

# OMERO: overview & update

April 2014

Will Moore & Douglas Russell

The **O**pen **M**icroscopy **E**nvironment



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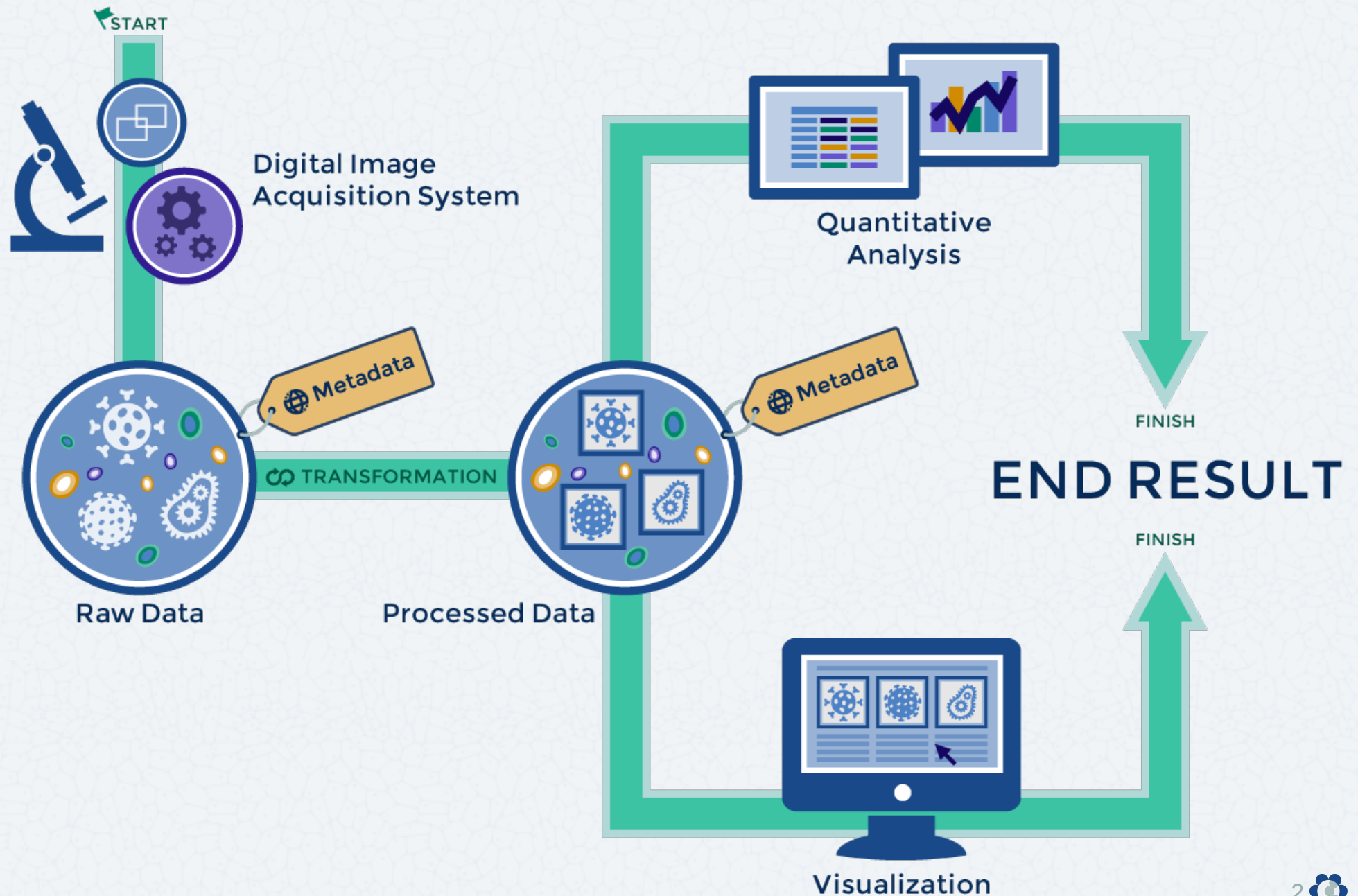
**GLENCOE**  
SOFTWARE

