Research Data Management for Bioimage Data at the HHU

How to connect Fiji and OMERO?

Tom Boissonnet

I3D:bio
Information Infrastructure for BioImage Data

Adapted from: Schmidt C., Bortolomeazzi M., Boissonnet T., Fortmann-Grote C. *et al.* (2023). I3D:bio's OMERO training material: Re-usable, adjustable, multi-purpose slides for local user training. Zenodo. DOI: 10.5281/zenodo.8323588

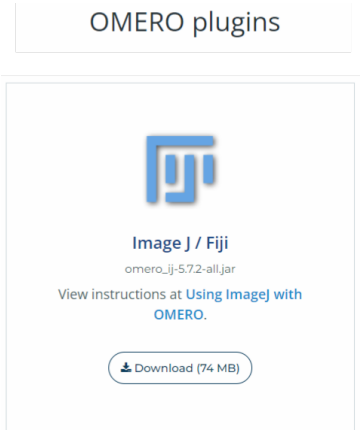
Heinrich Heine Universität Düsseldorf

Connect Fiji and OMERO (1/2)

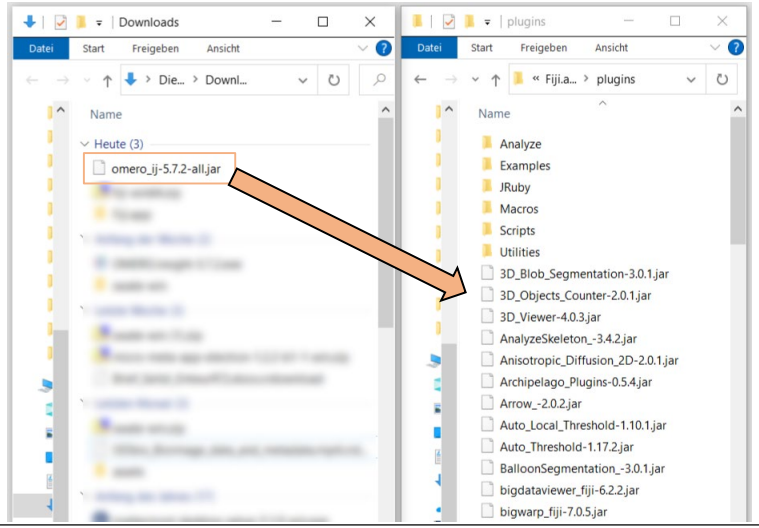
Prerequisite:

You have downloaded Fiji (https://fiji.sc) and have access to the OMERO instance (direct or VPN)

1. Download the OMERO plugin for Fiji from the OME downloads website: https://www.openmicroscopy.org/omero/downloads



2. Move the *omero-ij-x.x.x-all.jar* file to the *Plugins* folder of your Fiji application

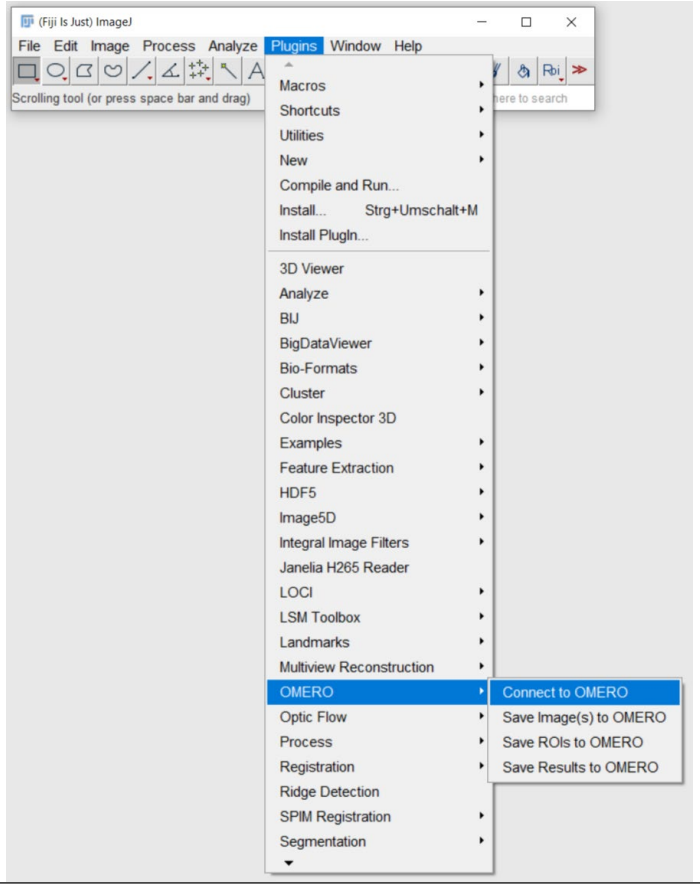


See the official OMERO guide: https://omero-guides.readthedocs.io/en/latest/fiji/docs/index.html

Connect Fiji and OMERO (2/2)

3. Open Fiji and go to
   Plugins → OMERO → Connect to OMERO

4. Log in to OMERO with your user credentials.

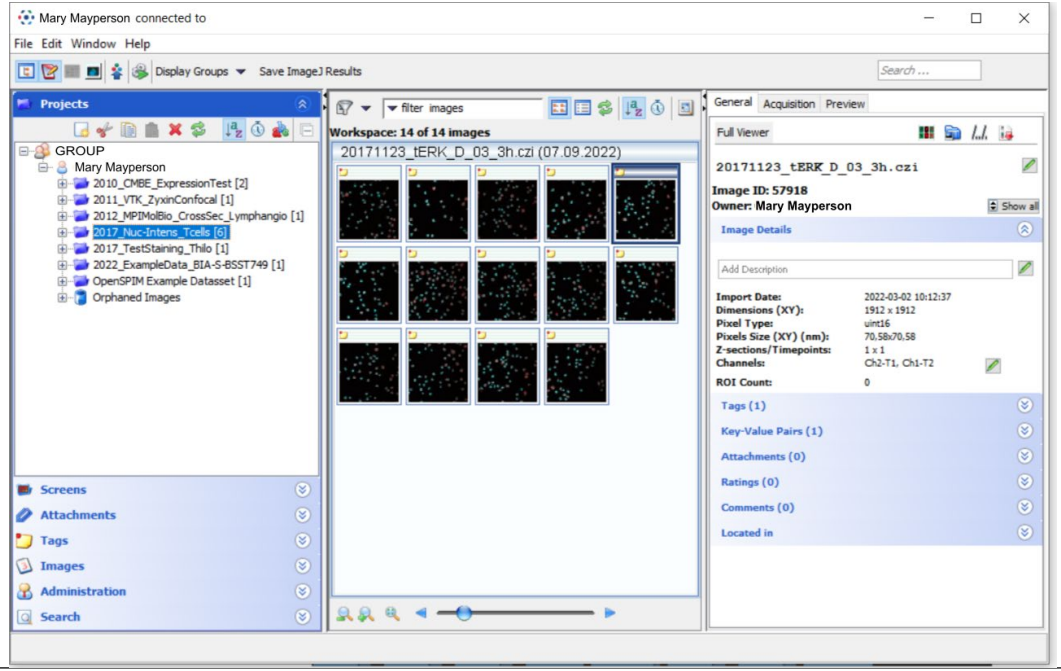


The Fiji-OMERO plugin looks almost precisely like OMERO.insight, but is, in fact, part of the open Fiji application

