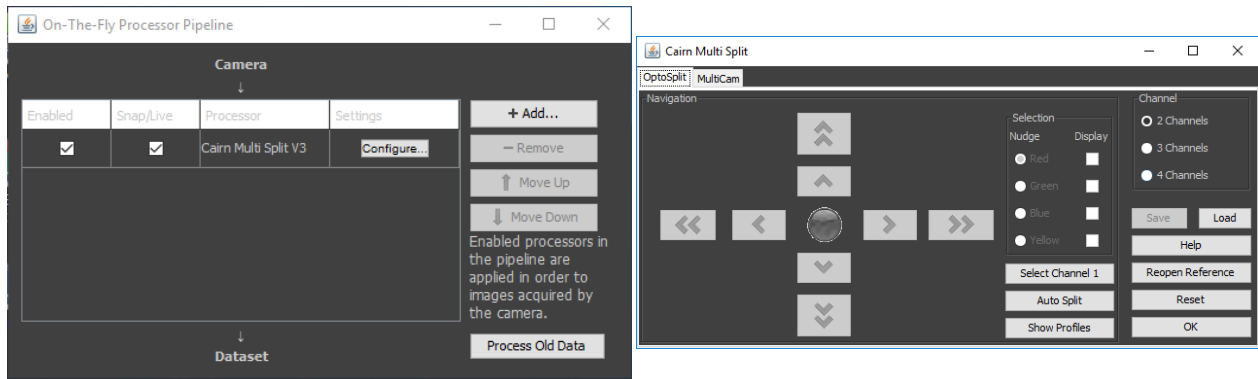
All files required for the running of the program are contained within the provided “Cairn\_MultiSplit\_3.jar” file. Simply copy this file into the “mmplugins” subdirectory of your  $\mu$ Manager installation directory. For example, if  $\mu$ Manager was installed to “C:\Program Files\Micro-Manager-2.0” then the file must be placed in “C:\Program Files\Micro-Manager-2.0\mmplugins”. Once installed the plugin should appear under the “Plugins>On-The-Fly Image Processing” menu in  $\mu$ Manager (Please note: The file must be placed into the mmplugins directory **not** the plugins directory)



