

# Imaging Strategies, Tools & Software

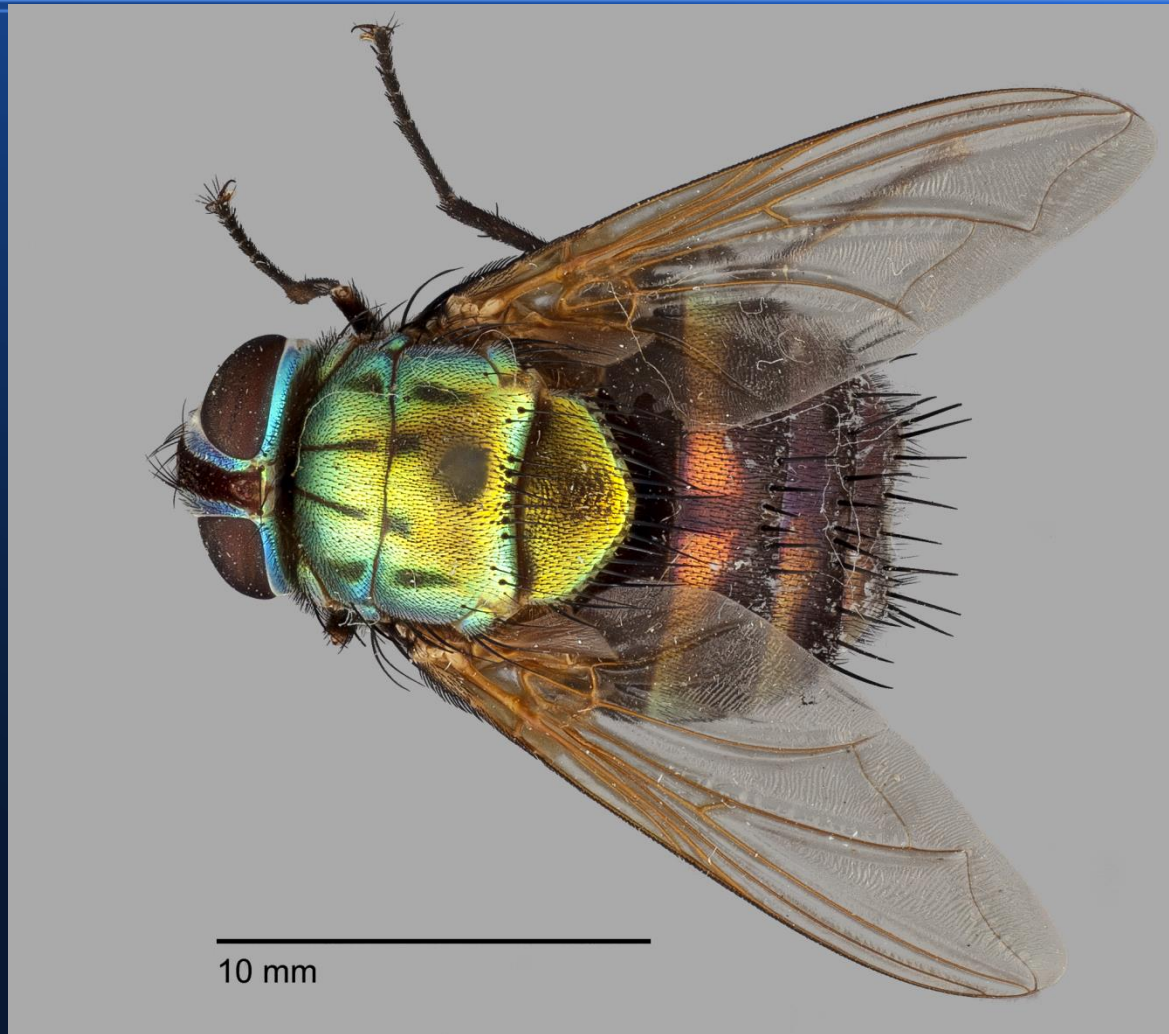
By Roy Larimer Visionary Digital



# What is the purpose of the image?

- Drawer, unit tray, single specimen, dorsal habitus or series, etc.
- Web or print or both. (color space)
- Quick IDs or archival or both. (Format, bit depth, and size)
- Photo illustration = accurate positioning and accurate scales.
- Labels.

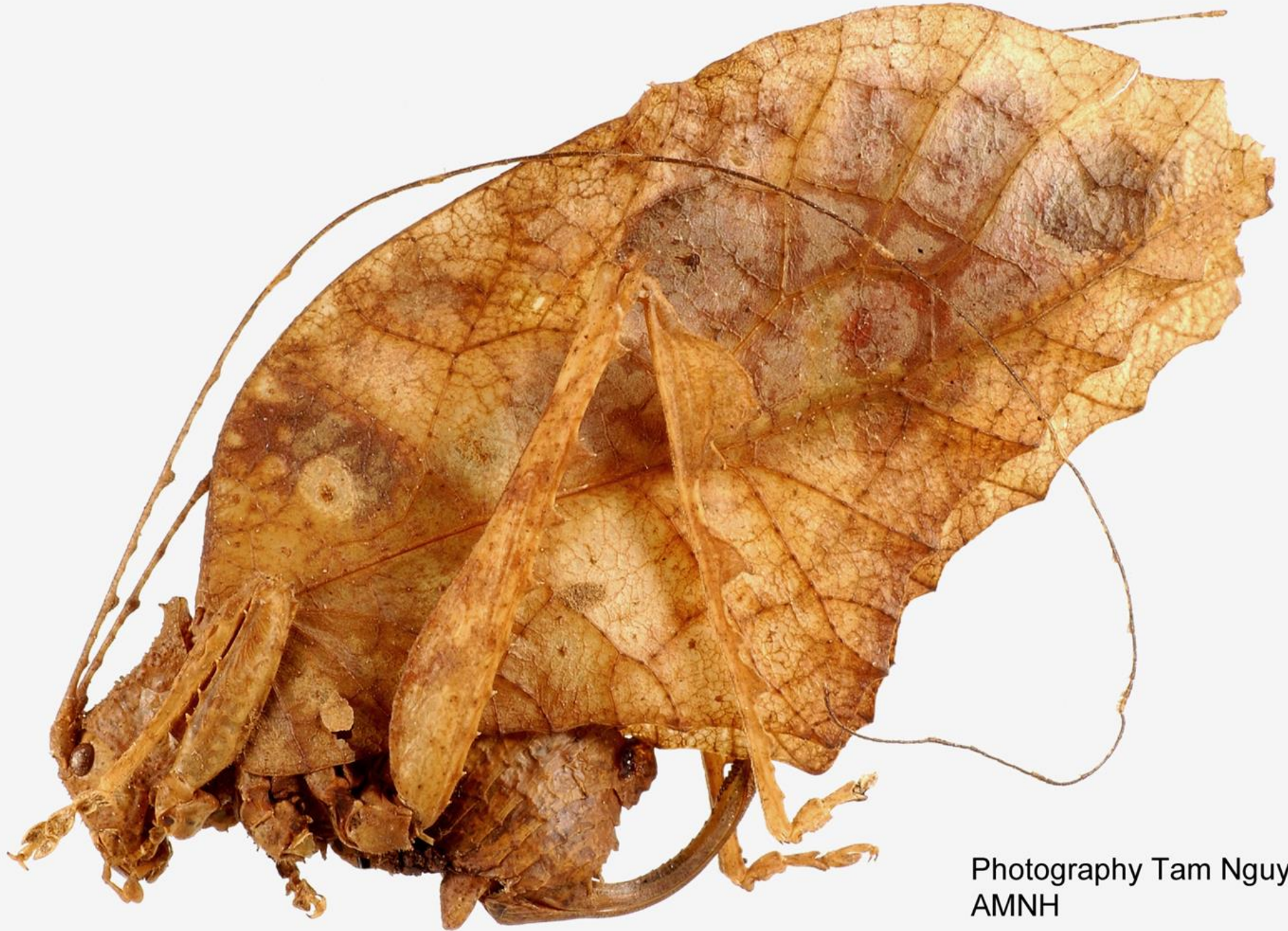
Preparation is key.



