WCC Macro Workshop

Geoff Shaw

All photos by Geoff Shaw, unless another source is stated.

based on https://resources.waverleycameraclub.org/macro-and-close-up-photography/

Outline of presentation

- **What is Macro/Close-up?**
- **Macro & Close-up photography uses**
- **Camera settings**
- **Equipment**
- **Lighting**
- **Post-processing (including focus stacking)**
- **Tips and traps**

Note

This is a **basic** introduction

I can only skim the surface of this topic in the time available

Feel free to ask questions or ask for clarifications

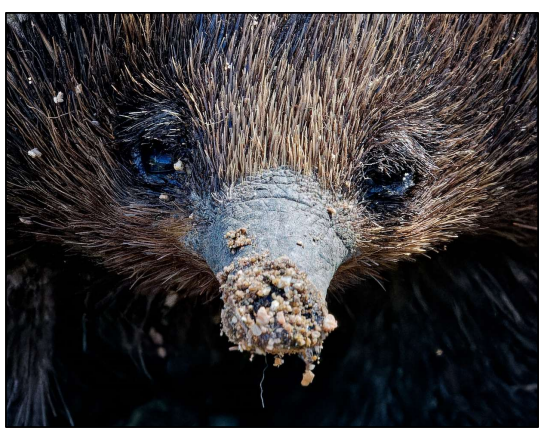
What is Macro Photography

some definitions:

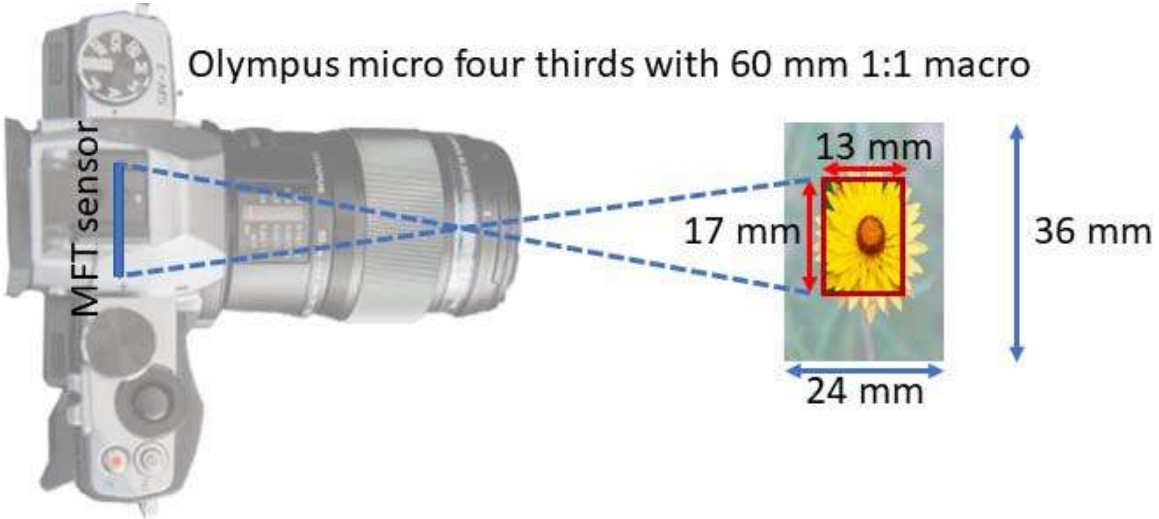
- size of the subject on the image sensor is life-size or greater
- a finished photograph of a subject that is greater than life-size
- subject imaged at 1:1 or better

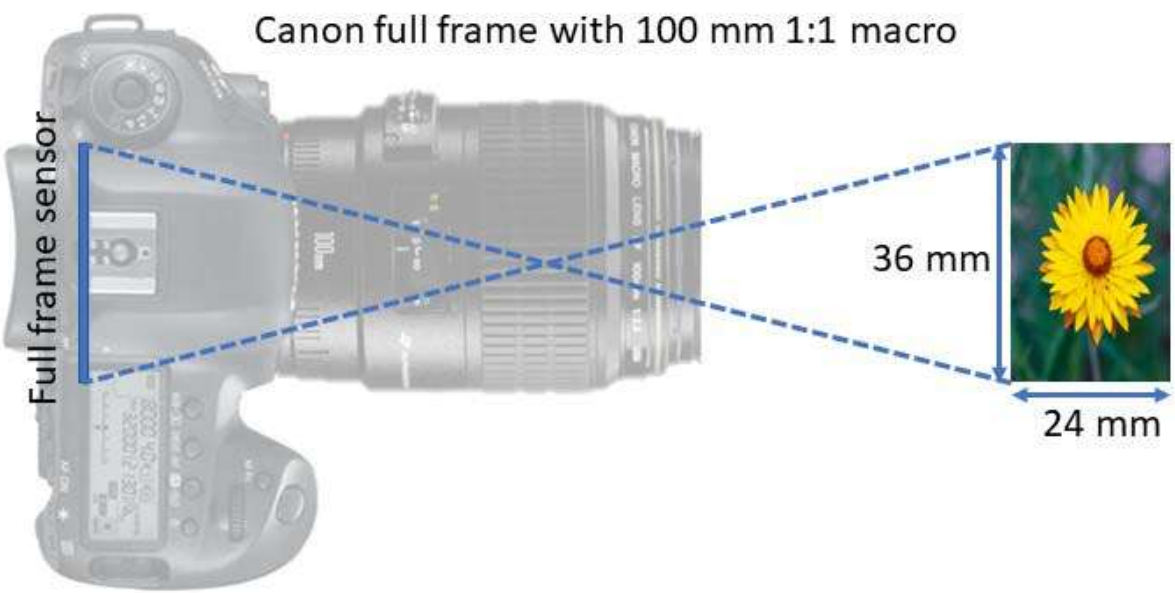
But all this depends on sensor size, cropping etc.

close up?

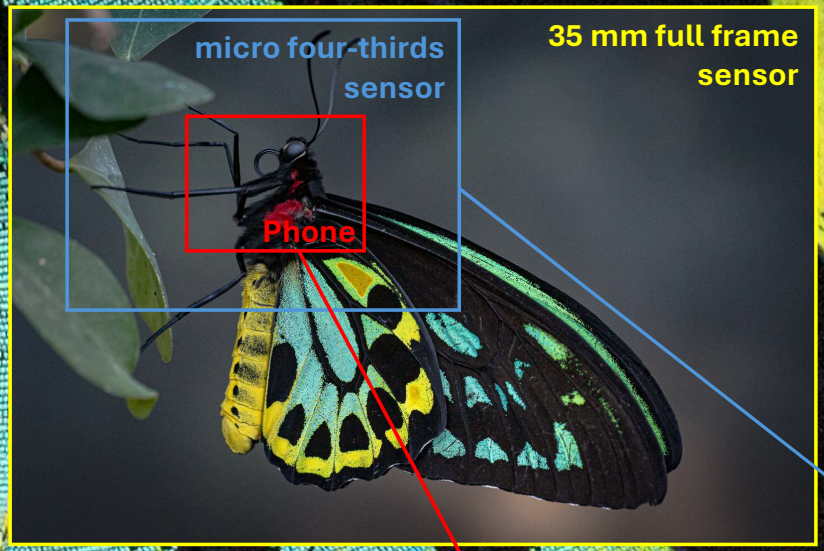


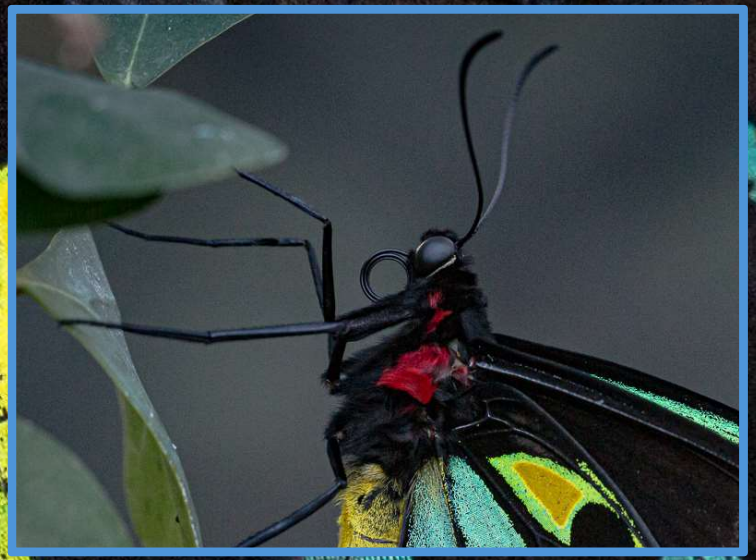
almost macro?


