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Bryophyte Digitizing Procedure

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PTBG HERBARIUM

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NTBG Bryophyte Digitizing Procedure

This procedure is intended to standardize high resolution imaging of small (up to 10 x 14 cm) specimens, i.e., specimens that fit into a small envelope or box typically used for herbarium storage of Bryophyte and other small specimens. Considerable effort has been spent to identify the apparatus, equipment, computer, software and ancillary equipment commercially available to produce high quality herbarium specimen images with minimal capital investment yet suitable for imaging (digitizing) large numbers of specimens for digital archiving. The process has been simplified and defined to enable training volunteers with few computer or photographic skills to produce consistent results with. Each part of the system has been selected for long term durability, integration and ease of use to maximize investment. The overall system has been considered to permit use for other applications where high-resolution MACRO photography imaging is needed and allow maximum flexibility of the investment.

This document specifies initiating the camera, computer, and "specimen stage", along with the process to optimize the resulting digitized images for study and identification as well as integration with existing database systems. It concludes with instructions for shutting down the process and stowing equipment for the next session. The procedure covers three parts for the system operator: Initial setup in Section I. Specimen handling, photographing, identification and digitized image file handling procedures in Section II. Section III concludes with system shutdown, working area cleanup, and security.

Apparatus / Equipment:

Camera: CANON Model EOS R5 mirrorless, with Canon RF 100 mm f 2.8 L MACRO IS USM lens.
Copy Stand: Smith Victor CS36K 36" with Light Mounting Kit.
Lighting: (2 each), Lumecube Panel Pro SKU: LC-PANELPRO
Computer System: HP Pavilion All-in-One – 27-d0072 Product # 13Z68AA#ABA
Software: Windows 10 or above OS with Canon EOS Utilities Software for Windows Ver 3.15.0, Canon Digital Photo Professional for Windows Ver 4.16.0

Ancillary Equipment:
Symbol Technologies USB Bar Code Scanner, Model LS2208-SR20007R-UR
*i*Gaging Snap-Check Height Gauge, Model X00211FLXD
USB 3.1 Gen 2 cables as required for Camera to Computer hook-up and lighting power supplies
2 ea. USB C Charger, 25W for Lumecube Panel Pro lights
1 ea. Canon DC Coupler Model DR-E6 for camera
1 ea. AC Power Bar with surge protection and on off switch

Specimen Stage: Custom made, marked "Bryophyte Project", kept in a carboard box ~11 x 17 in. The stage fits on the copy stand, with greyscale card, ruler scale, and removable specimen carrier.

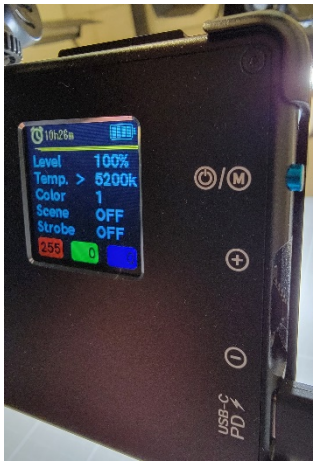
SECTION I – Initial Specimen Digitizing Setup

Retrieve two herbarium storage boxes from the push cart – one marked “Specimens to be digitized” and the other “Completed Specimens”. Place the “Specimens to be Digitized” box on the left side of the larger Copy Stand used for Standard Herbarium Specimens. Working left to right, place the “Completed Specimens” box against the wall to the right of the computer screen.

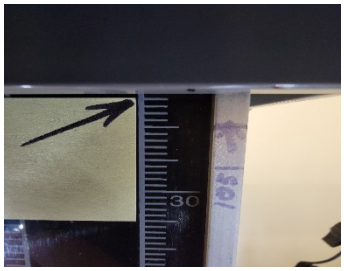




TURN ON the computer (“ON” button on the side of the screen display at lower left). (Login: garden1)



TURN ON the two **Lumecube** lights for the copy stand. Each light array has its own blue push button switch. Push button a second time to set Temp **5200K** using + rocker adjust. **TURN ON** Power Bar behind the copy stand.