Seattle, WA, USA  
Dundee, UK

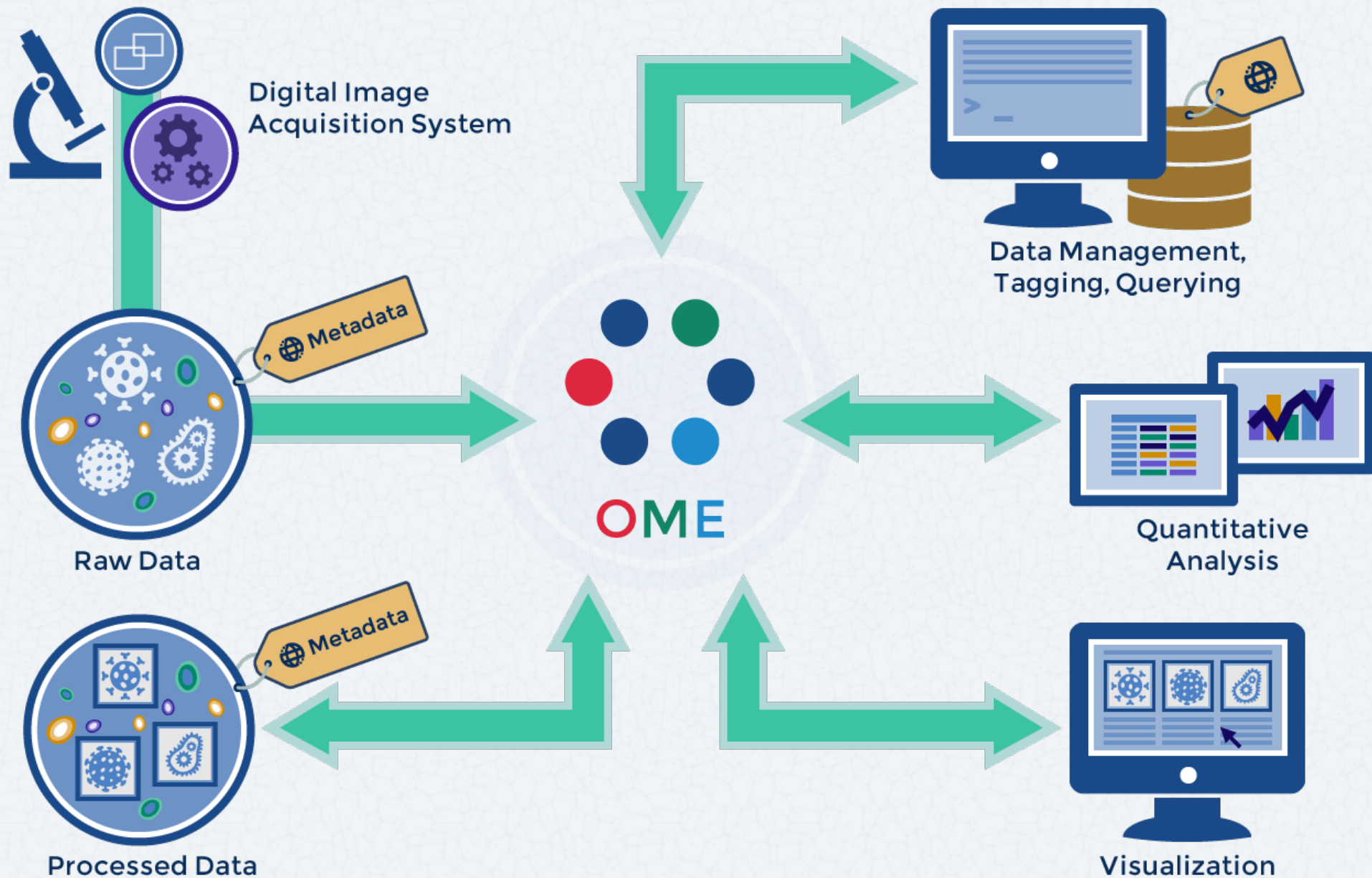
# OMERO: overview & update

- About OME
- OMERO overview
- Using OMERO
  - Import, Organising, Sharing, Analysis, Export
- What's New?
  - OMERO 5, OMERO.webtagging, OMERO.figure

# Following the Data...



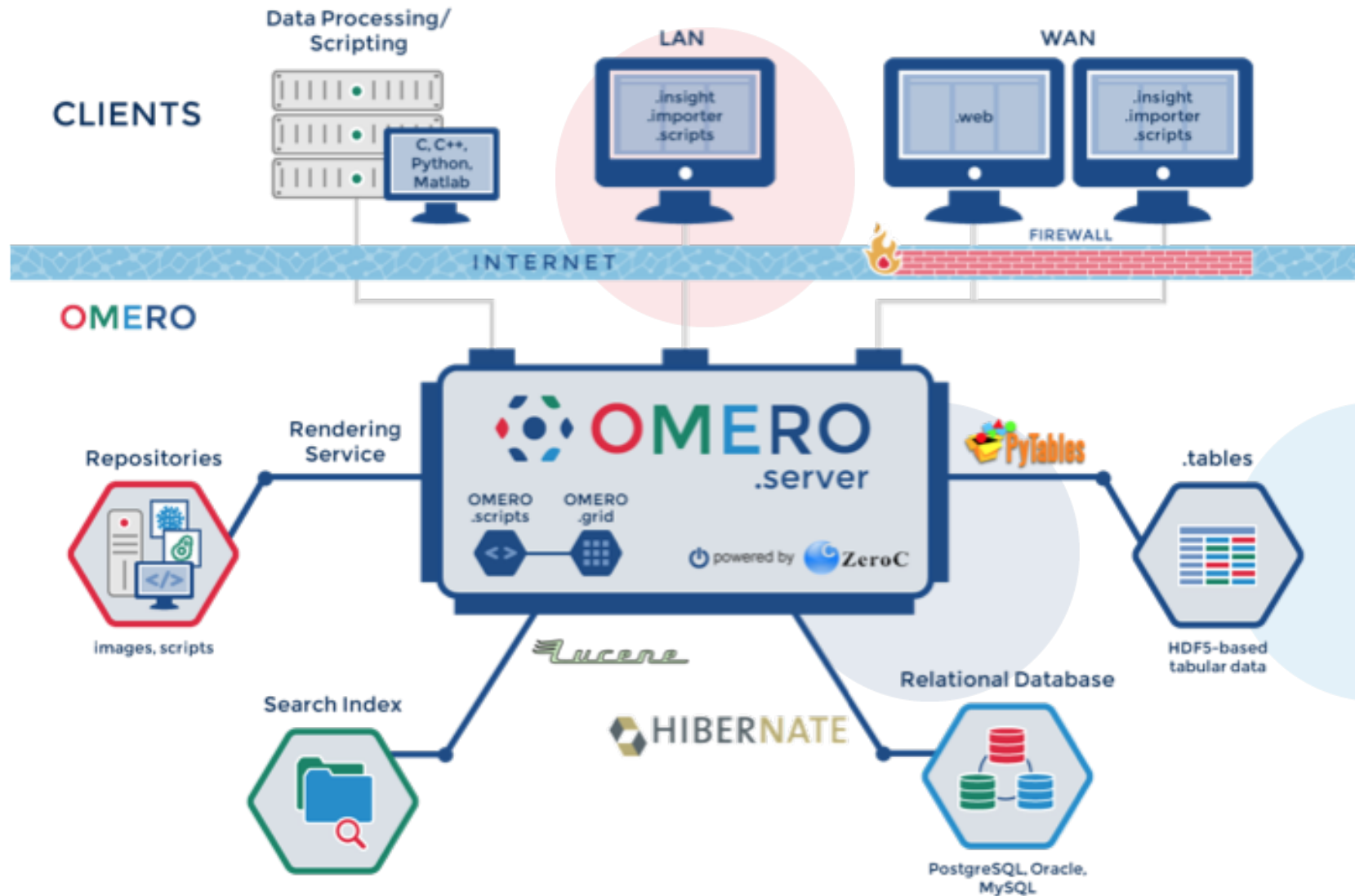
# ...Towards Image Informatics





# WHAT IS OMERO?

# OMERO: Open Data Management Platform





# OMERO: Desktop and Web clients

The image displays two screenshots of the OMERO software interface. The top screenshot shows the OMERO Desktop client, which features a hierarchical tree view on the left for project management, a central workspace with a grid of image thumbnails, and a right-hand panel for image details and annotations. The bottom screenshot shows the OMERO Web client, which includes a search and explore interface on the left, a central image viewer with various viewing options (like Max Intensity, Quality, and Zoom), and a right-hand panel with metadata and a comment section.

# OMERO WORKFLOW





# OMERO: Import-1

Import Data

Select data to import and monitor imports.

Select Data to Import

siRNAi-2-03-2006

Name	Date Modified
C-out	Thursday, April 24, 2014 3:24 PM
CSFV	Thursday, April 24, 2014 3:20 PM
details-2.3.6.txt	Monday, March 6, 2006 3:42 PM
INCENP	Thursday, April 24, 2014 3:21 PM
scrambled	Thursday, April 24, 2014 3:21 PM
V-out_01.psd	Friday, March 3, 2006 10:18 AM
V-out_01.r3d	Thursday, March 2, 2006 8:16 PM
V-out_01.r3d.log	Thursday, March 2, 2006 8:16 PM
V-out_01.r3d_D3D.dv	Friday, March 3, 2006 12:57 AM
V-out_01.r3d_D3D_log.txt	Friday, March 3, 2006 12:57 AM
V-out_01.r3d_D3D_PRJ.dv	Friday, March 3, 2006 10:18 AM
V-out_02.psd	Friday, March 3, 2006 10:17 AM
V-out_02.r3d	Thursday, March 2, 2006 8:17 PM
V-out_02.r3d.log	
V-out_02.r3d_D3D.dv	
V-out_02.r3d_D3D_log.txt	
V-out_02.r3d_D3D_PRJ.dv	
V-out_03.psd	
V-out_03.r3d	
V-out_03.r3d.log	
V-out_03.r3d_D3D.dv	

Files to import Options

Free Space Import size: 4 GB

File or Folder	Project/Dataset or Screen	Folder as Dataset	Size
CSFV	INCENP siRN...	<input checked="" type="checkbox"/>	1 GB
INCENP	INCENP siRN...	<input checked="" type="checkbox"/>	977 MB
scrambled	INCENP siRN...	<input checked="" type="checkbox"/>	977 MB
V-out_01.r3d	INCENP siRN...	<input checked="" type="checkbox"/>	80 MB
V-out_02.r3d	INCENP siRN...	<input checked="" type="checkbox"/>	80 MB
V-out_03.r3d	INCENP siRN...	<input checked="" type="checkbox"/>	80 MB

Import Location - Select where to import your data.

