

This workflow was developed at an iDigBio workshop in January 2015. The most recent version is available at <https://github.com/iDigBioWorkflows/FlatSheetsDigitizationWorkflows> and <https://www.idigbio.org/content/workflow-modules-and-task-lists>.

Appendix S4. Module 4: Imaging Station Setup, Light Box

There are three practical image lighting setup options in widespread use in the herbarium community. These are: (1) a copy stand with a light box, (2) copy stand with fluorescent lights, and (3) copy stand with strobe lights. This module is specific to the copy stand with a light box approach and emphasizes the use of the ORTech Photo eBox Bio photographic lighting system. Many herbaria have produced detailed guidelines for setting up and/or using the ORTech Photo eBox Bio. Some examples are the University of Wisconsin (WISC, http://herbarium.wisc.edu/documents/TCN_equipment-Field_setup_manual_Dec15.pdf) and the University of New Hampshire (NHA, <http://vimeo.com/user20813619/review/74466690/886a3c6226>). Option 2 is addressed in Module 2: Imaging Station Setup, Camera/Copy Stand. Strobe lighting is rarely used in herbarium digitization and is not addressed here, although flash lighting is mentioned in Module 3.

Task ID	Task Description	Comments and Explanations	Resources
T1	Select appropriate light box for your needs.	A light box is a photographic lighting device that lights specimens from four sides within an enclosed space to minimize shadows on the specimen. This lighting system is recommended for high-quality image capture.	ORTech Photo eBox Bio photographic lighting system (“NYBG-modified”, Model: 777000). IMPORTANT: Upon ordering, request that the middle feet not be installed. The ORTech camera arm mount is not appropriate for herbarium image photography; a copy stand is required (see T2). Another light box option is the Ortery Photosimile 50 (not easily used with a copy stand; therefore, modifications are required to the top of the box to attach camera).
T2	Select copy stand.	The copy stand (without lights) is	See: iDigBio Imaging

		<p>necessary for stability and adjustable camera height.</p> <p>The copy stand should have (1) continuous adjustment for camera height (as opposed to pre-set heights with a locking clip system), (2) flexible (or extendable) horizontal distance from copy stand arm, and (3) stability on the benchtop.</p>	<p>Equipment Recommendations: https://www.idigbio.org/wiki/images/8/86/IDigBioImagingGeneralEquipmentRecommendations1_0.pdf.</p> <p>Kaiser Copy Stand RS 1 with RT-1 Arm, 40" Counterbalanced Column, 18" x 20" baseboard.</p> <p>Bencher Copy Mate II Tabletop copy stand. This copy stand has a smaller footprint and a shorter arm than the Kaiser, so depending upon your camera and lens, it may not be tall enough to mount camera and capture the entire specimen within the light box.</p> <p>Other copy stands may work well, but are as yet untested by this group, and include OR-Tech CopyStand (42" max camera height) and Beseler CS-21 Digital/Photo & Video Copy Stand, which has a large base and appears to be tall enough.</p> <p>If you have a permanent suitable tabletop (and appropriate carpentry skills), you can purchase ONLY the column and carriage mechanism, and mount these to the table itself (thereby avoiding the possibility of your ebox being bigger than your copy stand base).</p>
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<p>T3</p>	<p>Attach camera to copy stand arm.</p>	<p>Make sure the camera is centered over the opening of the light box. Test with the camera's live-view option on camera and a target on which to focus.</p> <p>Before attaching the camera, it may be necessary to insert the camera's AC adapter and USB cord, as the camera battery compartment and ports may become difficult to access.</p> <p>See Module 3: Imaging Station Setup, Camera/Copy Stand for information on setting up a copy stand with camera.</p>	<p>Refer to Module 2: Selecting Components for an Imaging Station for guidelines on placement of imaging equipment.</p>
<p>T4</p>	<p>Place light box on copy stand.</p>		
<p>T5</p>	<p>Prepare internal platform of light box for herbarium specimen photography.</p>	<p>It is recommend that the imaging surface be covered with a black, light-absorbing material that is easily cleaned of plant debris and resistant to wear and tear (or easily replaceable). The background material can be adhered to the imaging surface with gaffer's tape.</p> <p>Background options include:</p> <ul style="list-style-type: none"> ● Black velvetine paper background ● Black velvet material ● Flat-black poster board <p>For the Photo-e Box Bio, one may want to remove the translucent light-diffusing plastic which covers the platform lights to use as a template for cutting the background paper.</p>	<p>Velvetine Paper Background, 52" x 20' roll, Midnight Black, See for example: http://www.bhphotovideo.com/c/product/45657-REG/Savage_522020_52_x20_Velvetine_Background.html.</p>
<p>T6</p>	<p>Adjust camera height.</p>	<p>Camera height is partially dependent on whether the camera is full frame or crop frame. Height can be calculated using the Focal Length Calculator or visually using the camera's live view feature. Camera height should frame an entire herbarium sheet with minimal extra space around edges of sheet (to eliminate need for later cropping).</p>	<p>Focal Length Calculator: http://www.cambridgeincolor.com/tutorials/camera-lenses.htm.</p>

<p>T7</p>	<p>Place specimen guide in box.</p>	<p>This can be a blank herbarium sheet. Use live-view on camera to position the specimen guide in juxtaposition to the scale and color target. Use gaffer tape to tape herbarium specimen guide to velvetine.</p> <p>Matting material may also be used to create a square corner to guide specimen placement.</p>	<p>Herbarium sheet. Matting material.</p>
<p>T8</p>	<p>Position and affix color standard and scale bar.</p>	<p>These items should be placed along the short edge of the herbarium sheet. They can be placed at the top or bottom edge.</p> <p>Affixing these should be done with care so that they are squared and flat to create quality images.</p>	<p>Gaffer tape or strong double-sided tape. Scale bar. Quarter-sized color standard: http://www.digitaltransitions.com/product/targets/colorgauge-nano-target.</p>
<p>T9</p>	<p>Configure imaging computer and install software.</p>	<p>Install camera control and image editing software, and any custom software or scripts. Create folder structures to facilitate image organization and processing (See Module 7: Image Processing, T1).</p> <p>Connect camera to computer using USB cord, and test that camera is recognized.</p> <p>Configure camera control software and camera settings. Camera settings (e.g., F-stop, color balance) should be chosen to produce an image that will require no or minimal post-processing. Can use information from the color standard to determine proper camera settings. The appearance of an image on a monitor may not be reliable.</p>	<p>See Module 3: Imaging Station Setup, Camera/Copy Stand for more detail about camera settings and control software. Camera control software. Imaging editing software.</p>