Olympus micro four thirds with 60 mm 1:1 macro
MFT sensor
13 mm
17 mm
36 mm
24 mm


Canon full frame with 100 mm 1:1 macro
Full frame sensor
36 mm
24 mm

1:1 on the sensor gives different apparent magnfications

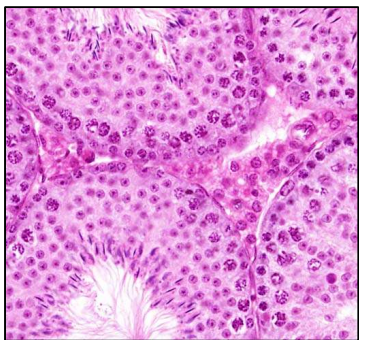




A Spectrum of magnifications



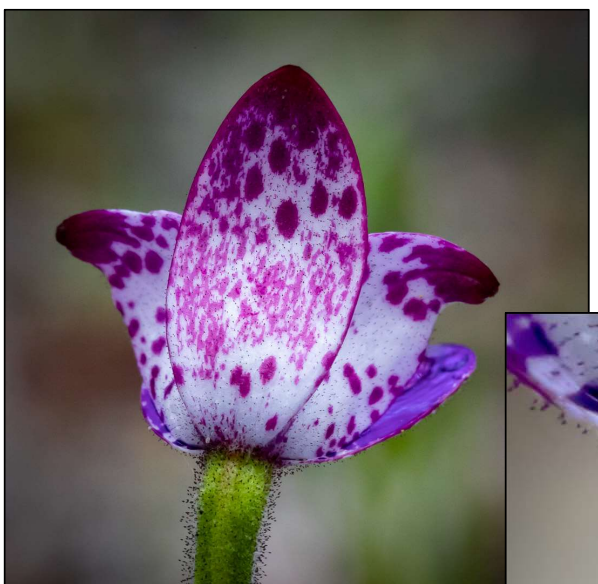


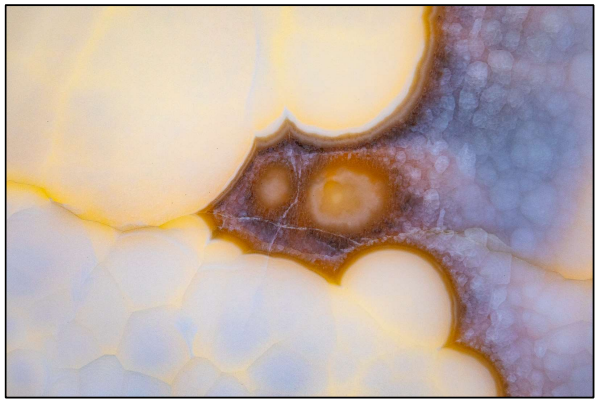


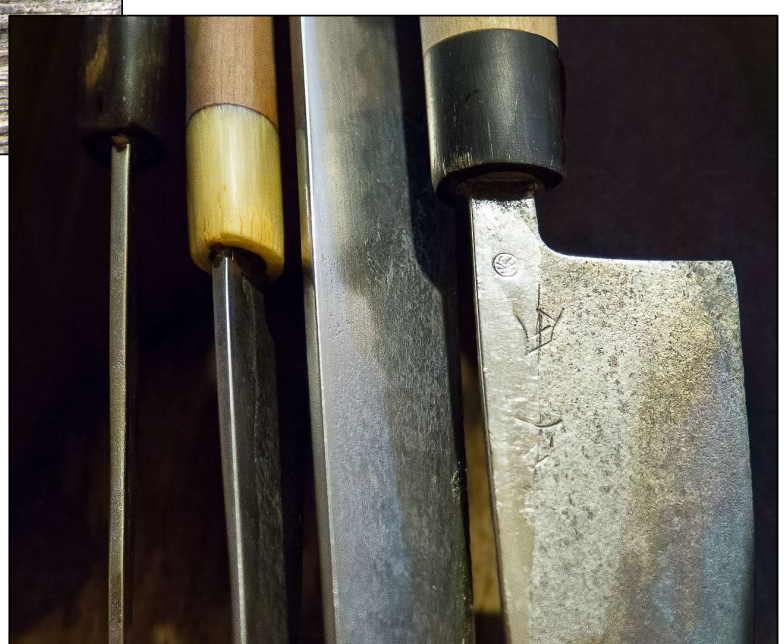
close-up macro extreme macro microphotography




Macro *and* Close-up

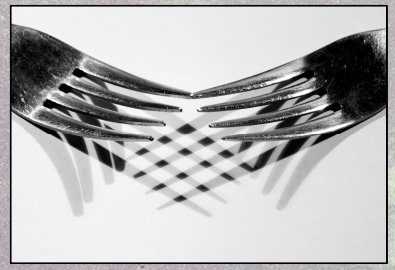


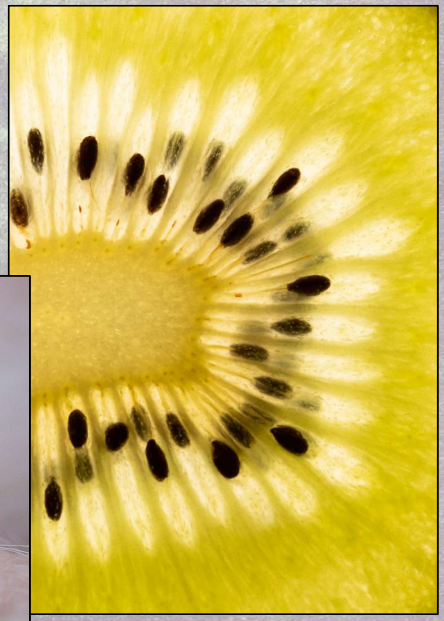




Why Macro / Close-up photography?

Close-up and macro photography allows you to see things in a completely new way. It isn't all about bugs and flowers. Lots of everyday things look different when magnified.