A properly imaged specimen will show incredible detail. Every speck of dust, hair and fiber will show up.



# Prepared



Photography Tam Nguyen  
AMNH

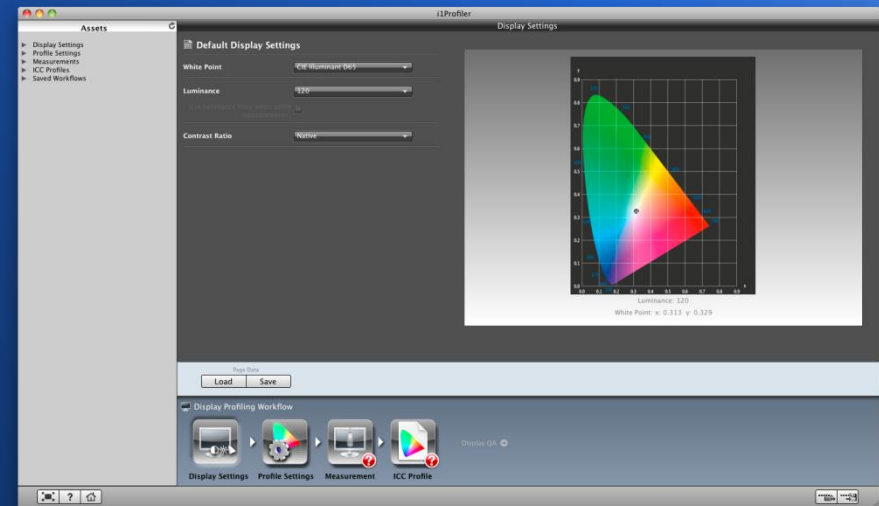
# Keys to setting up a rapid workflow



- .Quad / Hex core super cooled processors
- .32-64 GB fast memory
- .Solid state drives
- .Hardware Raid
- .Appropriate graphics card (s)
- .Enterprise drives for data storage
- .UPS power supply
- .Operating system and programs configured correctly!

Use a computer that is as powerful and as fast as possible

# Keys to setting up a rapid workflow



Establish file format, color space, bit depth meta data presets and file structure etc.

.Calibrate your camera, monitor and or printer before you begin.

# Keys to setting up a rapid work-flow

## Based on imaging a 7-12,000 specimen collection

- Look at the entire collection and select a sampling of a small number of average specimens in order to establish mounting and lighting techniques, lighting quality, positioning, and presets in software and identify potential bottlenecks.
- Clean and prepare material in advance of imaging when possible.
- Set all your meta-data fields and presets prior to starting a project.  
Save your preset information for all meta data color space, bit depth, white balance, file format and image composite software . This makes it possible to replicate the exact process again.
- Arrange the collection so that it may be imaged in the most efficient manner. Markers or an overall drawer image works.
- Establish a post shot editing and naming protocol. This can include bar code scanning or a digital list of specimen numbers that may be cut and pasted as file names.
- Save and back up all files daily.



# Keys to setting up a rapid workflow

Based on actually imaging a 7-12,000 specimen collection.

- Work with a partner(s) to maximize workflow

Photo document your set up for a particular imaging scenario.  
Keep the image together with a list of presets and notes.

# Naming your files

Using a unique identifier.....

How to imbed text into an image using an action in Photoshop.

Scripts to add the file name into the image

<http://blogs.adobe.com/jkost/2010/09/add-file-name-as-text-layer.html>

Adding the magnification to the file name or meta data so the image may be calibrated anywhere.

# Naming your files

How to imbed text into an image in Photoshop and save it to an action:

Before you imbed text in an image standardize your image print resolution. 300 ppi recommended for print 72 ppi for web.

*dpi dots per inch* refers to how an image is printed.

*ppi pixels per inch* refers to the images density or resolution

The actual image size is measured in pixels vertical and horizontal.

As an example:

If you have a 100 X 100 pixel image and print at 10 ppi you get a 10" X 10" print

Print the same image at 100ppi and you get a 1 inch print.

Same image, different print resolution

When you change the print resolution do it without resampling the image otherwise you will change the original image size..

