



MACRO AND CLOSE-UP PHOTOGRAPHY AND THE MACRO SIG



Bob Gobeille

macro- |'makrō|

From the Greek makros “large”

Large on your sensor

Think Dragonfly



Not Denali



Nest



Not Nebula



ISO 1600

300mm x 1.4TC = 420mm

f/5.6

30 sec

No Flash

macro photography
1:1 or greater reproduction ratio

Image on Camera Sensor

Physical Object



=



1:1 Reproduction

The FCDCC macro
SIG is really a
“close-up” photography
special interest group

How close is up to you.

Russ Lawry



Close-up photography is just plain fun!

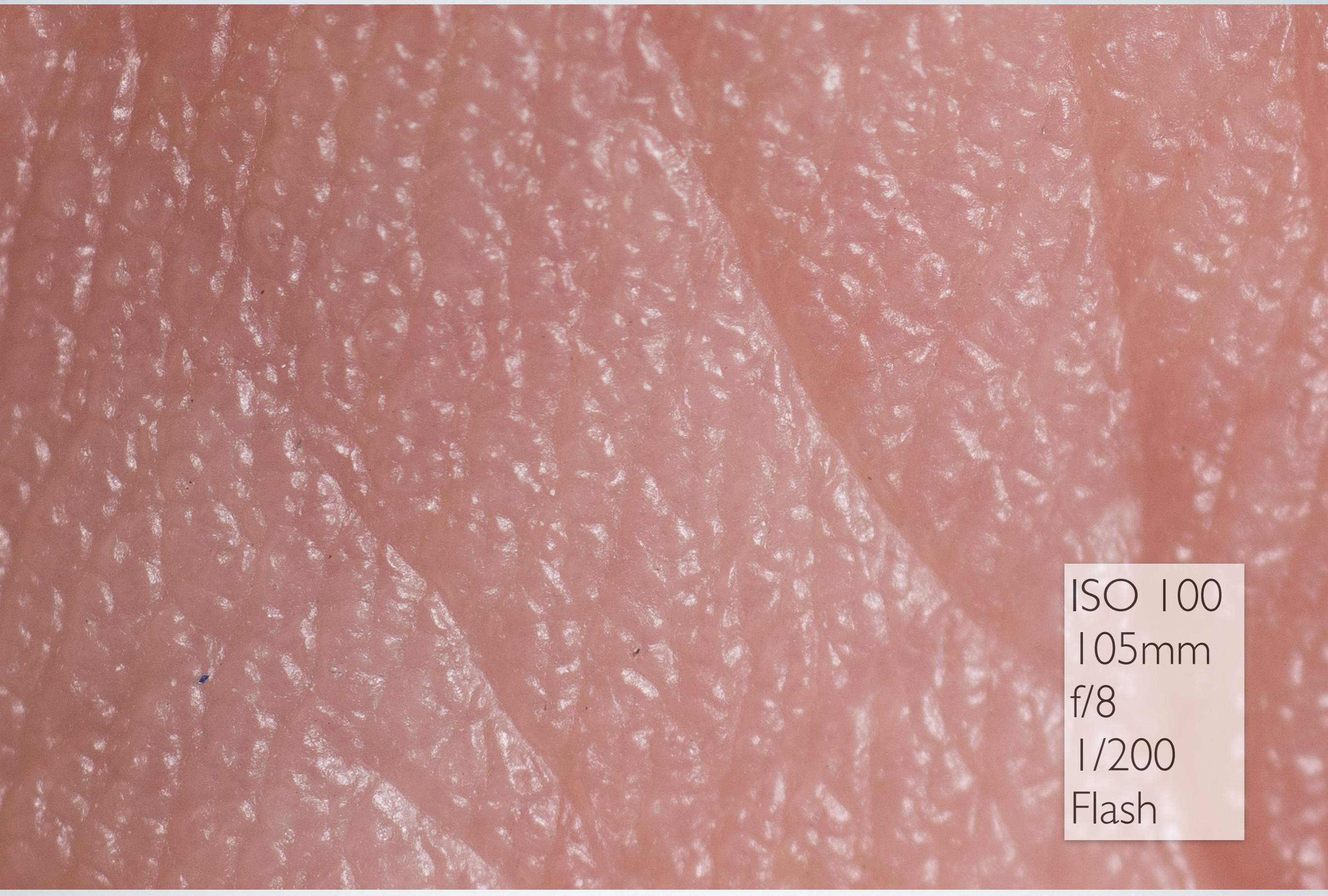


Russ Lawry

Combine close-up with the Portrait SIG

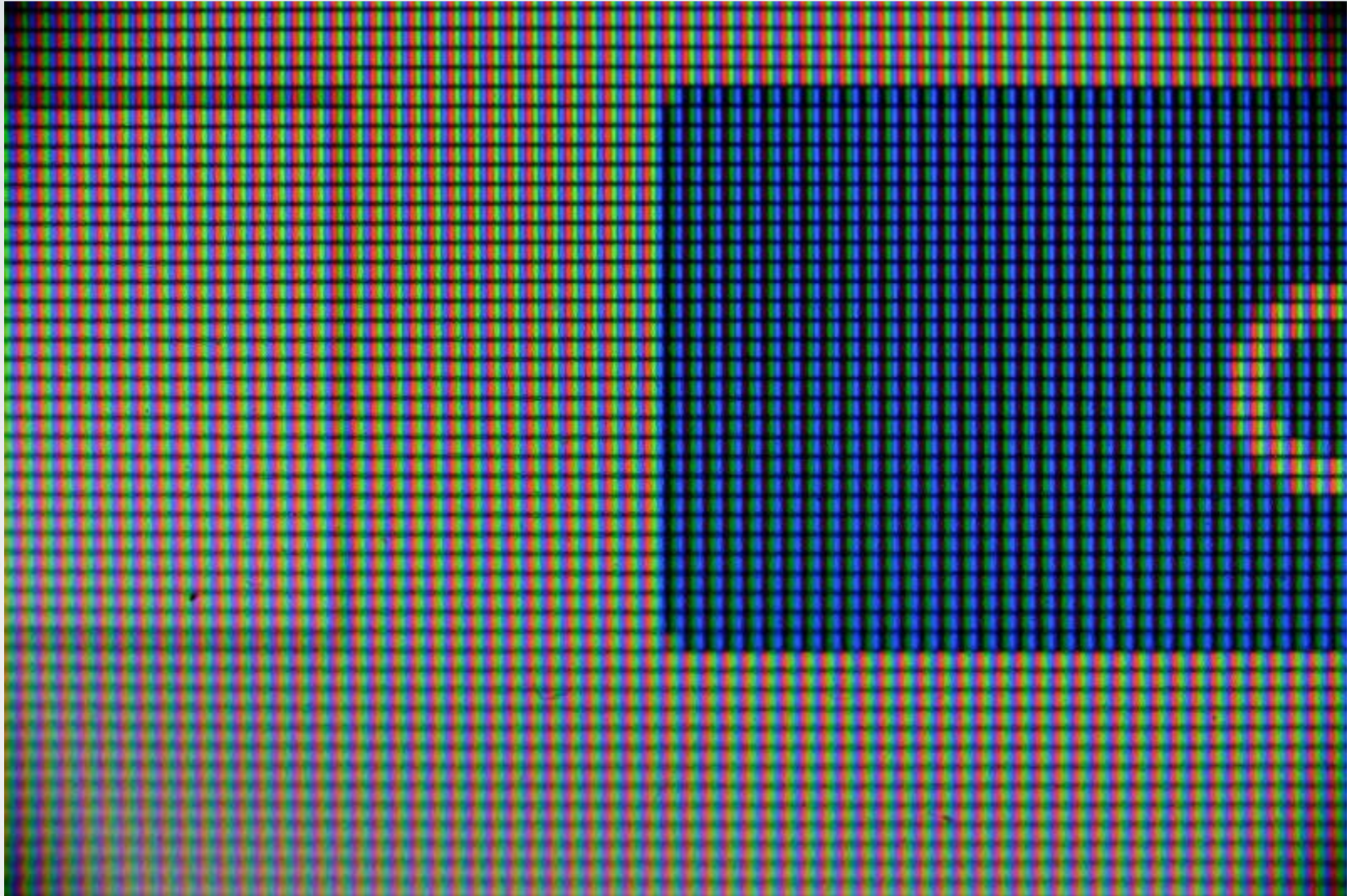


The Nude SIG



ISO 100
105mm
f/8
1/200
Flash

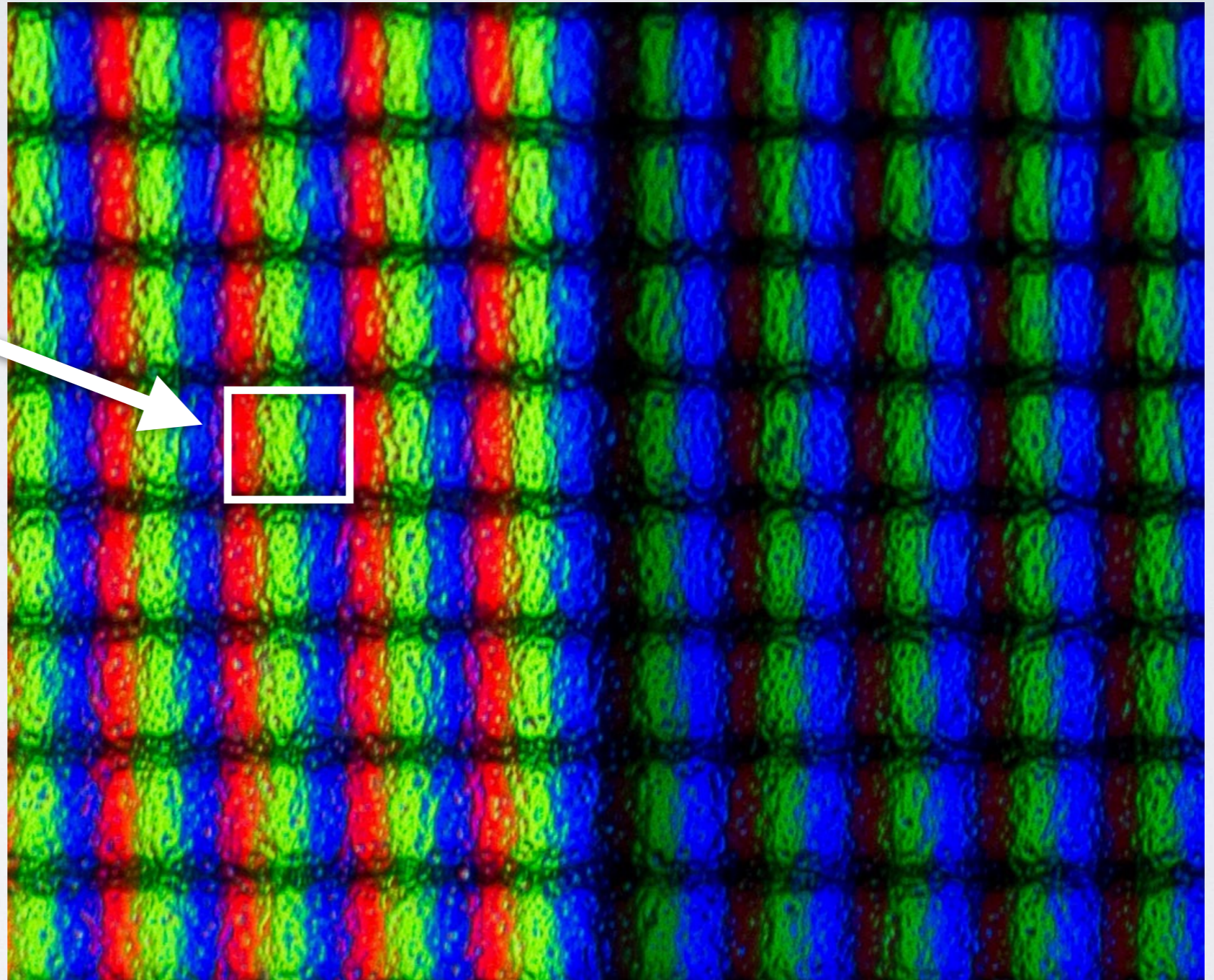
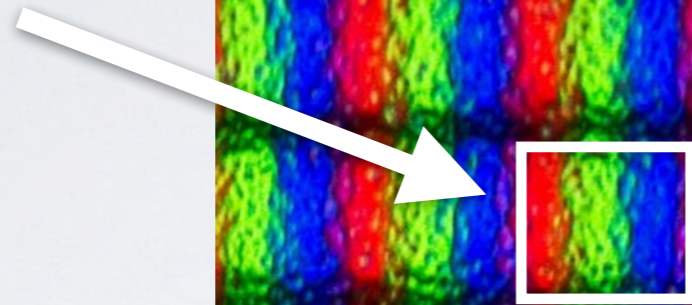
THE FAMILIAR



Close up photo of my monitor

THE NOT SO FAMILIAR

Pixel



Macro photo of my monitor

FUNGUS NOT FOREST



Ken Eis

SCALE



FOR DOCUMENTARY SHOTS, SCALE IS CRITICAL

“Them!”

1954

Warner Bros.



NO SCALE - CAN ADD INTEREST



PRACTICE SAFE PHOTOGRAPHY

Focal length Matters

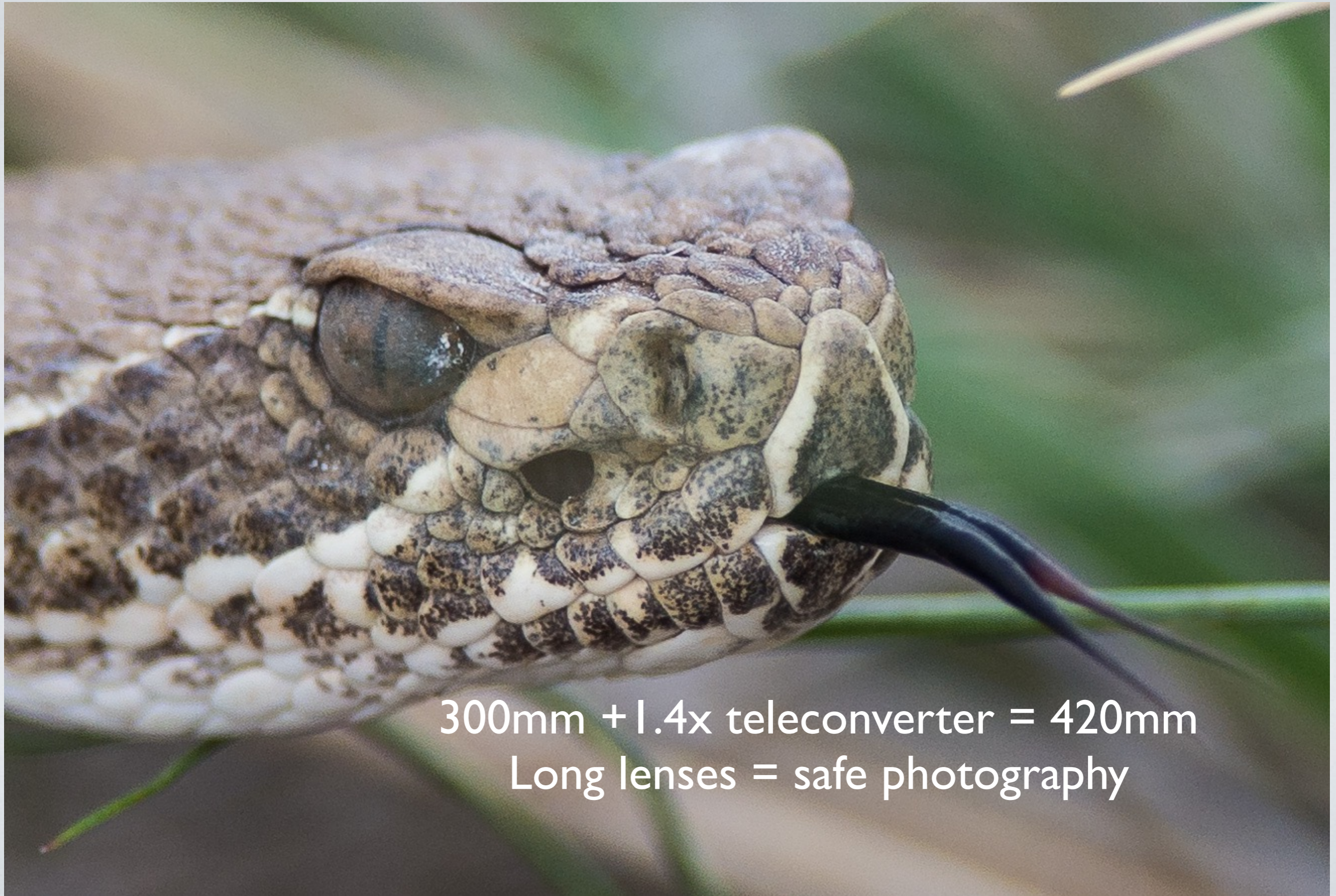