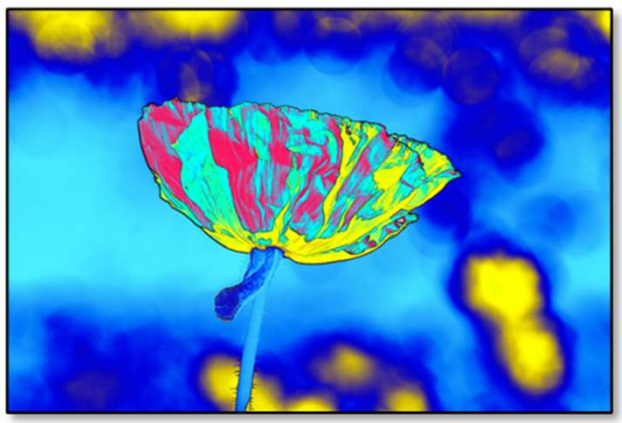


Documentary

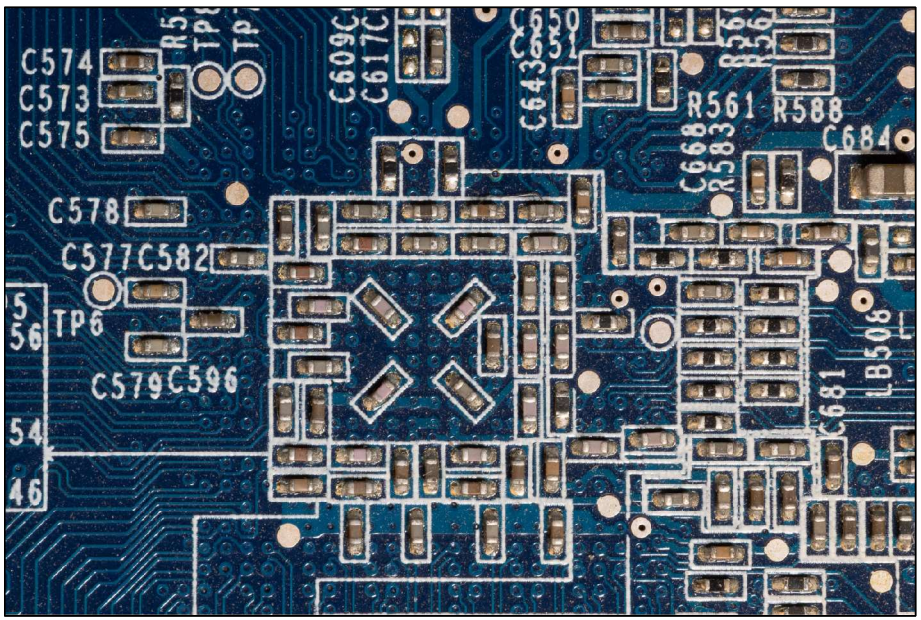
Banksia flower

Ice crystals

You can use macro photos creatively – eg play with scale and context

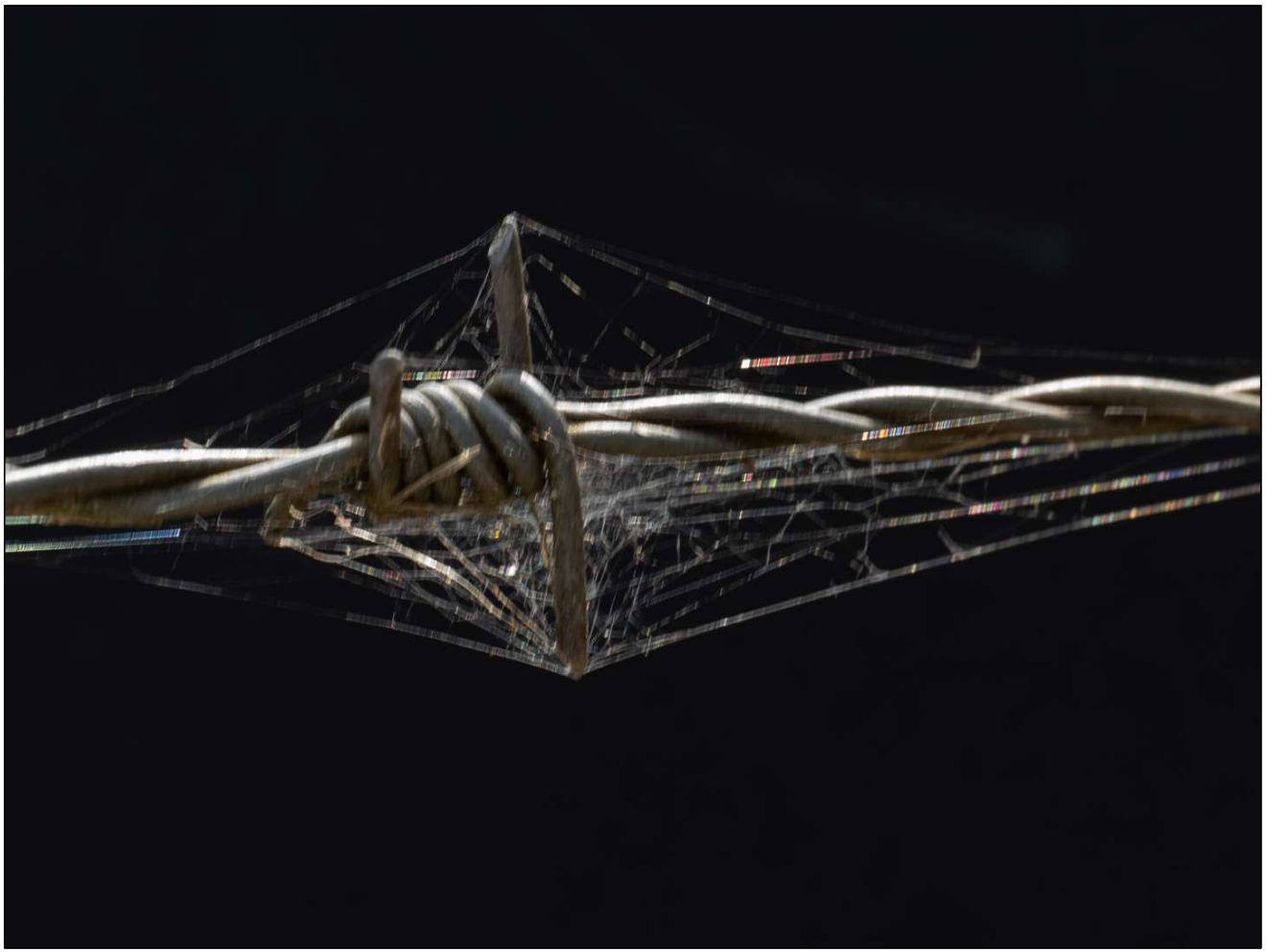


Patterns


C574
C573
C575
C578
C577
C582
TP6
C579
C596
R561
R588
C684
C681
LB508

Water drop ...