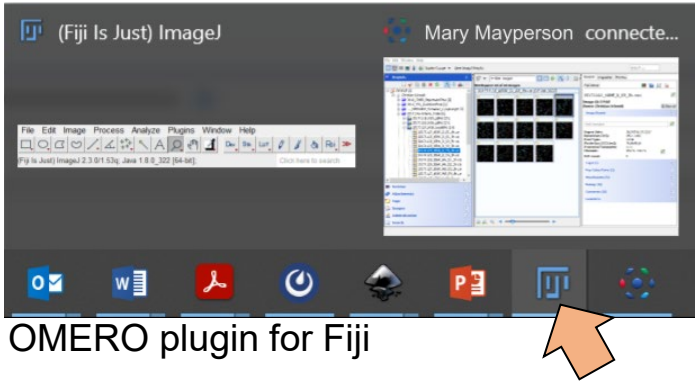
Fiji publication: Schindelin, J., Arganda-Carreras, I., Frise, E. et al. Fiji: an open-source platform for biological-image analysis. Nat Methods 9, 676–682 (2012). https://doi.org/10.1038/nmeth.2019

OMERO plugin for Fiji versus OMERO.insight

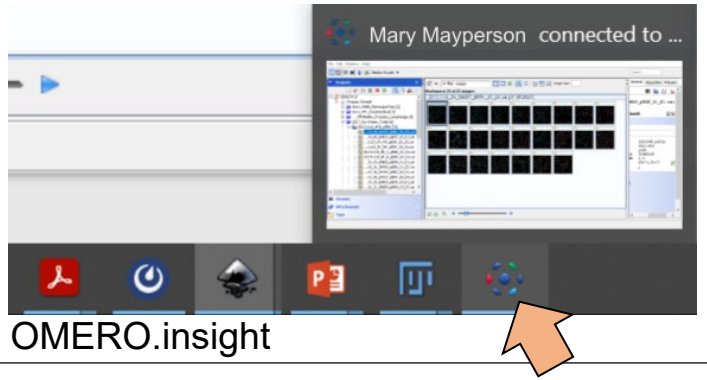
NOTE: The window looks similar to OMERO.insight, but it is a different application. For example, OMERO.insight has no **View in ImageJ** function nor allows **Save ImageJ Results**.



You can distinguish the applications by their appearance in the task bar.



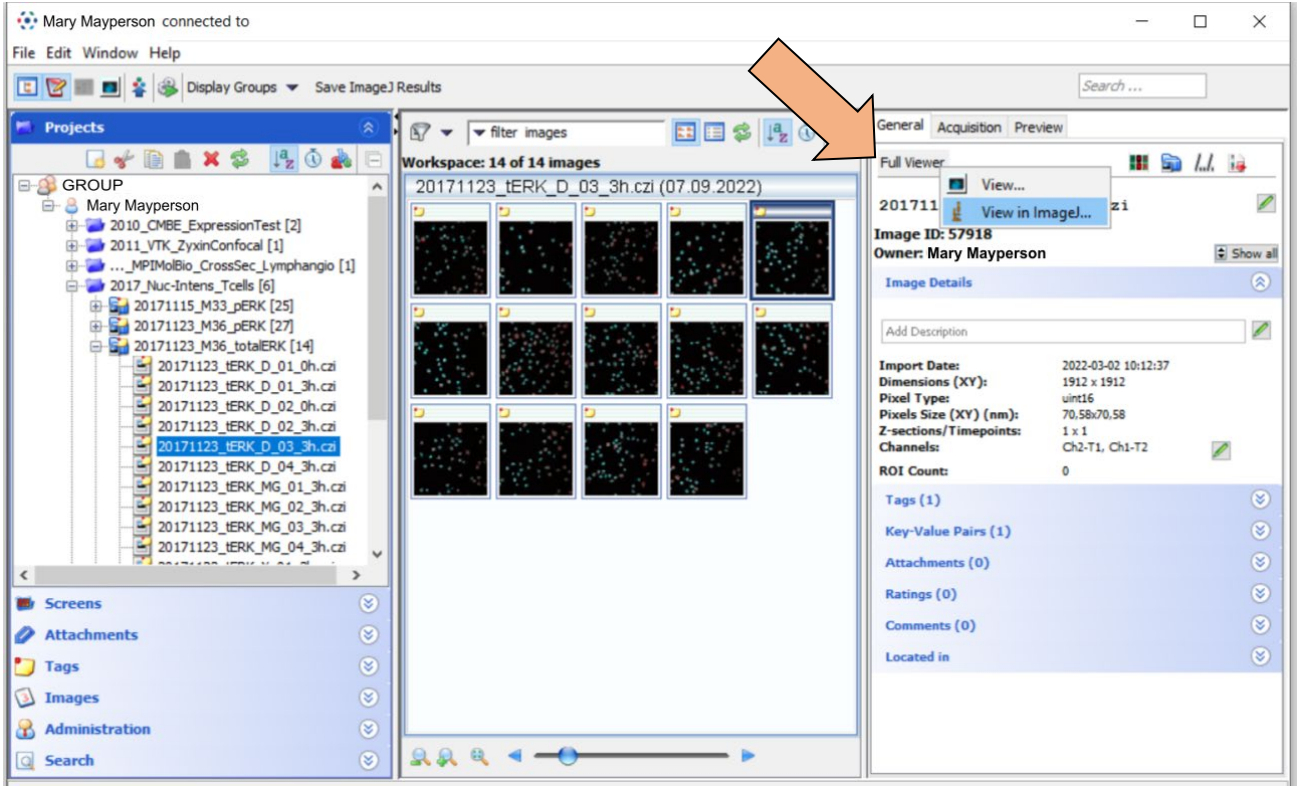
OMERO plugin for Fiji



OMERO.insight

Select image(s) to open in Fiji (1/2)

