

How to use the Comparative Pathology Workbench

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2 Introduction

This document describes how to use the Comparative Pathology Workbench (CPW); terms are first described, with a brief overview of the system, followed by a more detailed description of the typical tasks a user could expect to achieve within the CPW.

3 What is the CPW?

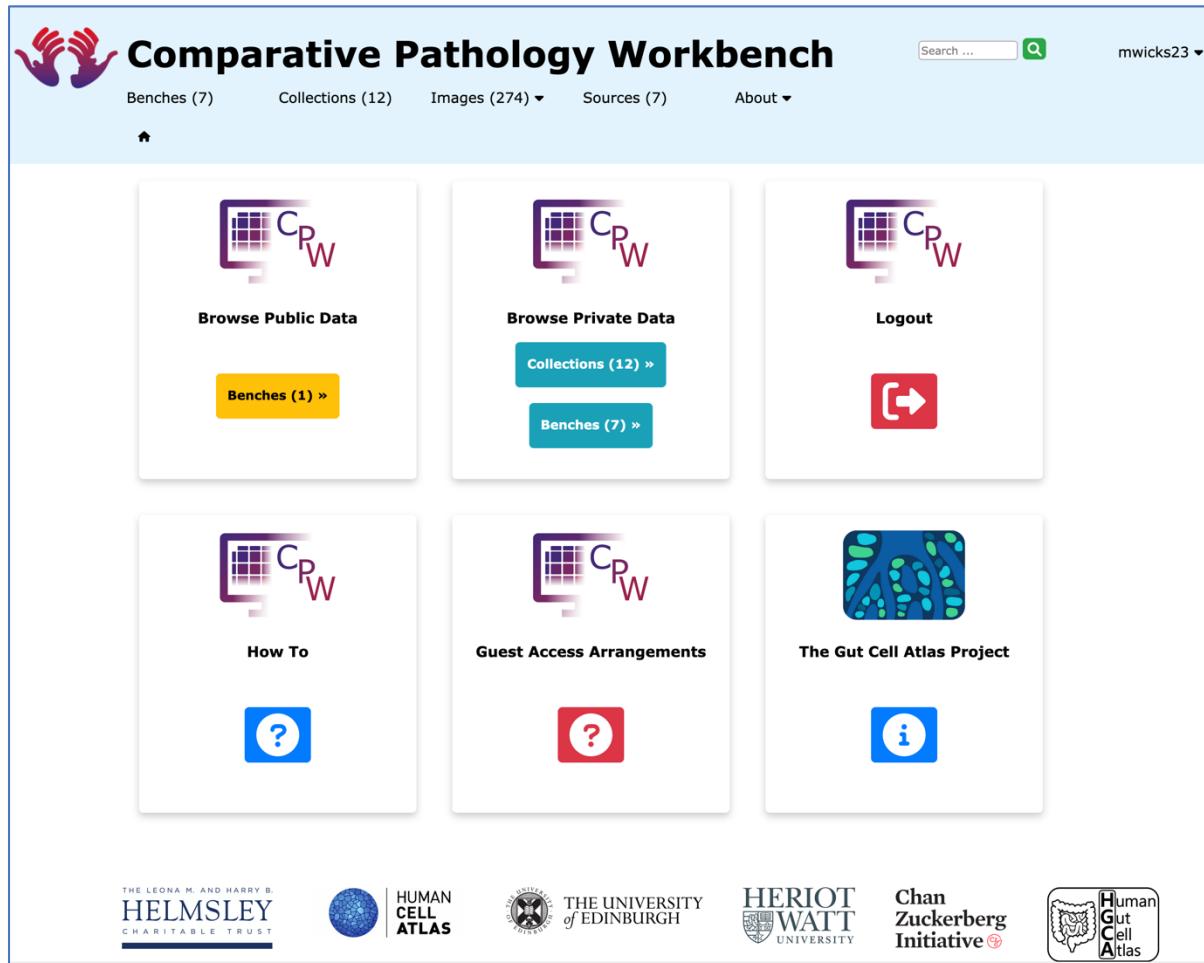


Figure 1 – The CPW Home Page

The CPW is intended to be used by Pathologists to organise histopathological images and other image-related related data and metadata from multiple disparate sources.

To this end, we have created the concept of a “Bench”; this is a user-configurable grid of “Cells” arranged in rows and columns (similar to the concept of a spreadsheet), that can be populated with data and metadata, as the User sees fit.

3.1 The CPW Header Panel



Figure 2 – The CPW Header Panel

At the top of every page in the CPW, there is a common header panel, which includes the following main menu options:

- Benches
 - This displays the List Benches page;
- Collections
 - This displays the List Collections page;
- Images
 - This displays the List Images pages from:
 - Your Active Collection,
 - All your images from all your Collections,
 - All your images from all your Collections with Advanced Search Options,
 - All your Links between Images,
 - The Link Images page.
- Sources
 - This displays the List Sources page;
- About
 - Displays further pages:
 - About (general information on the CPW),
 - People (involved in the creation and construction of the CPW) and
 - How To (use the CPW);
- Search Box
 - a general search box, that searches for Benches that contain the string supplied (case sensitive) in their titles, descriptions, owners or authorities.
- User
 - If a User is Logged in, User account functions are displayed, including
 - Logout,
 - Bench Permissions (See later section on Sharing),
 - Collection Permissions (See later section on Sharing),
 - Change Password, and
 - My account (information).
 - If a User is not Logged in, only the Login and Registration options are displayed.

3.2 The Home Page

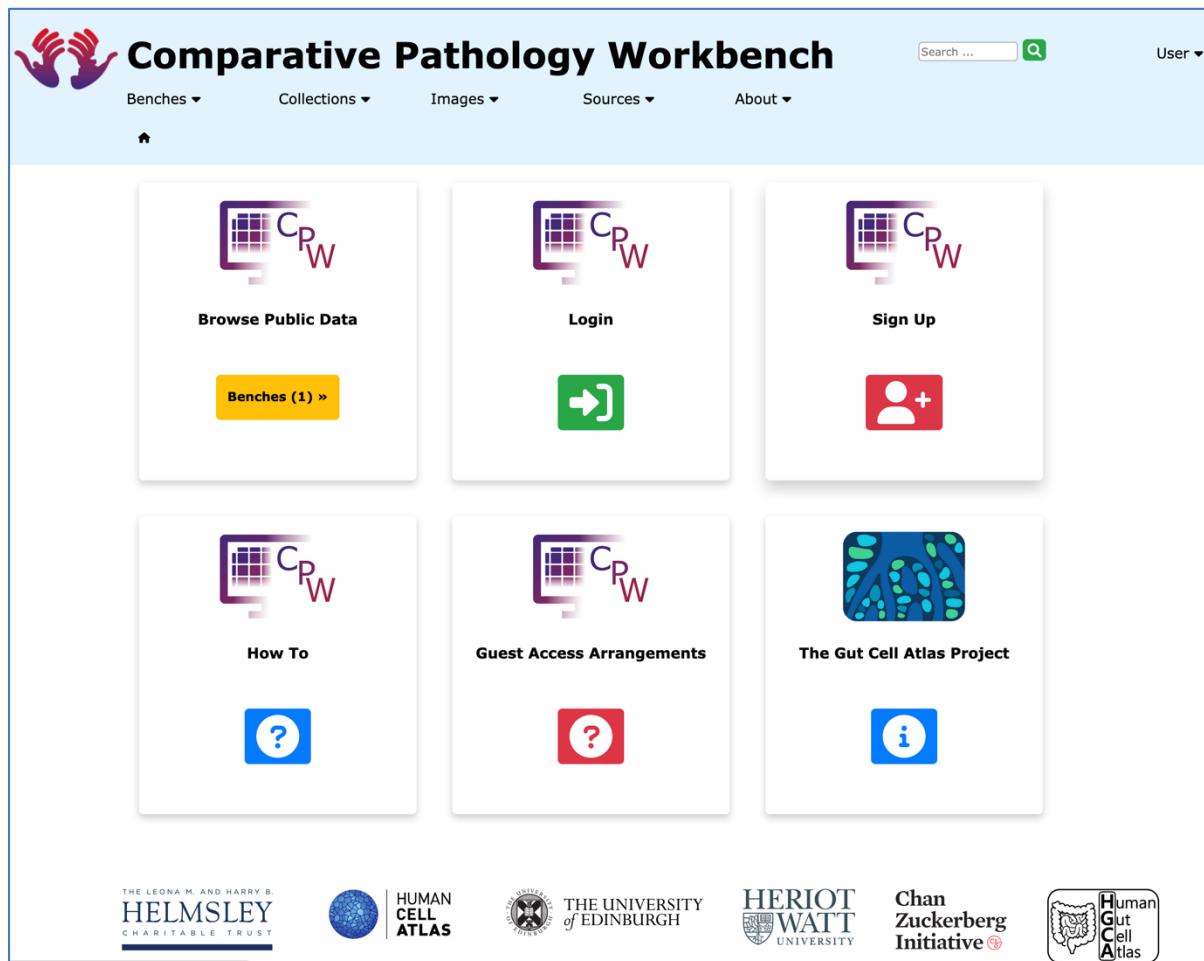


Figure 3 – The CPW Home Page, with a user not logged In

When no user is logged in, the Home page offers the following short cut functions via buttons within 6 “cards”:

- “Browse Public Data”
- “Login”
- “Sign Up”
- “How To”
- “Guest Access Arrangements”
- “The Gut Cell Atlas Project”.

When a User is logged in, the home page offers the following short cut functions via buttons within 6 “cards”:

- “Browse Public Data - Benches”
- “Browse Private Data – Collections and Benches”
- “Log Out”

- “How To”
- “Guest Access Arrangements”
- “The Gut Cell Atlas Project”.

3.2.1 The Home Page Cards

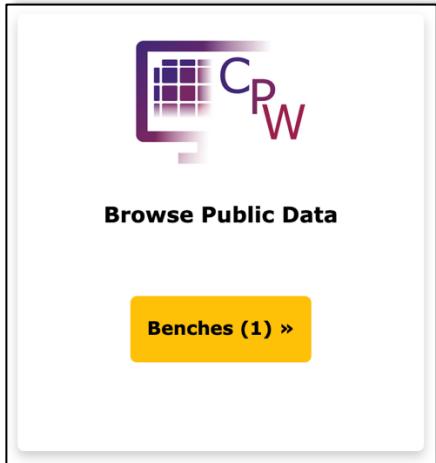


Figure 4 – The CPW Home Page Card – “Browse Public Data”

Clicking on this will show the user a list of Publicly viewable Benches.

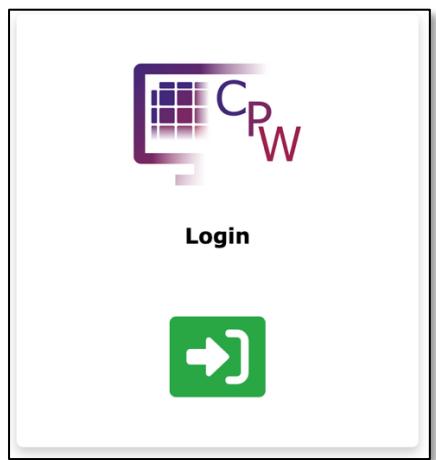


Figure 5 – The CPW Home Page Card – “Login”

Clicking on this is the same as clicking on the “User”, “Login” main menu option.

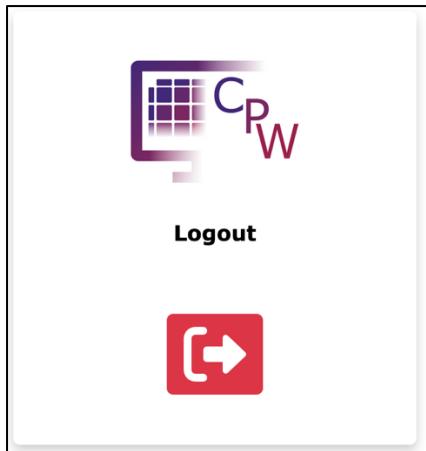


Figure 6 – The CPW Home Page Card – “Logout”

Clicking on this is the same as clicking on the “User”, “Logout” main menu option.

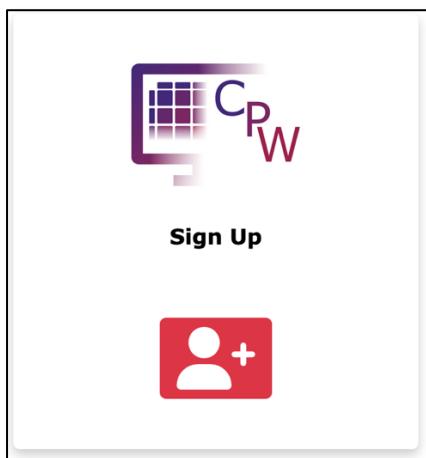


Figure 7 – The CPW Home Page Card – “Sign Up”

Clicking on this is the same as clicking on the “User”, “Sign Up” main menu option.

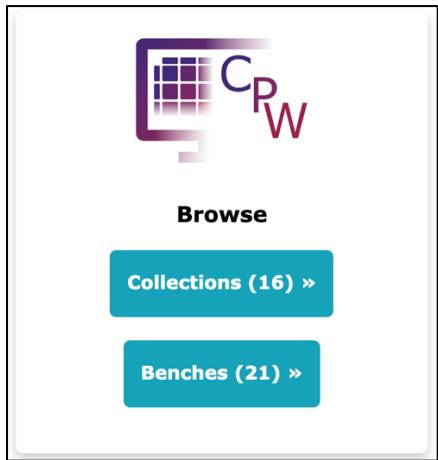


Figure 8 – The CPW Home Page Card – “Browse”

Clicking on “Collections” is the same as clicking on the “Collections” main menu option.

Clicking on “Benches” is the same as clicking on the “Benches” main menu option.

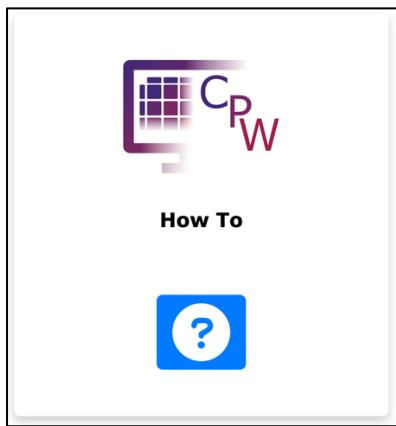


Figure 9 – The CPW Home Page Card – “How To”

Clicking on this is the same as clicking on the “About”, “How To” main menu option.

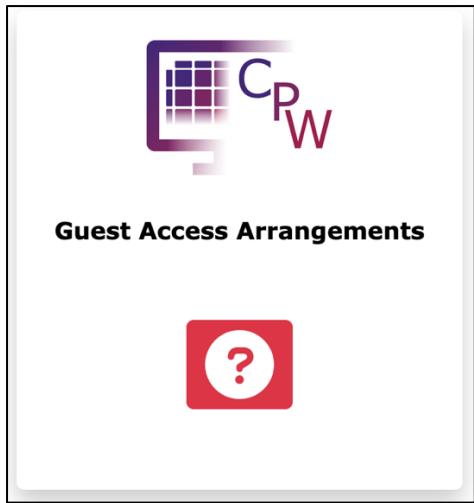


Figure 10 – The CPW Home Page Card – “Guest Access Arrangements”

Clicking on this shows the user a description of the available arrangements for Guest Users wanting to use the CPW.

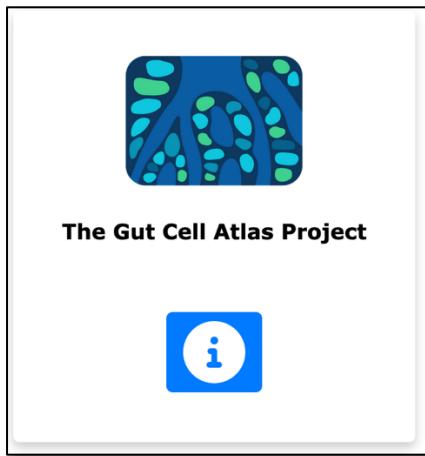


Figure 11 - The CPW Home Page Card – “The Gut Cell Atlas Project”

Clicking on this takes the User to The Gut Cell Atlas Project website.

4 Nomenclature

The CPW uses the following terms to describe the components that it can manage and organise:

4.1 Sources

The list of available Sources can be viewed by selecting the “Sources” main menu option within the CPW.

There are 4 types of data source that the CPW can handle:

1. OMERO servers,
2. WordPress Media Libraries,
3. The European Bioinformatics Institute (EBI) Single Cell Atlas (SCA) and
4. The CPW itself.

The CPW can be updated to include as many of these types of data source as required.

4.1.1 OMERO Servers

OMERO servers provide a JSON interface that allows the resources that it manages to be exposed, via unique URLs. The CPW uses this interface to provide a set of screens that enable easy navigation through the available resources.

The user of the CPW can drill down through as many available Groups, Projects and Datasets stored on an OMERO server, that the credentials stored with the source definition in the CPW, allows.

The displayed Groups, Projects and Datasets mirror exactly those available on the OMERO server.

The User can upload image files (such as scanned histopathology sections, or photomicrographs of parts of sections, or macroscopic pathology images, or any other relevant image) to OMERO and then view the images, within a Dataset (and their Regions Of Interest (ROIs) if any), for bringing into and further processing by the CPW.

4.1.2 The EBI Single Cell Atlas (SCA)

The EBI Single Cell Atlas (SCA) provides a highly configurable set of URLs that precisely define “tSNE” and “UMAP” charts that it can provide to the User.

The CPW can store charts downloaded from these URLs as images locally. The User can select these images for further processing by the CPW.

4.1.3 WordPress Media Libraries

The CPW uses a WordPress server to provide a commentary facility; However, a WordPress server can also be used to store miscellaneous images. The User can select these images for further processing by the CPW.

4.1.4 The CPW itself

Miscellaneous images can also be added to the CPW itself, along with a supporting comment and a URL providing relevant provenance. The User can select these images for further processing by the CPW.

4.2 Images

The list of available images can be viewed by selecting the “Images” main menu option within the CPW, and further selecting either the “Current Collection” or “All Images” sub menu options.

The CPW can store any images locally within its system (CPW and EBI SCA server types); as well as storing references to images that are held on other systems. These references are to images held on the 2 types of system mentioned previously (OMERO servers, and WordPress Servers).

The following figures show examples of images referenced in the CPW from the various types of Image source:

- Figure 12 shows an Image referenced from an OMERO Server;
- Figure 13 shows an ROI from an Image referenced from an OMERO server;
- Figure 14 shows a t-SNE chart showing gene expression patterns held on a WordPress Server;
- Figure 15 shows a t-SNE Chart downloaded from a URL from the EBI SCA;
- And finally, Figure 16 shows an annotated image generated using QuPath, stored locally on the CPW itself.

