Camera Setup and Software

- Cameras
- Lenses
- Lighting
- Other equipment and accessories
- Software

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ImageID Studio general setup

• Designated room for imaging
  • Minimizes disruptions, traffic, and movements
• 2 Cameras
• Camera Lift with programmed movements to create image stacks
• Camera tethered to PC with CaptureOne, all actions and controls performed on PC
• 18% grey stages used as background
• Different Diffusers depending on situation
Cameras and Lenses to cover a wide range
Canon 5DS – full frame sensor camera

- High MP camera (50.6MP) capable of taking very detailed, high-resolution images
- Full frame cameras generally provides bigger and better pixels than smaller sensor cameras
- For larger specimens or anything ranging from a few inches, down to ~2mm
- General camera settings
  - 1/125-1/160 second, 100 ISO, f4, f5.6, f8.
  - Lighting and diffusion as needed
Lenses for Canon 5DS – full frame sensor camera

- 65mm MPE Macro f2.8 1x-5x
  - Considered a Macro Gold standard lens
  - Extremely sharp and versatile
  - 1:1 and anywhere between 5:1 magnification
  - Great for highly detailed close ups of body parts or small specimens
Images taken using the Canon 65mm MPE Macro f2.8 1x-5x, and the Canon 5DS
Agonosoma trilineatum (Scutelleridae) Photo by L. Seastone
Lenses for Canon 5DS – full frame sensor camera

- Canon EF 100mm Macro f2.8 L
  - Considered another Macro Gold standard lens
  - Extremely sharp and versatile
  - Down to 1:1 magnification, up to infinity
  - Great for specimens that are generally a couple inches or larger
  - Can take much more zoomed out compositions
• *Strategus oblongus* at 1:1 on the Canon 100mm Macro f2.8 L, and the Canon 5DS
Canon 100mm Macro f2.8 L, and the Canon 5DS
Canon 7D mkii – microscope APS-C “crop” sensor camera

• 20.2MP crop frame sensor camera
• Smaller sensor size cameras can be great for macro/ultra macro photography
  • Subject appears to be ~1.5x closer with APS-C sensors
  • Pixel density is greater, so high magnification can appear to have more resolution
• Used when ultra high magnification of 5x, 10x, or 20x is needed
• For smaller specimens, closeups, or anything ranging from ≤2mm
• Extension tube with thread adapter to accept Microscope objectives
• General camera settings
  • 1/125-1/160 second, 100 ISO, wide open Iris at base of tube.
  • Lighting and diffusion as needed
Lenses for Canon 7D mkii – APS-C sensor camera

• Extension tube with Microscope objective thread adapter

• Mitutoyo Microscope objectives
  • 5x, 10x, 20x MPlan APO

• Higher mag. = less DOF = more images in stack
Mplan 5x and 10x, and the Canon 7Dmkii
Mplan 5x and 10x, and the Canon 7Dmkii
Recap: Which camera for what situation? And why?

- Smaller specimens or extreme close-ups- ranging from ~2mm or smaller
- When 5x, 10x or 20x magnification is needed
- APS-C often provides higher pixel density for ultra macro
- Microscope camera is setup and mounted to camera. We switch whole camera systems easily when needed

- Can handle nearly any size specimen with proper lens selection
- Specimens between 1x-5x magnification with 65mm MPE lens
- Specimens needing 1x magnification or less, use 100mm L lens
- Our main workhorse camera. Meets our needs 90% of the time
• Photography is all about Light!
• Diffused and balanced light is pleasing to the eye
  • Avoid hot spots and too direct of light
  • Single and double diffusion
• Proper light shows dimension and structure of the subject
• Proper light drastically improves the camera’s ability to take crisp sharp images and can reduce noise in the image
Lighting equipment

• (2) Interfit S1 Studio flashes
  • Steady 5700K color temperature
  • AC and DC power
  • TTL & HSS (nice to have, but not needed for most studio entomology work)
  • 500W output
  • 3 second recycle time at max power

• Interfit Wireless Remote Trigger
  • On camera - PC sends signal to trigger shutter and flashes

• (2) Manfrotto friction arms with clamps.
  • Secured to table to position lights
With minimal budget what do you suggest?