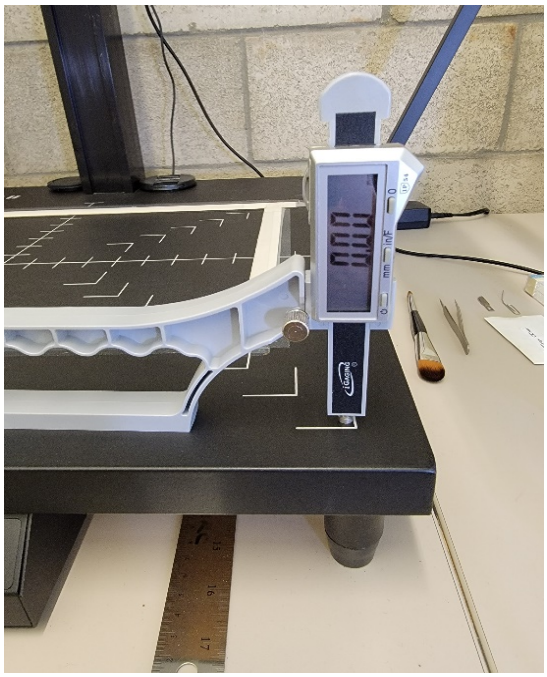




TURN ON the camera using the small [ON/OFF] switch on the camera body facing you. The camera is preset at **32.8 cm** above the copy stand [note scale on copy stand column below camera mount]. On the right side as you face the lens, ensure that the Image Stabilization switch is “**ON**”. After the camera is turned “**ON**”, the EOS utility will display in the upper right corner of the computer screen.

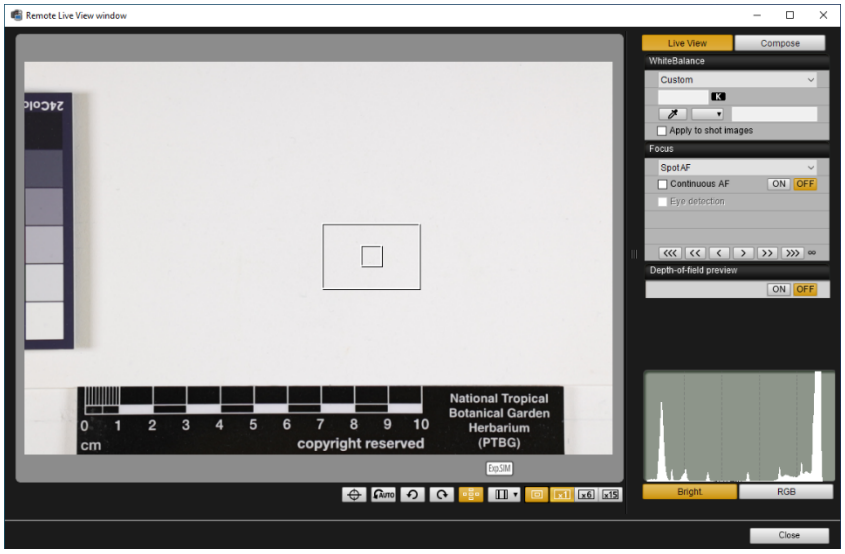
CAMERA SETTINGS in the EOS utility: **Exposure 1/80 second, f 8, ISO 800** as shown below.





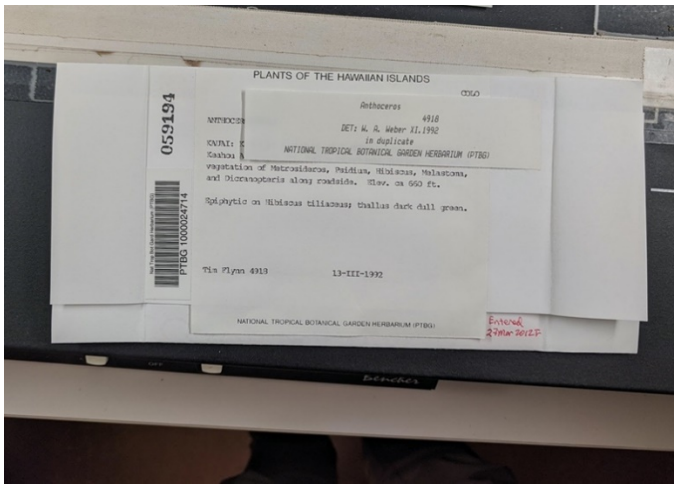
SET UP the "Snap Check/ digital gauge" on the larger copy stand to the left of the computer screen. Turn on digital gauge with button at lower left corner of readout screen. Using button at lower right of readout set it to 0. Last number on right of screen may read 3 or less.
Note: Snap Check/ digital gauge is in the box with the specimen stage.

