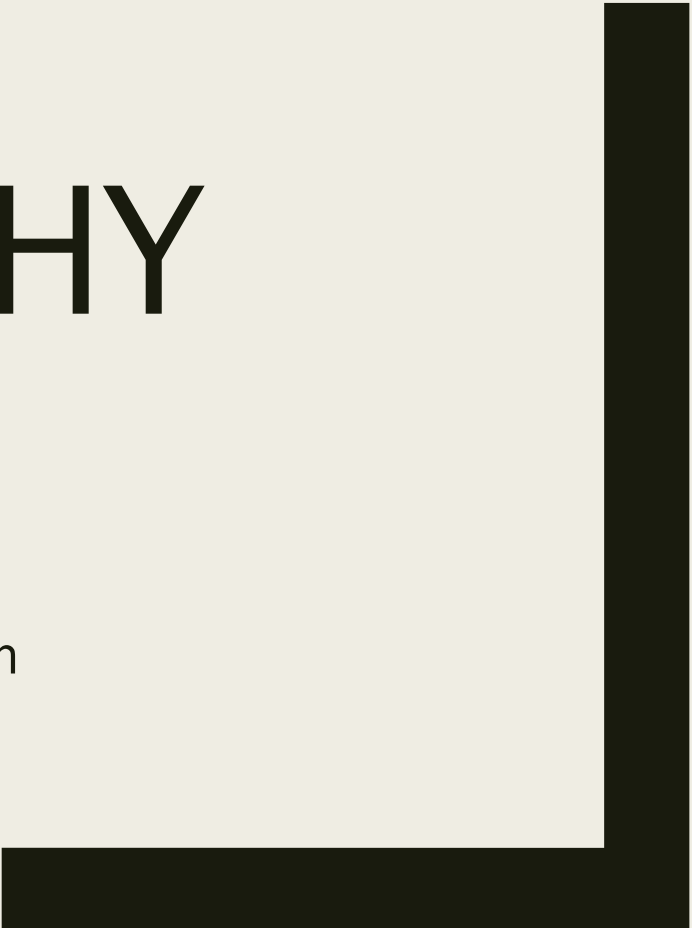


# MACRO PHOTOGRAPHY PROJECTS

For the Digital Photography Classroom

By Amy Horn



# About Me

- Taught high school for 13 years at Flagstaff and Coconino High Schools
- CTE Certifications held
  - *Business and Marketing (Entrepreneurship, Computer Applications)*
  - *Family and Consumer Sciences (Child Development & Foods)*
  - *Industrial & Emerging Technologies (Yearbook, Digital Photography, Web Design, Pre-Engineering)*
- In 2010, moved to Northern Arizona University to teach Photography full-time
- In my spare time, I teach photo workshops with Arizona Highways PhotoScapes, private instruction, and photograph client projects.
- 2018-2019 – I took a year long sabbatical on Photographing Water: Oceans to Ice
  - *8-week solo trip on the Pacific Coast in a tear drop trailer from Morro Bay, CA to La Push, WA.*
  - *Additional Travel: Cape Cod, Maine, Colorado, Michigan, Washington, Florida, Arizona, California*
- September 2018, Co-authored *The Art of Macro Photography* with Bruce Taubert





















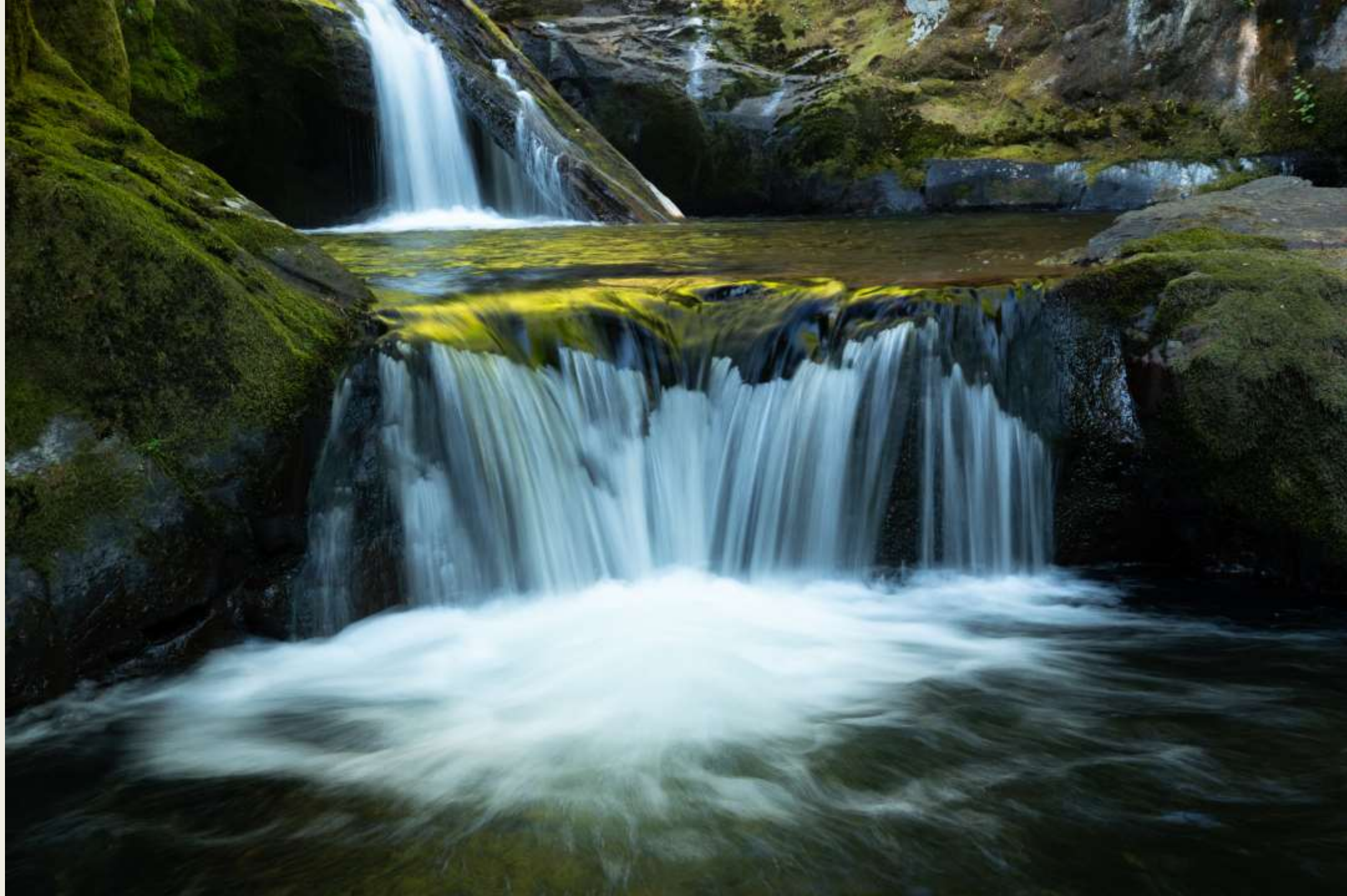


















# MACRO PHOTOGRAPHY

What, Why and How



# What is Macro Photography?

Often referred to as:

- Small subjects
- Magnified
- Close-up





# What is Macro Photography?

## True definition:

- Size of the subject on the image sensor is life size or greater; 1:1 ratio
- Example, your sensor is 17mm in width. Therefore, at your closest focusing distance you capture an image of exactly 17mm on a ruler.



# What gear is needed?

- Macro Lens or Close-Up filter
- Tripod
- Shutter release or timer
- Patience



- Recommended for nature macro
  - *Diffuser/Reflector*
  - *Circular Polarizing Filter*
  - *Wimberly Plamp*
- Optional:
  - *Extension Tubes*
  - *Focus Stacking Software*
  - *In Camera Focus Bracketing*

# Close-Up Lens (filter)

- Purchase by diameter of lens





# Macro Lens

- Common focal lengths: 60mm, 100mm, 105mm, 180mm
- For 1:1 captures, place lens at minimum focusing distance.
- Check your manual or Google to determine minimum focusing distance



# Extension tubes

- Tubes are placed between camera and macro lens
- Shortens minimum focusing distance and magnifies subject.
- Hard to use with wind





