

# Diagnostic Entomology Photography Workshop

Techniques for producing high quality images for digital identification tools

Introduction:	Hume Douglas, AAFC
Specimen Selection:	Hume Douglas
Photo methods:	Hanna Royals, USDA
Camera & Software:	Paul Langlois, USDA
Image editing:	Paul Langlois
Questions:	Amanda Redford, USDA



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My co-presenters are with the Identification Technology Program (ITP) of (USDA-A.P.H.I.S.).

Specialists in this kind of work.

Hanna Royals: Entomologist. Has been with ITP for 8 years and works closely with port identifiers to identify intercepted pests.

Paul Langlois: Has been with ITP for 5 years. Enjoys all aspects of biology and enjoys photography.

Purpose of the workshop. Producing digital interactive tools.

However, much of this advice is applicable to other kinds of identification tools, like dichotomous keys.

I am going to talk about specimen selection.

Hanna Royals and Paul Langois will talk about: Camera setup and software;

Photography tips and tricks; Post-process editing.

Amanda Redford will handle questions at the end and conclude the workshop.

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## Introduction

Hume Douglas



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We should begin before photography, in planning the project.

## Consider types of photos



P. Langois, USDA



J. Guyot, INRA, Bugwood.org



K. Savard, AAFC



Once you have decided to make an identification tool. It is important to consider two factors about your finished product.

These are the species that you will be working with, and the venue where you will publish the identification tool.

On the species side, you will need to consider the types of images needed to illustrate the key in a way that will allow non-experts to identify specimens.

This may mean transmitted light through a backlit specimen or reflected light from an opaque specimen.

It will probably include some full body habitus photos as well as higher magnification detail photos.



*Ips apache*, male frons



*Ips apache*, female elytral declivity



*Ips apache*, male elytral declivity



*Ips apache*, male lateral habitus

Plan a set of images  
for one species

K. Savard, AAFC  
<https://biologicalsurvey.ca>

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It can be useful to produce a representative set of images of a single species at the beginning. This gives the best opportunity for planning, consultation and ultimately completing the imaging without wasted effort. It also provides confidence that the images will really help people identify species.

Will your tool allow identification of all adults? ... males, females, immature stages?

When planning the set of images you will also need to determine whether you are producing only a key, or if there will be species descriptions or fact sheets for each species.

If you are producing a sub-document for each species you will need a more complete set of images than you would for a key alone.

## Plan with experts

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It is useful to include a taxonomy expert as a co-author of the key, because they will be important to the development process at multiple steps. For imaging, they can help plan the images needed to illustrate the key (beginning with the representative set discussed above).

## Plan a host venue and consider the target audience

IDTools.org



and many others...

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It is also important to consider the publication venue. Here are four popular ones...

It is useful to choose the venue early in the process.

Then you can read their instructions to authors and plan the imaging to meet their specifications.

If the project is large, or in any way unusual, it can also be useful to discuss it with the editorial team for the hosting website or journal.

This can help you plan your work in a way that will reduce problems in publishing.

There is really a third factor to consider here too: The target audience.

Will the tool mainly be used by the general public, non-specialized biologists, or taxon specialist researchers and amateurs?

This choice will affect many aspects of how you design the tool.

You might wish to include a non-expert from your target audience in the design team.

Active participation from a non-expert can help the team design a tool that will meet the needs of the target audience.

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## Process initiation:

- Plan a set of exemplar photos for one taxon.
- Include taxonomic experts and users in the team.
- Consult the hosting venue.
- Consider the target audience.



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## Specimen selection



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Now to selecting specimens for imaging.



## Type specimens are not always best for imaging



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Here we have some type specimens. These are the only specimens for which we can have 100% confidence in their identification. However, they are not always available, and not always in suitable condition for photography.

This is where a carefully considered identification by an expert is the next best way to assure the identity of specimens chosen for photography.

This means that the expert should re-check the diagnostic characters for that particular specimen.

This is to make sure that the diagnostic characters are both present and suitable for illustration of that specimen.

