Camera Setup and Software

-Cameras

-Lenses

-Lighting

-Other equipment and accessories

-Software

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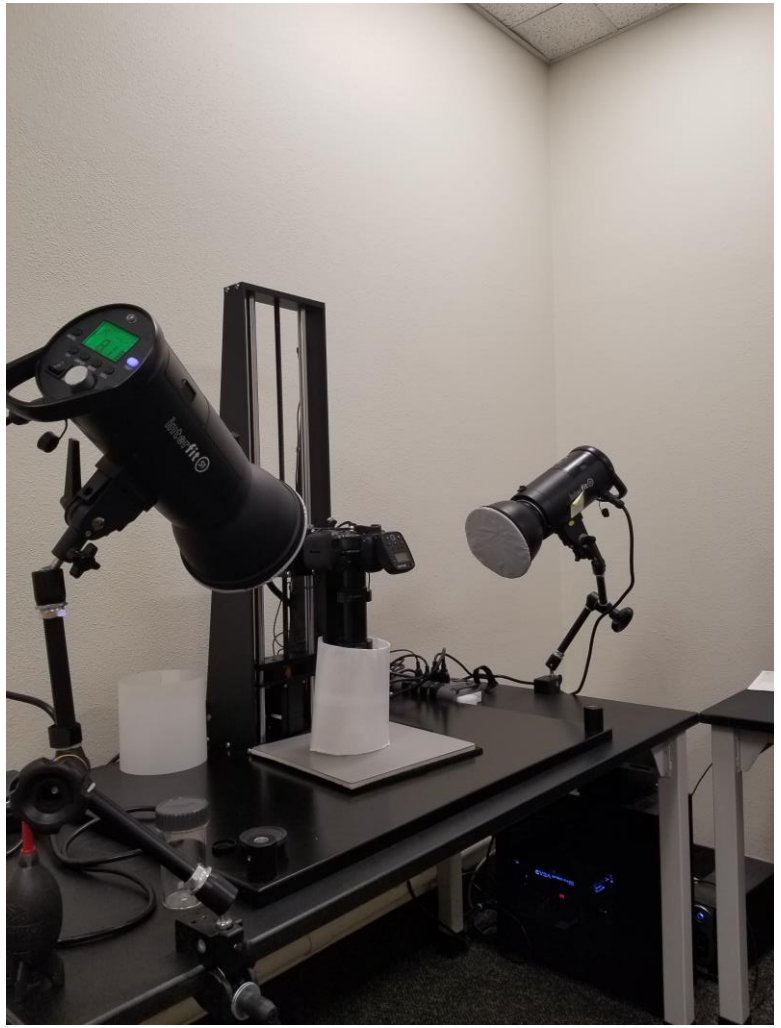
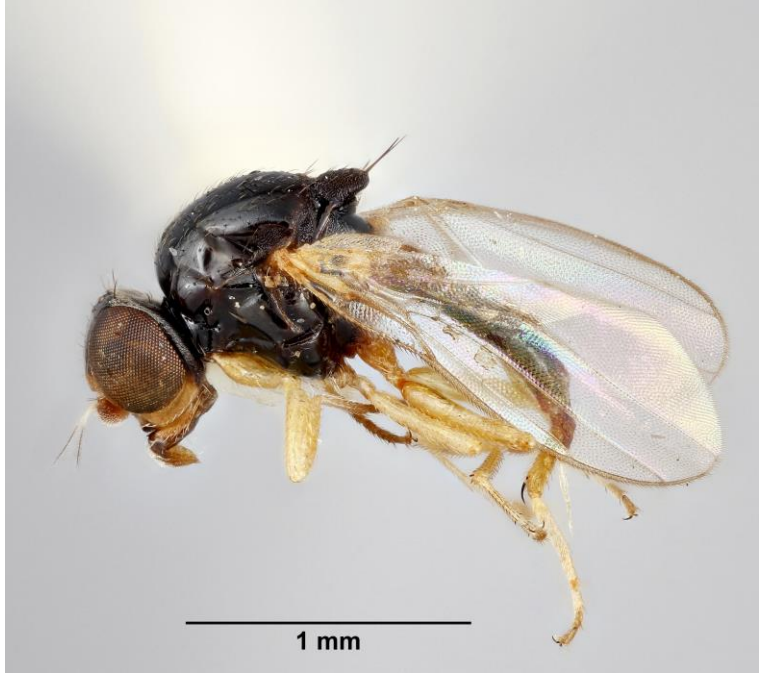
ImageID Studio general setup