Macro lens



Macro lens with 26mm extension



Macro lens



Macro lens with 26mm extension tubes



105mm Macro lens

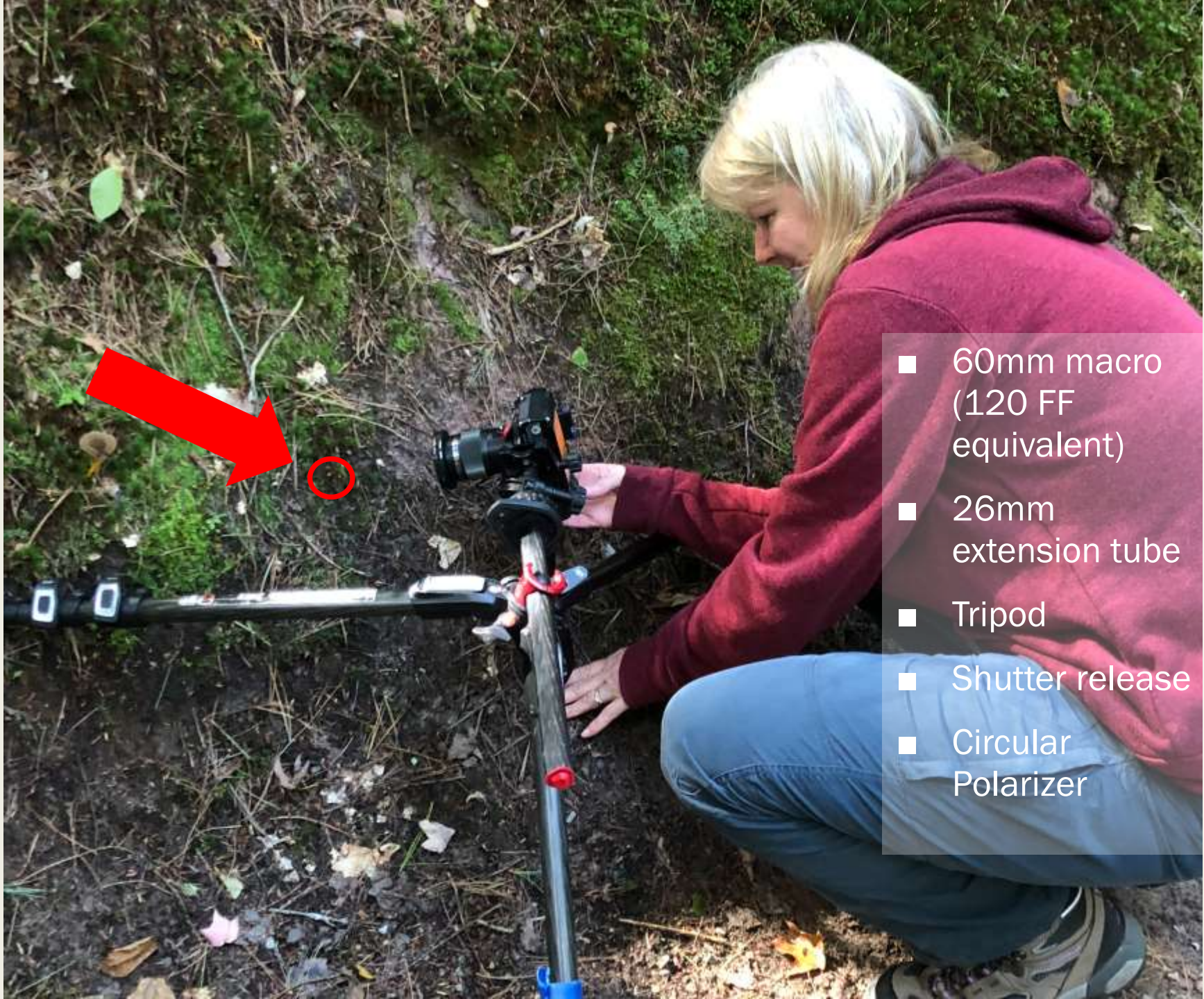


105mm Macro lens w/58mm extension









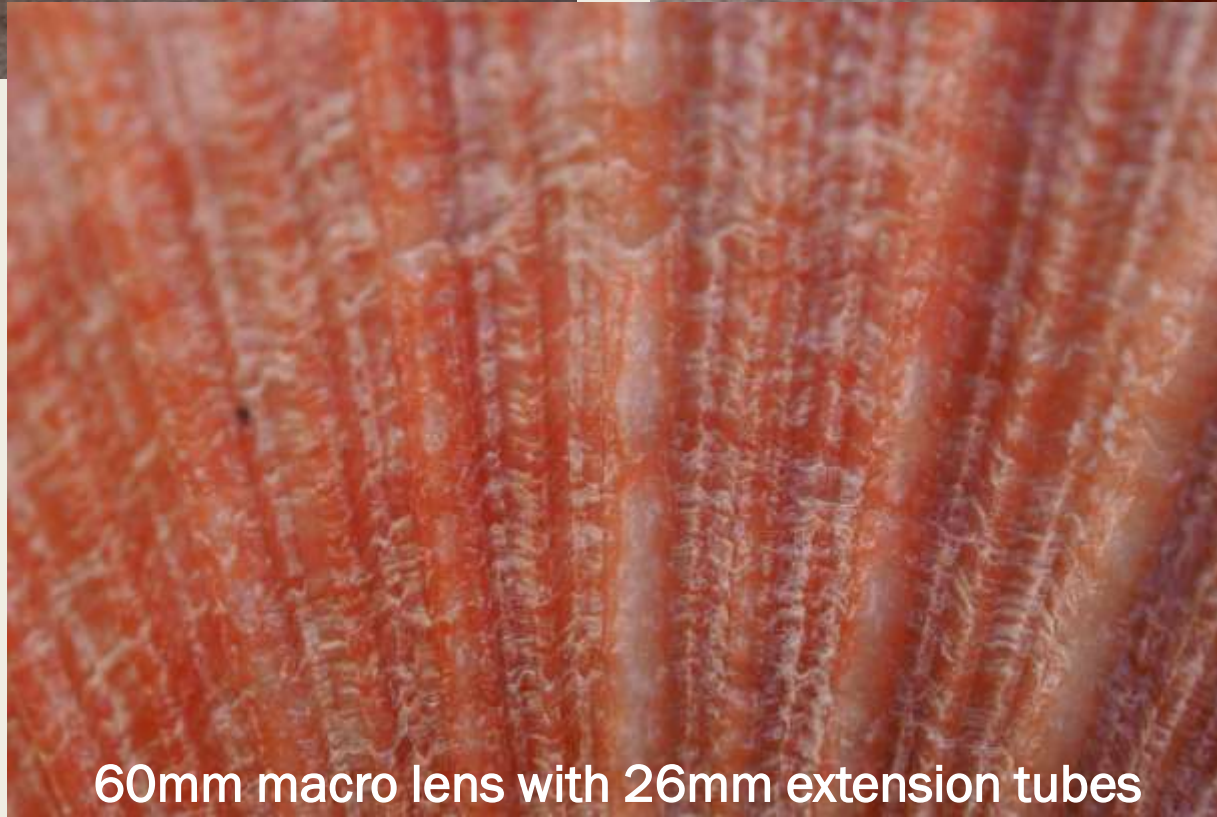
- 60mm macro (120 FF equivalent)
- 26mm extension tube
- Tripod
- Shutter release
- Circular Polarizer



12-100mm lens @ 38mm (76mm FF)



60mm macro lens (120mm FF)



60mm macro lens with 26mm extension tubes

CAMERA POSITION



# Shooting angle

- Image should be on a parallel plane to maximize sharp focus

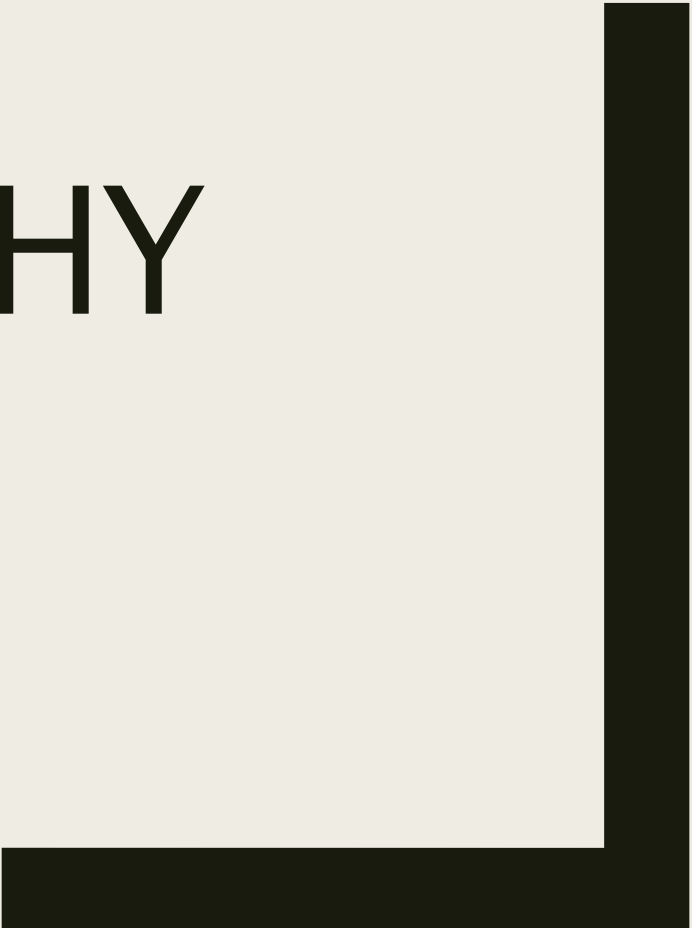





Notice the difference in depth of field?