SET UP THE "STAGE": If the stage is not on the copy stand, take it out of the box and place it on the camera stand table. Position the stage, using the "Live View Shoot" function in the EOS R5 Utility as shown. Focus on scale. Align to the bottom of the NTBG branded scale and the edge of the grayscale row on the color reference card to the left of the frame. Use tape to secure the stage in place.



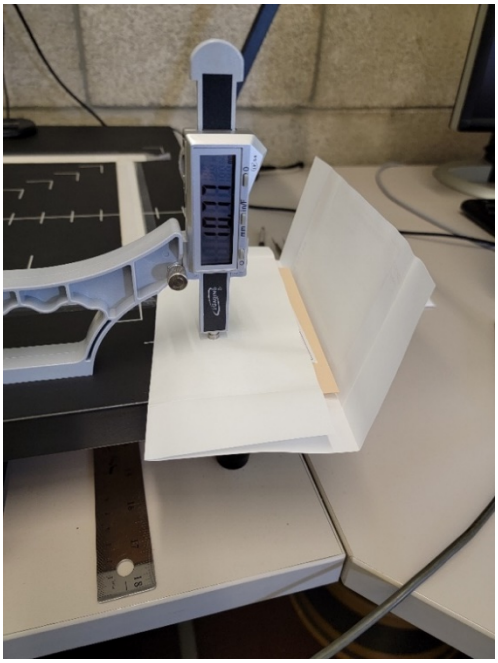
SECTION II – Specimen Digitizing Process

REMOVING THE SPECIMEN: Take the specimen envelope out of the "Specimens to be digitized" box on your left.



Using your index fingers and thumbs, open the flaps on each side of the envelope carefully. Fold the "wings" in to the face of the envelope. Open the label side of the envelope. Lift the flap, ensuring that no additional package encloses the specimen. If so, take the package out to be measured.

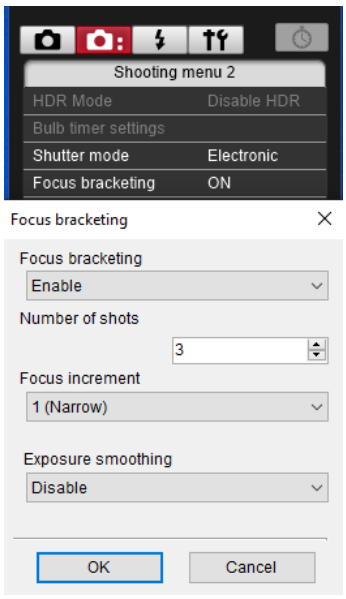
MEASURING SPECIMEN HEIGHT: Turn "ON" (power switch) of the "Snap Check/ digital gauge"]. Confirm it is set to mm – not inches. Lift up the "probe" and measure the height of each specimen at its apparent highest point. **NOTE**: Do not place the gauge directly against the specimen, but rather on the envelope flap covering it.



The gauge measures height to the nearest 1/100th of a millimeter, however, **use only the whole numbers left of the decimal point**. The specimen height determines the number of bracketed exposures needed to ensure the best image. Note the table below. Repeat for each specimen.

FOCUS BRACKETING TABLE	
Specimen Height in mm	**Exposures**
=< 5 mm	2
= 6 – 10 mm	3
= 11 – 15 mm	4
= 16 – 20 mm	6
For greater heights, divide height by 3.6 and round up to the next whole number.	