Projects Screens

Project INCENP siRNAi New...

Dataset --New From Folder-- New...

Close Refresh Add to the Queue

Cancel All Import



# OMERO: Import-2

**Import Data**

Select data to import and monitor imports.

Select Data to Import | Import #1

**Report:** 21 out of 53 uploaded Show Failed

**Import Size:** 816 MB

When upload is complete, the import window and OMERO session can be closed. Reading will continue on the server.

File Name	Upload Progress	Processing Status	Action
CSFV_02.r3d	80 MB	Complete	View
CSFV_05.r3d_D3D.dv	80 MB	Complete	View
CSFV_04.r3d_D3D.dv	80 MB	Generating Thumbnails	Cancel
CSFV_06.psd	793 KB	Complete	View
CSFV_02.psd	796 KB	Complete	View
CSFV_06.r3d	19/80 MB 1s Left	Pending...	Cancel
CSFV_04.r3d_D3D_PRJ.dv		Pending...	Cancel
CSFV_03.r3d_D3D.dv		Pending...	Cancel
CSFV_05.psd		Pending...	Cancel
CSFV_05.r3d		Pending...	Cancel
CSFV_03.r3d		Pending...	Cancel

Retry All | Submit All | Cancel All | Close



# OMERO: Organising Data

Will Moore connected to nightshade.openmicroscopy.org

Display Groups

Projects

- Swedlow Lab [1]
- Will Moore
  - Big Images [2]
  - con-Test [0]
  - confoal [4]
  - CSFV-staining [2]
  - Demo [1]
  - INCENP siRNAi [3]
    - CSFV [12]
    - INCENP [9]
    - scrambled [13]
      - CSFV/scram\_01.r3d\_D3D.dv
      - CSFV/scram\_02.r3d\_D3D.dv
      - CSFV/scram\_03.r3d\_D3D.dv
      - CSFV/scram\_04.r3d\_D3D.dv
      - CSFV/scram\_04.r3d\_D3D\_PI
      - CSFV/scram\_05.r3d\_D3D.dv
      - CSFV/scram\_06.r3d\_D3D.dv
      - CSFV/VRAQ\_01.r3d\_D3D.dv
      - CSFV/VRAQ\_02.r3d\_D3D.dv
      - CSFV/VRAQ\_03.r3d\_D3D.dv
      - CSFV/VRAQ\_04.r3d\_D3D.dv
      - CSFV/VRAQ\_05.r3d\_D3D.dv
      - CSFV/VRAQ\_06.r3d\_D3D.dv
  - MLB [1]
  - Time-resolved test data [1]
  - 200704098-Figure 4 [3]

Screens

Attachments

Tags

Images

Administration

Search

Workspace: 34 of 34 images

scrambled>CSFV/scram\_02.r3d\_D3D.dv (Mar 3, 2006)

CSFV[12]

INCENP[9]

scrambled[13]

General Acquisition Preview

Image's details

Image ID: 3814858  
Owner: Will Moore  
CSFV/scram\_02.r3d\_D3D.dv  
IMGCORR: Norm=on Method=1

Archived

Acquired 3/3/06 12:50 AM  
Imported 7/2/09 9:17 AM  
Dimensions (XY) 512 x 512  
Pixel Type Signed 16-bit (2 byte)  
Pixels Size (XYZ)  $\mu\text{m}$  0.065x0.065x0.2  
z-sections/timepoints 40 x 1  
Channels  DAPI,  INCENP,  AuroraB,  ACA

Annotations

All   
rate  ★★★★★  
tag  Anti-tubulin  metaphase   
attachment  scrambled\_02.r3d\_D3D.jpg   
others  None

Comments

Will Moore 7/4/12 3:26 PM  
one three



# OMERO: Rendering settings

Will Moore connected to nightshade.openmicroscopy.org

Display Groups

Projects

- Swedlow Lab [1]
  - Will Moore
    - Big Images [2]
    - con-Test [0]
    - confoal [4]
    - CSFV-staining [2]
    - Demo [1]
    - INCENP siRNAi [3]
      - CSFV [12]
      - INCENP [9]
      - scrambled [13]
    - CSFV/scram\_01.r3d\_D3D.dv
    - CSFV/scram\_02.r3d\_D3D.dv
    - CSFV/scram\_03.r3d\_D3D.dv
    - CSFV/scram\_04.r3d\_D3D.dv
    - CSFV/scram\_04.r3d\_D3D\_Pf
    - CSFV/scram\_05.r3d\_D3D.dv
    - CSFV/scram\_06.r3d\_D3D.dv
    - CSFV/VRAQ\_01.r3d\_D3D.dv
    - CSFV/VRAQ\_02.r3d\_D3D.dv
    - CSFV/VRAQ\_03.r3d\_D3D.dv
    - CSFV/VRAQ\_04.r3d\_D3D.dv
    - CSFV/VRAQ\_05.r3d\_D3D.dv
    - CSFV/VRAQ\_06.r3d\_D3D.dv
  - MLB [1]
  - Time-resolved test data [1]
  - 200704098-Figure 4 [3]
  - 200704098-Figure 4 [1]
  - Bowen-2011 [10]
  - dv [1]

Screens

Attachments

Tags

Images

Administration

Search

Workspace: 34 of 34 images  
scrambled>CSFV/scram\_02.r3d\_D3D.dv (Mar 3, 2006)

filter images # per row: [ ]

CSFV[12]

INCENP[9]

scrambled[13]

General Acquisition Preview

Z

DAPI

INCENP

AuroraB

ACA

Apply Z=21/40 T=1/1

Live Update Min/Max Full Range Reset Saved by Apply to All

62		885
145		564
58		126
59		311





# OMERO Insight: ROI tool

The screenshot displays the OMERO Insight interface. The main window shows a microscopy image with several regions of interest (ROIs) marked. The ROIs are labeled with their dimensions and angles:  $1.1\mu\text{m}$ ,  $0.8\mu\text{m}$ ,  $52.4^\circ$ , and  $85.6^\circ$ . The image is a composite of channels: DAPI (blue), INCENP (green), Aurorab (red), and ACA (red). The interface includes a toolbar with various tools, a 'Manager' panel on the right showing a list of ROIs, and a status bar at the bottom.