The only change is the camera angle.



# MACRO PHOTOGRAPHY PROJECTS

For the High School Classroom

By Amy Horn



# PROJECT #1

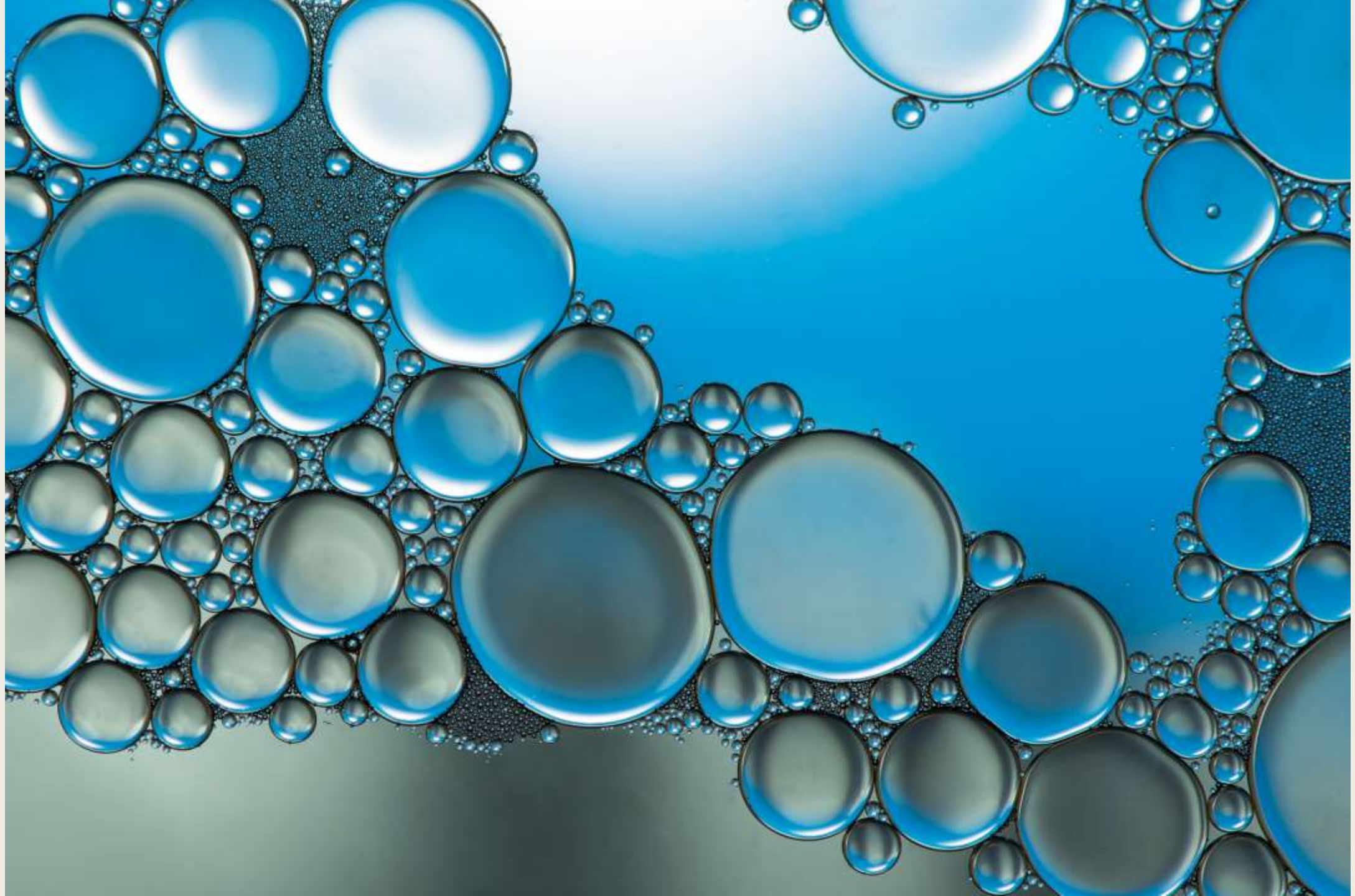
Oil & Water













# Oil & Water

## Equipment:

- Clear glass dish without words on bottom
- Water
- Oil (vegetable works well)
- Colored paper
- Q-tip with dish soap on it
- Something to stir with

## Camera Gear/Settings

- 2 off-camera flash, bounce off white wall or foam board
- Macro lens
- Tripod
- Shutter release
- Manual exposure, 1/60 sec, f/8, ISO 100-400 (depends on flash powers)
- Flash power 1/32-1/64
- Manual focus, live view, 3-5x zoom
- Stabilizer off



