

Exploring Macro Photography

Presenter: Dr. Daniel C. Hyde

- Introduction
- Major issues and solutions
 - How to get larger image of small object?
 - Dealing with camera shake.
 - Dealing with subject motion.
 - Focusing can be tricky.
 - Extremely narrow depth of field.
 - Lighting can be tricky.
- Equipment
- Technique

Macro is a Magical World!

- Abundance and variety of interesting subjects.
- Can see things you didn't know existed!
- Macro images can really WOW people.
- Don't have to get up early or wait for sunrise or sunset.
- Don't have to travel to far off lands.
- Can find neat subjects in your house, backyard, or around town.
- Ability to use flash to freeze moving subjects, boost color and vibrancy.

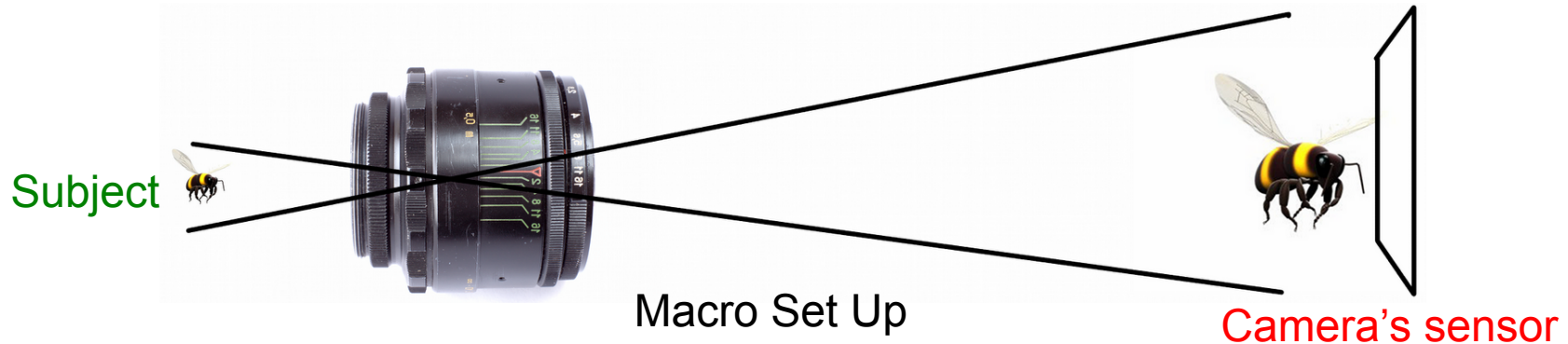
Defining Macro Photography

Macro photography is extreme close-up photography, usually of very small subjects and living organisms like insects, in which the size of the **subject in the photograph** is greater than **life-size**.

Good start but not precise! What size is the photograph?

Def #1: Some define a macro photograph as one in which the size of the **subject on the negative or image sensor** is life size or greater.

Def #2: However, others use the phrase to refer to a **finished photograph of a subject** at greater than life-size.



What's Reproduction Ratio?

- **Reproduction Ratio** is the **ratio** of the subject size on the **sensor** (or film) to the **actual subject size**.
- Companies like Nikon and Canon rate macro lens by **reproduction ratio**, i.e., they use the first definition (#1) of macro.
- A macro lens is a lens capable of **reproduction ratios** of at least 1:1.
- My **Canon 60mm macro lens** will do 1:1. Cost \$400
- Canon MP-E f/2.8 65mm 1-5x lens will do 5:1. Cost \$1100