ROI	id	Z	T	Type	Comment	Visi...
[1]	84911	33	1			
	561...	33	1			
[8]	8491230-37	1				
	561...	30	1			
	561...	31	1			
	561...	32	1			
	561...	33	1			
	561...	34	1			
	561...	35	1			
	561...	36	1			
	561...	37	1			
[1]	85361	21	1			
	561...	21	1			
[1]	85363	31	1	/		
	--	31	1	/		
[1]	85364	31	1	/		
	--	31	1	/		

Ready.

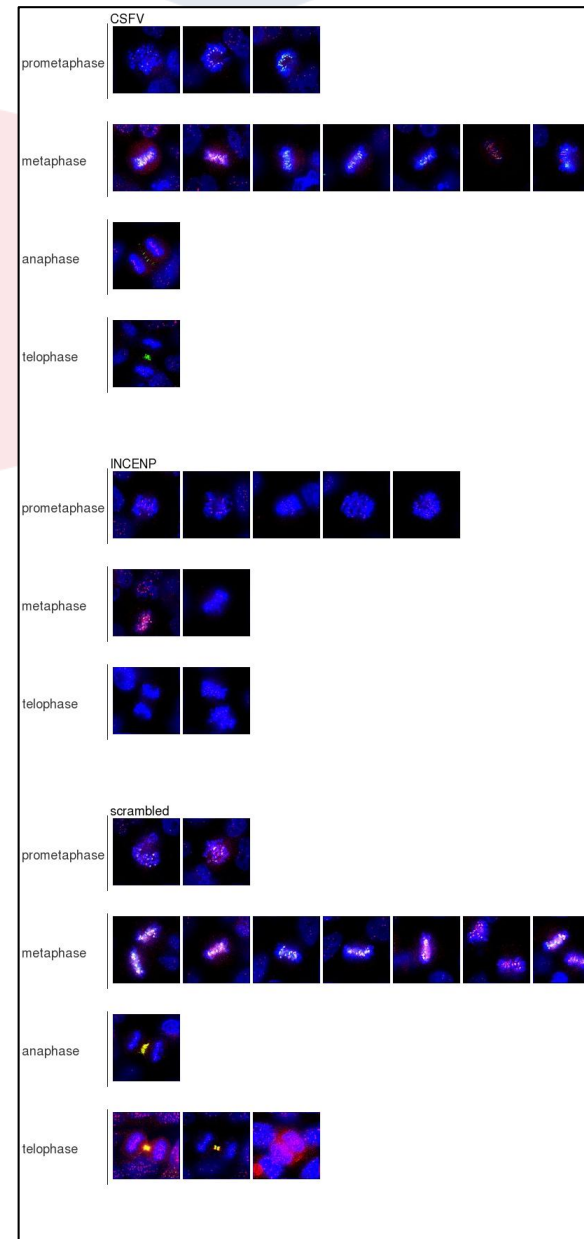
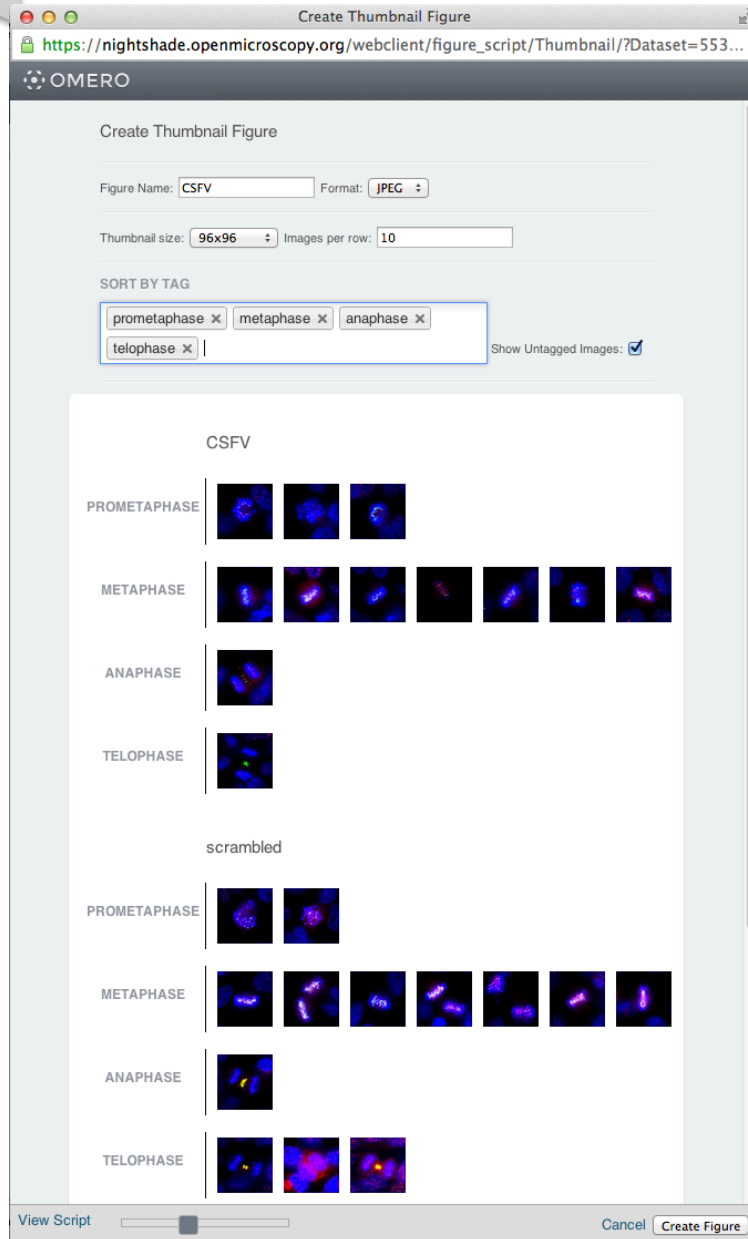
Z=31 (6.0 $\mu\text{m}$ )/40 T=1/1      8s 33s 1min3s 1min33s      200%



# OMERO: Annotations / Tagging

The screenshot displays the OMERO web interface. At the top, it shows the user 'Will Moore' is connected to 'nightshade.openmicroscopy.org'. The main workspace contains 6 of 12 images, filtered by the tag 'metaphase'. The image list on the left includes files like 'CSFV/CSFV\_02.r3d\_D3D.dv' through 'CSFV/CSFV\_12.r3d\_D3D.dv'. The right-hand panel shows the 'Image details' for 'Image ID: 3814715', including acquisition date (3/2/06 10:15 PM), dimensions (512 x 512), and channels (DAPI, INCENP-GFP, Aurora-B, AC). The 'Annotations' section shows the image is tagged with 'metaphase' and has a 5-star rating.