1. Select image(s) from the file tree
2. Open in Fiji by clicking Full Viewer and then View in ImageJ…

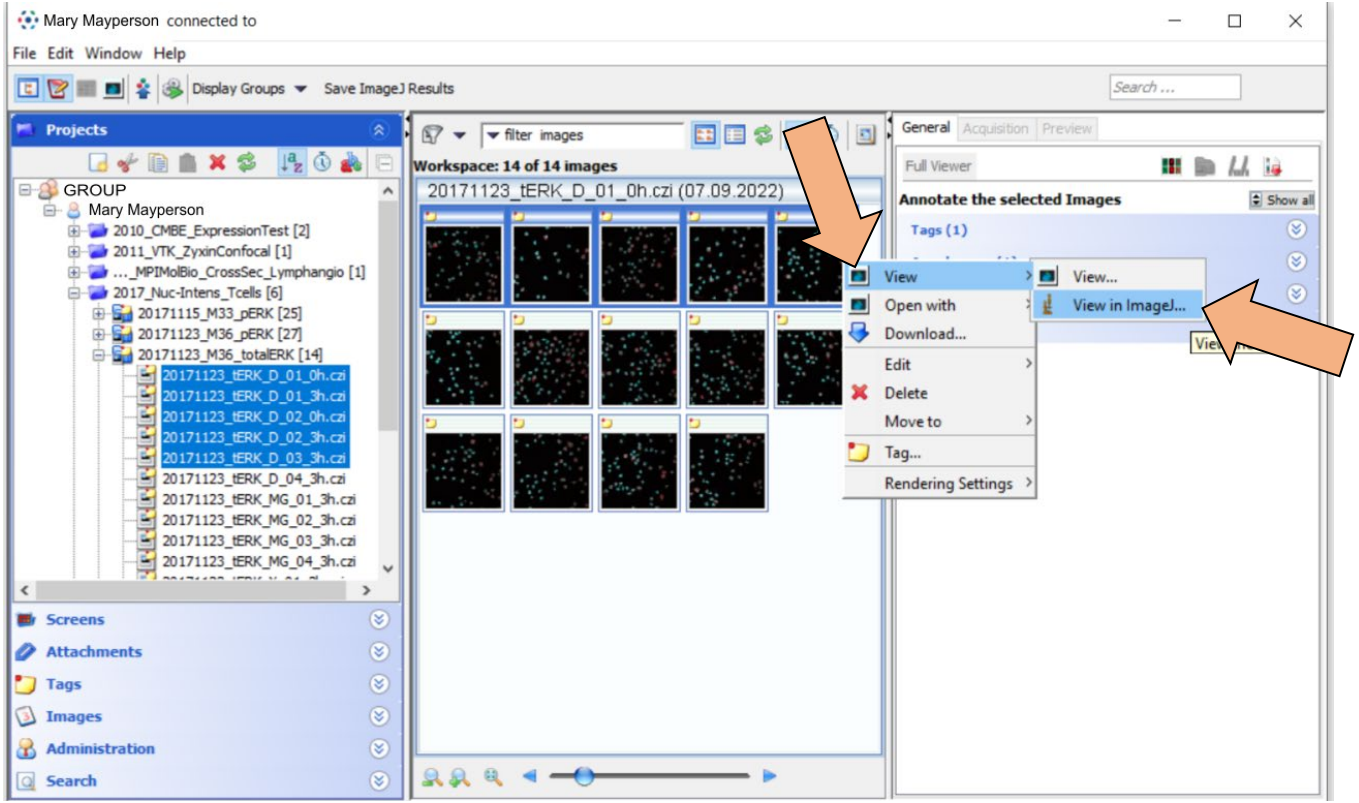


Select image(s) to open in Fiji (2/2)

OR

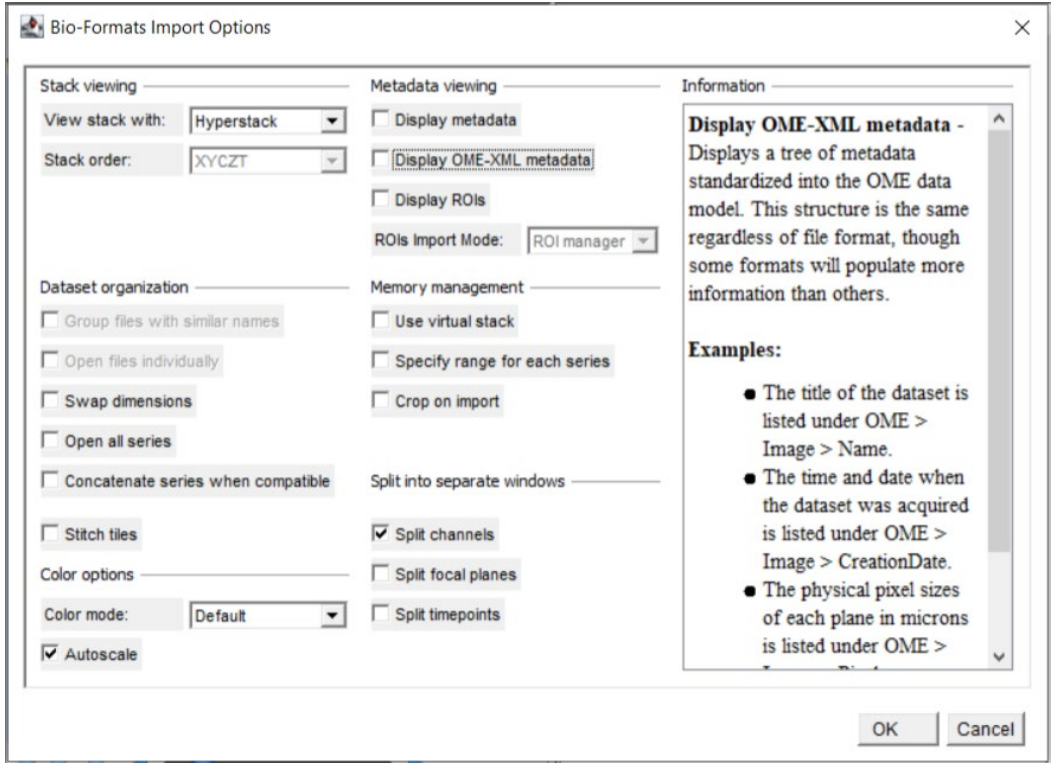
3. Open image(s) by right-click
   View
   and then
   View in ImageJ…

   (or double-click)