Macro Shots by Dan - Insects



Insects



Mountain Laurel





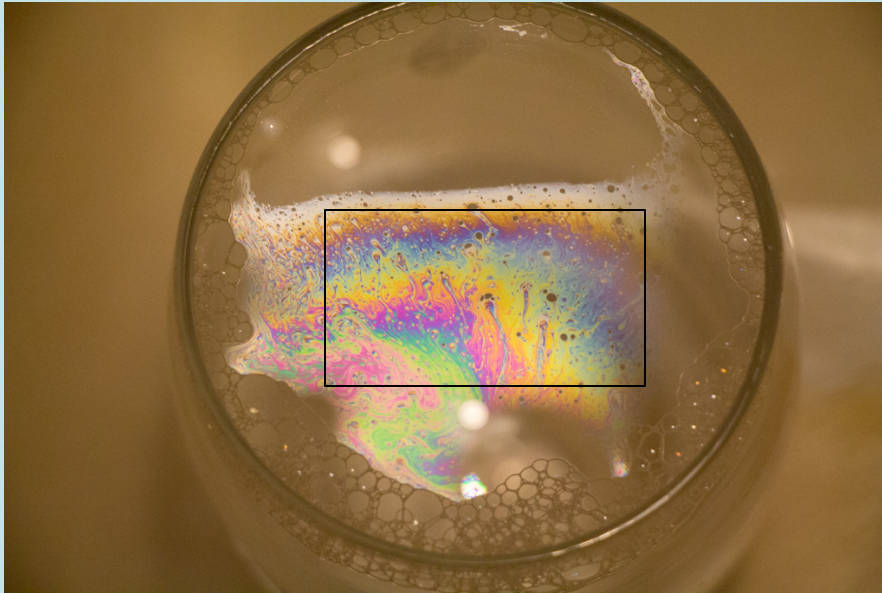
Fiddlehead



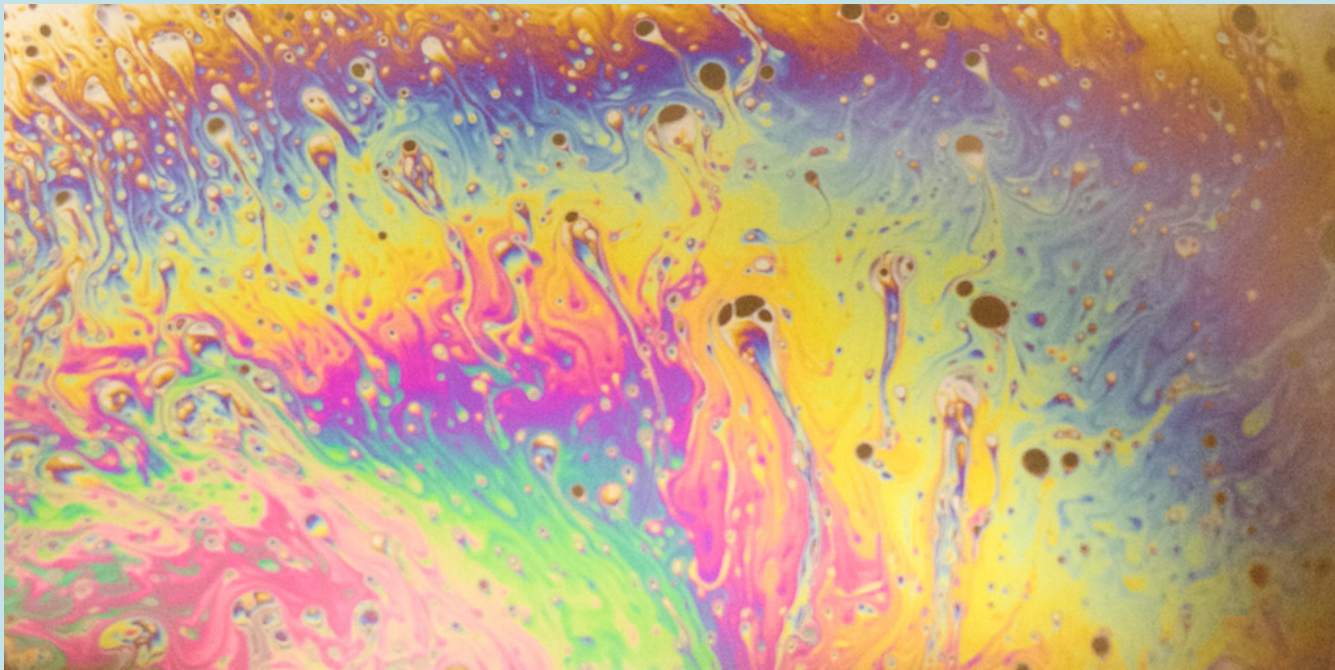
Nature

Hoarfrost on pond near Dale
Ridge Trail, January 7, 2016.
Ice crystals are half inch long.