- 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

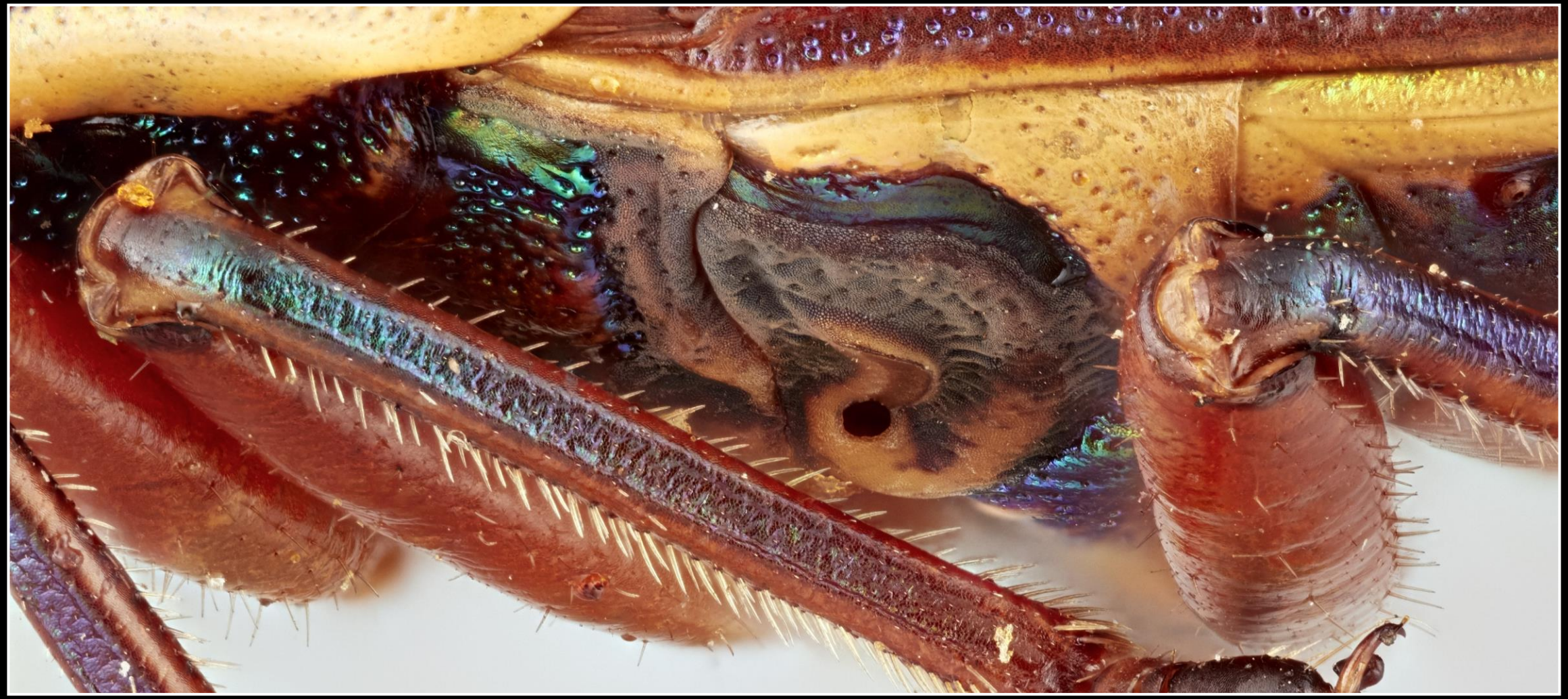
- High MP camera (50.6MP) capable of taking very detailed, high-resolution images
- Full frame cameras generally provides bigger and better pixels than smaller sensor cameras
- For larger specimens or anything ranging from a few inches, down to ~2mm
- General camera settings
  - 1/125-1/160 second, 100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

Euglossa viridissima (Apidae)

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 w/ 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 10x, and the Canon 7Dmkii

