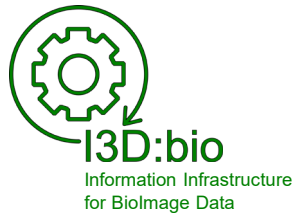


# Research Data Management for Bioimage Data at the HHU

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

The screenshot displays the OMERO.web interface. On the left, a file tree shows a folder named '20171115\_M33\_pERK 25' containing several image files. The main area shows a grid of 20 microscopy images. The right-hand panel displays metadata for the selected image, including 'General', 'Acquisition', and 'Preview' tabs. The 'General' tab is active, showing fields for 'Image ID', 'Owner', 'Import Date', 'Dimensions (XY)', 'Pixels Type', 'Pixels Size (XYZ) (µm)', 'Z-sections/Timepoints', 'Channels', and 'ROI Count'. Below these fields, there are sections for 'Tags' (showing 0) and 'Key-Value Pairs' (showing 2). An orange callout box with two arrows points to these two sections, with the text 'Tags and Key-Value Pairs' inside.

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.

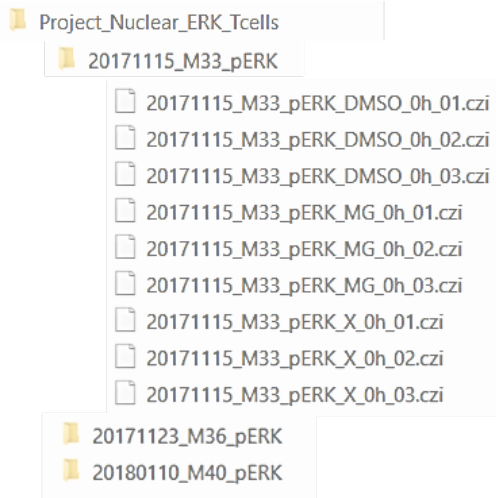
# Why Tags?

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

**Original file structure**

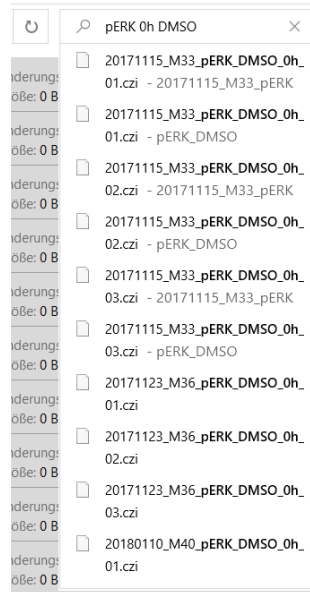
**purpose:**

Compare different treatments per time point for each staining target



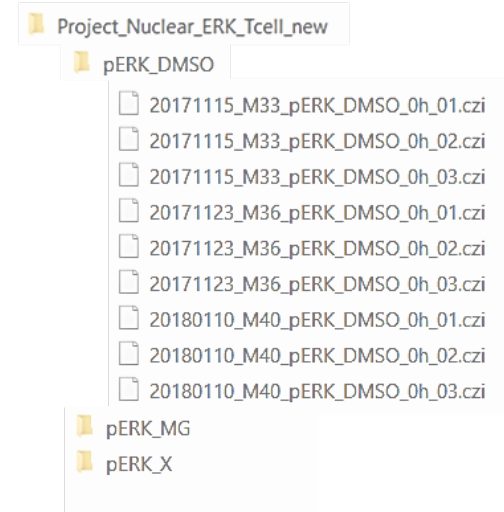
**New intention:**

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

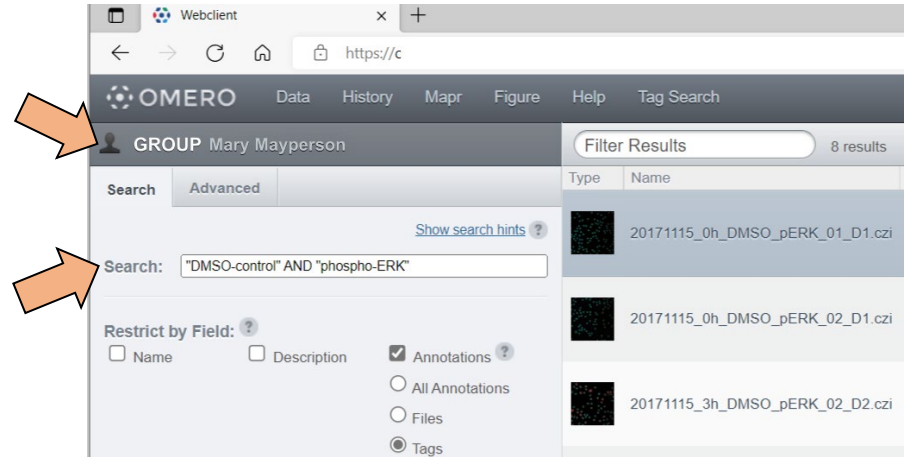
...think of tag combinations, instead:

*User:* Mary Mayperson

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

or

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

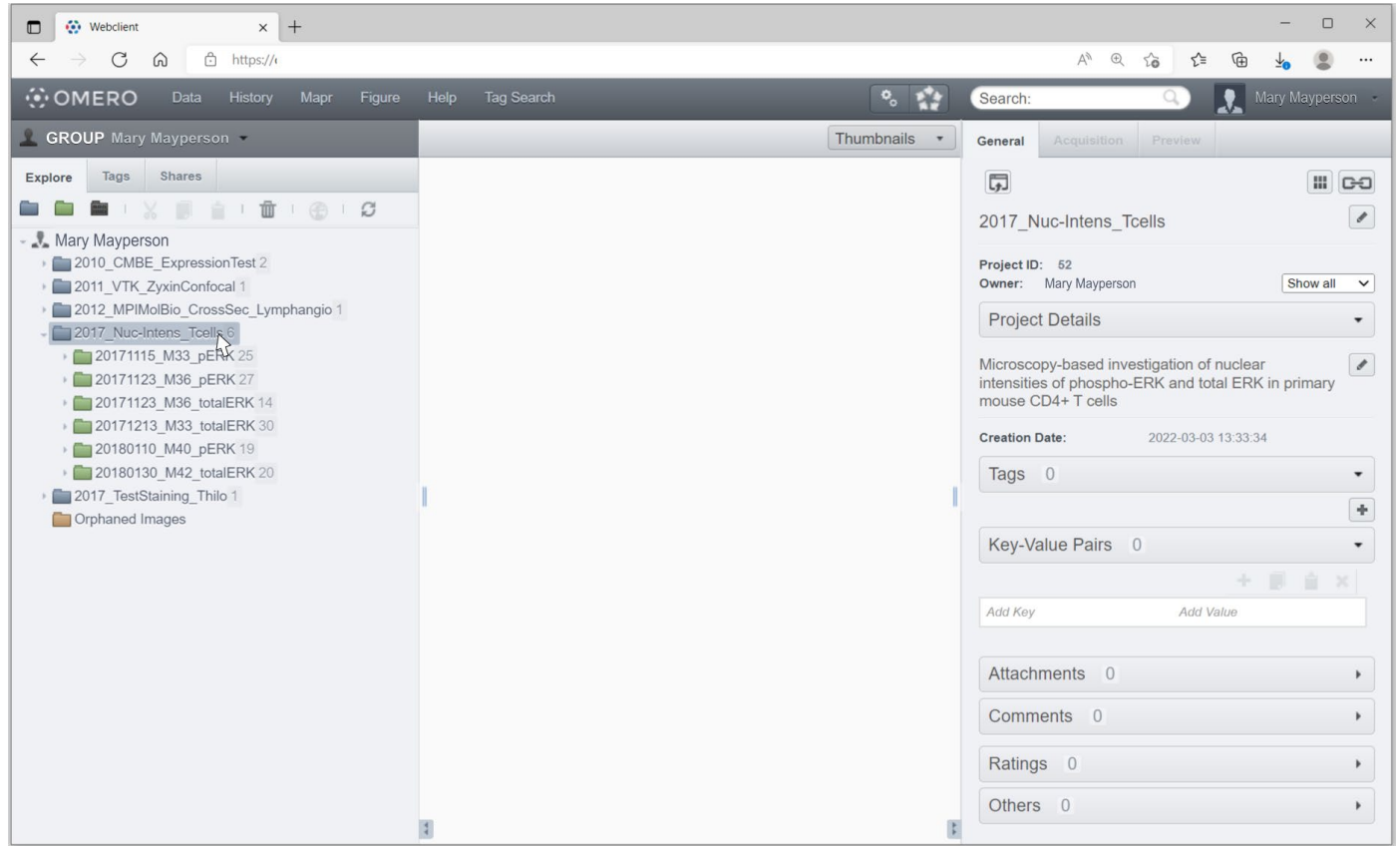


(see also: subchapter 6.1)

# Use Tags for flexible data exploration 1/2

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

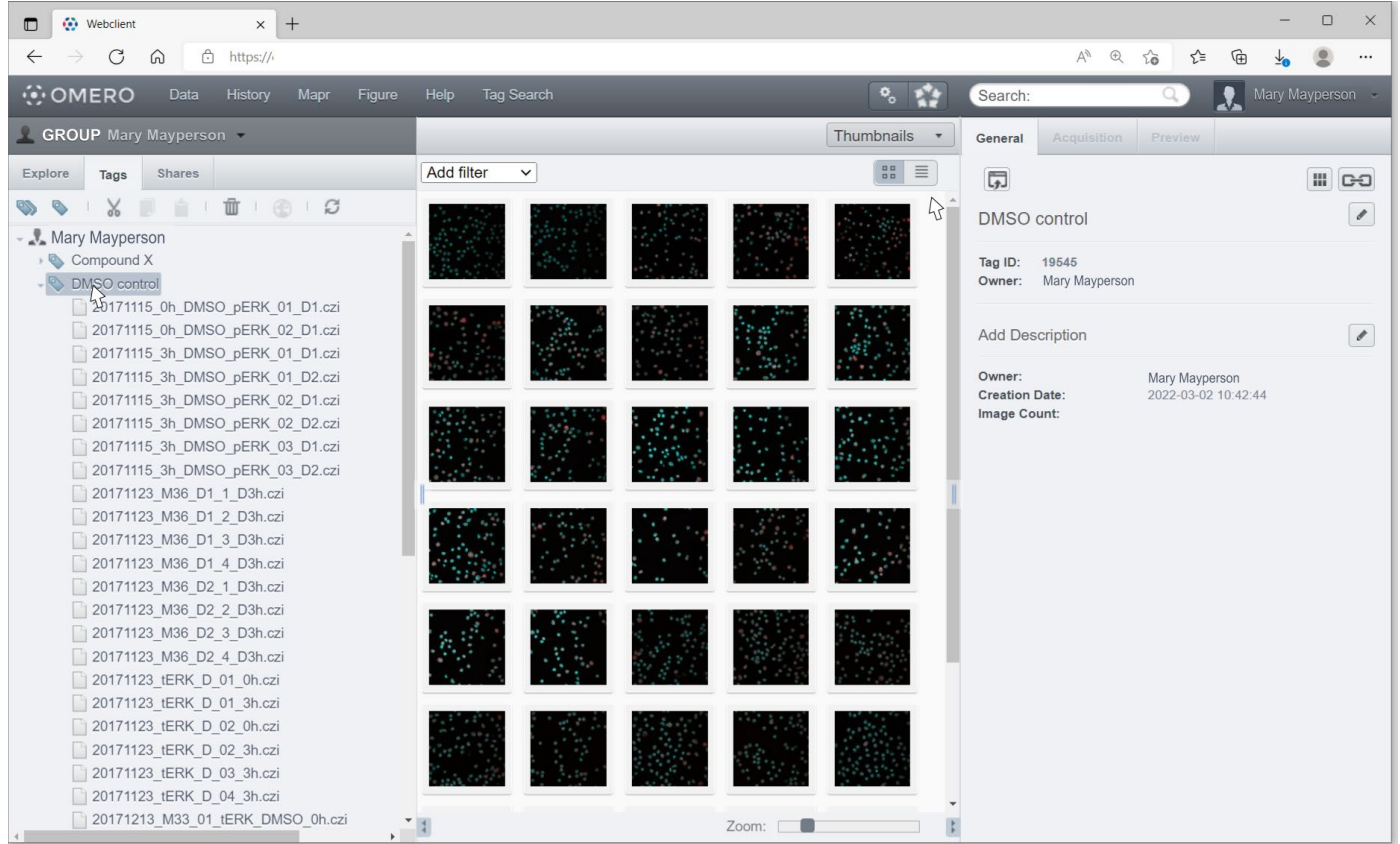
*Example:*  
The data is organized by the stained intracellular targets, and the independent replications are organized in separate **datasets**