# Naming your files

Image file name : ASUCS00012345\_Habitus\_Lat\_100mm1-2



ASUCH000123456\_Habitus\_Lat\_100mm\_1-2

# Keys to setting up a rapid workflow



0.5 mm

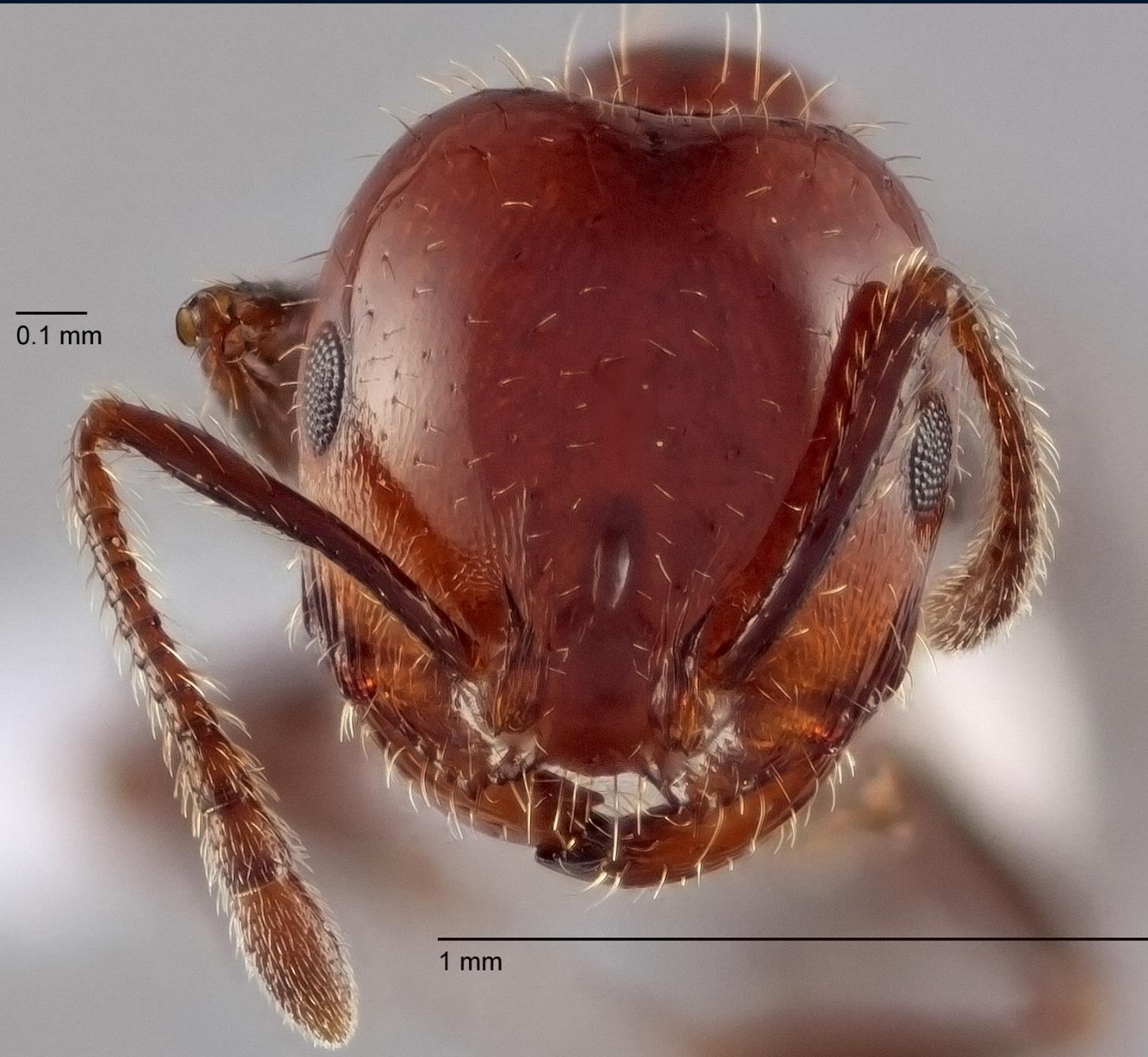


0.5 mm

# Keys to setting up a rapid workflow



# Keys to setting up a rapid workflow



Traditionally a bottleneck, the smaller material has a work flow too.

Organize your material and sequence your shots.



# Typical bottlenecks



Small point mounted material



# Typical bottlenecks



High contrast and reflective

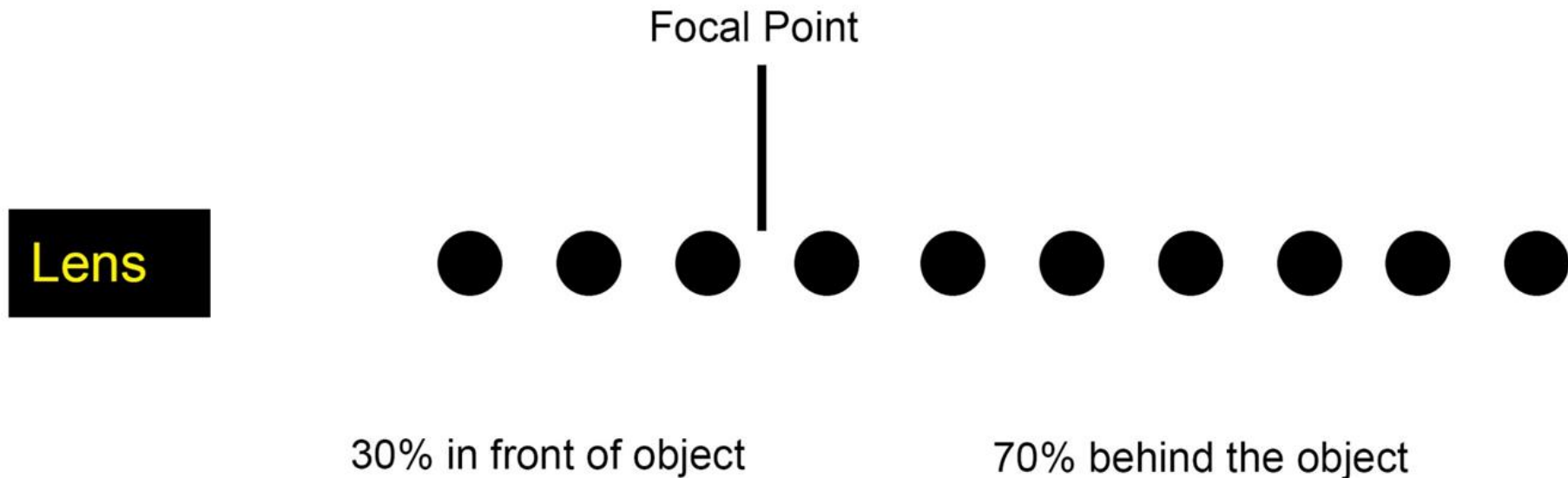
Fly - Tachinidae (Face)



# Techniques for imaging smaller material

- .Qualify the image. What is it being used for? Do I really need all the toes in focus?
- .Prepare your material correctly, clean, positioned, background, etc
- .Don't over magnify
- .Don't over stack
- .Reducing the magnification increases depth of field reducing the number of individual images needed for a specific composite.
- .Maximize your effective depth of field without sacrificing resolution. (find the sweet spot)
- .Know what and where your depth of field is.