# OMERO: Export “Thumbnail Figure”



# SHARING DATA WITH OMERO





# OMERO: Share data within Groups

The screenshot shows the OMERO web interface with a tree view of projects and groups. The 'Swedlow Lab OMERO' group is selected, and a context menu is open over it. The context menu has the following options:

- Display Users
- All Groups
- PUBLIC
- Swedlow Lab
- Swedlow Lab OMERO
- system

The 'Swedlow Lab OMERO' group is expanded, showing a list of users and their associated data. The 'Swedlow Lab OMERO' group has 13 members:

- Will Moore
  - Orphaned Images
- Kenneth Gillen
- Jean-Marie Burel
- Gus Ferguson
- Emma Hill
- Simon Li
- Brian Loranger
- Donald MacDonald
- Josh Moore
- Balaji Ramalingam
- Jason Swedlow
- Gus-test User
- Petr Walczysko

# Group Permissions

PERMISSIONS	 Read	 Annotate	 Write	 Privacy
 Private	✓	✓	✓	 You
 Group-Read	✓	✗	✗	
 Group-Annotate	✓	✓	✗	 Your Group
 Group-Write	✓	✓	✓	



# Link to data in OMERO.web

The screenshot displays the OMERO.web interface. The top navigation bar includes 'OMERO', 'Data', 'History', 'Admin', and 'Figure'. The user is logged in as 'Will Moore'. The left sidebar shows a file tree for 'Swedlow Lab' and 'Will Moore', with 'CSFV' selected. The main area shows a grid of image thumbnails. A tooltip over one thumbnail displays the URL: `https://nightshade.openmicroscopy.org/webclient/?show=image-3814715`. The right panel shows details for image 'CSFV/CSFV\_02.r3d\_D3D.dv', including 'IMAGE ID: 3814715', 'Owner: Will Moore', 'Acquisition Date: 2006-03-02 22:15:26', and 'Imported Date: 2009-07-01 18:02:16'. A 'Full viewer' button is visible. A smaller window in the foreground shows the 'img\_detail/3814715/' page with 'Viewing Options' (Normal, Max Intensity, Split Channel, Quality, Zoom 100%, Line Plot) and 'Rendering Details' (Channels: DAPI, INCENP-GFP, Aurora-B, ACA; Color checked). The main image shows a Z-stack of cells with blue DAPI and green INCENP-GFP channels.



# OMERO: Data Publication

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## Jason Swedlow



Position:	Professor of Quantitative Cell Biology
Address:	College of Life Sciences, University of Dundee, Dundee
Telephone:	385819
Email:	<a href="mailto:jason@lifesci.dundee.ac.uk">jason@lifesci.dundee.ac.uk</a>
Website:	Open Microscopy Environment
Related Links:	Glencoe Software Incorporated

P-TRE\_10\_R3D\_D3D.dv  
[https://nightshade.openmicroscopy.org/webgateway/img\\_detail/3933597/](https://nightshade.openmicroscopy.org/webgateway/img_detail/3933597/)

**Viewing Options**

Normal

Max Intensity

Split Channel

Quality

Zoom (%)

100

Line Plot

**Rendering Details**

Channels - [Edit](#)

437 528 617

Color

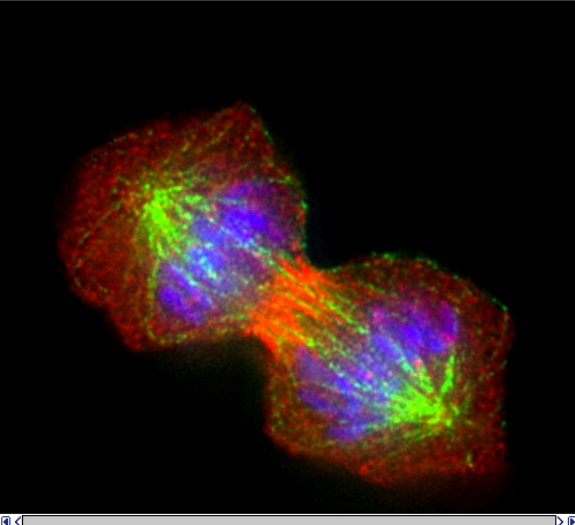
Current Image

Z: 43/85 | T: 1/1

[Image Information](#)

[Image Link](#)

ROI Count: 0

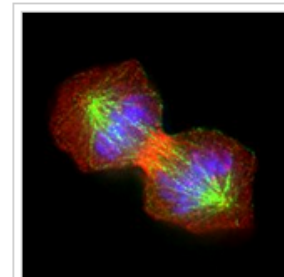


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divided to a pair of new daughter cells. Proper chromosome segregation depends on the correct attachment of chromosomes to microtubules at a special structure called the kinetochore, the components of cell division, especially in living cells and in yeast. Recently, we used these tools to discover a new protein, Bod1, that regulates the kinetochore by modulating the activity of Aurora B protein kinase. We are currently studying the inner workings of the centromere and kinetochore of the mitotic

cell. To understand this data, we, along with our collaborators, formed the Open Microscopy Environment translators and data management software for imaging and data analysis. You can see the Consortium's web site.

The image is viewed in OMERO by clicking on the thumbnail.



INCENP (red) localization in a dividing cell, also stained for microtubules (green) and DNA (blue). Click on the thumbnail to view and manipulate the image in OMERO.





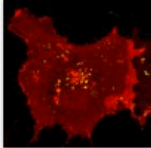
# OMERO Data Publication: JCB Data Viewer

JCB JCB DataViewer - Full View x

jcb-dataviewer.rupress.org/jcb/img\_detail/623301/24790/

**JCB Data Viewer** Search the JCB DataViewer Search Home About Contact JCB log in create account

Published 07 Apr 2014



**A novel probe for phosphatidylinositol 4-phosphate reveals multiple pools beyond the Golgi**

Gerald R.V. Hammond, Matthias P. Machner, Tamas Balla

JCB vol. 205 no. 1 113-126 Article DOI: [10.1083/jcb.201312072](https://doi.org/10.1083/jcb.201312072) DataViewer DOI: [10.1083/jcb.201312072.dv](https://doi.org/10.1083/jcb.201312072.dv)

