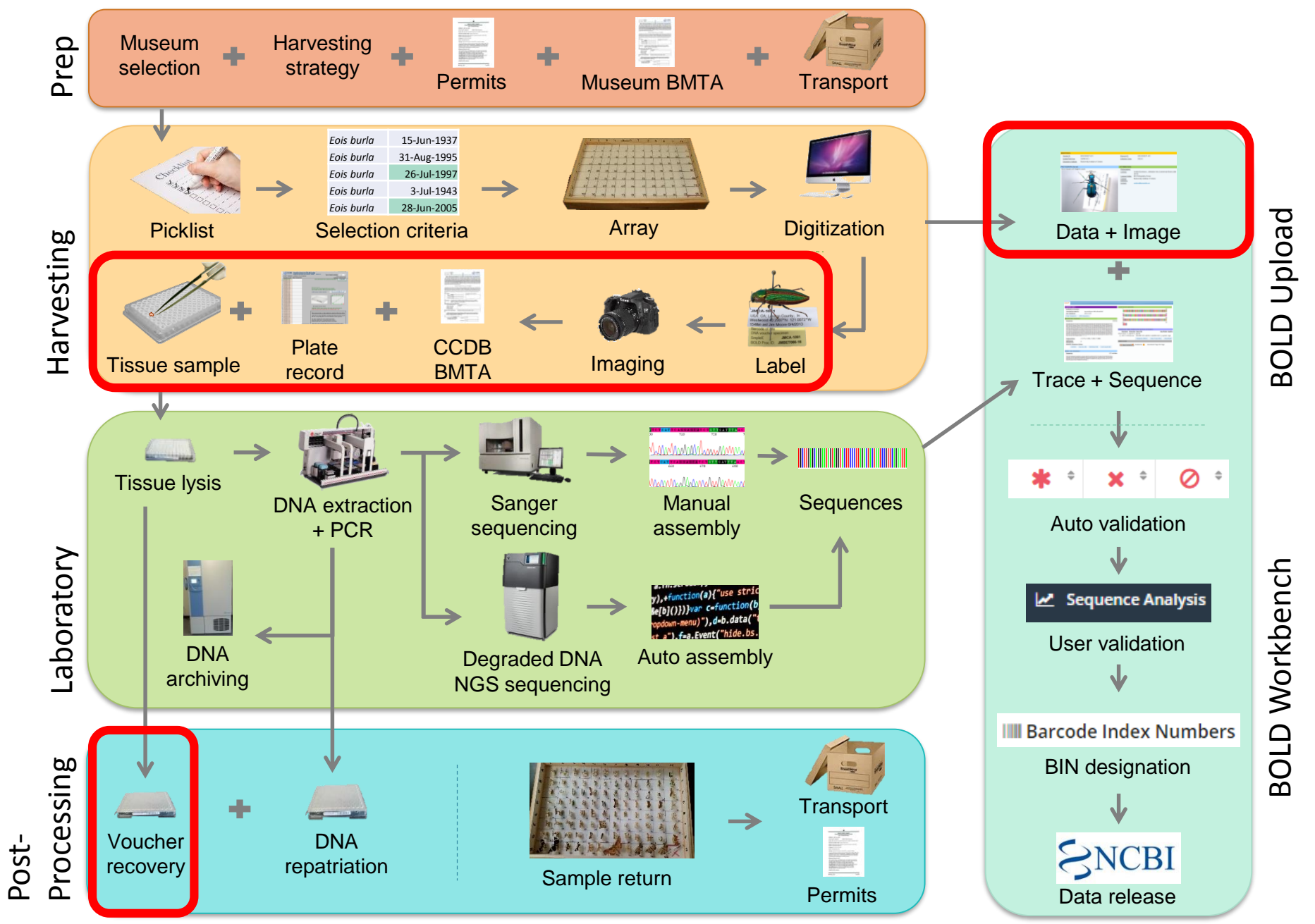


11:45 – 12:30 - Kate Perez and Monica Young  
Pre-lab Processing



DNA Barcoding Natural History Collections



Post-

Processing

Laboratory

Harvesting

Prep

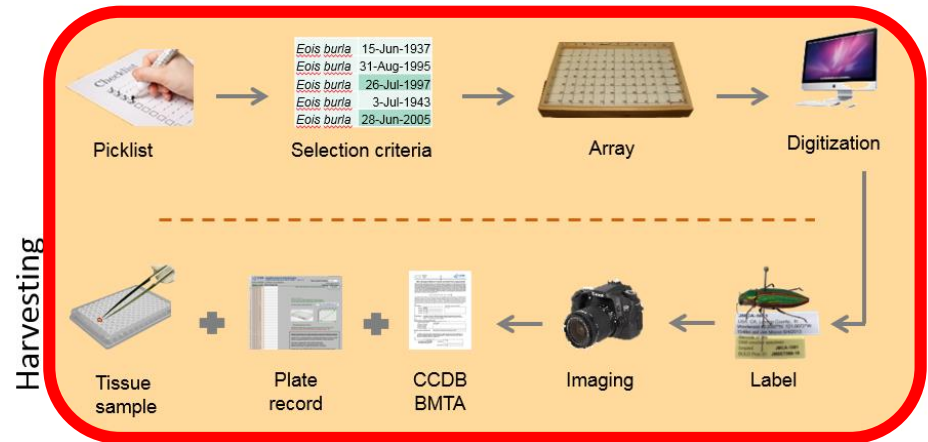
BOLD Workbench

BOLD Upload

# Recap

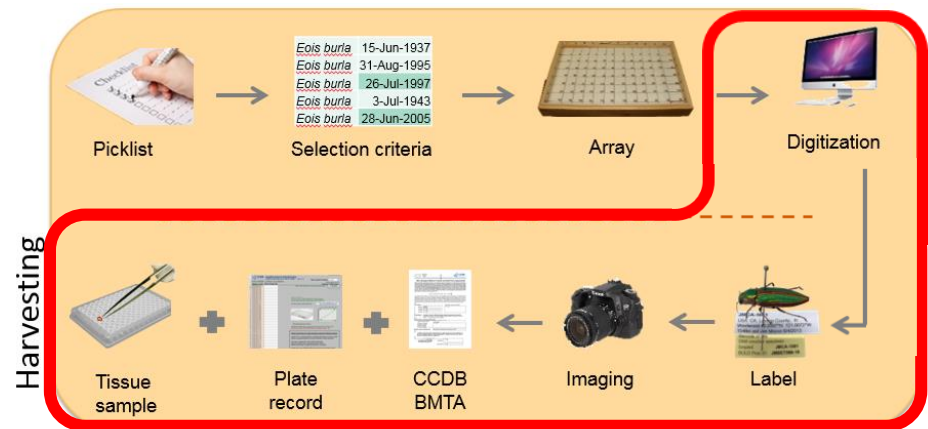
- **Sampling on site**

- Usually plants and vertebrates
- Completed at the museum



- **Borrowing specimens**

- Depends on collection, usually for invertebrates
- First 3 steps completed at the museum
- Digitization and pre-lab processing completed at home institution

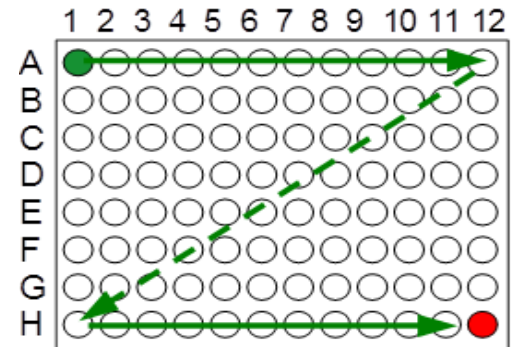


# Before you start...

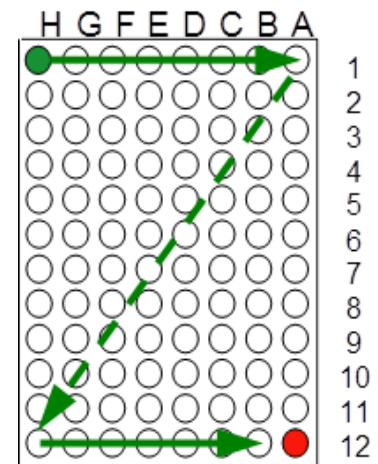
## **IMPORTANT:** critical to next 3 stages

- Labelling
  - Imaging
  - Tissue Sampling
- 
- Check orientation of plate and note different controls
    - 12 columns (A01 → A12) for animals
    - 8 columns (H01 → A01) for plants

## 12 Column Format

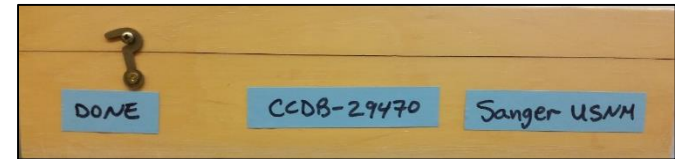


## 8 Column Format



# Before you start...

- Ensure you have labelled all tissue media and all arrays



- Ensure you have generated a plate map and use this to verify all stages

Microplate (animal tissue)

[Print layout map](#)

CCDB array number:

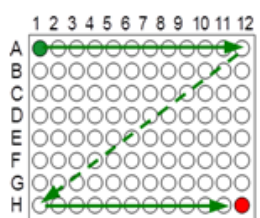
Sample container: **microplate**

Overall samples submitted: **95** out of 95

**Map of Sample Locations**

*SAMPLING ORDER: Begin sampling with position A01 and finish at H11*

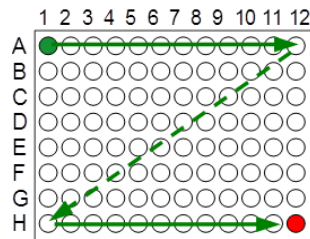
*	01	02	03	04	05	06	07	08	09	10	11	12
<b>A</b>	USNMENT 00565484	USNMENT 00565485	USNMENT 00565486	USNMENT 00565487	USNMENT 00565488	USNMENT 00565489	USNMENT 00565490	USNMENT 00565491	USNMENT 00565492	USNMENT 00565493	USNMENT 00565494	USNMENT 00565495
<b>B</b>	USNMENT 00565496	USNMENT 00565497	USNMENT 00565498	USNMENT 00565499	USNMENT 00565500	USNMENT 00565501	USNMENT 00565502	USNMENT 00565503	USNMENT 00565504	USNMENT 00565505	USNMENT 00565506	USNMENT 00565507
<b>C</b>	USNMENT 00565508	USNMENT 00565509	USNMENT 00565510	USNMENT 00565511	USNMENT 00565512	USNMENT 00565513	USNMENT 00565514	USNMENT 00565515	USNMENT 00565516	USNMENT 00565517	USNMENT 00565518	USNMENT 00565519
<b>D</b>	USNMENT 00565520	USNMENT 00565521	USNMENT 00565522	USNMENT 00565523	USNMENT 00565524	USNMENT 00565525	USNMENT 00565526	USNMENT 00565527	USNMENT 00565528	USNMENT 00565529	USNMENT 00565530	USNMENT 00565531
<b>E</b>	USNMENT 00565532	USNMENT 00565533	USNMENT 00565534	USNMENT 00565535	USNMENT 00565536	USNMENT 00565537	USNMENT 00565538	USNMENT 00565539	USNMENT 00565540	USNMENT 00565541	USNMENT 00565542	USNMENT 00565543
<b>F</b>	USNMENT 00565544	USNMENT 00565545	USNMENT 00565546	USNMENT 00565547	USNMENT 00565548	USNMENT 00565549	USNMENT 00565550	USNMENT 00565551	USNMENT 00565552	USNMENT 00565553	USNMENT 00565554	USNMENT 00565555
<b>G</b>	USNMENT 00565556	USNMENT 00565557	USNMENT 00565558	USNMENT 00565559	USNMENT 00565560	USNMENT 00565561	USNMENT 00565562	USNMENT 00565563	USNMENT 00565564	USNMENT 00565565	USNMENT 00565566	USNMENT 00565567
<b>H</b>	USNMENT 00565568	USNMENT 00565569	USNMENT 00565570	USNMENT 00565571	USNMENT 00565572	USNMENT 00565573	USNMENT 00565574	USNMENT 00565575	USNMENT 00565576	USNMENT 00565577	USNMENT 00565578	<b>CONTROL</b>



# Before you start...

- Always follow sampling order

## 12 Column Format



- Specimens may not be in array

- Envelopes
- Plants/Fungi
- Vertebrates



- \* **NOTE** Plants, Fungi, Vertebrates are usually *labelled, imaged* and *tissue sampled* at the **same time** as specimen selection

# Pre-Lab Processing

Specimen Labelling

Specimen Imaging

Image Upload

Tissue Sampling

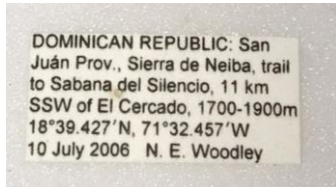
Lab Submission

Voucher Recovery

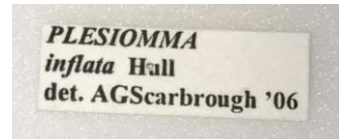
# Specimen Labelling

## Labels to Add When Sampling

Data Label



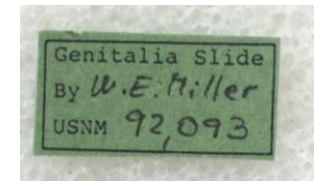
Det. Label



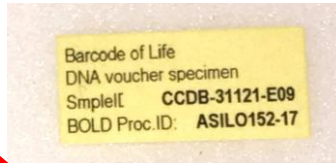
Type Label



Genitalia Slide



Barcode Label



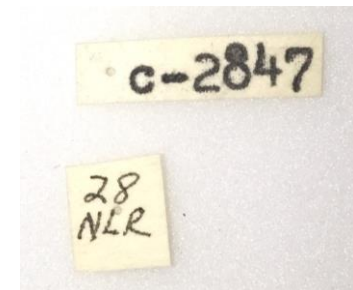
Museum Label



Collection Label



Other Labels



**Many museums have standards** for the format, material, size and colour of voucher labels. **Please check prior to labelling.**