• Camera
  • DSLR or Mirrorless with at least ~18MP
  • Mirrorless - endless lens possibilities
• Lens
  • Extension Tubes
  • Single reverse lens setup
  • Dedicated macro lens
  • Tube lens with microscope obj.
• Lights
  • 2 speedlights and a trigger
  • Lightbox
• Macro Rail
  • Manual movement macro rail
  • StackShot Macro Rail package
• Stacking software or PS

http://extreme-macro.co.uk/coupled-reverse-lens/
https://expertphotography.com/macro-photography-on-a-budget/
Diffusing light

• Proper light diffusion is key for a nicely lit and balanced exposure

• Types of diffusers
  • Transmission
    • Paper lantern
    • Velum paper
    • Velum paper wrapped in kimwipes
    • Liquid, such water or ethanol

• Reflection
  • Bounce lighting or using umbrellas
Choosing a background

- Gray, Black, or White
- Why do we like Middle Gray/18% Gray???
  - 18% gray is the mean light reflectance of colors and light, for a proper camera exposure
  - Easy to get a good White Balance
  - Easy on the eyes
  - Separates specimen and small details from background nicely
  - Works well for wide varieties of colors and specimens
  - Professional style for documenting specimens
  - Provides some reflective diffusion but does not “spill over” colors or excess light very easily
Software we use

- CaptureOne – Image processing software
  - Allows live view of camera and live tethered capture. Perfect for our type of work and output we desire

- Camlift – (discontinued)
  - Step sizes with known lenses and apertures allows precise movement and overlap

- Zerene Stacker
  - Helicon is comparable, both work well
  - Photoshop can be used for stacking as well

- Photoshop
  - Final edits and sizing
Imaging with dissecting or compound scopes vs SLR cameras

• Pros
  • Common equipment among labs
  • High magnification capabilities
  • Stacking images can still be done
  • Many scopes can adapt SLR cameras on top of the microscope

• Cons
  • Cannot manage or control light as much as studio photography
  • Light diffusion can be more difficult
  • Colors and structure can be harder to illustrate
  • Microscope cameras generally are not very high resolution (MP), and have smaller sensor sizes
Post process editing

- Processing images for stacking
- RAW or JPEG?
- Stacking images and retouching
- Touchups in Photoshop after a stacked image
- File sizes and optimization

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Processing your images

- Export images from software (or transfer from SD card) to send over for stacking
- Do you shoot RAW or JPEG? What is a RAW file?
- Things to consider:
  - Do you have lots of hard drive space to manage many large RAW files?
  - Do you need to shoot RAW? – maybe. With our workflow, output, and equipment we don’t
  - RAW images are an amazing tool, but do you need them in your situation?
  - How much time do you want to spend editing images?

- We shoot in Extra Fine JPEG then process them into TIFFs (in CaptureOne) for stacking
- Get the lighting and exposure right the first time!
Post-Processing: Stacking & Retouching

• Select all images that have a portion in focus.
  • Top to bottom of spec. (or designated area of focus e.g. Antennae and Head)

• Sync white balance for all, if AWB was used

• Bring images into stacking software to stacking
  • Zerene can create smaller stacks within the main stack, for retouching
  • Individual frames can also be used for retouching
  • Retouching brush can selectively retouch darker or lighter tones, to help match layers better
Creating substacks in ZereneStacker – Retouching to fix Translucent foreground affect
Cleaning up and Optimizing in Photoshop

• Clone and Heal tool
  • Remove dust and streaks

• Levels
  • adjust tonal range by adjusting midtones, blacks, and whites

• Sharpening: Filter>Sharpen>Unsharp Mask

• Sizing: Image>Image Size
  • Sizing image down if needed, so 100% view is sharp
  • Custom Resolution or Dimensions
  • Can also save your own Sizing Presets
Image Resolution and dimensions (pixels) vs File Size (megabytes)

• The more pixels per amount of area, the higher resolution an image is. Pixel density is resolution.

• The larger the image file size (eg 8.7MB), the more space is needed for storage

• Reducing image size in pixels makes the image size at full scale, smaller on monitors and in print

• Reducing image file size in MB reduces the storage space and the details and sharpness - especially when blown up, like large prints or large screens

Good read on this topic: http://digicameras.weebly.com/the-difference-between-megapixels-and-megabytes.html
Optimization: File types and size considerations

- Our stacked TIFFs are our original copies! Save as JPEG to make new copies and backups
- **Always** keep your original images!
- For Web?
  - Consider dimensions – compression
  - MB size - loading of image
- Publication or Online database?
  - May want full size, depending what the Journal or source requires
  - Consider what file type they want. PNG, JPEG, TIFF?
- Naming files so there is adequate information, but not too long to cause issues in transferring files
  - Acanthoscelides rhynchosiestes_SI_holo_PL_latscale
- Avoid punctuation in file names
Thank you so much for coming!

- Time for Q & A!
  - Please, let us know what questions you have!

- Please fill out the questionnaire when leaving the webinar.
- Thank you!!