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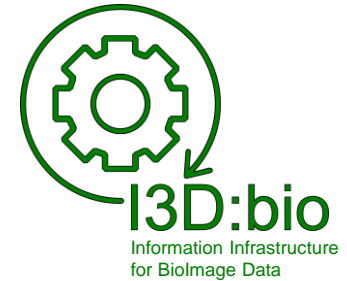
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# Disclaimer



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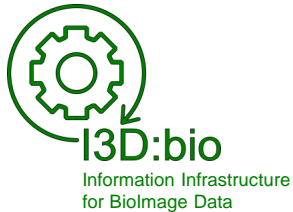
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# Research Data Management for Bioimage Data at the **ADD INSTITUTE HERE**

## Metadata Curation: Tags



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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  
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**ADD LOGO  
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# Tags in OMERO are part of the metadata (here: in OMERO.web)

The screenshot displays the OMERO.web web client interface. On the left, a file tree under 'Mary Mayperson' shows a list of image files, with '20171115\_0h\_DMSO\_pERK\_01\_D1.czi' selected. The main area shows a grid of 16 image thumbnails. On the right, the 'General' tab of the metadata panel is active, showing details for the selected image. The 'Tags' section shows 0 tags, and the 'Key-Value Pairs' section shows 2 pairs. An orange callout box with two arrows points to these sections, with the text 'Tags and Key-Value Pairs'.

Tags and Key-Value Pairs

Key	Value
CellType	CD4+ T cell
Organism	Mus musculus
Organ	Spleen
IsolationMethod	MACS negative sort
ActivationMethod	anti-CD3/anti-CD28

# Tags and Key-Value Pairs in OMERO (recommendations)

## Tags & Key-Value Pairs

can be added to:

- Images
- Groups of Images
- Datasets
- Projects

**NOTE:** Tags are...

- **linked to groups**
- **owned by a user**  
(i.e., if a Tag is deleted, it is deleted on all data(sets) using this Tag!)

### I3D:bio recommendation:

- Use **Tags** for data organization across datasets and projects
- Use **Tag categories** to organize the Tags
- Use **Key-Value Pairs** for metadata enrichment

**For advanced users:**

Annotate Tags & Key-Value Pairs using *ontology terms*  
(see subchapter 7-3)

# Tags and Tag categories (recommendation)

**Tags are owned by the user who created the Tag**

**As a research group, discuss and decide together**

- if only one (or few) persons curate the Tags for all group members
- if each user should create own Tags (bears the risk of redundancy!)
- If and which Tag categories might benefit your use case

*I3D:bio recommendation:*

When using the same group in OMERO, one person can curate the Tags for multiple users.

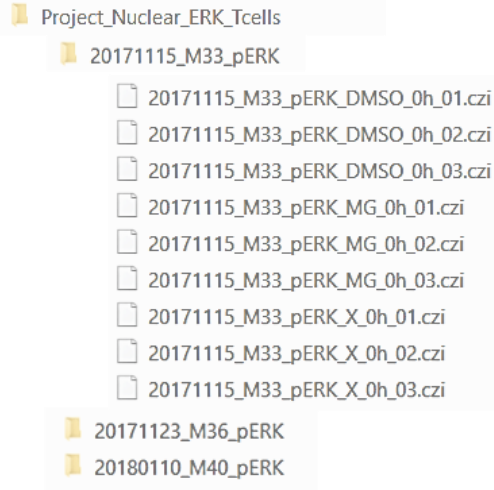
Tags may be created together with the users depending on the research needs.

# Why Tags?

## Example of a problem: Searching datasets and images in a file explorer

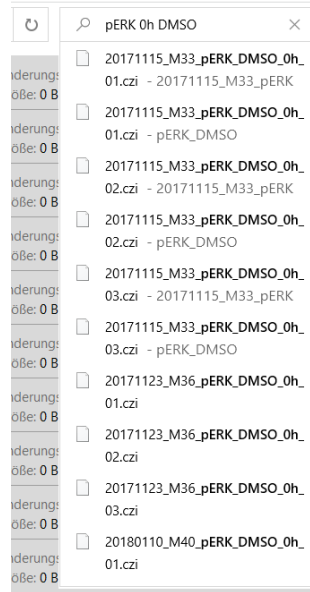
### Original file structure purpose:

Compare different treatments  
per time point for each  
staining target



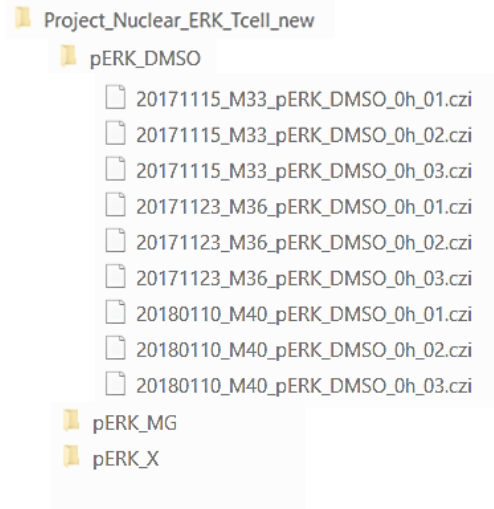
### New intention:

Compare all „DMSO“ control  
images for „pERK“ staining at „0 h“  
of incubation



### What is the solution?

- access individual files
- or
- rearrange the file structure?



# Why Tags?

## Example of a solution: Using the search function based on Tags

Instead of file-path-centered thinking...

D:\MaryMayperson\MyData\Project\_Nuclear\_ERK\_Tcells\20171115\_M33\_pERK\20171115\_M33\_pERK\_DMSO\_01.czi

VS

D:\MaryMayperson\MyData\Project\_Nuclear\_ERK\_Tcells\_new\pERK\_DMSO\20171115\_M33\_pERK\_DMSO\_01.czi

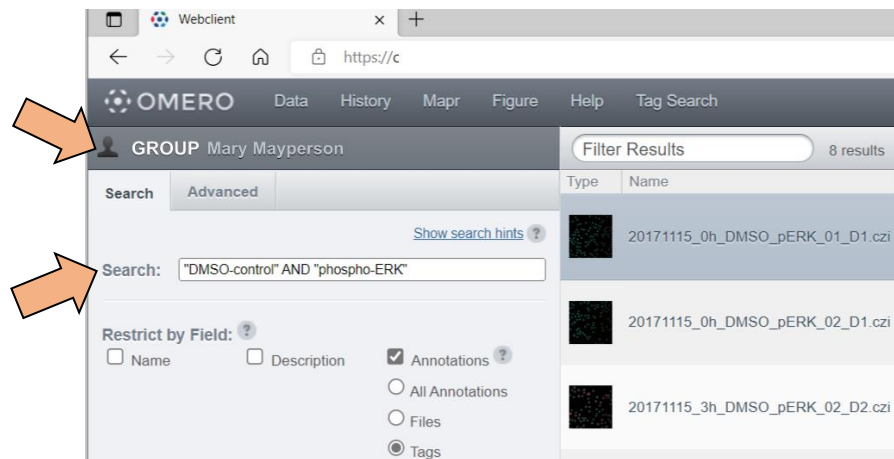
...think of tag combinations, instead:

*User:* Mary Mayperson

*Tags:* „DMSO“ AND „phospho-ERK“ AND „0h“

or

*Tags:* „DMSO“ AND „phospho-ERK“ AND „M33“



(see also: subchapter 6.1)

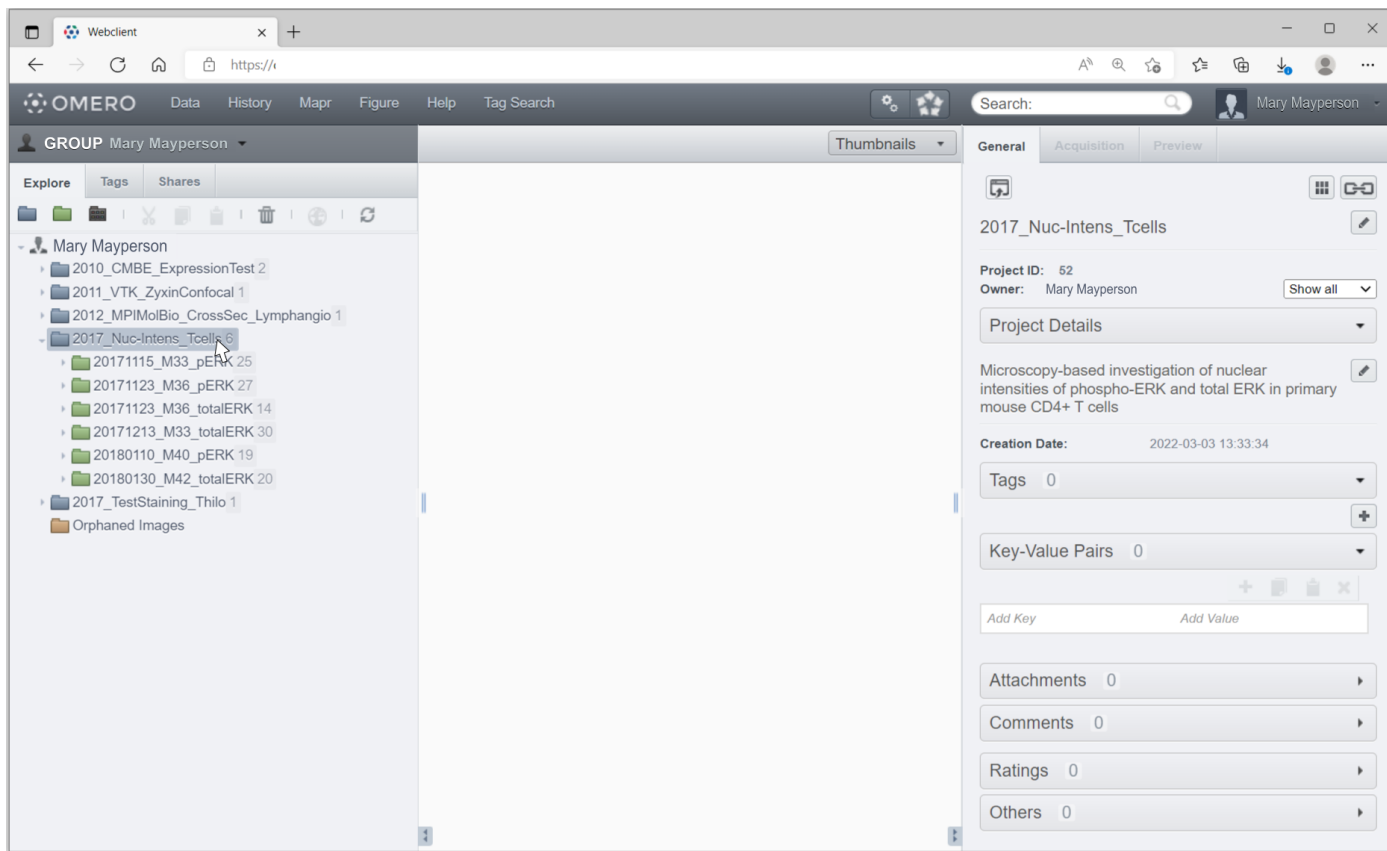


# Use Tags for flexible data exploration 1/2

Data is shown in a flat (two-folder) hierarchy

*Example:*

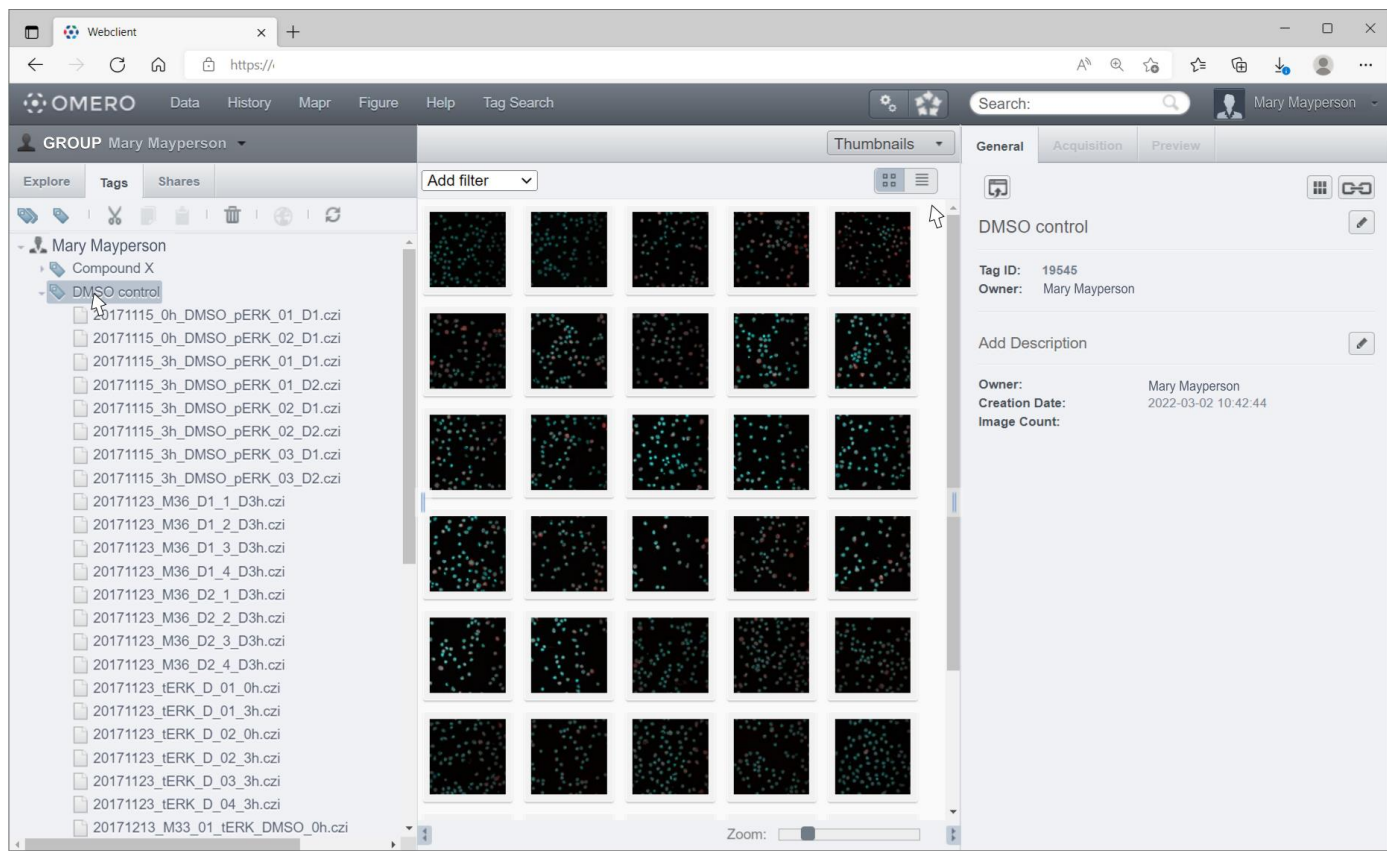
The data is organized by the stained intracellular targets, and the independent replications are organized in separate **datasets**