Sometimes you can't get close to your subject without scaring it.

Or it biting you.

DISTANCE MATTERS



DISTANCE MATTERS



300mm + 1.4x teleconverter = 420mm
Long lenses = safe photography

ORIGINAL



Cheat Crop to taste

REPEAT FOR DRAMATIC EFFECT



DIFFERENT WAYS TO GET CLOSE

Free



\$\$\$

- Crop
- Macro Couplers
- Reversing Ring
- Microscope adapter
- Screw on close-up lens
- Extension tubes
- Teleconverter
- Bellows
- Macro lens
- CSI

MACRO COUPLER

Connects two lenses FACE to FACE by their filter threads

- magnification = focal length of primary lens / focal length of the reversed lens
- High magnifications.
- Small subject to lens distances.
- Reversed lens should have manual aperture ring (or lever).



**General Brand 52mm to 58mm
Macro Coupler - For Mounting
Lenses of 52mm & 58mm Face to
Face**
B&H # GBMC5258 • MFR # AM5258

Availability: **IN STOCK** | Ship Time: Order Now to
ship Tomorrow ⓘ

★★★★★ (41)

Free Expedited Shipping on Orders over \$49 ⓘ

You Pay: **\$7.95**

[View Cart](#)

[+ Add to Wish List](#)

MACRO COUPLER

aka: Frankenlens



MACRO COUPLER

Quality can be good even though I did everything wrong.