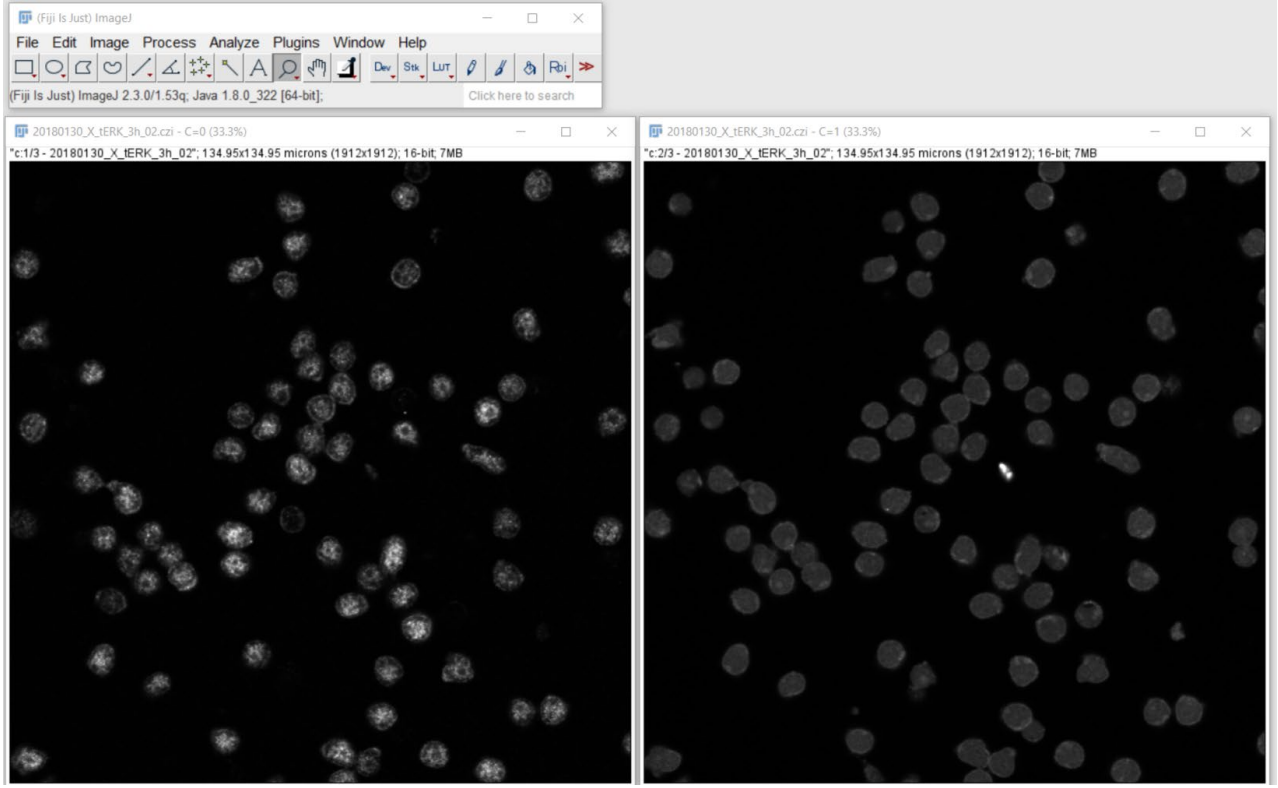


Choose settings for loading the image(s) in Fiji

Use your prefered settings to open the image(s) as required for your work

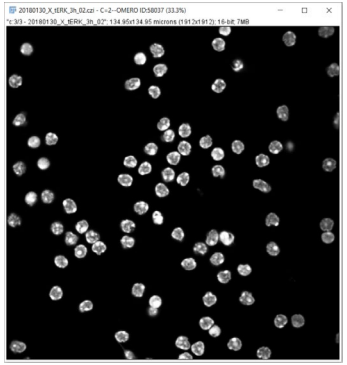


View your images in Fiji and work with the image for processing and analysis

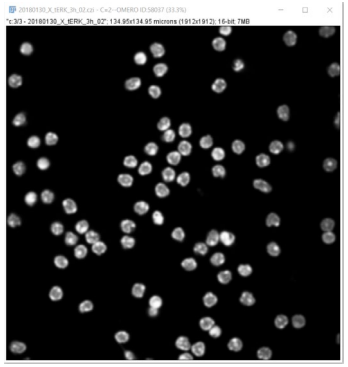


Example – processing & analysis workflow to segment and count nuclei

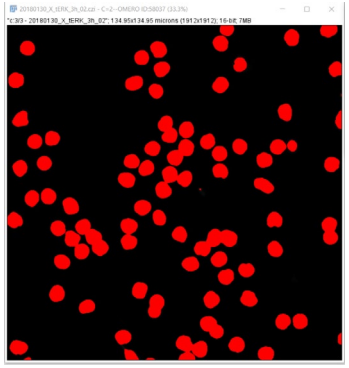
Perform your workflow in Fiji
(here: segmentation and cell counting based on nuclear staining with DAPI)



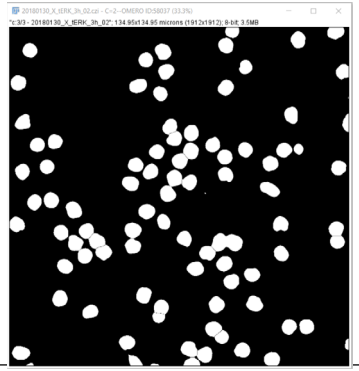
Gaussian blur



Thresholding
(Huang)



Watershed

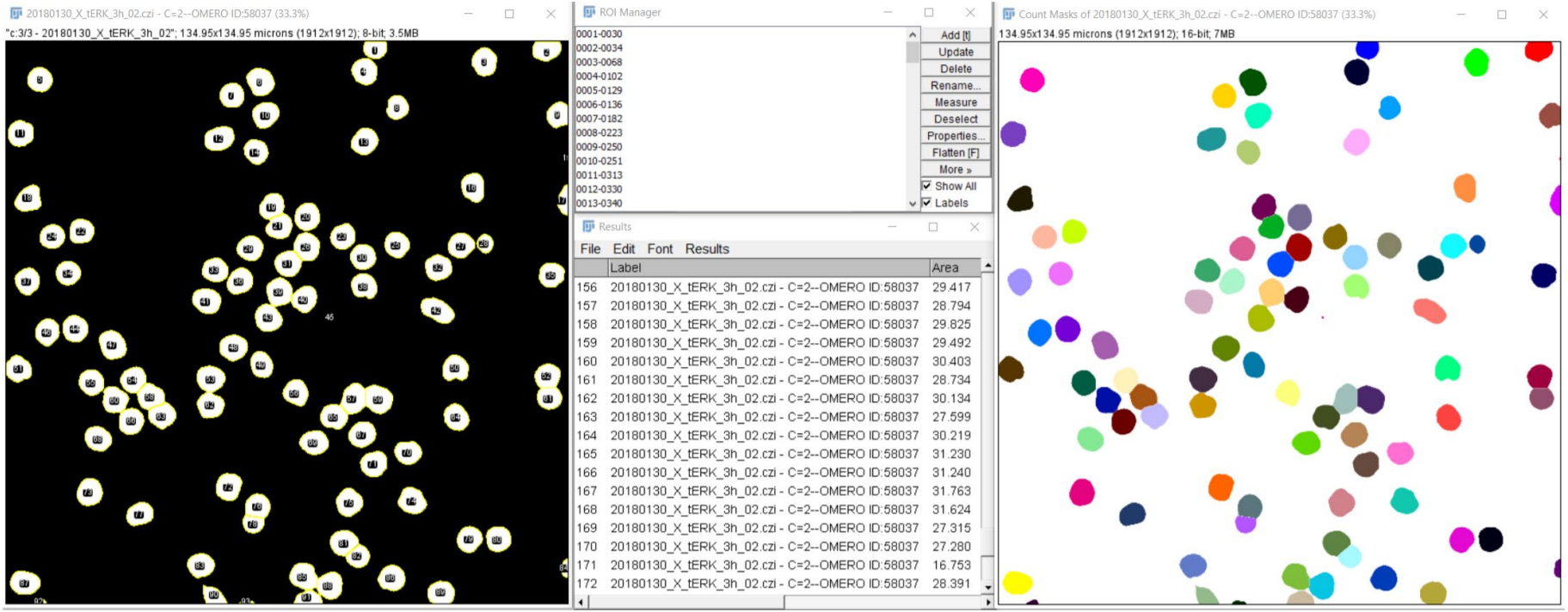


Analyze
Particles

Performed with Fiji: Schindelin, J., et al. Nat Methods 9, 676–682 (2012). https://doi.org/10.1038/nmeth.2019
See also: Haase R. Lecture BioImage Analysis 2020: https://www.youtube.com/playlist?list=PL5ESQNfM5lc7SAMstEu082ivW4BDMvd0U