## Use Tags for flexible data exploration 2/2

Use **Tags** to explore related data across projects and datasets

*Example:*  
Review all imaging results for DMSO-treated samples (negative control) across repetitions and stained targets



## Options to annotate with Tags in OMERO:

- Manually in OMERO.web or in OMERO.insight
- During the data upload with OMERO.importer in the OMERO insight client
- Using the AutoTag function (only available if the OMERO webtagging extension is installed by the OMERO admin)
- (other automated solutions exist, which are not explained here)

# Manual Tag annotation (here: in OMERO.web) 1/3

1. Mark one or more images, projects or datasets you wish to tag
2. Go to General tab,  
Go to the toggle: Tags  
Click „+“ to add

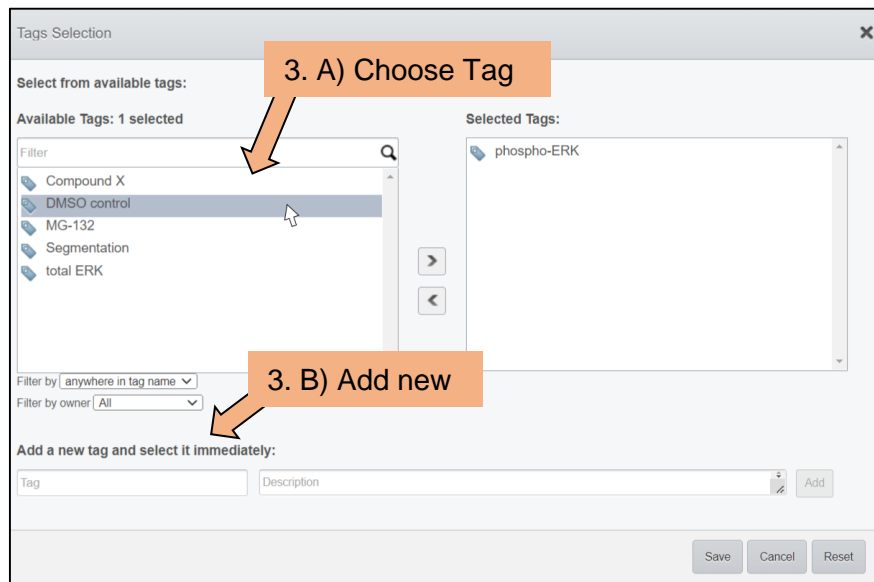
The screenshot shows the OMERO.web interface. On the left, the 'Explore' pane shows a tree structure under 'Mary Mayperson'. A folder named '20171115\_M33\_pERK 25' is selected, and its contents are listed. On the right, the 'General' tab is active. The 'Tags' section is expanded, showing a list of tags. The 'phospho-ERK' tag is highlighted. An orange arrow points from the 'Tags' section to the 'phospho-ERK' tag, and another orange arrow points from the 'Tags' section to the 'Tags' toggle.

1. Choose data to be tagged

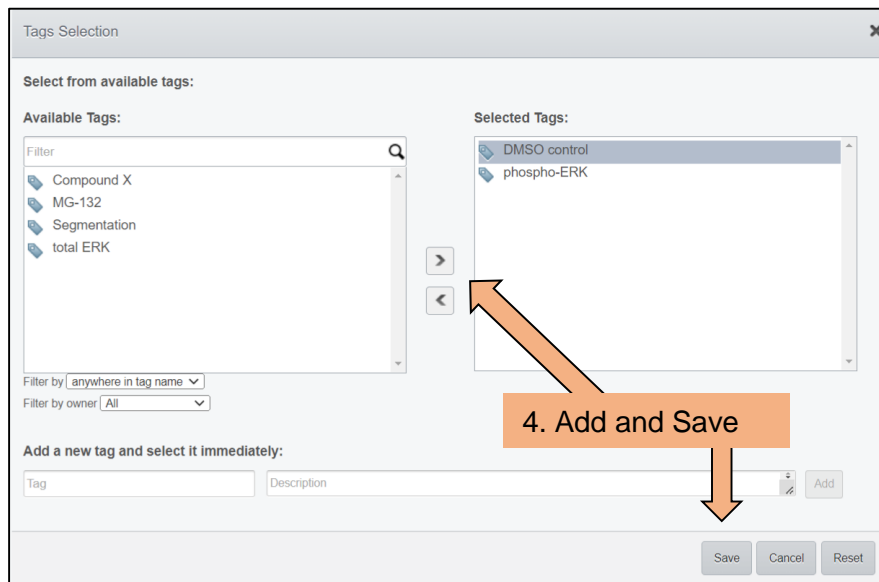
2. Tags section („+“ to add)

## Manual Tag annotation (here: in OMERO.web) 2/3

3. A) Choose from Available Tags  
B) Add a new Tag (and a tag description)



4. Add Tag to Selected Tags and Save



# Manual Tag annotation (here: in OMERO.web) 3/3

The Tag is now added as an annotation to the data.