Home / Sources / private_user@CompPathUofE / MVM / Helmsley_CD / 2021.03.12 - PSR_he... / 2021.03.12-SR149220...

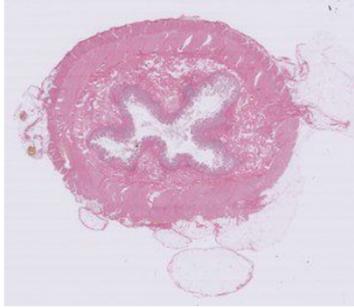
 **2021.03.12-SR149220...**



 **Image Information**

Image Name: 2021.03.12-SR149220_02_PSR_Healthy.ndpi [0]
Image Description: 680058

Image:



Dimensions (XY): 98304 x 86016
Pixels Type:
Pixels Size (XYZ) (μm): 0.2267 x 0.2267
Z-sections/Timepoints: 1 x 1

Figure 12 – An Image referenced from an OMERO Server

Regions Of Interest (ROIs)

Image has 3 ROIs

ROI ID: 61

Coordinates: X: 19915, Y: 15456, Width: 2520, Height: 1456

Polygon

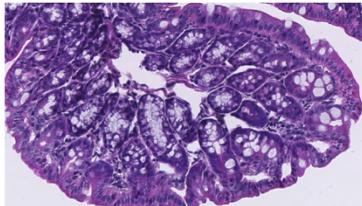


Figure 13 – A ROI from an Image referenced from an OMERO server

E-HCAD-11_CCL8_gene-expression

Image Information

Image Caption:

Image Description:



Figure 14 – A t-SNE image showing gene expression patterns held on a WordPress Server

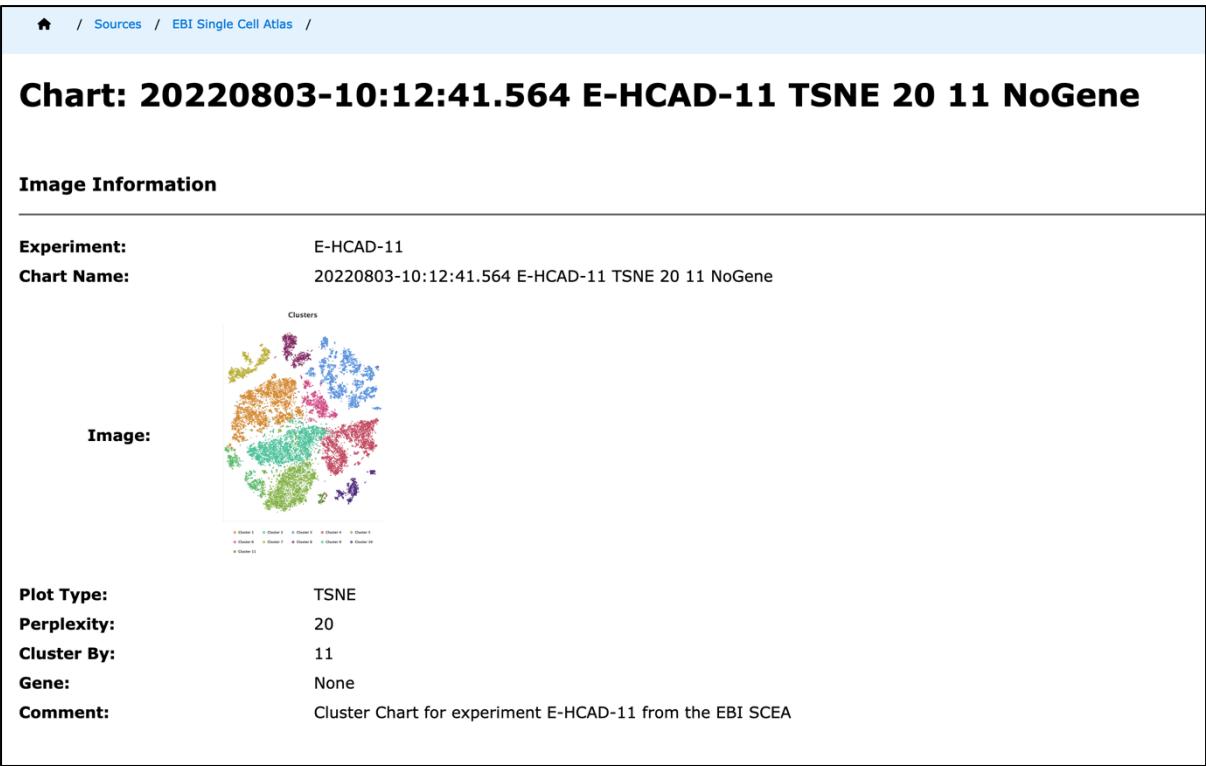


Figure 15 – A t-SNE Chart downloaded from a URL from the EBI SCA.

Home / Sources / THIS Comparative Pathology Workbench /

Image:
20220927-13:19:25.772_SR149216_Healthy.annotated.tif.jpeg

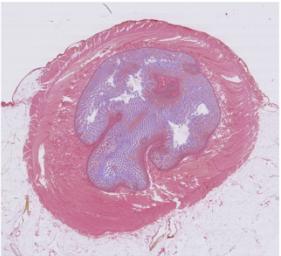


Image Information

Image Name:	20220927-13:19:25.772_SR149216_Healthy.annotated.tif.jpeg
Comment:	An Annotated Image from Qupath
Source:	https://omero-czi-cpw.mvm.ed.ac.uk/webclient/?show=image-8390

[+](#)
[○](#)

Figure 16 – An annotated image generated using QuPath, stored locally on the CPW itself.

When the user of the CPW has found an image of interest, the image must be added to a Collection before it can be added to a Bench

4.3 Collections

The list of available Collections can be viewed by selecting the “Collections” main menu option within the CPW.

Action	Collection Id	Title	Images	Owner	Authority
☰	000003	GUEST Default Collection	5	guest	VIEWER
☰	000004	Default Collection	9	rbadock	VIEWER
☰	000011	Normal and Crohns Examples	9	mwicks23	OWNER
☰	000014	FBI SCA Collection	2	mwicks23	OWNER
☰	000016	A Simple Collection	9	mwicks23	OWNER
☰	000022	Test Collection	2	mwicks23	OWNER
☰	000023	Default Collection	0	mwicks23	OWNER

Figure 17 –The Collection List Page

The Collections List page provide full search facilities for the users’ collections, as well as the pagination amount.

A Collection is a set of images that the user has gathered together in a single, named group; a collection can hold references to images from many different sources.

Initially, a new user has NO collections, and must create one to start collecting images. Each collection must have a name and description. A collection can be marked as “Active”. Setting the active collection can be done on both the “List Collections” and “View Collections” pages. The Active Collection on the “List Collections” page is indicated by the red background, underneath the relevant collection.

The Active Collection is the collection that houses any images that are selected and saved by the User from browsing the Image Sources.

When browsing images from the sources available to the CPW, the user is offered the chance to add that image to a Collection; images are always added to the users Active Collection.

The images in collections can then be used by the User to populate a Bench.

The screenshot shows the Comparative Pathology Workbench (CPW) interface. At the top, there is a navigation bar with links for Benches (7), Collections (12), Images (274) (with a dropdown arrow), Sources (7), and About (dropdown). On the right, there is a search bar, a user dropdown (mwicks23), and a 'Collections' link. Below the navigation, the URL indicates the user is viewing the 'Images for Collection: "000014"'.

The main content area is titled 'Search Images from the Collection "000014", "EBI SCA Collection"'. It displays a message: 'You have collected 2 Images in this Collection'. Below this are search filters for Name, Comment, ROI, Hidden, Source, Collection, Bench, and Tag, along with a 'Search' and 'Clear' button.

Below the filters, there is a table header with columns: Action, Name ▲, Ordering, Comment, ROI, Hidden?, Owner, Tag, Source, Collection, and Bench. A single image row is shown:

Action	Name ▲	Ordering	Comment	ROI	Hidden?	Owner	Tag	Source	Collection	Bench
	MVM/Helmsley_CD/2021.03.12 - PSR_healthy_CD_ilium/2021.03.12-SR149220_02_PSR_Healthy.ndpi [0]	No Comments	mwicks23	private_user@CompPathUofE	0	False				
Collection:	"000014"; "Normal and Crohns Examples"; (Owned By mwicks23)									
	"000014"; "EBI SCA Collection"; (Owned By mwicks23)									
	"000016"; "A Simple Collection"; (Owned By mwicks23)									
	"CPW:000020"; "Ileum Normal and Crohns"; (Owned By mwicks23)									

Below the table, it says 'Ordering: 1'.

Figure 18 – An example of a Collection with some images

If the collection being viewed is not the Active Collection, then a Red Bell button is shown to allow the user to active this collection.

The screenshot shows the Comparative Pathology Workbench interface. At the top, there is a navigation bar with links for Benches (7), Collections (12), Images (274), Sources (7), and About. A search bar and user information (mwicks23) are also at the top right. Below the navigation, a breadcrumb trail shows the current location: Collections / Images / Images for Collection: "000014". The main title is "Search Images from the ACTIVE Collection \"000014\", \"EBI SCA Collection\"". It indicates that 2 images have been collected in this collection. There are search filters for Name, Comment, ROI, Hidden, Source, Collection, Bench, and Tag, along with a "Search" and "Clear" button. Below the filters is a table header with columns for Action, Name (with a sort arrow), Ordering, Comment, ROI, Hidden?, Owner, Tag, Source, Collection, and Bench. One image row is shown, detailing its name, comment, owner (mwicks23), server (private_user@CompPathUofE), ROI (0), and hidden status (False). The image itself is a histological slide of a healthy ileum. The collection dropdown shows "000014"; "EBI SCA Collection"; "000016"; "A Simple Collection"; and "CPW:000020"; "Ileum Normal and Crohns". The ordering is set to 1.

Figure 19 – An Active Collection

The collection is displayed on the left-hand side of the Bench page, thus:

The screenshot shows the Comparative Pathology Workbench interface. At the top, there is a navigation bar with links for Benches (9), Collections (10), Images (101), Sources (7), and About. A search bar and user information (admin) are also at the top right. Below the navigation, a breadcrumb trail shows the current location: Workbenches / CPW:000020, Ileum Normal and Crohns. The main area displays a grid of histological images. The first column contains thumbnails of normal ileum tissue. Subsequent columns contain thumbnails of tissue affected by various conditions, such as Crohn's disease (CD). Each thumbnail includes a small icon indicating its status or type. The grid is organized into rows and columns, with some cells being empty or grayed out.

Figure 20 –a Collection displayed on the Bench Page

4.4 Benches

The list of available Benches can be viewed by selecting the “Benches” main menu option within the CPW.

The screenshot shows the 'Benches' list page of the Comparative Pathology Workbench. At the top, there is a navigation bar with links for 'Benches (4)', 'Collections (6)', 'Images (25)', 'Sources (7)', and 'About'. A search bar and user information ('mwicks23') are also at the top right. Below the navigation, a breadcrumb trail shows the current location as 'Home / Benches'. The main title 'Benches' is displayed above a search bar and filter options. The search bar includes fields for 'Title', 'Description', 'Owner', 'Authority', and a 'Paginate by' dropdown set to 10. Below the search bar are filters for 'Created before', 'Created after', 'Modified before', and 'Modified after'. Two buttons, 'Search' and 'Clear', are located below these filters. The main content area displays a table of four benches with columns for 'Action', 'Bench Id', 'Title', 'Created On', 'Updated On', 'Owner', and 'Authority'. The entries are:

Action	Bench Id	Title	Created On	Updated On	Owner	Authority
	CPW:000016	Test bench for sharing	2020/09/15	2022/09/08	rbalcock	VIEWER
	CPW:000020	Ileum Normal and Crohns	2021/05/17	2022/11/15	mwicks23	OWNER
	CPW:000025	Test for Micheal 25/1/2022	2022/01/25	2022/02/22	rbalcock	EDITOR
	CPW:000030	CPW_Manuscript	2022/09/28	2022/10/28	mglinka	EDITOR

A '+ Add' button is located at the bottom left of the table. At the bottom of the page, there are logos for 'THE LEONA M. AND HARRY B. HELMSLEY CHARITABLE TRUST', 'HUMAN CELL ATLAS', 'THE UNIVERSITY of EDINBURGH', 'HERIOT WATT UNIVERSITY', 'Chan Zuckerberg Initiative', and 'Human Gut Cell Atlas'.

Figure 21 – The Benches List Page

As described previously, a Bench is a grid of cells, which can house references to images; the Bench has a user definable title and description.

On the creation of a Bench, the User may specify the initial number of rows and columns (between 1 to 10)

More Rows and Columns can be added later; the size of the cells in the grid is specified when the Bench is created but can also be amended later as the User sees fit.

The row and column headers in the Bench can be given titles and descriptions, as the user requires. Benches can be increased or decreased in size by adding or removing rows and columns of cells.

4.4.1 Public Benches

By default, all Benches are created as private, to be viewed and amended by their Owner only, and those users who they give permissions.

Benches can be marked as Public by the Bench Owner or Admin. Public Benches can be viewed by any CPW user, even without logging in. However, public benches may contain references to images that are held on systems that require further credentials to view at greater resolutions, for example.

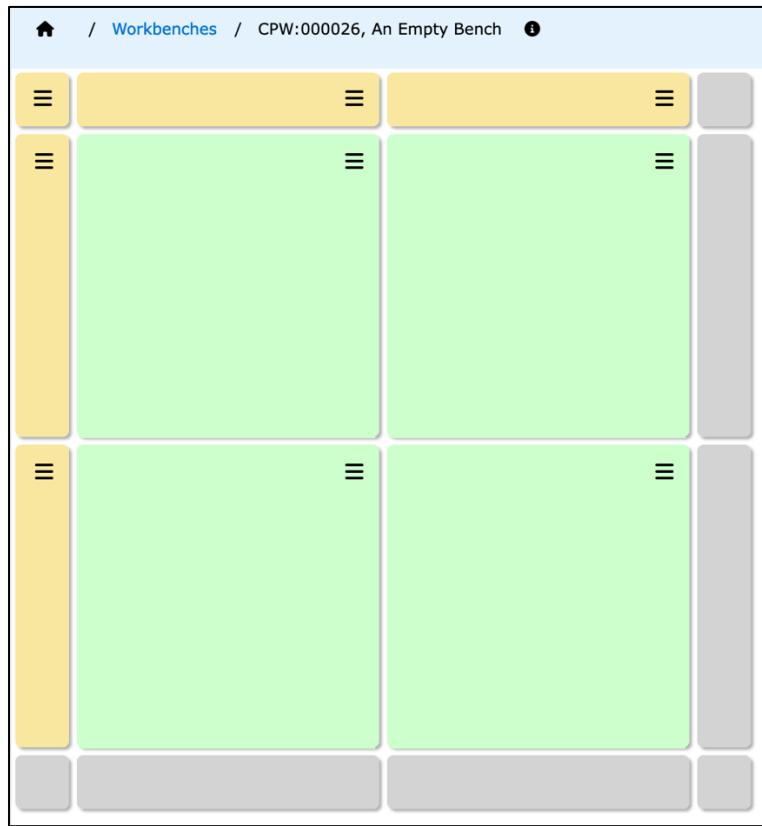


Figure 22 – An Empty Bench

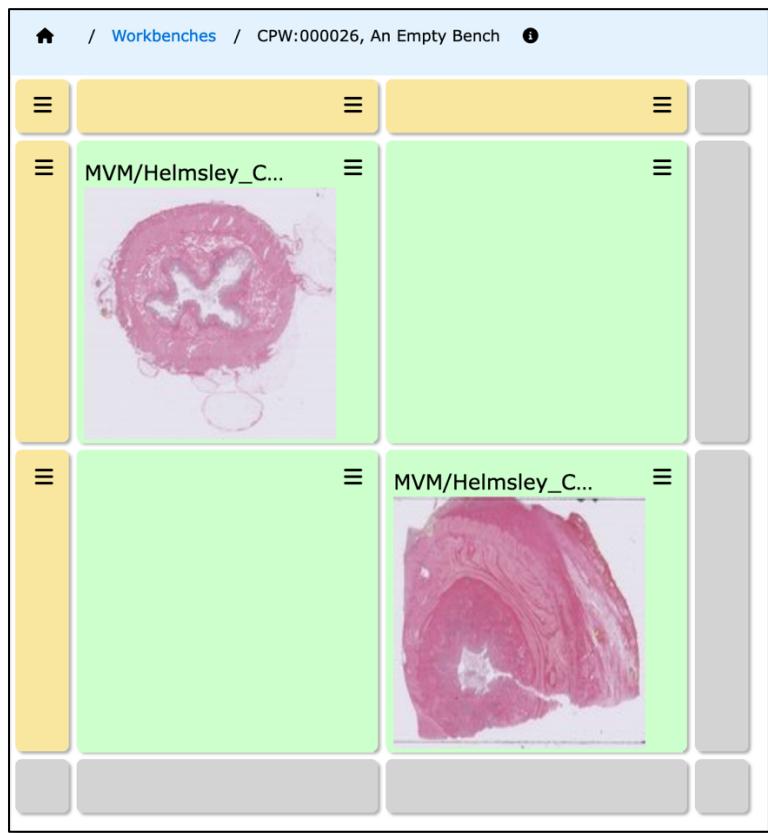


Figure 23 – A Bench with images

5 Tasks

There are a number of typical tasks that a User will want to achieve with the CPW:

5.1 Registering as a new User

On the Home page, the User can click on the red “Registration” button to register as a new user of the CPW. The User can then fill in the form and press “Sign Up”, with the registration confirmed by email.

The User of the CPW will also need to register on the Comparative Pathology WordPress site to ensure use of the full functionality of the Workbench. The CPW Administrator will provide instructions for the User to do this.

The User of the CPW must contact the CPW administrator for further instructions.

5.2 Logging into the CPW

From the Home page, the User must click on green “Login” button to login into the CPW.

5.3 Creating a Collection

From the Home page, the User must first click on the “Collections” main menu item to display the List Collections page.

The screenshot shows the 'Collections' page of the Comparative Pathology Workbench. At the top, there are navigation links for 'Benches (5)', 'Collections (7)', 'Images (25)', 'Sources (7)', and 'About'. A search bar and a user dropdown 'mwicks23' are also at the top right. Below the header, a sub-navigation bar shows a home icon and the text '/ Collections'. The main section is titled 'Collections' and contains a search bar with placeholder 'Search the list of Collections'. Below the search bar is a filter panel with fields for 'Title', 'Description', 'Owner', 'Authority', and a 'Paginate by' dropdown set to 10. Two buttons, 'Search' and 'Clear', are located below the filter panel. The main content area displays a table of collections:

Action	Collection Id	Title	Images	Owner	Authority
☰	000003	GUEST Default Collection	5	guest	VIEWER
☰	000004	Default Collection	9	rbaldock	VIEWER
☰	000011	Normal and Crohns Examples	9	mwicks23	OWNER
☰	000014	EBI SCA Collection	2	mwicks23	OWNER
☰	000016	A Simple Collection	9	mwicks23	OWNER
☰	000022	Test Collection	2	mwicks23	OWNER
☰	000023	Default Collection	0	mwicks23	OWNER

At the bottom of the table is a green '+ Add' button. Below the table, there are logos for various partners: THE LEONA M. AND HARRY B. HELMSLEY CHARITABLE TRUST, HUMAN CELL ATLAS, THE UNIVERSITY of EDINBURGH, HERIOT WATT UNIVERSITY, Chan Zuckerberg Initiative, and Human Gut Cell Atlas.