Mplan 5x and 10x, and the Canon 7Dmkii

Mplan 5x and 10x, and the Canon 7Dmkii

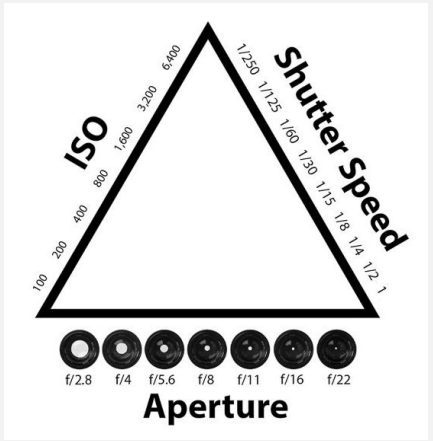
Recap: Which camera for what situation? And why?

- Smaller specimens or extreme close-ups- ranging from ~2mm or smaller
- When 5x, 10x or 20x magnification is needed

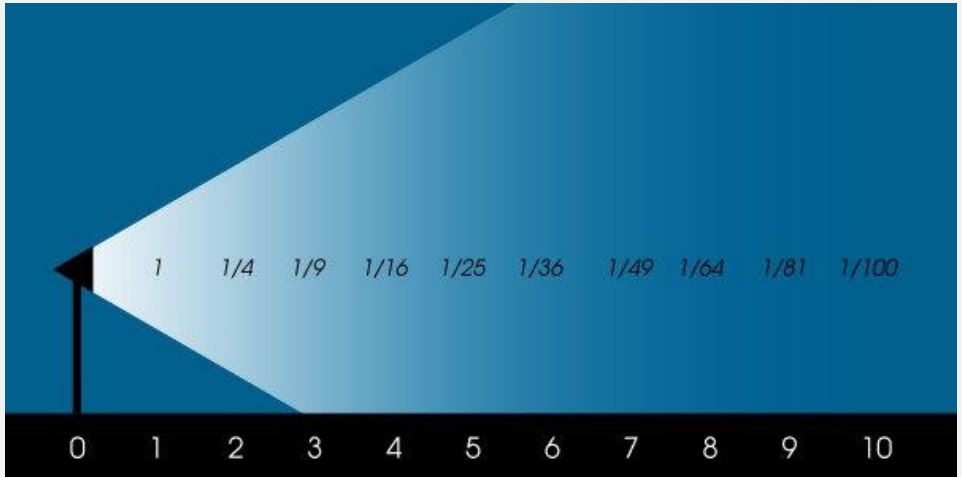
- APS-C often provides higher pixel density for ultra macro
- Microscope camera is setup and mounted to camera. We switch whole camera systems easily when needed

- 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 work-horse camera. Meets our needs 90% of the time



The Importance of Light!



- 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

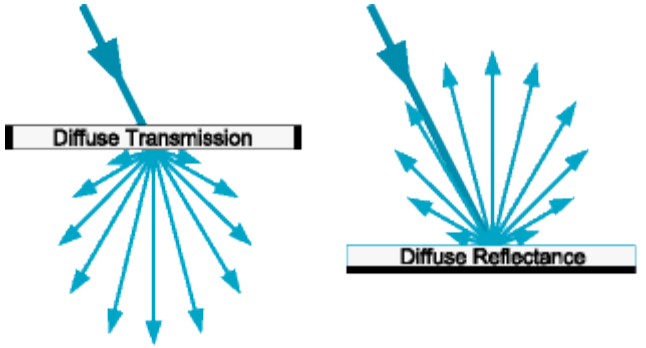
http://extreme-macro.co.uk/coupled-reverse-lens/
https://expertphotography.com/macro-photography-on-a-budget/