Example – processing & analysis workflow to segment and count nuclei

Perform your workflow in Fiji
(here: segmentation and cell counting based on nuclear staining with DAPI)

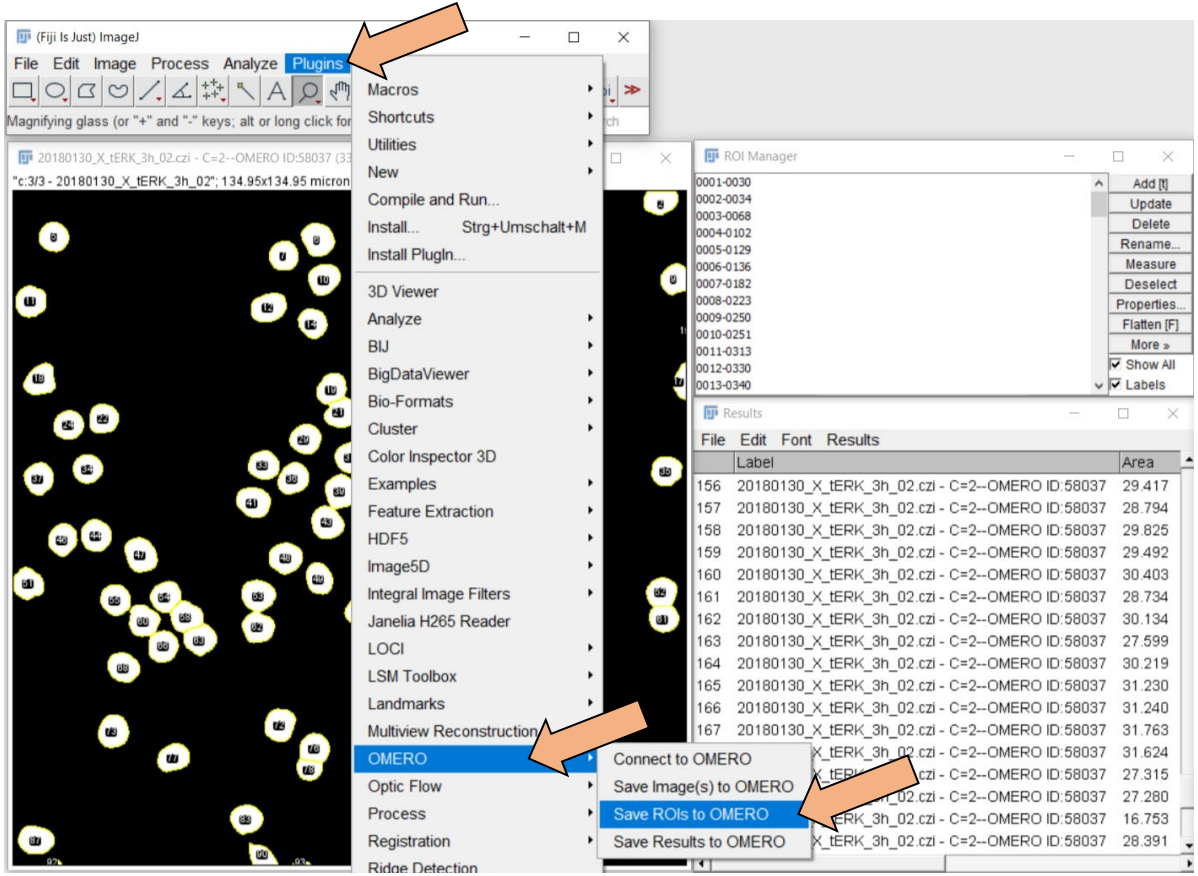


hhu.