Figure 24 – the Collection List page

+ Add

Before the User can collect images to populate a Bench with, a Collection must be created, by pressing the green “Plus” icon on the List Collections page.

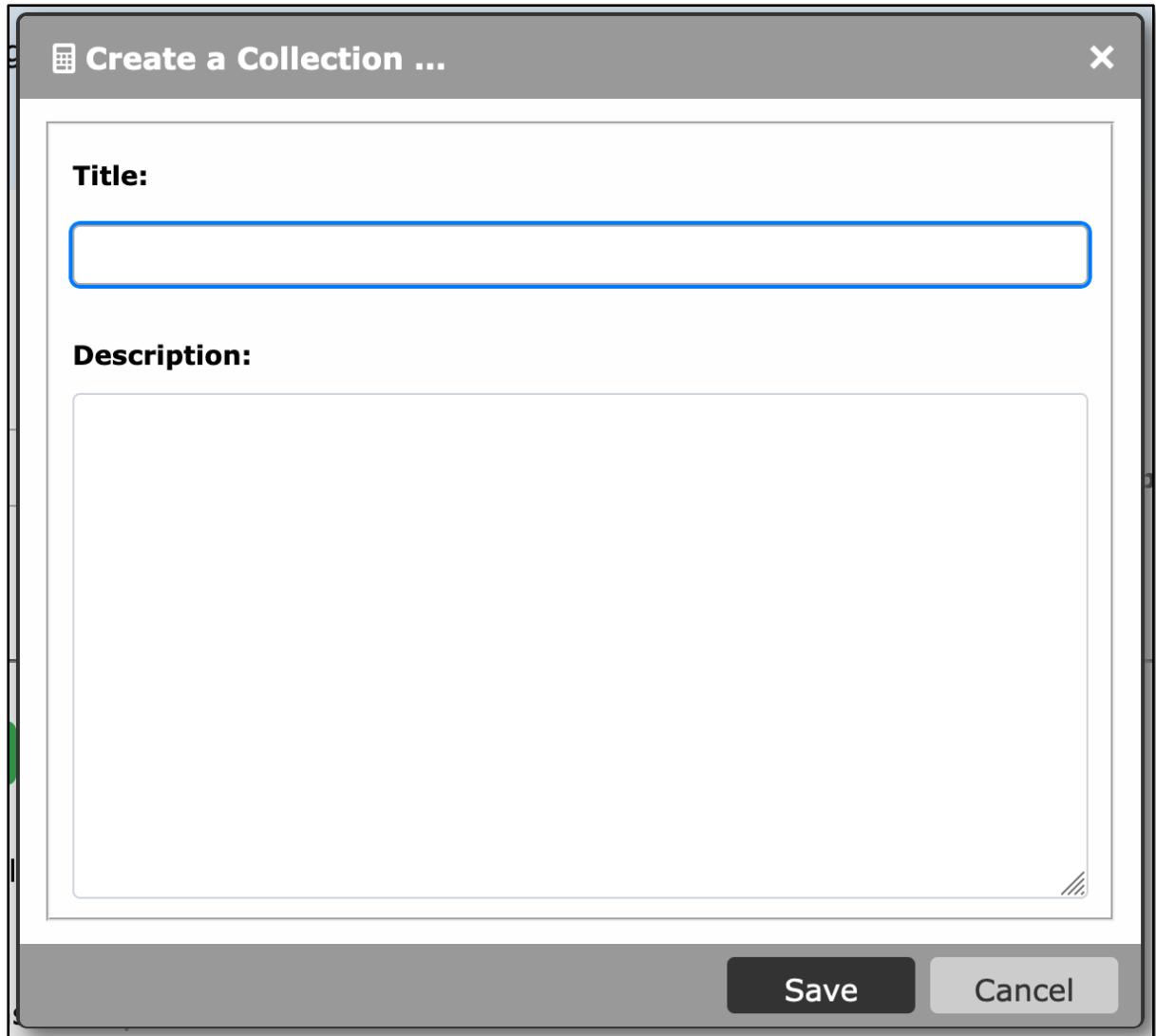


Figure 25 – the Collection Add pop-up

The User must supply a title and description for the Collection.

The List Collections page provides a search facility for the User to list Collections, depending on the following criteria:

- Title
 - The Title of the Collection contains the supplied string in the matching text box.
- Description
 - The Description of the Collection contains the supplied string in the matching text box.
- Owner
 - The Owner of the Collection is chosen from the list of available users.
- Authority

- The Authority assigned to the User over the Collection is chosen from the list of available authorities (“VIEWER” only).
- Paginate By
 - The Number of Collections to be displayed per Page
 - Use this without any of the other parameters to alter the pagination of the Collection list.

The Pagination amount for the List Collections page can also be controlled here, as well as providing controls for page selection:



- “<<”
 - Go to the First page
- “<”
 - Go to the Previous page
- <a number>
 - Go to page N
- “>”
 - Go to the Next page
- “>>”
 - Go to the Last page

Each Collection has an associated menu accessed by clicking on the green “hamburger” icon:

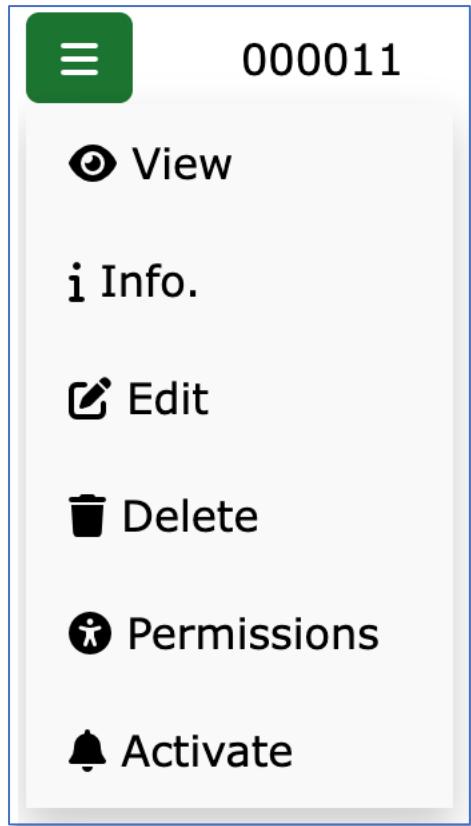


Figure 26 - The Collection Menu

Here the user can do the following:

- View the Collection
- View the Collection Details (“Info.”)
- Edit the Collection Details
- Delete the Collection
- View the Permissions for the Collection
- Activate the Collection to make it the user’s Active Collection

A Collection can be viewed using the “View” menu option:

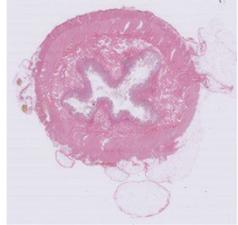
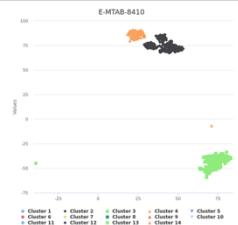
Action	Name ▲	Ordering	Comment	ROI	Hidden?	Owner	Tag	Source	Collection	Bench
		Name: MVM/Helmsley_CD/2021.03.12 - PSR_healthy_CD_ileum/2021.03.12-SR149220_02_PSR_Healthy.ndpi [0] Comment: No Comments Owner: mwicks23 Server: private_user@CompPathUofE ROI: 0 Hidden: False Collection: "000011"; "Normal and Crohns Examples"; (Owned By mwicks23) "000014"; "EBI SCA Collection"; (Owned By mwicks23) "000016"; "A Simple Collection"; (Owned By mwicks23) "CPW:000020"; "Ileum Normal and Crohns"; (Owned By mwicks23) Bench: Ordering: 1								
		Name: 20211210-11:22:10.467_E-MTAB-8410_TSNE_5_14_NoGene.png Comment: No Comments Owner: mwicks23 Server: EBI Single Cell Atlas ROI: 0 Hidden: False Collection: "000014"; "EBI SCA Collection"; (Owned By mwicks23) Bench: "CPW:000025"; "Test for Micheal 25/1/2022"; (Owned By rbaldock) Ordering: 2								
		Name: MVM/Helmsley_CD/2021.03.12 - PSR_healthy_CD_ileum/2021.03.12-SR149220_02_PSR_Healthy.ndpi [0] Comment: No Comments Owner: mwicks23 Server: private_user@CompPathUofE ROI: 0 Hidden: False Collection: "000011"; "Normal and Crohns Examples"; (Owned By mwicks23) "000014"; "EBI SCA Collection"; (Owned By mwicks23) "000016"; "A Simple Collection"; (Owned By mwicks23) "CPW:000020"; "Ileum Normal and Crohns"; (Owned By mwicks23) Bench: Ordering: 8								

Figure 27 – A typical Collection

5.4 Finding Images & Adding Images to a Collection

From the Home page, the User must first click on the “Source” main menu option.

The screenshot shows the 'Sources' section of the Comparative Pathology Workbench. At the top, there are navigation links for 'Benches (9)', 'Collections (10)', 'Images (101) ▾', 'Sources (7)' (which is highlighted in brown), and 'About ▾'. A search bar with a magnifying glass icon and the text 'admin ▾' are also at the top right. Below the header, a sub-navigation bar shows a back arrow, the text '/ Sources', and a search icon.

Search Sources

Search the sources with a URL (OMERO source ONLY!):

Url string:

Action	Owner	Name	URL	Type
	admin	Your WordPress Images	workbench-czi-cpw.mvm.ed.ac.uk/wordpress	WORDPRESS
	admin	public@IDR	idr.openmicroscopy.org	OMERO_5.4.7
	admin	mwicks23@CompPathUofE	omero-czi-cpw.mvm.ed.ac.uk	OMERO_5.4.7
	admin	public_user@CompPathUofE	omero-czi-cpw.mvm.ed.ac.uk	OMERO_5.4.7
	admin	CPW - CZI OMERO server	omero-czi-cpw.mvm.ed.ac.uk	OMERO_5.4.7
	admin	EBI Single Cell Atlas	www.ebi.ac.uk/gxa/sc	EBI_SCA
	admin	THIS Comparative Pathology Workbench	workbench-czi-cpw.mvm.ed.ac.uk/highcharts	CPW

+ Add

Logos at the bottom include: THE LEONA H. AND HARRY B. HELMSLEY CHARITABLE TRUST, HUMAN CELL ATLAS, THE UNIVERSITY of EDINBURGH, HERIOT WATT UNIVERSITY, Chan Zuckerberg Initiative, and Human Gut Cell Atlas.

Figure 28 – the Source List Page

A list of sources is presented to the User, and clicking on the green “hamburger” icon next to a source of interest, shows the Source Menu options:

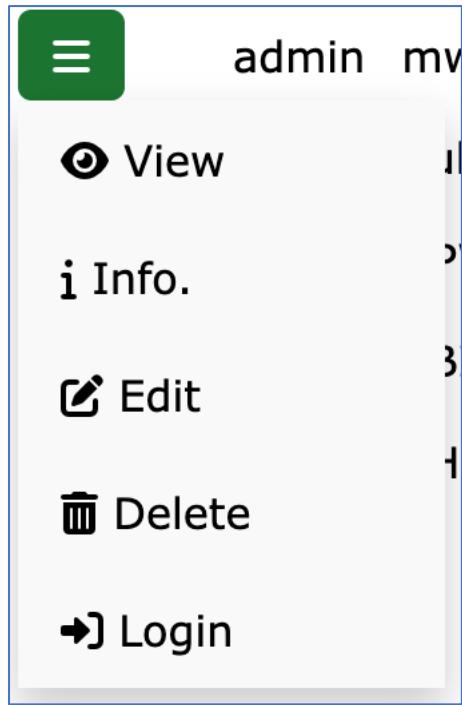


Figure 29 – the Source Menu

Here the user can do the following:

- View the Source.
- View the Source Details (“Info.”).
- Edit the Source Details (if allowed).
- Delete the Source (if allowed).
- Login to the Source.

Depending on the type of source being browsed, different options are presented to the User.

Some types of Image Source, typically certain OMERO servers, require you to login separately in another tab in the same browser. If the User needs to do this, “Login” option is displayed in the Source dropdown menu. Clicking on this prompts the CPW User to login to this external system, with the browser returning to the originating page in the CPW.

5.4.1 OMERO Images

For an OMERO source type, the User is presented with a list of Groups available on the OMERO server.

- Clicking on a Group, shows the list of available Projects within the selected Group;
- Clicking on the Project, shows the list of available Datasets within the selected Project;

- Clicking on the Dataset shows the list of available Images within the selected Dataset;
- Clicking on the Image shows the Image, its metadata and any Regions Of Interest, if available.

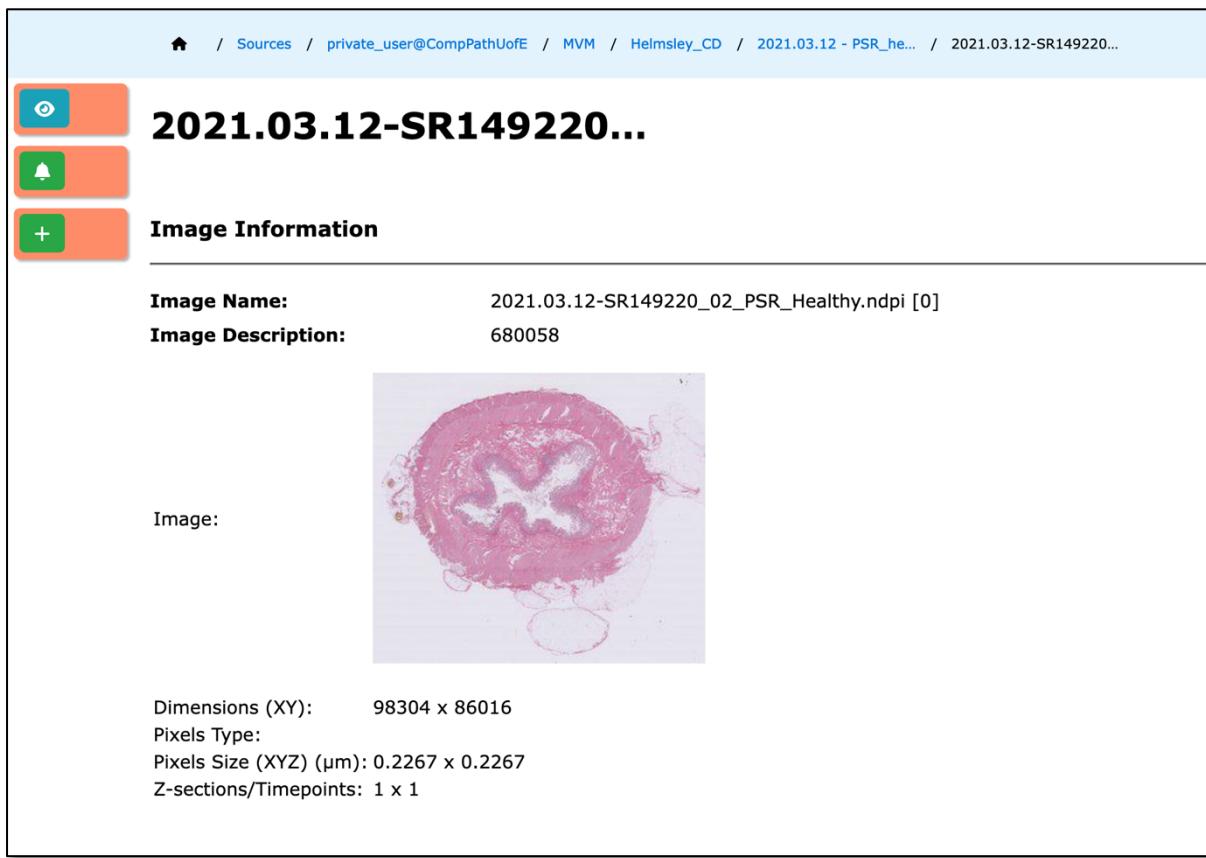


Figure 30 – The Image page

On the Image display page, there is a menu on the Left-Hand Side of the screen, containing the following functions from top to bottom:

- View the Active Collection
 - (Blue-Grey Eye icon)
- Select the Active Collection
 - (Green Bell icon)
- Add All the Images to the existing Active Collection
 - (Green Plus icon)

If the Image has Regions of Interest (ROIs), displayed by scrolling down from the image, then these can be added to the User's active collection, by pressing the green “Plus” button followed by the confirmation pop-up dialogue.