# 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



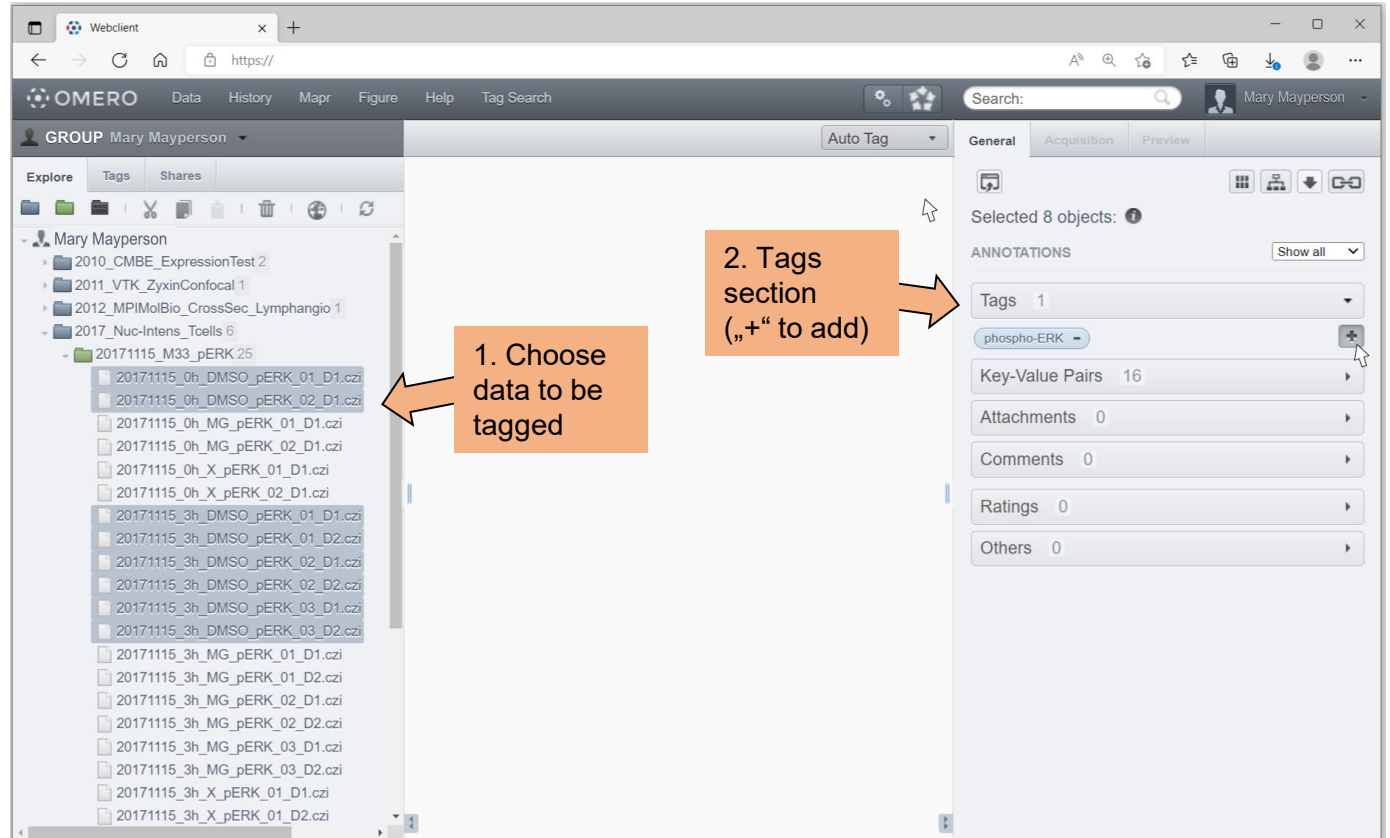


## Options to annotate with Tags in OMERO:

- 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

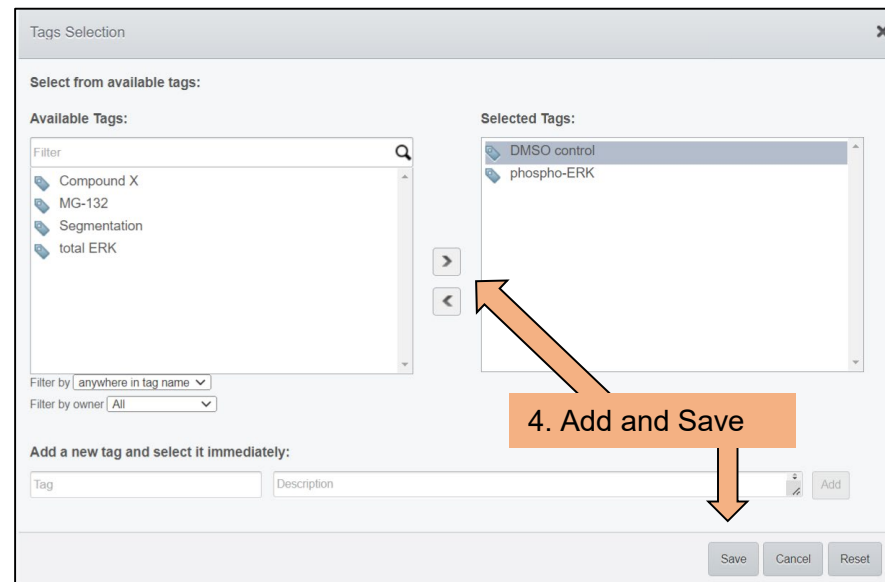
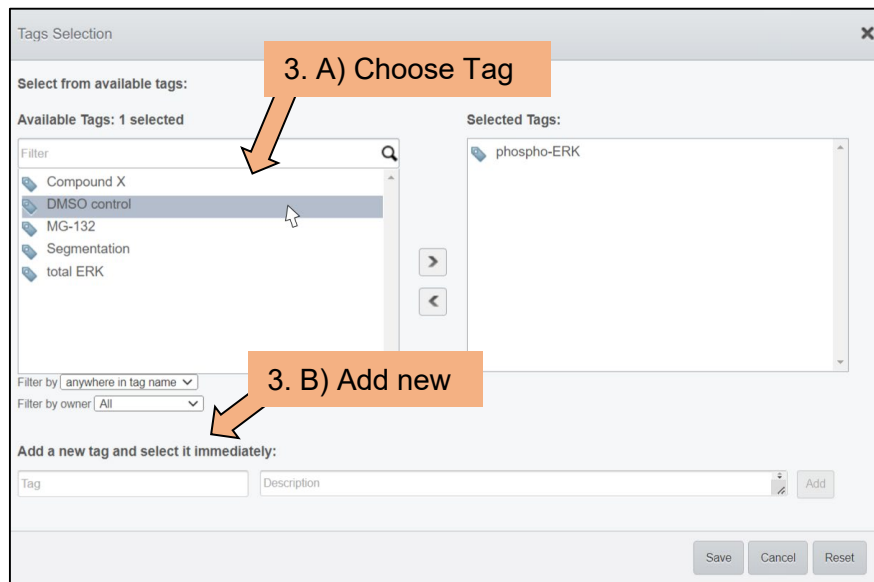
1. Mark one or more images, projects or datasets you wish to tag
2. Go to General tab, Go to the toggle: Tags Click „+“ to add



# 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.

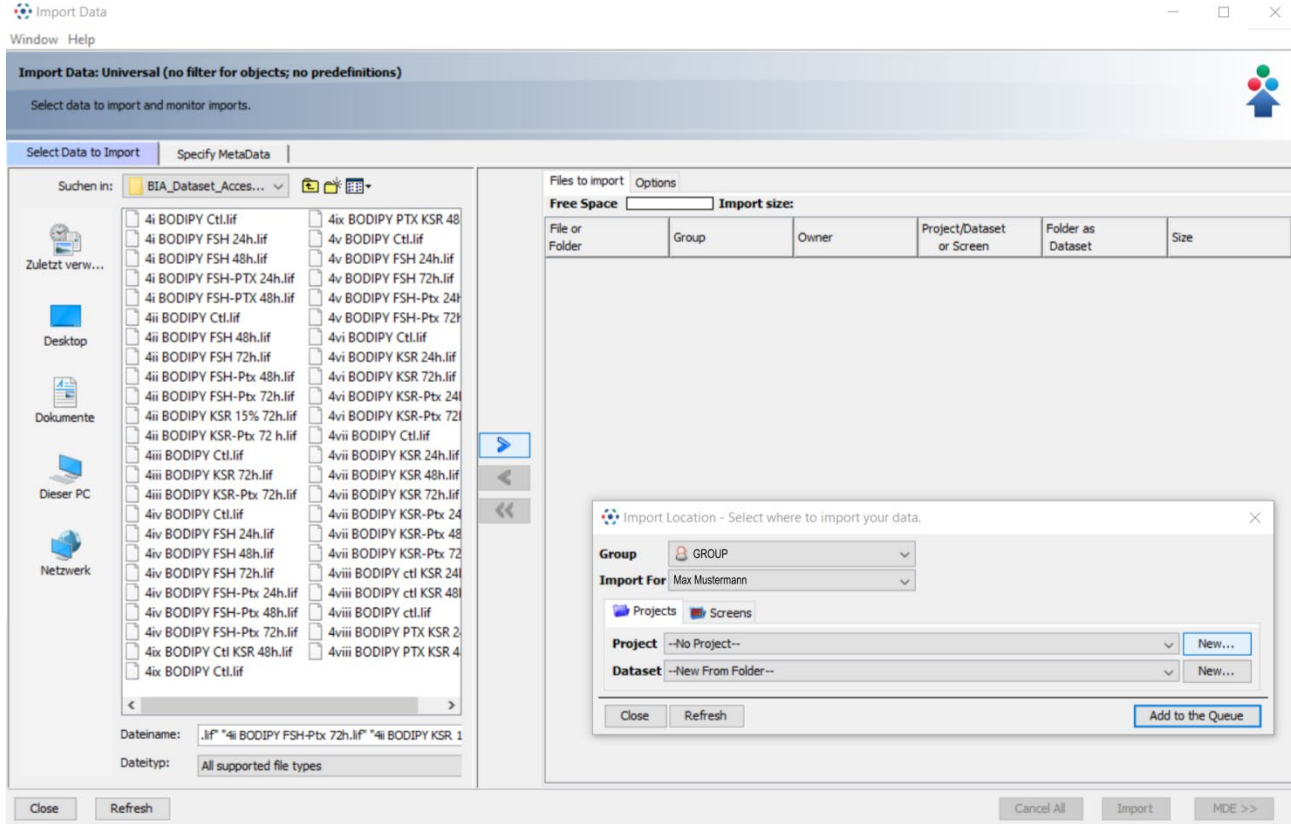
- Tags have
- an ID
  - an owner
  - Information about who linked the Tag
  - a tagging date
  - (a Tag description)

The screenshot displays the OMERO.web webclient interface. On the left, a file tree shows a folder named '20171115\_M33\_pERK 25' containing several image files. The central area shows a grid of 20 microscopy images, with one image in the second row, second column highlighted with a blue border. On the right, the 'Image Details' panel for the selected image is visible, showing metadata such as 'Image ID: 58118', 'Owner: Mary Mayperson', and 'Import Date: 2022-04-08 13:50:44'. Below the metadata, a 'Tags' section shows two tags: 'phospho-ERK' and 'DMSO control', with the latter selected. 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:'. The browser's address bar shows the URL 'https://omero-prod.cloud-app.dkfz.de/webclient/?show=tag-19545'.