**Viewing Options**

- Normal
- Max Intensity
- Split Channel

Quality

Zoom

Line Plot

**Rendering Details**

Edit Channels

Ch1-T1  ChS2-T1  TPMT-T1

ChS1-T2  Ch2-T2

Color

**Current Image**

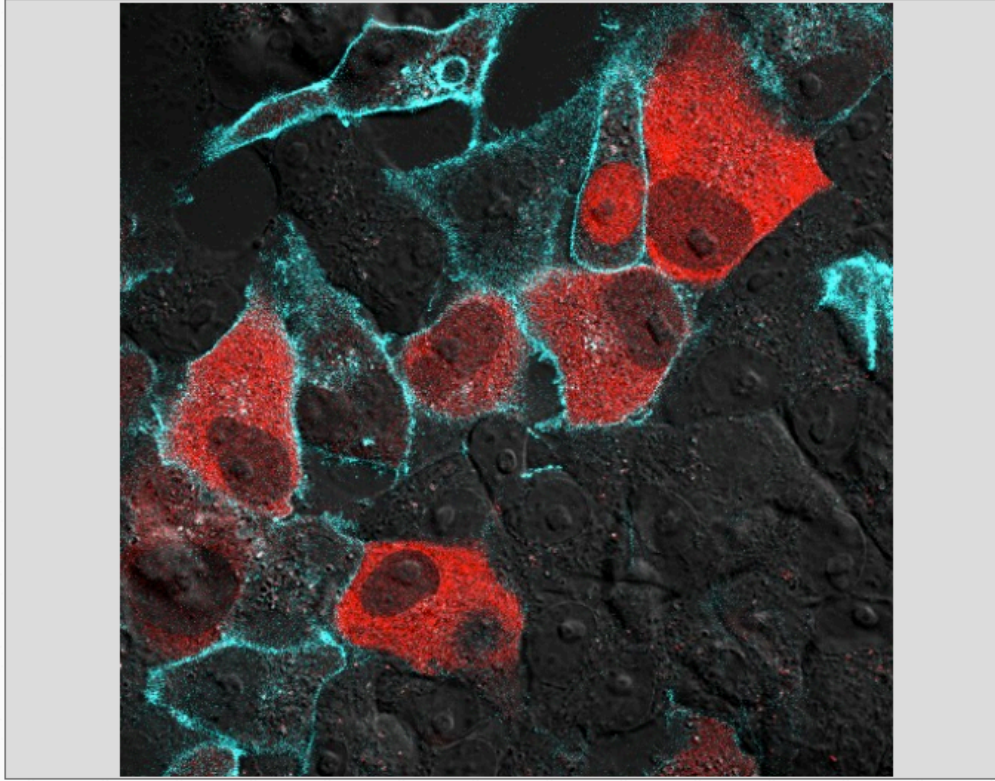
Z: 1/1 | T: 1/46

[Image Information](#)

[Image Legend](#)

[Image Link](#)

[Make Movie](#)

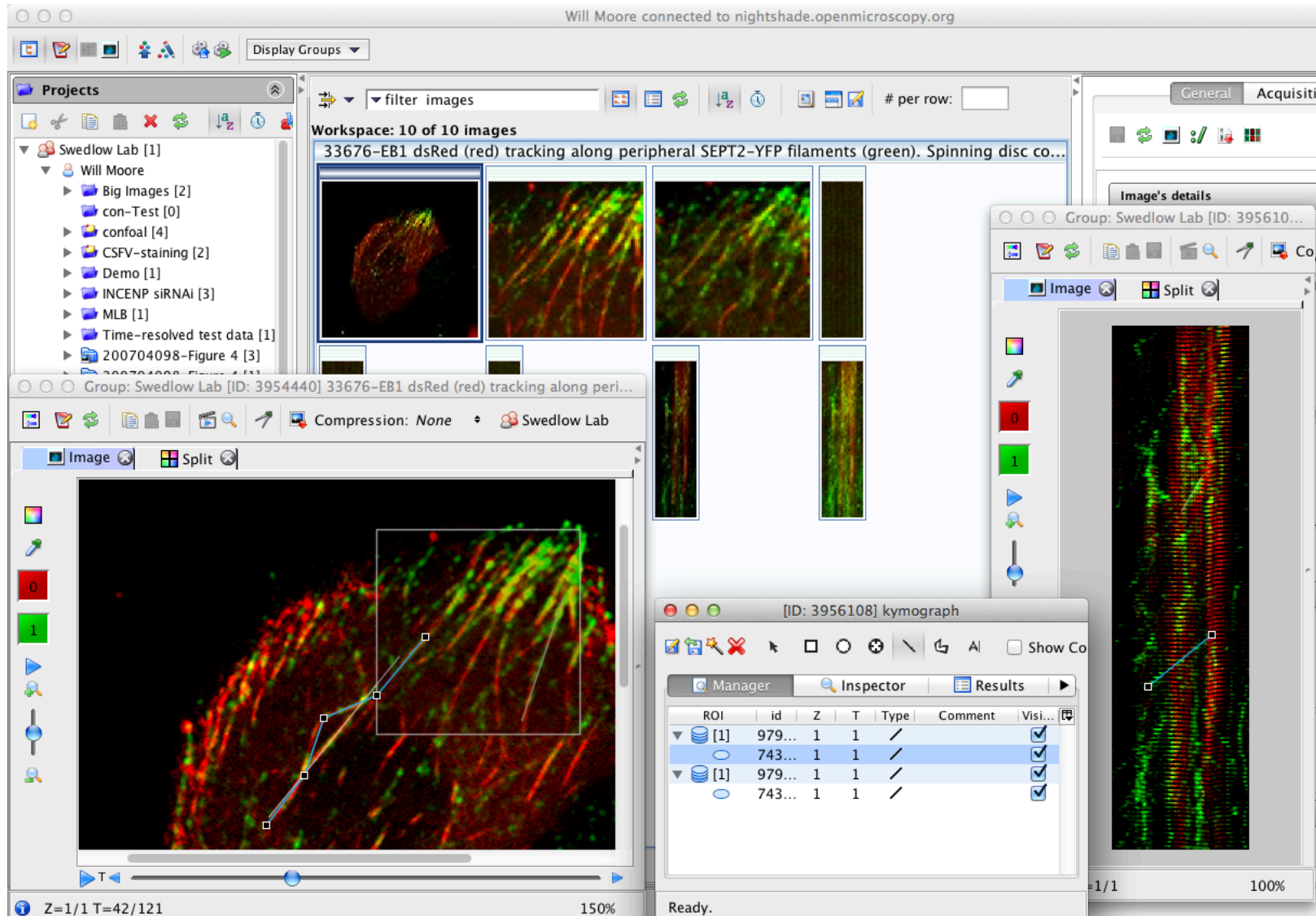


z-sections

timepoints

# ANALYSIS WITH OMERO

# OMERO.scripts: Kymographs example



Will Moore connected to nightshade.openmicroscopy.org

Projects

- Swedlow Lab [1]
  - Will Moore
    - Big Images [2]
    - con-Test [0]
    - confoal [4]
    - CSFV-staining [2]
    - Demo [1]
    - INCENP siRNAi [3]
    - MLB [1]
    - Time-resolved test data [1]
    - 200704098-Figure 4 [3]

Workspace: 10 of 10 images

33676-EB1 dsRed (red) tracking along peripheral SEPT2-YFP filaments (green). Spinning disc co...

Group: Swedlow Lab [ID: 3954440] 33676-EB1 dsRed (red) tracking along peri...