Tags have

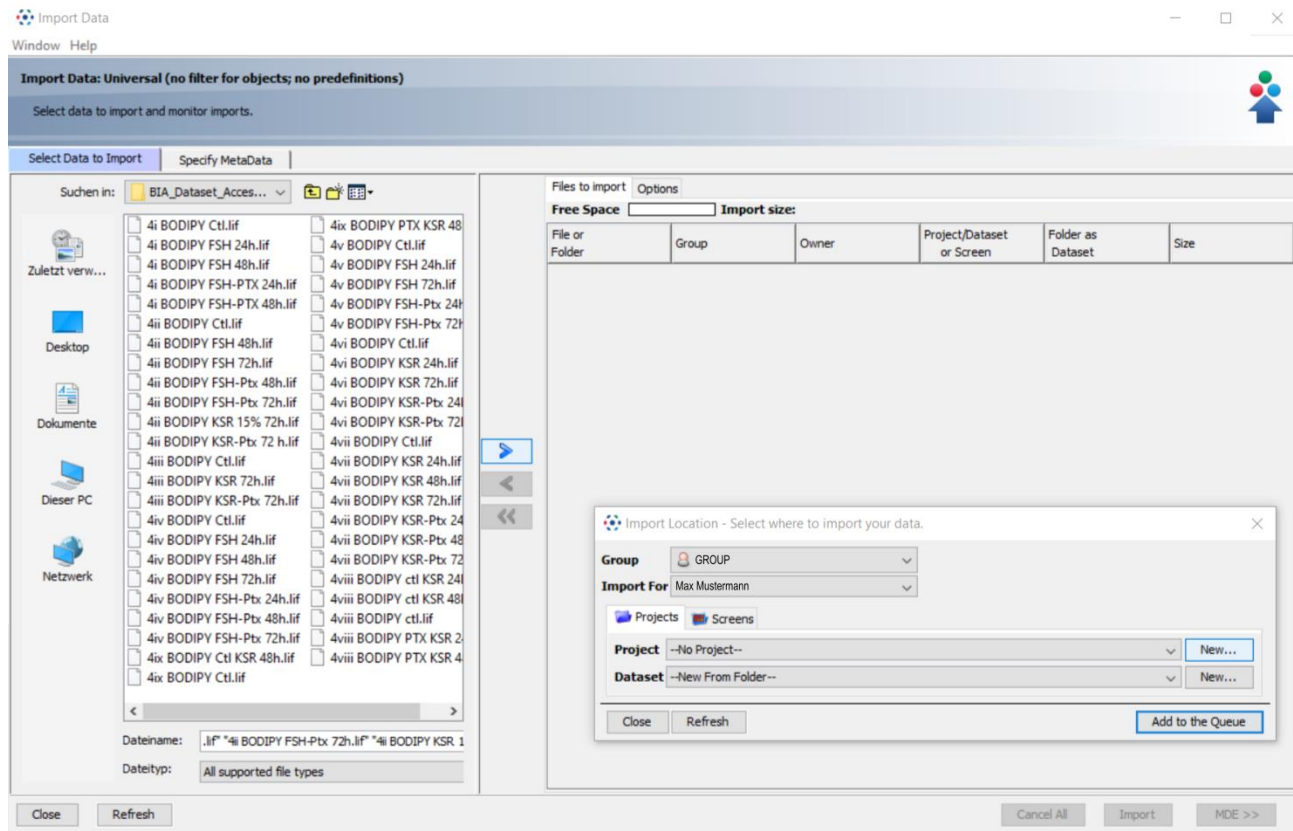
- an ID
- an owner
- Information about who linked the Tag
- a tagging date
- (a Tag description)

The screenshot displays the OMERO.web webclient interface. On the left, the 'Explore' panel shows a tree view of data under the group 'Mary Mayperson'. A file named '20171115\_3h\_DMSO\_pERK\_01\_D1.czi' is selected. The main area shows a grid of image thumbnails, with one thumbnail highlighted by a blue border. On the right, the 'General' tab is active, showing details for the selected image. The 'Image ID' is 58118, the 'Owner' is Mary Mayperson, and the 'Image Description' is '20171115\_3h\_DMSO\_pERK\_01\_D1.czi'. Below this, the 'Tags' section shows a list of tags, including 'phospho-ERK' and 'DMSO control'. A tooltip is visible over the 'DMSO control' tag, displaying its details: ID: 19545, Owner: Mary Mayperson, Linked by: Mary Mayperson, On: 2022-07-28 15:39:46, and Description: (empty).

# Tag annotation during upload (OMERO.insight) 1/5

Start the upload process with **OMERO.insight**

Choose files and select target Project and Dataset ...



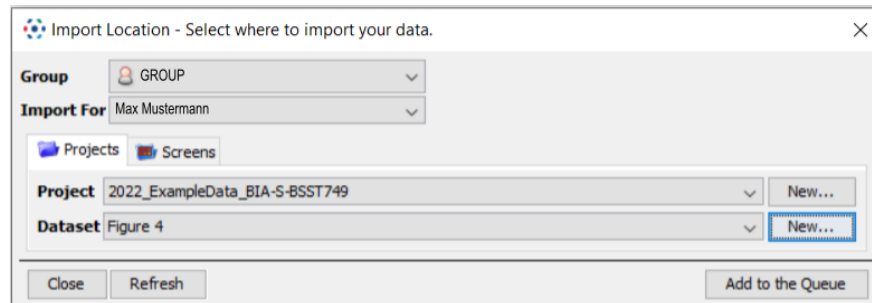
## Tag annotation during upload (OMERO.insight) 2/5

... OR create a new Project and/or Dataset.

When finished, add the data to the import queue



The 'Create Project' dialog box is shown. It has a title bar with the OMERO logo and the word 'Create'. Below the title bar, it says 'Create Project' and 'Create a new Project.' with a folder icon. The 'Name' field contains '2022\_ExampleData\_BIA-S-B SST749'. The 'Description' field contains: 'Example Dataset downloaded from the BioImage Archive with Accession No. S-B SST749: https://www.ebi.ac.uk/biostudies/BioImages/studies/S-B SST749 Original publication: Sayers NS, Anujan P, Yu HN, Palmer SS, Nautiyal J, Franks S and Hanyaloglu AC (2022) Follicle-Stimulating Hormone Induces Lipid Droplets via Galphai/o and beta-Arrestin in an Endometrial Cancer Cell Line. Front. Endocrinol. 12:798866. doi: 10.3389/fendo.2021.798866'. At the bottom right are 'Cancel' and 'Create' buttons.