# Depth of field chart



A general rule to follow is that the depth of field will reside 30% in front and 70% behind the focal point. Longer focal length lenses weight the D.O.F more to the front.

## Keys to setting up a rapid workflow

**This is an example of a work-flow where a high resolution file for print and web is required and a compressed Tiff archive is mandated.**

Capture in the camera's RAW format.

Export as Tiff 16 bit into the project folder in a sub folder named Tiff 16 bit

Every image file has its unique name (Follow your naming protocol)

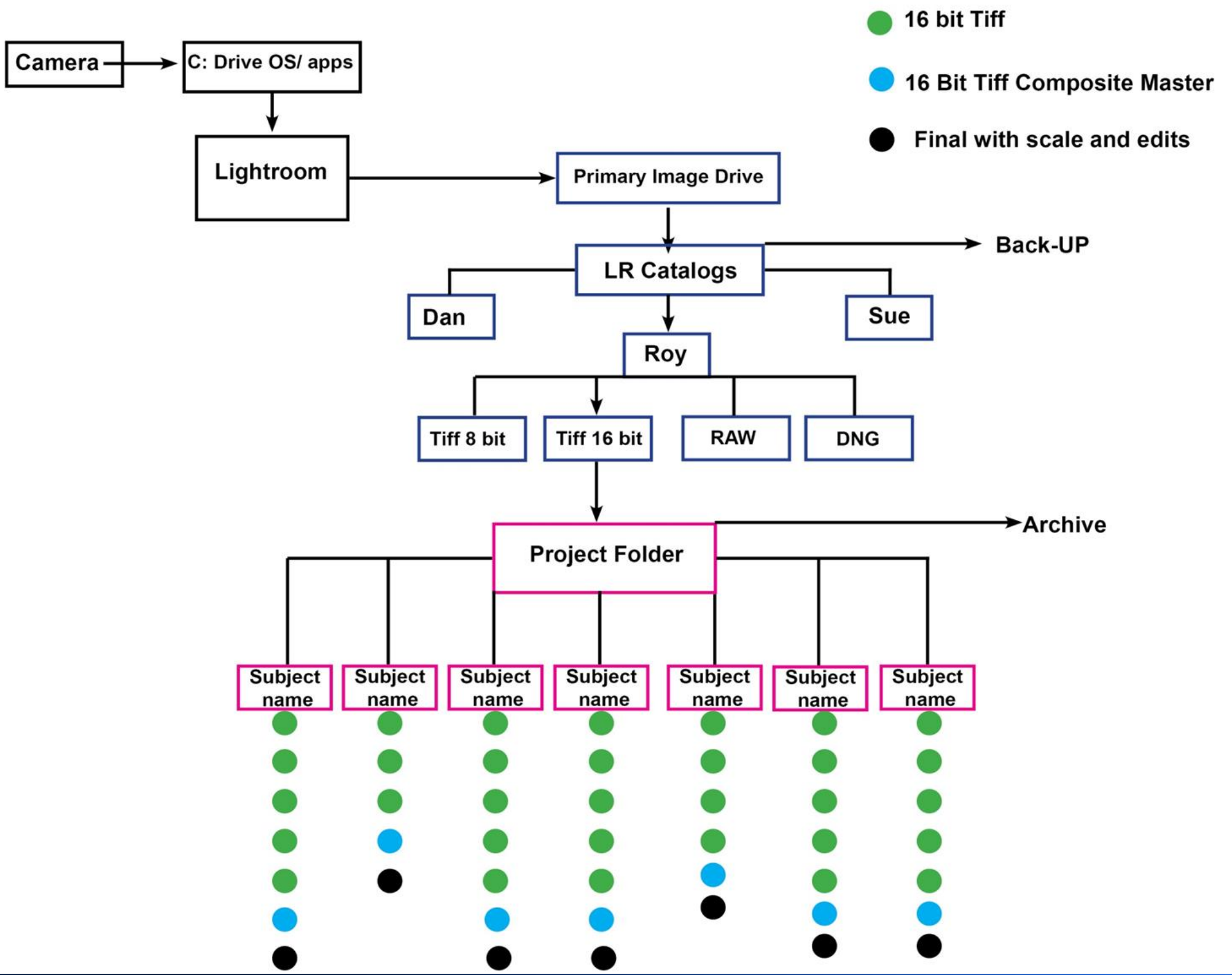
Run the tiffs through the composite software and save 16 bit tiff

Verify in PS your final composite image is correct then save it as a master.

This is now the digital master for the final image.

All editing modifications, scales, sharpening, compression are done on a copy of the master.

Now your 16 bit tiff files are safe and ready for back up.





# Dedicated laboratory / studio digital imaging systems



- .Wide range of magnification from studio to macro and micro. Infinity to 10 microns.
- .Multiple lighting platforms. Studio, Fiber optic. Transmissive, adjustable NA.
- .Visible, UV and IR. Different wavelengths of flash illumination possible.
- .Designed to handle extremes in work flow, working with a team of as many as 3 at once.

- .Lab systems are not typically movable after they are set up
- .Requires larger operating space

# Counter top portable/mobile system



- .Designed for travel, it is light weight, portable, with battery or wall current.
- .Same High quality imagery as studio systems.
- .Automation and high work flow configured to specific tasks.
- .Substantially lower cost than a complete lab system.

- .Portable systems don't typically have the magnification range of the lab systems
- .Lighting options are task specific

## Less expensive options - Home spun



- .Low cost
- .You can build a specialized system just for your needs.
- .You learn a lot about macro photography.
- .There are entire on line communities that share information on these creations.

- .If time is money this route is normally not cost effective.
- .Standardization is often difficult and support from manufacturers is normally non existent.

# Considerations when imaging pinned insects

## What is the purpose of the image? (there's that question again)

**What lens, magnification do I use and how do I set it?**

**Depth of field. Yikes! we could write a book here.**

**Resolution, diffraction limit, f numbers, focal distance **ARRGH!****

You absolutely need to understand your camera and optics relative to your subject before you start shooting. This will remove a lot of mystery and make things almost predictable!



# A brief note about cameras.

Camera choice along with setup and use

What are the images going to be used for?

Digital cameras are affordable (Hasselblad excluded)

Shop around read reviews talk to friends. Fit the camera to the task.

Get a full sized sensor if you can

Live view preview is critical, most all cameras have that now.

Make sure the camera has an AC power supply.

Video is also a great feature.

External or wireless flash is must for macro.