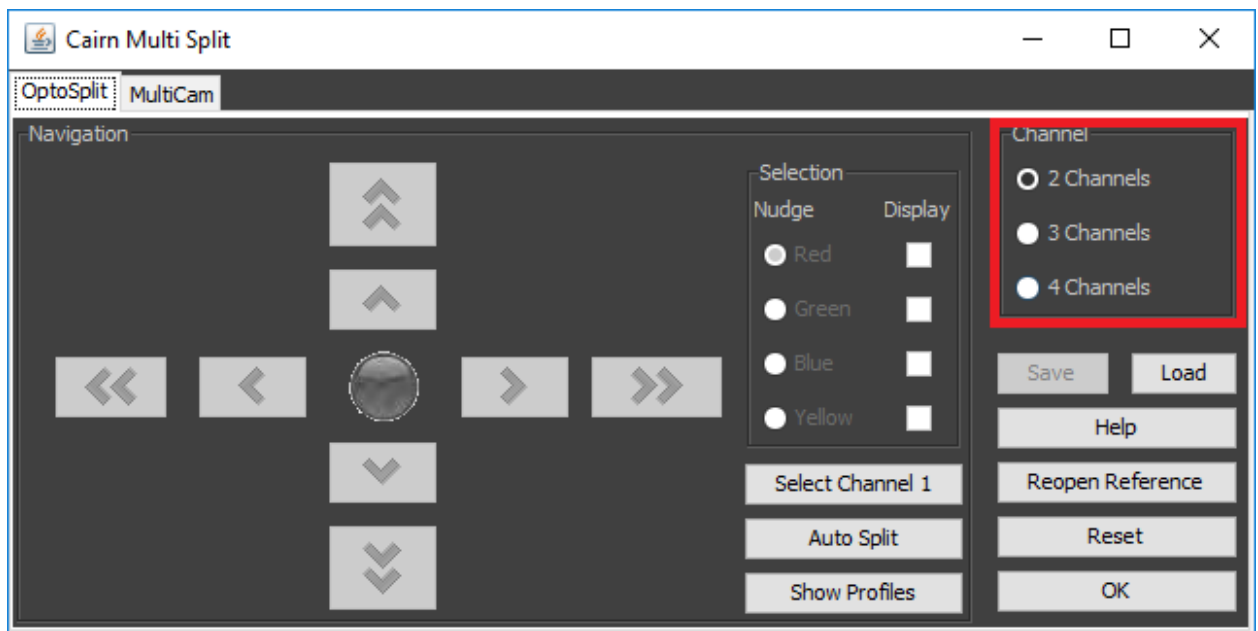
## 3 Opto-Split

### 3.1 Basic Use

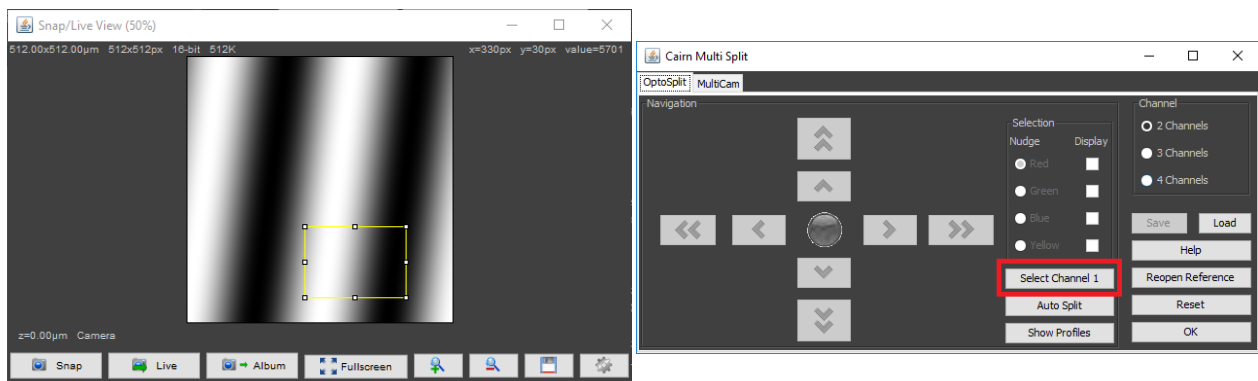
To use the software in conjunction with the Opto-Split configure the camera as normal, snap a reference image and select “Plugins\On-The-Fly Image Processing\Cairn MultiSplit V3”. Two windows should open, the “On-The-Fly Processor Pipeline” window and the “Cairn Multi Split” window.



Next select the number of channels you want to split the image into using the radio buttons to the right hand side of the Cairn Multi Split window.

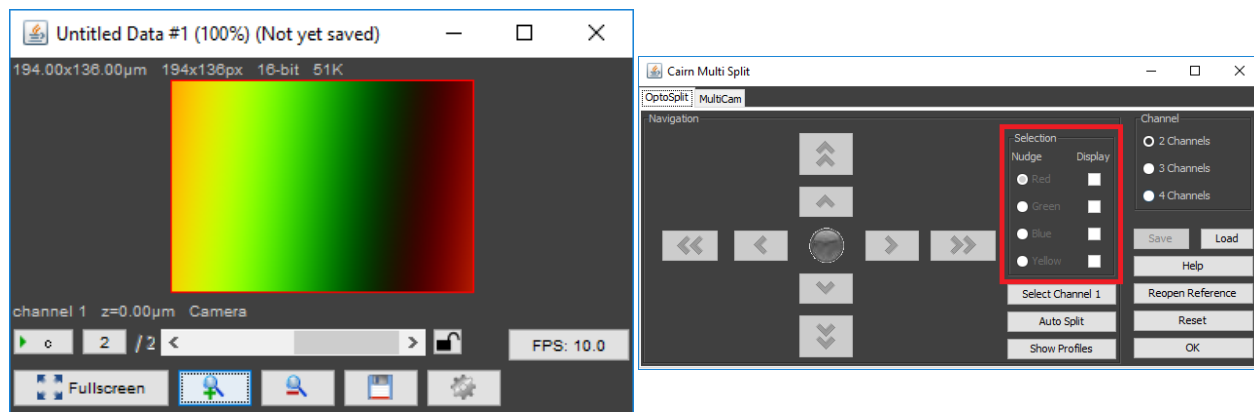


Now draw a rectangular region of interest (ROI) over the reference image corresponding to the location of the first channel and press "Select Channel 1". Now drag the ROI to the location of the second channel and press "Select Channel 2". Repeat this process for as many channels as are required.



After the second channel is selected an image window will open displaying the composite image based

on your reference and ROIs. At this point you will be able to “nudge” individual channels left, right, up and down using the buttons in the “Navigation” pane. Pressing the buttons labelled with a single arrow will nudge the specified channel by a single pixel in the corresponding direction, while pressing the buttons labelled with double arrows will nudge the selection by 10 pixels. The channel to be nudged is selected using the radio buttons in the “Selection” panel and channels can be hidden by un-checking the corresponding check boxes.



Once all regions are selected to your liking press “OK” and close the reference image. While the “On-The-Fly Processor Pipeline” window remains open, all new Snaps, live acquisitions and multi-dimensional acquisitions will automatically be split according to your ROIs.

### 3.2 AutoSplit

Pressing the “AutoSplit” button will automatically draw the appropriate number of channels on your image. For 2 and 3 channels the ROIs selected will be vertical splits of equal width and for 4 channels will be the top left, top right, bottom left and bottom right quadrants of the image. This split can either be used as is or as a starting point for nudging.

### 3.3 Reset

To reset the plugin back to its initial state press the reset button.

### 3.4 Reopen Reference/Redraw ROI

If you accidentally close your reference image press the “Reopen Reference” button. This will also have the effect of redrawing the ROI to the image and can therefore be used in the event you accidentally resize or delete the ROI from the reference image.