# 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

Create

Create Project

Create a new Project.

Name 2022\_ExampleData\_BIA-S-BSST749

Description Example Dataset downloaded from the BioImage Archive with Accession No. S-BSST749: <https://www.ebi.ac.uk/biostudies/BioImages/studies/S-BSST749>  
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

Cancel Create

Import Location - Select where to import your data.

Group GROUP

Import For Max Mustermann

Projects Screens

Project 2022\_ExampleData\_BIA-S-BSST749 New...

Dataset Figure 4 New...

Close Refresh Add to the Queue

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

Choose options tab

The screenshot shows the 'Import Data' dialog box in OMERO. The 'Options' tab is selected, and an orange arrow points to it. The dialog displays a list of files to import and a table of file details.

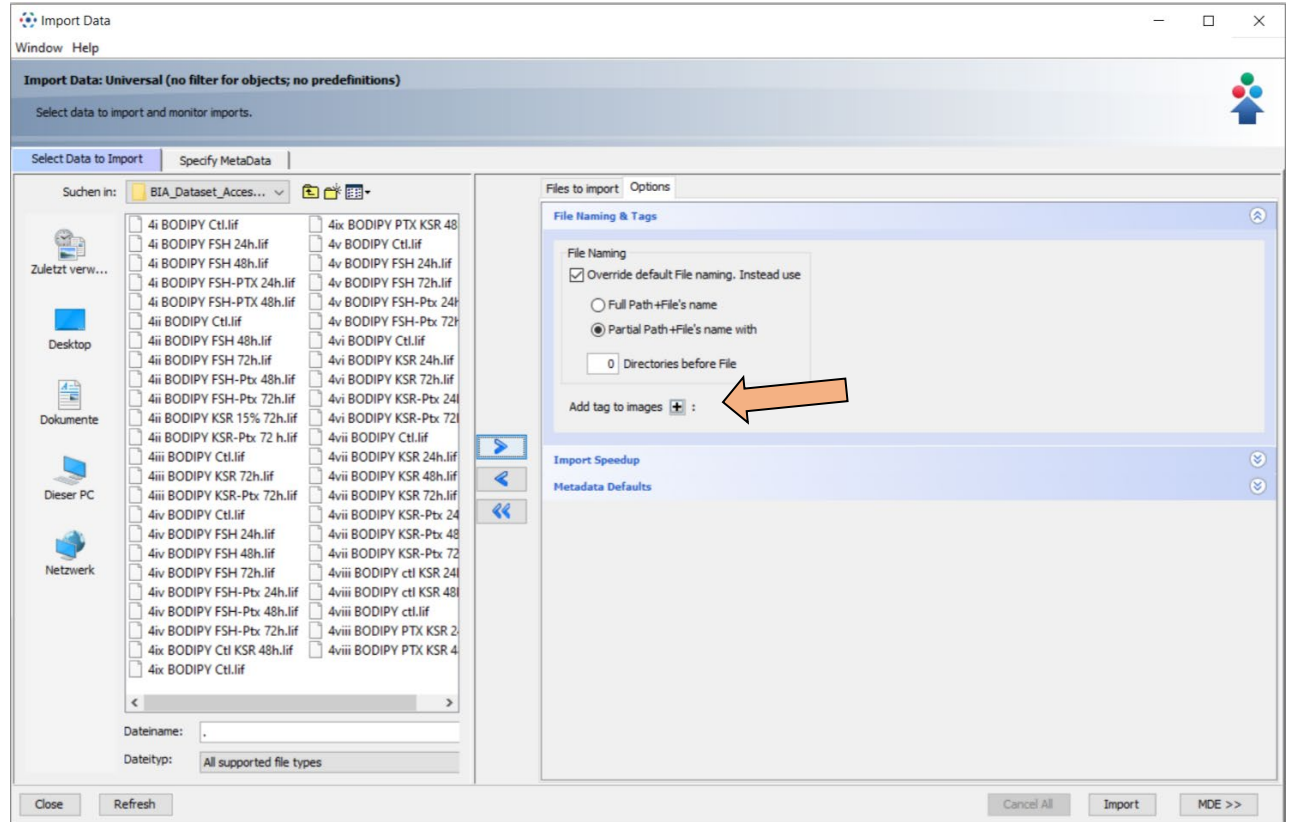
**Files to import** (Import size: 107 MB)

File or Folder	Group	Owner	Project/Dataset or Screen	Folder as Dataset	Size
4i BODIPY Ctl.tif	GROUP	Max Mustermann	2022_ExampleData_BIA-S-BS...	<input type="checkbox"/>	3 MB
4i BODIPY FSH 24h.tif	GROUP	Max Mustermann	2022_ExampleData_BIA-S-BS...	<input type="checkbox"/>	19 MB
4i BODIPY FSH 48h.tif	GROUP	Max Mustermann	2022_ExampleData_BIA-S-BS...	<input type="checkbox"/>	5 MB
4i BODIPY FSH-PTX 24h.tif	GROUP	Max Mustermann	2022_ExampleData_BIA-S-BS...	<input type="checkbox"/>	10 MB
4i BODIPY FSH-PTX 48h.tif	GROUP	Max Mustermann	2022_ExampleData_BIA-S-BS...	<input type="checkbox"/>	7 MB
4ii BODIPY Ctl.tif	GROUP	Max Mustermann	2022_ExampleData_BIA-S-BS...	<input type="checkbox"/>	4 MB
4ii BODIPY FSH 48h.tif	GROUP	Max Mustermann	2022_ExampleData_BIA-S-BS...	<input type="checkbox"/>	9 MB
4ii BODIPY FSH 72h.tif	GROUP	Max Mustermann	2022_ExampleData_BIA-S-BS...	<input type="checkbox"/>	15 MB
4ii BODIPY FSH-Ptx 24h.tif	GROUP	Max Mustermann	2022_ExampleData_BIA-S-BS...	<input type="checkbox"/>	6 MB
4ii BODIPY FSH-Ptx 48h.tif	GROUP	Max Mustermann	2022_ExampleData_BIA-S-BS...	<input type="checkbox"/>	9 MB
4ii BODIPY FSH-Ptx 72h.tif	GROUP	Max Mustermann	2022_ExampleData_BIA-S-BS...	<input type="checkbox"/>	9 MB
4ii BODIPY KSR 15% 72h.tif	GROUP	Max Mustermann	2022_ExampleData_BIA-S-BS...	<input type="checkbox"/>	9 MB
4ii BODIPY KSR-Ptx 72h.tif	GROUP	Max Mustermann	2022_ExampleData_BIA-S-BS...	<input type="checkbox"/>	7 MB