FOCUS RAIL

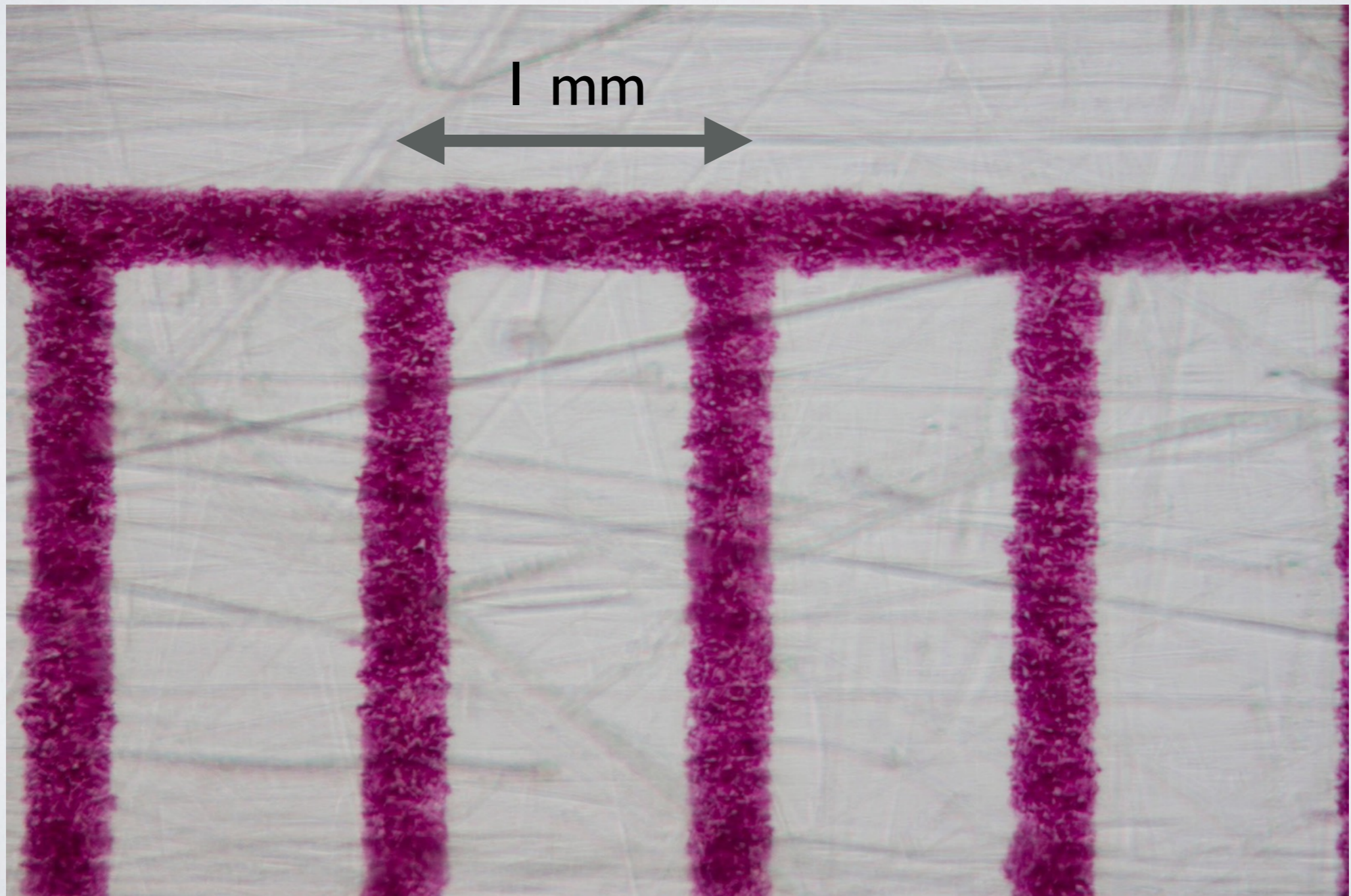


FOCUS RAIL



MACRO COUPLER

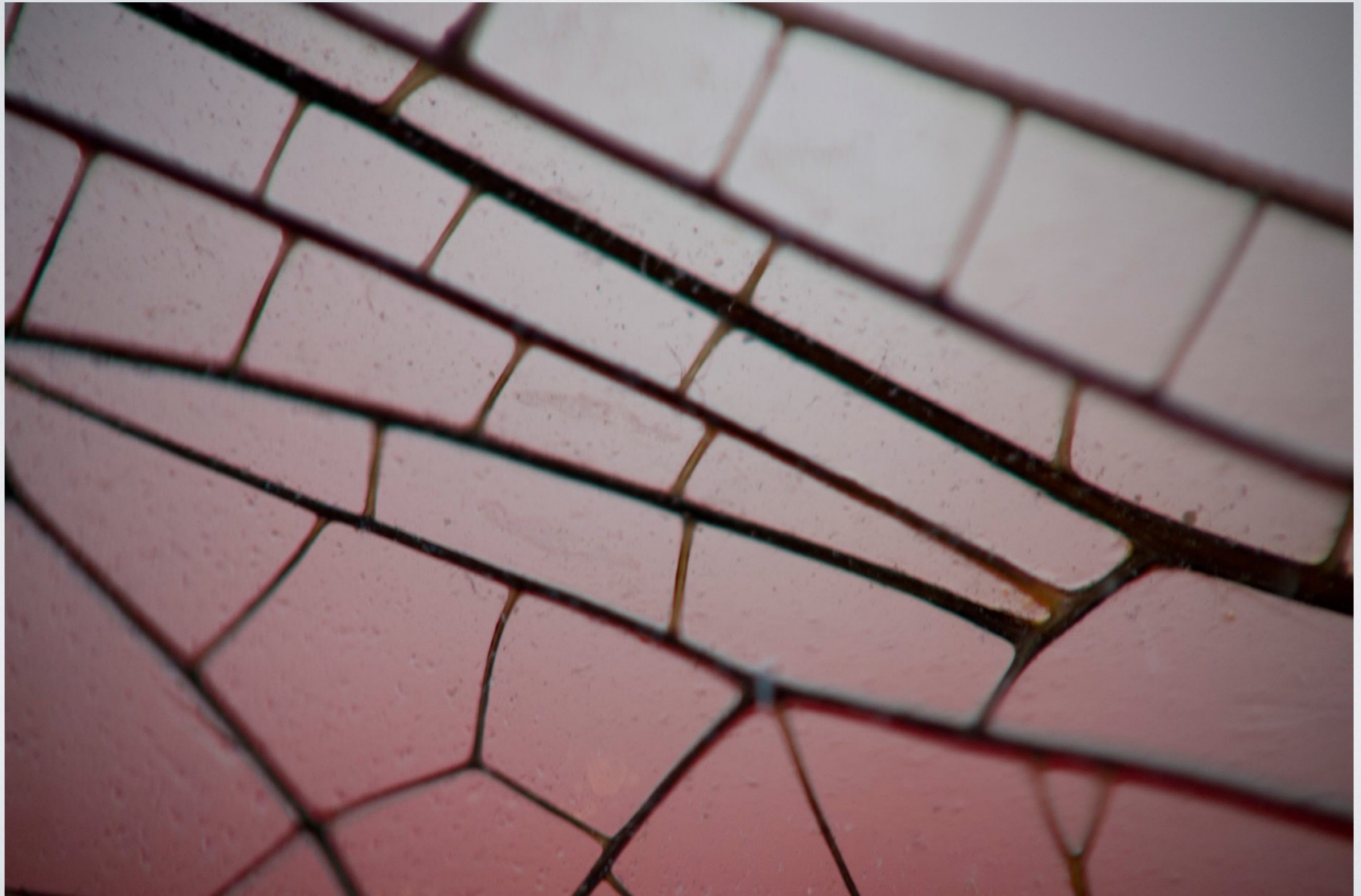
300mm lens with a 50mm lens reversed
5.3x magnification, not cropped



Mike Barry

MACRO COUPLER

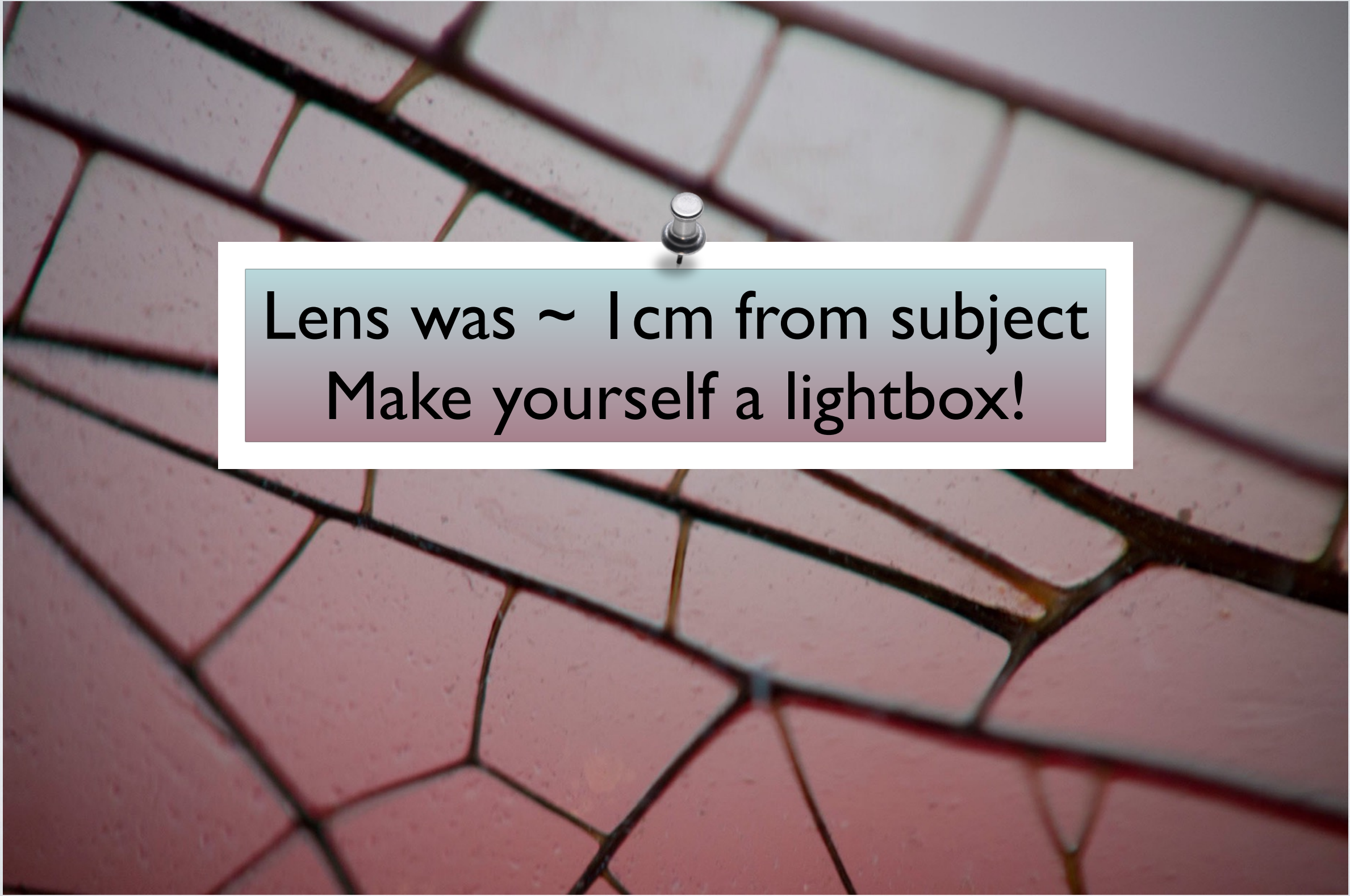
Dragonfly wing



Mike Barry

MACRO COUPLER

Dragonfly wing



Lens was ~ 1cm from subject
Make yourself a lightbox!

