

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 S3. Module 3: Imaging Station Setup, Camera/Copy Stand

This module focuses specifically on the use of camera and copy stand without a light box, though it mentions use of a light box several times and will be useful when setting up a camera stand in association with a light box.

Task ID	Task Description	Explanations and Comments	Resources
T1	Review imaging protocol.	<p>Ensures that initial camera setup matches imaging policies and protocols.</p> <p>It should be noted that some of the subsequent tasks included in this module may be included or excluded and re-ordered based on equipment selection and requirements, local conditions, and institutional preference.</p>	<p>Imaging protocol or handbook.</p> <p>Refer to Module 2: Selecting Components for an Imaging Station.</p> <p>See: iDigBio Imaging Equipment Recommendations: <a href="https://www.idigbio.org/wiki/images/8/86/IDigBioImagingGeneralEquipmentRecommendations1_0.pdf">https://www.idigbio.org/wiki/images/8/86/IDigBioImagingGeneralEquipmentRecommendations1_0.pdf</a>.</p>
T2	Change or attach lens to camera.	<p>Lens choice may depend upon subject to be recorded, i.e., herbarium sheet, bryophyte packet, label, or macro morphological feature.</p>	<p>Camera. Selected lenses.</p>
T3	Mount camera on copy stand or light box; connect or ensure connection of computer to camera and to power source via surge protection.	<p>Connection to computer may be via USB, FireWire (IEEE 1394), or other means.</p> <p>Lens may be mounted to camera prior to mounting camera on copy stand.</p>	<p>Camera. Appropriate cables. Surge protection.</p>
T4	Connect remote shutter release or	<p>Allows remote release of the shutter without jarring the camera.</p>	<p>Camera. Wireless or tethered</p>

	wireless shutter release transmitter to camera.	Alternatively, camera shutter may be operated via computer connection (see T3, T9).	camera release.
<b>T5</b>	Set up and turn on studio lighting, light box, light tent, or equivalent and allow time to warm up.	Lighting arrangements vary from enclosed light boxes and light tents to free-standing studio lights or daylight fluorescent tubes on stand-mounted light arms. Some lighting systems require up to 10 minutes to reach full output.  Some institutions use varying lighting systems for varying specimen types (e.g., sheets versus packets), which may determine the precise setup activities accomplished during this task.	Lighting system.
<b>T6</b>	Check, adjust, test flash units, power supplies.	For flash-based systems, ensure that batteries are fully charged and/or power supplies are fully functional.	Flash unit(s). Power supply. Replacement batteries.
<b>T7</b>	Place and/or affix scale and color standard; ensure both are clean, visible in the field of view, and that the colors on the color standard have not faded from their original hue and brightness.	It may be best to have these attached to the copy stand, specimen frame, or base surface of a light box to ensure consistency in their placement relative to specimen images.	Scale. Color standard.
<b>T8</b>	Start camera.		Camera.
<b>T9</b>	Start compatible image acquisition or camera control software.	Most digital cameras used for imaging scientific specimens can be completely controlled by a computer using compatible camera control tethering software, with images recorded immediately onto computer hardware. This is currently the common practice.	Computer. Software.

		An alternative implemented by some institutions is to record images onto the camera's internal memory card, then download the images en masse to the computer.	
<b>T10</b>	Start ancillary image management/processing software.	Image processing software might include: Adobe Lightroom, Adobe Photoshop, Nikon Capture Nx2, Canon Photo Professional, Gimp, etc.	Appropriate software.
<b>T11</b>	Set aperture, shutter speed, ISO, white balance, color temperature, and focus point to desired settings, or load these settings from a previously configured settings file.	<p>For flat sheets and packets, adjusting most of these settings occurs once for each imaging session. Some camera control software is capable of saving these settings to a file that can be reloaded for future, similarly situated shooting sessions. White balance is often set automatically based on camera sensitivity and assessment.</p> <p>The ordering of this task may be dependent upon whether camera settings are adjusted from a computer via camera control software, as assumed here, or manually. If manually, adjustments might be made prior to attaching the camera to the copy stand.</p> <p>Use camera control software to adjust or set white balance to meet the color temperature of the lighting source. Adjustments to white balance are sometimes made following recording of the image via software such as Lightroom.</p>	<p>Camera. Computer. Associated camera control software. Settings file. Adobe Lightroom or equivalent. Digital gray card. Color standard.</p>

		<p>A neutral gray card designed specifically for digital cameras (e.g., the Robin Myers Imaging Digital Gray Card or WhiBal G7 White Balance Reference Gray Card) is inexpensive and helpful in this process.</p> <p>An option used by some institutions is to open a test image in Adobe Lightroom and rest the cursor over the white square in the color standard (affixed in T7) while reading the RGB values, then adjusting the camera, reshooting, and re-testing until all values are in the range <math>240 \pm 3</math> (237–243).</p>	
<b>T12</b>	Adjust or ensure appropriate camera height, lens zoom (if variable focal length lens is used), and specimen framing.	A premeasured camera height is helpful for this step, as is a visually delimited region or positioning mechanism (e.g., black, metal carpenter square) for ensuring appropriate placement of the specimen and associated scale and color standard for imaging.	Camera. Copy stand. Camera lens. Positioning mechanism.
<b>T13</b>	Ensure correct aspect ratio for highest resolution.	This may require recording one or more test exposures and examining the resulting images.	Camera.
<b>T14</b>	Perform initial quality control for image color prior to imaging session.	Options include software examination of color standard in image or human examination of sheet and image with a color-calibrated monitor.	Adobe Lightroom or equivalent. Color standard.