# Specimen Labelling

## Standard Guidelines

### Materials and format

- Use acid free paper, ink, and glue
- Durable material e.g. cardstock or fluid resistant
- Colour considerations
- Size and font considerations



### Use forceps to:

- Grasp base of pin and push through label to prevent bent pins
- Remove labels (only if necessary)
- Adjust label spacing and orientation
- Affix glued labels



# Specimen Labelling

## Standard Guidelines: Scannable Labels

- Link specimen to digital data
- 1D or 2D format
- Consider placement for easy scanning
- Do not obscure or pin through barcode



### 1D Barcode system



### 2D Barcode system

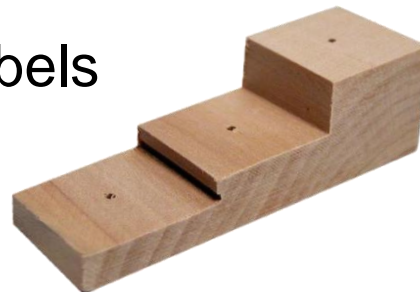
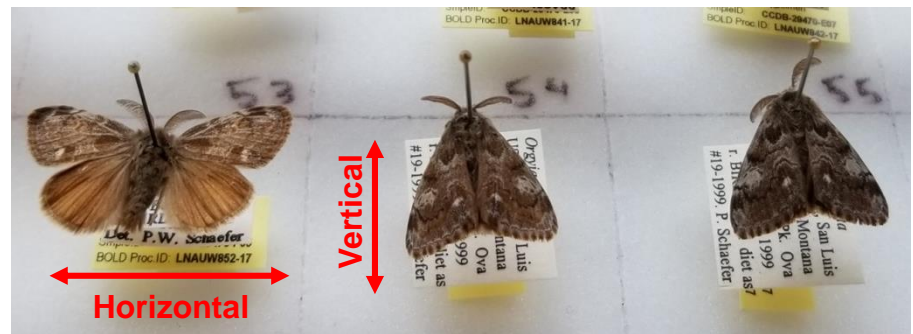


# Specimen Labelling

## Standard Guidelines: Pinned Invertebrates

### Orientation and Spacing

- Align label with specimen preparation and existing labels
- Append new labels at end, label order important
- Ensure labels are spaced evenly
- Ensure scannable labels are accessible



# Specimen Labelling

## Standard Guidelines: Dry Envelopes

### Envelopes

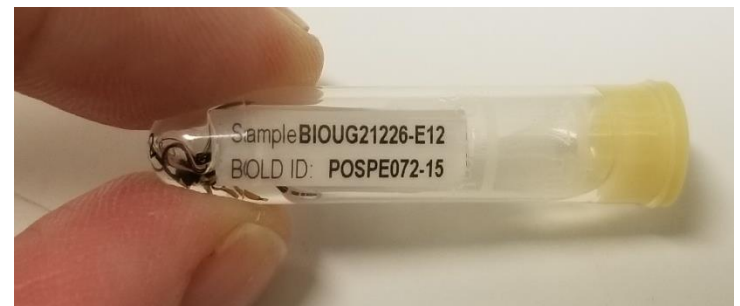
- Affix label to exterior of envelope using staples or glue (if museum allows) or add to inside
- Use acid free glue
- **Option:** use sticker labels if acid free



# Specimen Labelling

## Standard Guidelines: Fluid Invertebrates

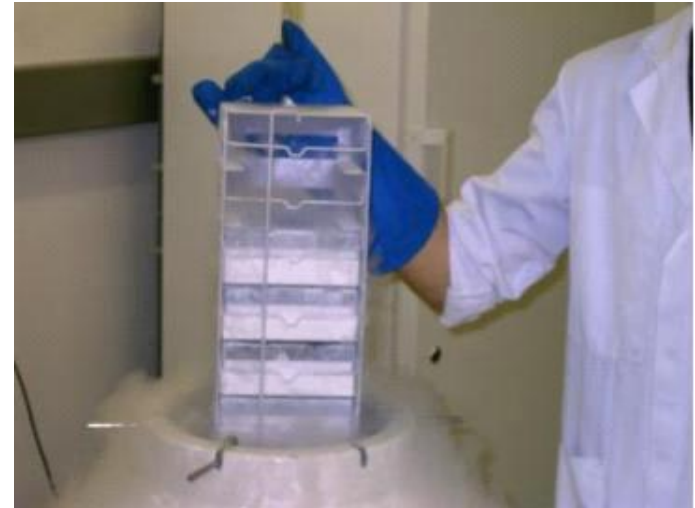
- Print on paper intended for fluid immersion
- Caution: printing method important so ink does not rub off
- Samples pulled from parent lots may require parent lot # on label



# Specimen Labelling

## Standard Guidelines: Vertebrates

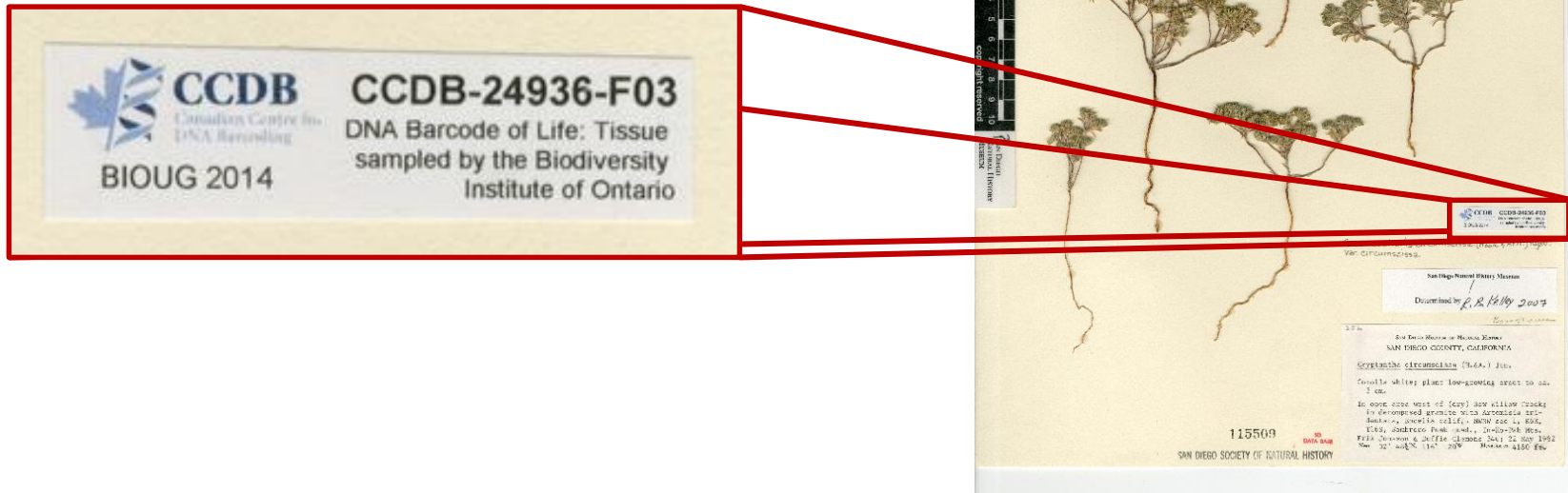
- Generally sampling from tissue archive so you **do not** affix labels
- More important to **add note on digital records** that link tissue with skull, skin etc.
- **If labelling**, then tie to voucher with string that is non-dissolvable and acid free



# Specimen Labelling

## Standard Guidelines: Plants & Fungi

- Glue to herbarium sheet with acid free glue
- Middle right – above existing labels



# Pre-lab Processing

Specimen Imaging

Image Upload



# Specimen Imaging

## Equipment Overview: DSLR Camera

### Great for:

- Pinned invertebrates
- Large invertebrates
- Vertebrates



### Pros

- Fast
- Portable
- Inexpensive

### Cons

- Moderate learning curve
- Doesn't accommodate very small specimens

# Specimen Imaging

## Equipment Overview: Imaging Capable Microscope



### Great for:

- Small invertebrates
  - Fluid and dry/pinned
- Slides (i.e. genitalia)

### Pros

- Reasonably fast
- Built-in software

### Cons

- Relatively expensive
- Less portable

# Specimen Imaging

## Equipment Overview: Scanner



### Great for:

- Plants
- Fungi

### Pros

- Fast
- Great for flat specimens
- Natural colour

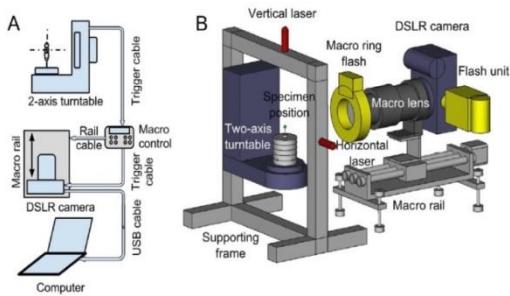
### Cons

- Relatively expensive
- Less portable

# Specimen Imaging

## Equipment Overview: 3D Imaging

### 3D DSLR



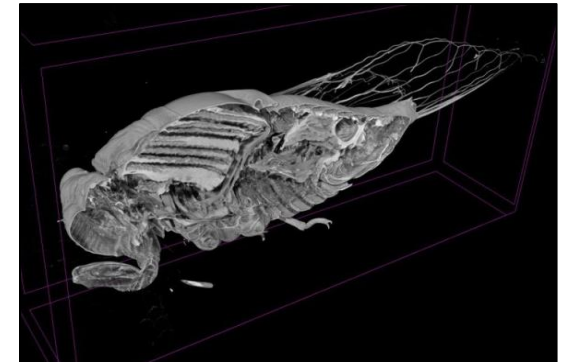
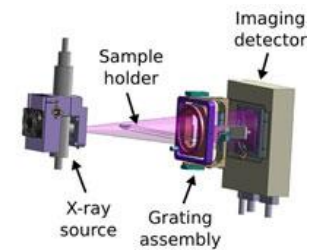
Credit: Nguyen CV, Lovell DR, Adcock M, La Salle J. Capturing Natural-Colour 3D Models of Insects for Species Discovery and Diagnostics. López-Vaamonde C, ed. *PLoS ONE*. 2014;9(4):e94346. doi:10.1371/journal.pone.0094346.

### SEM



Photo by Eric Erbe; digital colorization by Chris Pooley (USDA, ARS, EMU). This image was released by the Agricultural Research Service, the research agency of the United States Department of Agriculture, with the ID K9077-23

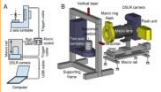


### Micro-CT Scanning



Credit: Chandiramani, S. (2016) *Internal anatomy through a cutaway view of the cicada* [Digital Image]. Retrieved on <https://www.microphotonics.com/1376-2/> (Accessed Nov 1, 2017)

# Specimen Imaging

## Equipment Overview: 3D Imaging

Equipment	Pros	Cons	Great for:
<b>ALL</b>	<ul style="list-style-type: none"> <li>Detailed morphology</li> </ul>	<ul style="list-style-type: none"> <li>Expensive</li> <li>Not portable</li> <li>Not supported by BOLD</li> </ul>	<ul style="list-style-type: none"> <li>Type specimens</li> <li>Species descriptions</li> </ul>
<b>3D DSLR</b> 	<ul style="list-style-type: none"> <li>Natural colour</li> </ul>	<ul style="list-style-type: none"> <li>Time consuming</li> </ul>	<ul style="list-style-type: none"> <li>Pinned specimens</li> </ul>
<b>SEM</b> 	<ul style="list-style-type: none"> <li>Smaller desktop versions available</li> </ul>	<ul style="list-style-type: none"> <li>May destroy sample</li> </ul>	<ul style="list-style-type: none"> <li>Extremely small specimens</li> </ul>
<b>Micro-CT</b> 	<ul style="list-style-type: none"> <li>Internal morphology</li> </ul>	<ul style="list-style-type: none"> <li>Low contrast</li> <li>Radiation risk</li> </ul>	<ul style="list-style-type: none"> <li>Histological study</li> <li>Variety of taxa</li> </ul>

# Specimen Imaging

## Standard Guidelines: Maximum Diagnostic Characters

### Example: Diptera

- Wing venation, bristles, ...



### Example: Mesostigmata

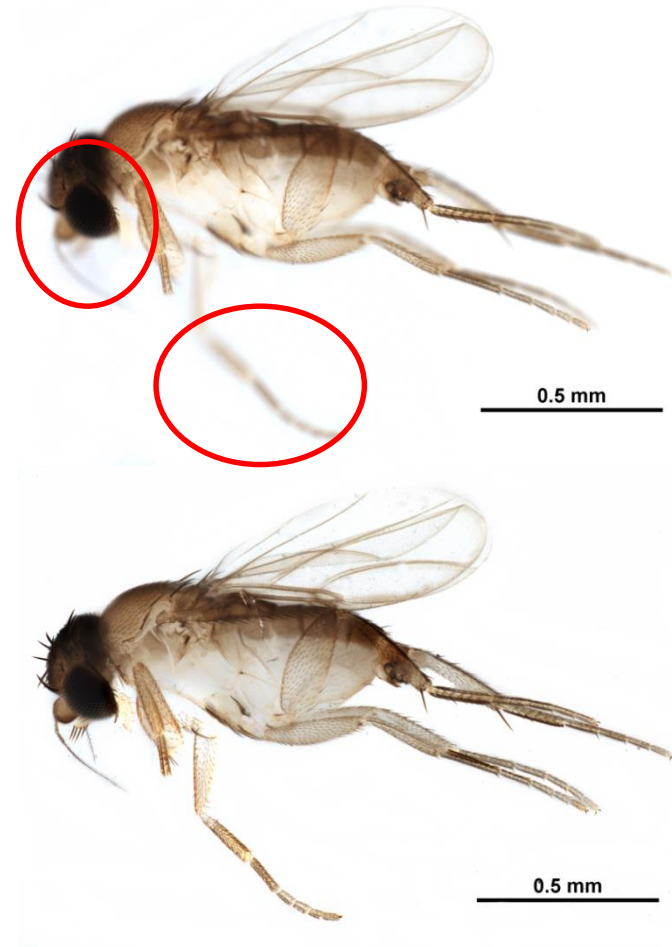
- Ventral shield shape & arrangement



# Specimen Imaging

## Standard Guidelines: Z-Stacking

- **Combining a series of images from different focal planes**
  - Time consuming but may be necessary to get all of specimen in focus
- **Microscopes with automatic z-stacking will have a built in stacking software**
- Other software
  - **CombineZ** by Alan Hadley
  - **Helicon Focus**
  - **Zerene Stacker**