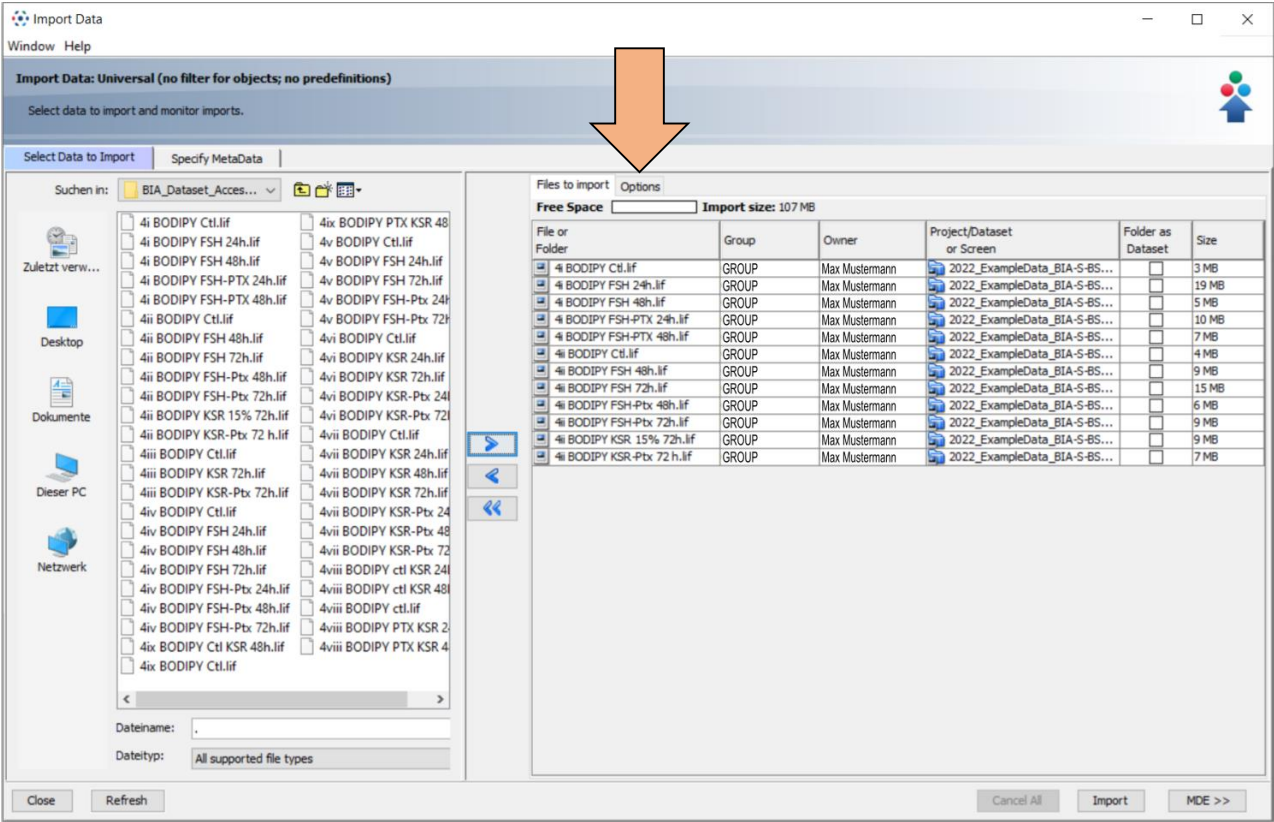


The 'Import Location' dialog box is shown. It has a title bar with the OMERO logo and the text 'Import Location - Select where to import your data.' Below the title bar, it says 'Group' with a dropdown menu showing 'GROUP'. Below that is 'Import For' with a dropdown menu showing 'Max Mustermann'. There are two tabs: 'Projects' (selected) and 'Screens'. Below the tabs, there are two rows: 'Project' with a dropdown menu showing '2022\_ExampleData\_BIA-S-B SST749' and a 'New...' button; and 'Dataset' with a dropdown menu showing 'Figure 4' and a 'New...' button. At the bottom are 'Close', 'Refresh', and 'Add to the Queue' buttons.



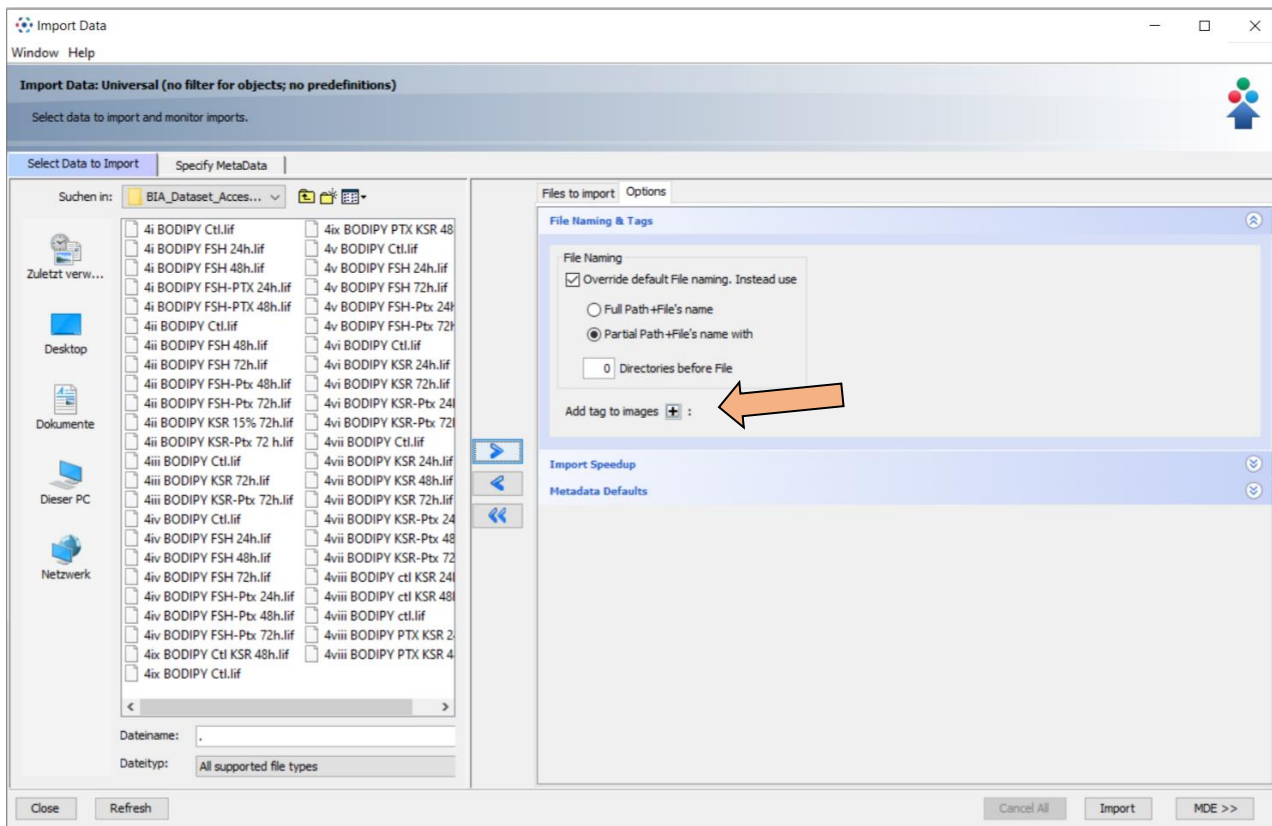
# Tag annotation during upload (OMERO.insight) 3/5