# A brief note about cameras.

In The Macro World

What is currently popular in the world of professional Macro today?

Canon

Nikon

Hasselblad (What?)

Image sensor size vs megapixels. Web search yields over 200,000 articles.

Higher pixel density (smaller pixels) = more noise in the image

Larger sensor = typically have a lower pixel density.

Photo courtesy:  
Geoff Thompson  
Queensland Museum

# Large format digital cameras



Photo courtesy:  
Geoff Thompson  
Queensland Museum





# Large format digital cameras

134. MB Tiff 8176 X 6132 pixels

Photo courtesy: *Geoff Thompson*



# Large format digital cameras



# Full size 35mm sensor cameras

Uncropped. Note F.O.V.

Canon 5D Mark II





10 mm

# Full size 35mm sensor cameras



# Everybody loves to make composites, not

The successful completion of an image composite requires a few things.

- Camera and lens must be normal to the specimen, not tracking at an angle.
- Vibration especially at higher mag must be mitigated by flash or vibration isolation / image stabilization.
- The more images you stick together the more artifacts you are going to get.
- Determine the correct composite software (s) for your needs.
- Apply only minor post shot editing prior to stacking.
- The lens based on  $f\#$  and magnification will have a set physical depth of field. Make sure your step size is adjusted correctly and that you can increase or decrease overlap.

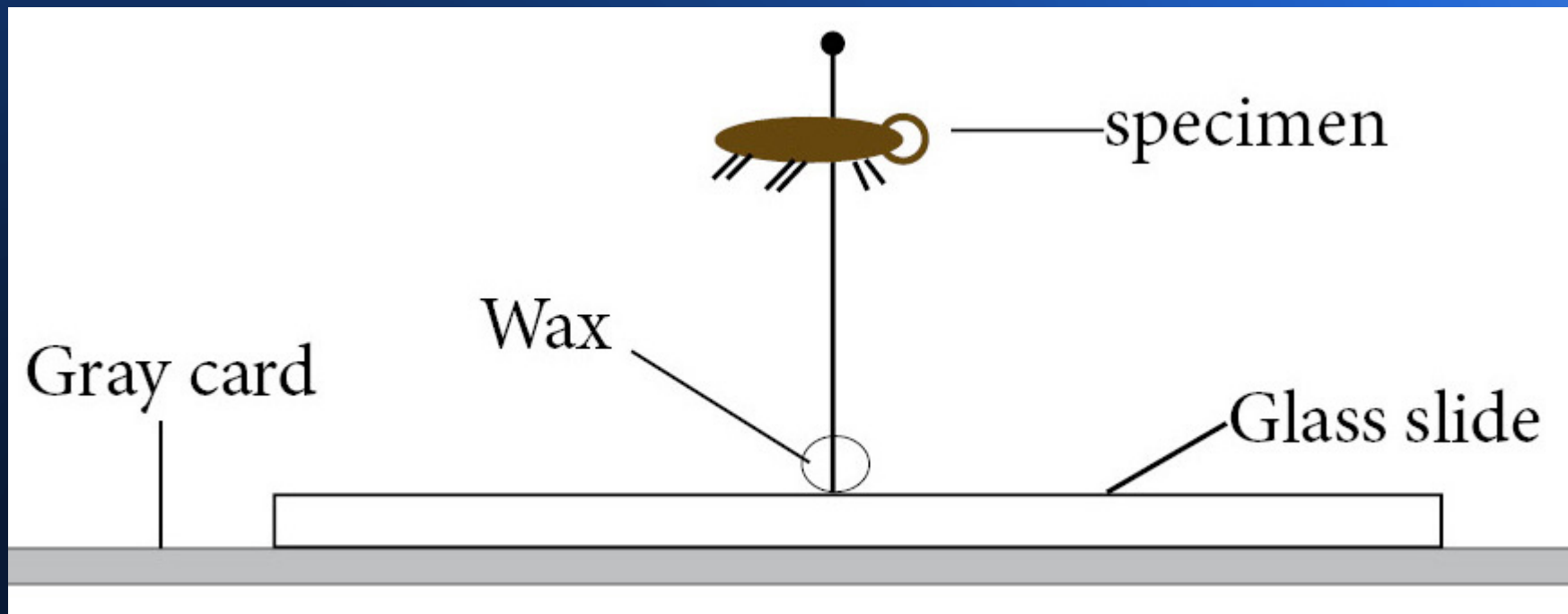
# Background choice based on specimen as well as image purpose

Get your background right when you shoot the image.

Mounting methods that allow for easy background manipulation.

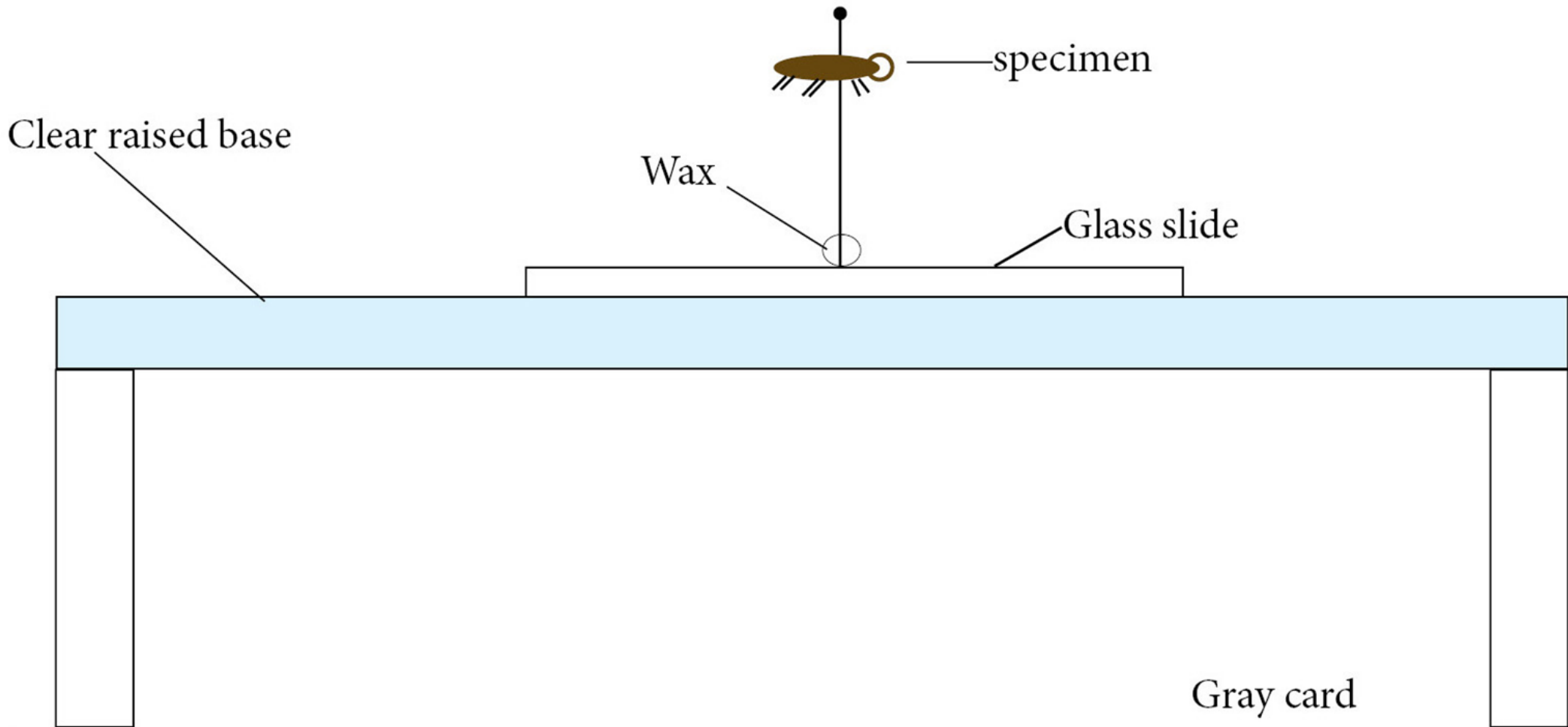
If you are electing to knock out the backgrounds then select the best for that app.  
Blue or green screen