Save Regions of Interest (ROIs) and Measurement Results to OMERO

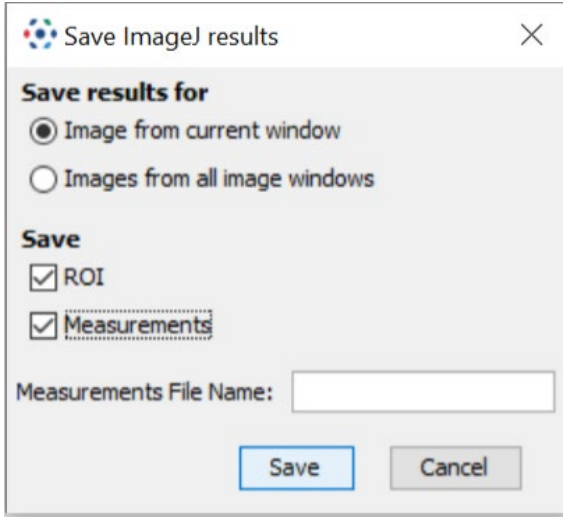
Save to OMERO using the plugin

Plugins
→ OMERO
→ Save ROIs to OMERO

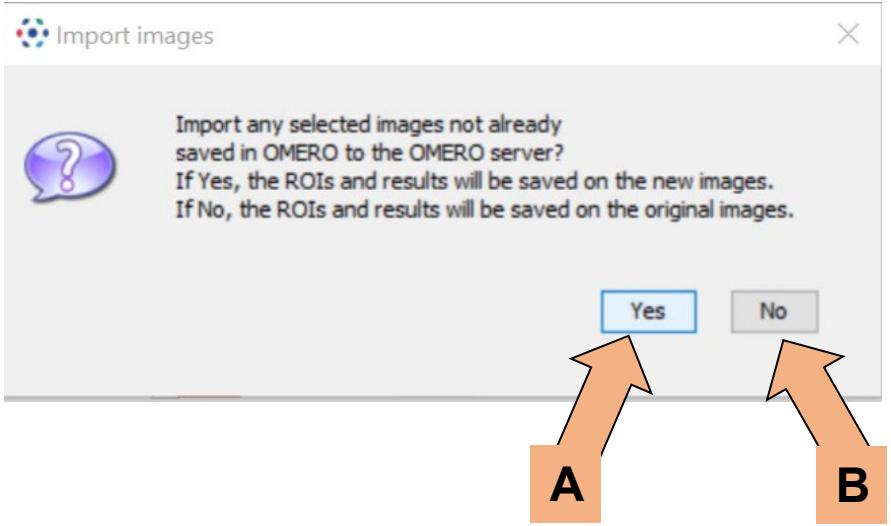


Choose settings for saving in OMERO

1



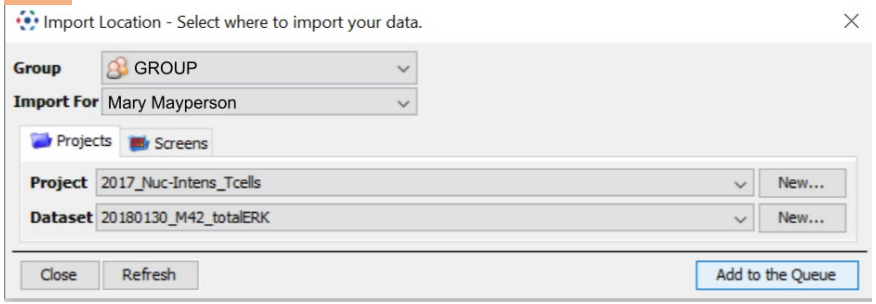
2



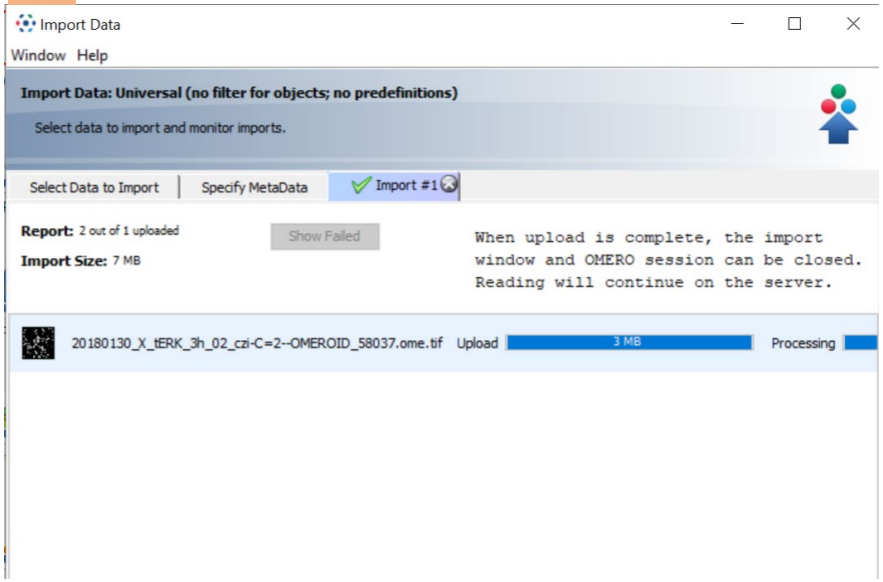
A – Upload the mask image to OMERO as a new image

Choose upload destination (Group, User, Project, Dataset) and upload

1

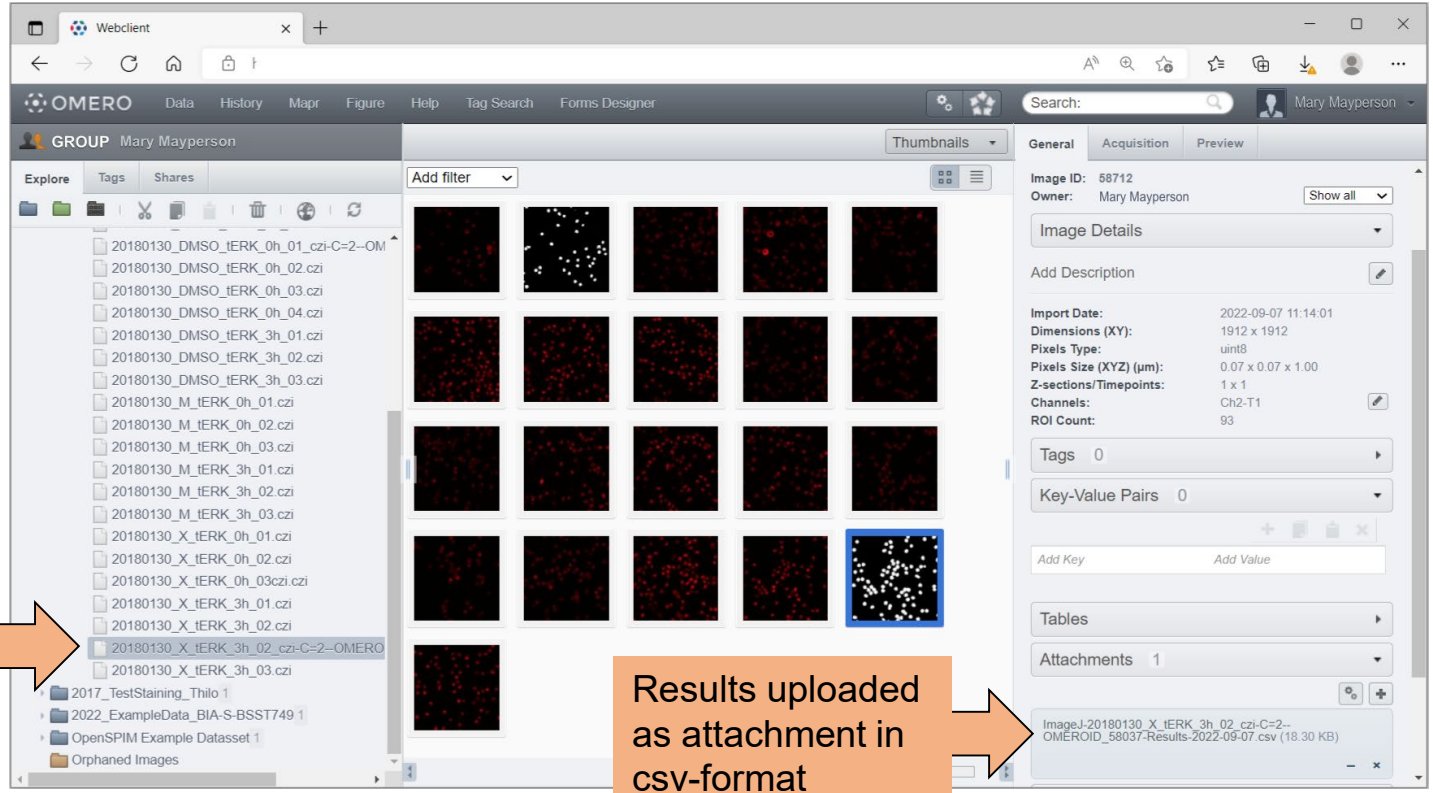


2



A – View the imported mask image and the analysis results

(e.g., in OMERO.web)