Image [ID: 3956108] Split

[ID: 3956108] kymograph

Manager Inspector Results

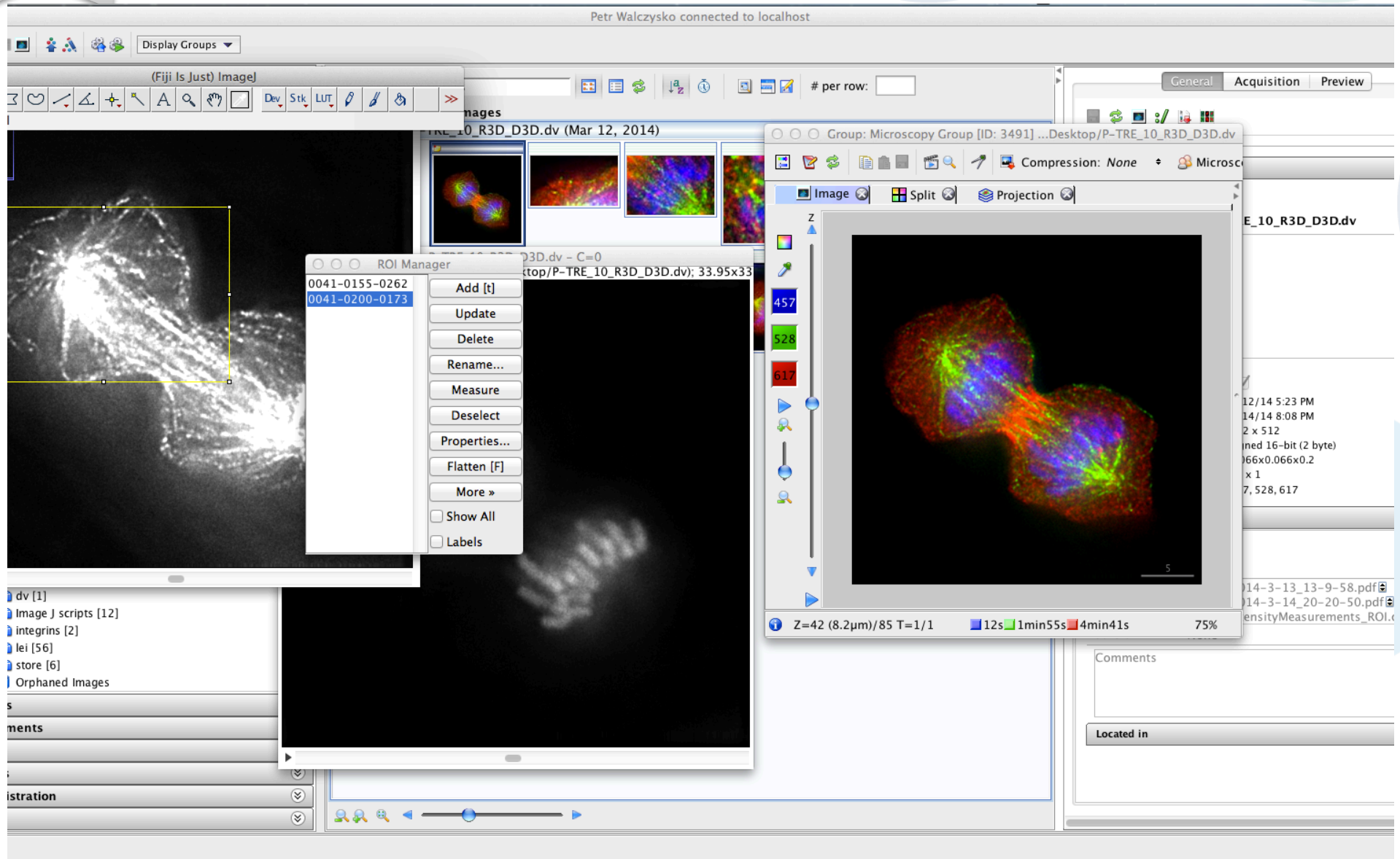
ROI	id	Z	T	Type	Comment	Visi...
[1]	979...	1	1	/		<input checked="" type="checkbox"/>
[1]	743...	1	1	/		<input checked="" type="checkbox"/>
[1]	979...	1	1	/		<input checked="" type="checkbox"/>
[1]	743...	1	1	/		<input checked="" type="checkbox"/>

Z=1/1 T=42/121 150%

Ready.



# OMERO and ImageJ



# WHAT'S NEW IN OMERO?





# OMERO 5

- Original data is uploaded on import
- No need to “Archive”
- No data duplication
- “In-place” import for sysadmins via command-line

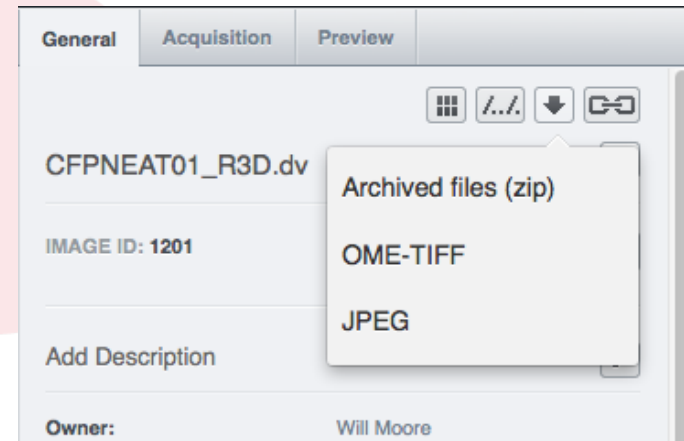
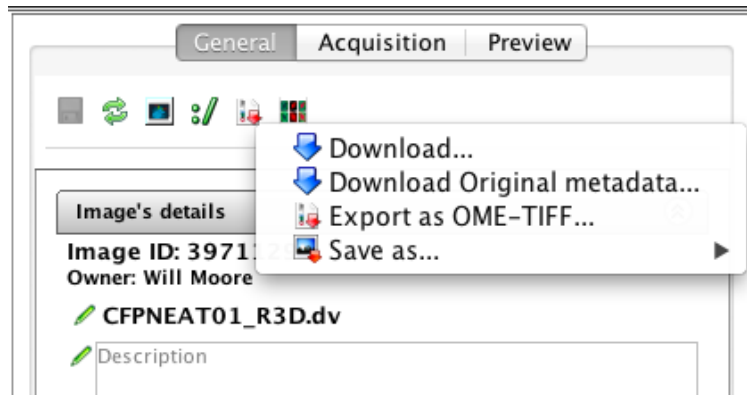
The screenshot shows the 'Import Data' window in OMERO 5. The window title is 'Import Data'. Below the title bar, there is a header area with the OMERO logo and a user icon. The main content area is divided into several sections:

- Select Data to Import:** A tab labeled 'Import #3' is active.
- Report:** '3 out of 9 uploaded' and 'Import Size: 48 MB'. A 'Show Failed' button is present.
- Instructions:** 'When upload is complete, the import window and OMERO session can be closed. Reading will continue on the server.'
- File List:** A table of files with their upload and processing progress.
- Buttons:** 'Retry All', 'Submit All', 'Cancel All', and 'Close' buttons at the bottom.

File Name	Upload Progress	Processing Status	Action
CFPNEAT01_R3D.dv	29 MB	Complete	View
IAGFP-Noc01_R3D.dv	19 MB	Reading Pixels	Cancel
lung-lentiCMtriple-4_R3D.dv	29 KB	Reading Pixels	Cancel
mt1_R3D_D3D.dv	2 MB	Pending...	Cancel
off_by_1_a.dv	Pending...		Cancel
SMN10uI03_R3D_D3D.dv	Pending...		Cancel
test11_R3D.dv	Pending...		Cancel
very_small.d3d.dv	Pending...		Cancel
very_small.d3d.dv.ome.tif	Pending...		Cancel



# OMERO 5: Access to Original Data





# OMERO 5: Filesets

- Some formats have many images from a single file / import
- E.g. Leica LIF, Leica LEI, Zeiss mdb
- Indicated by light-coloured selection of thumbnails
- A Fileset of images cannot be partially deleted or changed group

The screenshot displays the OMERO webclient interface. The browser address bar shows `localhost:8000/webclient/userdata/`. The main navigation bar includes 'OMERO', 'Data', 'History', and 'Figure'. The user is logged in as 'Will Moore'. The left sidebar shows a file tree with a folder 'Leica 18' containing 18 files, including '...iles.tif [image 02 - XYCh-20x]'. The central area shows a grid of image thumbnails, with the selected image highlighted in light blue. The right sidebar shows the 'General' tab for the selected image, displaying details such as 'sample files.tif [image 02 - XYCh-20x]', 'IMAGE ID: 372', and acquisition metadata.