## A mounting technique for smaller material

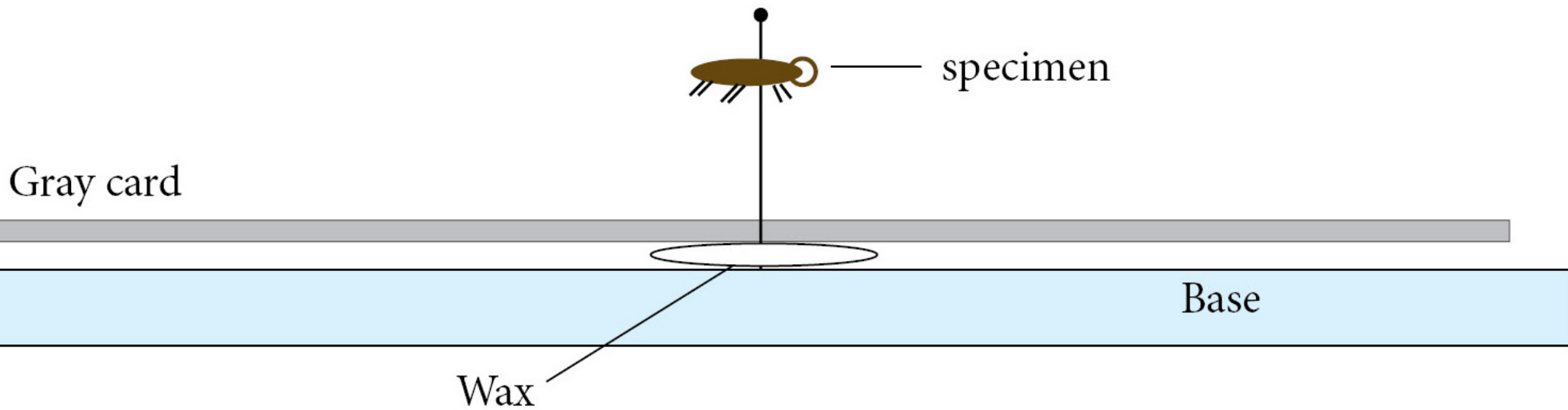




# Blurred background for smaller material



# Controlled color background for larger material



# Proper lighting for the specimen

**The quantity of light controls the exposure.  
The quality of light controls what you see.**

Lighting is probably the single most important component of an image. Everything we see is nothing more than reflected light. Understanding the subject and what you want to see is key in deciding how to illuminate the specimen.

“If it's true that a picture is worth a thousand words,  
then lighting defines the vocabulary”  
*Micheal S. Engel*

# Proper lighting for the specimen

Light *quality* refers to the type of light

- .Direct illumination
  - .Raking light
  - .Transmitted light
  - .Fill light accent/ hair light
  - .Diffused directional light
  - .Diffused flat light
  - .Bounce light
  - .Hard / Soft light
  - .Warm / Cool light
  - .Combinations of the above.
- .This is just in the visible spectrum.





10 mm

# Light

Highlights can be a good thing.



Photography by Gavin Svenson

**Direct illumination.**





# Diffused illumination.



# Light

Photograph: Hojun Song



# Ultra Violet

Photograph: Lorenzo Prendini



# Software tools

*At the end of the day Adobe owns your pixels.*

Adobe Lightroom.

A 'must have' if work flow is a consideration no matter the camera and lens.

Adobe Photoshop

The industry standard software for post capture image editing.

**Composite software: (I have no dog in this race)  
Two current top commercial software applications.**

**Helicon Focus and Zerene Stacker. How they differ.**

**Zerene Stacker:** <http://zerenesystems.com/cms/stacker>

**Helicon Focus:** <http://www.heliconsoft.com/heliconfocus.html>

**Zerene Stacker:** Great for deep stacks of 100 plus images loves image overlap.

**Helicon Focus:** Feature rich and very fast . A solid Go-to application for daily use.

# Software tools

*At the end of the day Adobe owns your pixels.*

Adobe Lightroom. Buy it . Learn it. Love it.

Importing an image .

Edit meta data and save it as a “Preset”

You can include copyright info, links to websites and email addresses along with keywords and GPS coordinates just to name a few.

Exporting an image.

You can generate presets to specific folders for specific types of images like J pegs, Tiff 8 and 16bit etc. You can automate the file naming process for large groups of images with a single click. Excellent tools for organizing files.

The develop module.

You can set your white balance, apply a small degree of sharpening, noise reduction and lens calibration to every image as it comes in.

You can save as many presets as you want for any number of lighting /lens combinations.

The Map module in Lightroom uses Google maps and Google earth to Geo-tag any image you want. Loads the GPS data into the meta data. One click and the map comes up and zooms into the location.

# Bit depth and working color space

- Image bit depth and why.