Intraspecific variation in characters means that some specimens are closer to the species mean for diagnostic traits than others. It is useful to illustrate specimens without exaggerated or reduced features.



Use clean,  
well-mounted  
specimens

P. Langlois, USDA

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Talk about some characteristics of the specimen for photography.

They should be clean...

And mounted in a somewhat standard way, that shows many diagnostic characters as possible.

These kinds of simple, standardized images improve users efficiency in comparing diagnostic characters.

Photographs are 2 dimensional and best represent somewhat simplified information.



E. engasser, Arizona State Univ.

Use  
representative  
specimens for  
life stage

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They should be representative of their life stage.

Interesting photo... But it has something you rarely see. The deciduous tooth of a weevil, used only for escaping the puparium and then discarded.

The presence of this structure would confuse identifiers.

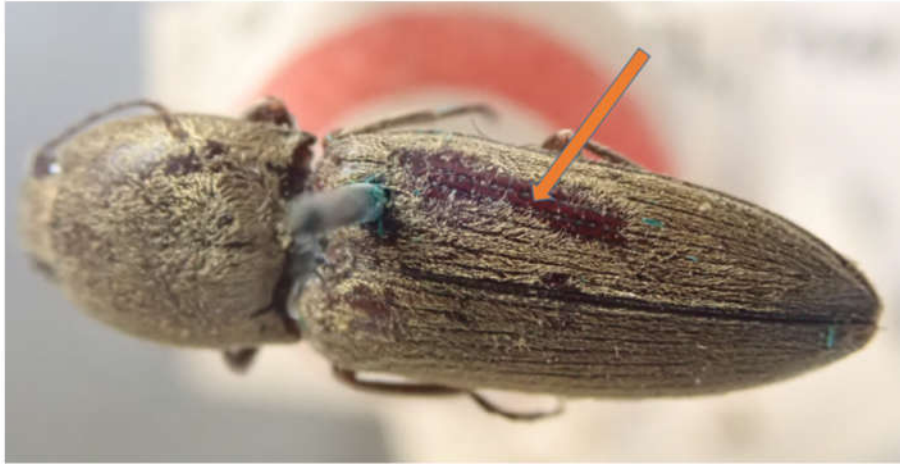
Use specimens with intact setal coat



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Here (arrow) you can see how some setae can be rubbed off. [Photo, H. Douglas]  
If too many are lost it can change the appearance of the insect enough to become confusing.

Use specimens with intact setal coat



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Here (arrow) you can see how some setae can be rubbed off. [Photo, H. Douglas]  
If too many are lost it can change the appearance of the insect enough to become confusing.

## Use specimens that clearly illustrate characters



K. Savard, AAFC, <https://biologicalsurvey.ca> (both)

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Also, sometimes I have chosen to use teneral (newly eclosed adult specimens) for photographic reasons.

Here the less sclerotized teneral specimens (on the right) have relatively more pigment in their spines than in the rest of the integument.

This makes it easier to see the sculpture of the elytra. Here I would tell readers that the pale colour is not the most common, but that I had chosen it for illustration purposes.

However, it is generally more useful to illustrate fully sclerotized adult insects because these are more commonly observed than teneral specimens.

Use specimens that look like the users' specimens



Scott Bauer, USDA, Bugwood.org

Live insect



Lesley Ingram, Bugwood.org

Pinned specimen

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It is also important to think about what kind of specimens users will most often examine. Will it be live specimens as shown on the left? or pinned dried specimens?



Use specimens that look like the users' specimens



Joseph Berger, Bugwood.org

Live insect



Whitney Cranshaw, Colorado State Univ., bugwood.org

Trap sample

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Or maybe, they will mainly be identifying insects directly from trap samples in fluid or even sticky traps (nobody like sticky traps).

It is important to show the specimens as they are likely to appear to the target audience.



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## Choose specimens that:

- are intact, clean and well-mounted in a symmetrical way
- are not morphologically extreme
- have the characters you want to illustrate
- will be relevant to the insects the target audience will examine



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## Imaging techniques and problem solving

Hanna Royals, USDA



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Next Hanna Royals will discuss imaging techniques and problem solving.