Soap Bubbles



Drinking glass dipped in Palmolive dish soap and water. Shot hand held using Canon 18-135 mm lens at 135 mm. Moved around until I could see rainbow colors in viewfinder from ceiling lamp.



Cropped interesting part. See rectangle.

True Macro shots - Bumble Bee at 1:1



Uncropped photo by Dan Hyde

How big is 1:1?



Uncropped photo by Dan Hyde

True Macro - Honey Bee at 1:1



True Macro at 1:1



True Macro at 1:1



True Macro at 1:1



Really is ...



True Macro at 1:1



Really is ...



True Macro at 1:1



How to do this?

Really is ...



Major Issues in Macro Photography

- A. How to get larger image of small object?
- B. Dealing with camera shake
- C. Dealing with subject motion
- D. Focusing can be tricky
- E. Extremely narrow depth of field
- F. Lighting can be tricky

A. How to get larger image of small object?

1. Move camera lens farther from sensor/film
 - Why? Optics allows for larger image on sensor/film.
 - How?
 - A **macro lens** has more travel, i.e., sticks out more.
 - Extension tubes
 - Bellows



\$50 for set of 3.

2. Add another lens in front of camera lens

- 10x macro conversion lens
- Screws on front of lens like a filter
- Get size that fits your lens.
- 52mm filter size 10x macro lens \$20



A. How to get larger image of small object?

3. Use a reversed lens set-up.

Turn the lens around and use an adaptor to attach to camera.



Problem with above set-up is no electrical connection! Camera can't communicate with lens! Can't adjust aperture on most lenses! No autofocus!

Better to use a reverse mount like Vello's Macrofier with a piece that fits between camera and reversed lens and a second piece to make electrical connection on the other end of lens.

Now lens can communicate with camera to adjust aperture and autofocus.

Vello's Macrofier for Canon cost \$100.



B. Reducing Camera Shake

- If hand holding
 - Learn to be very steady.
 - Shoot burst of images with hope one will be in focus.
- Use tripod and cable release.
- Lock up mirror.
- Wait a few seconds for camera to settle down before pressing cable release. I use Live View on 5x magnification to monitor the motion.
- Use flash to freeze action!

C. Handling Subject Motion

- Insects – wait until they are not moving.
 - Less active in early morning and late evening when cool.
- Plants may be blown by wind.
 - Shoot in early morning when wind tends to be less.
 - Use a shield to block the wind.
- Use flash to freeze motion!

D. Getting Subject in Focus

- Place lens in **manual focus**. Auto focus can be confused or focus wrong when very close.
- Don't focus with **focus ring** but move the camera nearer or farther. Esp. if hand held.
- On a tripod, use a **focusing rail** to move camera.



Velbon Slider Macro Rail \$130

- Since there may be camera shake and subject motion, shoot at a higher shutter speed and use flash.
- Because of narrow depth of field, you may be tempted to shoot at a very narrow aperture, e.g., F-36. Don't go above F-22, as a lens' diffraction may cause fuzziness. A lens has a sweet spot usually around F-11; use it.

E. Depth of Field

- In macro photography, depth of field can be extremely shallow.
- The closer to the subject, the shallower the depth of field.
 - If a few inches from subject, depth of field can be less than a hundredth of an inch.
- Solutions?
 - Shoot with a narrow **aperture**, e.g., F-22
 - Make sure the **plane** of the subject is parallel to plane of sensor /film.
 - Use **focus stacking** where you take several shots at different focus settings and merge them in post.

E. Depth of Field

- Use focus stacking to improve depth of field.
- **Focus stacking** - Several shots of the same subject are taken with slightly different focusing lengths and joined afterwards with specialized **focus stacking software** which picks out the sharpest parts of every image, artificially increasing depth of field.
- Popular **focus stacking software** is Helicon Focus. Cost \$115
<http://www.heliconsoft.com/heliconfocus.html>



Andrea Hallgass used 30 images in her stack.