Choose options tab



# Tag annotation during upload (OMERO.insight) 4/5

Use  
Add tag to images  
by clicking on the  
+ symbol



## Tag annotation during upload (OMERO.insight) 5/5

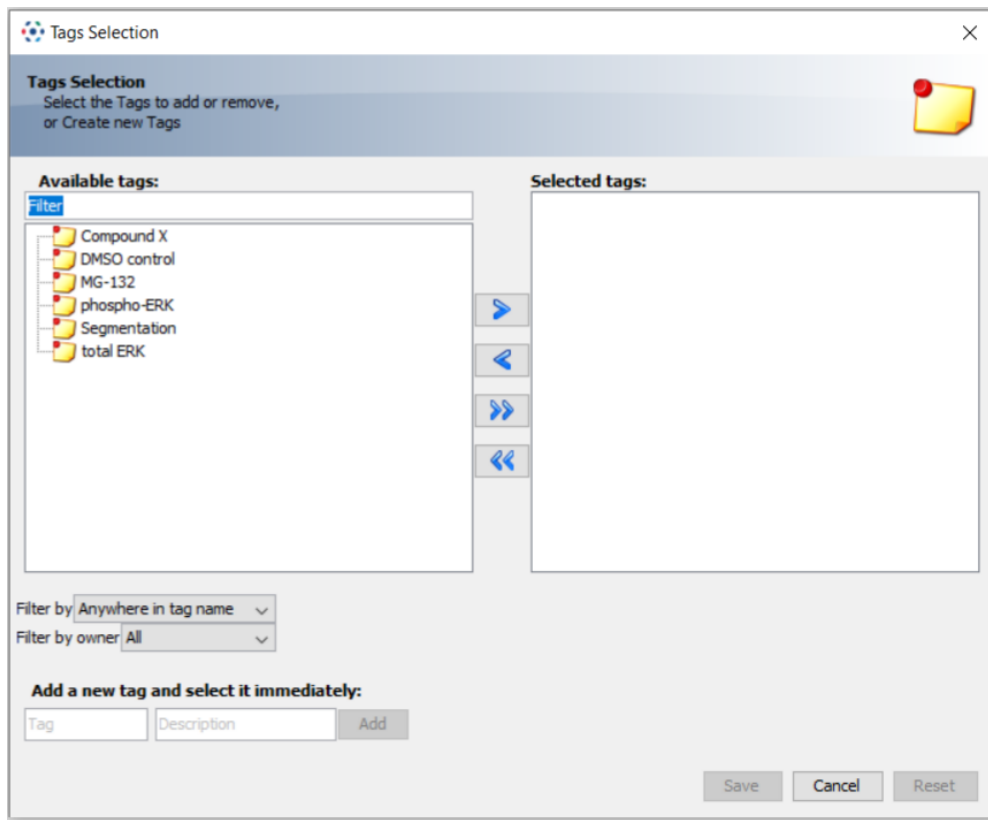
Use Available Tags  
for annotation with existing  
Tags

OR

Create a new Tag  
(similar to OMERO.web)

### NOTE:

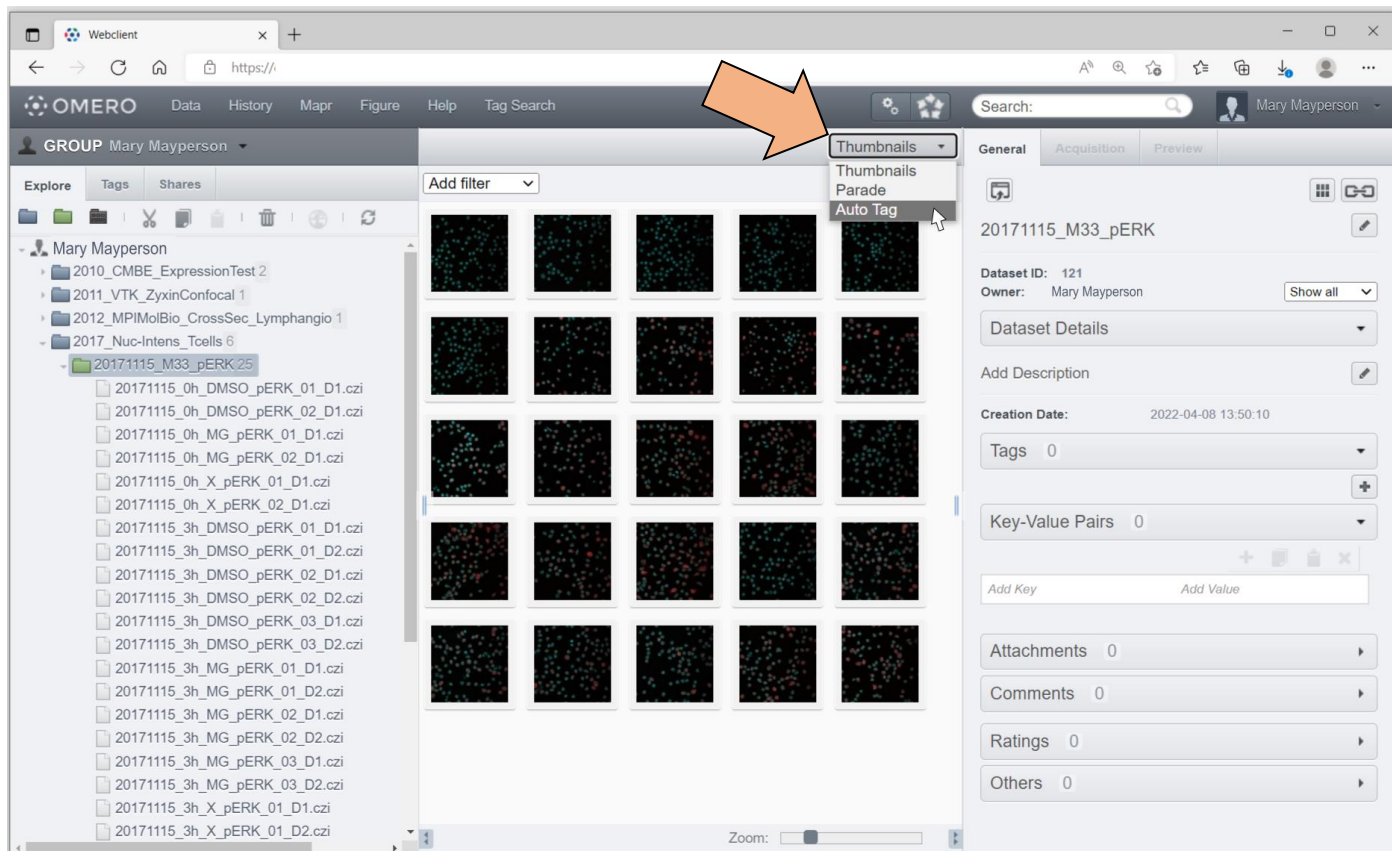
Tags annotated during *Import*  
are applied to all data in the  
queue!