### 3.5 Saving/Loading Splits

Once you have started selecting channels the save button will become available. This allows you to save your current ROIs to disk for later use. The load button can be used to load a previously saved set of ROIs at any time.

### 3.6 Profiles

Pressing show profiles will display the vertical and horizontal line profiles for all channels through each channel’s ROI. This image is updated automatically when nudging. Profiles can be disabled by pressing “Hide Profiles”. (Note that due to a bug in the version of ImageJ that  $\mu$ Manager ships with the profiles do not work properly. It is recommended that you update to a version of ImageJ >1.50 to fix this functionality. Instructions on how to do this are found in the appendix)

### 3.7 Help

Pressing the “Help” button will display this manual at any time.

## 4 Twin-Cam or Multi-Cam

To use Cairn Multi Split V3 with either a Twin-Cam or Multi-Cam first set up the MultiCamera adapter to use your cameras (instructions on how to do this can be found in the appendix). Snap an image to use as a reference and open the plugin using “Plugins>On-The-Fly Image Processing>Cairn Multi Split V3”. Select the “MultiCam” tab.

Draw a rectangular ROI over most of the image (making sure to leave enough room for nudging individual channels) and press “Select Initial Region”. This will open an image window, displaying the composite image based on your reference and ROI. At this point you will be able to “nudge” individual channels left, right, up and down using the buttons in the “Navigation” pane. Pressing the buttons labelled with a single arrow will nudge the specified channel by a single pixel in the corresponding direction, while pressing the buttons labelled with double arrows will nudge the selection by 10 pixels. The channel to be nudged is selected using the radio buttons in the “Selection” panel and channels can be hidden by un-checking the corresponding check boxes. Once you have finished nudging the channels to their desired positions press the OK button and close the reference image. While the “On-The-Fly Processor Pipeline” window remains open, all new Snaps, live acquisitions and multi-dimensional acquisitions will automatically be split according to your ROIs.

### 4.1 Reset

To reset the plugin back to its initial state press the reset button.

### 4.2 Reopen Reference/Redraw ROI

If you accidentally close your reference image press the “Reopen Reference” button. This will also have the effect of redrawing the ROI to the image and can therefore be used in the event you accidentally resize or delete the ROI from the reference image.

### 4.3 Saving/Loading Splits

Once you have started selecting channels the save button will become available. This allows you to save your current ROIs to disk for later use. The load button can be used to load a previously saved set of ROIs at any time.

### 4.4 Profiles

Pressing show profiles will display the vertical and horizontal line profiles for all channels through each channel’s ROI. This image is updated automatically when nudging. Profiles can be disabled by pressing “Hide Profiles”. (Note that due to a bug in the version of ImageJ that  $\mu$ Manager ships with the profiles do not work properly. It is recommended that you update to a version of ImageJ >1.50 to fix this functionality. Instructions on how to do this are found in the appendix)

### 4.5 Help

Pressing the “Help” button will display this manual at any time.

## 5 Licence

## A Updating the Version of ImageJ Shipped with $\mu$ Manager

$\mu$ Manager ships with a version of ImageJ that is several years out of date and as a result many newer features and bug fixes are not present in the standard  $\mu$ Manager distribution (this includes several bug fixes in the plotting APIs that Cairn Multi Split V3 relies upon). Previously to update ImageJ it was simply a case of clicking “Help>Update ImageJ”, however, the version that  $\mu$ Manager ships with is sufficiently old that it can’t understand the new format that ImageJ updates are currently provided in. The solution is to download the ImageJ Updater plugin (available here: <https://imagej.nih.gov/ij/plugins/updater/index.html>) and place it in the “plugins” subdirectory of your  $\mu$ Manager installation directory (Note: That’s plugins **not** mmplugins). Run (from the main ImageJ window) “Plugins>ImageJ Updater”, select the latest release of ImageJ and click OK. Follow the instructions on screen to update to the latest version of ImageJ.

## B Setting up Multiple Cameras in $\mu$ Manager

Support for running multiple cameras in  $\mu$ Manager is given by the Multi-Camera device adapter. Start off by opening the Hardware Configuration wizard, select “Create new configuration” and click the next button. In the available devices list scroll down to “Utilities”, expand this option and double click on Multi Camera. Click OK in the box that opens. Next find your camera(s) in the available devices and add them as if you were setting them up for single camera use (if you have multiple cameras of the same make then select that camera multiple times in the available devices list, making sure to name each copy of the camera differently). After you have added all your cameras click next, select Multi-Camera as the default camera. Continue the hardware configuration as you would do for setting up your cameras for single camera use. Once the hardware configuration is finished you may get the error message “Failed to initialize circular buffer - memory requirements not adequate”, this is due to the Multi-Camera adapter not currently knowing how large a single frame will be and can be ignored at this point. Open the device property browser and set “Multi Camera-Physical Camera 1-4” to your cameras names (or undefined if you do not want to use all 4 camera slots). Set up your camera’s properties and close the device property browser. Clicking snap should now show a single image with multiple channels, one channel per camera.