SET THE NUMBER OF SHOTS NEEDED: Based on the height of the specimen, and the table above, go to the "Shooting Menu 2" [photo on right]. In the "Focus Bracketing Menu"



Verify Focus bracketing **Enable**

Enter **Number of shots** from Focus Bracketing Table

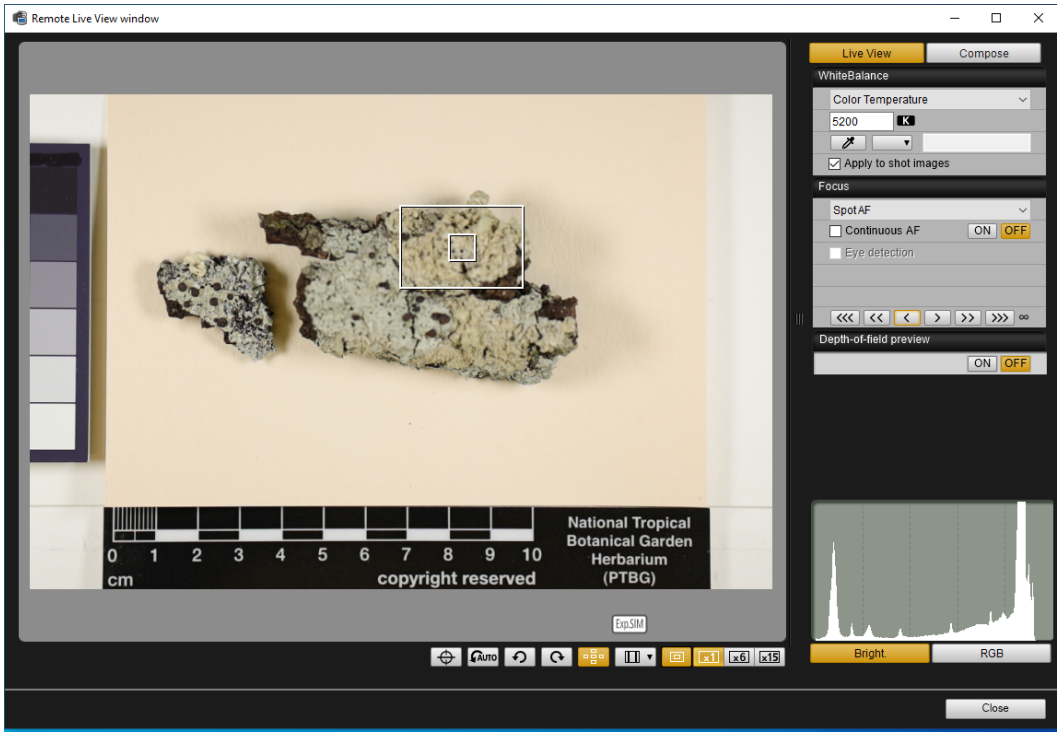
Focus increment **1 (Narrow)**

Exposure smoothing **Disable**

Press "**OK**" to exit the menu.

ENSURE "Live View Shoot" is open in the EOS Utility program to begin the session.
Check that the stage alignment is correct [gray scale at left, ruler scale at bottom].

PLACE THE SPECIMEN on the stage.
Gently remove it from its envelope. Look at specimen to determine where the high point for focus is. Place it on the stage, arranged in the center of the frame to reveal its best aspect. If the specimen is in more than one part, place each piece so that their shadows do not overlap.