# Using Auto Tag (OMERO.webtagging extension) 1/6

Auto Tag can assist in automatically extracting possible Tags from your data.

1. Change the view mode to Auto Tag



# Using Auto Tag (OMERO.webtagging extension) 2/6

2. Browse the proposed Tags and choose which you wish to add.

3. Click on **New/Existing Tag** to add the Tag.

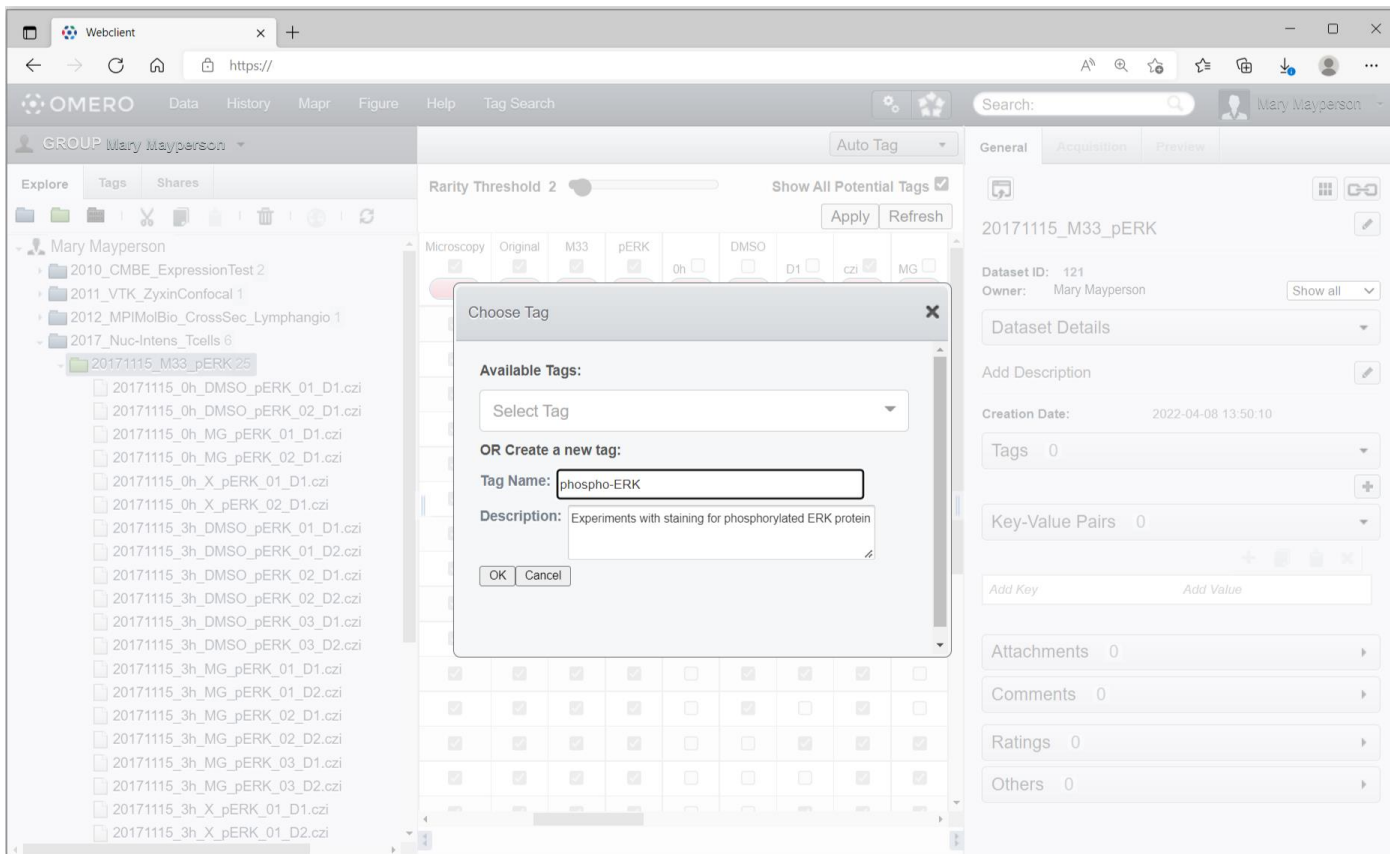
The screenshot displays the OMERO webclient interface. On the left, a file tree under 'Mary Mayperson' shows a folder '2017\_Nuc-Intens\_Tcells 6' with a subfolder '20171115\_M33\_pERK25'. The main panel is titled 'Auto Tag' and features a 'Rarity Threshold 2' slider and a 'Show All Potential Tags' checkbox. Below these is a table with columns for various tags: Microscopy, Original, 33, pERK, 0h, DMSO, D1, czi, and MG. An orange arrow labeled '3.' points to the 'pERK' column. The right sidebar shows dataset details for '20171115\_M33\_pERK', including 'Dataset ID: 121', 'Owner: Max Mustermann', and 'Creation Date: 2022-04-08 13:50:10'. It also displays sections for 'Tags', 'Key-Value Pairs', 'Attachments', 'Comments', 'Ratings', and 'Others'.

# Using Auto Tag (OMERO.webtagging extension) 3/6

4. Select from the Available Tags

OR

Create a new Tag.