# 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

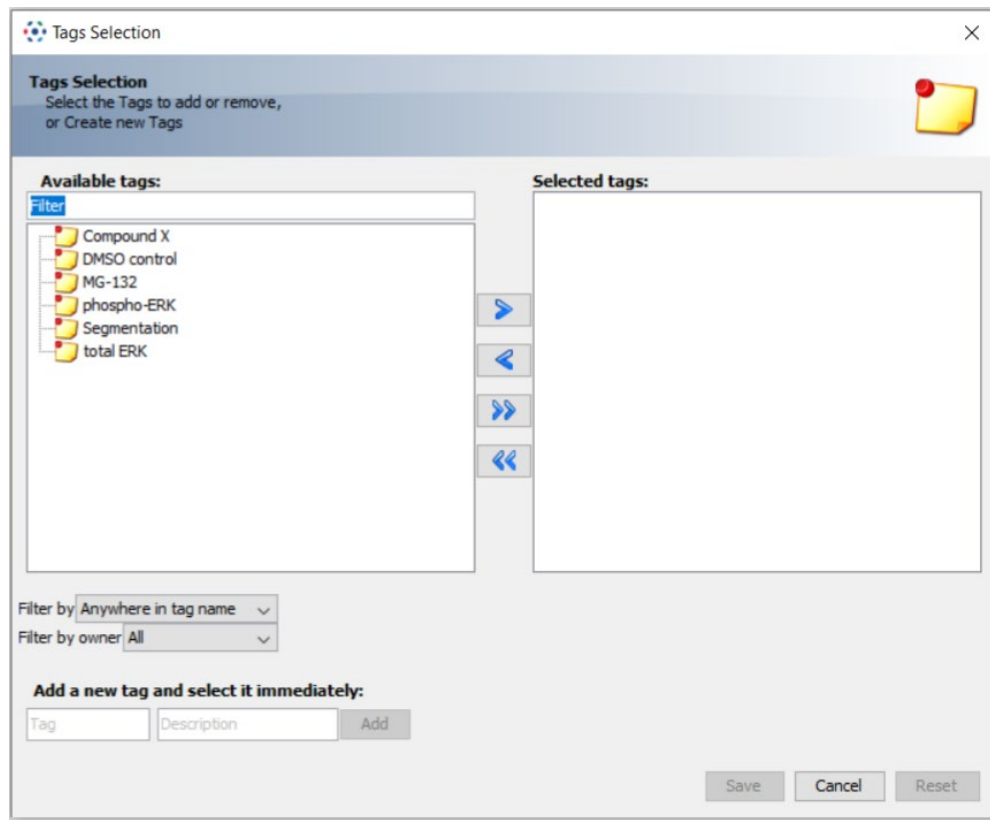
Use Available Tags  
for annotation with existing  
Tags

OR

Create a new Tag  
(similar to OMERO.web)

### NOTE:

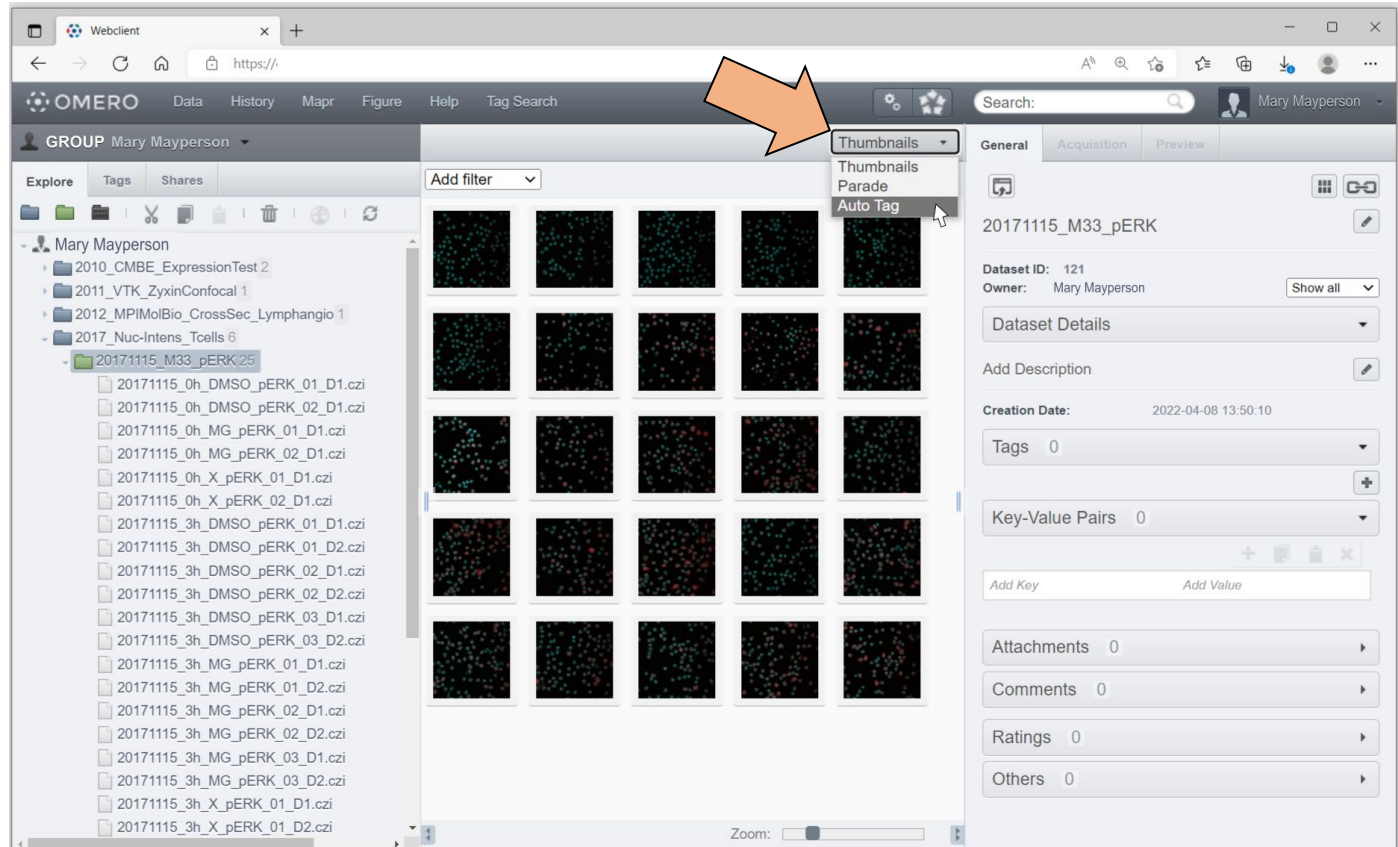
Tags annotated during *Import*  
are applied to all data in the  
queue!