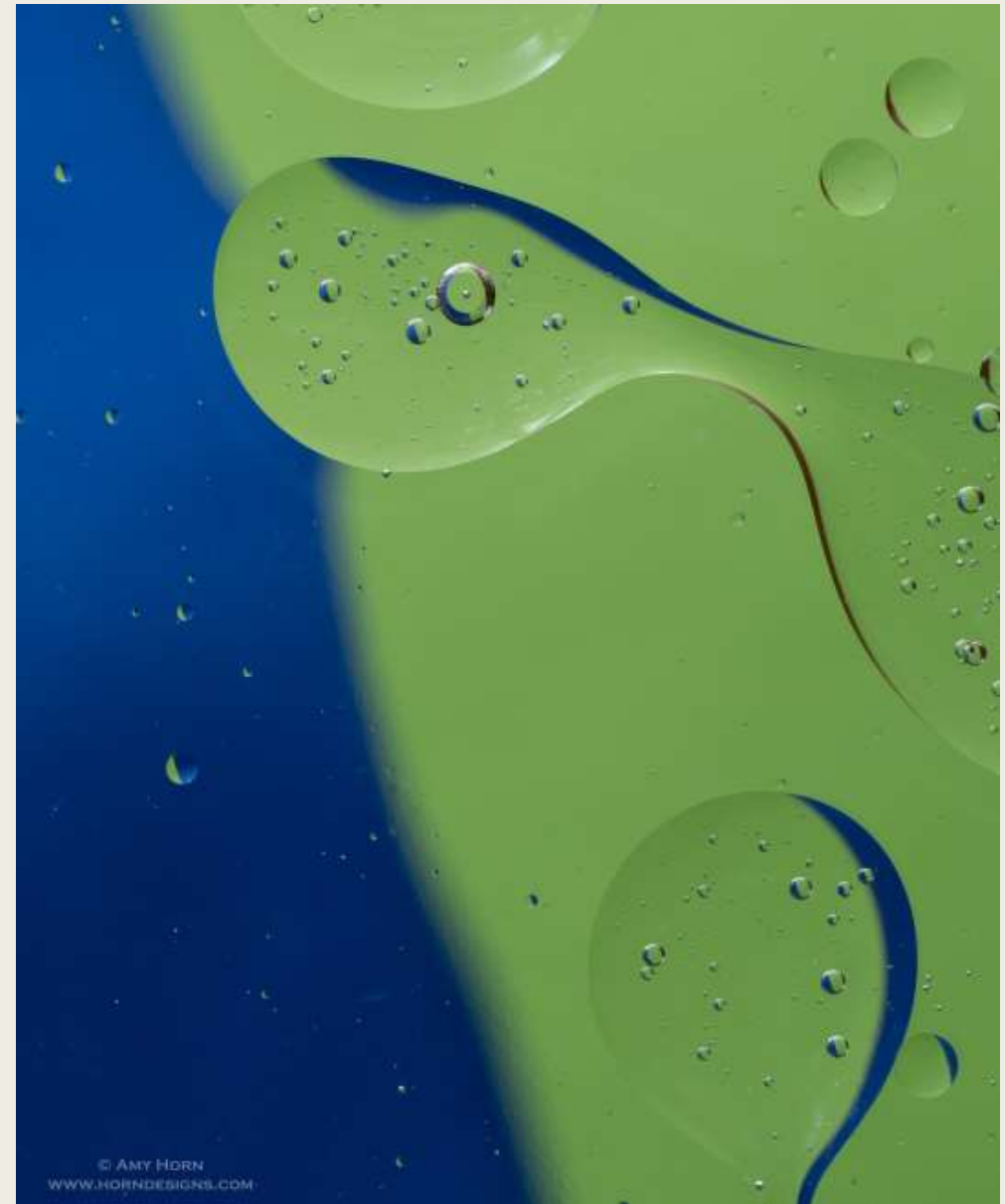








original



cropped

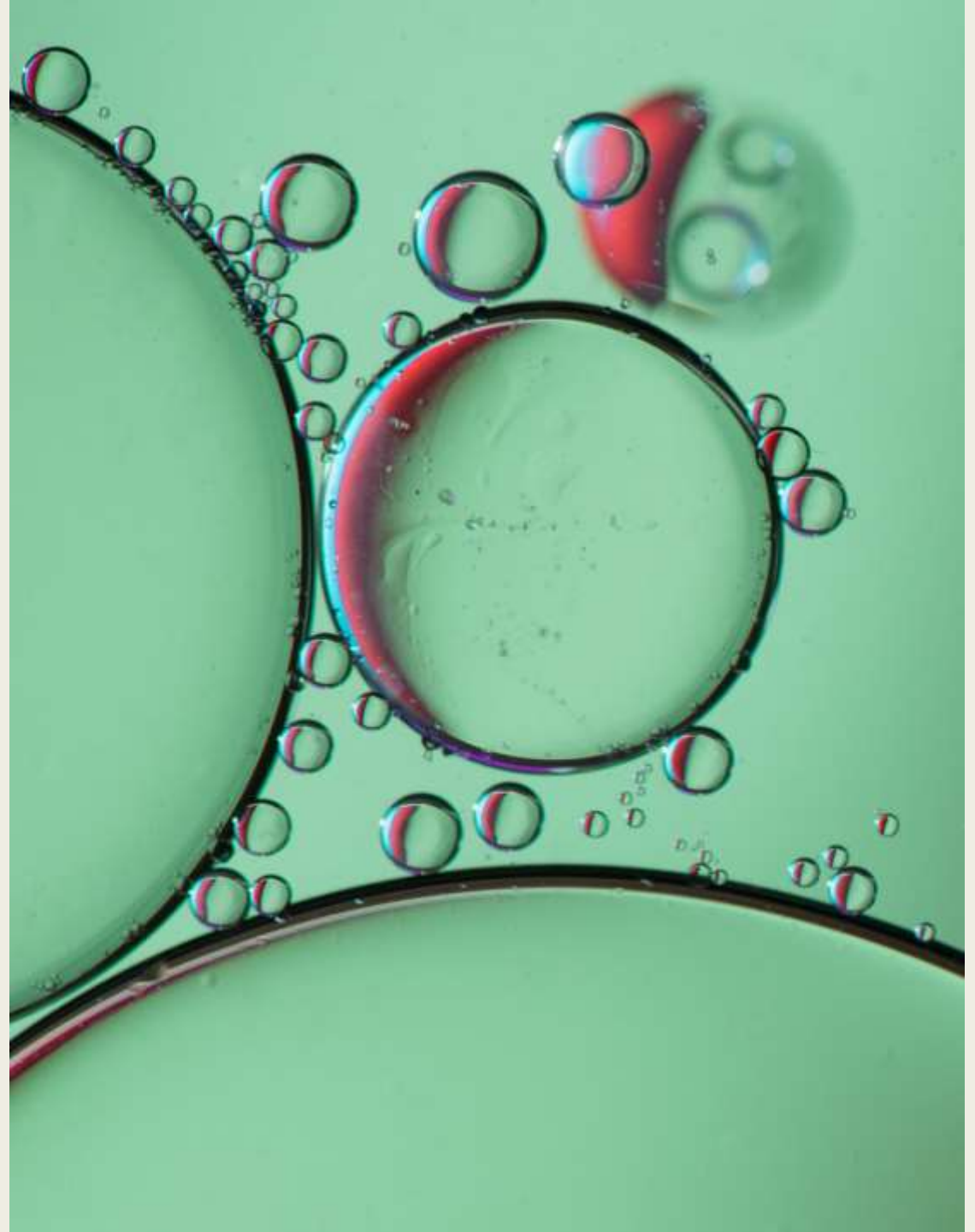
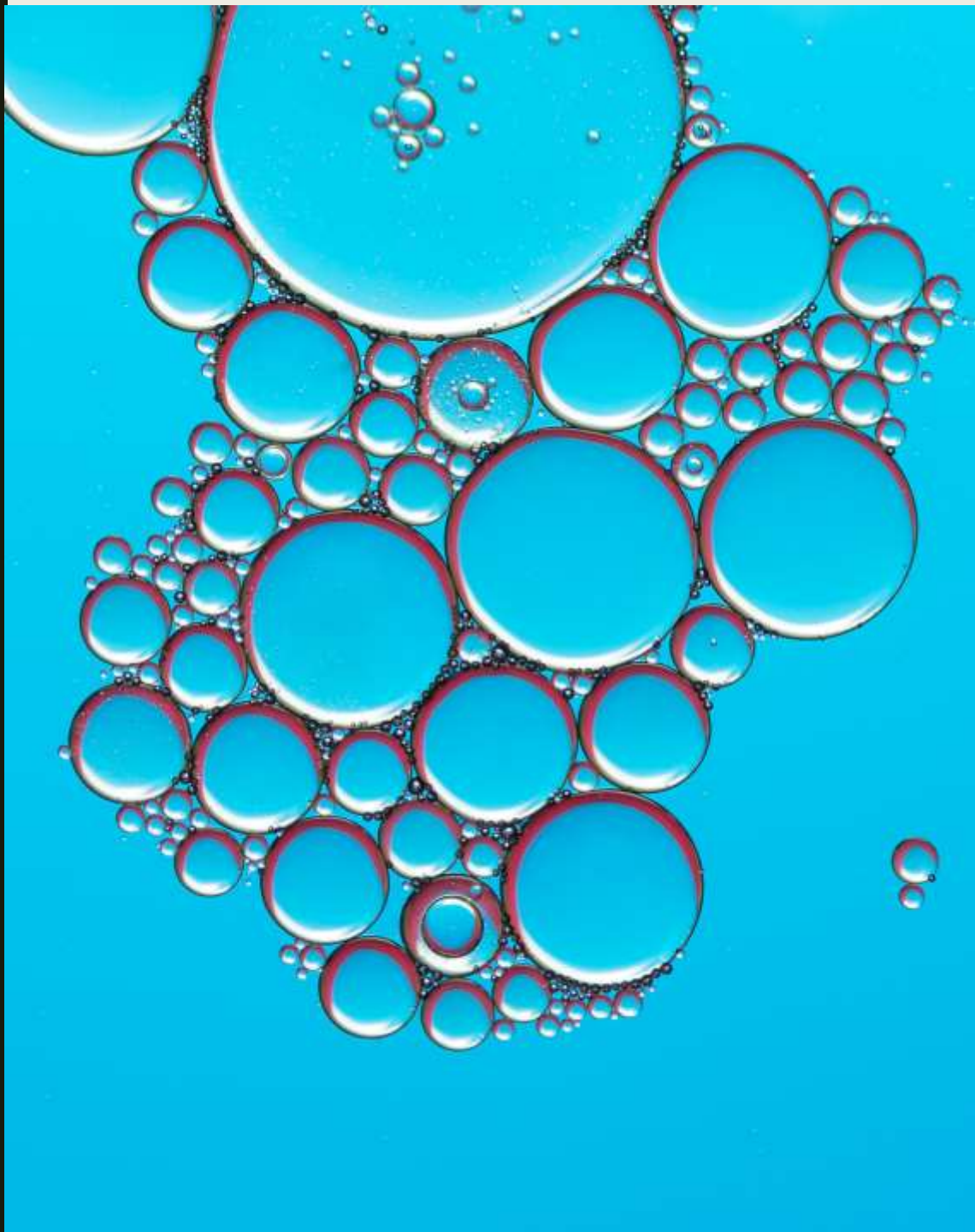