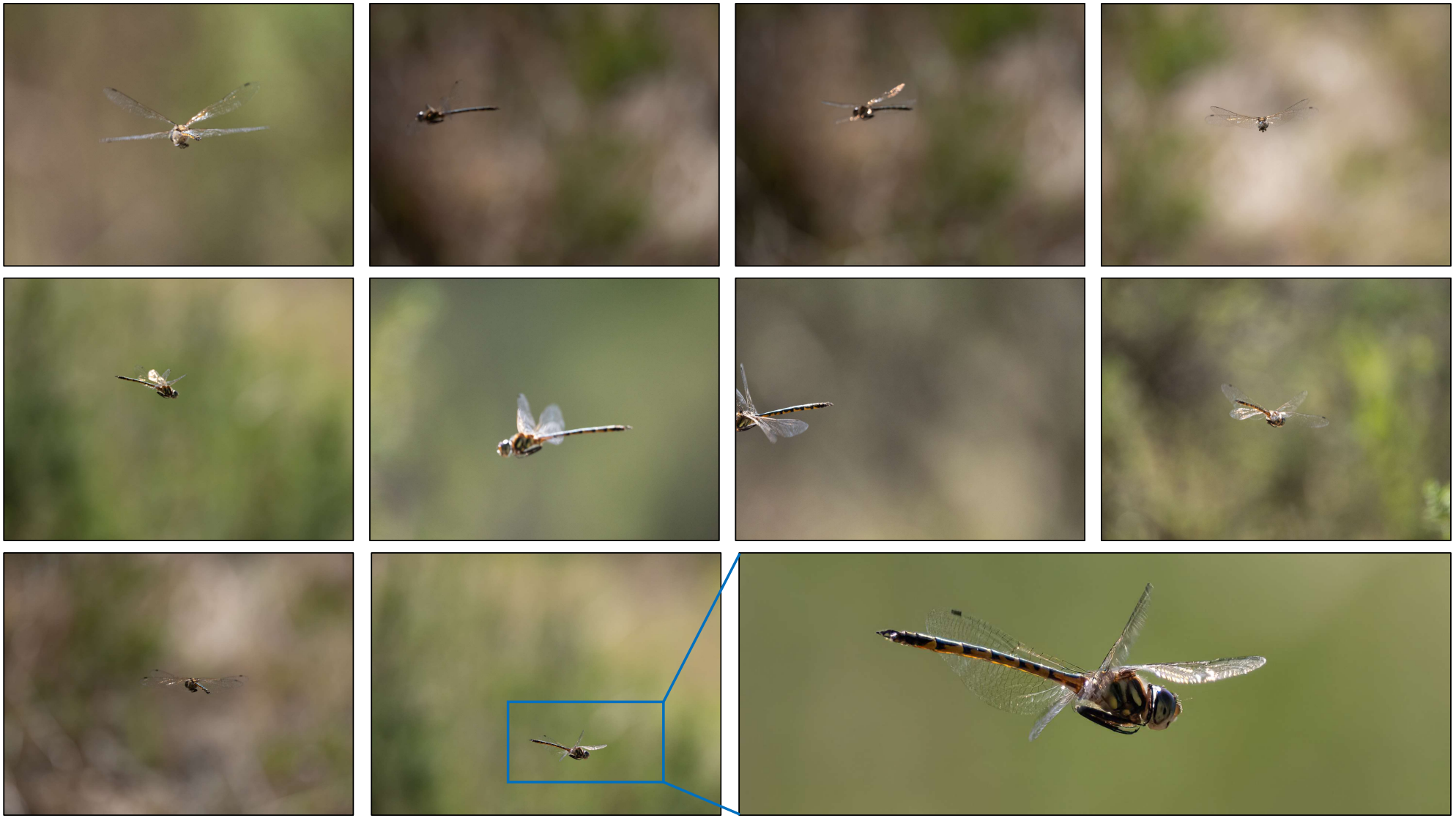
Be prepared for failure



eg – sunlight from behind, f16 for depth of field, 1/15 sec, ISO 200

Hand-holding macro shots at slow shutter speeds is challenging

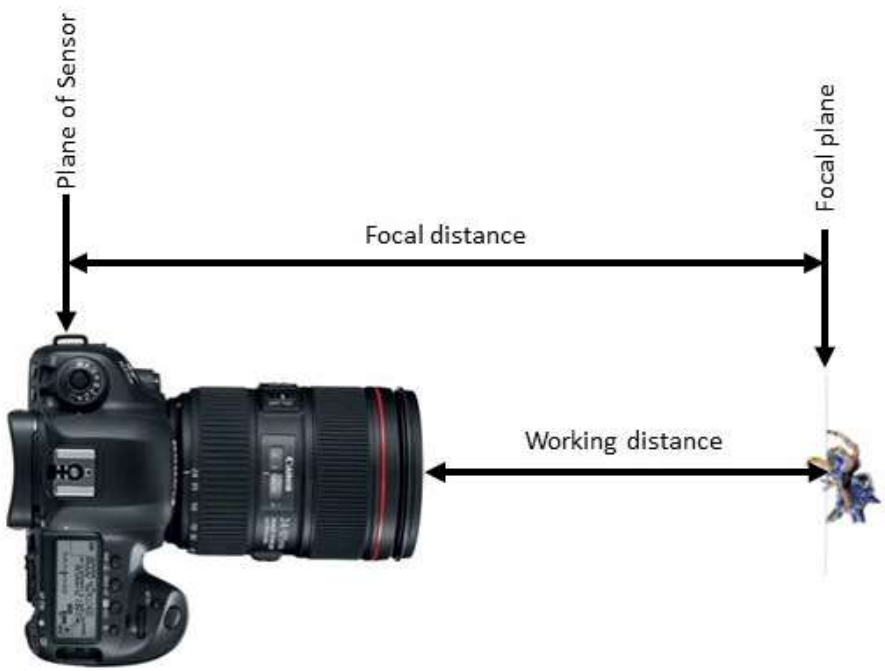
The more you know, the more you practise, the fewer the failures.



Working distance

- Macro lens – typically 1:1 or better
- **Working distance** – space between front of lens and subject

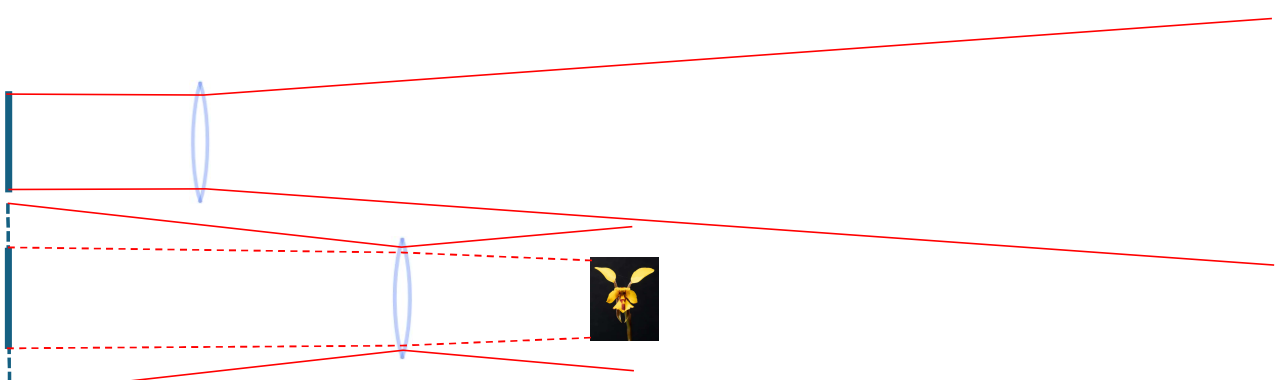
- Large **working distance**
  - access for lighting
  - less scary for animal subjects
  - safer for lens (scratchy plants etc)



Effective Aperture

- Aperture → focus at infinity
- Close focus → smaller **effective aperture**

- eg f2.8 macro lens at 1:1 → effective aperture f5.6
  - more light
  - diffraction



see https://www.bhphotovideo.com/explora/photography/tips-and-solutions/effective-aperture-and-macro

Equipment: cameras and lenses

- Phone camera
  - many phone cameras give good close-up
- All in one cameras – can be surprisingly good
- digital camera
  - macro lens – should get at least 1:1
  - standard zoom
  - telephoto zoom

  } most will get close-up (0.2 – 0.3 X) and you have lots of pixels to crop closer!

For this sort of image, a standard macro lens won't work – you need high magnification at a large working distance. A telephoto-zoom does the job well.

Dragonfly on the wing. 100-400 mm zoom at 400 mm, f13, 1/1000 sec. I had about 1.5 m *working distance* between the lens and the dragonfly, and this is a crop from the centre of the frame (full frame sensor).

Equipment: Teleconverters

Teleconverters can give extra magnification/working distance, but you lose light

1.4x → 1 stop

2x → 2 stops

Not all lenses are compatible with teleconverters

Pobblebonk frog on a rainy night in Gardiners Creek Reserve.

Canon EF 100 mm macro lens with a *Kenko* 1.4x teleconverter.

The teleconverter gave me a bit of extra working space at a given magnification, so I didn't need to get so close to the frog that it hopped away.

Even at f16 the depth of field is quite shallow at high magnifications

Equipment: extension tubes / bellows

- Tubes that sit between the camera body and lens
- effectively increase the close focusing
- decreased working distance
- reduced focus range

https://lensnotes.com/photography/extension-tubes/

- **Extension tubes** often come as a set of 3 that you can stack to produce different extensions
- **Bellows** can give huge extensions – often used with *reversed lenses* to give large magnifications.

https://digital-photography-school.com/how-to-extreme-close-up-photography-macro-bellows/

Equipment: Close-up filters

- attach to the front of your lens and act like reading glasses to allow closer focus.
- small and light to carry
- cheap versions may give distortions / aberrations.
- more expensive ones (multiple glass elements) can give excellent results

https://www.amazon.ca/Close-Up-Diopters-Magnificatoin-CoolPix-Digital/dp/B01H5TH8S0

Lighting

- Natural Light:
  - direct sunlight can be harsh – try using a diffuser, overcast, shade.
    - only need small diffuser for small subjects

- Continuous lighting:
  - specialised lighting units may provide adjustable brightness and colour balance

Continuous lighting

- Continuous lighting:
  - specialised lighting units may provide adjustable brightness and colour balance
  - Not usually very bright, so light may need to be close to subject