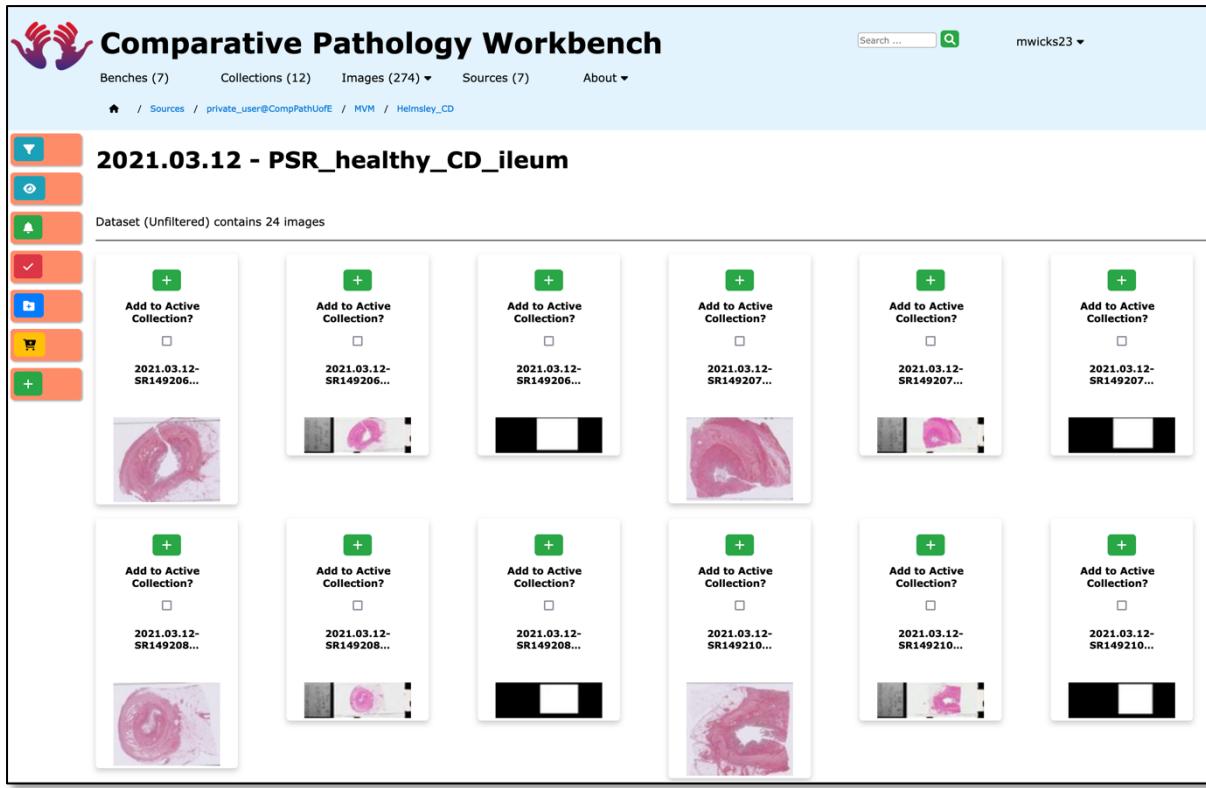


Figure 31 – The Dataset page (unfiltered), Top

On the Dataset display page, there is a menu on the Left-Hand Side of the screen, containing the following functions from top to bottom:

- Filter/Un-Filter the Dataset
 - (Blue-Grey Filter/Unfilter icon)
- View the Active Collection
 - (Blue-Grey Eye icon)
- Select the Active Collection
 - (Green Bell icon)
- Toggle the Image Checkboxes
 - (Red Tick icon)
- Add All the Images to a New Active Collection
 - (Blue Plus Folder icon)
- Add Selected (Checked) Images to the existing Active Collection
 - (Yellow Plus Trolley icon)
- Add All the Images to the existing Active Collection
 - (Green Plus icon)

A single Image can be added to the User's active collection, by pressing the green “Plus” button on each individual Image Card, followed by the confirmation pop-up dialogue.

The Dataset page can be “filtered” to show only whole slide images, and not the “Macro” and “Macro Mask” images by pressing the “Filter” button.

All images can be viewed by pressing the “Unfilter” button.

The screenshot shows the Comparative Pathology Workbench interface. At the top, there's a navigation bar with links for Benches (7), Collections (12), Images (274), Sources (7), and About. A search bar and user profile 'mwicks23' are also at the top right. Below the navigation, the title '2021.03.12 - PSR_healthy_CD_ilium' is displayed. A message indicates 'Dataset contains 24 images; (Filtered) Dataset shows 8 images'. On the left, there's a vertical toolbar with icons for Filter (selected), Unfilter, Add to Active Collection, Delete, and Create. The main area displays 8 image thumbnails in a grid. Each thumbnail has a green '+' icon labeled 'Add to Active Collection?' and a small checkbox. The images are labeled with their names: '2021.03.12-SR149206...', '2021.03.12-SR149207...', '2021.03.12-SR149208...', '2021.03.12-SR149210...', '2021.03.12-SR149219...', '2021.03.12-SR149220...', '2021.03.12-SR149221...', and 'SR149216_Healthy'.

Figure 32 – The Dataset page (filtered), Top

5.4.2 EBI SCA Charts

For an EBI SCA source type, the User is presented with a simple input box into which a URL from the EBI SCA must be pasted; along with a Comment box, and a Button to upload the associated chart with.

Pressing the red “Upload” button uploads chart, and this is displayed, together with its associated metadata (reference via the supplied URL).

The screenshot shows the 'Chart Upload' section of the EBI Single Cell Atlas interface. At the top, there is a breadcrumb navigation: a house icon followed by '/ Sources / EBI Single Cell Atlas'. Below this, the title 'EBI Single Cell Atlas' is displayed in large bold letters, with 'Chart Upload' in bold below it. A placeholder text 'Input a Comment and a URL to upload a Chart' is shown above a horizontal line. The main form area has three fields: 'Comment:' with a large text input box, 'Source url:' with a smaller text input box, and 'Location:' with a 'Browse...' button and a message 'No file selected.'. At the bottom, there are two buttons: a red 'UPLOAD' button and a green 'CLEAR' button.

Figure 33 – The EBI SCA page

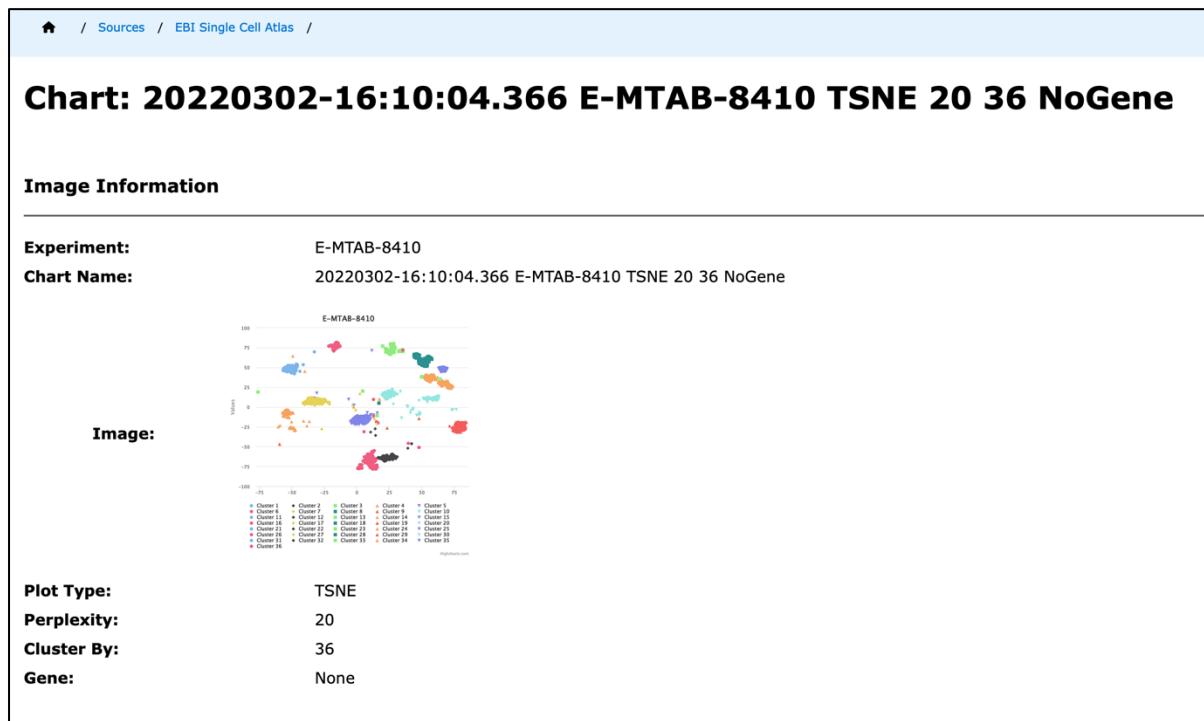


Figure 34.1 – The EBI SCA Chart page

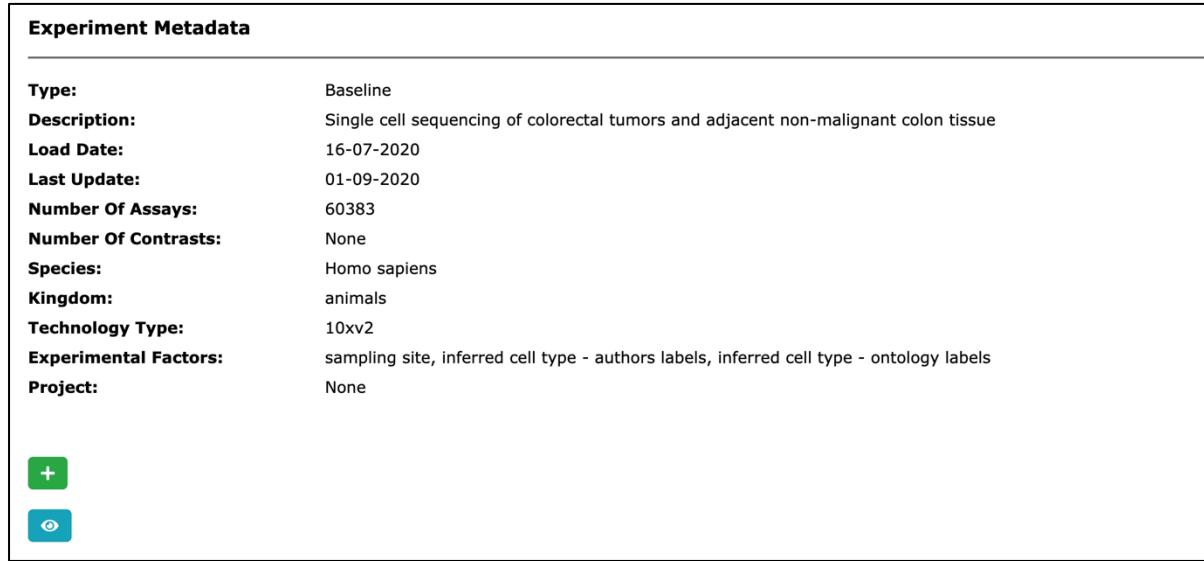


Figure 34.2 – The EBI SCA Chart page

This chart can be added to the User's active collection, by pressing the green "Plus" button followed by the confirmation pop-up dialogue.

The User can press the grey-green "Eye" icon which displays the List Collection page; the List Collection page shows all the images in the Active collection.

5.4.3 WordPress Images

For a WordPress source type, the User is presented with a list of images from the User's WordPress Media Library.

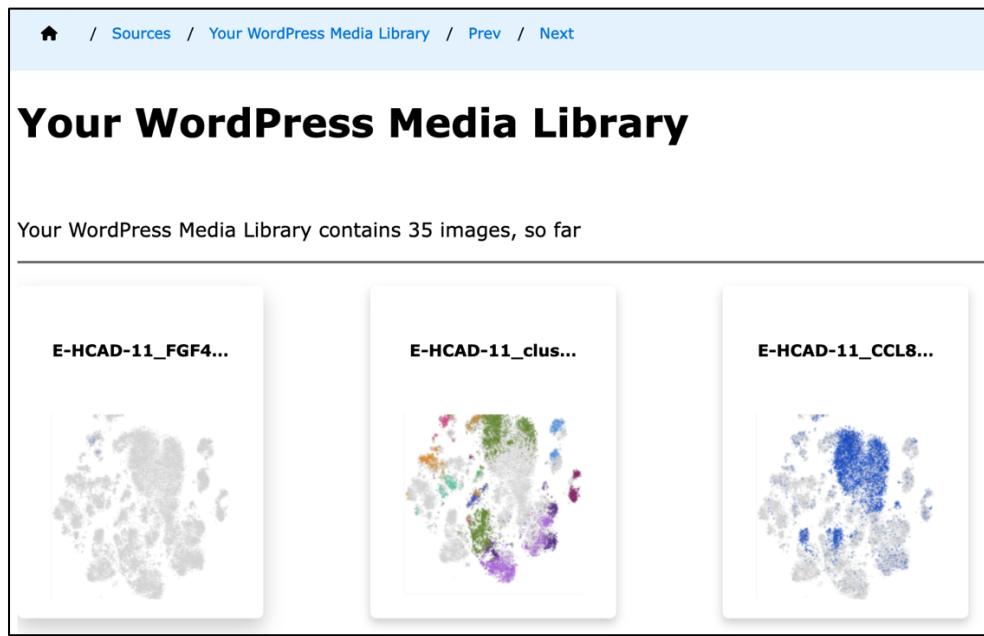


Figure 35 – The WordPress Media Library page

By clicking on an image, the User is presented with the image.

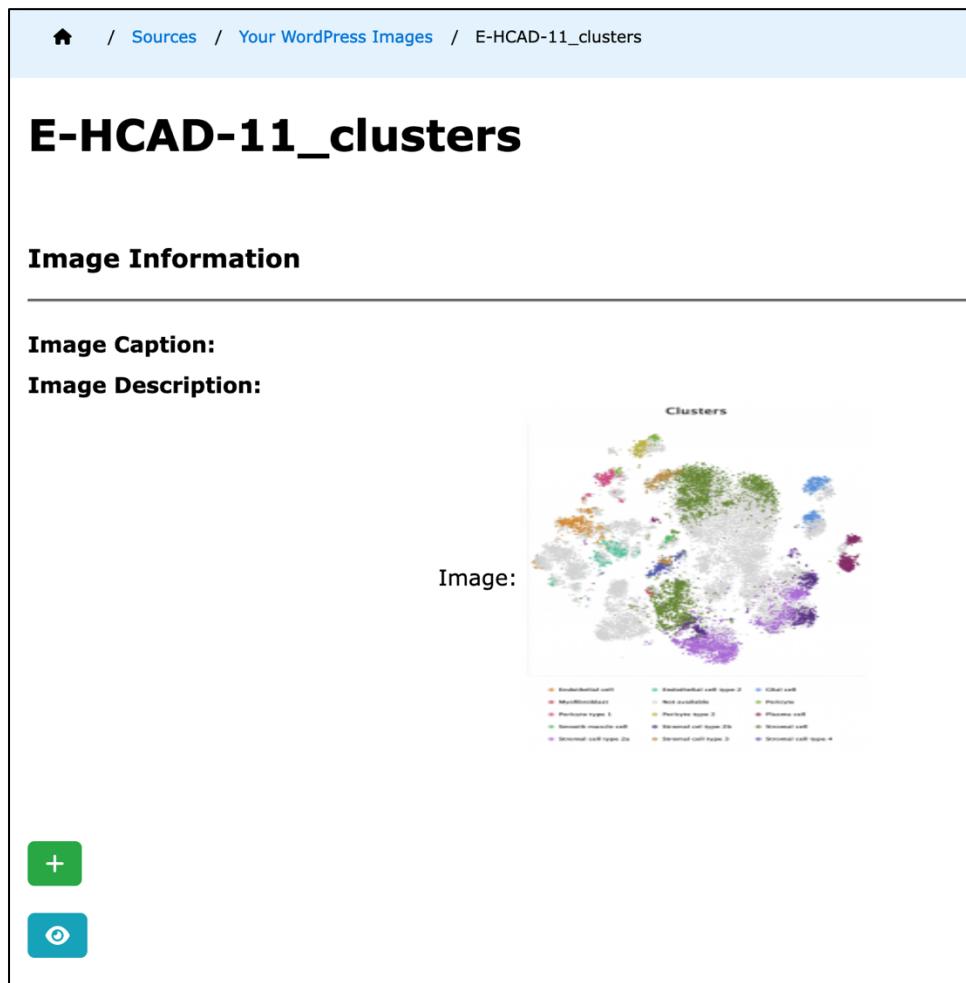


Figure 36 – The WordPress Image page

This image can be added to the User's active collection, by pressing the green “Plus” button followed by the confirmation pop-up dialogue.

On the image page, the User can press the grey-green “Eye” icon which displays the List Collection page, which shows all the images in the Active collection.

5.4.4 CPW Images

For miscellaneous images that come from other source types that are unsupported directly by the CPW, the CPW itself can host images.

The User is presented with a simple input box into which a URL must be pasted; along with a Comment box, and a Button to upload an image with.

The screenshot shows the 'THIS Comparative Pathology Workbench' interface. At the top, there is a navigation bar with icons for home, sources, and the current page. The main title 'THIS Comparative Pathology Workbench' is displayed prominently. Below the title, the section 'Image Upload' is shown. A text input field is labeled 'Input a Comment and a URL to upload an Image'. To the right of this input field is a large, empty rectangular area representing the uploaded image. Below this area, there is a 'Comment:' label followed by a text input field. Further down, there is a 'Source url:' label next to a text input field. At the bottom of the form, there is a 'Location:' label with a 'Browse...' button and a message 'No file selected.' To the left of the location label is a red 'UPLOAD' button, and to its right is a green 'CLEAR' button.

Figure 37 – The CPW Image Upload Page

Pressing the red “Upload” button uploads the image to the CPW, and it is displayed, together with the comment thus:

[Home](#) / [Sources](#) / [THIS Comparative Pathology Workbench](#) /

Image: 20220927-12:50:29.379_SR149216_Healthy.annotated.tif.jpeg

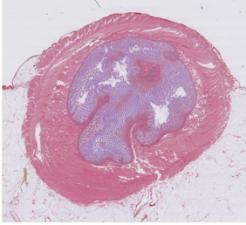


Image Information

Image Name:	20220927-12:50:29.379_SR149216_Healthy.annotated.tif.jpeg
Comment:	A healthy, annotated and stained example image
Source:	https://omero-czi-cpw.mvm.ed.ac.uk/webclient/?show=image-8390

Figure 38 – An image uploaded to the CPW itself, of an image that has been annotated using QuPath.



The image can be added to the User's active collection, by pressing the green "Plus" button followed by the confirmation pop-up dialogue.



The User can press the grey-green "Eye" icon which displays the List Collection page, which shows all the images in the Active collection.

5.5 Creating a Bench

From the Home page, the User must first click on the “Benches” main menu option, or the grey-green “Benches” button in the Home Page “Browse Card”.

A list of the User’s Benches is presented in the “List Benches” page.

Action	Bench Id	Title	Created On	Updated On	Owner	Authority
	CPW:000016	Test bench for sharing	Tuesday, September 15th, 2020	Tuesday, August 29th, 2023	rbalcock	VIEWER
	CPW:000020	Ileum Normal and Crohns	Monday, May 17th, 2021	Monday, December 16th, 2024	mwicks23	OWNER
	CPW:000025	Test for Micheal 25/1/2022	Tuesday, January 25th, 2022	Tuesday, February 22nd, 2022	rbalcock	EDITOR
	CPW:000030	CPW_Manuscript	Wednesday, September 28th, 2022	Tuesday, August 29th, 2023	mglinka	EDITOR
	CPW:000040	Friday 24th March	Friday, March 24th, 2023	Friday, March 24th, 2023	admin	VIEWER
	CPW:000050	Demo Public Bench	Monday, May 20th, 2024	Monday, May 20th, 2024	mwicks23	OWNER
	CPW:000066	PSR	Wednesday, December 4th, 2024	Wednesday, December 4th, 2024	mwicks23	OWNER

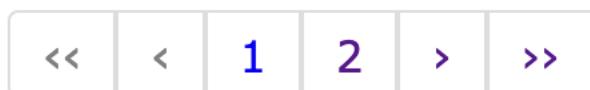
Figure 39 – The Bench List page

The List Benches page provides a search facility for the User to list Benches, depending on the following criteria:

- Title
 - The Title of the Bench contains the supplied sting in the matching text box.
- Description
 - The Description of the Bench contains the supplied sting in the matching text box.
- Owner
 - The Owner of the Bench is chosen from the list of available users.
- Authority
 - The Authority assigned to the User over the Bench is chosen from the list of available authorities (“VIEWER” or “EDITOR”).