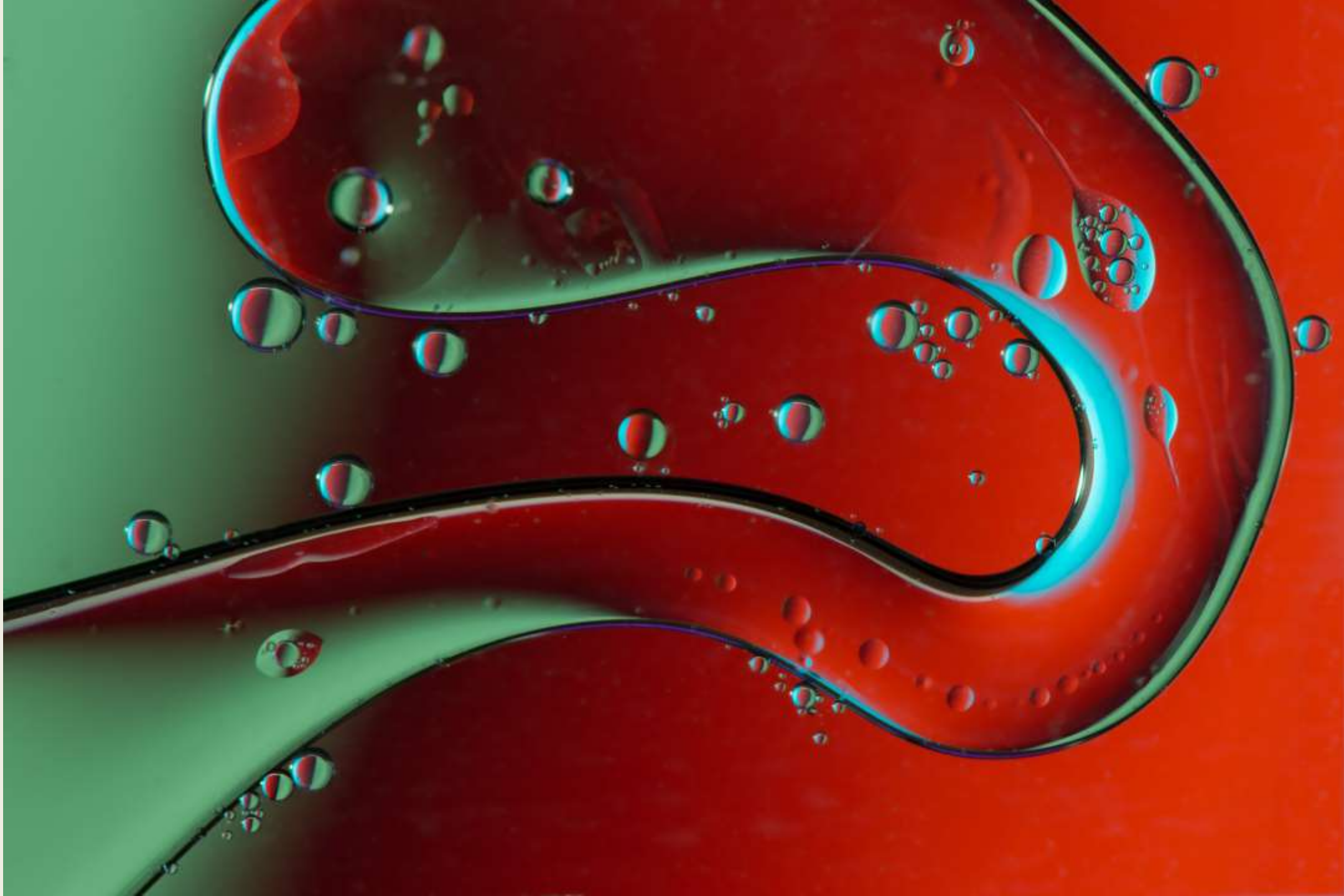


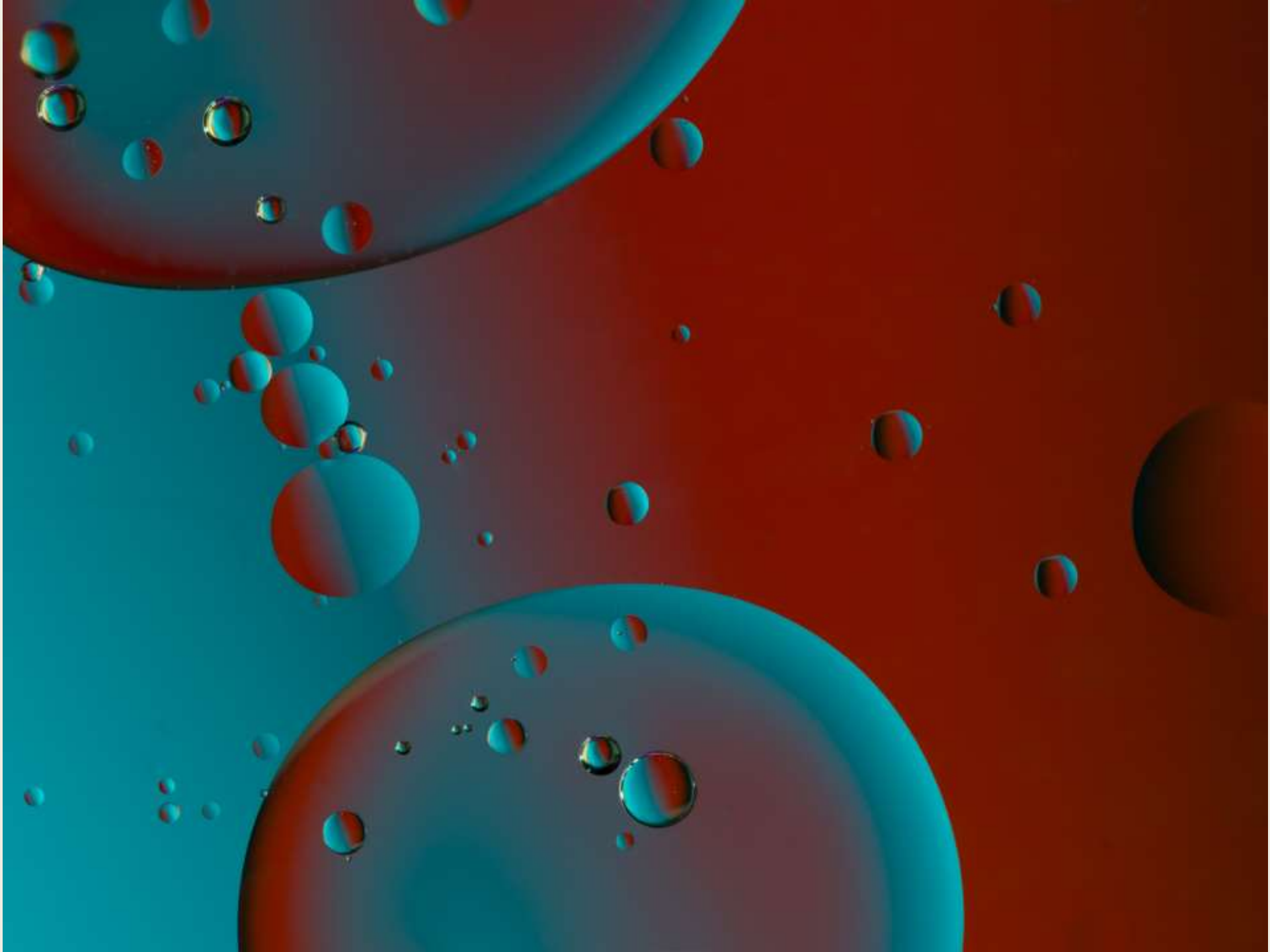
cropped



Final: spot healing, sharpening, dehaze, levels









# PROJECT #2

Milk & other additives













Drop food color



Stir it up and add more color if desired

# Milk, Food Color & Dish Soap



Adding dish soap makes the colors move!

## Equipment:

- Small bowl or plate
- Milk (not fat-free)
- Food color
- Toothpicks to stir food color
- Q-tip with dish soap on it
- 1-2 off camera diffused flashes

## Camera Gear/settings:

- Macro lens
- Tripod
- Shutter release
- Manual exposure, 1/60 sec, f/8, ISO 100-400 (depends on flash powers)
- Flash power 1/32-1/64
- Manual focus, live view, 3-5x zoom
- Stabilizer off











# PROJECT #3

Water droplets









# Water Droplets



Try on flowers too!