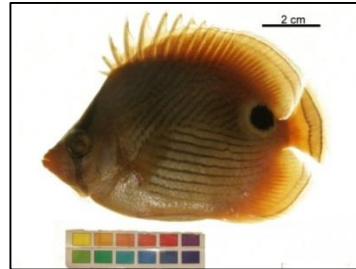
# Specimen Imaging

## Standard Guidelines: Specimen Orientation

### BOLD Standards:



**Dorsal:** Anterior part of specimen face top of image



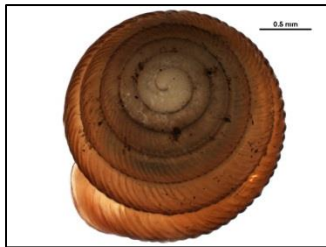
**Lateral:** Anterior part of specimen face left of image



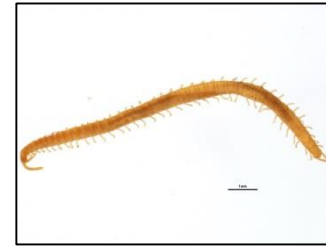
**Herbarium:** Entire sheet in image (portrait)

---

### Special Cases:



**Gastropods:** Apical and apertural



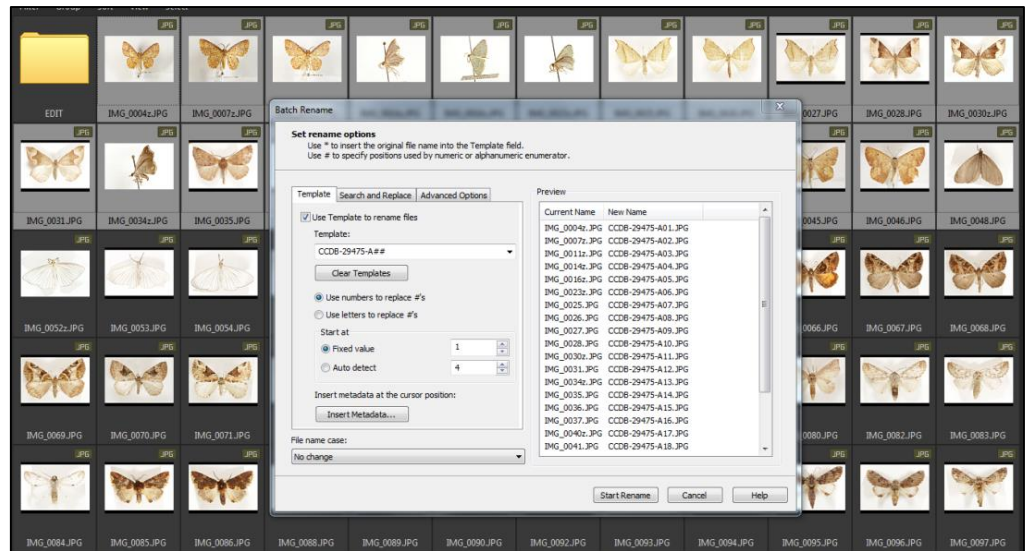
**Long Specimens:** Dorsal face left of image



# Specimen Imaging

## Standard Guidelines: Image Naming

- Create folder for each array/plate
- Name image files by Sample ID for easy reference
- **Batch renaming**
  - Camera software
  - Editing program
  - Free software: Batch Renamer <https://www.advancedrenamer.com/>



\* **NOTE** Consider museum Requirements

# Specimen Imaging

## Standard Guidelines: Procedure

### Quality assurance

- One image/specimen **or**
- Image label before each specimen **or**
- Include label in image **or**
- Rename each image after capture
- After completing a plate, rename all images

### Background choice

- White/black
- Leave space between specimen and background



# Specimen Imaging

## Taxon Specific Guidelines: Pinned Invertebrates

- Image entire array
- Can use for validation after array is disassembled
- Ideal to have array name in image
- Re-name file to array name



# Specimen Imaging

## Taxon Specific Guidelines: Pinned Invertebrates (large)

### Equipment

- DSLR camera, macro lens, ring/twin flash and a slave flash
- White fabric and needlepoint ring
- Tripod
- Pin holder



### Procedure

- Pin specimen on fabric or on a piece of foam in front of ring
- ⊘ Avoid:** Shadows = flash from behind specimen



# Specimen Imaging

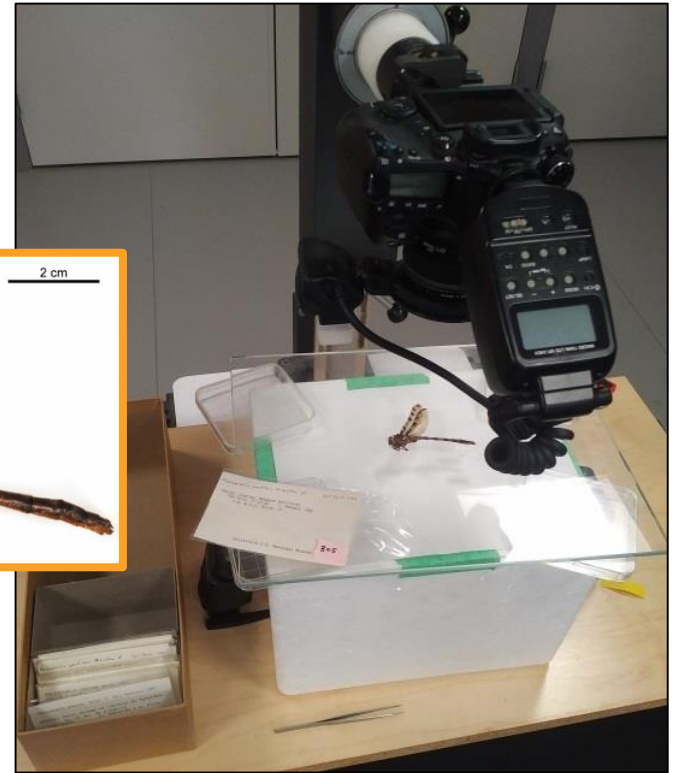
## Taxon Specific Guidelines: Envelopes

### Equipment

- DSLR camera, macro lens, ring/twin flash and two slave flashes
- Styrofoam box with glass
- Copy stand
- Ruler

### Procedure

- Remove specimen from envelope
- Place flat on glass



**⊘ Avoid:** Overexposure on shiny specimens - no direct light on specimen

# Specimen Imaging

## Taxon Specific Guidelines: Fluid Invertebrates (large)

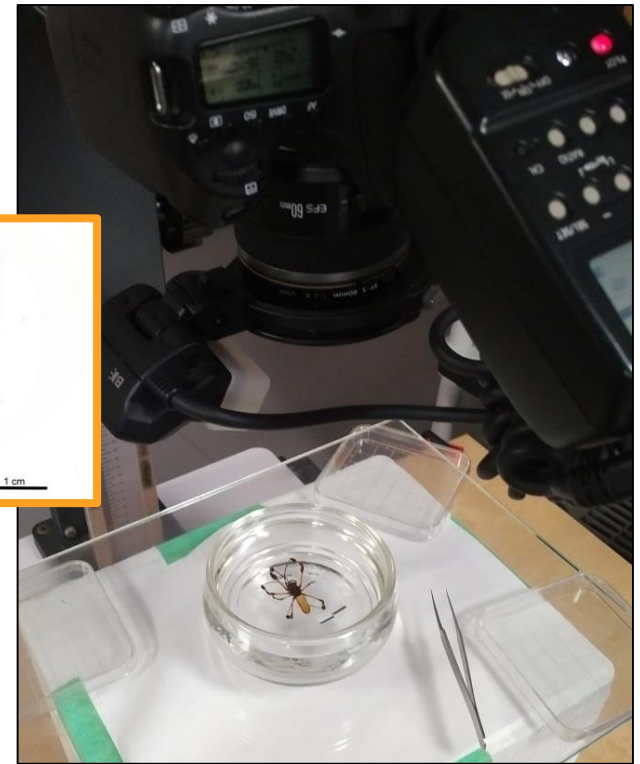
### Equipment

- DSLR camera, standard/macro lens, master flash and two slave flashes
- Styrofoam box with glass
- Copy stand
- Ruler



### Procedure

- Place specimen in shallow dish
- Submerge completely in ethanol



- ⊘ Avoid:** 1) Image distortion from too much fluid – use just enough fluid to cover specimen  
2) Colour balance wrong - white balance with camera or when editing

# Specimen Imaging

## Taxon Specific Guidelines: Fluid Vertebrates

### Equipment

- DSLR camera with a standard lens, master flash and two slave flashes
- Copy stand
- Ruler and colour bar



### Procedure

- Lay specimen flat on glass or
- Place in shallow dish with ethanol
- Include colour bar if necessary

- ⊘ Avoid:** 1) Image distortion from too much fluid = use just enough fluid to cover specimen 2) Colour balance wrong = white balance with camera or when editing



# Specimen Imaging

## Taxon Specific Guidelines: Dry Vertebrates

### Equipment

- DSLR camera, standard lens, master flash and two slave flashes
- White light box
- Copy stand
- Ruler



### Procedure

- Place specimen on flat surface inside light box





# Specimen Imaging

## Taxon Specific Guidelines: Pinned Invertebrates (small)

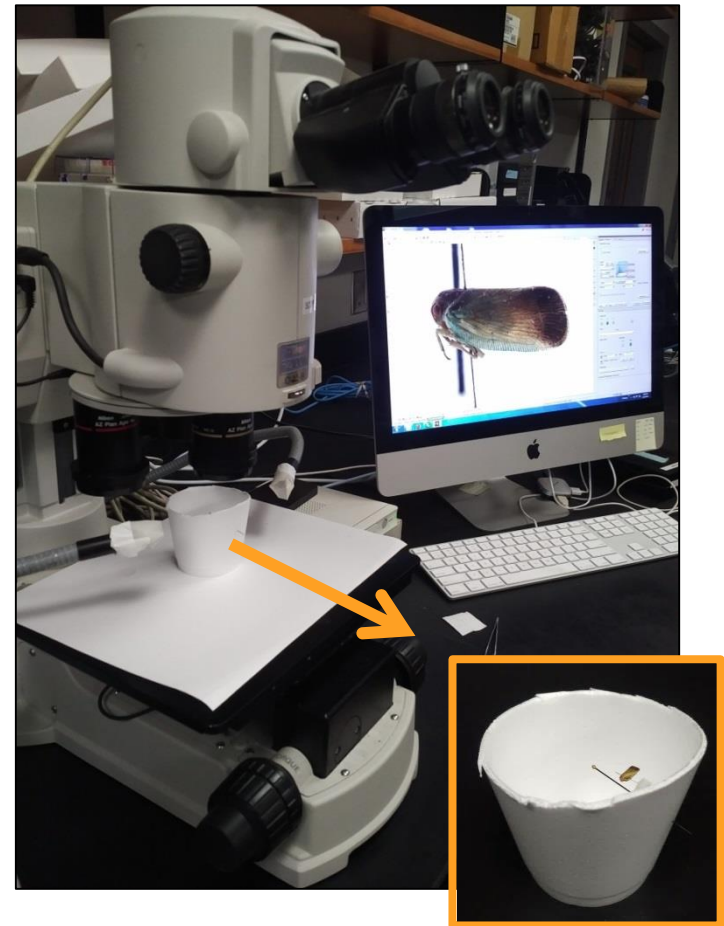
### Equipment

- Automatic z-stacking microscope
- Styrofoam cup
- Goose neck lights

### Procedure

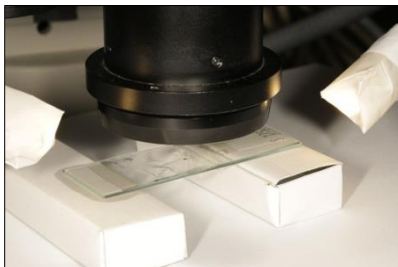
- Pin specimen on cup wall (for lateral) or cup bottom (for dorsal)
- Add calibrated scale

**⊘ Avoid:** Overexposure on shiny specimens - no direct light on specimen



# Specimen Imaging

## Taxon Specific Guidelines: Fluid Invertebrates (small)




### Equipment

- Imaging microscope
- Goose neck lights
- Dish or slide
- Coverslips

### Procedure

- Submerge specimen in ethanol
- For z-stacking use a coverslip to keep specimen still

 **Avoid:** Glare from dish = diffuse light with paper caps on goose necks



# Specimen Imaging


## Taxon Specific Guidelines: Herbarium sheets

### Equipment

- Scanner preferred
- Alternative: DSLR camera, standard lens and external flashes with copy stand

### Procedure

- Scan entire sheet including labels

 **Avoid:** Colour balance wrong – white balance before scanning



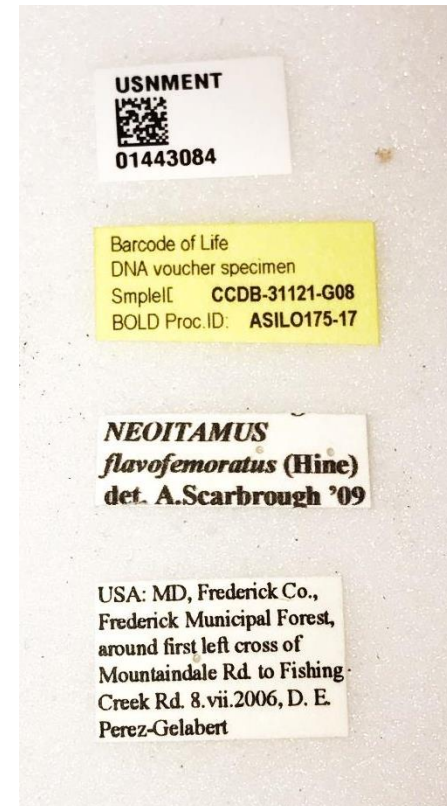
# Specimen Imaging

## Imaging Labels

- Ensure image is bright and in focus
- May be requirement of museum
- Useful to allow digitization to occur off site without borrowing samples
- Useful for labels that can not be digitized, e.g. illegible or in another language
- Useful as verification of data entry