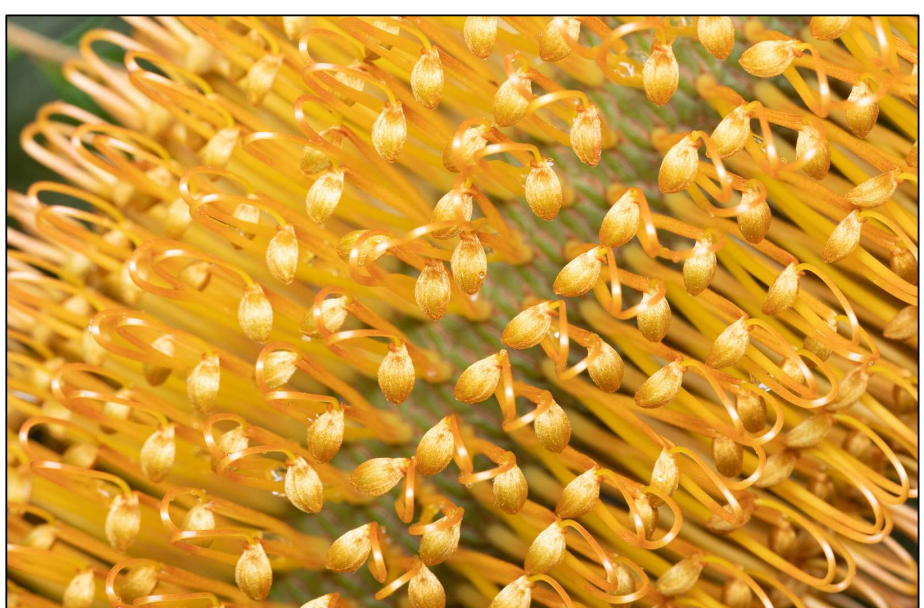
Studio flash with modelling light

Godox LiteMons

Flash lighting

- Flash
  - can give very bright light
  - may need supplementary continuous light for focusing
  - on-camera / off-camera
  - ringlight / macro-light
  - flash diffuser often helps

  - Off-camera flash can be useful



direct flash

flash with diffuser

softer shadows
slight shift in colour
(my DIY diffuser may not be neutral)

Natural lighting

direct sunlight can be harsh

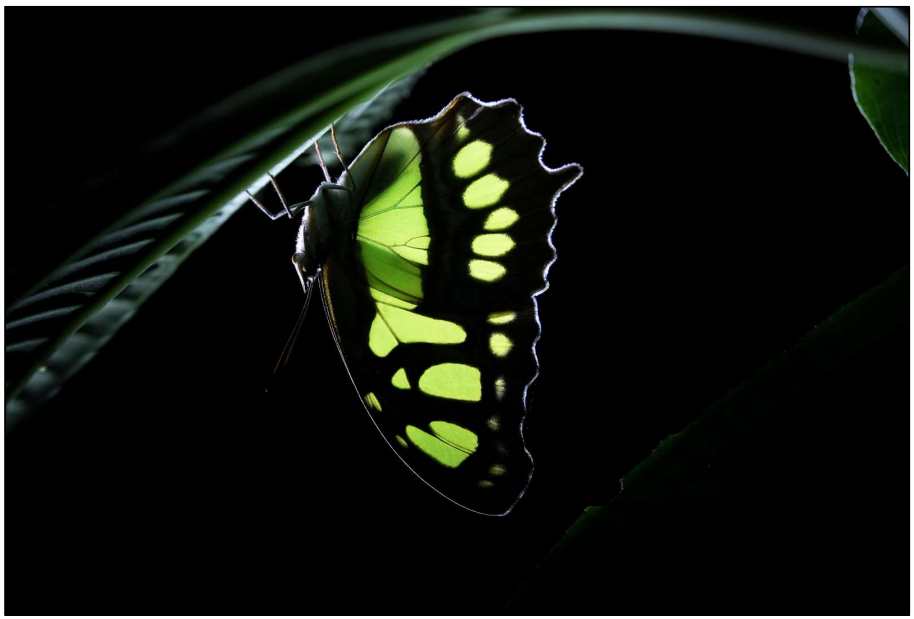
- diffuser
- overcast
- shade
- flash fill

ice patterns on frozen lake
overcast

direct sunlight

Sunlit from behind … transillumination

Backlighting / Transillumination



torchlight at night

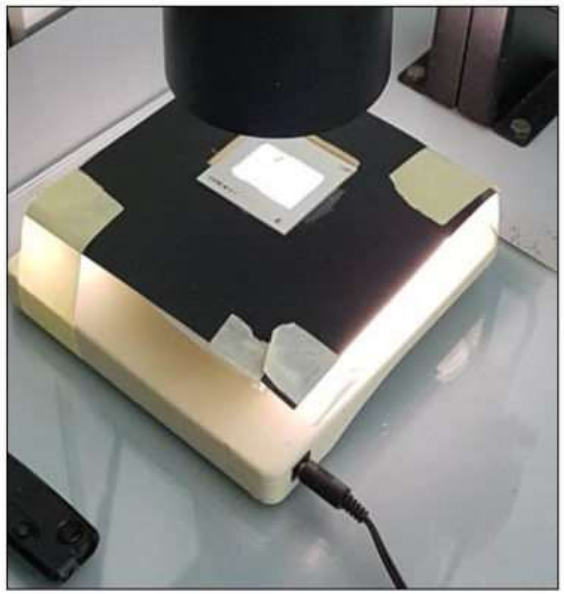
combined backlight (lightbox) and continuous front light.

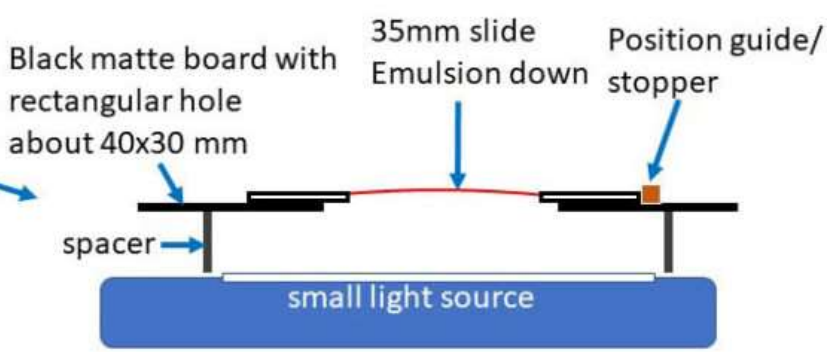
balance sources for brightness / colour

Improvised lighting setup for pond life

off-camera flash below (or to the side)

35 mm slide digitisation





Fill Flash

all shots used ISO 200 with TTL flash

f 16
1/250

f 5.6
1/250

f 5
1/100

f 5
1/100

Tripods etc

- static subjects
- slow exposures
- focus stacking

Camera Settings

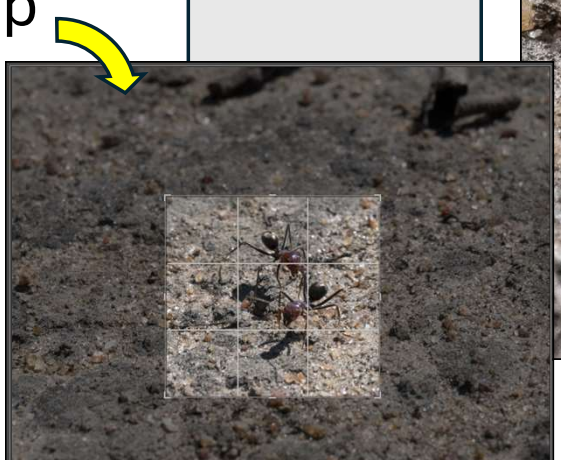
- P – pot luck
- A – you decide the aperture / depth of field
- S – you decide the speed (subject movement / camera shake)
- M – you choose degree of DoF and motion blur

- ISO
  - lower the better consistent with speed and aperture requirements (DoF/Blur).
  - noise reduction software