## Equipment:

- Clear glass raised above candy (I place glass on top of betta tank)
- Candy or something similar
- Glycerin or Water
- Syringe (without needle)

## Camera Gear/Settings

- 2 off-camera flash, bounce off white wall or foam board
- Macro lens
- Tripod
- Shutter release
- Manual exposure, .4 sec, f/2.8, ISO 100-400 (8 image stack works best)
- Manual focus, live view, 3-5x zoom
- Stabilizer off

# PROJECT #4

Tiny landscapes all around us





















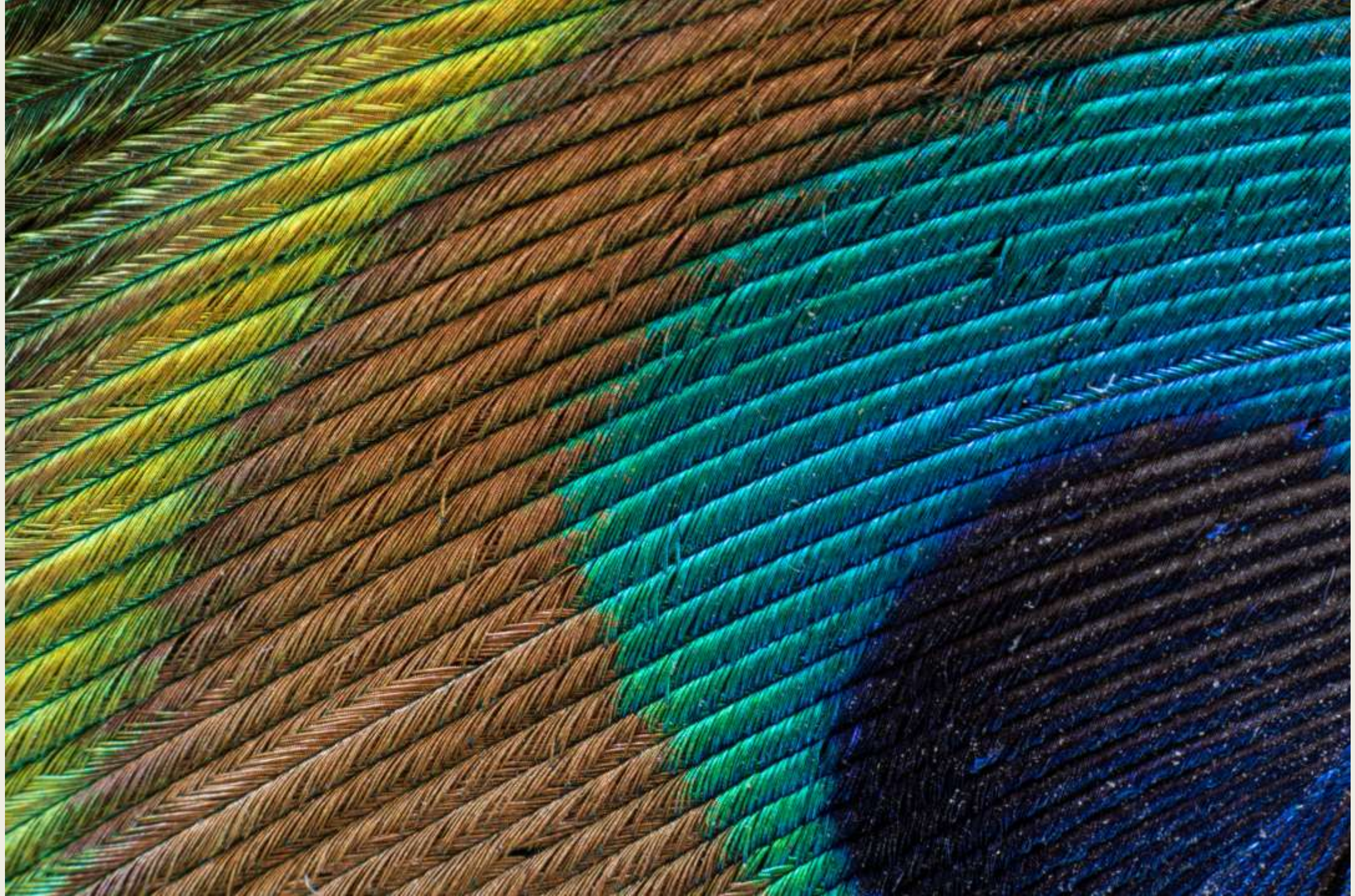












# Random Objects



## Equipment:

- Pine cones, Rust, paint chip, metal shavings, shells, wood curls, crayons, colored pencils, etc.
- Backdrops: velvet, velour, foam board, black plexi glass, glass with black underneath
- Helping Hands

## Camera Gear/Settings:

- Off-camera flash or natural light
- Macro lens, Tripod, Shutter release
- Manual exposure, provided your subject is not moving, this is variable.
- Stabilizer off
- Manual focus, live view, 3-5x zoom

# CAMERA SETTINGS & FOCUS STACKING



# Camera Settings – Depth of Field



# Camera Settings - Aperture



f/2.8



f/6.3

# Camera Settings - Focus



Focus on stem



Focus on petals



2-image focus stack w/Helicon Focus

# Focus Stacking

- Tripod
- Shutter release or timer
- Small consistent intervals
- Software (Photoshop or Helicon Focus)
- Focusing rails
- In Camera Focus Bracketing