## Using Auto Tag (OMERO.webtagging extension) 4/6

5. Choose data to be assigned with the Tag.  
(AutoTag prefills boxes as a suggestion)

*Optional:* You can narrow the view by unchecking

**Show All Potential Tags** ☒

and extend your view by hiding the side panels with this button:



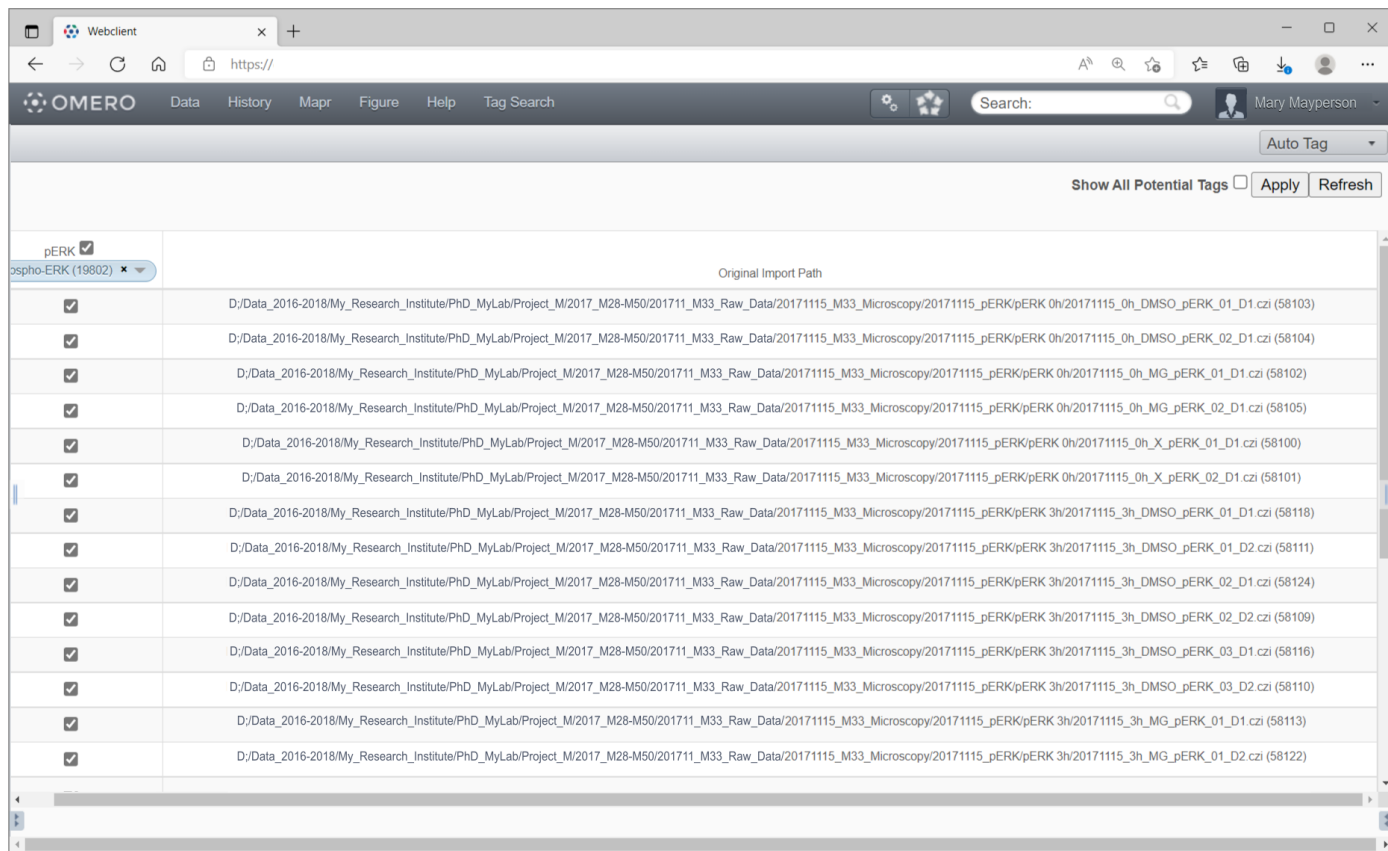
The screenshot shows the OMERO webclient interface. The top navigation bar includes 'Data', 'History', 'Mapr', 'Figure', 'Help', and 'Tag Search'. The 'Auto Tag' button is highlighted with an orange arrow. Below it, the 'Show All Potential Tags' checkbox is checked, also highlighted with an orange arrow. The left sidebar shows a tree view of datasets under 'Mary Mayperson'. The center panel displays a table of tags with columns for 'pERK', 'DMSO', 'D1', 'czi', 'MG', and 'X'. The right panel shows dataset details for '20171115\_M33\_pERK'.

Dataset	pERK	DMSO	D1	czi	MG	X
phospho-ERK (19802)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20171115_0h_DMSO_pERK_01_D1.czi	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
20171115_0h_DMSO_pERK_02_D1.czi	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
20171115_0h_MG_pERK_01_D1.czi	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
20171115_0h_MG_pERK_02_D1.czi	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
20171115_0h_X_pERK_01_D1.czi	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
20171115_0h_X_pERK_02_D1.czi	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
20171115_3h_DMSO_pERK_01_D1.czi	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
20171115_3h_DMSO_pERK_01_D2.czi	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
20171115_3h_DMSO_pERK_02_D1.czi	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
20171115_3h_DMSO_pERK_02_D2.czi	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
20171115_3h_DMSO_pERK_03_D1.czi	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
20171115_3h_DMSO_pERK_03_D2.czi	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
20171115_3h_MG_pERK_01_D1.czi	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
20171115_3h_MG_pERK_01_D2.czi	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
20171115_3h_MG_pERK_02_D1.czi	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
20171115_3h_MG_pERK_02_D2.czi	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
20171115_3h_MG_pERK_03_D1.czi	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
20171115_3h_MG_pERK_03_D2.czi	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
20171115_3h_X_pERK_01_D1.czi	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

# Using Auto Tag (OMERO.webtagging extension) 5/6

OMERO.web now shows you the Original Import Path of the data, which you can choose for tagging.

6. Click Apply





# Using Auto Tag (OMERO.webtagging extension) 6/6

The data now contains the new Tag

Shown here: One of the images that was marked and its metadata window.

The screenshot displays the OMERO webclient interface. On the left, a tree view shows the data structure under 'Mary Mayperson', with '20171115\_0h\_DMSO\_pERK\_01\_D1.czi' selected. The main panel shows a table of images with columns for 'M33', 'pERK', 'DMSO', 'D1', 'czi', 'MG', and 'X'. The 'pERK' column is highlighted in green, and a 'phospho-ERK (19802)' tag is applied to the selected image. The right sidebar shows the 'Image Details' for '20171115\_0h\_DMSO\_pERK\_01\_D1.czi', including 'Image ID: 58103', 'Owner: Mary Mayperson', 'Import Date: 2022-04-08 13:50:20', 'Dimensions (XY): 1912 x 1912', 'Pixels Type: uint16', 'Pixels Size (XYZ) (µm): 0.07 x 0.07 x -', 'Z-sections/Timepoints: 1 x 1', 'Channels: Ch2-T1, Ch1-T2', 'ROI Count: 0', and 'Tags: 1'. A tooltip for the 'phospho-ERK' tag shows its ID (19802), owner (Mary Mayperson), link (https://openmicroscopy.org/help/pdfs/web-tagging.pdf), and description (Experiments with staining for phosphorylated ERK protein).