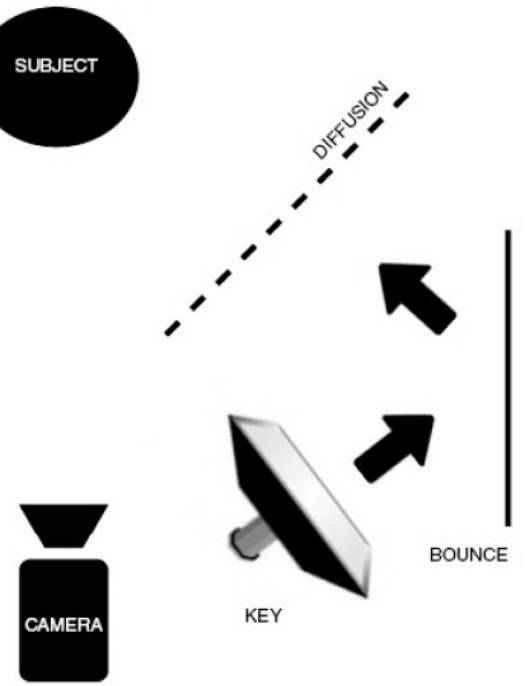
Diffusing light

- 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

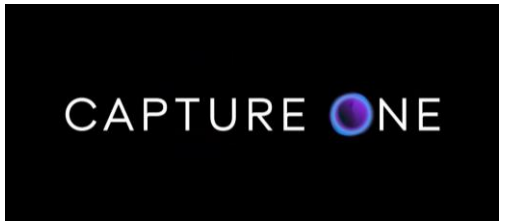




Choosing a background

- 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

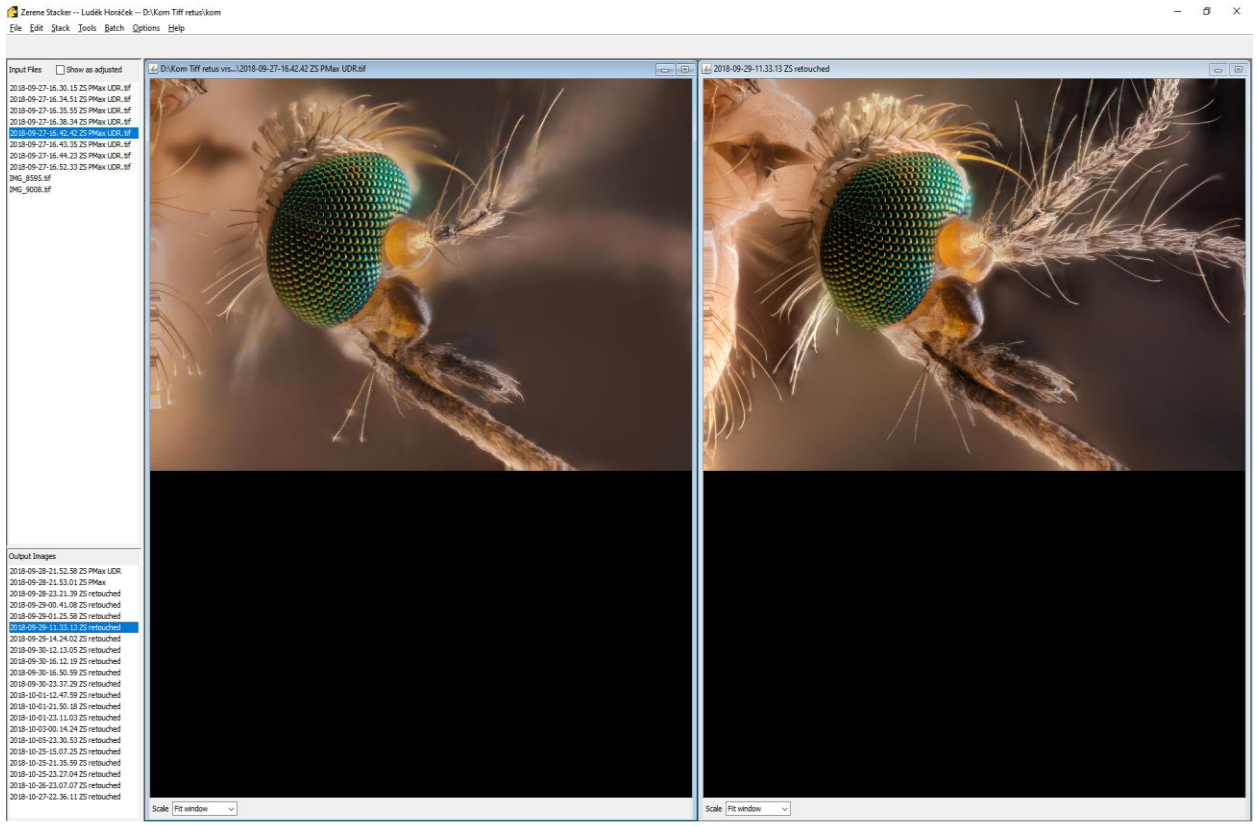
- Export images from software (or transfer from SD card) to send over for stacking
- Do you shoot RAW or JPEG? What is a RAW file?
- Things to consider:
  - Do you have lots of hard drive space to manage many large RAW files?
  - Do you need to shoot RAW? – maybe. With our workflow, output, and equipment 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!