MACRO COUPLER - MY FIRST ATTEMPT



Don't make mistakes like this vignetting.

See

http://coinimaging.com/coupled_lenses.html



21

REVERSING RING

Lets you mount the lens backwards on the camera body

- Your lens should have a manual aperture ring!
- High magnifications.
- Small subject to lens distances.

General Brand Reverse Adapter for Mounting Lenses with 52mm Filter Threads Backwards on Nikon Bodies

B&H # GBRRN52 • MFR # AV52N

GENERAL BRAND

IN STOCK

Order **Now** to ship **Tomorrow** ⓘ

Free Expedited Shipping on Orders over \$49

★★★★★ Reviews 25 | Q&A 3



You Pay: **\$11.99**

QTY

Add to Cart

Add to Wish List

Questions? Ask our experts:

16MM LENS REVERSED

Full frame shown 4.5:1



REVERSING RING

Macromania

Focal Length	Reproduction Ratio
16mm	4.5x
20mm	3.4x
24mm	2.6x
35mm	1.5x
50mm	1x

MICROSCOPE ADAPTER

- Photo microscopy
- Macro at “low” power
- Compared to a lot of cameras and lenses, good microscopes can be inexpensive. (\$250)
- <http://www.nikonsmallworld.com/>



Nikon SLR/DSLR Camera Adapter for Microscopes

SKU: CA-NIK-SLR

Availability: **In stock**

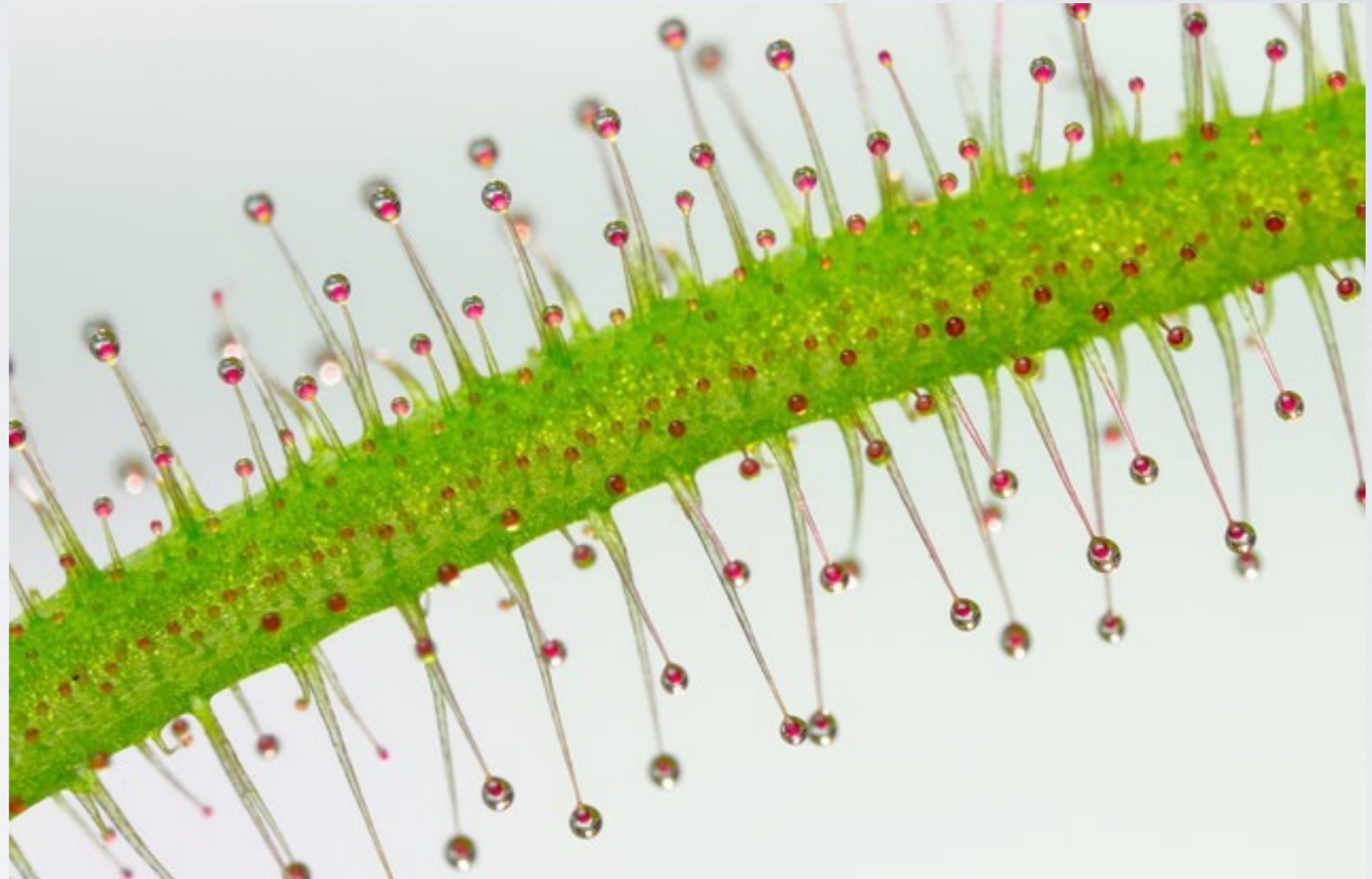
~~\$179.96~~
\$89.75

- This is a brand new Nikon SLR/DSLR Camera adapter for microscopes.
- Compatible with Nikon SLR/DSLR cameras including D40, D40X, D50, D60, D70, D70S, D80, D90, D100, D200, D300, D300S, D3000, D3100, D3200, D3300, D5000, D5100, D5200, D5300, D5500, D7000, D7100, D7200, (except G series)
- Magnification Power: 2X
- Material: metal
- Mounting Size on Microscope Side: 23.2mm, 30mm and/or 30.5mm

AmScope.com

MICROSCOPE ADAPTER

Tentacles of a carnivorous plant (*Drosera* sp.) - 20x



José R. Almodóvar
1 3th place winner

<http://www.nikonsmallworld.com/galleries/entry/2015-photomicrography-competition/13>

CLOSE-UP LENS FILTER

Screw on like lens filter. AKA: diopters

Lens focal length	Magnification increase
100 mm	0.3x
200 mm	0.5x
400 mm	0.8x

Canon 58mm 500D Close-up Lens B&H # CACUL500D58 • MFR # 2822A001

Canon

IN STOCK

Order **Now** to ship **Tomorrow** ⓘ

Free Expedited Shipping

PRODUCT HIGHLIGHTS

- Attaches to Front Element
- Changes Close Focus Distance
- Range: 500mm to Infinity (19.6" approx)

★★★★☆ [Reviews 46](#) | [Q&A 7](#)



You Pay: **\$84.95**

QTY

Add to Cart

Add to Wish List

Questions? Ask our experts:

📞 800.894.9703 **Live Chat**

CLOSE-UP LENS FILTER

Screw on like lens filter

Pros

- Easy to carry
- Don't have to mount/remount a lens

Cons

- Need different lens for each filter size
- Minimal magnification with lenses $< 80\text{mm}$
- Distance focus lost
- Good close-up lenses may be more expensive than extension tubes
- Can get complicated where a diopter does not work with your lens. (see http://coinimaging.com/add-on_macro.html)

EXTENSION TUBES

- Different lengths
- No lens elements to add distortion

Kenko Auto Extension Tube Set DG (12, 20 & 36mm Tubes) for Nikon Digital and Film Cameras

B&H # KEAETSND • MFR # A-EXTUBEDG-N

 Kenko

IN STOCK

Order **Now** to ship **Tomorrow** ⓘ

Free Expedited Shipping

★★★★★ Reviews 277

Q&A 27

Similar item at lower price:

Vello Auto Extension Tube Set for Nikon **\$79.95**


You Pay: **\$129.00**

QTY

Add to Cart

Add to Wish List

Questions? Ask our experts:

 800.894.9703 **Live Chat**



EXTENSION TUBES

Magnification = normal magnification +
(extension tube length / focal length)

My 50 mm lens maximum reproduction ratio is 0.15x

so with 68mm of extension tubes:

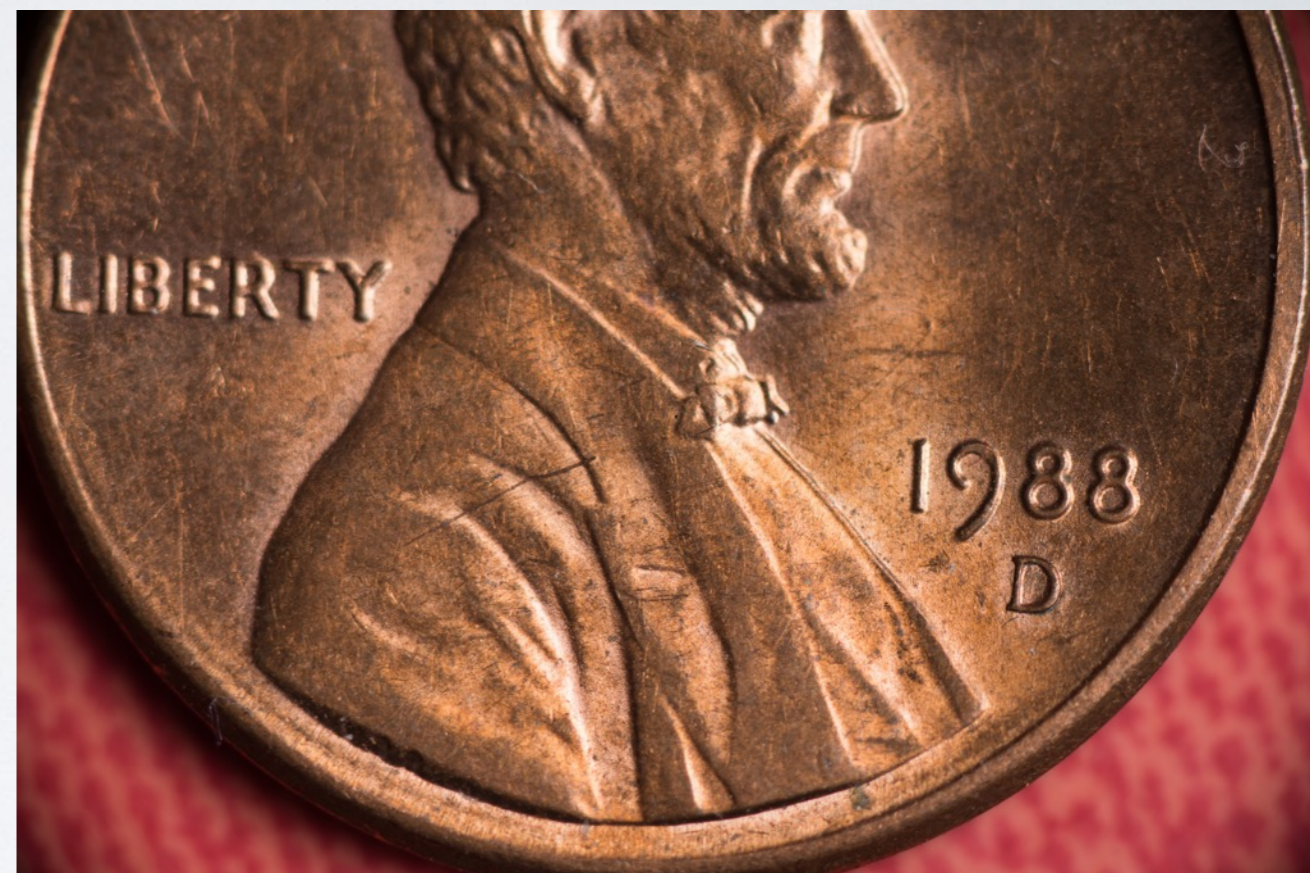
$$\text{Magnification} = 0.15 + (68 / 50) = 1.5x$$

Tube Length (mm)	Reproduction Ratio
12	0.39
20	0.55
36	0.87
56	1.27
68	1.5

EXTENSION TUBES

50 mm lens + 68 mm extension tubes

105 mm macro lens + 68 mm extension tubes



Full uncropped images

Lens	Reproduction (measured)	Distance to front of lens
105 mm macro	1.9:1	4"
50 mm	1.4:1	2"

50 mm lens + 68 mm
extension tubes



105 mm macro lens + 68
mm extension tubes



50 mm lens + 68 mm extension tubes



1.4x

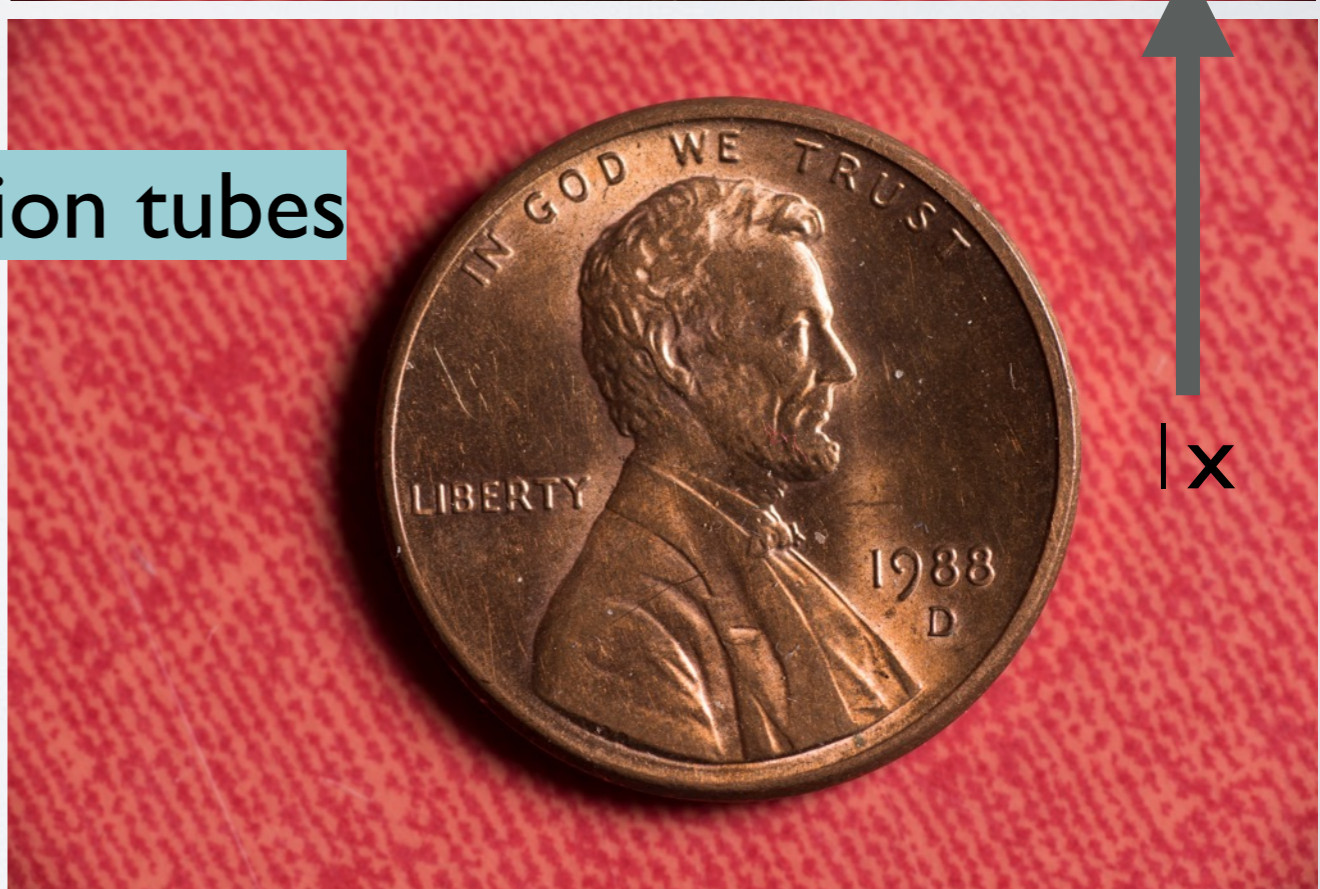
105 mm macro lens + 68 mm extension tubes



1.9x

0.15x

No extension tubes



1x

105mm macro + 68 mm extension tubes - crop



TELECONVERTER

- Minimum focus distance does not change
- Increase working distance
- Can combine with extension tubes or bellows
- Always attach to the camera body when you are using extension tubes or bellows.
- A small resolution decrease but it may be made up by the magnification.

BELLOWS

- Bulky
- Extends like a variable extension tube
- Some can work as tilt-shift lens
- Needs rail and lens adapters or new lenses

Novoflex Castbal Tilt-Shift Bellows Attachment B&H # NOBACQ • MFR # CASTBAL-T/S



SPECIAL ORDER

Ship Time: 3-7 business days ⓘ

Free Standard Shipping

Not eligible for free Expedited Shipping

PRODUCT HIGHLIGHTS

- Compact Bellows
- For 35mm, Mirrorless, Medium Format
- Enables Tilt-Shift Macro Photography
- Fits Castel-Q Macro Focus Rack

★★★★★ Reviews 0 [Write a review](#) | [Q&A 0](#)

You Pay: **\$514.99**

1 QTY

Add to Cart

Add to Wish List

Questions? Ask our experts:

📞 800.894.9703 [Live Chat](#)



BELLOWS

- There are cheap alternatives (no tilt/shift)

FotodioX Macro Bellows for Nikon F Mount Camera Systems

B&H # FOMBNFMCS • MFR # 11BLLWNIKF

FotodioX[®]
FOTODIOX



SPECIAL ORDER

Ship Time: 7-14 business days ⓘ

Free Standard Shipping

Not eligible for free Expedited Shipping

★★★★★ Reviews 0 [Write a review](#) | [Q&A 0](#)

You Pay:

\$49.95

1 QTY

[Add to Cart](#)

[Add to Wish List](#)

Questions? Ask our experts:

[800.894.9703](#) [Live Chat](#)

MACRO LENSES

Couplers, reversing adapter, screw-on close-up lens, extension tubes are all restricted to macro work. Your far focus distance is very close to your near focus distance.