- Created Before
 - A Date before the Bench was created.
- Created After
 - A Date after the Bench was created.
- Modified Before
 - A Date before the Bench was last modified.
- Modified After
 - A Date after the Bench was last modified.
- Paginate By
 - The Number of Benches to be displayed per Page
 - Use this without any of the other parameters to alter the pagination of the list.

Public Benches are highlighted with a Pink background.



- “<<”
 - Go to the First page
- “<”
 - Go to the Previous page
- <a number>
 - Go to page N
- “>”
 - Go to the Next page
- “>>”
 - Go to the Last page

Each Bench has an associated menu accessed by clicking on the green “hamburger” icon:



Clicking on this green “hamburger” icon shows a menu, thus:

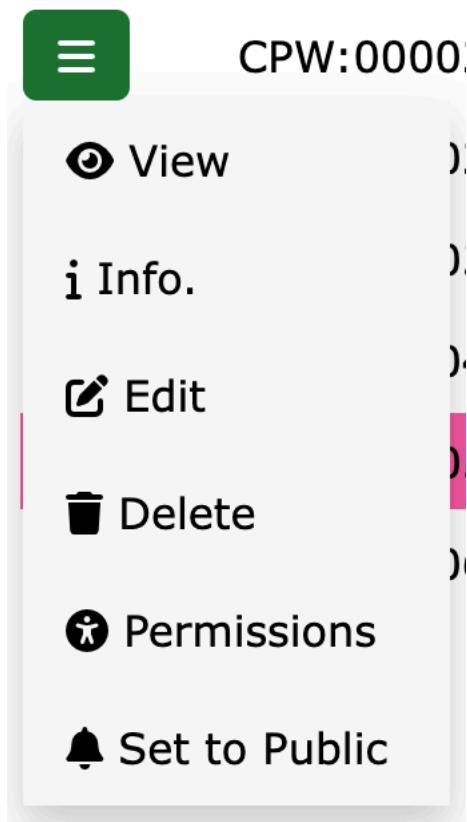


Figure 40 – The List Benches page, Bench Menu

Here the user can do the following:

- View the Bench.
- View the Bench Details (“Info.”)
- Edit the Bench (Details)
- Delete the Bench.
- View the Permissions for the Bench.
- Set to Public or Private

At the end of the current page of benches, there is a button to create a new bench:



When a Bench is created a title and description must be supplied; optionally the cell width and height can be specified as well as the number of rows and columns, if the default values are not satisfactory.

On creation the Bench page is displayed.

A typical bench, is displayed in the CPW using the “View” menu option:

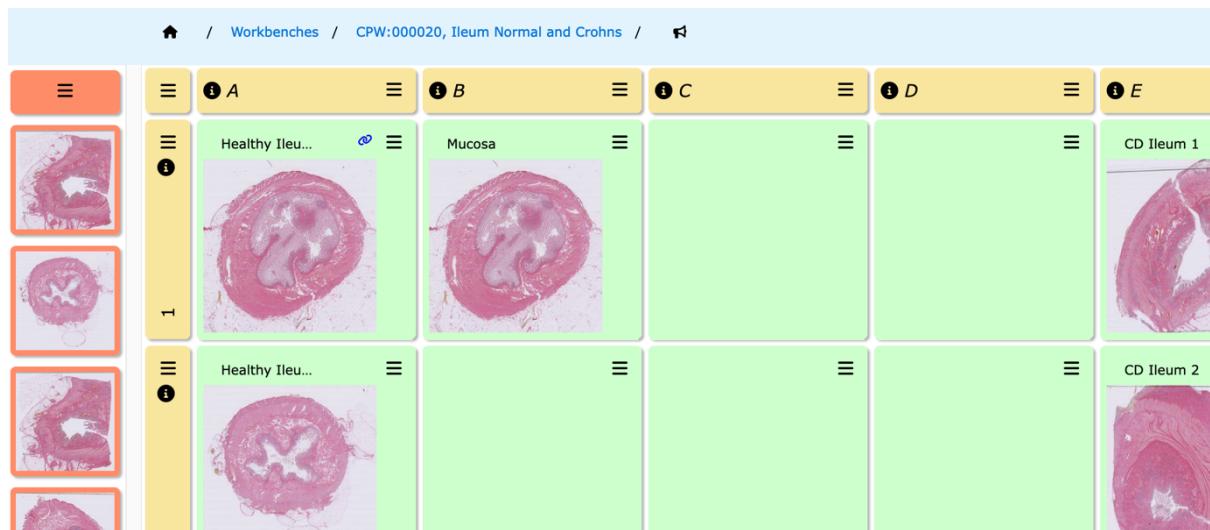


Figure 41 – The Bench page

5.5.1 Bench page components

The Bench page consists of 2 panels: the currently Selected Collection is displayed to the immediate left of the page; and the Bench itself to the right of the Active Collection.

Information on the current Bench can be displayed in a pop-up dialogue, by clicking on the bench name in the breadcrumb.

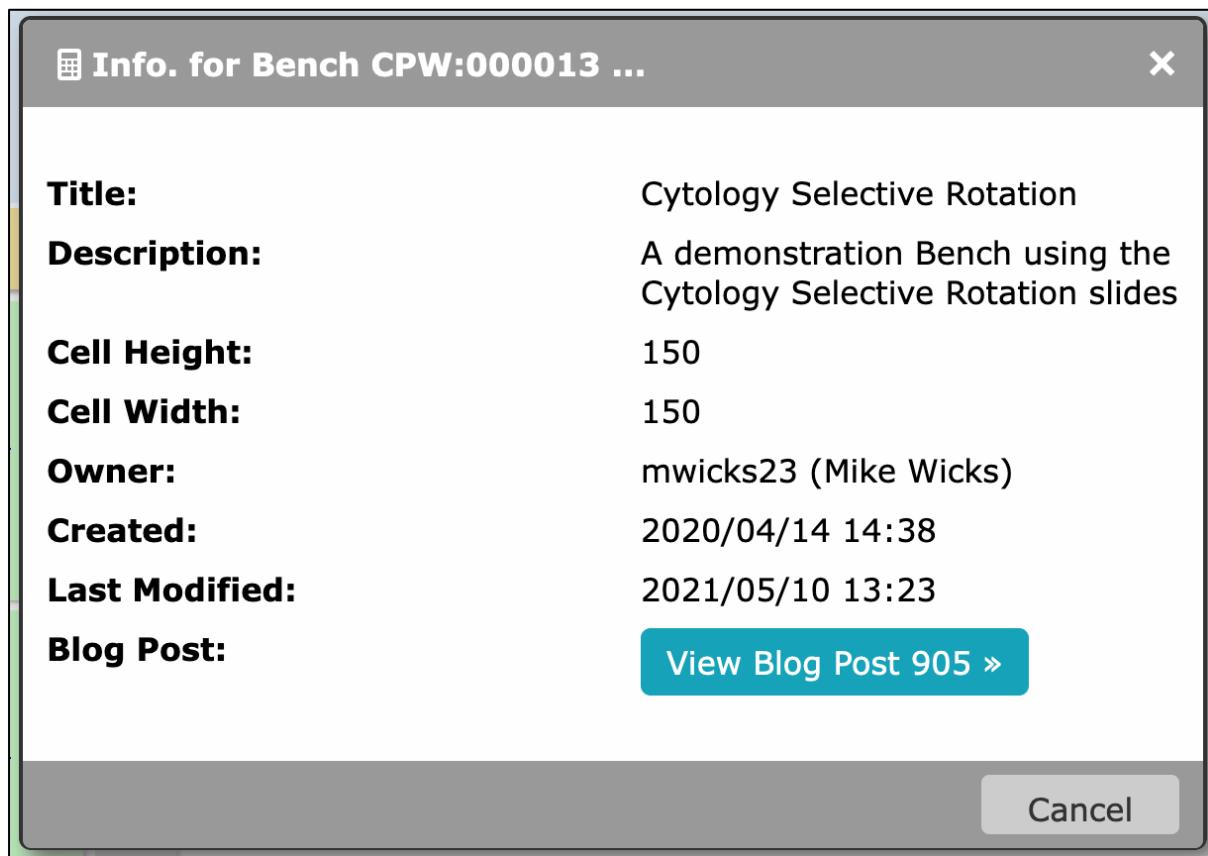


Figure 42 – The Bench Information pop-up dialogue

5.5.1.1 The Selected Collection

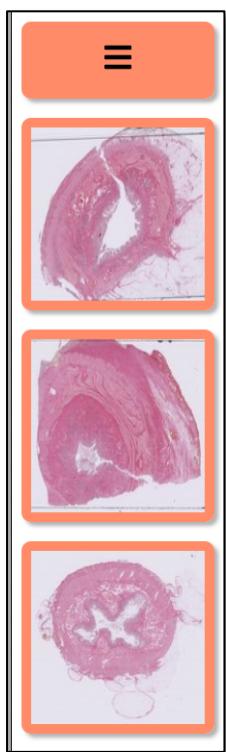


Figure 43 – The Selected Collection on the Bench page

The Selected collection is displayed as a vertical series of orange cells. There is a Menu in the topmost orange cell, with each Image from the collection displayed in the orange cells below.

The Collection Panel Menu is accessed by clicking on the “Hamburger” icon (3 short lines), and offers the user to options, “Select Collection” and “View Collection”.

If any of the Images in the Collection have been “tagged”, these tags are displayed as menu options; clicking on a tag menu option, displays in the Selected Collection only those images that have been tagged with this Tag.

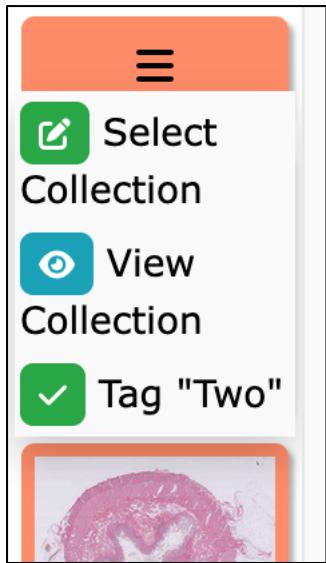


Figure 44 – The Collection Panel Menu

Clicking on “Tag “Two”” will sub-select the collection, and display only those images in the collection that have been tagged with the Tag “Two”.

Clicking on “View Collection” will show List Collection page, which lists all the images in the Active Collection.

Clicking on “Select Collection” will show a pop-up menu, offering the user the chance to select an alternative collection to use with this bench, thus:

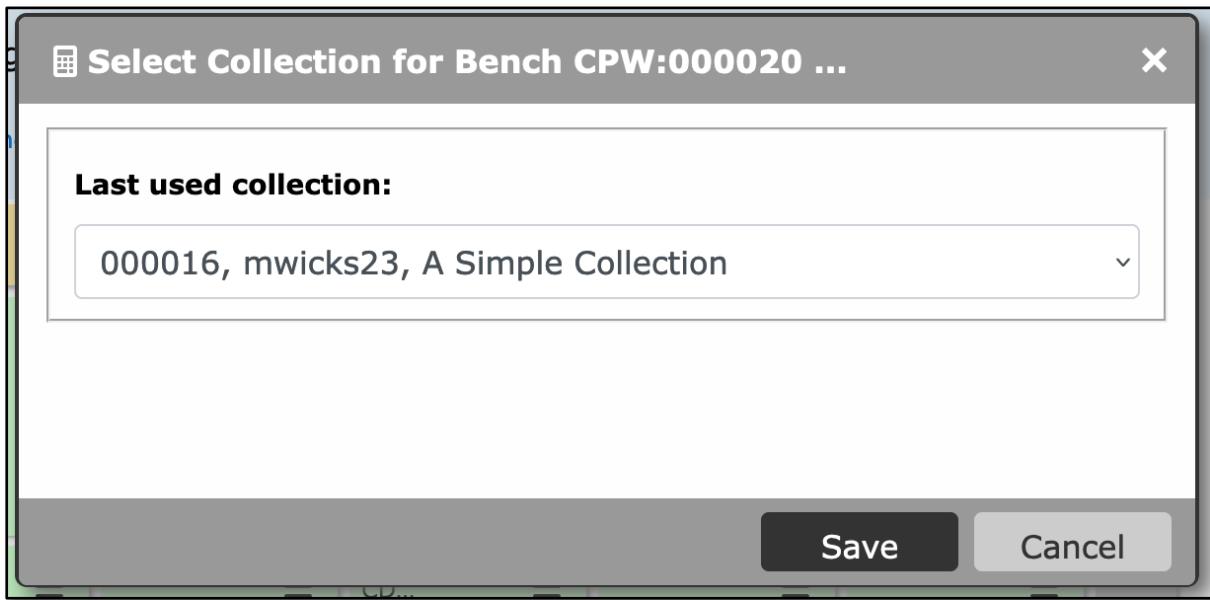


Figure 45 – The Collection Selection Pop-up

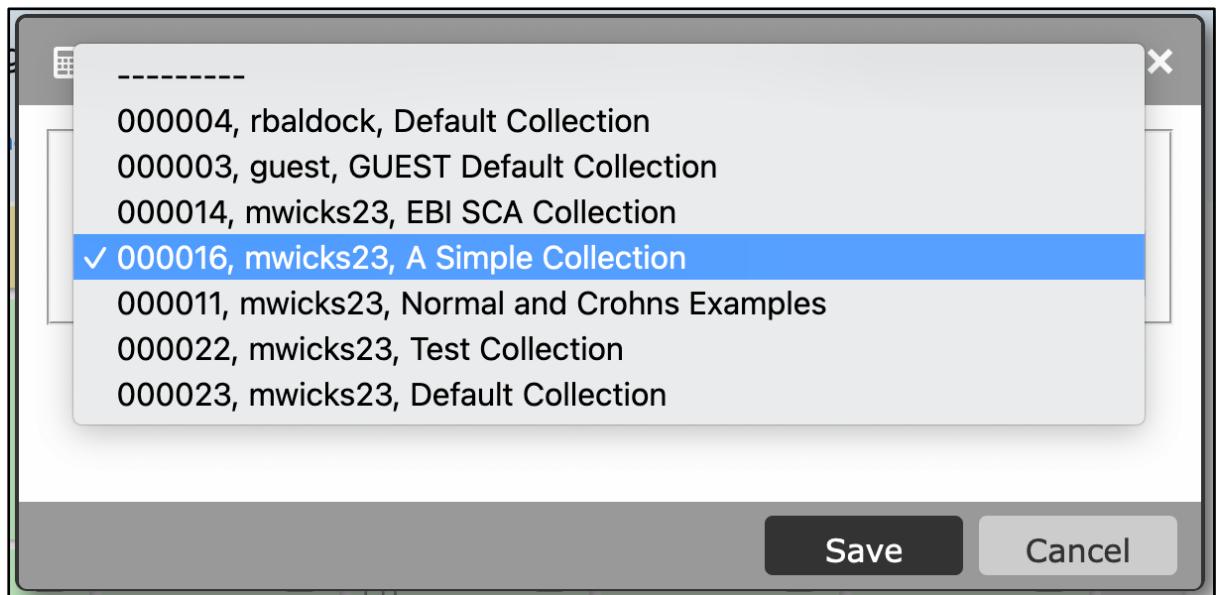


Figure 45.5 – Selecting an alternative Collection

5.5.1.2 The Bench

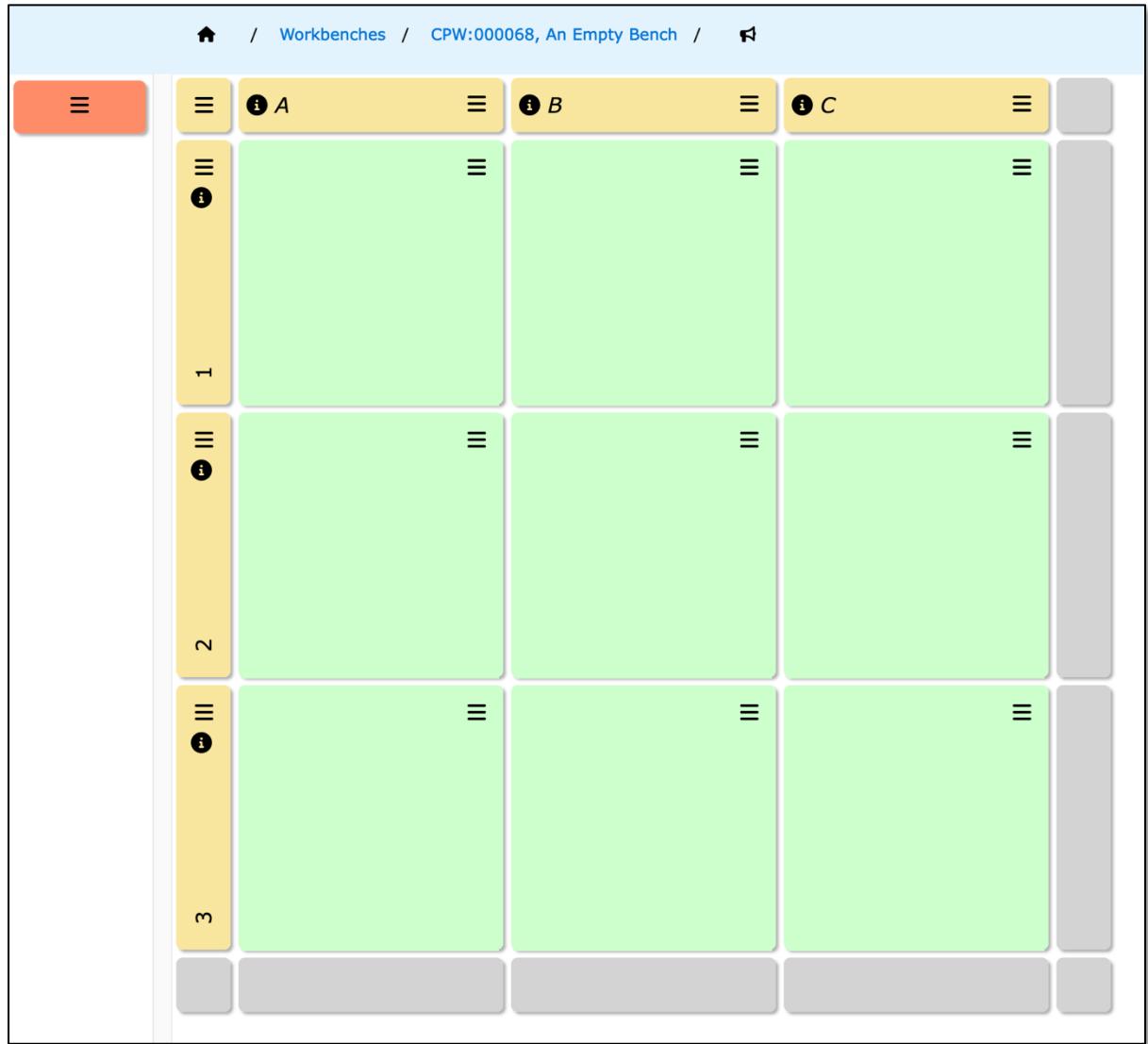


Figure 46 – An initial, empty Bench

There are 4 types of Cell that make up a Bench:

- A Yellow “Master” cell,
- Yellow column and row “Header” cells,
- Grey “Footer” cells and,
- Green “Ordinary” cells.