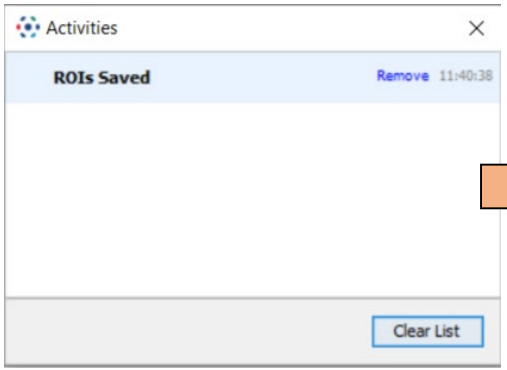


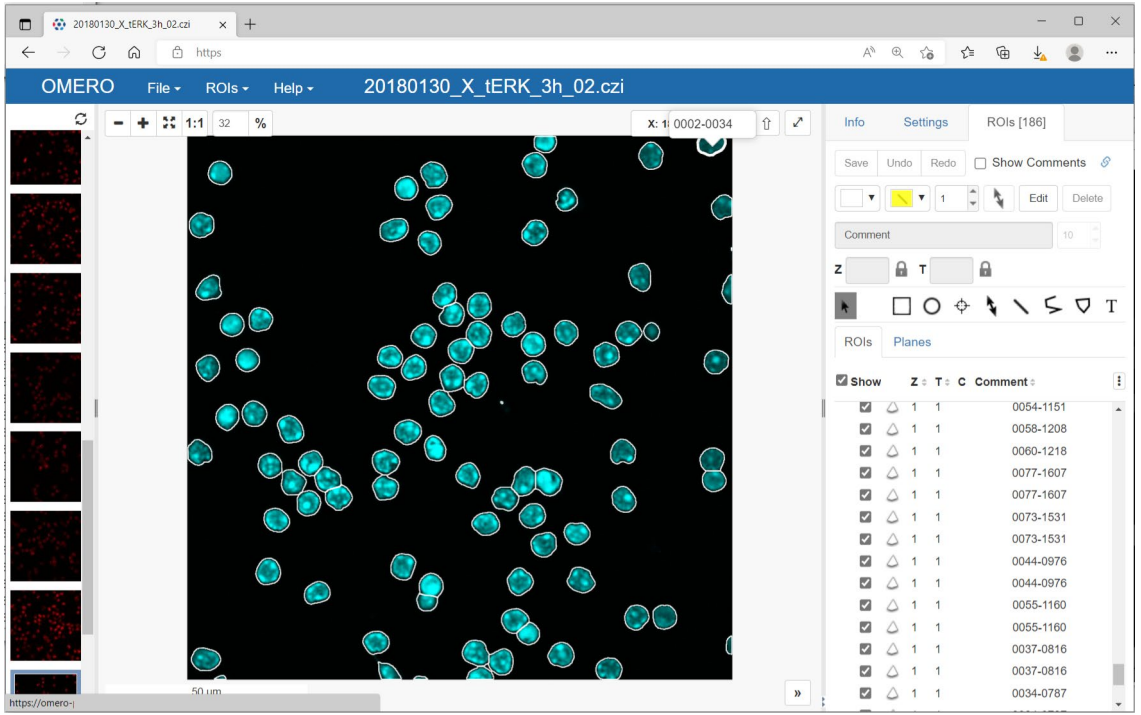
ROI image uploaded as new file (new ID!)

Results uploaded as attachment in csv-format

B – Add the ROI to the orginal image in OMERO

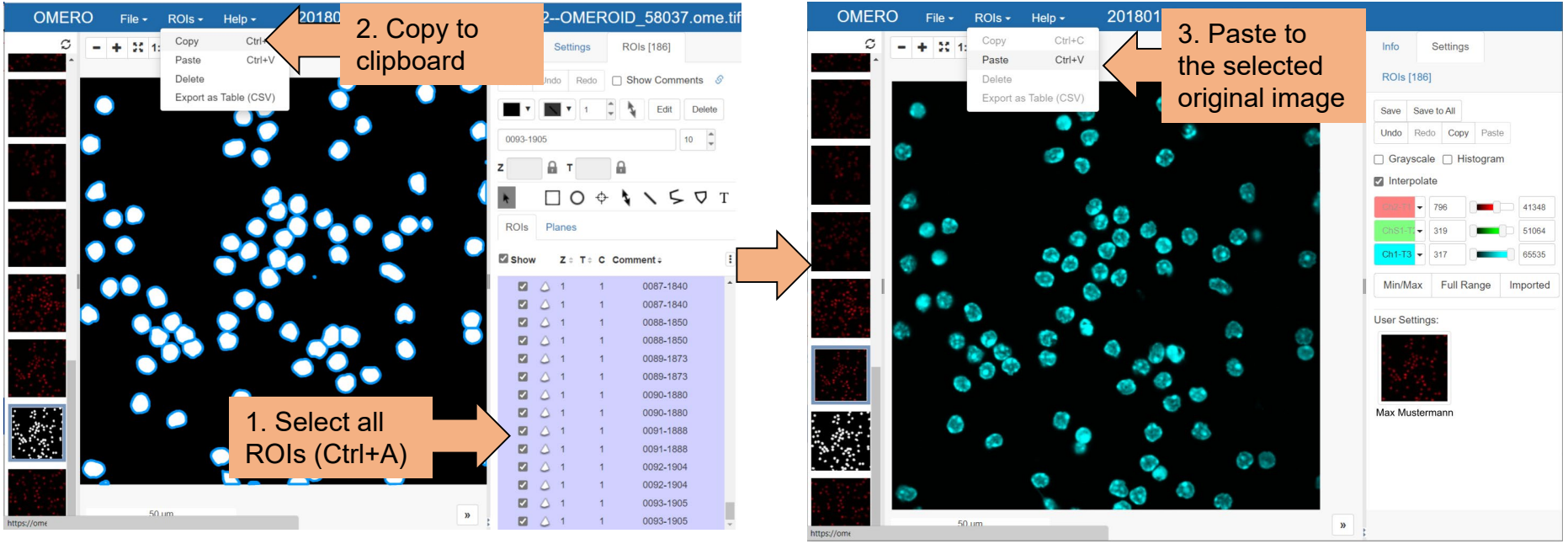
Review the ROIs on the original image with OMERO.iviewer





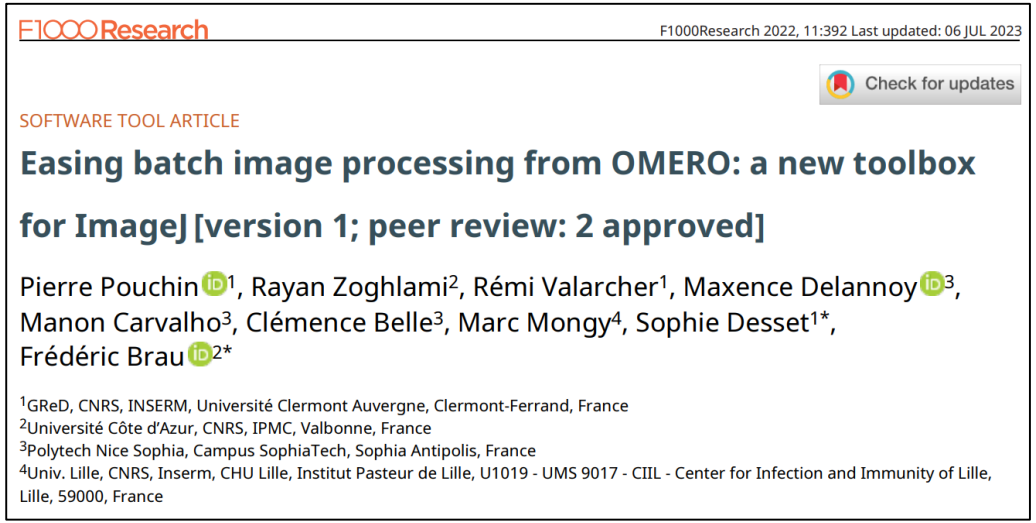
A and B combined

In the OMERO.iviewer you can copy the ROI from the segementation image to the original image manually, too.