Macro lenses are regular lenses that let you get closer. So they can be used for portraits, landscapes, whatever you want.

MACRO LENSES

Like regular lenses but let you get closer.

	Nikkor 105mm	Micro-Nikkor 105mm
Minimum aperture	f/16	f/32
Angle of View	23 deg	23 deg
Reproduction Ratio	0.13x	1.0x
Min. Focusing Distance	3.0 ft	1.0 ft

MACRO LENSES

All 1:1 reproduction or better

Nikon 105mm f/2.8 Micro-Nikkor	1:1	\$900
Canon 100mm f/2.8 Macro	1:1	\$550-\$850
Canon 180mm f/3.5 Macro	1:1	\$1,400
Canon MP-E f/2.8 1-5x Macro	5:1	\$1,050

Versatile:

- Expensive but used prices can be 1/3 for older models
- Focus ~1 foot to infinity
- Can use for any type of photography, not just macro
- HIGHLY recommended for close-up and macro

THE HUNT



GETTING THE SHOT

You don't need to do all (or any of these).

- Manual focus
- Use a tripod
- Remote shutter release (or timer, possibly with mirror up)
- If no remote, don't stab the shutter, gently squeeze while slowly exhaling
- Rail for critical focus at high magnifications ($> 1:1$)
- Live view zoom for focus at high magnifications!!!
- Break the wind to keep plants from moving (reflector works well) or use clamps/brace
- Focus your mind to lower your heart rate
- Have a martini to steady your nerves

And ...

... pray for the best

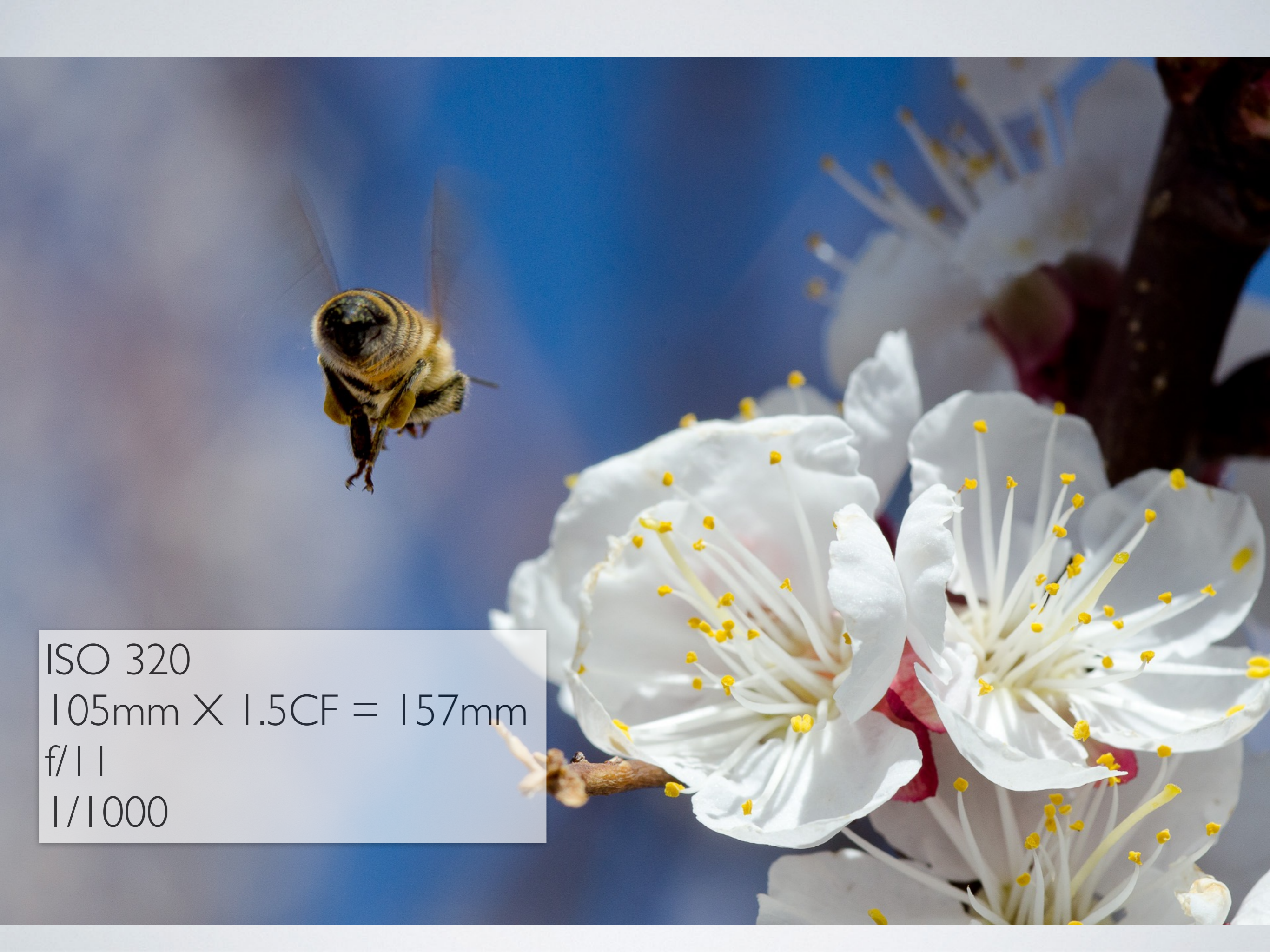


GETTING THE SHOT

Or Work Fast

- Hand hold
- Up the shutter speed
- Use flash if you need to for a good aperture, iso and to freeze motion (this will probably happen often)
- Pre-focus
- Move the CAMERA not the focus ring (once you are close)

Where would you want to work fast?



ISO 320

105mm X 1.5CF = 157mm

f/11

1/1000

Bee's don't stay still unless they are dead.

This one wasn't.

Shallow depth of field
for subject isolation.
Flash for low ISO.

ISO 100

105mm x 1.5CF = 157mm

f/7.1

1/200

Flash



FLASH

Getting the flash off axis



FLASH

Flash gives you a lot of creative control

- Can darken the background
- Freeze motion
- Let you use low ISO for low noise
- Let you use small aperture for larger DOF



FLASH

On camera flash.



FLASH

Off camera flash. Light just what you want.



Hawk Moth

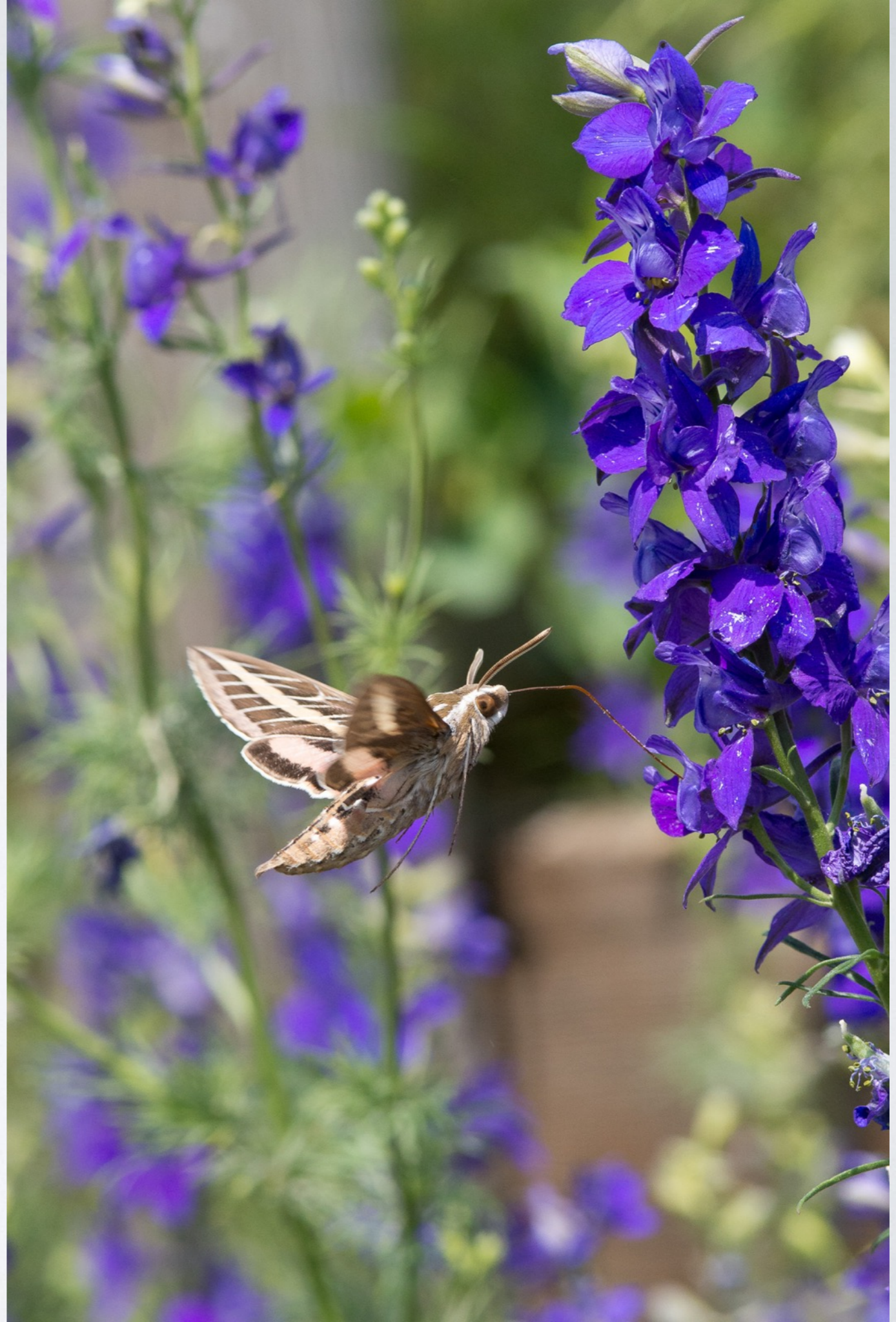
ISO 1100

105mm

f/7.1

1/2000

Possible improvement:
Flash could have darkened
the background, let me
use noise free iso, and let
me shoot at a smaller
aperture for greater DOF.