Top  $\frac{1}{2}$  in focus



Bottom  $\frac{1}{2}$  in focus





2 image focus stack

# Depth of Field

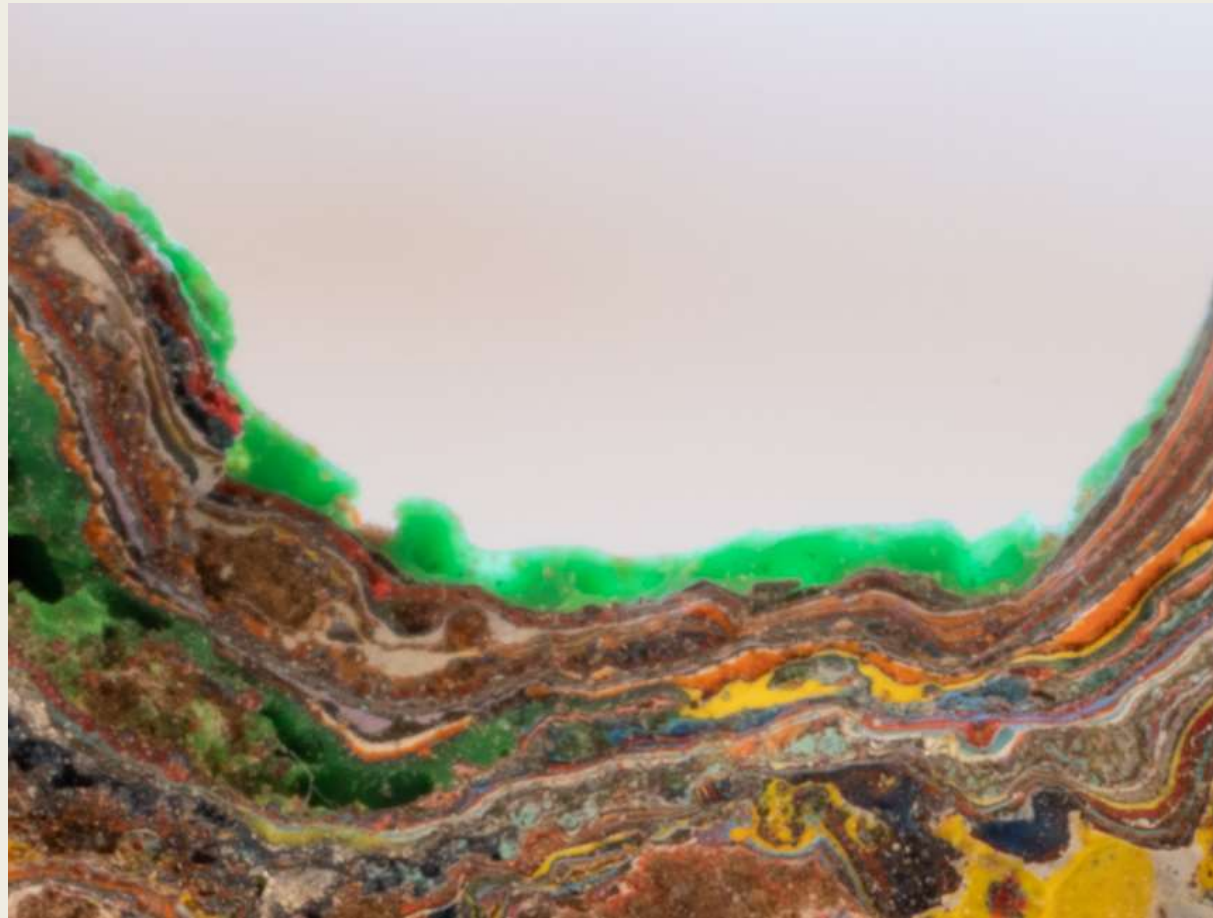


f/2.8



f/16

# Single image vs focus stacked



f/16



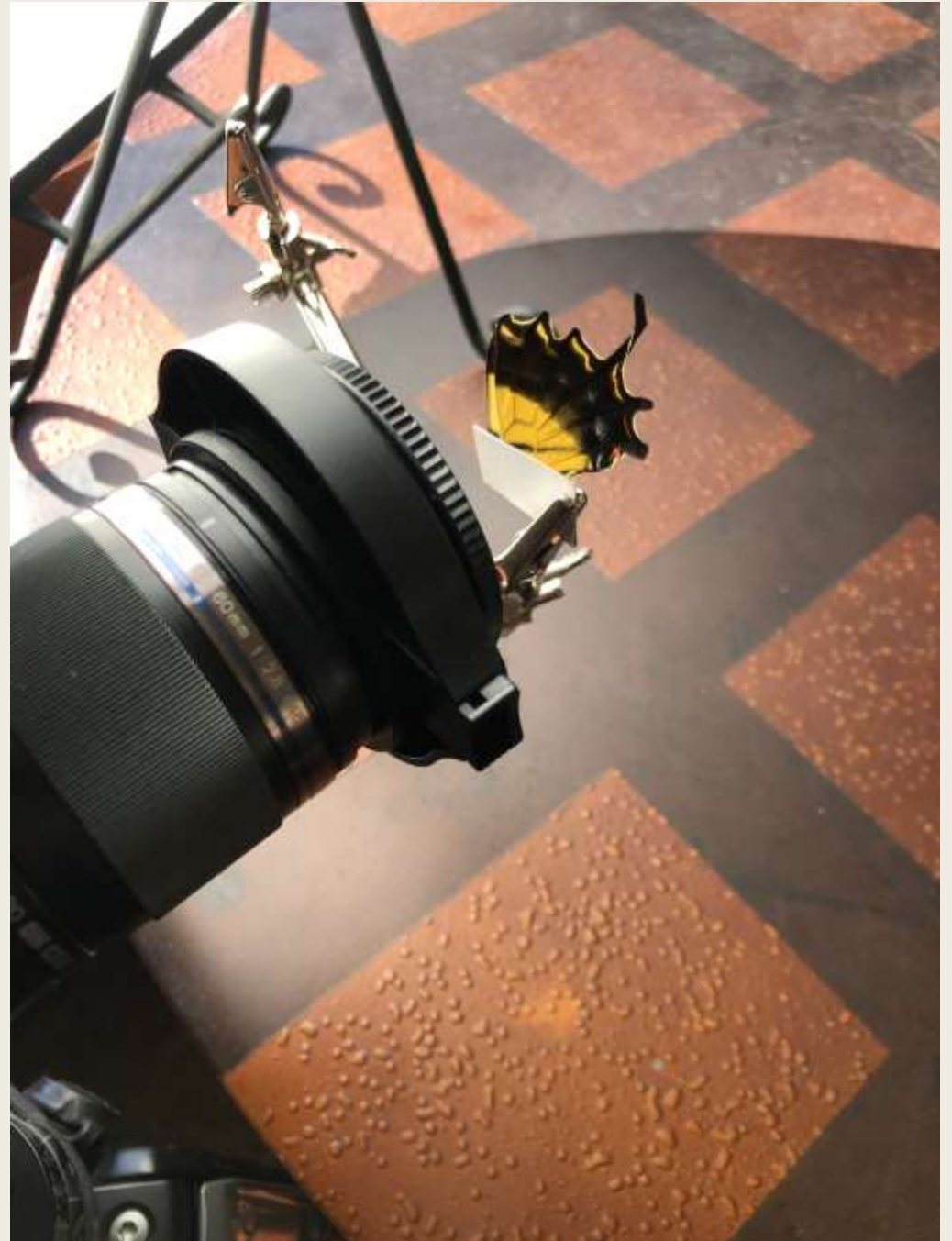
Focus stack of 116 images



**Fordite from Cadillac Ranch**

# Why Focus Stack?

- Especially with macro subjects it is the only way to achieve complete focus from front to back of a subject.
- Depth-of-field
  - *Aperture*
  - *Distance to subject*
  - *Focal length*





















































































Final Stacked image



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

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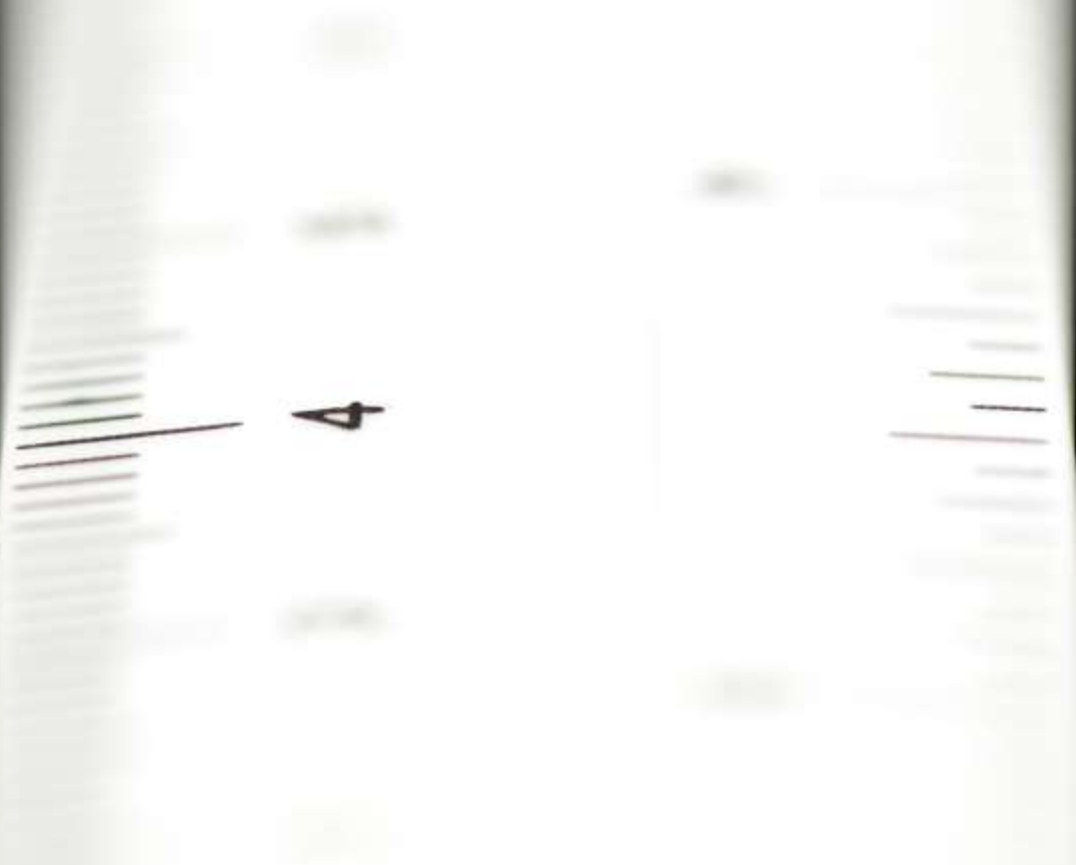
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Let's try focus stacking









# Review/Questions

- What is Macro?
- Equipment needed
- Project 1 – Oil & Water
- Project 2 – Milk and other additives
- Project 3 – Water Droplets
- Project 4 – Tiny landscapes around us
- Focus Stacking



# Gear demonstrated or explained

- Camera – Olympus OM-D EM-1 Mark II
- Macro lens – 60mm
- Manfrotto Tripod
- Extension Tubes - Kenko
- Yongnuo YN560 IV Flashes with transmitter ~\$80 each (Godox is good too!)
- Flash Diffusers – Neewer, 6”x 8” - \$10
- Tent diffuser – Neewer
- Helping Hands – Amazon or Harbor Freight - \$10
- Small Betta Tank – Amazon or pet store
- 5”x7” piece of glass – picture frame
- Syringe (no needle) – Amazon
- Glycerin - Sprouts
- Black plexi glass – Amazon
- Bowls, table cloth – dollar store
- Foam Board – any art store
- Helicon Focus - \$30 - \$240 discounts available



# Thank you!

Learn more:

- Sign up for Monthly Newsletter or
- Follow my blog, ([www.horndesigns.com/blog](http://www.horndesigns.com/blog))
- Instagram: amyhornphotographer
- Facebook: Amy Horn, Horndesigns Photography
- Take a workshop! (next slide)

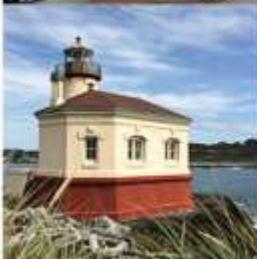
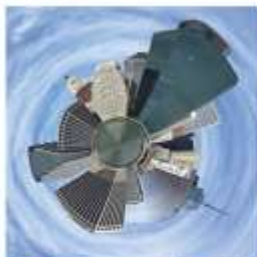


Amy Horn  
amy@horndesigns.com  
www.horndesigns.com  
928.699.3456

# Amy's Future Workshops @ ahps.org

- Super Macro w/Bruce Taubert – Aug 24-25, 2019 (waitlist)
- Flash Photography Workshop – September 7, 2019
- Super Macro w/Bruce Taubert – Sept 14-15, 2019 (waitlist)
- San Diego Women's Photo Retreat – Sept 26-29, 2019 (waitlist)
  
- Wildlife World Zoo – October 12, 2019
- iPhoneography – October 13, 2019
- Seasons of Sedona, October 24-27, 2019
- Bisbee – November 15-17, 2019
  
- Watson Lake in Winter – February 1-2, 2020

# Photography workshops for the creatively inspired.



## SEPTEMBER 2019

### Flash Photography

*Amy Horn* 09.07.2019  
Understand the basics of on-camera and off-camera flash as you learn how to manipulate the quantity and quality of light in your image.