https://www.picture-power.com/images/xJPEGFloweCollage.jpg.pagespeed.ic.Btm1xUOVG6.jpg

Post-Processing: Stacking & Retouching

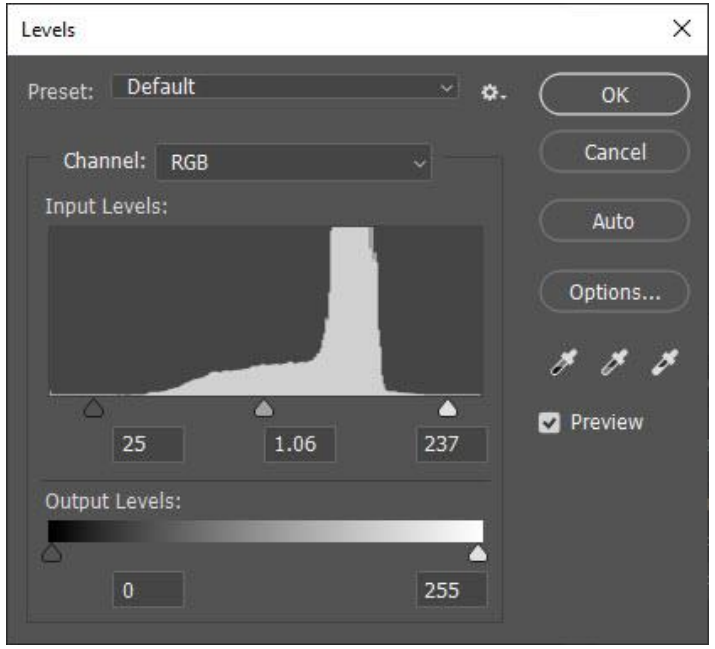
- Select all images that have a portion in focus.
  - Top to bottom of spec. (or designated area of focus e.g. Antennae and Head)
- Sync white balance for all, if AWB was used
- Bring images into stacking software to stacking
  - Zerene can create smaller stacks within the main stack, for retouching
  - Individual frames can also be used for retouching
  - Retouching brush can selectively retouch darker or lighter tones, to help match layers better

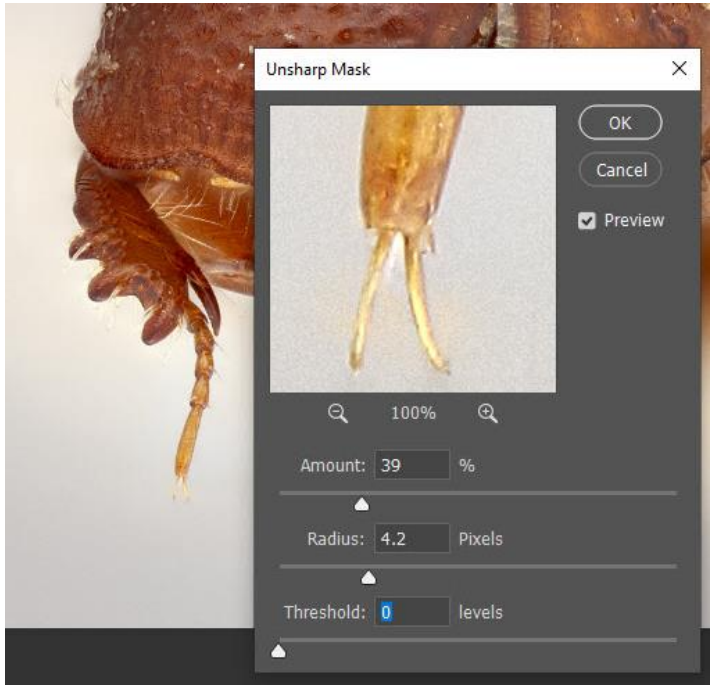


https://12in.cz/temp/zs_kom/zs_kom_17.jpg

Creating substacks in ZereneStacker – Retouching to fix Translucent foreground affect