# 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 shows the OMERO webclient interface. The top navigation bar includes 'OMERO', 'Data', 'History', 'Mapr', 'Figure', 'Help', and 'Tag Search'. The user is logged in as 'Mary Mayperson'. The main area is divided into three sections:

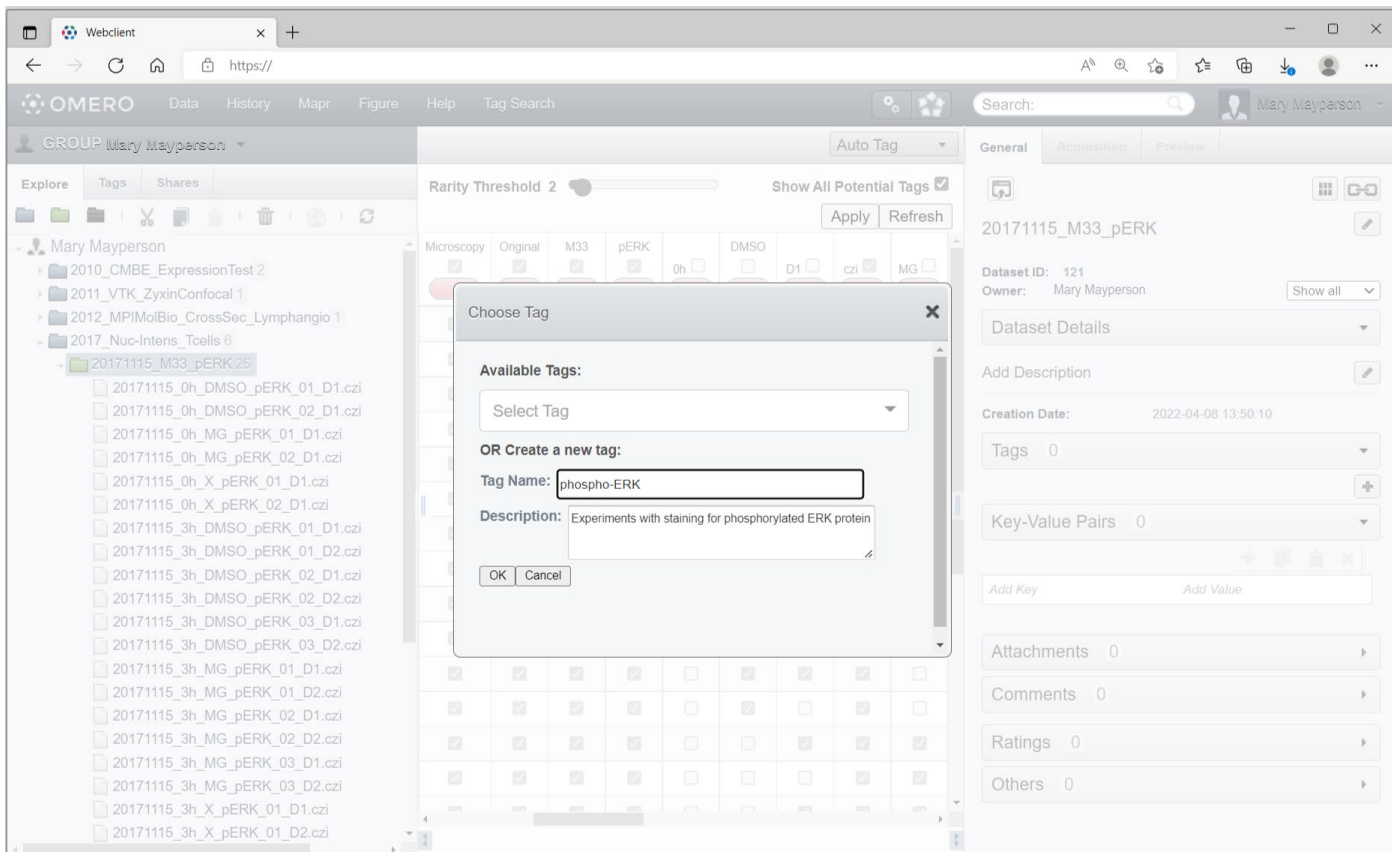
- Left Panel (Explore):** Shows a tree view of datasets under 'Mary Mayperson'. The selected dataset is '20171115\_M33\_pERK25'.
- Center Panel (Auto Tag):** Features a 'Rarity Threshold 2' slider and a 'Show All Potential Tags' checkbox. Below this is a grid of tags with checkboxes. An orange arrow labeled '3.' points to the 'pERK' tag in the first row. The grid columns are labeled: Microscopy, Original, M33, pERK, 0h, DMSO, D1, czi, MG.
- Right Panel (Dataset Details):** Shows '20171115\_M33\_pERK' with 'Dataset ID: 121' and 'Owner: Max Mustermann'. It includes sections for 'Add Description', 'Creation Date: 2022-04-08 13:50:10', 'Tags: 0', 'Key-Value Pairs: 0', 'Attachments: 0', 'Comments: 0', 'Ratings: 0', and 'Others: 0'.