FLASH



ISO 100
180mm
f/18
1/200
Flash

FLASH WITH SNOOT



Remote trigger is VERY convenient and may be already built into your flash.

FLASH



FLASH



Tripod



Shooting down



Position down low

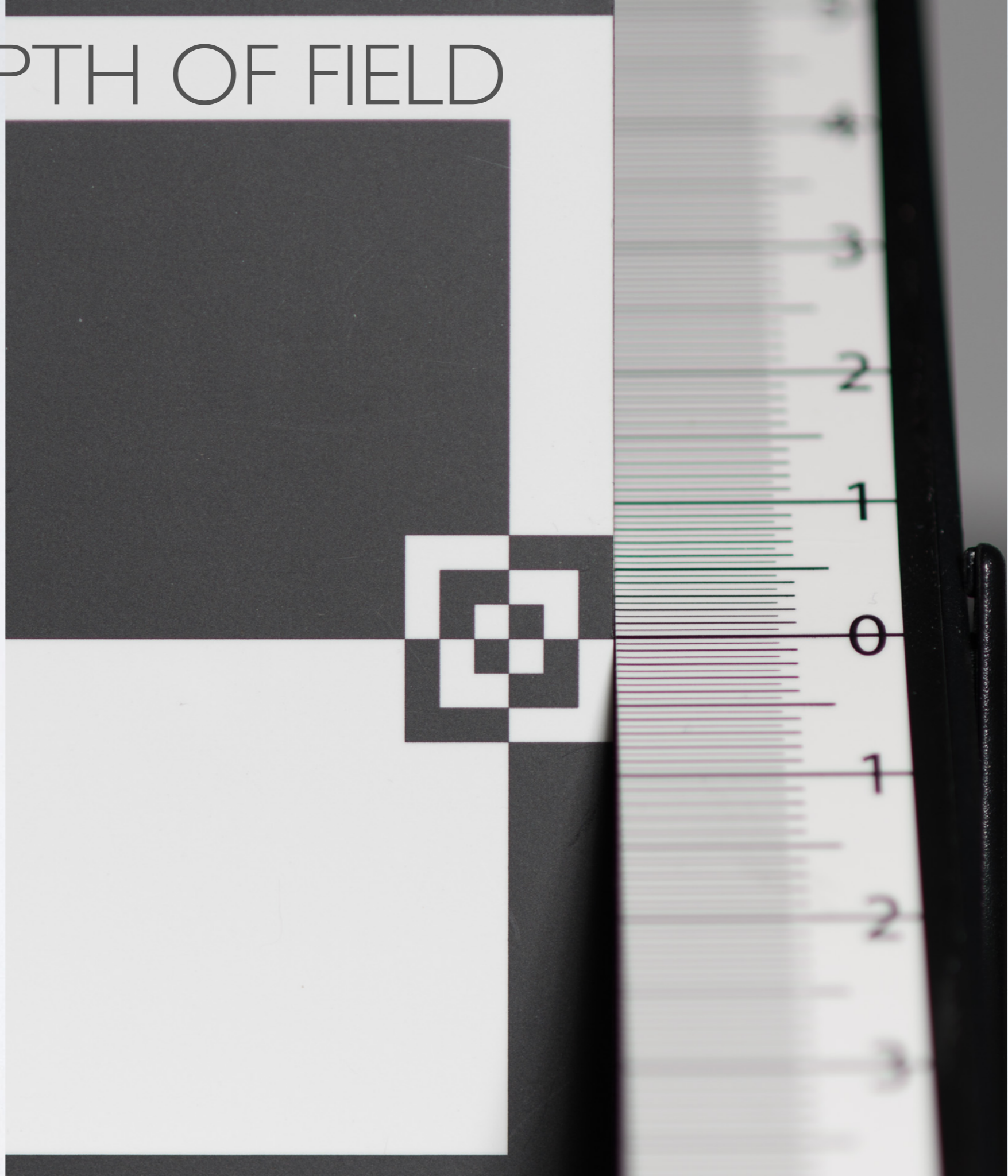
DEPTH OF FIELD



DEPTH OF FIELD

Aperture
sensor size
lens focal length
focus distance

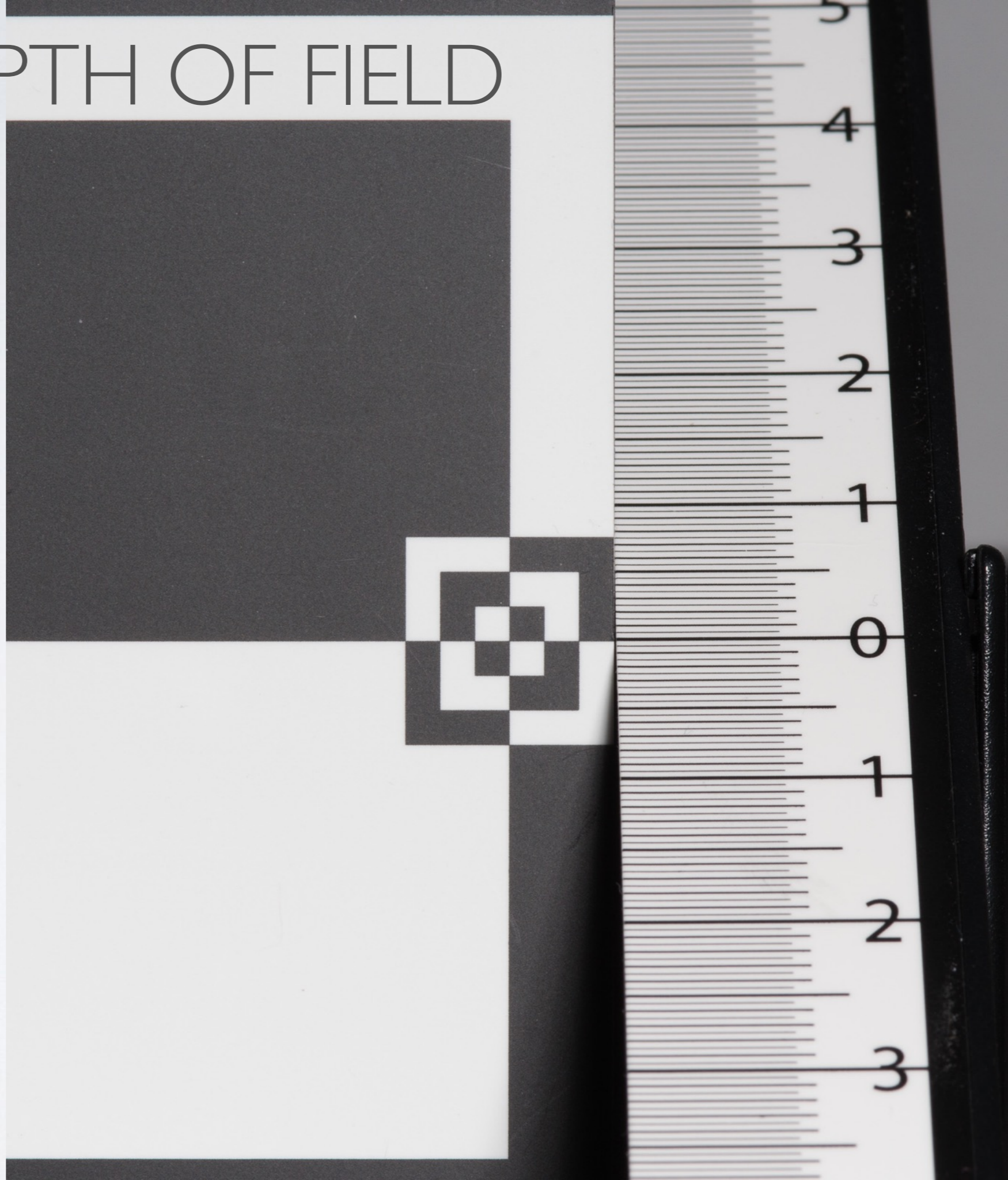
f/3.2 shown



DEPTH OF FIELD

Aperture
sensor size
lens focal length
focus distance

f/16 shown



DEPTH OF FIELD AT 1 FOOT

Full Frame sensor, 105 mm macro lens, at one foot from subject.

Aperture	Nearest Acceptable Sharpness	Furthest Acceptable Sharpness	Total DOF
f/4	11.97"	12.03"	0.06"
f/8	11.94"	12.06"	0.12"
f/16	11.89"	12.11"	0.24"

Macro Depth of Field Calculators:

- <http://www.kielia.de/photography/calculator/>
- <http://www.photopills.com/calculators/dof-macro>
- phone apps

DEPTH OF FIELD

Cheat Sheet

DOF doubles when aperture doubles.

For example, $f/4 > f/8$. That is TWO stops.

Each stop is 1/2 the light. So going from $f/4$ to $f/8$ (two stops) is 1/4 the light. This has to be compensated by a reduction in shutter speed, an increase in iso, or use a flash.

Halving the subject distance reduces the DOF by over 4x.

DEPTH OF FIELD

Not a problem if you limit yourself to flat subjects



FOCUS STACKING

For very deep depth of field

Combine the in-focus parts of multiple images to create a depth of field that is impossible with a single shot.