Initiating Focus Bracketing

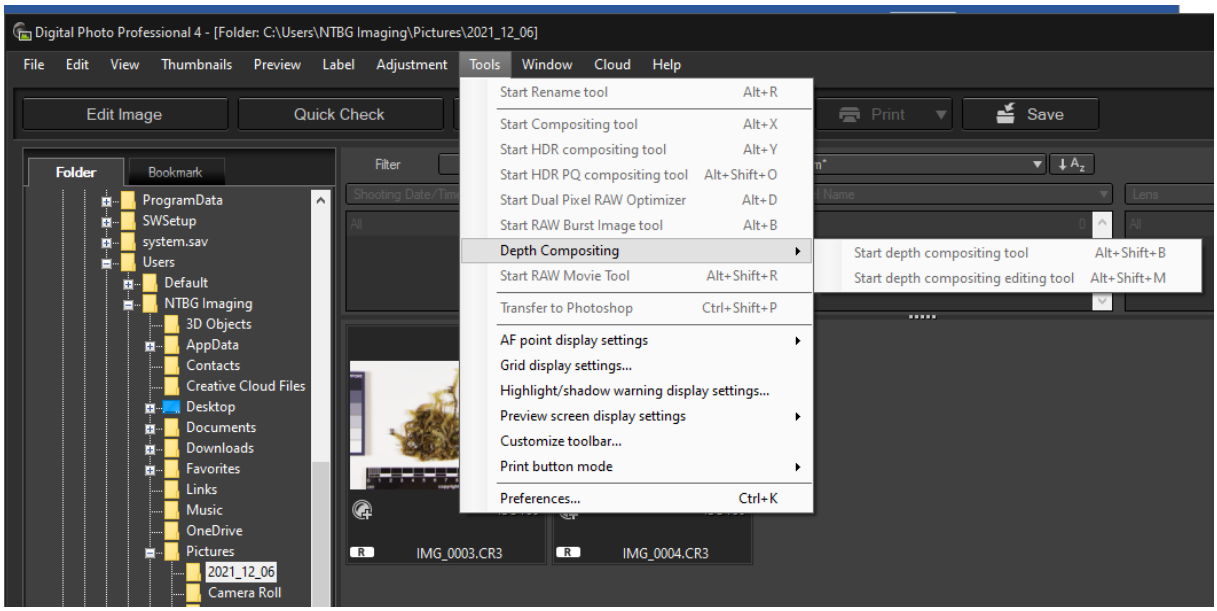
At the computer's home screen, "EOS Utility" and "Live View Shoot" will be open. Using the mouse, move the focus spot on the "Live View Shoot" screen to the highest point on the specimen. Move the cursor over the focus button for autofocus (do not press mouse button). Check the image at X6 magnification to ensure the image is clearly in focus (Fine focus adjustment can be made in the Live View Shoot "Focus" section using **< >** symbols for fine focus if required). Move all hands/ legs away from the table with the camera stand and specimen to decrease vibration and image distortion. Touch the **space bar** gently to take the shot. The green indicator above the shutter button will light briefly. Remain still until the camera has taken all shots.

Note:
Based on the specimen complexity and or size, multiple views may be needed. Again, go through the same procedure as above being sure to identify each new completed digitized image with a different letter when saving. (First image PTBGxxxxxxxx_a, next _b, then _c, …)

DEPTH COMPOSITING of Focus Bracketing Shots:

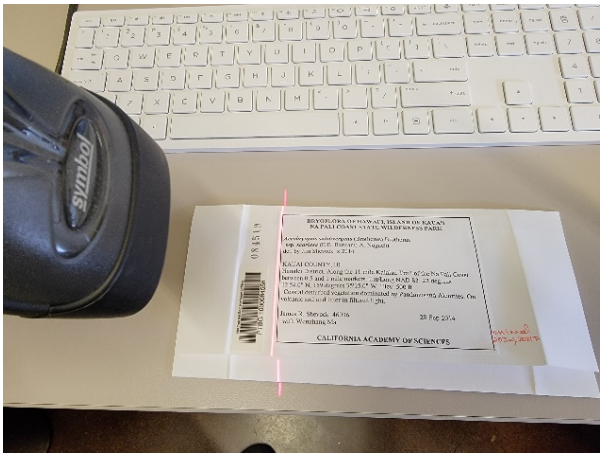
Highlight each shot of the same specimen image from focus bracketing. In the **Tools** dropdown Menu, [DPP4], "Open Depth Compositing" to start the tool (shortcut ALT+SHIFT+B).

Note: Verify that the file will be saved in the correct daily folder [Pictures/ (where today's date is in format yyyy_mm_dd)]. Do not change the menu/output file [the default is .JPG].



Execute "Start Compositing" with the "**ENTER**" key and then "**Y**" at the sub-window. This process will take about 5 seconds for each mage shot using the focus bracketing feature.

After Depth Compositing is complete:



Right click over composited image. Select **Rename** the composited image file using the **bar code reader** adding _a to the file name for the first composited image. For example, "_b" if the last was "_a" or "_c" if the last was "_b".
See the Special Note below if the specimen was previously stamped "**DIGITIZED**".

When all images of the same specimen are complete, put the specimen back into its envelope or box. Close the envelope or box. Use your fingernail to press down on the folded "wings" on each side to better seal the envelope. Set the just digitized specimen in its envelope or box in front of the computer keyboard.