5.5.1.2.1 *The Master Cell*

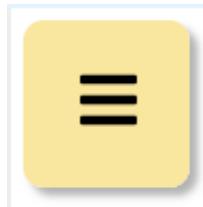


Figure 47 - The Master Cell

The “Master” cell provides the main control functions for the Bench, with these available via the master cell menu;

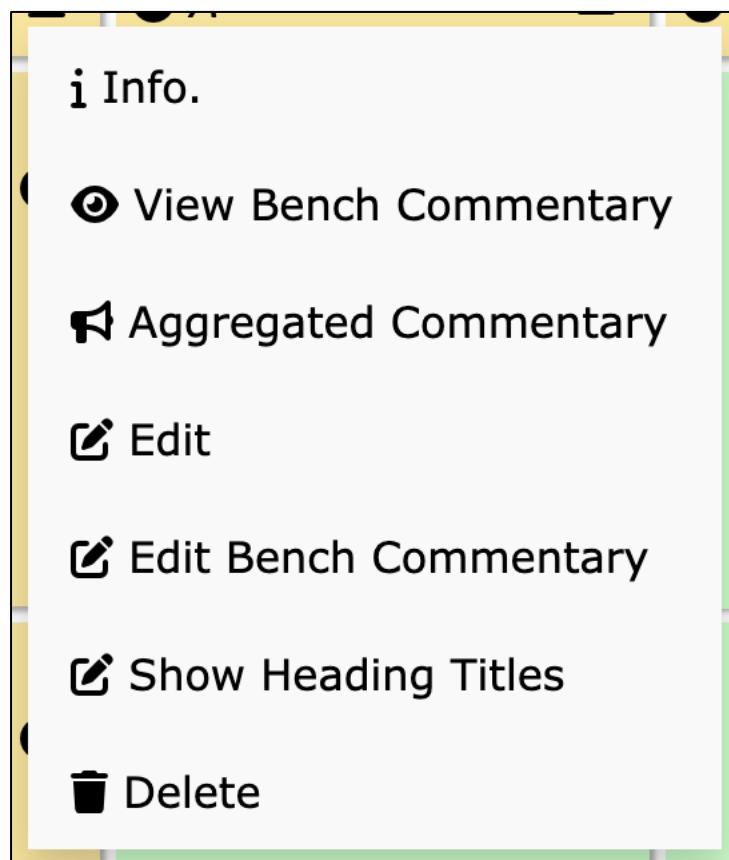


Figure 48 – The Master Cell Menu Items

The menu is accessed by clicking on the “Hamburger” icon, and offers the following functions:

- Info.
 - Shows the information about the Bench, as provided on creation or at last edit.
- View Bench Commentary
 - Displays a pop-up window with a summary of the commentary stored for this Bench.
- Aggregated Commentary
 - Displays a pop-up window with a summary of the commentary stored for this Bench and all its Cells
- Edit
 - Allows the Bench parameters to be edited.
- Edit Bench Commentary
 - Displays a page in a separate browser tab, to allow more commentary to be added to the Bench Commentary.
- Show Heading Titles / Numbers
 - Toggles the bench between displaying the Headers Numbers or Titles.
- Delete
 - Deletes the Bench after a confirmatory dialogue.

5.5.1.2.2 Row and Column Header Cells

Row and Column Header cells provide row and column level functions, as well as allowing the User to label Rows and Columns of Ordinary cells, with a Title and Description, as required.

Normal 

Figure 49 – A Column Header Cell



Figure 50 – A Row Header Cell

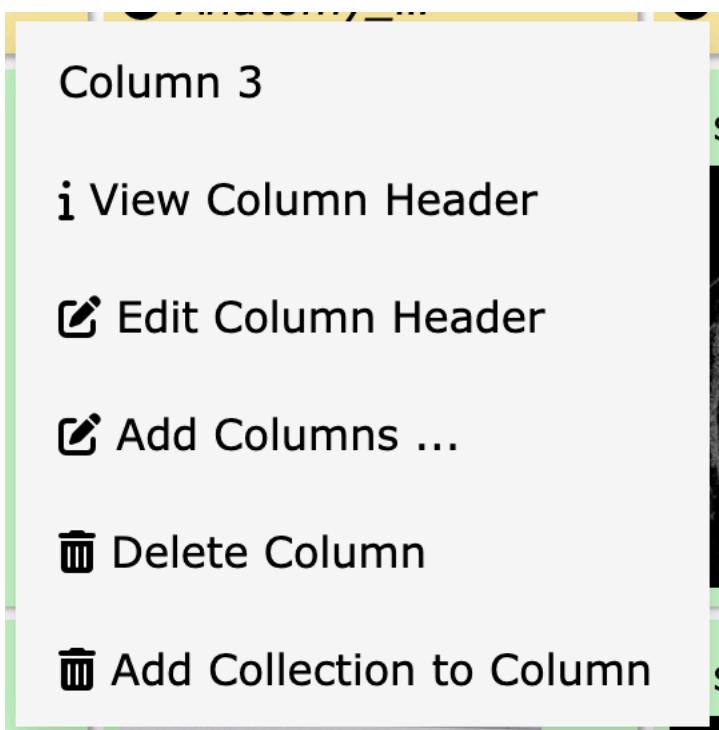


Figure 51 – Column Header Menu Items

The menu is accessed by clicking on the “Hamburger” icon, and offers the following functions:

- The Column Number
- View Column Header

- Shows the Title and Description added to this Header Cell.
- Edit Column Header
 - Allows a Column Header Title and Description to be added.
- Add Columns
 - Adds up to 5 new columns of cells to the left or right of this column.
- Delete Column
 - Deletes this column of cells after a confirmatory dialogue.
- Add Collection to Column
 - Adds the entire Selected Collection to the Column, downwards from the topmost Cell.

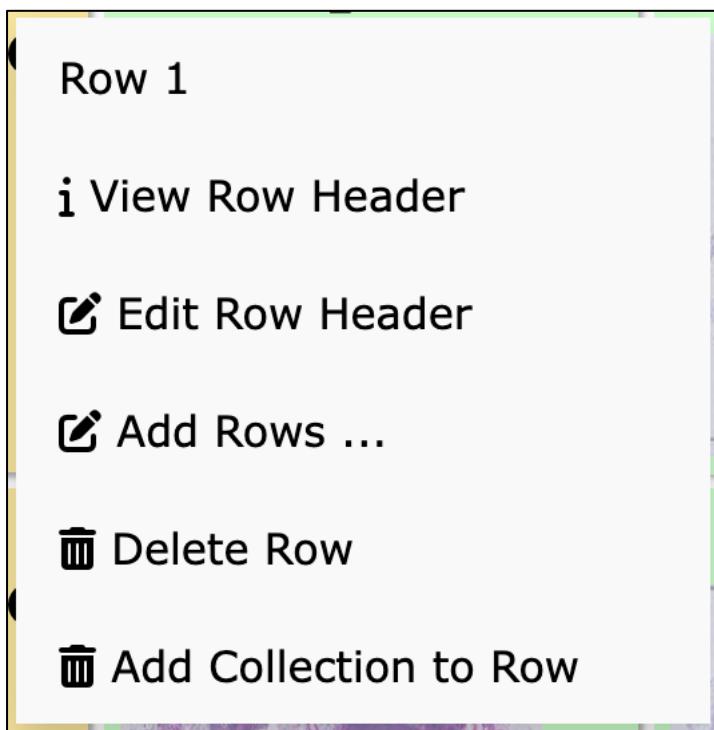


Figure 52 – Row Header Menu Items

The menu is accessed by clicking on the “Hamburger” icon, and offers the following functions:

- The Row Number
- View Row Header
 - Shows the Title and Description added to this Header Cell.
- Edit Row Header
 - Allows a Row Header Title and Description to be added.
- Add Rows
 - Adds up to 5 new rows of cells above or below this row.
- Delete Row
 - Deletes this row of cells after a confirmatory dialogue.

- Add Collection to Row
 - Adds the entire Selected Collection to the Row, rightwards from the leftmost Cell.

5.5.1.2.3 *Footer Cells*

Footer cells are simply place holder cells, that provide “targets” for the dropping of dragged cells. Green “Ordinary” cells can be dragged and dropped to expand the Bench, in addition to the functions available in the master cell, column header cells and row header cells.



Figure 53 – A Column Footer Cell

Dragging a green “ordinary” cell onto a column footer cell, adds a row to the Bench.



Figure 54 – A Row Footer Cell

Dragging a green “ordinary” cell onto a row footer cell, adds a column to the Bench.

5.5.1.2.4 Ordinary Cells

The following is an example of an Ordinary Cell that is empty:

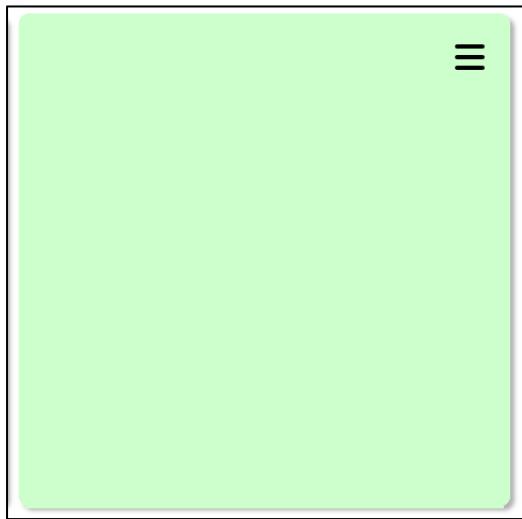


Figure 55 – An “ordinary” empty Bench Cell

The following is an example of an Ordinary Cell that contains a reference to an image:

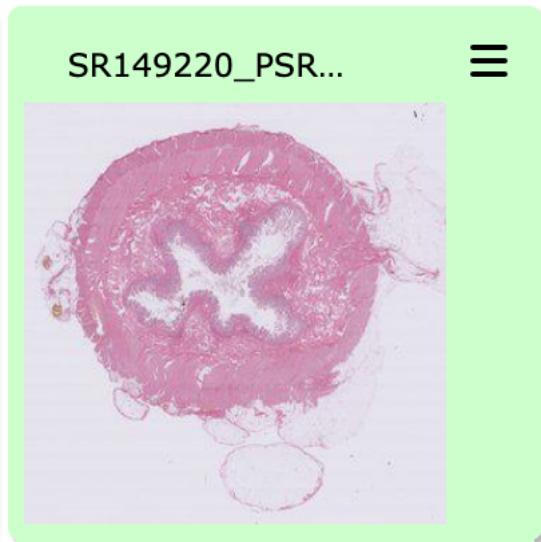


Figure 56 – An “ordinary” Bench Cell with a reference to an image

The following is an example of an Ordinary cell that contains a reference to an image, and that image has a “link” to another image referenced in the CPW:



Figure 57 – An “ordinary” Bench Cell with a reference to a “linked” image

See section on “Linking Images” for further instructions on creating associations between images.

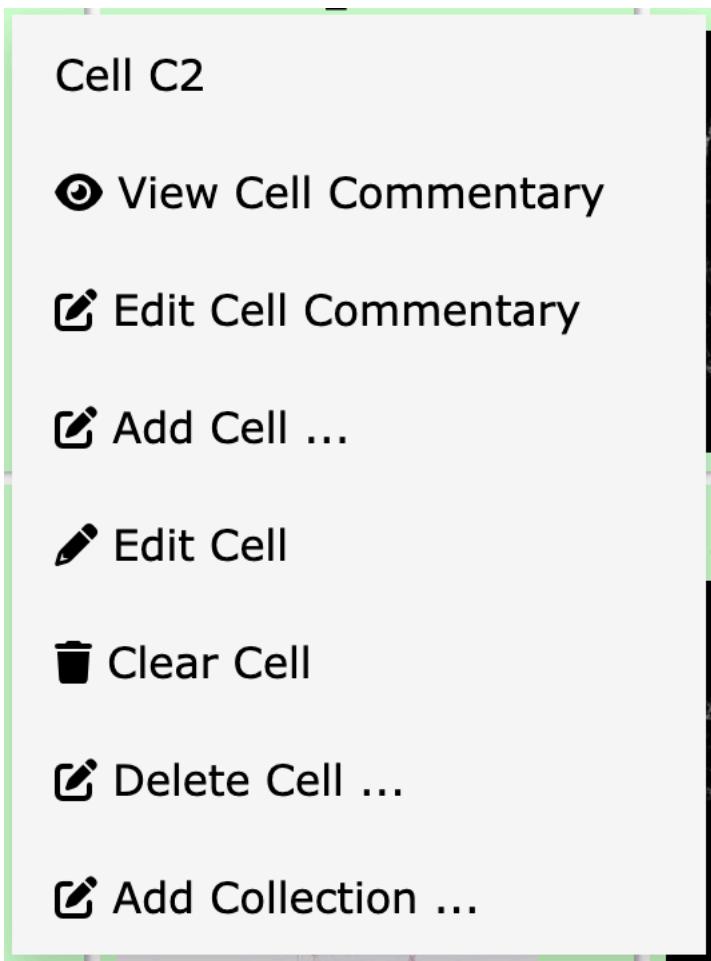


Figure 58 – An “ordinary” Bench Cell Menu

The menu is accessed by clicking on the “Hamburger” icon, and offers the following functions:

- The Cell Number
- View Cell Commentary
 - Displays the cell commentary as a Pop-up dialogue.
- Edit Cell Commentary
 - Displays the Edit Cell Commentary page, to allow more commentary to be added to the Cell Commentary.
- Add Cell
 - Adds a new cell in place of this cell and pushes the existing cells Rightwards or Downwards
- Edit Cell
 - Displays the Amend Cell page.
- Clear Cell
 - If there is an image associated with the cell, this option allows the cell to be emptied with the image returning to the active collection.
- Delete Cell
 - Deletes this cell and pulls the existing cells from the Left or from Below.

- Add Collection
 - Adds the entire Selected Collection to the Bench, downwards from, or to the right of, this Cell.

5.6 Adding an Image to a Bench

There are 3 ways to add images to a Bench:

1. On the Bench Page,
 - a. By Dragging and Dropping an Image from the Selected Collection.
2. On the Edit Cell Page ,
 - a. By Dragging and Dropping an Image from the Selected Collection.
3. On the Bench Page,
 - a. by adding the entire Selected Collection to a Row of Cells from the Leftmost Cell,
 - b. by adding the entire Selected Collection to a Column of Cells from the Topmost Cell,
 - c. by adding the entire Selected Collection to a Row of Cells from a specific Cell,
 - d. by adding the entire Selected Collection to a Column of Cells from a specific Cell.

5.6.1 On the Bench Page using Drag'n'Drop

The Bench page displays the currently active Collection and the Bench; Images can be dragged from the Collection to ordinary green cells in the Bench.

The User is prompted to “Import” the image, or “Close” the dialogue – Import being a confirmation, Close cancels the import.

5.6.2 On the Edit Cell Page using Drag'n'Drop

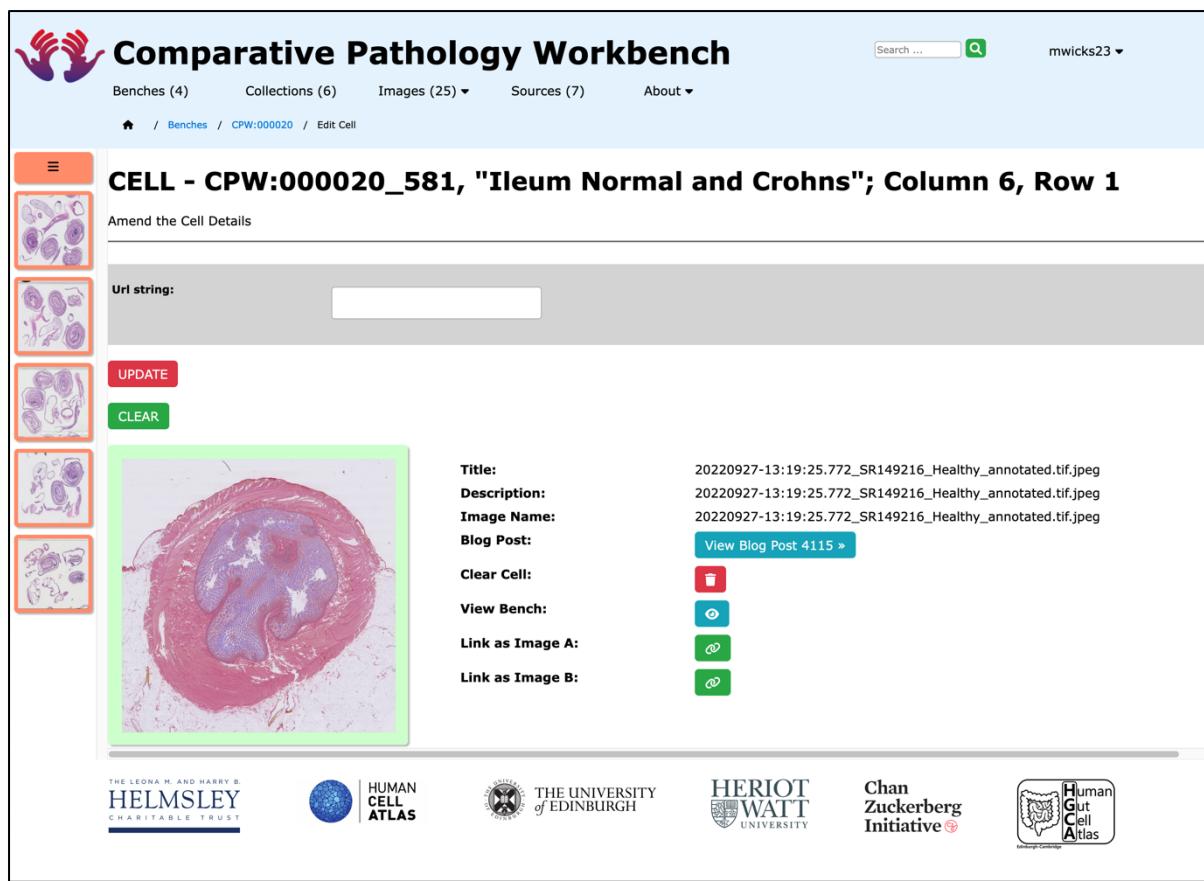


Figure 59 – The Edit Cell page

On the Edit Cell page, it is also possible to update a cell by Drag and Drop. Here, the user can drag an image from the Active Collection onto the single Green Cell.