- Take multiple pictures at different focus planes.
- Align
- Blend

Avoid on camera flash (probably cause halos)
Subject better be pretty still

FOCUS STACKING: IMAGE 1



FOCUS STACKING: IMAGE 14

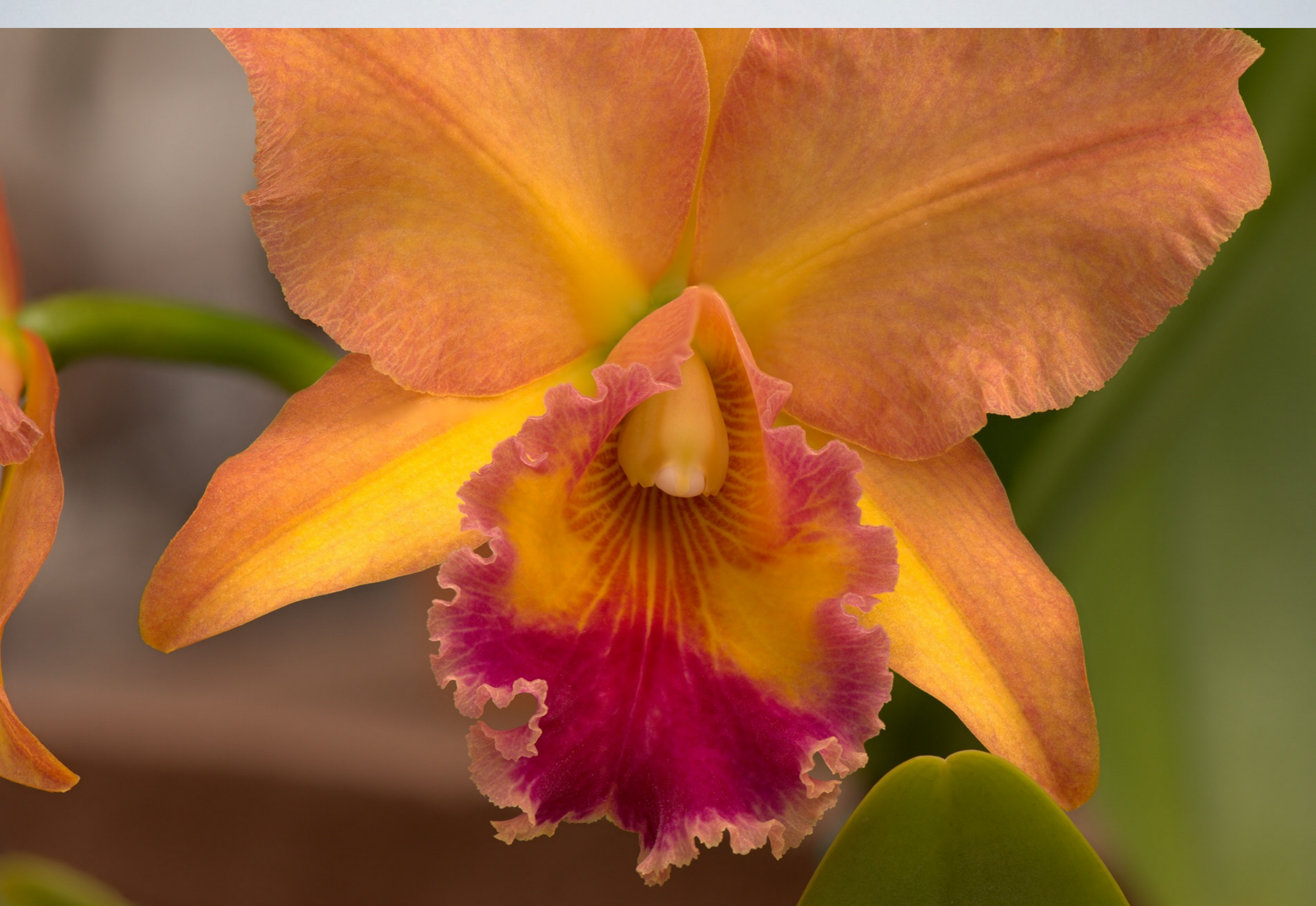


FOCUS STACKING: IMAGE 26



FOCUS STACKING: FINAL STACK





Ken Eis



5 image stack

Russ Lawry

FOCUS STACKING

Not just a macro technique!

Can focus stack landscapes or whatever you want.

FOCUS STACKING

Take pictures with overlapping focus by

- Manual lens focus OR
- Use software to control the camera focus (e.g. Helicon Remote (excellent), or Camranger) OR
- Use a manual rail OR
- Use an automated rail (e.g. Cognisys Stackshot) for extremely shallow focus slices

FOCUS STACKING

Can be done in Photoshop

OR specialized software like:

Helicon Focus (heliconsoft.com)

Zerene Stacker (zerenesystems.com)

and others

FOCUS STACKING

- Helicon Focus
 - Import images
 - Click merge
- Photoshop
 - File > Automate > Photomerge OR
 - Put images in layers and: Edit > Auto-Align Layers then Edit > Auto-Blend then Layer > Flatten Image

FOCUS STACKING

For extreme macro and repeatability, Cognisys StackShot automated rail.



StackShot™

Macro Rail Package

Includes Power Supply and Motor Cable



Image from <https://www.cognisys-inc.com/>

Steve Gettle

CLOSE-UP VIDEO

Sample video shot over 49 hours

1432 shots

one shot every 2 minutes

Video run length 30 seconds



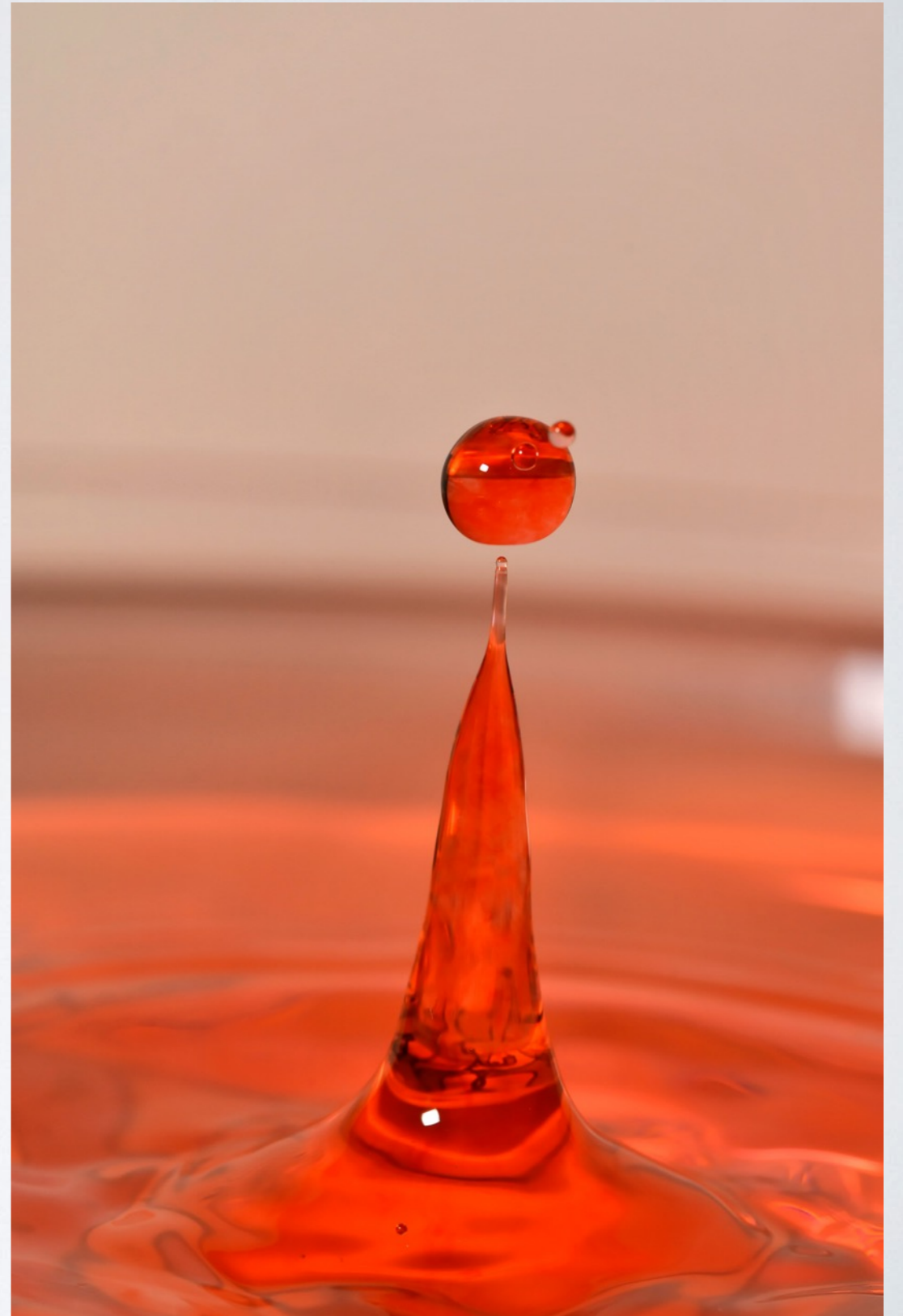
CLOSE-UP VIDEO

Shot in raw (7360 x 4912 px) for adjustments and cropping
with Interval Timer (still frames)
not time-lapse (video)

Final product was HD Video (1920 x 1080 px)

WATER DROPS

Fun



NEXT MACRO SIG OUTING

55mm to 62mm reversing ring

Oil and water

Saturday February 27
Indoor macro shoot at CSU

Light box

Light tent

Water drops

Sony extension tubes

Other stuff

A close-up photograph of a bird's eye, where the iris has been replaced by a camera lens. The bird has vibrant green feathers on its head and neck, and a large, bright red crest on the right side. The eye is surrounded by white, textured skin. The camera lens is a small, black, circular object with a clear glass element in the center. The text "See you at CSU" is overlaid on the image in a white box with a black border.

See you at CSU