Capturing in Raw allows you to export in a 16bit Tiff file format.

“If you save the best you will never be disappointed”

important information on the difference between 8bit and 16bit so you can make an informed decision.     **8 Bit= 1.6 million colors**     **16 Bit= 281 Trillion colors**

<http://www.cambridgeincolour.com/tutorials/sRGB-AdobeRGB1998.htm>

<http://www.photoshopessentials.com/essentials/16-bit/>

- Selecting a color space to work in.

Once again the question must be asked. What is this image for? The Web, print, both or I don't know. Here is a link to help out with selecting the correct color space.

<http://www.cambridgeincolour.com/tutorials/sRGB-AdobeRGB1998.htm>

# Image storage formats

.Jpeg for web based applications.

.Tiff for high color depth and print / archival applications.

.Dng Digital negative for archival purposes.

Why DNG over Camera Raw:

<http://photographylife.com/dng-vs-raw>

# Video

- Video is imaging too!

Many cameras record video, some in HD 1080P

Adobe Lightroom will allow you to import and play videos with very basic editing and the ability to take a single frame and use it as an image.

Save as a tiff or j peg

Julianne Kost Video in LR4

<http://tv.adobe.com/watch/whats-new-in-lightroom-4/working-with-dslr-video->



# iDigBio's imaging guidelines

[https://www.idigbio.org/sites/default/files/sites/default/files/Image\\_File\\_Format\\_Recommendations\\_and\\_Standards.pdf](https://www.idigbio.org/sites/default/files/sites/default/files/Image_File_Format_Recommendations_and_Standards.pdf)

● **What are the current accepted standards in the professional photographic industry for a basic digital image?**

See iDigBio's Imaging guidelines.

Also note if you want to see what professional imagers are doing in the industry look at the industry standard tools like Adobe Photoshop and Lightroom. There is a vast library of information on the web regarding this software and a world of professional photographers that use them.

● **Image capture standards and common practices**

<http://www.jiscdigitalmedia.ac.uk/guide/basic-guidelines-for-image-capture-and-optimisation>

# ● Image processing dos and don'ts

**Do** first understand your camera and software and know what options you have before you fire the shutter.

**Do** calibrate your monitor and use consistent room lighting for viewing. In large part you are basing your edits on what you are seeing and that is on your monitor. You want it correct!

**Do** save your raw image so you can fix a major screw up you inadvertently just made.

**Do** all edits and processing on a copy of the original and save it accordingly.

**Do** understand what processes you are committing in your photo editing software.

**Do** process and edit your image with a specific purpose in mind.

**Do** take full advantage of the powerful software to automate your work flow as much as possible while establishing a consistent image.

# ● Image processing dos and don't s

## *Common mistakes I have made noted.*

**Don't** ever use the master file to edit because when you click **save** instead of **save as** you just lost your master image. Hope you had it backed up somewhere!

**Don't** over-process your images prior to using them in a composite program. Edit the final composite.

**Don't** over-sharpen. Always view your image at 100% when applying edits in order to properly gauge the effect.

<http://helpx.adobe.com/photoshop/using/adjusting-image-sharpness-blur.html>

**Don't** edit an image going out for print publication unless you have guidelines from the publisher.

**Don't** even think about editing an image without a calibrated monitor under controlled lighting.

**Don't** forget to back up your files, you will loose your work at the most inopportune time.

# ●Ethics of image enhancement

*How to turn a photograph into a photo illustration without knowing it*

A small amount of sharpening and noise reduction are accepted norms in professional imaging.

Regardless what you do to the original photograph just note it . Call it what it is.