Batch processing, macros and scripts for Fiji and OMERO

Running image analysis pipelines with Fiji over several images from OMERO in batch is possible, too.
Recommended: OMERO Macro Extension & OMERO batch plugin



F1000Research F1000Research 2022, 11:392 Last updated: 06 JUL 2023

Check for updates

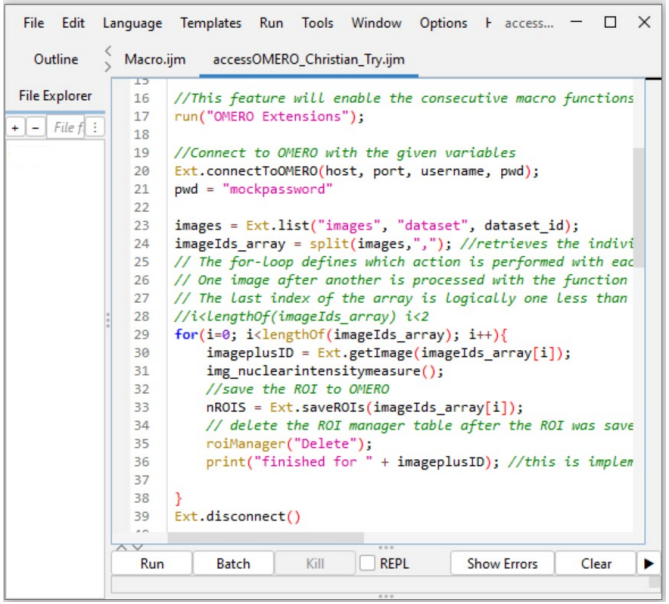
SOFTWARE TOOL ARTICLE

Easing batch image processing from OMERO: a new toolbox for ImageJ [version 1; peer review: 2 approved]

Pierre Pouchin[1], Rayan Zoghlami[2], Rémi Valarcher[1], Maxence Delannoy[3], Manon Carvalho[3], Clémence Belle[3], Marc Mongy[4], Sophie Desset[1]*, Frédéric Brau[2]*

[1]GReD, CNRS, INSERM, Université Clermont Auvergne, Clermont-Ferrand, France
[2]Université Côte d'Azur, CNRS, IPMC, Valbonne, France
[3]Polytech Nice Sophia, Campus SophiaTech, Sophia Antipolis, France
[4]Univ. Lille, CNRS, Inserm, CHU Lille, Institut Pasteur de Lille, U1019 - UMS 9017 - CIIL - Center for Infection and Immunity of Lille, Lille, 59000, France

Example:

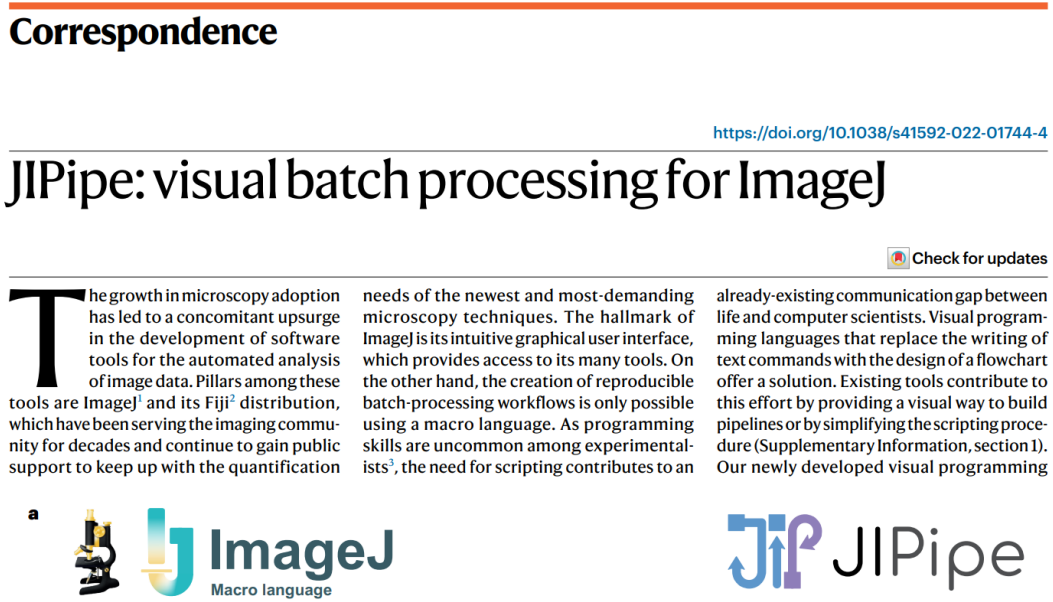


https://omero-guides.readthedocs.io/en/latest/fiji/docs/index.html

Pouchin et al., F1000Research 2022, 11:392 (https://doi.org/10.12688/f1000research.110385.1)

JiPipe visual macro programming with a connection to OMERO

Batch processing in Fiji/ImageJ and the connection to OMERO can now be established with a graphical user interface (GUI) in the software JiPipe:



Correspondence

https://doi.org/10.1038/s41592-022-01744-4

JIPipe: visual batch processing for ImageJ

Check for updates

The growth in microscopy adoption has led to a concomitant upsurge in the development of software tools for the automated analysis of image data. Pillars among these tools are ImageJ[1] and its Fiji[2] distribution, which have been serving the imaging community for decades and continue to gain public support to keep up with the quantification needs of the newest and most-demanding microscopy techniques. The hallmark of ImageJ is its intuitive graphical user interface, which provides access to its many tools. On the other hand, the creation of reproducible batch-processing workflows is only possible using a macro language. As programming skills are uncommon among experimentalists[3], the need for scripting contributes to an already-existing communication gap between life and computer scientists. Visual programming languages that replace the writing of text commands with the design of a flowchart offer a solution. Existing tools contribute to this effort by providing a visual way to build pipelines or by simplifying the scripting procedure (Supplementary Information, section 1). Our newly developed visual programming

a

ImageJ
Macro language

JIPipe

Gerst et al., Nat Methods 20, 168–169 (2023). https://doi.org/10.1038/s41592-022-01744-4

Extended resources on using Fiji and OMERO

Official OMERO guide:
https://omero-guides.readthedocs.io/en/latest/fiji/docs/index.html

A workshop on image analysis with Fiji and OMERO:
https://learning.rc.virginia.edu/notes/fiji-omero/

Workshop recordings by the Open Microscopy Environment Consortium on YouTube, including scripting in Fiji:
https://www.youtube.com/watch?v=W5EDx3yKA_o
(https://www.youtube.com/watch?v=dOtnEO-nmIg)

Image Analysis Lecture by Robert Haase (TU Dresden):
https://www.youtube.com/playlist?list=PL5ESQNfM5lc7SAMstEu082ivW4BDMvd0U

Help for Image Analysis or OMERO-related issues - Image.sc forum:
https://image.sc