More precise control of Title, Description and Image Name is available on this page, than the Bench Page Drag and Drop option that updates a cell.



The Cell Title and Description can be amended by hovering over each, and clicking on the “pencil” icon.

A URL Box and update button is provided as well, should the User want to use a URL (eg. cut and paste the “Link To this Image” URL from the OMERO Webclient) from an OMERO server to update the cell directly.

5.6.3 On the Bench Page using Add Collection

The Bench page displays the currently active Collection and the Bench; All the Images in the currently Selected Collection can be added to a Bench, using the Column Header, Row Header or Cell menu options:

- All the Images can be added to the right of the leftmost cell for adding to a Row,
- All the Images can be added below of the topmost cell for adding to a Column,
- All the Images can be added to the right of the selected cell for adding to a Cell, or
- All the Images can be added below the selected cell for adding to a Cell.

5.6.4 Moving Cells within a Bench

In addition, Cells can be moved by “Drag and Drop” to rearrange the Bench.

An ordinary green Bench cell can be dragged and dropped onto another ordinary cell, with a confirmatory dialogue prompt.

The User is prompted to “Swap”, “Cut”, “Copy” the cell, or “Close” the dialogue.

- “Swap”
 - simply swaps around the source and target cells;
 - Eg. For a source Cell A at X1, Y1 and a target Cell B at X2, Y2, “Swap” moves Cell A to X2, Y2, and Cell B to X1, Y1.
- “Cut”
 - moves the source cell to the target cell, overwrites the target cell, and empties the source cell;
 - Eg. For a source Cell A at X1, Y1, and target Cell B at X2, Y2, “Cut” moves Cell A to X2, Y2, and the contents of the Cell at X1, Y1 is cleared.
- “Copy”
 - moves the source cell to the target cell, overwrites the target cell, but leaves the source cell in place;
 - Eg. For a source Cell A at X1, Y1, and target Cell B at X2, Y2, “Copy” moves Cell A to X2, Y2, and keeps the same contents as Cell A in the Cell at X1, Y1.
 -
- “Close”
 - cancels the import.

Dragging an ordinary green cell to a grey row footer cell will expand the Bench by another row, without a confirmatory dialogue.

Dragging an ordinary green cell to a grey column footer cell will expand the Bench by another column, without a confirmatory dialogue.

5.7 Adding Commentary

Commentary can be added to a cell or the Bench in general, by the Edit Commentary or Edit Bench Commentary Menu options.

The screenshot shows the 'Bench Commentary' section of a web application. At the top, there's a navigation bar with links to 'Workbenches' and 'CPW:000020'. Below that, the title 'CPW:000020, "Ileum Normal and Crohns"' is displayed. Underneath the title, a heading 'Bench Commentary' and a sub-heading 'Browse the Bench Commentary' are visible. A table lists posts from different users:

Date	Time	Author	Post	Action
2021-05-17	13:49:37	mwicks23	Example Images from both Normal Ileum and Crohns Diseased Ileum	View >
2021-06-01	09:55:27	marends	Comment Normal terminal ileum section shows normal lymphoid aggregates as Mucosa Associated Lymphoid Tissue (MALT) usually located spanning both mucosa and submucosa. No abnormal inflammatory cell infiltrates.	View >
2021-06-01	09:57:01	marends	Ileum with Crohn's disease shows moderate to marked fibrosis involving mostly submucosa and serosa and also some increased fibrosis in the muscularis propria and in the (partly ulcerated) mucosa.	View >

Below the table, there's a 'Post a Comment:' section with a 'Comment:' text area labeled 'Required'. At the bottom of the page are two buttons: a red 'COMMENT' button and a green 'Back' button.

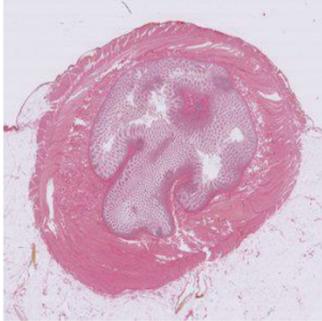
Figure 60 – The Edit Bench Commentary page

CPW:000020_000000501, "Ileum Normal and Crohns"

Cell Commentary

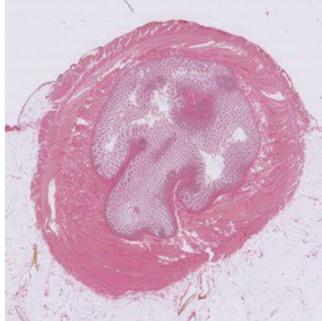
Browse the Bench Commentary

Date	Time	Author	Post	Action
2021-05-17 13:51:00		mwicks23	Healthy Ileum 1	View >



No Comments!

Figure 61.1 – The Edit Cell Commentary page



No Comments!

Post a Comment:

Comment: Required

COMMENT

Back

Figure 61.2 – The Edit Cell Commentary page

The User simply adds their comment in the grey box and presses the red “Comment” button. The page is updated in place.

These 2 pages are displayed in new separate browser tabs, to allow the user to easily reference the Bench as a whole on the previous tab, while adding a new comment to the commentary.

Closing these extra tabs is recommended after update, together with a refresh of the original Bench page.

5.8 Other Tasks

There are other functions available in the CPW which will now be described here.

There are a number of search facilities that are available in the CPW.

Benches can be browsed using the following parameters and their combinations:
Title, Description, Owner, Authority, Created before date, Created after date, Modified before date, and Modified after date.

Collections can be browsed for using the following parameters and their combinations:
Title, Description, Owner and Authority.

5.8.1 “Global” Search



Figure 62 – Main Menu Header Search Box

In the Main Header panel, there is a simple text search box, which takes the supplied (case sensitive) text and returns a list of Benches, Collections, or Images, whose title, description, owner or authority contains the supplied string, to which the current User has access. Furthermore, detailed search options are offered on the search results page.

An example of the result of using the Global search is described in the following 2 Figures.

 Comparative Pathology Workbench

BENCHES (8) COLLECTIONS (12) IMAGES (274) SOURCES (7) ABOUT ▾

Home / Global

Global Search

BENCHES

There is 1 Bench with 'psr' in Title or Description:

Action	Bench Id	Title	Created On	Updated On	Owner	Authority
	CPW:000066	PSR	Wednesday, December 4th, 2024	Wednesday, December 4th, 2024	mwicks23	OWNER

for more Bench Search options ...

COLLECTIONS

There are 3 Collections with 'psr' in Title or Description:

Action	Collection Id	Title	Images	Owner	Authority
	000048	CD FSL PSR 60	mglinka	OWNER	
	000060	PSR	60	mwicks23	OWNER
	000060	PSR	60	mwicks23	VIEWER

for more Collection Search options ...

Figure 63.1 – The Global Search results page for the string “psr”

COLLECTIONS

There are 3 Collections with 'psr' in Title or Description:

Action	Collection Id	Title	Images	Owner	Authority
	000048	CD FSL PSR 60	mglinka	OWNER	
	000060	PSR	60	mwicks23	OWNER
	000060	PSR	60	mwicks23	VIEWER

for more Collection Search options ...

IMAGES

There are 83 Images with 'psr' in Name; Here are the first 10 Images:

Action	Name	Comment	ROI	Server	Hidden	Collection
	MVM/Helmsley_CD/2021.03.12 - PSR_healthy_CD_ilium/2021.03.12-SR149206_02_PSR_CD.ndpi [0]	No Comments	0	private_user@CompPathUofE	False	"000011"; "Normal and Crohns Examples"; (Owned By mwicks23)
	MVM/Helmsley_CD/2021.03.12 - PSR_healthy_CD_ilium/2021.03.12-SR149206_02_PSR_CD.ndpi [0]	No Comments	0	private_user@CompPathUofE	False	"000016"; "A Simple Collection"; (Owned By mwicks23)
	MVM/Helmsley_CD/2021.03.12 - PSR_healthy_CD_ilium/2021.03.12-SR149206_02_PSR_CD.ndpi [0]	No Comments	0	private_user@CompPathUofE	False	"CPW:000020"; "Ileum Normal and Crohns"; (Owned By mwicks23)
	MVM/Helmsley_CD/2021.03.12 - PSR_healthy_CD_ilium/2021.03.12-SR149206_02_PSR_CD.ndpi [0]	No Comments	0	private_user@CompPathUofE	False	"000011"; "Normal and Crohns Examples"; (Owned By mwicks23)
	MVM/Helmsley_CD/2021.03.12 - PSR_healthy_CD_ilium/2021.03.12-SR149206_02_PSR_CD.ndpi [0]	No Comments	0	private_user@CompPathUofE	False	"000016"; "A Simple Collection"; (Owned By mwicks23)
	MVM/Helmsley_CD/2021.03.12 - PSR_healthy_CD_ilium/2021.03.12-SR149206_02_PSR_CD.ndpi [0]	No Comments	0	private_user@CompPathUofE	False	"CPW:000020"; "Ileum Normal and Crohns"; (Owned By mwicks23)
	MVM/Helmsley_CD/2021.03.12 - PSR_healthy_CD_ilium/2021.03.12-SR149206_02_PSR_CD.ndpi [0]	No Comments	0	private_user@CompPathUofE	False	"000011"; "Normal and Crohns Examples"; (Owned By mwicks23)
	MVM/Helmsley_CD/2021.03.12 - PSR_healthy_CD_ilium/2021.03.12-SR149206_02_PSR_CD.ndpi [0]	No Comments	0	private_user@CompPathUofE	False	"000016"; "A Simple Collection"; (Owned By mwicks23)
	MVM/Helmsley_CD/2021.03.12 - PSR_healthy_CD_ilium/2021.03.12-SR149206_02_PSR_CD.ndpi [0]	No Comments	0	private_user@CompPathUofE	False	"CPW:000020"; "Ileum Normal and Crohns"; (Owned By mwicks23)
	MVM/Helmsley_CD/2021.03.12 - PSR_healthy_CD_ilium/2021.03.12-SR149206_02_PSR_CD.ndpi [0]	No Comments	0	private_user@CompPathUofE	False	"000011"; "Normal and Crohns Examples"; (Owned By mwicks23)

Figure 63.2 – The Global Search results page for the string “psr”

5.8.2 Image Search

There are 2 ways of searching for Images, the Simple Image Search (“All Images”) and the Advanced Image Search (“All Images (Adv.)”), available on the Images Main Menu, thus:

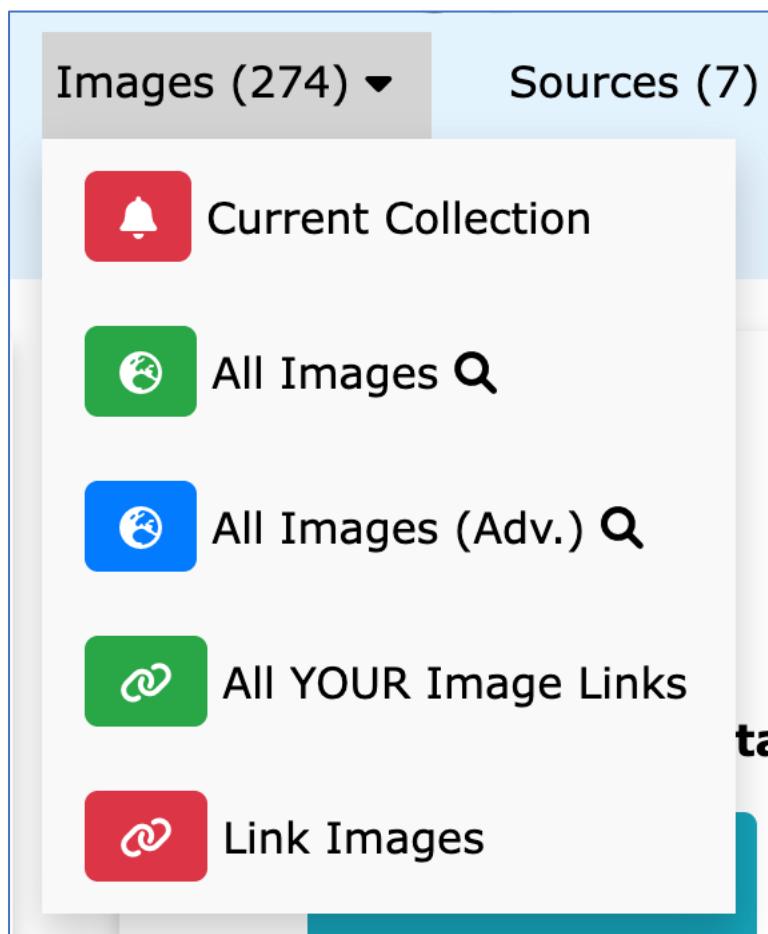


Figure 64 – The Images Main Menu dropdown.

5.8.2.1 Simple Image Search

This option displays the Simple Image List page:

Benchmarks (0) Collections (12) Images (274) Sources (7) ADD NEW ▾

Home / Collections / Images / Images for All Collections

Search Images From All Your Collections

Image Search ... Sort By ... Sort Direction ... Paginate By ... Search Clear Advanced Q

	Name: 20211210-11:22:10.467_E-MTAB-8410_TSNE_5_14_NoGene.png Owner: mwicks23 Server: EBI Single Cell Atlas Collection: "000014"; "EBI SCA Collection"; (Owned By mwicks23) Bench: "CPW:000025"; "Test for Micheal 25/1/2022"; (Owned By rbaldock) Tags: This Image has NO Tags!	Comment: No Comments! ROI: 0 Hidden: False
	Name: 20220927-13:19:25.772_SR149216_Healthy_annotation.tif.jpeg Owner: mwicks23 Server: THIS Comparative Pathology Workbench ROI: 0 Hidden: False Collection: "000016"; "A Simple Collection"; (Owned By mwicks23) Bench: "CPW:000020"; "Ileum Normal and Crohns"; (Owned By mwicks23) Tags: One	Comment: An Annotated Image from QuPath

Figure 65 – The Simple Image Search Page

This page provides a mean to search all the images available to the user, using the name only, with results sortable by attribute (Name, Comment, ROI, Hidden, Owner, Tag, Source, Collection or Bench), and direction (Ascending or Descending).

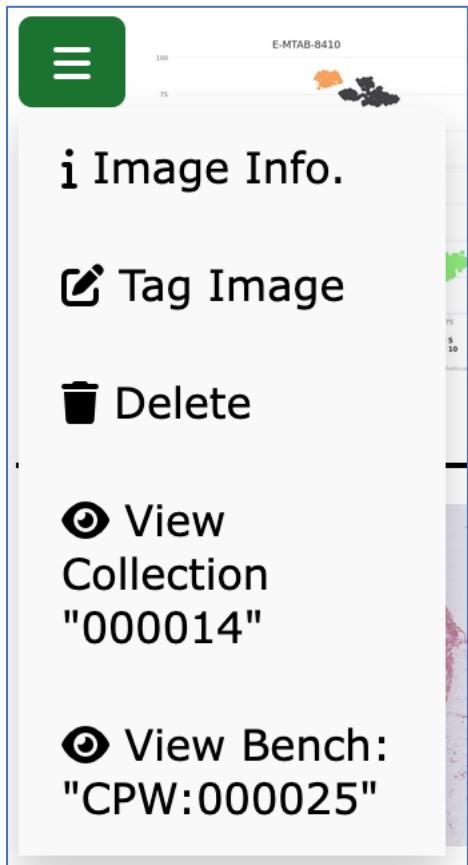


Figure 66 – the Simple Search Image Menu options

The Edit Image Ordering option is used to provide a custom order within a Collection, if so required. Otherwise, images within a collection are sorted alphabetically.

The Tag Image option allows the user to add or delete Tags associated with this image. Tags can be used to sub-select large collections of images, when updating a Bench.

5.8.2.2 Advanced Image Search

This option displays the Advanced Image List page:

The screenshot shows the 'Search Images From All Your Collections' page. At the top, there are navigation links: Benches (8), Collections (12), Images (274) (with a dropdown arrow), Sources (7), and ABOUT (with a dropdown arrow). Below the links is a breadcrumb trail: Home / Collections / Images / Images for All Collections. The main title is 'Search Images From All Your Collections'. A message below it says 'You have collected 274 Images (and 2 Hidden Images) from 12 Collections'. There are several search filters: Name, Comment, ROI, Hidden (checkbox), Source (dropdown: All Sources), Collection (dropdown: All Collections), Bench (dropdown: All Benches), and Paginate by (dropdown: 10). Below the filters are 'Search' and 'Clear' buttons. At the bottom, there are buttons for Action, Name ▲, Ordering, Comment, ROI, Hidden?, Owner, Tag, Source, Collection, and Bench.

Figure 67 – The Advanced Search Page

This page provides a mean to search all the images available to the user, using the Name, Comment, Roi, Hidden, Source, Collection, Bench and Tag, and combinations of all of these parameters. The search results can be sorted by any attribute and direction.

A typical image returned by this search is as follows:

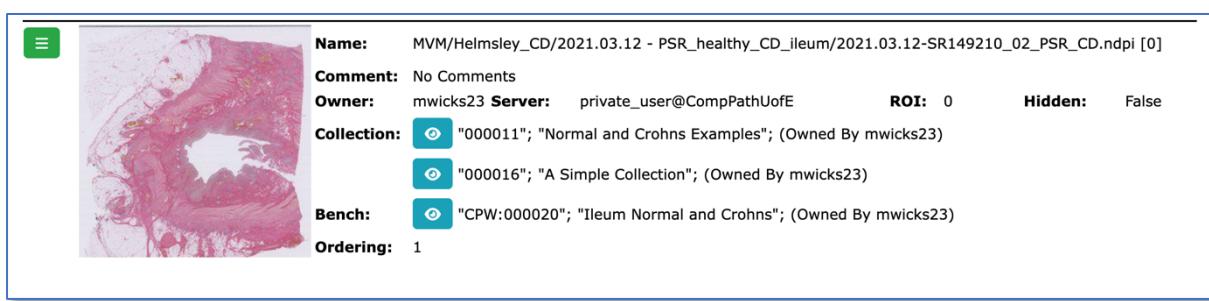


Figure 68 – An Advanced Search Result Image

The User is offered a menu for each resulting image as follows

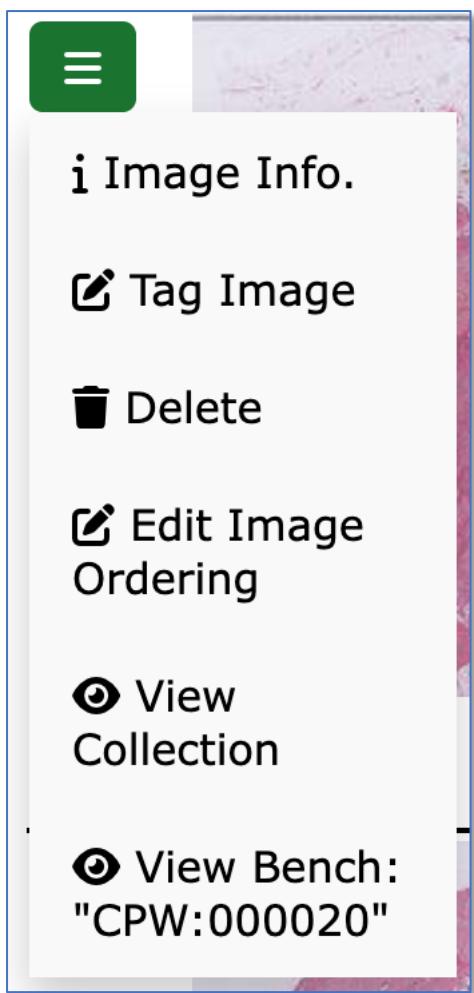


Figure 69 – Advanced Search Image Menu options

The Edit Image Ordering option is used to provide a custom order within a Collection, if so required. Otherwise, images within a collection are sorted alphabetically.