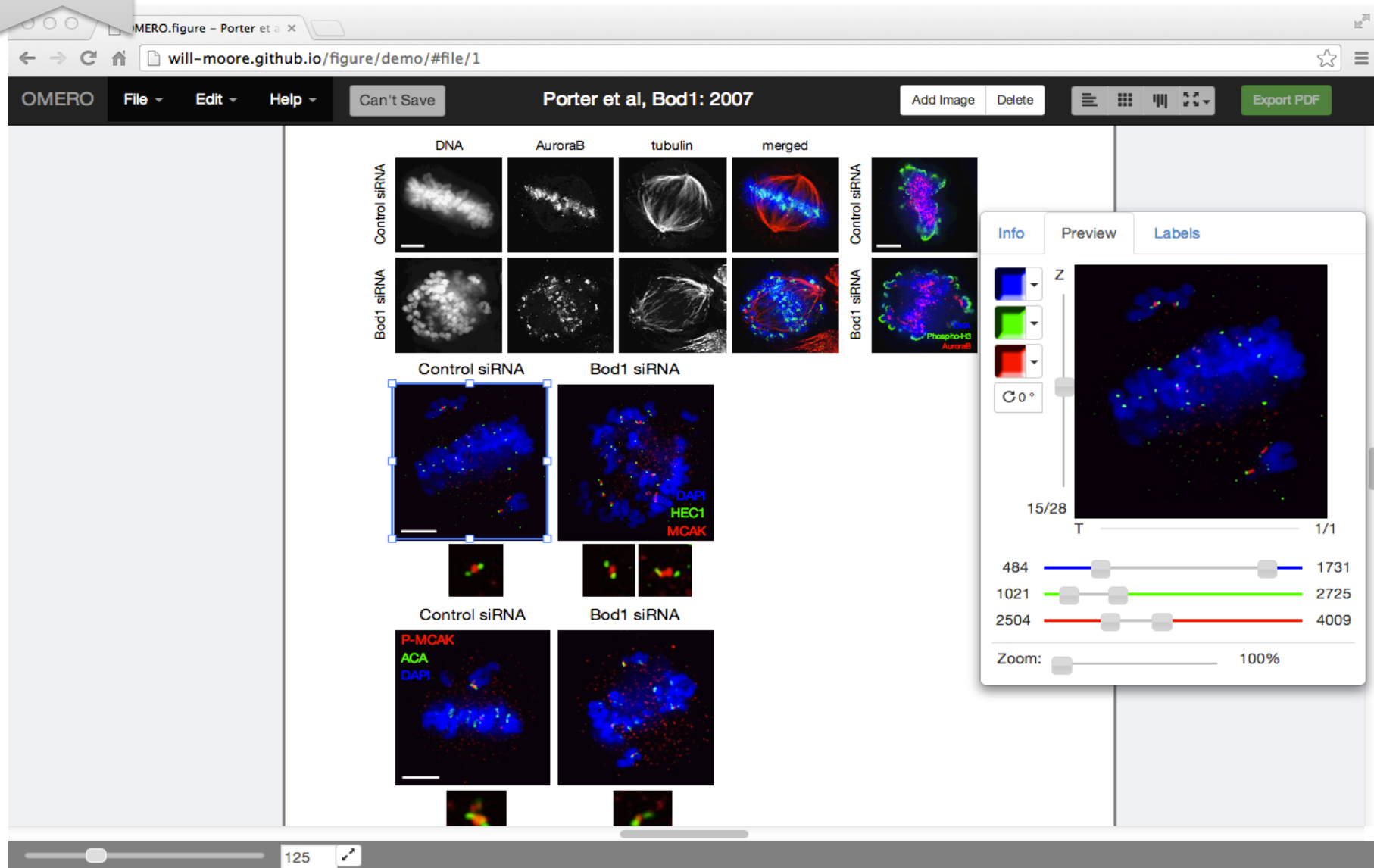
Property	Value
Owner:	Will Moore
Acquisition Date:	2009-04-24 10:10:39
Imported Date:	2014-04-28 23:02:31
Dimensions (XY):	512 x 512
Pixels Type:	uint8
Pixels Size (XYZ) (µm):	1.51 x 1.51
Z-sections/Timepoints:	1 x 1
Channels:	0, 1, 2, 3

# OMERO.webtagging

The screenshot shows the OMERO webclient interface. The browser address bar displays <https://omero1.bioch.ox.ac.uk/webclient/>. The interface includes a navigation bar with 'Data', 'History', and 'Admin' tabs, a search bar, and a user profile for 'Douglas Russell'. Below this, there's a section for 'davisgroup Douglas Russell' with an 'Auto Tag' dropdown. The main area features a table with columns for image tags: 'sqdGFP01', 'R3D', 'GLScy3', 'D3D', and 'Contrasted'. The 'R3D', 'GLScy3', and 'D3D' columns have dropdown menus. The 'Contrasted' column has a 'Contrasted' dropdown. A 'selected' column is also present. The 'Image Name' column lists two files: '020710\_GLScy3\_sqdGFP01\_2\_R3D\_D3D.dv (19660)' and '020710\_GLScy3\_sqdGFP01\_2\_R3D\_D3D\_Contrasted.dv (42336)'. On the left, a file explorer shows a tree structure under 'Douglas Russell', including folders like 'Course 1', 'Douglas\_Report2013 1', 'Graeme 1', 'Contrasting 2', 'proj2 2', 'testpermissions1 1', 'TestProj1 2', 'dpwrsacreen', 'screen1', and 'Orphaned images'. At the bottom left, a small window shows <https://omero1.bioch.ox.ac.uk/webadmin/>.

sqdGFP01	R3D	GLScy3	D3D	Contrasted	selected	Image Name
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	020710_GLScy3_sqdGFP01_2_R3D_D3D.dv (19660)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	020710_GLScy3_sqdGFP01_2_R3D_D3D_Contrasted.dv (42336)

# OMERO.figure



OMERO.figure - Porter et al

will-moore.github.io/figure/demo/#file/1

OMERO File Edit Help Can't Save Porter et al, Bod1: 2007 Add Image Delete Export PDF

DNA AuroraB tubulin merged

Control siRNA Bod1 siRNA

Control siRNA Bod1 siRNA

Control siRNA Bod1 siRNA

Control siRNA Bod1 siRNA

Info Preview Labels

Z

15/28 T 1/1

484 1731

1021 2725

2504 4009

Zoom: 100%

125

<http://will-moore.github.io/figure/>



Thank you!!!

Please come to the workshop: 2-4pm

**wellcome**trust