## OCR

- Program that reads text from images
- May reduce entry error but still requires human verification and parsing
- Can be expensive



\* **NOTE** Label order critical

# Specimen Imaging

## Image Editing: General

- Keep original images and copy to a new edit folder
- Crop tightly at a **4x3** aspect ratio
  - Or in original aspect ratio
  - Exception: herbarium sheet
- Limit manipulation

### Editing Software

- Free: GIMP, Paint.NET
- Licensed: ACDSee, Photoshop



# Specimen Imaging

## Image Editing: Poor Examples

**Not cropped**



**Facing wrong direction; dark**



**Incorrect aspect ratio**



**Colour balance off**



# Specimen Imaging

## Image Editing: Quick Tips

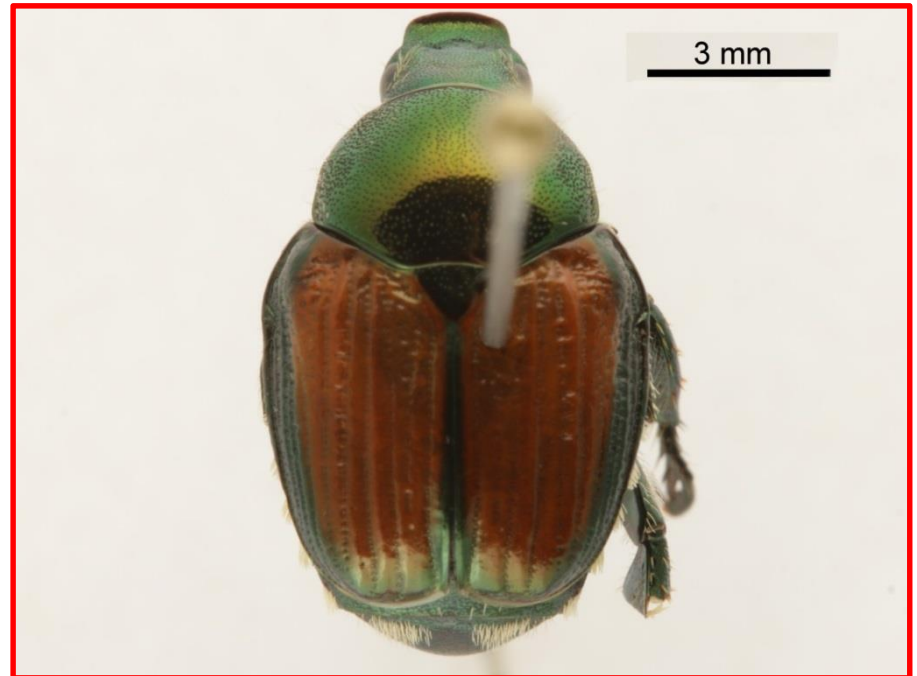
- Create a scale bar



# Specimen Imaging

## Image Editing: Quick Tips

- Create a scale bar
- Crop image (4:3 ratio)

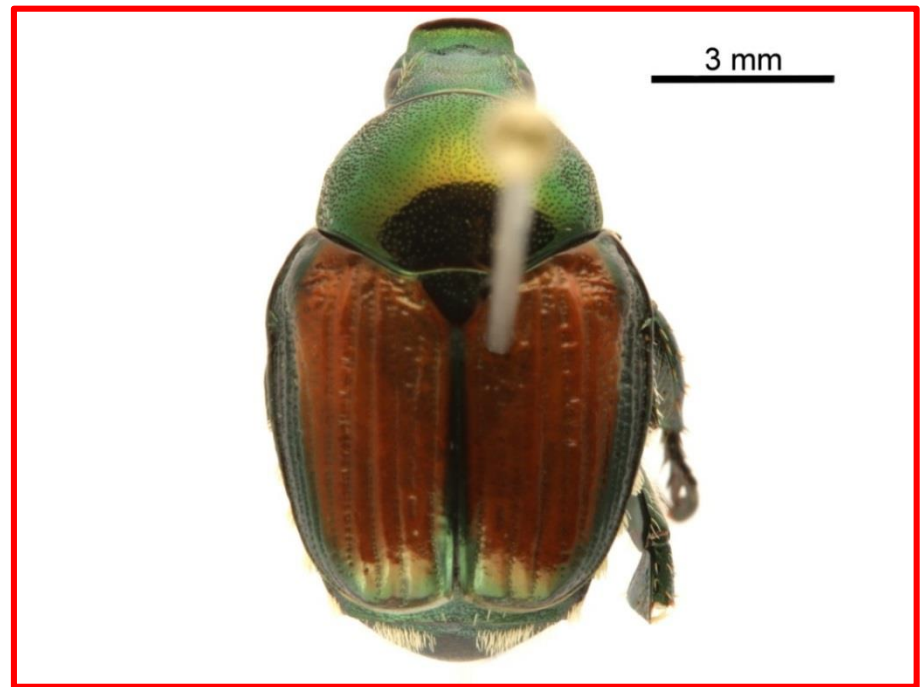




# Specimen Imaging

## Image Editing: Quick Tips

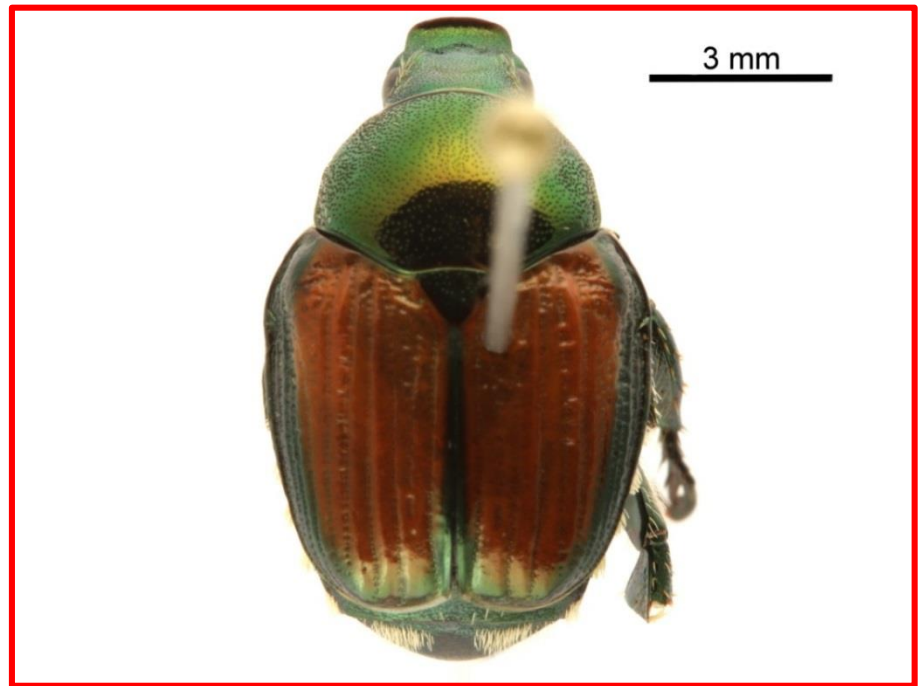
- Create a scale bar
- Crop image (4:3 ratio)
- Exposure/levels



# Specimen Imaging

## Image Editing: Quick Tips

- Create a scale bar
- Crop image (4:3 ratio)
- Exposure/levels
- Use of repair tool
- Rotate Image
- White Balance



# Image Upload

## Image Submission Template

- Links specimen image(s) with specimen record on BOLD
- Links specimen image(s) with image metadata, e.g. Copyright
- Save in folder with images to upload

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Image File	Original Specimen	View Metadata	Caption	Measurement	Measurement Type	Specimen ID	Process ID	Copyright Holder	Copyright License	Copyright Year	Copyright Institution	Copyright Contact	Photographer	
2	CCDB-29463-A01.JPG	yes	Dorsal				CCDB-29463-A01	LNAUW2448-17	CBG Photography Group	CreativeCommons	2017	Centre for Biodiversity Genomics	<a href="mailto:collectionsBIO@gmail.com">collectionsBIO@gmail.com</a>	CBG Photography Group	
3	CCDB-29463-A02.JPG	yes	Dorsal				CCDB-29463-A02	LNAUW2449-17	CBG Photography Group	CreativeCommons	2017	Centre for Biodiversity Genomics	<a href="mailto:collectionsBIO@gmail.com">collectionsBIO@gmail.com</a>	CBG Photography Group	
4	CCDB-29463-A03.JPG	yes	Dorsal				CCDB-29463-A03	LNAUW2450-17	CBG Photography Group	CreativeCommons	2017	Centre for Biodiversity Genomics	<a href="mailto:collectionsBIO@gmail.com">collectionsBIO@gmail.com</a>	CBG Photography Group	
5	CCDB-29463-A04.JPG	yes	Dorsal				CCDB-29463-A04	LNAUW2451-17	CBG Photography Group	CreativeCommons	2017	Centre for Biodiversity Genomics	<a href="mailto:collectionsBIO@gmail.com">collectionsBIO@gmail.com</a>	CBG Photography Group	
6	CCDB-29463-A05.JPG	yes	Dorsal				CCDB-29463-A05	LNAUW2452-17	CBG Photography Group	CreativeCommons	2017	Centre for Biodiversity Genomics	<a href="mailto:collectionsBIO@gmail.com">collectionsBIO@gmail.com</a>	CBG Photography Group	
7	CCDB-29463-A06.JPG	yes	Dorsal				CCDB-29463-A06	LNAUW2453-17	CBG Photography Group	CreativeCommons	2017	Centre for Biodiversity Genomics	<a href="mailto:collectionsBIO@gmail.com">collectionsBIO@gmail.com</a>	CBG Photography Group	
8	CCDB-29463-A07.JPG	yes	Dorsal				CCDB-29463-A07	LNAUW2454-17	CBG Photography Group	CreativeCommons	2017	Centre for Biodiversity Genomics	<a href="mailto:collectionsBIO@gmail.com">collectionsBIO@gmail.com</a>	CBG Photography Group	
9	CCDB-29463-A08.JPG	yes	Dorsal				CCDB-29463-A08	LNAUW2455-17	CBG Photography Group	CreativeCommons	2017	Centre for Biodiversity Genomics	<a href="mailto:collectionsBIO@gmail.com">collectionsBIO@gmail.com</a>	CBG Photography Group	
10	CCDB-29463-A09.JPG	yes	Dorsal				CCDB-29463-A09	LNAUW2456-17	CBG Photography Group	CreativeCommons	2017	Centre for Biodiversity Genomics	<a href="mailto:collectionsBIO@gmail.com">collectionsBIO@gmail.com</a>	CBG Photography Group	
11	CCDB-29463-A10.JPG	yes	Dorsal				CCDB-29463-A10	LNAUW2457-17	CBG Photography Group	CreativeCommons	2017	Centre for Biodiversity Genomics	<a href="mailto:collectionsBIO@gmail.com">collectionsBIO@gmail.com</a>	CBG Photography Group	
12	CCDB-29463-A11.JPG	yes	Dorsal				CCDB-29463-A11	LNAUW2458-17	CBG Photography Group	CreativeCommons	2017	Centre for Biodiversity Genomics	<a href="mailto:collectionsBIO@gmail.com">collectionsBIO@gmail.com</a>	CBG Photography Group	
13	CCDB-29463-A12.JPG	yes	Dorsal				CCDB-29463-A12	LNAUW2459-17	CBG Photography Group	CreativeCommons	2017	Centre for Biodiversity Genomics	<a href="mailto:collectionsBIO@gmail.com">collectionsBIO@gmail.com</a>	CBG Photography Group	
14	CCDB-29463-B01.JPG	yes	Dorsal				CCDB-29463-B01	LNAUW2460-17	CBG Photography Group	CreativeCommons	2017	Centre for Biodiversity Genomics	<a href="mailto:collectionsBIO@gmail.com">collectionsBIO@gmail.com</a>	CBG Photography Group	
15	CCDB-29463-B02.JPG	yes	Dorsal				CCDB-29463-B02	LNAUW2461-17	CBG Photography Group	CreativeCommons	2017	Centre for Biodiversity Genomics	<a href="mailto:collectionsBIO@gmail.com">collectionsBIO@gmail.com</a>	CBG Photography Group	
16	CCDB-29463-B03.JPG	yes	Dorsal				CCDB-29463-B03	LNAUW2462-17	CBG Photography Group	CreativeCommons	2017	Centre for Biodiversity Genomics	<a href="mailto:collectionsBIO@gmail.com">collectionsBIO@gmail.com</a>	CBG Photography Group	
17	CCDB-29463-B04.JPG	yes	Dorsal				CCDB-29463-B04	LNAUW2463-17	CBG Photography Group	CreativeCommons	2017	Centre for Biodiversity Genomics	<a href="mailto:collectionsBIO@gmail.com">collectionsBIO@gmail.com</a>	CBG Photography Group	
18	CCDB-29463-B05.JPG	yes	Dorsal				CCDB-29463-B05	LNAUW2464-17	CBG Photography Group	CreativeCommons	2017	Centre for Biodiversity Genomics	<a href="mailto:collectionsBIO@gmail.com">collectionsBIO@gmail.com</a>	CBG Photography Group	
19	CCDB-29463-B06.JPG	yes	Dorsal				CCDB-29463-B06	LNAUW2465-17	CBG Photography Group	CreativeCommons	2017	Centre for Biodiversity Genomics	<a href="mailto:collectionsBIO@gmail.com">collectionsBIO@gmail.com</a>	CBG Photography Group	
20	CCDB-29463-B07.JPG	yes	Dorsal				CCDB-29463-B07	LNAUW2466-17	CBG Photography Group	CreativeCommons	2017	Centre for Biodiversity Genomics	<a href="mailto:collectionsBIO@gmail.com">collectionsBIO@gmail.com</a>	CBG Photography Group	
21	CCDB-29463-B08.JPG	yes	Dorsal				CCDB-29463-B08	LNAUW2467-17	CBG Photography Group	CreativeCommons	2017	Centre for Biodiversity Genomics	<a href="mailto:collectionsBIO@gmail.com">collectionsBIO@gmail.com</a>	CBG Photography Group	
22	CCDB-29463-B09.JPG	yes	Dorsal				CCDB-29463-B09	LNAUW2468-17	CBG Photography Group	CreativeCommons	2017	Centre for Biodiversity Genomics	<a href="mailto:collectionsBIO@gmail.com">collectionsBIO@gmail.com</a>	CBG Photography Group	
23	CCDB-29463-B10.JPG	yes	Dorsal				CCDB-29463-B10	LNAUW2469-17	CBG Photography Group	CreativeCommons	2017	Centre for Biodiversity Genomics	<a href="mailto:collectionsBIO@gmail.com">collectionsBIO@gmail.com</a>	CBG Photography Group	
24	CCDB-29463-B11.JPG	yes	Dorsal				CCDB-29463-B11	LNAUW2470-17	CBG Photography Group	CreativeCommons	2017	Centre for Biodiversity Genomics	<a href="mailto:collectionsBIO@gmail.com">collectionsBIO@gmail.com</a>	CBG Photography Group	
25	CCDB-29463-B12.JPG	yes	Dorsal				CCDB-29463-B12	LNAUW2471-17	CBG Photography Group	CreativeCommons	2017	Centre for Biodiversity Genomics	<a href="mailto:collectionsBIO@gmail.com">collectionsBIO@gmail.com</a>	CBG Photography Group	