F. Lighting

- May be hard to light in close quarters (inches).
- Be careful not to cast shadows on subject.
- Use reflector to reflect light in shadow areas.
- Use diffuser to soften the light.
- Use LED lamp/flashlight.
- Use ring lite.
- **Use portable flash off camera.**
 - Need a hot shoe cable that connects flash to camera
 - Use a small, e.g. 6" by 6", softbox over flash head to soften the lighting.

Comparison of Different Lighting Set-ups

Used 60mm macro lens adjusted to fill image with SC Quarter.



Ring Lite with Right side on



Ring Lite with Left side on



Ring Lite with both sides on



Desk lamp



Off camera flash - I controlled position

Macro Equipment

- Tripod, cable release, Focusing rail
- Macro lens
- 10x conversion lens
- Extension tubes
- Lens reversed set-up
- Lighting set-ups
 - Desk lamp
 - LED lamp
 - Ring lite
 - Flash off camera

Magnification Comparison of Different Set-ups

NY and SC quarters. All shot as close as possible for set-up. On tripod, F-22, ISO 400



Canon 18-55mm kit lens



Canon 18-200mm lens



Canon 60mm macro lens



Canon 60mm macro lens



60mm macro lens & 10x lens



60mm macro lens &
3 extension tubes (65mm)

Magnification Comparison of Different Set-ups

NY and SC quarters. All shots as close as possible for set-up. On tripod, F-22, ISO 400



Canon 60mm macro lens



60mm macro lens & 10x lens



60mm macro lens &
3 extension tubes



60mm macro lens & 3
extension tubes & 10x lens



18-200mm lens reversed on
Vello Macrofier locked at 18mm



18-200mm lens reversed on
Vello Macrofier locked at 18mm

Dan's Macro Flash Set-up

- Canon 80D camera with Canon 60mm macro lens, portable flash, hot-shoe flash cable, and 6"x6" softbox.
- Lens on manual focus. Set focus ring to 1:1.
- Camera on M (Manual), shutter speed at 1/250 sec. (fastest for flash with my camera), aperture at F-22 (for wide depth of field), and ISO on Auto (allows camera to vary ISO for exposure).
- I shoot holding flash with softbox over the flash head in my left hand and holding camera in right hand looking through the viewfinder.

Dan's Macro Flash Set-up in Action



Photo by Mary Jane Hyde

Cost for Dan's Macro Set-up

I assume you have a DSLR camera and a portable flash. What's the extra cost to do macro?

- Canon 60mm macro lens \$400
 - Or Canon 100mm macro lens \$600
 - Or Canon 180mm macro lens \$1400
- Vello 6"x6" softbox for portable flash \$40
- Hot-shoe flash-to-camera cable \$20

A Cheap Macro Set-up – replace 60mm macro lens with your kit lens plus 10x conversion lens. Cost \$20. Total \$80 extra for macro.

Techniques for Dan's Macro Set-up

- Canon's 60mm macro lens has reproduction ratios of 1:1, 1:2, 1:3, 1:4, 1:5 labeled on its focus ring. I select the one I want and don't touch ring after that.
- I focus by moving camera in and out and click the shutter when subject is in focus. Takes practice and lots of shots. 😊
- With my left hand I aim the flash. After a shot, I glance at camera's screen with left eye to see if I need to adjust the softbox.

Techniques for Dan's Macro Set-up (con't)

- Luckily the macro lens is light weight or I wouldn't be able to hold and shoot with only my right hand.
- Since I like to shoot at F-22 for large depth of field, I still use the flash with softbox even in bright sunlight.
- Move the softbox as close to the subject as possible. The closer the softbox the softer the light because the softbox appears larger to the subject.
- At 1:1 the front of the lens is about 3" from subject. One needs to be careful not to cast shadows on the subject. And it is easy to bump a branch or stem with the camera or softbox and shoo your subject.

True Macro at 1:1



True Macro at 1:1



True Macro at 1:1



True Macro at 1:1



Macro is a Magical World!

Questions?

Great article for macro photography ideas!

<http://www.shawacademy.com/blog/15-macro-photography-ideas-to-get-creative-juices-flowing/>

Have fun shooting macro photos!

Contact me at hyde@bucknell.edu

My Flickr page

<https://www.flickr.com/photos/danchyde/>