Depth of Field

- **aperture**
- focal length of lens
- distance
- sensor size
- magnification / crop

f16
400 mm
1.3 m
MFT



daylight MFT 1/800 **f16** 100-400 @ 400 mm

Read more at

https://photographylife.com/sensor-size-perspective-and-depth-of-field

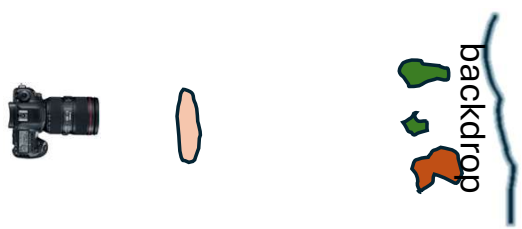
DoF and subject Isolation

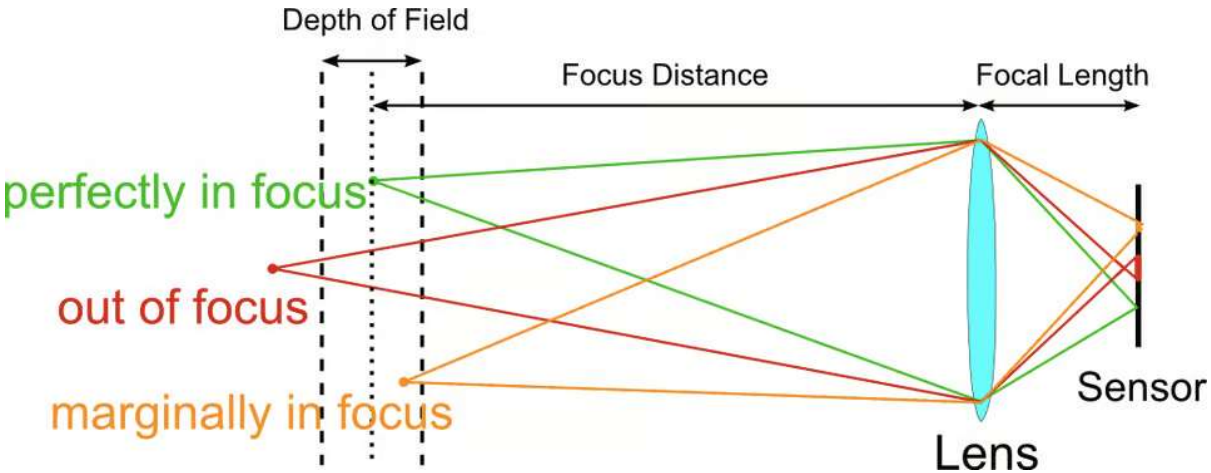
f 16

f 5.6

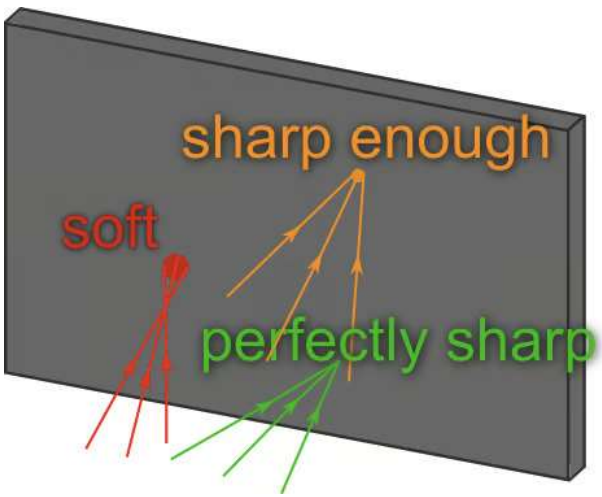
Increasing distance between subject and background

all 90 mm f 5.6



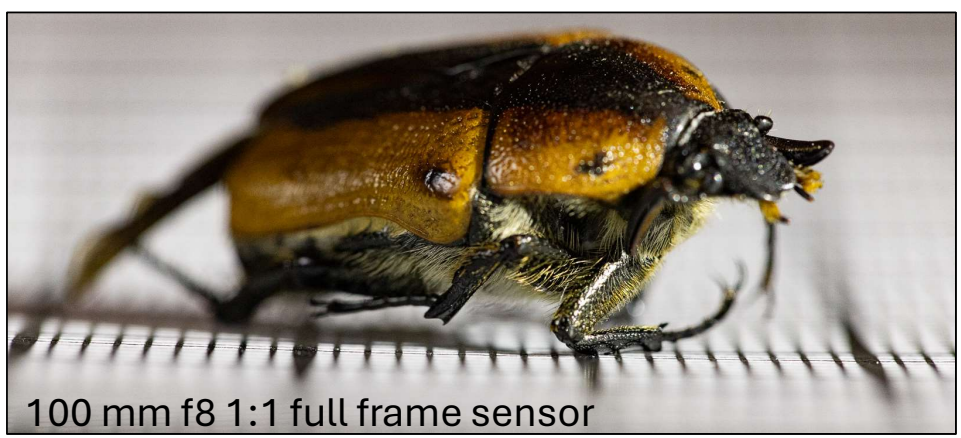


https://photographylife.com/sensor-size-perspective-and-depth-of-field#depth-of-field



Depth of field (DoF):

how much of your image is “acceptably sharp”



DEPTH OF FIELD (DOF) CALCULATOR

Camera	Canon EOS 5D, 5D Mark II, 5D Mark III, 5D Mark IV, 5DS, 5DS R	
Focal length	100	mm
Aperture	f/8.0	
Subject distance	15	centimeters
Teleconverter	--	

Hyperfocal distance	4176.67 cm
Hyperfocal near limit	2088.33 cm
DoF near limit	14.98 cm
DoF far limit	15.02 cm
Depth of field	0.04 cm

https://www.photopills.com/calculators/dof

search for DoF calculators online.

How does sensor size affect DoF?

the following two slides show an explanation from https://photographylife.com/what-is-depth-of-field#sensor-size that explain.

Go to the website for more information on DoF and the factors that affect it.

https://photographylife.com/what-is-depth-of-field#sensor-size

Sensor size also affects depth of field – in a sense – with bigger camera sensors having shallower depth of field. Technically, it is not the sensor size directly, but rather, the longer focal length that you must use for a given composition. The article "Sensor Size, Perspective and Depth of Field" goes into quite a bit of detail on this topic. So for more of an explanation follow the link.

But in a nutshell, cameras with smaller sensors have more depth of field, while larger sensors tend to offer more of a shallow focus effect. However, you have to be careful how you make the comparison. You must look at cameras with lenses that have the same effective focal length so that the fields of view are the same. If you shoot at the same camera-subject distance, with the same apertures, you will find that the larger sensors have a shallower DoF. That is why many professional portrait photographers like to use full frame cameras. Here is an example. A full frame camera with a 120mm lens, an APS-C camera with an 80mm lens, and a Micro 4/3 camera with a 60mm lens (all the same field of view) are each set to an aperture of f/9 and a camera-subject distance of 5.0m. This table summarizes how the DoF will look in each image.

Camera	Crop Factor	Physical Focal Length	Effective Focal Length*	Aperture	DoF
Full Frame	1.0	120mm	120mm	f/9	0.92m
APS-C	1.5	80mm	120mm	f/9	1.42m
Micro 4/3	2.0	60mm	120mm	f/9	1.91m

**Effective Focal Length = Physical Focal Length x Crop Factor*

https://photographylife.com/what-is-depth-of-field#sensor-size

A common question though is can you take similar images, with the same DoF's, using cameras with different sensor sizes? The answer is yes. However, you must divide the apertures by the crop factor in order to get the same depth of field. Using the same cameras and lenses in the above example, but setting an aperture of f/18 on the full-frame camera, f/12** on the APS-C sized sensor and f/9 on the Micro 4/3 camera, you will end up with images that not only take in the same field of view but have approximately the same DoF.