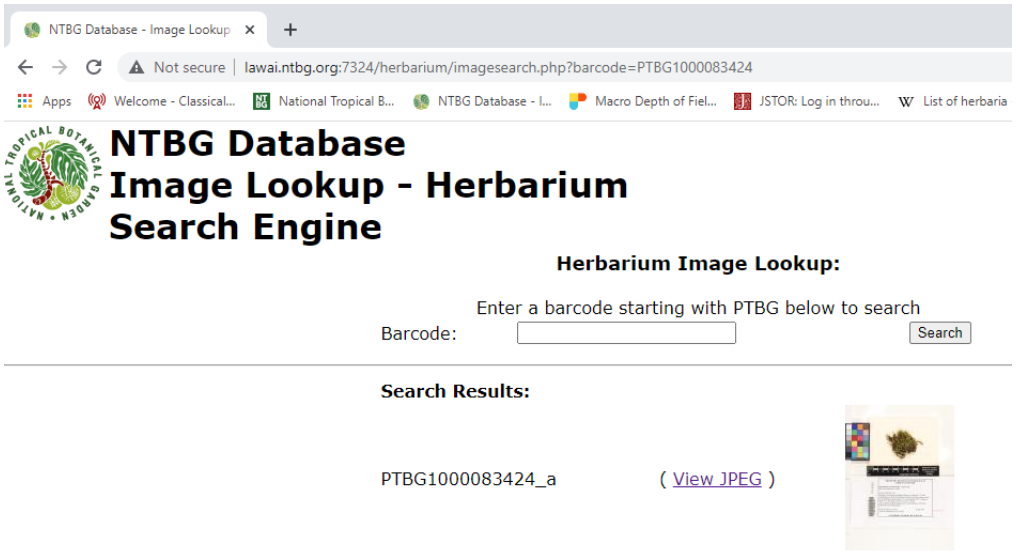
Stamp "**DIGITIZED**" above the bar code on the envelope flap or container and place the specimen in the "Completed Digitizing" box. Ensure that the Sliding Specimen Stage is clean and properly positioned for the next photo.

Additional Specimens:

Take the next specimen from the "To Be Digitized" box. Turn the height gauge back on if needed. Measure the height of the new specimen. Follow the procedure described above in Section II.

Special Note:

If the specimen has been previously digitized, there will be a "Digitized" stamp in red at the top flap of the envelope above the specimen ID tag. Go to the NTBG Herbarium database and confirm its original orientation. In the **Chrome** browser, open the NTBG Database Image Lookup– Herbarium Search Engine. In the search window, scan the image label and search for that specimen. See information on next page below.



Place the specimen in a similar orientation if possible when using “Live View Shoot”. However, you might want to place it in a different orientation to highlight different or more salient characteristics.

In this case save the image with the letter following that in the image database. For example, “_b” if the last was “_a” or “_c” if the last was “_b”, etc.

SECTION III – Concluding the Session:

Digitized File Management

At the end of the digitizing session, go to the "Windows Shortcut Bar" at the bottom of your screen. Pick the "**File Manager**" tool and go to **daily** folder in the **Pictures** folder [today's date] File Menu", change to list view, then sort by file type. Select all .JPG files [they will be listed as [PTBGxxxxxx_x.JPG]. In Windows, click and drag files into "Digitized Completed Shortcut" shown on desktop screen toward the top left corner.

Check to ensure you did not miss any .JPG files in the daily folder. Do not delete any files until you've confirmed that no .JPG files remain. Delete entire folder "the daily folder" with today's date and time by dragging it to the Recycle Bin at lower left of Desktop screen.

Verify File Syntax in Digitized Completed folder

Open "Digitized Completed" folder on Desktop screen and check to see that file syntax is correct for all images, i.e. PTBG all caps, that underscore (_) follows number before letter (_a) and .JPG are all capitol letters. Example: **PTBG1000011111_a.JPG**

Digitizing System Shut Down (in the following order)

CAMERA: Rotate power switch clockwise to **OFF**.

SPECIMEN LIGHTS: Turn **Lumecube** stage lights **OFF**. (Press and hold Blue button)

POWER STRIP: Turn **rocker switch OFF.**

COMPUTER: In the shortcut bar [at the bottom of the Windows screen] select "Windows Function icon" at the left bottom corner. Left click START Menu, select Power, Click Shut down.

Before Exiting Digitizing Room

Place Bryophyte Stage in storage container
Return Specimen Height Gauge to storage location along with stage.
Remove specimen boxes from Digitizing Room.
Clean and organize all work surfaces.
Secure room using glass door lock.
Return key to upstairs location.

Credits:
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