- Can be uploaded through batch submissions on BOLD workbench

# Image Upload

## Image Submission Template Locations

- 1 On BOLD main console  
Uploads → Images → Spreadsheet Templates
  - 2 BOLD Handbook – Image submission protocol  
<http://v4.boldsystems.org/index.php/Resources>
  - 3 CCDB website – <http://ccdb.ca/resources/>
  - 4 CCDB submission package received via Email
- \* **NOTE** BOLD will only accept .xls file format
- \* **NOTE** must be named ImageData.xls (case sensitive)

# Image Upload

## Image Submission Template

Image File	Original Specimen	View Metadata	Caption	Measurement	Measurement Type	Sample ID	Process ID
CCDB-29475-A01.jpg	Yes	Dorsal				CCDB-29475-A01	LNAUW1168-17
CCDB-29475-A02.jpg	Yes	Dorsal				CCDB-29475-A02	LNAUW1169-17
CCDB-29475-A03.jpg	Yes	Lateral				CCDB-29475-A03	LNAUW1170-17

### Image File

- Complete and identical file name of image file
  - Including file extension
  - Case sensitive

\* **NOTE** Image File names that are identical to Sample IDs simplify data entry on the template

# Image Upload

## Image Submission Template

Image File	Original Specimen	View Metadata	Caption	Measurement	Measurement Type	Sample ID	Process ID
CCDB-29475-A01.jpg	Yes	Dorsal				CCDB-29475-A01	LNAUW1168-17
CCDB-29475-A02.jpg	Yes	Dorsal				CCDB-29475-A02	LNAUW1169-17
CCDB-29475-A03.jpg	Yes	Lateral				CCDB-29475-A03	LNAUW1170-17

### Original Specimen

- Enter **Yes** if the image shows the actual specimen for this record. Otherwise enter **No**

# Image Upload

## Image Submission Template

Image File	Original Specimen	View Metadata	Caption	Measurement	Measurement Type	Sample ID	Process ID
CCDB-29475-A01.jpg	Yes	Dorsal				CCDB-29475-A01	LNAUW1168-17
CCDB-29475-A02.jpg	Yes	Dorsal				CCDB-29475-A02	LNAUW1169-17
CCDB-29475-A03.jpg	Yes	Lateral				CCDB-29475-A03	LNAUW1170-17

### View Metadata

- Controlled Vocabulary: Dorsal, Ventral or Lateral
- Other Standard Orientations on BOLD are:
  - Larva, Eggs, Branch, Flower, Leaf, Stem, Habitat, Collection Site, Fruit, Genitalia, Wing, Pupal Casing, Blind Side, Eyed Side, Apical, Basal, Apertural, Abapertural

# Image Upload

## Image Submission Template

Image File	Original Specimen	View Metadata	Caption	Measurement	Measurement Type	Sample ID	Process ID
CCDB-29475-A01.jpg	Yes	Dorsal				CCDB-29475-A01	LNAUW1168-17
CCDB-29475-A02.jpg	Yes	Dorsal				CCDB-29475-A02	LNAUW1169-17
CCDB-29475-A03.jpg	Yes	Lateral				CCDB-29475-A03	LNAUW1170-17

- **Caption:** Short descriptions are recommended: i.e. part of organism photographed, life stage, sex, etc. (400 char max)
- **Measurement:** Any relevant measurement taken in metric units
- **Measurement Type:** Item or feature that was measured

\* **NOTE** these fields are not required



# Image Upload

## Image Submission Template

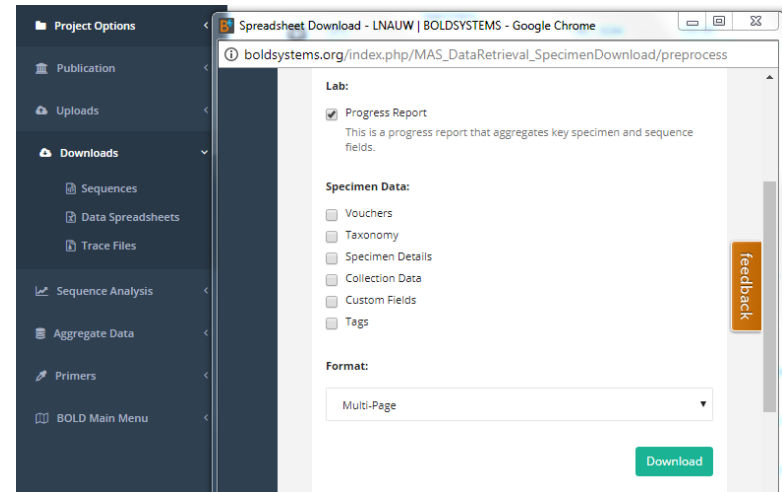
Image File	Original Specimen	View Metadata	Caption	Measurement	Measurement Type	Sample ID	Process ID
CCDB-29475-A01.jpg	Yes	Dorsal				CCDB-29475-A01	LNAUW1168-17
CCDB-29475-A02.jpg	Yes	Dorsal				CCDB-29475-A02	LNAUW1169-17
CCDB-29475-A03.jpg	Yes	Lateral				CCDB-29475-A03	LNAUW1170-17

- **Sample ID:**

- Sample ID for record  
e.g. CCDB-00000-A01

- **Process ID:**

- Generated by BOLD
- Download data spreadsheets to get list



# Image Upload

## Image Submission Template

Process ID	License Holder	License	License year	License Institution	License Contact	Photographer
LNAUW1168-17	CBG Photography Group	by-nc-sa	2017	Centre for Biodiversity Genomics	collectionsBIO@gmail.com	CBG Photography Group
LNAUW1169-17	CBG Photography Group	by-nc-sa	2017	Centre for Biodiversity Genomics	collectionsBIO@gmail.com	CBG Photography Group
LNAUW1170-17	CBG Photography Group	by-nc-sa	2017	Centre for Biodiversity Genomics	collectionsBIO@gmail.com	CBG Photography Group

### • License:

- Copyright (c)
- No Rights Reserved (nrr)
- CreativeCommons-Attribution (by)
- CreativeCommons-Attribution Share-Alike (by-sa)
- CreativeCommons-Attribution No Derivatives (by-nd)
- CreativeCommons-Attribution Non-Commercial (by-nc)
- CreativeCommons-Attribution Non-Commercial Share-Alike (by-nc-sa)
- CreativeCommons-Attribution Non-Commercial No Derivatives (by-nc-dc)

# Image Upload

## Image Submission Template

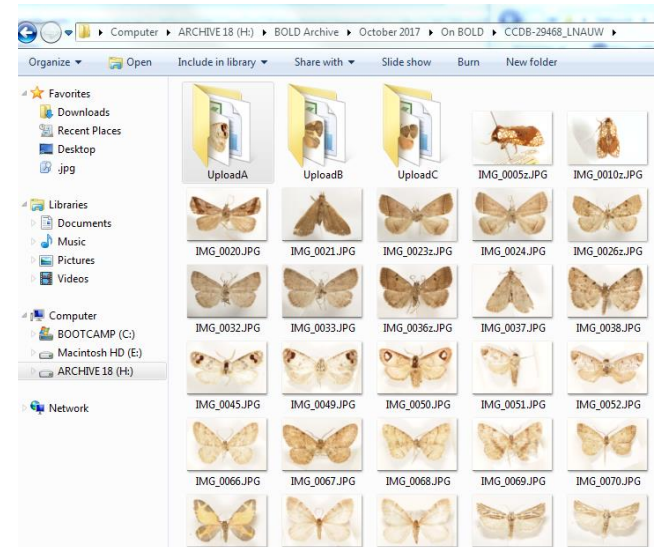
Process ID	License Holder	License	License year	License Institution	License Contact	Photographer
LNAUW1168-17	CBG Photography Group	by-nc-sa	2017	Centre for Biodiversity Genomics	collectionsBIO@gmail.com	CBG Photography Group
LNAUW1169-17	CBG Photography Group	by-nc-sa	2017	Centre for Biodiversity Genomics	collectionsBIO@gmail.com	CBG Photography Group
LNAUW1170-17	CBG Photography Group	by-nc-sa	2017	Centre for Biodiversity Genomics	collectionsBIO@gmail.com	CBG Photography Group

- **License Holder:** The primary individual holder of the license
- **License Year:** The year of license declaration (not the year of submission to BOLD)
- **License Institution & Contact:** The primary license holder's institution and contact information (email, mailing address, phone number etc.)
- **Photographer:** The individual or team responsible for photographing and editing the media prior to submission

# Image Upload

## Image Submission Package

- Ensure all images and “ImageData.xls” spreadsheet are in same folder
- Select folder and compress into zipped folder (WinZip, Winrar)
- **Max of 10 images per Sample ID**
  - Lateral, dorsal, ventral etc
- **Max of 199 MB per zipped folder**
  - Split into separate folders if too large
- **BOLD only accepts jpgs**
  - Consider museums requirements = may need to image in a different format (e.g. tiff) and convert before uploading



# Image Upload

## Image Submission to BOLD

**BOLDSYSTEMS**

Monica R. Young

Main Console

Projects

Checklists

Primers

BOLD Main Menu

Project & Dataset Search

Code Record Search

Welcome to BOLD Systems

Home / BOLD Main Console

**Projects** New Project

709 Projects with access

**Specimens**

1069502 Records with access

148437 Barcodes with access

**Uploads**

Sequences Traces **Images** Primers Publication Checklist

**Your Datasets: 61** New Dataset

Code	Title	Specimens
DATASET-MTBAR12	Revealing the Hyperdiverse Mite Fauna of Subarctic Canada through DNA Barcoding <small>COI-SP[6230]</small>	6291
DATASET-MTBAR12N	Revealing the Hyperdiverse Mite Fauna of Subarctic Canada through DNA Barcoding Aug 8 2012 <small>COI-SP[6279]</small>	6279
DATASET-MYCOMP12	Comparison of CO1 in Arachnids - full <small>COI-SP[1627]</small>	1627
DS-161101	2016-11-01 WMON <small>COI-SP[1549]</small>	1603
DS-CNGLOR	Gloridonus of CNC <small>COI-SP[80]</small>	80
DS-CUNG	Global Cunaxidae <small>COI-SP[309]</small>	309
DS-FALL16	2016-Sept-11	1237

**Recently Accessed** Top 20

Code	Title	Specimens	Accessed
DS-IXSCA	Ixodes scapularis <small>COI-SP[1]</small>	1	1 day ago
TJSD	Ticks of John D. Scott Collection <small>COI-SP[16]</small>	17	2 days ago
SMINA	Soil Mites of Israel in Natural and Agricultural Systems <small>COI-SP[83]</small>	285	7 days ago
MYMCA	Terrestrial Mites of Churchill 2010 <small>COI-SP[1027]</small>	1499	8 days ago
CHACA	Mites of Churchill <small>COI-SP[608]</small>	882	8 days ago
DS-WMON2	Water mites of Ontario Dataset <small>COI-SP[1543]</small>	1597	20+ days ago
ELPCG	Fel Lake - South Frontenac - General Collecting	10000	20+ days