Camera	Crop Factor	Physical Focal Length	Effective Focal Length*	Physical Aperture	Effective Aperture**	DoF
Full Frame	1.0	120mm	120mm	f/18	f/18	1.89m
APS-C	1.5	80mm	120mm	f/12***	f/18	~1.91m
Micro 4/3	2.0	60mm	120mm	f/9	f/18	1.91m

**Effective Focal Length = Physical Focal Length x Crop Factor*

***Effective Aperture = Aperture x Crop Factor*

**** although f/12 would be the mathematically correct physical aperture, you would have to select either f/11 or f/13 on your camera.*

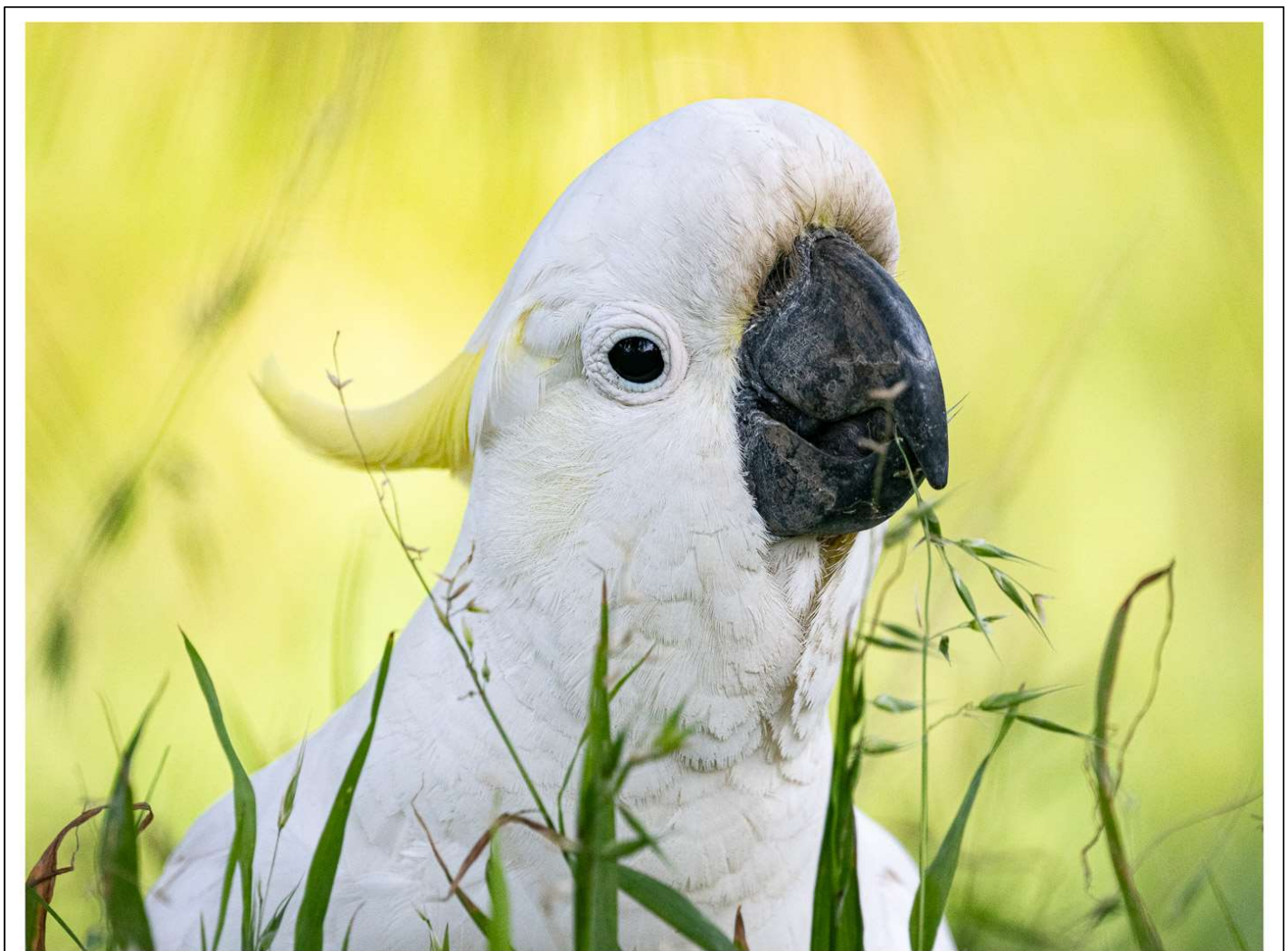
Large DoF sometimes is important

f 16

focus stack of 80 images

Large DoF is not always what you want

MFT
400 mm
f6.3



Backgrounds

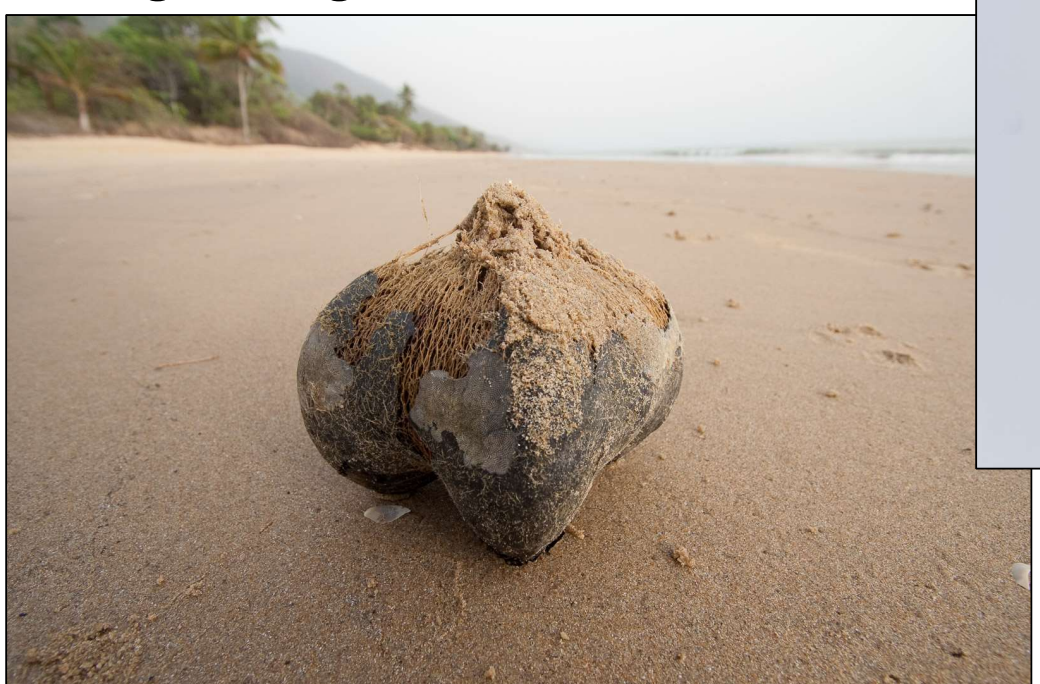
Often make or break a macro/close-up photo

Bokeh

Backgrounds

A plain background using a different perspective

Background gives context



Home studio,
black background

Botanic gardens
... a bit of black matt board behind the subject

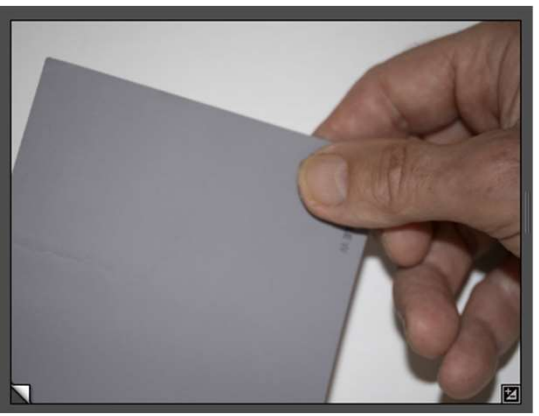
Colour Balance

Camera set to **WB daylight 5300 K**

WB can be adjusted easily (RAW)

