Module 2: Imaging Objects

Module 2D: Imaging Two Dimensional Compressed Fossils

Task ID	Task Name	Explanations and Comments	Resources
T1	Select and retrieve specimens/drawer of specimens from storage location.	Some institutions record images of labels and specimens simultaneously, combining relevant tasks from Module 2B and Module 2D.	● Institutional specimen imaging policy or project guidelines. ● Technician.
T2	Transport selected collection objects to staging area.	Ideally, staging areas should be located adjacent to or in close proximity of its related imaging station. For institutions that maintain two or more permanently configured imaging stations (e.g. microscope vs. camera), this step requires determining the staging area to which the specimens should be transported. This is especially true when the proximity of imaging stations do not allow shared use of a single staging area. For institutions with a single imaging station or staging area, the imaging station should be pre-configured for the selected specimens	● Cart. ● Technician.

		before or immediately following specimen transport. It is often most efficient to image specimens of approximately uniform size and shape together, to avoid constant adjustment of the imaging station.	
T3	Find specimens in drawer.	In some workflow implementations, T3 precedes T2. Institutional strategies vary. In some instances, specimens are ordered by size to optimize imaging efficiency by reducing or eliminating frequent lens changes and copy stand and lighting adjustments. In other instances, specimens are selected by taxonomic group. Decisions to be made include: ● whether to image multiple or single specimens from a single lot, ● determining the best quality specimen for exemplar images, ● determining the size(s) of	Institutionally or project (e.g., grant, research request, etc.) specific guidelines governing specimen selection criteria.

		specimens to image from a single lot (e.g., smallest, largest, average, representatives of several size classes, etc.), ● whether to include several specimens from varying lots in a single composite image.	
T4	Set up camera/imaging station (may need to be set up each time and disassembled for security reasons, etc.).	Attach appropriate lens. The imaging station can then be configured for whatever size/type of fossils you have chosen in T3 in preparation for iterating through T4-T11.	
T5	Clean specimen (if needed).	Might Include cleaning dust/hairs off of specimens.	Methods of cleaning: ● Compressed air. Caution: this method is specimen dependent and should be used only for sturdy specimens. Compressed air can destroy or seriously damage fragile specimens. ● Air puffer with soft brush. ● Soft bristle paint brush. ● Toothbrush.

			Electric, ultrasonic, or manual toothbrushes can be used, depending on the lithology and fragility of the specimen. ● Water (Caution: water may be used for certain prep types and not suitable for many types of specimens).
T6	Position specimen and insert fade-resistant color checker, white/black points, and scale into imaging frame, as needed. Calibrate to digital grey card, as needed (this task may occur and/or be checked periodically for accuracy).	Strategies vary. Some institutions limit image composition to specimen only, others include some or all associated labels within the image. The parameters listed here apply to both strategies. T5-T11 constitute an iterative process, often including sub-iterative processes for accommodating the capture of multiple standard views (e.g., anterior, posterior, lateral, dorsal, etc.) or multiple images of a single view in preparation for a	References to specific color checkers include: http://store.rmimaging.com/digitalgraycard-100.aspx http://www.munsellstore.com/default.aspx/MenuItemID/499/MenuGroup/Home.htm http://www.amazon.com/CameraTrax-24ColorCard-2x3-White-Balance-Guidebook/dp/B004QXU8VI/ref=sr_1_3?ie=UTF8&qid=1342555441&sr=8-3&keywords=macbeth+color+checker http://www.bhphotovideo.com/c/product/286652-

		subsequent focus stacking workflow. For example, a complete tray or several trays of specimens might be imaged prior to commencing with T14. Views to be imaged vary by organism and fossil type and should be reflected in institutional policies or documentation. It may also be necessary to place labels/tags into the imaging frame for identification and numbering purposes.	REG/QP_Card_GQP201.html http://www.bhphotovideo.com/c/product/26662-REG/Kodak_1527654_Color_Separation_Guide_and.html http://www.imagescienceassociates.com/mm5/merchant.mvc?Screen=PROD&Store_Code=ISA001&Product_Code=CGNT&Category_Code=TARGETS
T7	Maintain the association between specimen and labels.	This step is a cautionary reminder to ensure that specimens do not become separated from their labels, and that labels from one specimen are not inadvertently intermingled with those of another.	
T8	Manipulate specimen or equipment to enhance contrast.	Some compression fossils are coated with ethanol to increase visibility of fine details.	• Ethanol. • Xylene. • Linear polarizing film for light source. • Circular

		Screen light source with polarizing, green, or other films.	polarizing filter for camera lens. ● Using polarized light: https://www.idigbio.org/wiki/images/0/02/PMayer-Polarizedlight.pdf
T9	Adjust hardware and software.	This step usually applies to a batch of images of similar collection objects and may be periodically repeated. Select metadata pre-set profile for the batch of specimens to be imaged. Adjust viewfinder, camera/lens position to previously determined calibration, or live view to fill frame when using camera. Adjustments might include: ● exposure, ● camera height, ● shooting mode, ● focus method, ● focus, ● aperture setting, ● zoom intensity. Using cameras and camera control software that support live view from a computer can negate	Potential software includes: ● Canon Digital Photo Professional, ● Breeze Systems DSLR Remote Pro for Canon, ● Breeze Systems DSLR NKRemote for Nikon, ● Nikon Camera Control Pro 2.

		having to handle the camera itself. Tethered cameras with camera control software can streamline transfer of image to computer or other storage media.	
T10	Initial quality control and test image(s). Retake images as necessary.	At this stage, the imaging technician performs a visual check of ● focus, ● positioning, ● exposure, ● correct file name, ● image destination (computer folder).	
T11	Record image(s).	Naming image files can be accomplished through varying methods. Options range from hand keying filenames as images are made, scanning barcode values into renaming applications, using voice recognition to capture names, etc. Filenames can be cryptic and lack discernible meaning, however, many institutions prefer to use meaningful values within the name. For example, some institutions include the catalog	Institutional policy governing the naming of image files, including guidelines for naming series of files depicting varying views of a single collection object. A variety of imaging workflow software is available for managing pre-sets, file naming, metadata capture, etc. Adobe Lightroom is a popular solution for these workflows, as are proprietary Canon and Nikon software and the open source GIMP.

		number, an indication of magnification, view angle (dorsal, ventral, lateral, etc.), and sequence numbers for multiple images of a single collection object, all of which are persistent values that maintain a static relationship to content of the image over time. Voice Recognition Software procedures include: ● write to a spreadsheet for correlating image file names to catalog numbers, ● speak ”save as” command to insert the catalog number as the image file name. Some institutions use presets in Lightroom to adjust levels, contrast, etc. as images are recorded.	Voice recognition software might include: ● Dragon Naturally Speaking, ● Windows Speech Recognition.
T12	Potentially capture additional image metadata, to include EXIF, IPTC data.	Some image metadata (e.g., Audubon Core, camera adjustment such as sharpening, stacking, stacking software, human post-processing, etc.) is better captured	iDigBio’s Imaging Recommendations: https://www.idigbio.org/content/idigbio-image-file-format-requirements-and-recommendations. Audubon Core

		pre-imaging, as noted in T9, rather than post-imaging.	Vocabularies: http://vocabularies.gbif.org/node/126782.
T13	Re-shelve specimens.	Strict and well-defined rules governing re-shelving should be provided to technicians, and technicians charged with re-shelving should be carefully selected. Insert tag/label indicating that specimen or drawer has been imaged.	Cart.
T14	Archive images (temporary or permanent).	See Module 2E for additional image processing steps.	