Cleaning up and Optimizing in Photoshop

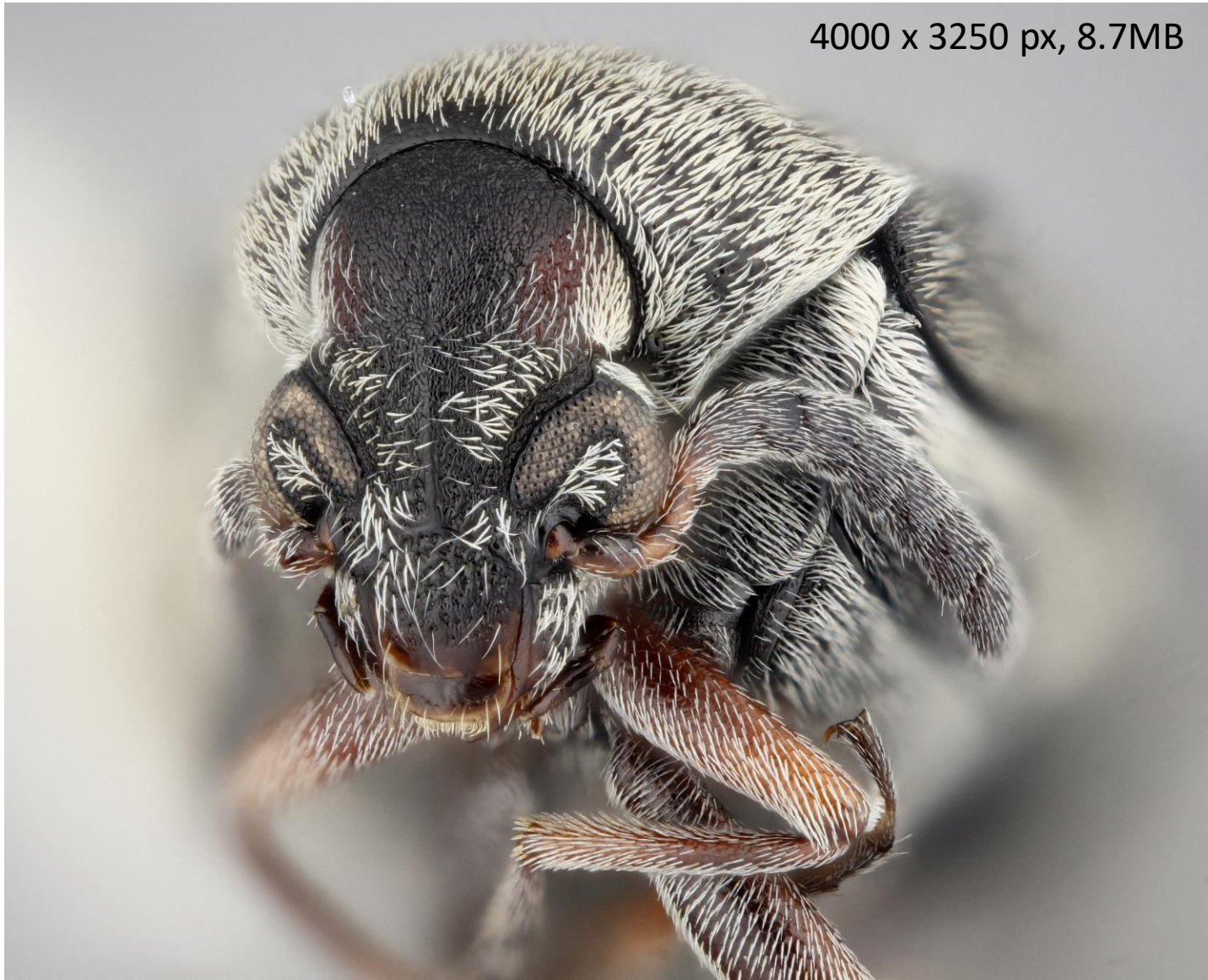




- Clone and Heal tool
  - Remove dust and streaks
- Levels
  - adjust tonal range by adjusting midtones, blacks, and whites
- Sharpening: Filter> Sharpen>Unsharp Mask
- Sizing: Image>Image Size
  - Sizing image down if needed, so 100% view is sharp
  - Custom Resolution or Dimensions
  - Can also save 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 punctation 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!!