### Photoshop for Photographers

*Tom Klare* 09.14.2019  
This introductory workshop will instruct on how to make non-destructive adjustments by learning masking techniques to enhance your images.

### Photo Fundamentals 101

*Sue Wright* 09.21.2019  
It's time to get off of automatic and learn how using the buttons, menus and settings on your camera can help you get better images.

## OCTOBER 2019

### Adobe Lightroom 101

*Suzanne Mathia* 10.05.2019  
Create an image catalog for easy management of your photos and see how simple non-destructive post-processing techniques will enhance your images in a few easy steps.

### Shoot at the Wildlife World Zoo

*Amy Horn* 10.12.2019  
Take amazing wildlife images with simple techniques for capturing the moments when wild animals show intriguing, dynamic and exciting behaviors.

### iPhoneography

*Amy Horn* 10.13.2019  
Take professional quality photos with your iPhone using simple to use accessories, apps and phone settings.

### Photo Fundamentals 102

*Sue Wright* 10.19.2019  
Take better photos when you learn optimal composition techniques, exposure compensation, and bracketing using manual settings.

### Photoshop 102: Panoramas & Focus-Stacking

*Tom Klare* 10.26.2019  
Learn the art of stitching images together to produce stunning panoramas or create sharp image detail with depth of field through stacked images.

Continuing Education Certificates available on all workshop curriculum. Purchase order registrations accepted.

## NOVEMBER 2019

### Adobe Lightroom 102

*Suzanne Mathia* 11.02.2019  
Learn advanced techniques, using the adjustment brush, auto masking, graduated neutral density filter, and how to utilize the power of the various development sliders.

### Fun in the Dark

*Beth Ruggiero-York* 11.09.2019  
Learn the basics for photographing and focusing at night from shooting star trails, the Milky Way, or urban and other artificially lit scenes.

### Portrait Photography

*Paul Markow* 11.09 - 11.10.19  
Whether you are photographing family and friends or models for a commercial shoot, understanding lighting conditions is essential. Learn to photograph people in both natural and artificial lighting conditions.

### Creative Elements in Bisbee

*Amy Horn* 11.015 - 11.17.19  
Use creative design elements to impact your photography through textures, patterns, lines, color and more in Bisbee, AZ.





## **Want to learn more about Macro Photography?**

By  
Bruce D. Taubert and  
Amy Brooks Horn

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(we pay sales tax)

Cash, check or Credit Card

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## FOCUS STACKING

BRUCE D. TAUBERT



I photographed this on my back porch before sunrise. I stacked 12 images to get the depth of field I needed. Note the backdrop remains soft due to the small f-stop. Canon 5D Mark III, 100mm f/2.8 macro, ISO 800, f/2.8 @ 1/30 sec., on-camera fill flash. Bruce

116

A

very small praying mantis on Foothills Palo Verde flowers. The flowers are less than 3/4 inch long and the mantis is a little smaller. I captured the mantis on a palo verde tree and brought both home since the light was too harsh and the wind too strong for a field shot.

117

**THE** Arizona night skies become alive with hundreds of thousands of beautiful moths during the monsoon season. Waiting underground for the entire year, moth cocoons hatch into adult moths as soon as the driving rains soften the earth. The wings of moths are made of tiny scales that are too small for the naked eye to see. Have you ever picked up a moth and noticed the “dust like” material that comes loose from their wings? This material is the scales.

Due to their small size, in order to see the unique structure of the scales of moth wings the magnification needs to be in the range of 5X to 10X. Although many different set-ups can produce an image of this nature, I choose to use my Canon MP-E 65 1X-5X macro lens and focus stacking. At these magnifications, depth of field is incredibly tiny, and tens if not hundreds of images need to be taken to have sufficient numbers for focus stacking. In addition, moving the focus ring of the lens by hand for these small increments is impossible. Therefore, I chose to use a micrometer driven macro focusing rail. If you are interested in considering this type of rail see <http://www.hejnarphotostore.com/product-p/ms4-1.htm>. I have not used this model but it is the only one that

I can find that is preassembled and ready to go. If you feel like making yours from scratch look at <https://www.flickr.com/photos/eurythyrea/8073291492/in-album-72157631380645768/>. I have used this modified Newport linear stage rail for about 3 years and find it excellent.

I secure the homemade macro focusing rail on a piece of wood and clamp it to my work table. The camera and lens are mounted on the rail and a “rice pudding container” diffuser mounted to the end of the camera. I either use a couple of flashes or a large LED light. I mount the moth wing on a helping hand and place it at the correct focal distance to the lens. To get the specimen close enough to the camera lens I must cut a channel in the diffuser. I normally use a Canon 7D Mark II which places the maximum magnification at 8X. From there I can crop to my needs and obtain magnifications more than 15X.

When photographing at high magnifications, diffraction and softening of the subject will happen unless you minimize the effect by using a relatively open f-stop. I normally use f/2.8.

I use 10X live view to focus the lens on the front most portion of the moth wing that I wish to photograph. From there I move

the focusing micrometer about 10 microns at a time until I finish the stack. During the process, I leave the camera in live view to minimize camera movement and use a wired remote release. For the showcased images in this chapter it was necessary to use approximately 150 images to focus from the front to back of my subjects.

The results are incredible. For the first time, I can see the unique structure of the scales of a moth wing. The patterns are unique and I am constantly amazed with what nature has produced.



**A SMALL** portion of the wing of an *Oculea* Silkmoth. Note the scales are small and similar to what you would expect from fish scales. Canon 5DSR, MP-E 65mm @ 5X, ISO 200, f/3.5 @ 1/250 sec., two external diffused flashes at 1/16 power. Bruce

**FLASHES** are available in different sizes and powers. They can be triggered wirelessly or wired. Olympus OM-D E-M1 Mark II, 12-100mm *f*/4, ISO 200, *f*/5 @ 1/640 sec. in a tent diffuser. Amy



**FLASHES** - Frequently, natural light is insufficient to meet the macro photographer's needs. Either there is not enough light, it is from the wrong direction, you are shooting indoors under low lighting conditions or tungsten wavelengths, or you're in any number of other situations where you need to supplement the available light. The first piece of photographic equipment we reach for when a little extra light is needed is the electronic flash. Flashes put out very short and bright "flashes" of light. The duration of the flash varies by model and ranges from about 1/500 to 1/1500 of a second. In general, smaller flashes put out a less powerful light than larger flashes. Larger flash sizes allow for bigger light tubes, larger capacitors, and more powerful batteries.

There are more styles of electronic flashes than there are brands of cameras. The first type of electronic flash is permanently attached to your camera and is generally called a "pop-up" flash. All you do is push

an external button on the camera body, and the small flash appears from the top of the camera. Generally, these flashes have a low power output and are useful only for a few situations when using relatively open *f*-stops. The next general type is the portable electronic flash. The portable flash is not built into the camera, but is a separate unit that either fits into the hot shoe on top of the camera or can be operated separately from the camera using wired or wireless flash remotes. These flashes are useful for almost all types of macro photography where supplemental light is needed. You can slave several portable flashes to the camera and/or each other to vary the light output and create modeling light on the subject. You can also vary the power output of the flash to meet your needs. All the major camera brands make several external flash models that vary in price and power output. There are also many other manufacturers that make portable flashes to fit almost any camera model.

Although not all flash units are useful for macro photography work, there are several types of flashes that are made specifically for macro use. Canon's macro flashes have two units that can be placed in different locations near the front of the lens. These flashes allow the photographer to get very close to the subject and still

provide adequate lighting. Canon also makes a "ring" flash for macro photography, and there are several manufacturers that make ring flashes for the other brands of cameras. Like the macro flash, the macro ring flash fits onto the front of the lens and allows the photographer to get great lighting while getting very close to the subject. NOTE: The Nikon macro flash uses a wireless system to initiate the flash and is more flexible than the Canon model, which attaches the flashes to the camera via two coiled wires. The fact that the Canon macro flashes have an attached wire limits where they can be placed and can sometimes limit



**MANY** manufacturers make macro flashes that fit on the front of the lens offering great lighting for close subjects. This is the Canon twin macro flash offering a wide variety of settings and configurations. Canon 5D Mark III, 24-105mm *f*/4, ISO 400, *f*/16 @ 1/200 sec., on-camera bounced flash. Bruce

## WHAT IS MACRO PHOTOGRAPHY?



**D**elicate hoar frost on this log was captured in late May at Schultz Tank, Flagstaff, AZ. Olympus OMD1 Mark II, 60mm f/2.8 macro, ISO 200, f/8.0 @ 1/100 sec. Amy





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