# 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:

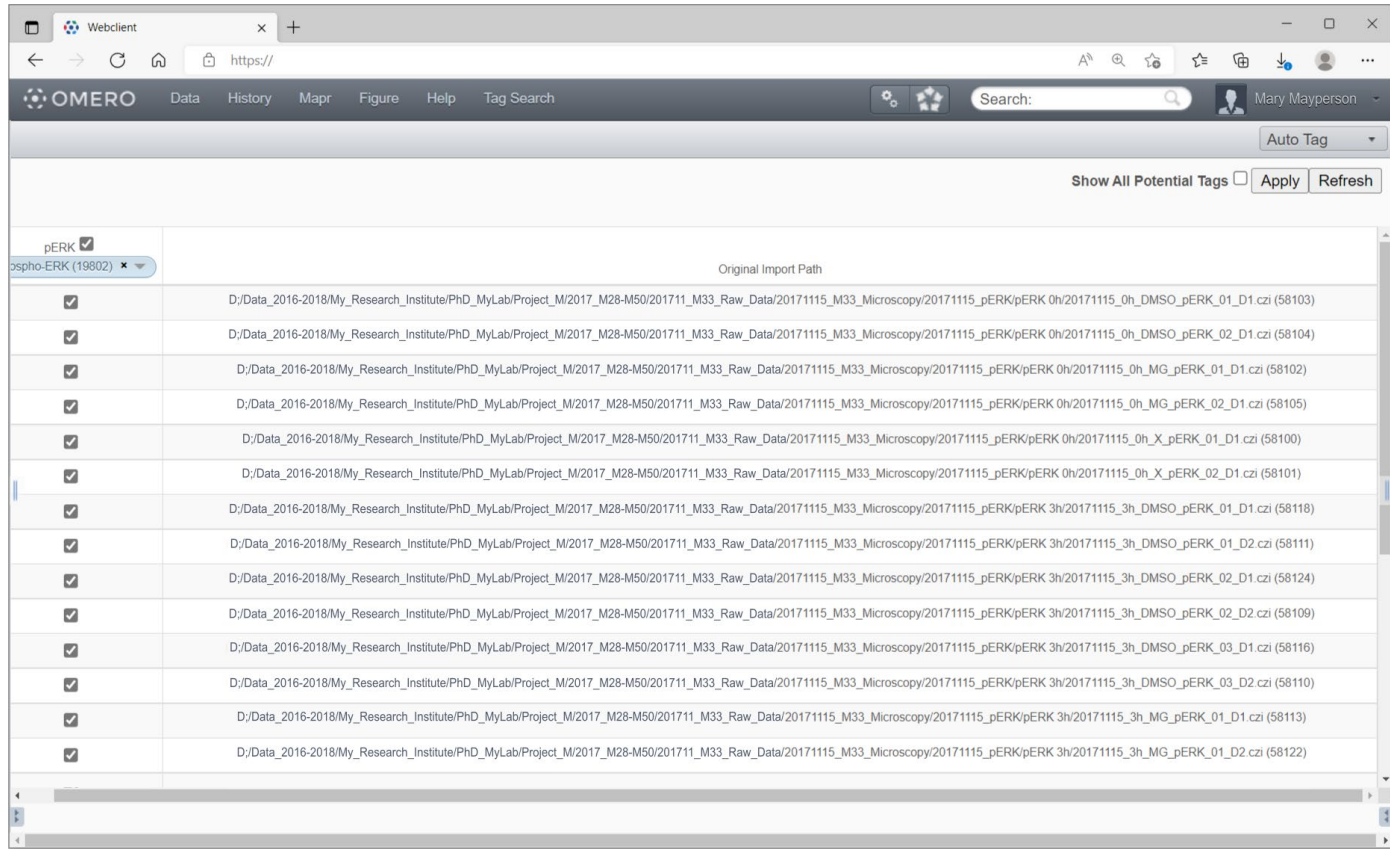


The screenshot shows the OMERO web client interface. The top navigation bar includes 'Data', 'History', 'Mapr', 'Figure', 'Help', and 'Tag Search'. The 'Auto Tag' dropdown menu is highlighted with an orange arrow. Below it, the 'Show All Potential Tags' checkbox is checked and also highlighted with an orange arrow. The central panel displays a table of potential tags with columns for 'pERK', 'DMSO', 'D1', 'czi', 'MG', and 'X'. The 'pERK' column is currently set to 'phospho-ERK (19802)'. The right-hand panel shows dataset details for '20171115\_M33\_pERK', including 'Dataset ID: 121', 'Owner: Mary Mayperson', and 'Creation Date: 2022-04-08 13:50:10'. The 'Tags' section shows 0 tags, and 'Key-Value Pairs' shows 0 pairs.

# 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. The main window shows a list of images under the group 'Mary Mayperson'. A dropdown menu labeled 'Auto Tag' is open, showing a 'phospho-ERK (19802)' tag selected. The 'Rarity Threshold' is set to 2, and 'Show All Potential Tags' is checked. The image list includes columns for 'M33', 'pERK', 'DMSO', 'D1', 'czi', and 'MG'. The image '20171115\_0h\_DMSO\_pERK\_01\_D1.czi' is highlighted in green. The metadata window on the right shows details for this image, including 'Image ID: 58103', 'Owner: Mary Mayperson', 'Import Date: 2022-04-08 13:50:20', and 'Dimensions (XY): 1912 x 1912'. The 'Tags' section shows 'phospho-ERK' with a tooltip that provides key-value information: 'ID: 19802', 'Owner: Mary Mayperson', 'Linked by: Mary Mayperson', 'On: 2022-07-28 15:30:53', and 'Description: Experiments with staining for phosphorylated ERK protein'.