# Images in ethanol

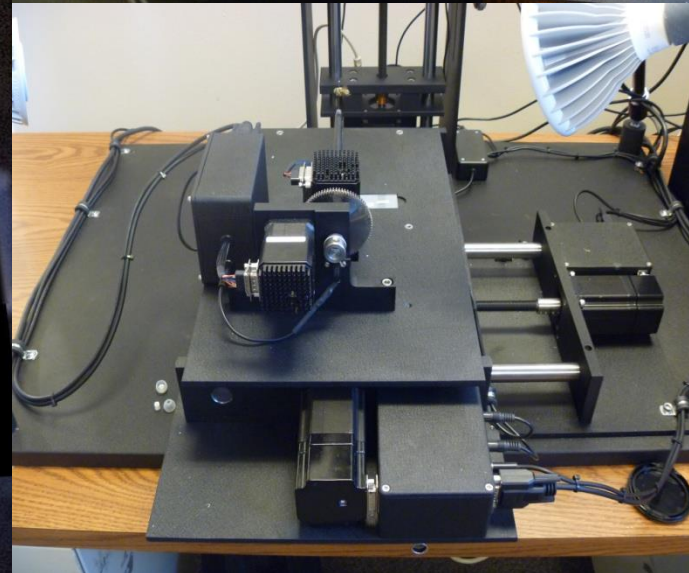
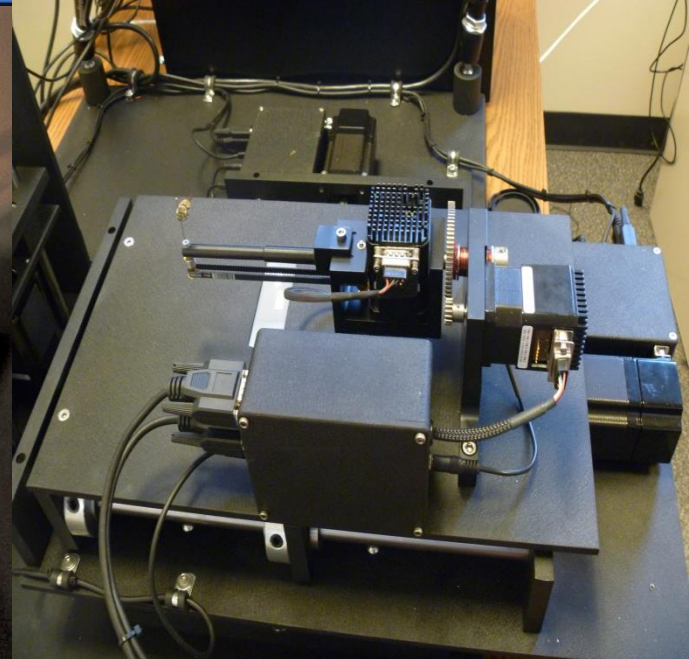
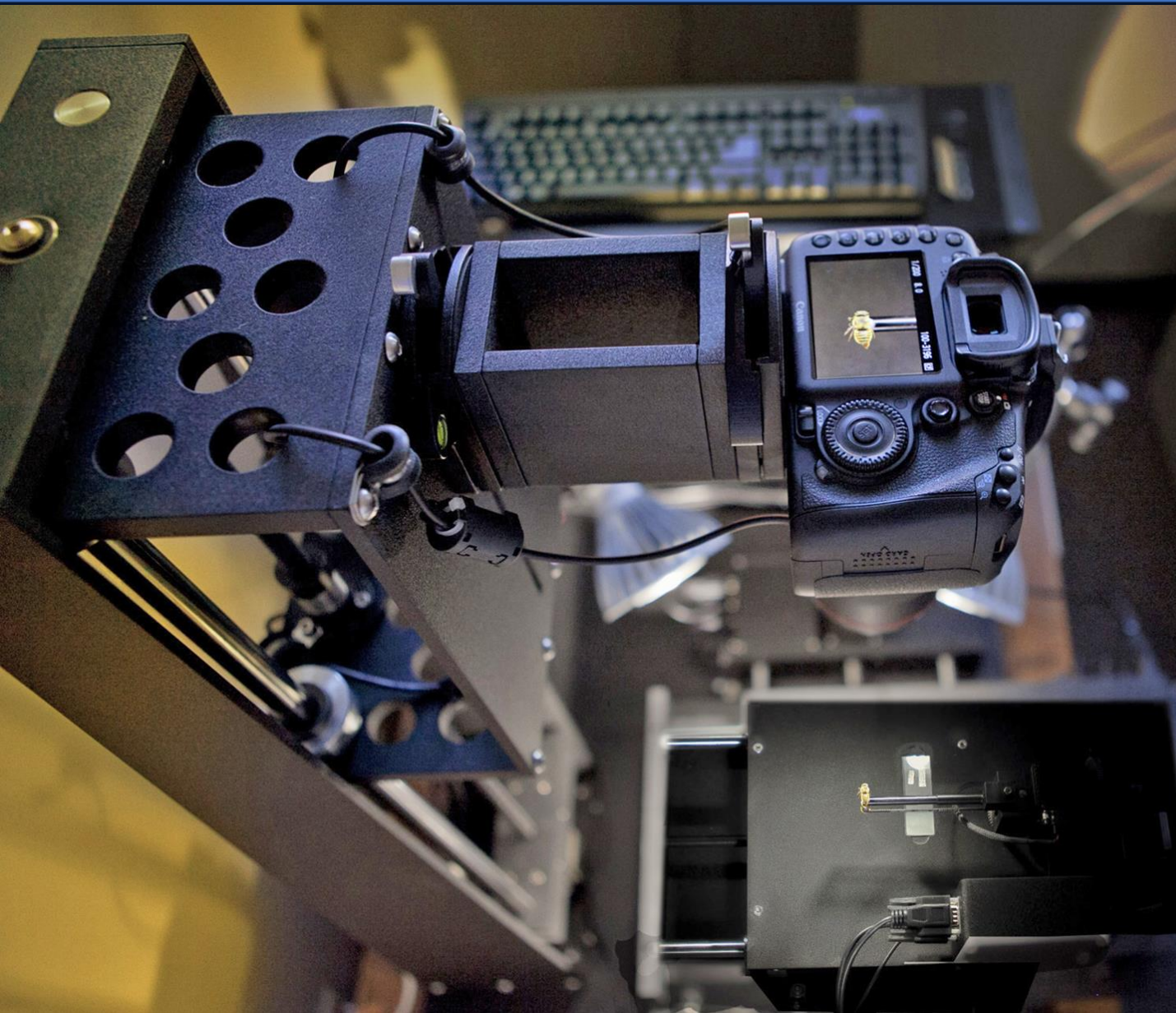
For another time but there are a number of simple solutions



What does the future hold?

# ROBOT

**Remotely Operable Benchmarker Of Types**



# ROBOTe

## Remotely Operable Benchmarker Of Types (Entomological)

ROBOT(E) remotely operable digital imaging system designed to allow taxonomists to examine, manipulate and digitally photograph type specimens through a Web connection.

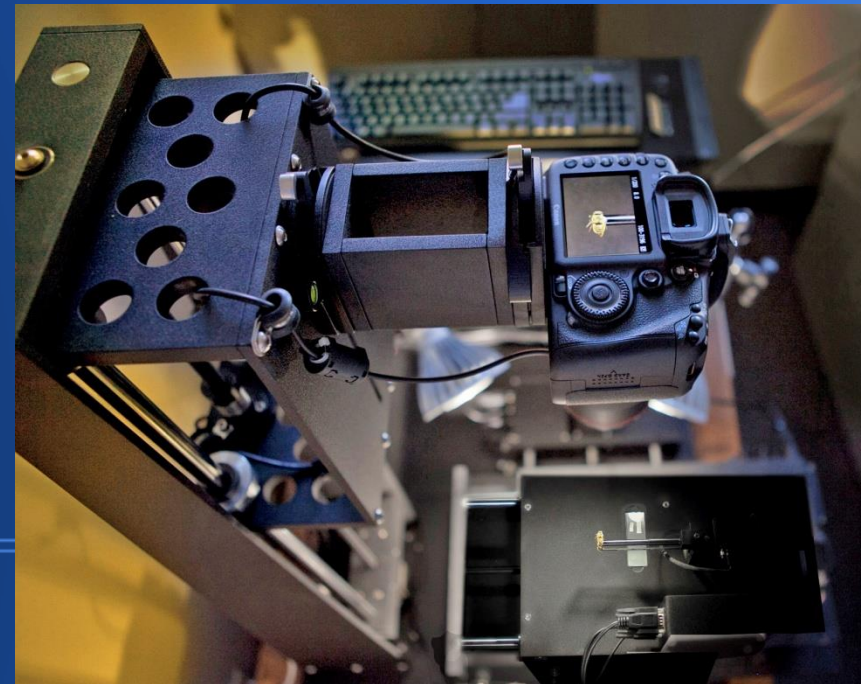
Three such instruments are being deployed to major insect collections in Washington, London, and Paris.

A prototype instrument remains with the IISE at ASU for testing and development purposes.

Very soon in 2013  
This ROBOTe will make type specimens from three  
of the worlds most important collections  
essentially available to anyone who wants to study  
them.

<http://www.cybertaxonomy.com>

<http://www.planetbob.asu.edu/>



# Visionary Digital has a new Home We are moving to Hollywood!





**Visionary Digital has a new Home  
We are moving to Hollywood!**