The Tag Image option allows the user to add or delete Tags associated with this image. Tags can be used to sub-select large collections of images, when updating a Bench.

5.8.2.2.1 Partial Search Strings

Note that Partial strings can also be used in the Name search field in Advanced Searches, as these are delimited by “*”.

For example, “SR149*Healthy”.

5.8.2.3 Tagging an Image

From the Image Search Results pages, a menu option is offered to allow a user to Tag an image:

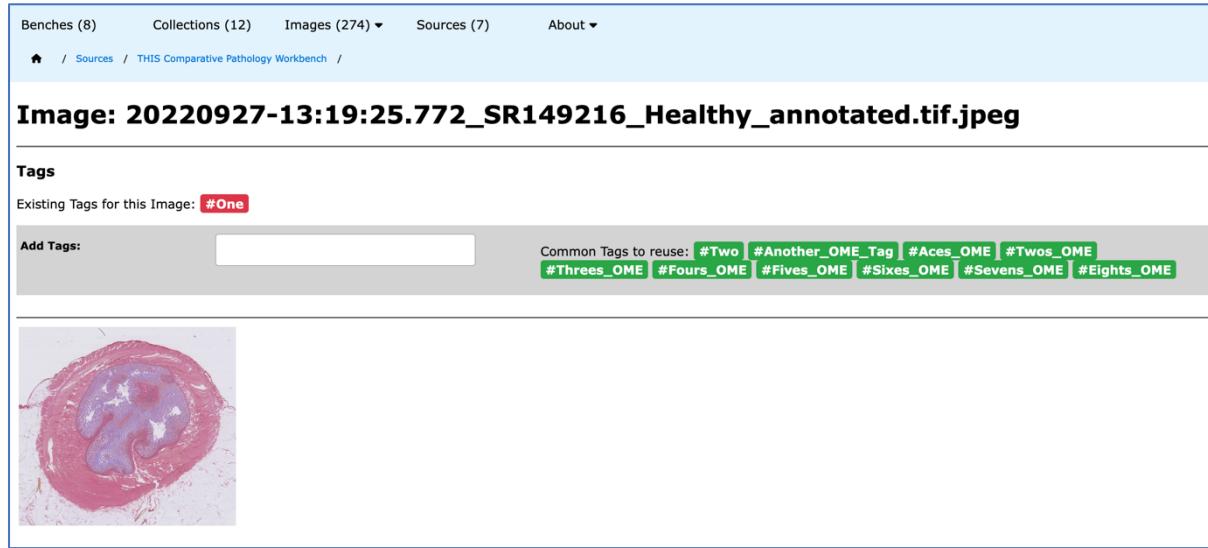


Figure 70 – The Tag Image Page

Users can either remove existing Tags from the Image by clicking on the Red Tag; add a Tag from those already in the CPW, by clicking on the Green Tag; or enter a completely new Tag, by typing it in the Text Box and hitting Enter.

5.8.3 Sharing

Benches and Collections can be shared between Users.

All data is owned by an individual User, and that user can determine who can view or edit their data, be it a Bench or a Collection.

A User can add permissions for other users to view or edit a Bench owned by the User.

A User can add permissions for other users to view a Collection owned by the User.

5.8.3.1 Sharing a Bench

The List Benches page provides a sharing facility for the User to share a Bench

Pressing the “Permissions” option on the Bench drop down menu, displays the Browse Bench Permissions page for that Bench.

Browse Permissions for Bench CPW:000020

Action	Bench	Owner	Permitted	Authority
	CPW:000020	mwicks23	marends	EDITOR
	CPW:000020	mwicks23	rbaldock	EDITOR
	CPW:000020	mwicks23	guest	VIEWER
	CPW:000020	mwicks23	mglinka	EDITOR

+ Add

THE LEONA M. AND HARRY B.
HELMESLEY
CHARITABLE TRUST

HUMAN CELL ATLAS

THE UNIVERSITY of EDINBURGH

HERIOT WATT UNIVERSITY

Chan Zuckerberg Initiative

Human Gut Cell Atlas

Figure 71 – The Browse Bench Permissions page

+ Add

Pressing the green “Plus” icon, allows the User to add new permission for other Users.

The Browse Bench Permissions page allows the CPW user add a new permission via a pop-up dialogue. This pop-up dialogue allows the user to choose a bench from a drop-down list of their collections, a user they wish to grant a permission to from a second drop-down, and an authority level they wish to grant from a third and final drop-down (Viewer or Editor).

The Browse Bench Permissions page for that Bench is updated with a new Permission, specifying the Bench Title and ID, Owner (the User), Permitted (who this permission has been granted to), and to what Authority (“Viewer” or Editor).

Each Bench Permission has a Green “hamburger” icon that displays a menu with options for managing the Bench Permission:

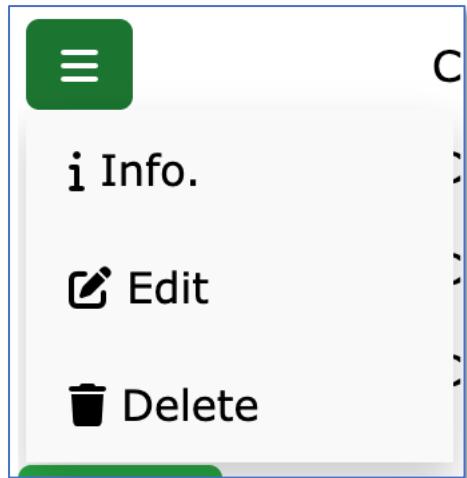


Figure 72 – The Browse Bench Permissions page, Permissions Menu

Here the user can do the following:

- View the Bench Permission Details.
- Edit the Bench Permission Details.
- Delete the Bench Permission.

All the Bench Permissions of the User can be accessed from the User Main Menu option in the Main Header Panel.

5.8.3.2 Sharing a Collection

The List Collections page provides a sharing facility for the User to share a Collection

Pressing the “Permissions” option on the Collection drop down menu, displays the Browse Collection Permissions page for that Collection.

The screenshot shows the CPW interface. At the top, there's a navigation bar with links for Benches (4), Collections (6), Images (25), Sources (7), and About. A search bar and user account information ('mwicks23') are also at the top right. Below the header, the main content area has a title 'Browse Permissions for Collection:000011'. Underneath, a sub-header says 'Browse the list of Permissions for Collection:000011'. A table lists one permission entry:

Action	Collection	Owner	Permitted	Authority
	000011	mwicks23	marends	VIEWER

A green button labeled '+ Add' is located below the table. At the bottom of the page, there are logos for various partners: THE LEONA M. AND HARRY B. HELMSLEY CHARITABLE TRUST, HUMAN CELL ATLAS, THE UNIVERSITY of EDINBURGH, HERIOT WATT UNIVERSITY, Chan Zuckerberg Initiative, and Human Gut Cell Atlas.

Figure 73 – The Browse Collection Permissions page

+ Add

Pressing the green “Plus”, allows the User to add new permission for other Users.

The Browse Collection Permissions page allows the CPW user add a new permission via a pop-up dialogue. This pop-up dialogue allows the user to choose a Collection from a drop-down list of their collections, a user they wish to grant a permission to from a second drop-down, and an authority level they wish to grant from a third and final drop-down (for Collections only the View permission is available).

The Browse Collection Permissions page for that Collection is updated with a new Permission, specifying the Collection Title and ID, Owner (the User), Permitted (who this permission has been granted to), and to what Authority (“Viewer” only for Collections).

Each Collection Permission has a Green “hamburger” icon that displays a menu with options for managing the Collection Permission:

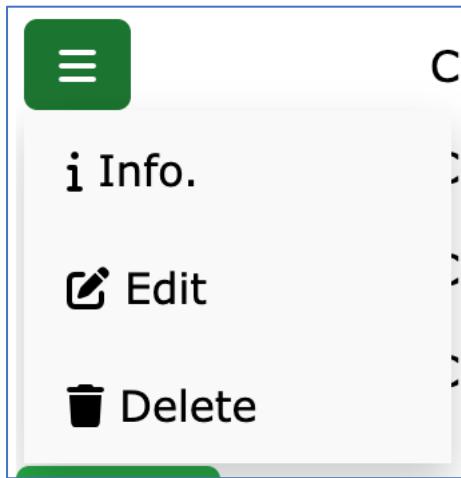


Figure 74 – The Browse Collection Permissions page, Permissions Menu

Here the user can do the following:

- View the Collection Permission Details.
- Edit the Collection Permission Details.
- Delete the Collection Permission.

All the Collection Permissions of the User can be accessed from the User Main Menu option in the Main Header Panel.

5.8.4 Linking Images

In addition to aggregating images into Collections and displaying references to images in Benches, the CPW can also store links between images too.

For example, the following screen shows the relationship between 2 Images, with Image B an annotated version of Image A, as processed by QuPath, the Quantitative Pathology & Bioimage Analysis software (<https://qupath.github.io/>)

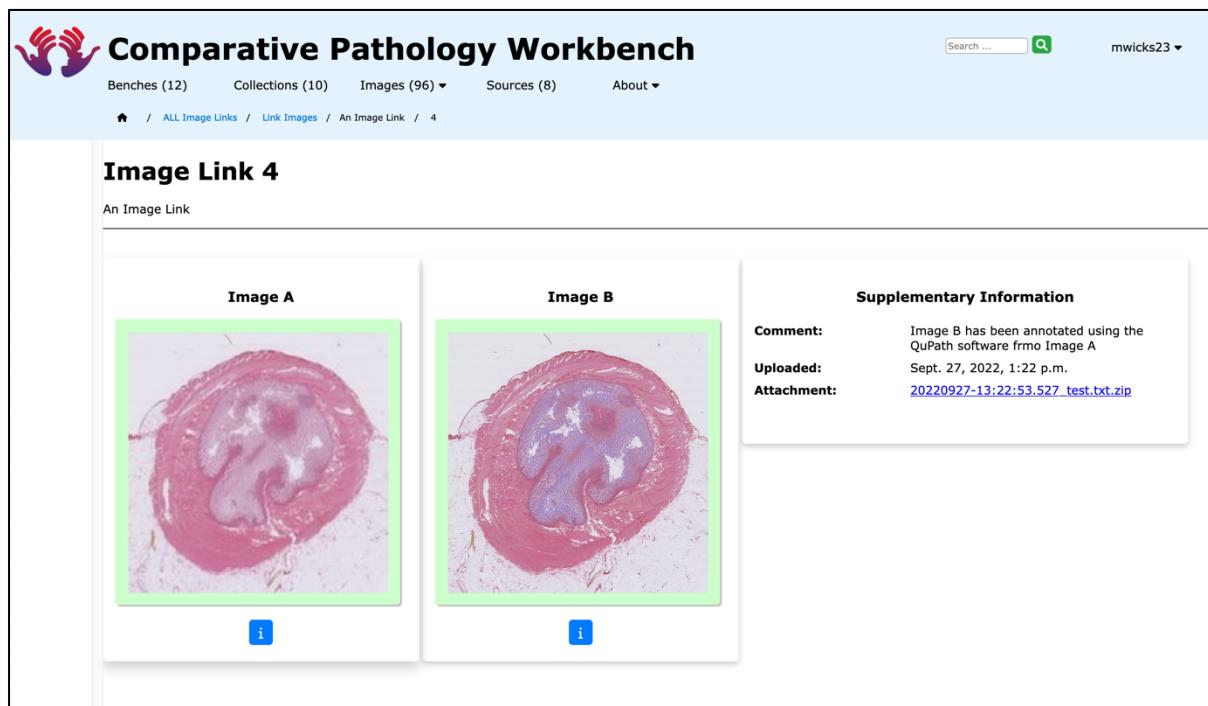


Figure 75 – 2 Linked Images

The Link between 2 images is stored with a comment that justifies the link, a date when the link was made, and a file attachment (a Zipfile), that contains a justification for the link.

All the Images that have been linked can be viewed using the “All Your Image Links” sub-menu option from the “Images” main menu, thus:

The screenshot shows the Comparative Pathology Workbench interface. At the top, there is a navigation bar with links for Benches (12), Collections (10), Images (96), Sources (8), and About. On the right, there is a search bar and a user account icon for mwicks23. Below the navigation bar, the page title is "All YOUR Image Links". A sub-header indicates "You can view 1 Image Links from 10 Collections". The main content area displays a table with two rows of data. The columns are labeled "Action", "Image A", "Image B", "Upload Time", "Attachment", and "Comment". The first row shows two histological images, one labeled "Image A" and one labeled "Image B". The second row shows the same images. The "Upload Time" column for the second row contains the text "Sept. 27, 2022, 1:22 p.m. [20220927-13:22:53.527_test.txt.zip](#)". The "Comment" column for the second row contains the text "Image B has been annotated using the QuPath application".

Figure 76 – A list of all Your Linked Images

Images can be linked using the “Link Images” breadcrumb, which displays the Link Images page, thus:

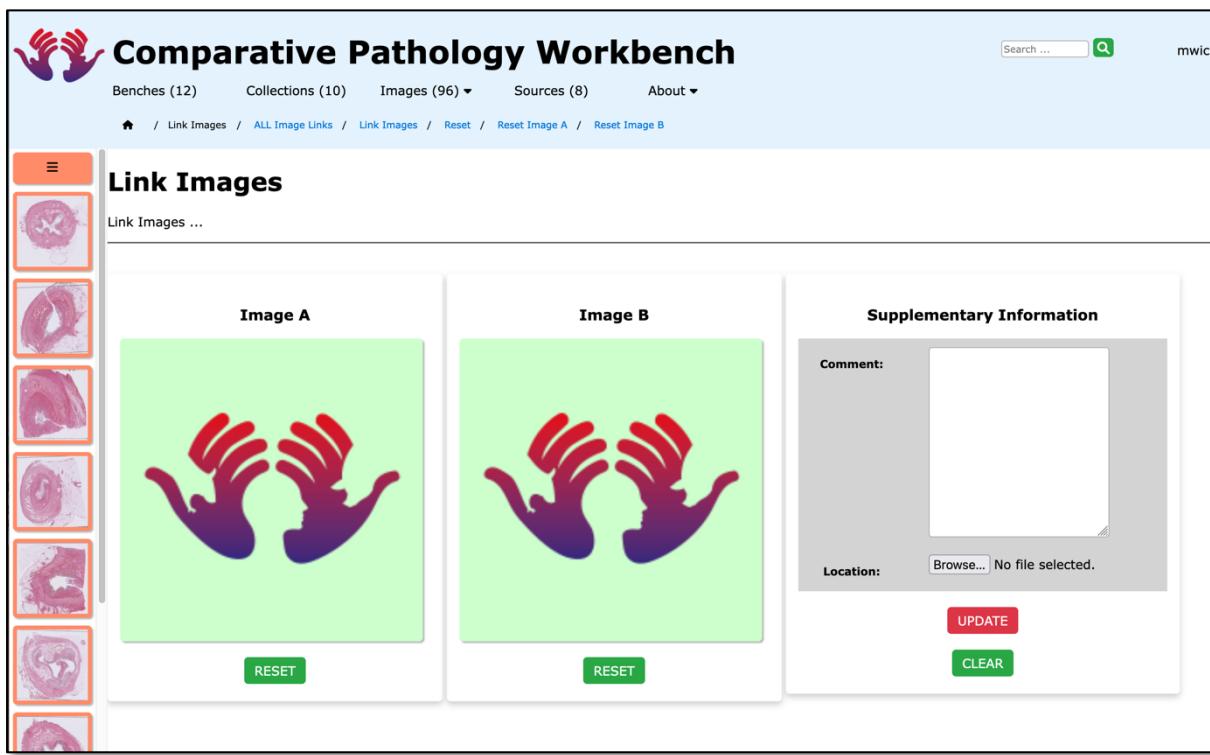


Figure 77 – Link Images

2 Images can be dragged from the Collection on the LHS of the screen, in to Image A or Image B; the user must supply a justification in the Comment Box, and a file must be supplied via the Location button, as a Zipfile.

Typically, the Zipfile may contain a set of files that explain the link between the 2 images. In the case of Figure 52, the Zipfile could contain all of the annotations and scripts that QuPath generated to produce Image B from Image A, for example.

5.8.4.1 Displaying Linked Images

The existence of a linked image is indicated throughout the CPW by the presence of the “Chain” icon:



This is displayed on all Image list pages, such as “View All Collections”, “View Active Collection” and “View Collection”, in the Image drop down Menu as a “Links” menu option, thus:

A screenshot of a CPW image list page. At the top, there are several green buttons for filtering: Action, Name ▲, Ordering, Comment, ROI, Hidden?, Owner, Tag, Source, Collection, and Bench. Below this, a list of images is shown. The first image in the list is highlighted with a gray border. To its left is a vertical menu with the following options: i Image Info., Tag Image, Links (which is selected and highlighted in blue), Edit Image Ordering, View Collection, and View Bench: "CPW:000030". The main details for the image are as follows:

Name:	MVM/Helmsley_CD/CPW_manuscript/SR149216_Healthy_annotated.tiff
Comment:	No Comments
Owner:	mglinka Server: private_user@CompPathUofE ROI: 0
Collection:	000021; "CPW_Manuscript"; (Owned By mglinka)
Bench:	CPW:000030; "CPW_Manuscript"; (Owned By mglinka)
Ordering:	22

Figure 78 – 2 Images that have links associated with them

Clicking on the “Links” menu option takes the user to the “View Image Link” page, in Figure 76.

If an image is referenced in a Bench, then the image title in the cell is replaced with a Chain icon, thus:



Figure 79 – a Linked Image in a Bench Cell

Again, clicking on the Chain icon takes the user to the “View Image Link” page, in Figure 76.

6 A Final Word ...

If there are any omissions and errors in this User Guide, please get in touch!

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