\* **NOTE** Email support@boldsystems.org to delete images

# Pre-lab Processing

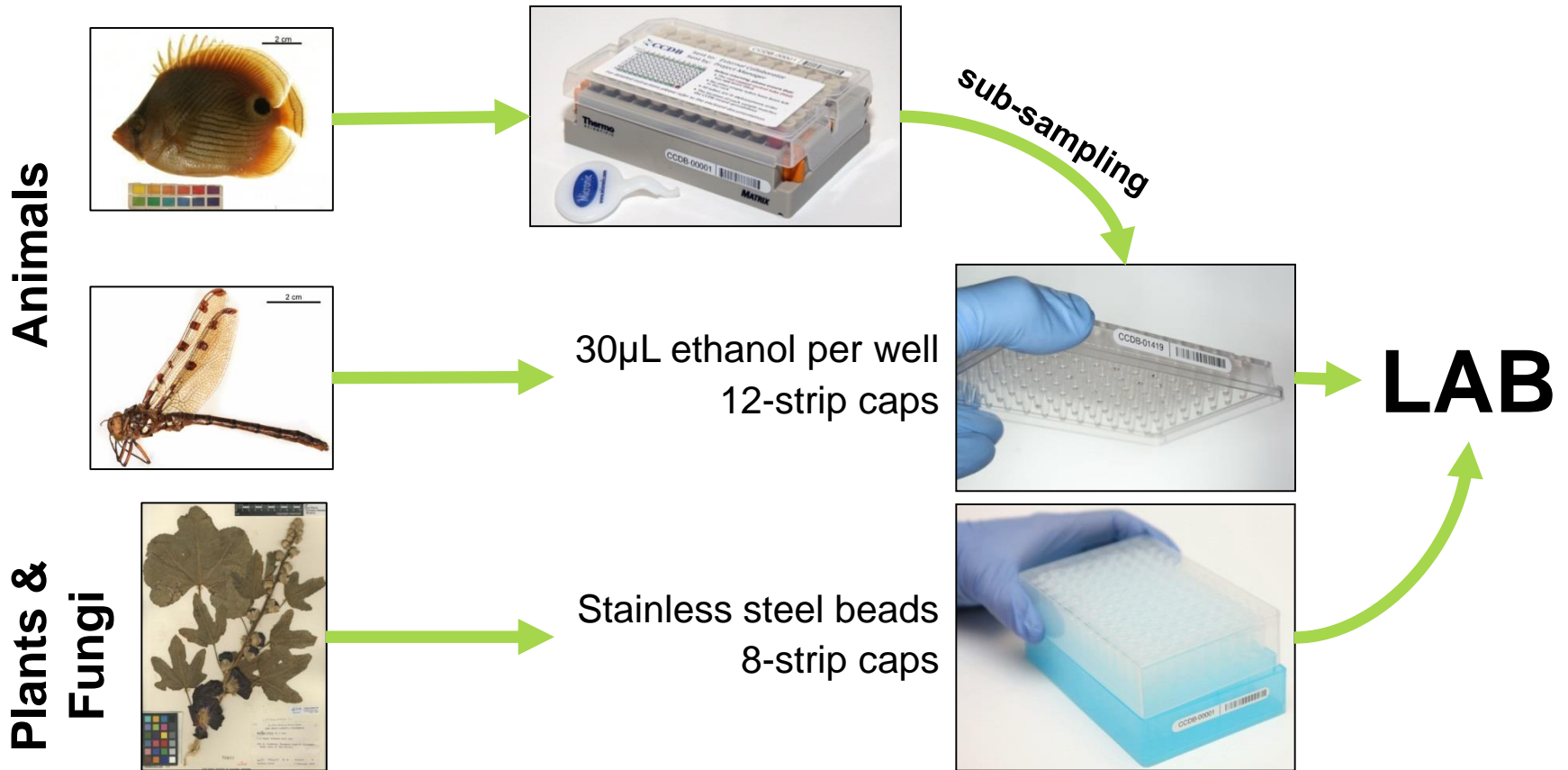
Tissue Sampling

Lab Submission

Voucher Recovery

# Tissue Sampling

## Sampling Media



\* **NOTE** For DNA extracts and PCR products see CCDB protocols

# Tissue Sampling

## Procedure

### 1 Clean sampling station and prepare required items:

- Sterilization tools (e.g. gloves, ethanol)
- Sampling tools (e.g. forceps, scissors, microscope, petri dish)
- Sampling media with label
  - **Microplate:** Add 30uL of ethanol per well, affix 12-strip caps in proper orientation
  - **Tube rack:** Add stainless steel bead to each tube; 2<sup>nd</sup> rack (empty) useful for sampling
- **Other useful items to have on hand:**  
Kimwipes, gel caps, tube decapper





# Tissue Sampling

## Procedure

### 2 Sterilize tools before starting & after each specimen

#### Ethanol + Flame

(DNA-poor tissue)

- Most invertebrates
- Plants



#### ELIMINase + 3X Water

(DNA-rich tissue)

- Vertebrates
- Large marine invertebrates



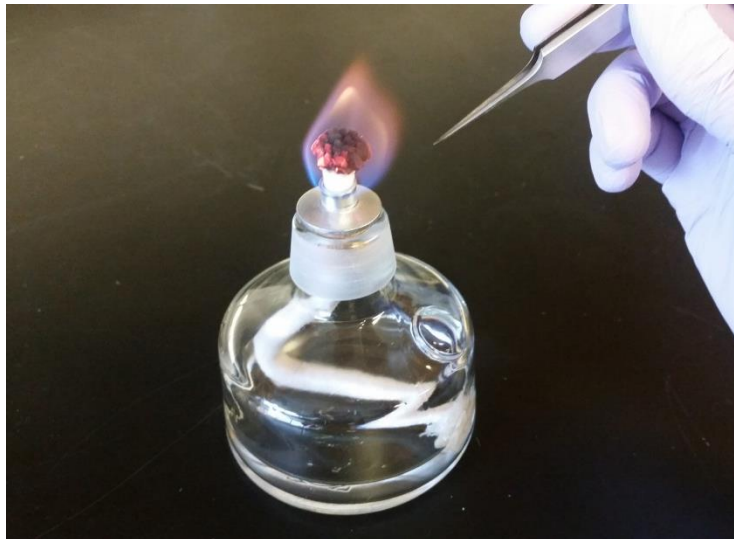
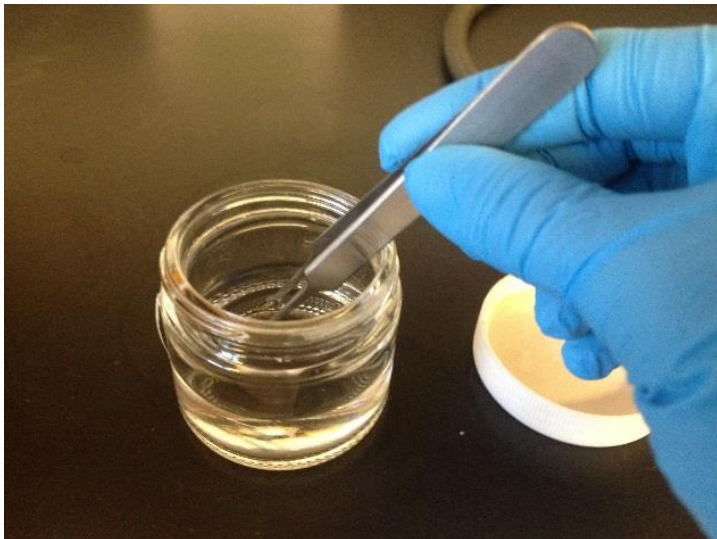
# Tissue Sampling

## Procedure

### 2 Sterilize tools before starting & after each specimen

#### Flame sterilization

- Dip forceps into high concentration ethanol then pass them through flame *quickly* to burn off the ethanol



# Tissue Sampling

## Procedure

- 2 **Sterilize tools before starting & after each specimen**  
Flame sterilization



### FIRE RISKS

- Ethanol fires **CANNOT** be put out by water
- Must cover ethanol jar or use fire extinguisher

✓ Tie back loose hair and clothing

Look at forceps and ensure flame is completely out before sampling next specimen

Extinguish flame when finished or when you leave the room



**NEVER** fill ethanol jar more than half way full

**NEVER** flick forceps when sterilizing

**NEVER** leave forceps standing in ethanol sterilization jar

# Tissue Sampling

## Procedure

- 2 Sterilize tools before starting & after each specimen ELIMINase sterilization**



- **Label jars to avoid error**
- **Water levels should be higher than ELIMINase levels to ensure thorough rinse**

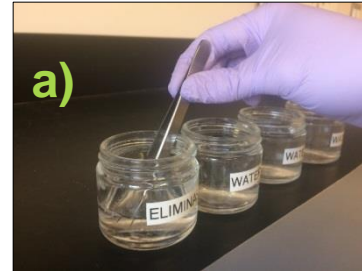
# Tissue Sampling

## Procedure

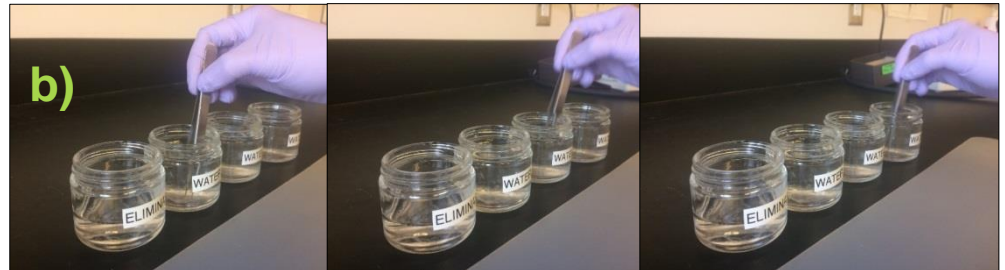
### 2 Sterilize tools before starting & after each specimen

ELIMINase sterilization

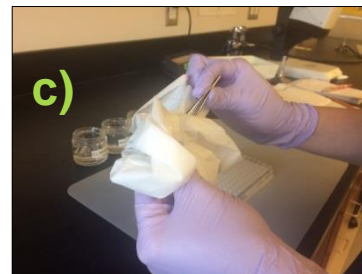
a) Stir forceps in ELIMINase jar for 1 second



b) Then rinse in 3 different jars with deionized water



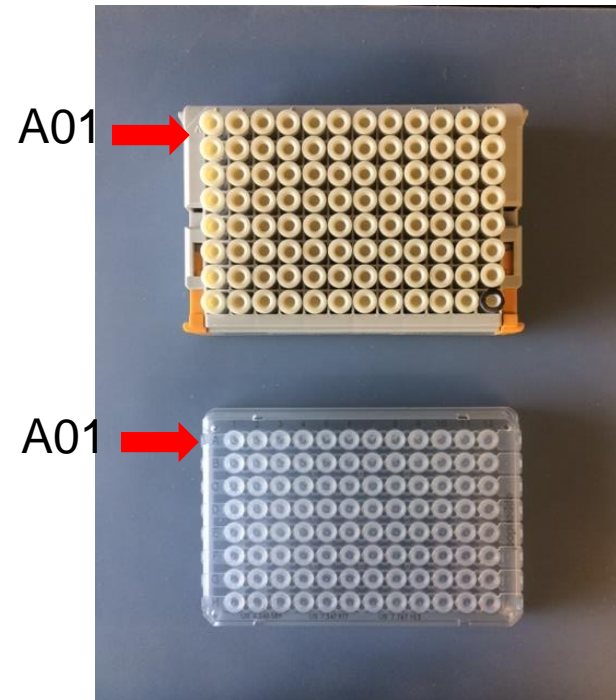
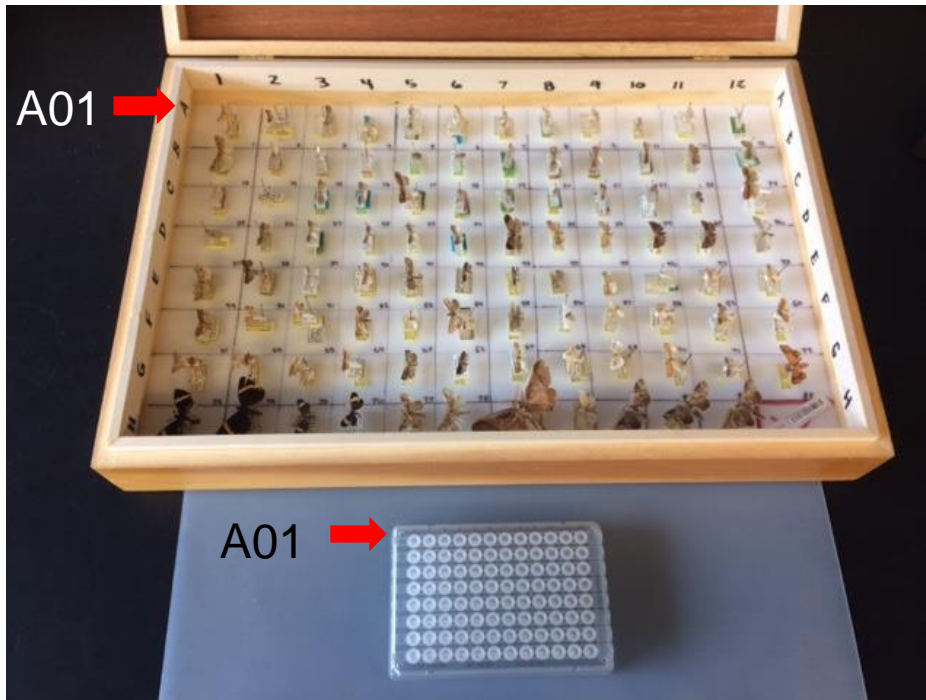
c) Wipe with clean Kimwipe before proceeding



# Tissue Sampling

## Procedure

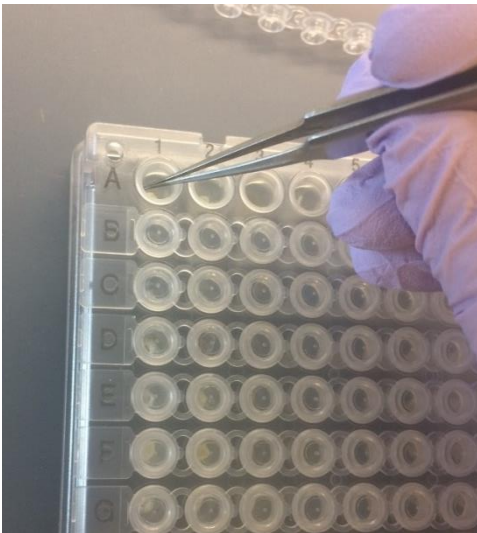
- 3 Arrange samples by sampling order. If arrayed, place plate and array in same orientation



# Tissue Sampling

## Procedure

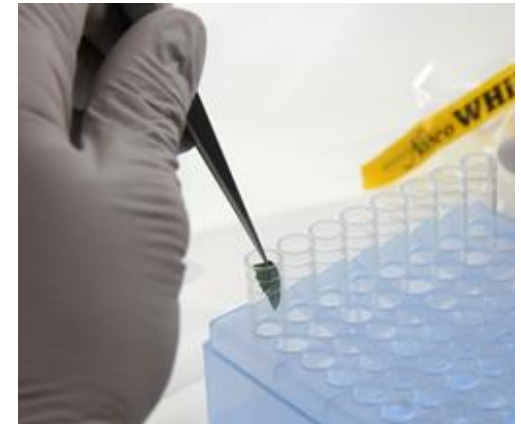
### 4 Take tissue sample from specimen and place into corresponding well/tube



- Consider museum requirements
- Remove **ONE strip cap** at a time to prevent cross-contamination

**DO NOT** place foreign objects into wells (e.g. labels)

**NEVER** remove and replace samples



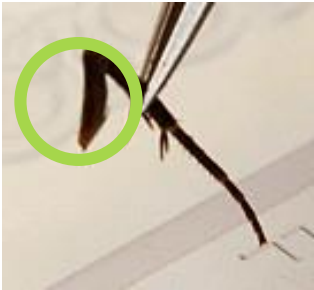
# Tissue Sampling

## Procedure

- 4 Take tissue sample from specimen and place into corresponding well/tube

### Large Arthropods

- Tibia or femur **only** (~2-4mm)




- Target right side of specimen  
(middle leg → front leg → back leg)

### Small Arthropods

- Whole leg or antenna (~5-6mm)



-  **DO NOT** take front legs on spiders (may damage pedipalps)



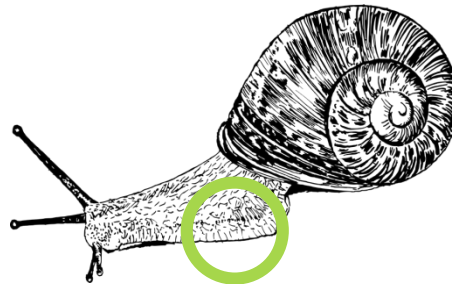
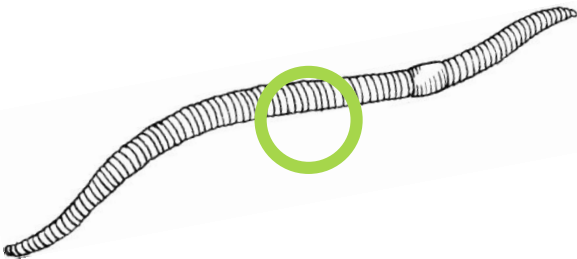
# Tissue Sampling

## Procedure

- 4 Take tissue sample from specimen and place into corresponding well/tube

### Worms, Gastropods, Marine invertebrates & Arthropod larvae without legs

- Dense tissue (muscle) from region not critical for identification (~8mm<sup>3</sup> or 2mm in diameter)



# Tissue Sampling

## Procedure

- 4 Take tissue sample from specimen and place into corresponding well/tube



\* Tissue size critical!!

## Plants

- Coin-sized leafy material, chlorophyll-rich (~3-4mm in diameter)



## Fungi

- Stem (~3-4mm in diameter)



# Tissue Sampling

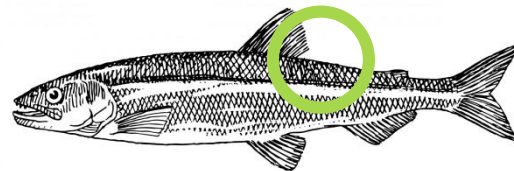
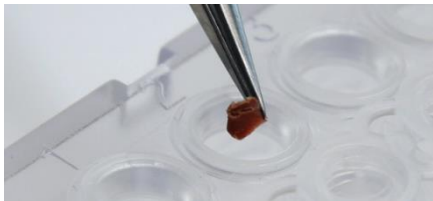
## Procedure

- 4 Take tissue sample from specimen and place into corresponding well/tube

### Vertebrates

- Muscle, e.g. leg or fin region, fin clips (~8mm<sup>3</sup> or 2mm in diameter)
- Skin or body wall (3-4mm in diameter)
- Avoid excessive tissue!

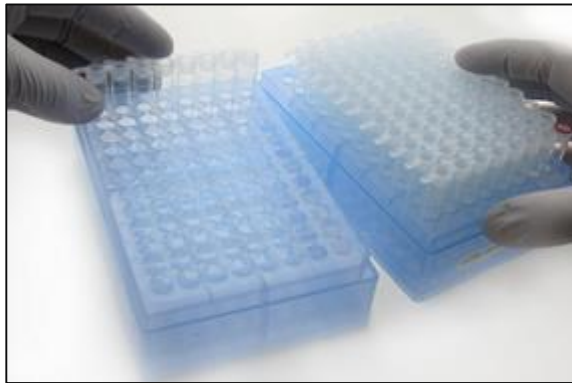
**DO NOT** take tissue from gut, liver, or other internal organs



# Tissue Sampling

## Procedure

- 5 Sterilize tools between each sample (step 2)!
- 6 Keep track of which specimens have been tissue sampled
  - Confirm that tissue remains in the appropriate well (especially for small tissue)



\* **NOTE:** Use 2<sup>nd</sup> tube rack

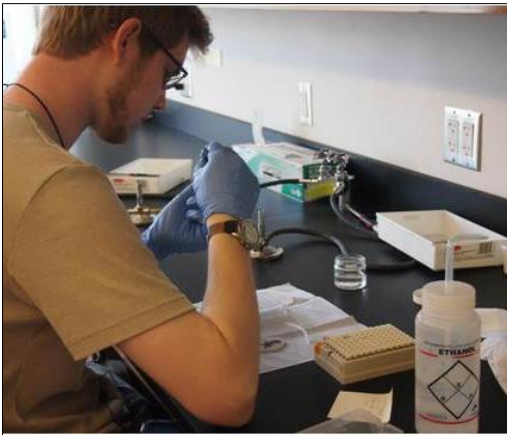


\* **NOTE:** Change specimen position or pinned orientation

# Tissue Sampling

## Procedure

- 7 Finish sampling entire array and store microplate/tube rack in cool dry place or freezer**
  - Ensure all cap strips are pressed firmly into the wells/tubes
  - Examine microplate from underneath, check for any empty wells!



**⊘ DO NOT fill control well (H12 or A12) – negative control**

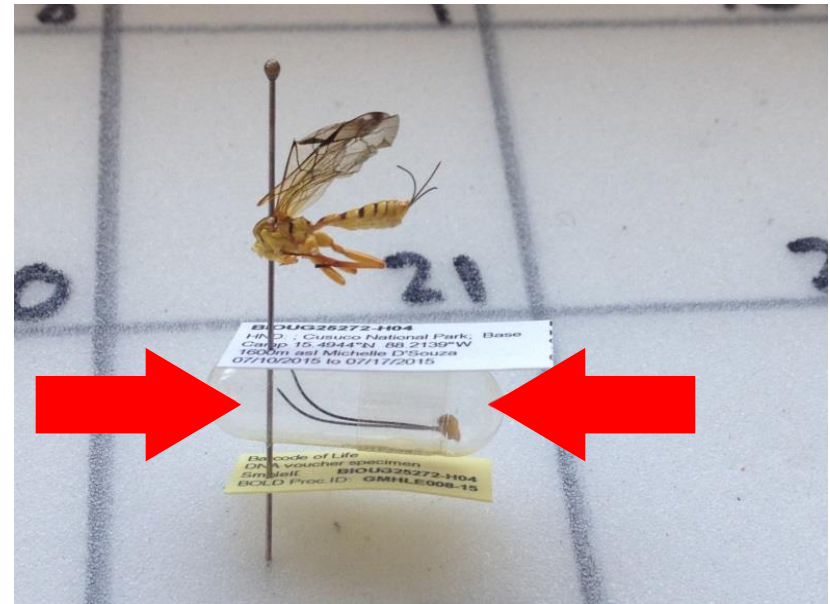
# Tissue Sampling

## Best Practices

- Always keep tissue sampling area clean to avoid contamination


 **DO NOT** sample over microplate/tube rack

- If you break a specimen:
  - Report to museum, they may want to glue back on or put in gel cap
  - Keep all specimen pieces together on same pin
  - Place above DNA label



# Tissue Sampling

## Best Practices

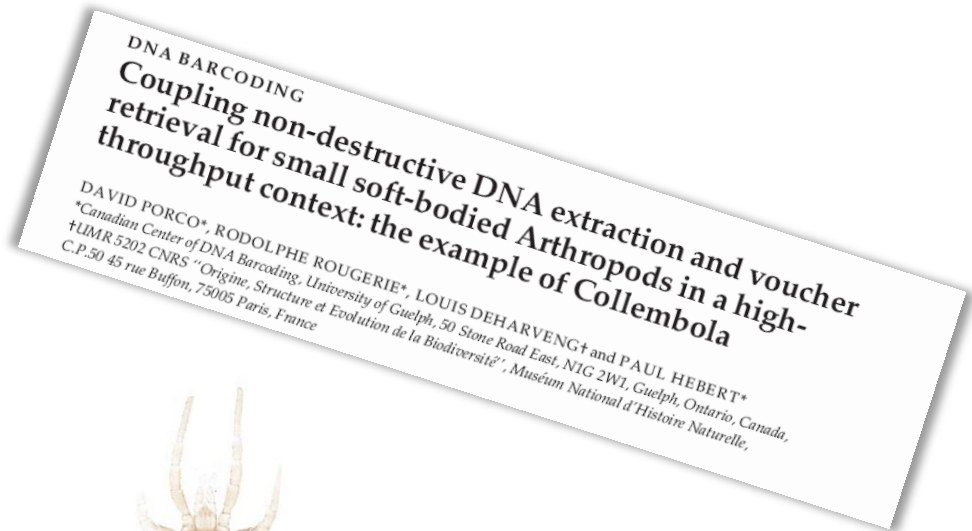
- **If you placed a tissue sample in the incorrect well:**
  - Ideally, start again with a new microplate or tube strip
-  **NEVER** remove and replace tissue samples!
- **If flame and ELIMINase are not permitted:**
  - Dip forceps in ethanol and wipe with a clean Kimwipe between samples

# Tissue Sampling

## Special Case: Whole Voucher Lysis

### Minute Invertebrates

- Place entire specimen into microplate (<3mm)
- Voucher recovery protocol



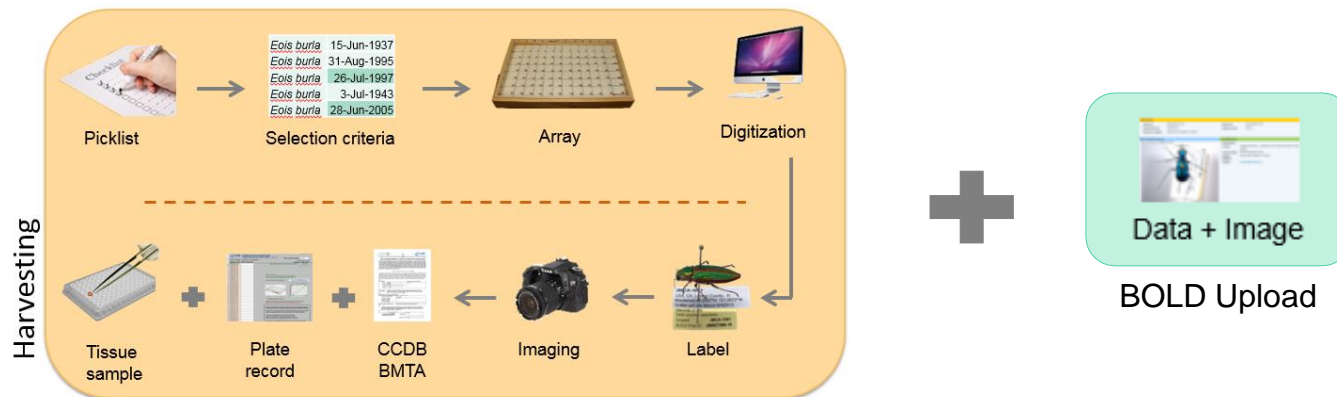
**!** **Destructive Sampling**  
Discuss with museum **FIRST**

Can also be used to  
recover tissue if  
requested by museum





# Lab Submission

- **Check that ALL prior steps are complete:**
  - ❑ Data submitted to BOLD
  - ❑ Plate map generated
  - ❑ Specimens have barcode labels
  - ❑ Images taken and uploaded to BOLD
  - ❑ 95 tissue samples in microplate/plant tube rack



# Lab Submission

- **Review and complete 3<sup>rd</sup> party agreement with molecular lab**
  - Ensure consistency with original donor institution agreement
  - Ownership and storage of DNA extracts
  - Submission protocols
- **CCDB services:**
  - DNA extracts and PCR products for sequencing (different protocols)
  - Voucher/tissue recovery
    - must be indicated BEFORE processing
  - DNA repatriation
    - can be requested AFTER processing

**IBOL Biological Material Transfer and Data Policy Agreement**

*Unless explicitly negotiated otherwise, all biological materials shipped to the Biodiversity Institute of Ontario fall under the standard provisions of the IBOL Biological Material Transfer Agreement (v. 2009-07), and all data submitted to BOLD and generated by the Canadian Centre for DNA Barcoding (CCDB) will comply with the IBOL Data & Resource Sharing Policies (v. 2009-07). Full texts can be downloaded from the IBOL website at <http://www.ibolproject.org> or requested from your contact person at the CCDB or IBOL Theme Coordinator. A synopsis of these documents is provided overleaf. Please acknowledge that you have read and agreed to these conditions by filling out and signing the Implementing Letter below either in electronic or hard copy form.*

**IMPLEMENTING LETTER**

*The purpose of this letter is to provide a record of the biological material transfer and to memorialize the agreement between the Provider of biological materials (identified below) and the Canadian Centre for DNA Barcoding to abide by the terms and conditions of the IBOL Biological Material Transfer Agreement (v. 2009-07) and the IBOL Data & Resource Sharing Policies (v. 2009-07). The Implementing Letter becomes effective when filled and signed by the Provider. The parties executing this Implementing Letter certify that their respective organisations have accepted and further agree to be bound by these terms for the transfer specified below.*

**1. Provider**

Name	_____	Organization name and address	_____
Position	_____		
Phone	_____		
E-mail	_____		

**2. Recipient:** Canadian Centre for DNA Barcoding, Biodiversity Institute of Ontario  
University of Guelph, 579 Gordon Street, Guelph, Ontario, Canada N1G 2W1  
Phone: +1 (519) 8242-4120 ext. 56393

**3. Description of Biological Materials**

Type of material sent:	Comments:
<input type="checkbox"/> whole voucher <input type="checkbox"/> tissue sample <input type="checkbox"/> DNA extract <input type="checkbox"/> PCR product	_____

**4. IBOL Theme / Workgroup:**

*"I hereby certify that I have read and agree to abide by the terms and conditions of the IBOL Biological Material Transfer Agreement (v. 2009-07) and the IBOL Data & Resource Sharing Policies (v. 2009-07)"*

On behalf of the Provider of Biological Materials: \_\_\_\_\_ Signature: \_\_\_\_\_  
Date signed: \_\_\_\_\_

# Lab Submission

## Transportation

- Include necessary documentation
  - **Customs declaration**
  - **Loan documents**
  - **Export permits**

**CBG** Centre for Biodiversity Genomics, University of Guelph  
50 Stone Rd. East, Guelph, Ontario, Canada N1G 2W1  
Tel: +1 519 824-4120 ext. 53600, Fax: +1 519 824-5703

**Shipping documentation / Customs declaration**  
"scientific research specimens; no commercial value"

This package contains dead insect museum specimens for scientific research, preserved in 95% Ethanol (UN1170, PG II) (for Latin species names refer to included loan agreement). Preserved specimens packed are not subject to the initial selection list of products for veterinary checks at border inspection posts under Art. 3 Council Directive 2007/275/EC, Annex I, EX 9705 00 00. Preservation of specimens agrees with requirements for Safe Treatment laid down in Point (5) (a) (ii) in the ANNEX to the Commission Regulation (EU) No 294/2013, amending Commission Regulation (EU) No 142/2011, ANNEX XIII, CHAPTER VI.

**Transfer of scientific specimens**  
From:  
Centre for Biodiversity Genomics, Collections unit (BIOUT)  
50 Stone Rd. East, Guelph, Ontario, N1G 2W1  
Canada

To:  
Stefan Schmidt  
Zoologische Staatssammlung München  
Münchhausenerstr. 21  
D-81247 München  
Germany  
+49 (0)89-8107 159

**Important**  
**Postal inspectors:** This package contains dead preserved insects for scientific research without any commercial value. If this shipment is inspected, it is **ABSOLUTELY SUPERVISED** that enclosed samples/labels are returned into their boxes and repacked shock-proof. **DO NOT REMOVE** samples/specimens from the vials or boxes! The material may easily become useless for scientific research. It is **ABSOLUTELY SUPERVISED** that all specimens remain intact and that they remain in their vials and boxes. We thank you very much for taking care of this important scientific resource.

staatliche naturwissenschaftliche sammlungen bayern

Freistaat Bayern, staatliche naturwissenschaftliche sammlungen bayern  
The Bavarian State Collection of Zoology, Hansstraußen 21, 81247 München (Germany)  
at: Berta Schwarz, Bismarckstr. 104, 80333 Ludwigsmaxhausen, Tel: +49 10 107-105, Fax: +49 10 107-102

**Shipping documentation / Customs declaration**  
"scientific research specimens, not restricted, special provision A180 applies"

**For your Attention: include this legal document ACCESSIBLE on the OUTSIDE of your SHIPMENT when returning this loan!**

This package contains dead insects for scientific research, preserved in 95% Ethanol (UN1170, PG II), these specimens are not infectious due to the preservation technique. Preservation agrees with requirements for SAFE TREATMENT laid down in Point (5) (a) (ii) in the ANNEX to the Commission Regulation (EU) No 294/2013, amending Commission Regulation (EU) No 142/2011, ANNEX XIII, CHAPTER VI. The package contains no endangered or vulnerable species. The specimens packed are returned from loan for biodiversity (morphological / taxonomic) research and legally belong to the State of Bavaria (Country of Origin: Germany); no commercial value, not for resale.

HS-Code: 9706 00 (Collection of zoological / botanical / mineralogical / archaeological / paleontological interest)

Declared value: 5,00 €

*Stefan Schmidt*  
I.A. S. Schmidt

**Important**  
**Postinspektoren:** This package contains dead preserved insects for scientific research without any commercial value. If this shipment is inspected, it is **ABSOLUTELY SUPERVISED** that enclosed samples/labels are returned into their boxes and repacked shock-proof. **DO NOT REMOVE** samples/specimens from the vials or boxes! The material may easily become useless for scientific research. It is **ABSOLUTELY SUPERVISED** that all specimens remain intact and that they remain in their vials and boxes. We thank you very much for taking care of this important scientific resource.

**Wichtig**  
**Postinspektoren:** Diese Pakete enthalten tote, konservierte Insekten für wissenschaftliche Zwecke ohne geschäftlichen Wert. Sollte diese Sendung inspektiert werden, sind die eingeschickten Proben/etiketten in die Originalverpackung zurückzugeben und die Proben/etiketten in die eingeschickten Behälter zurückzugeben und einzeln verpackt wieder Postwertlos zu versenden. Das Material kann leicht für wissenschaftliche Untersuchungen unbrauchbar werden. Es ist **ABSOLUTELY SUPERVISED**, dass die Proben in den Originalbehältern und nicht aus den Behältern entfernt werden. Es ist **ABSOLUTELY SUPERVISED**, dass alle Proben in den Originalbehältern und nicht aus den Behältern entfernt werden. Wir danken Sie sehr herzlich für Ihre Beachtung und Sorgfalt bei dem Umgang mit diesen wissenschaftlichen Ressourcen.

Fachbehörde für das Waiblinger Amtschreiberwesen und Bundesamtsschutzgesetz Sachgebiet "alle Tiere" (Bundesamt für Naturschutz) 22 77 2009, Nr. 151, 1415 01
Technical authority for the Convention on International Trade in Endangered Species of Wild Fauna and Flora, Bonn (Germany) CITES - No. DE 202-01
Registered scientific research organisations (Germany, for exchange of NATIVE Australian species - Reg. No. - DE 118A (Australian Government, Department of the Environment, Water, Heritage and the Arts) Zellnummer DE44 10 667
Zulassung der Zollabfertigung nach vereinfachter Zollabfertigung, Warengruppe 2 (zoologische und botanische Sammlungsstücke, Ziffer 9706 00) zum Zollausgangnummer DE 7600 / 51 / 0011, HZA München
Gestaltungsort: Gesamtinspektion der Staatlichen Naturwissenschaftlichen Sammlungen Bayerns, Menzinger Str. 1, 80483 München

- Mark as "Scientific research specimens, no commercial value"

# Lab Submission

## Transportation

- **Microplates:**

- Ensure caps are securely fastened and seal plates in 'ziplock' back
- Mark as "Scientific research specimens, not restricted Special Provision A180 applies"

- **Plant tube racks:**

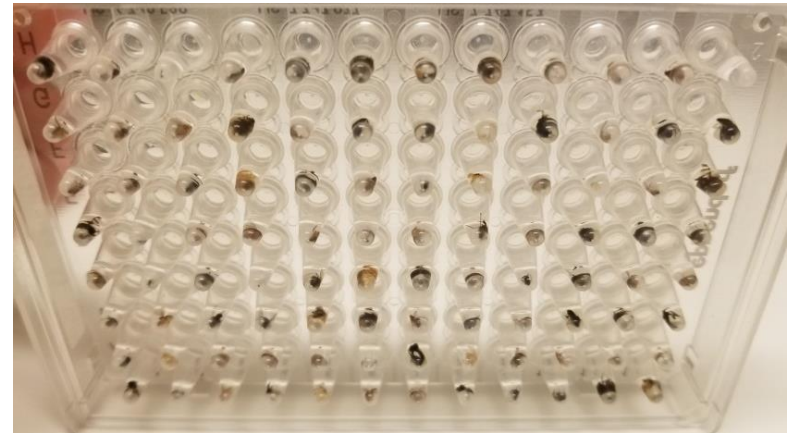
- Secure box lid with pieces of lab tape



- Consider transporting in a cooling container if necessary

# Post-Extraction: Voucher Recovery

- **Recover specimens or tissue** (exoskeletal parts) **after lysis in the lab**
- **Taxa with reduced recovery**
  - Zooplankton
  - Collembola
  - Mites
  - Soft-bodied flies
- If specimen is destroyed, BOLD “Voucher Status” field is updated to **“E-vouchered: DNA/tissue+photo”**



**Return to museum after ALL processing is complete**  
(ie. sequencing and BOLD data validation)

# Voucher Recovery

## Procedure

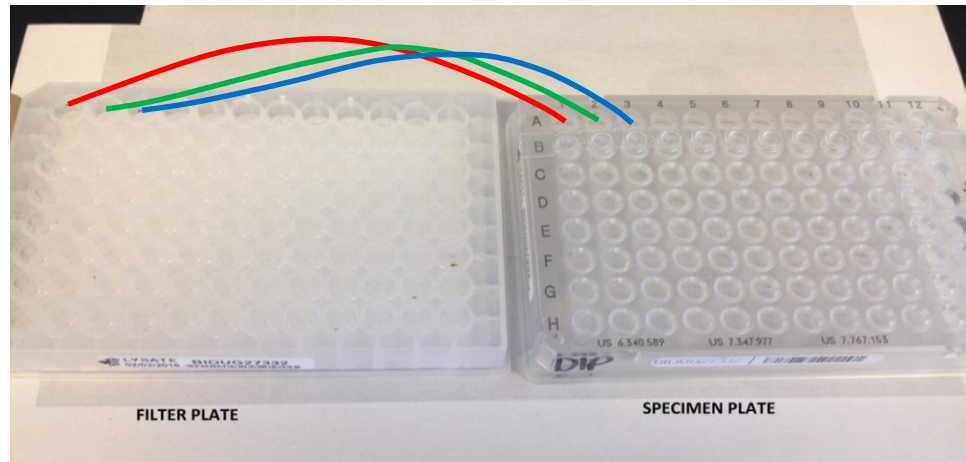
- 1 Original microplate and accompanying filter plate obtained from the lab after lysis
- 2 Remove foil slowly from both plates
  - Check for specimens stuck to foil and move them back into corresponding well



# Voucher Recovery

## Procedure

- 3 Under a microscope, look through each well of a filter plate and transfer specimens to corresponding well in specimen plate

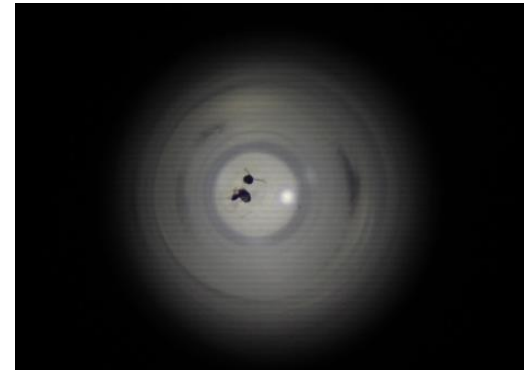
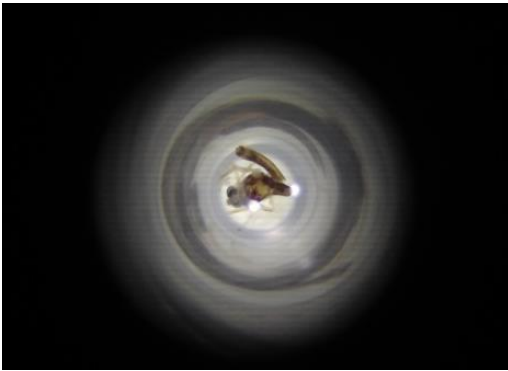


- 4 After all specimens removed from filter plate, move on to specimen plate.

# Voucher Recovery

## Procedure

- 5 Check all wells under the microscope to confirm that there are specimens in each well
  - Specimen considered **destroyed** if:
    - No specimen in well
    - Specimen not recognizable at order level



\* **NOTE** damaged specimens and inform museum if required.

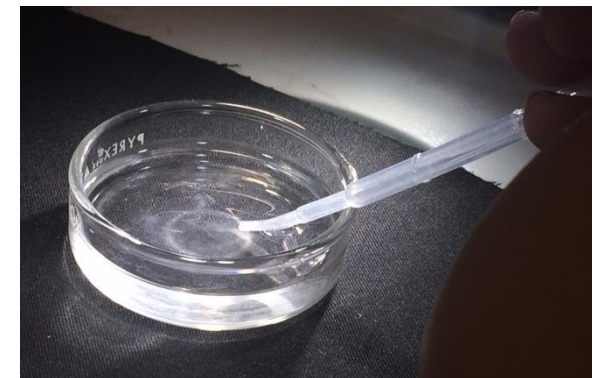
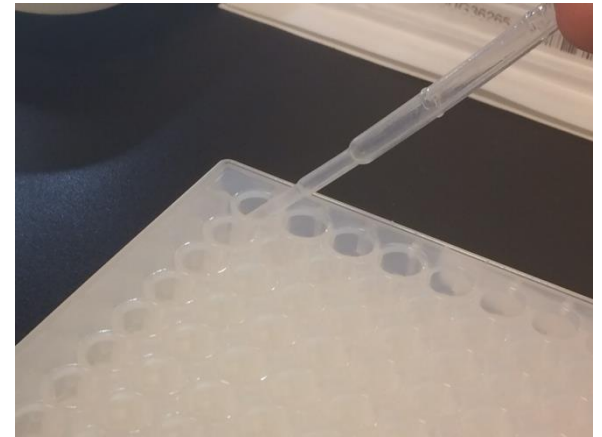


# Voucher Recovery

## Procedure

**For potentially translucent organisms (e.g. Mites and Collembola):**

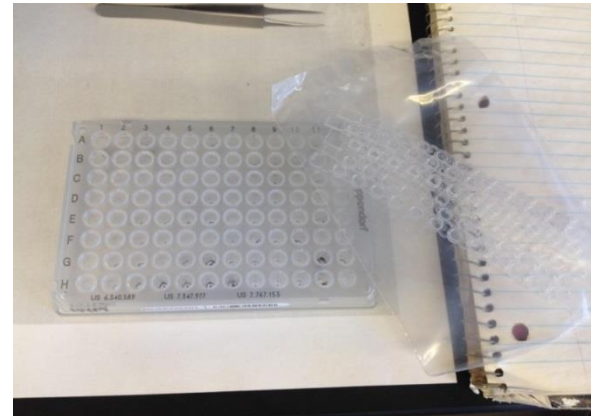
- Use a dark background under voucher plate
- Examine one row at a time and determine missing specimens
- Use pipette and ethanol to wash corresponding well in filter plate
  - Transfer to dish and examine contents on dark background
  - When specimen found, transfer to specimen plate



# Voucher Recovery

## Procedure

- 6 Record Sample IDs of destroyed specimens
- 7 If specimen destroyed, change BOLD “Voucher Status” to “E-vouchered: DNA/tissue+photo”
  - Can send as batch submission
- 8 Seal plate using 12-strip caps



**Return to museum after ALL processing is complete**  
(ie. sequencing and BOLD data validation)