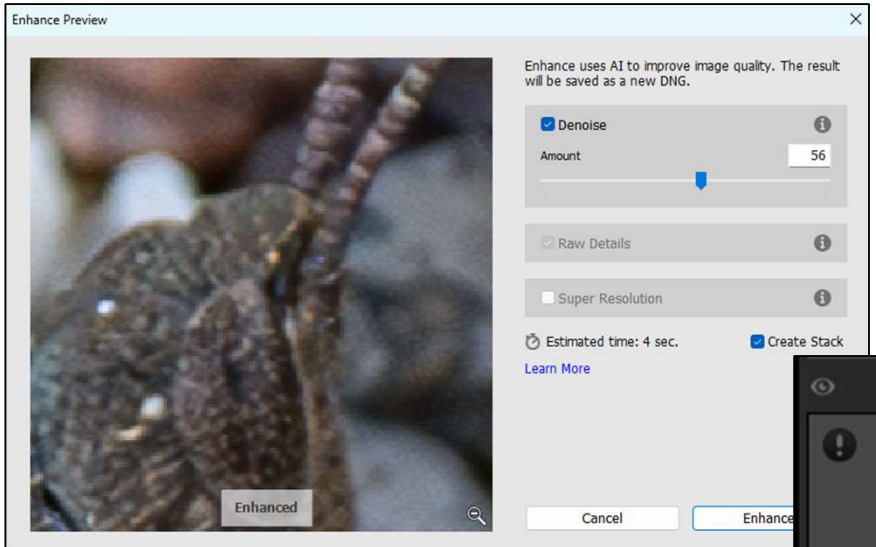
Mixed lighting can be tricky

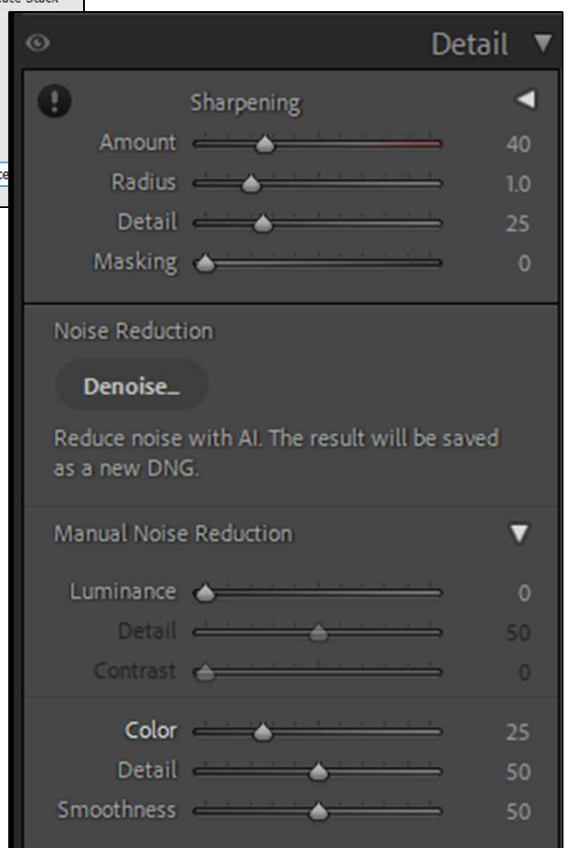
Adjust for aesthetics

	WB “As Shot” daylight	WB adjusted in LR from the white card background
Flash		
Halogen globe		

Post-Processing

- selective adjustments
  - layers and masks
- noise reduction
  - LR → Photo :: Enhance
- sharpening
  - LR → Detail sharpen // denoise
- focus stacking
  - Photoshop → photomerge

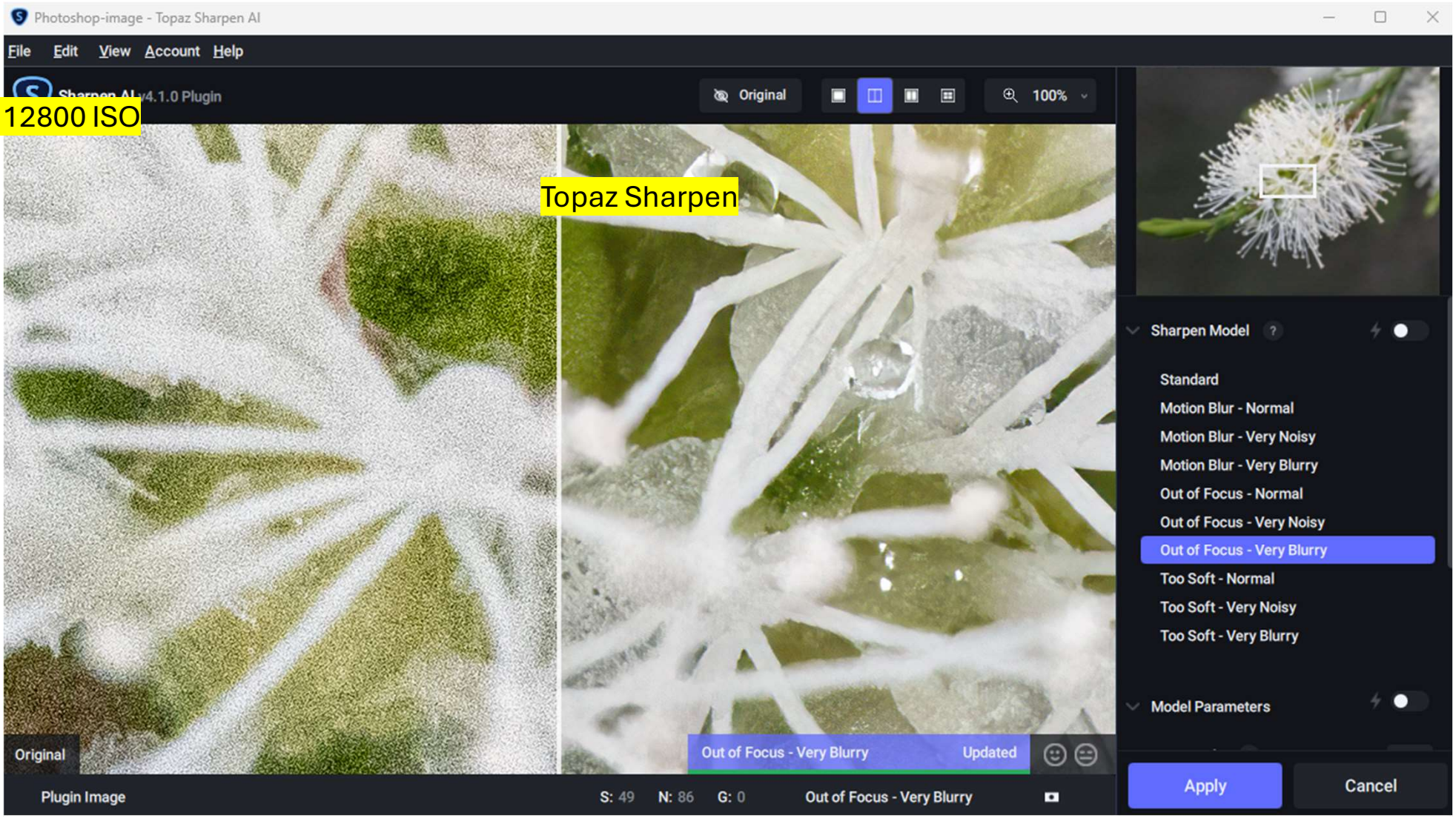




6400 ISO

LR Photo::Enhance::denoise

Topaz sharpen/denoise can be effective, but can also generate unwanted artefacts.



DxO PhotoLab / Pure Raw https://www.dxo.com/
also has very effective denoising for RAW files (Deep Prime)
as well as a wealth of other processing capabilities

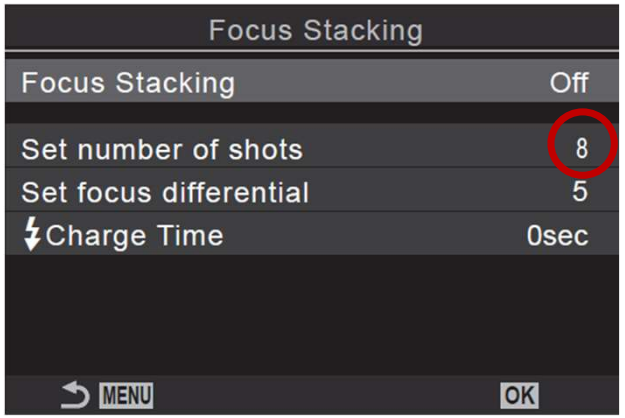
Lots of other options.

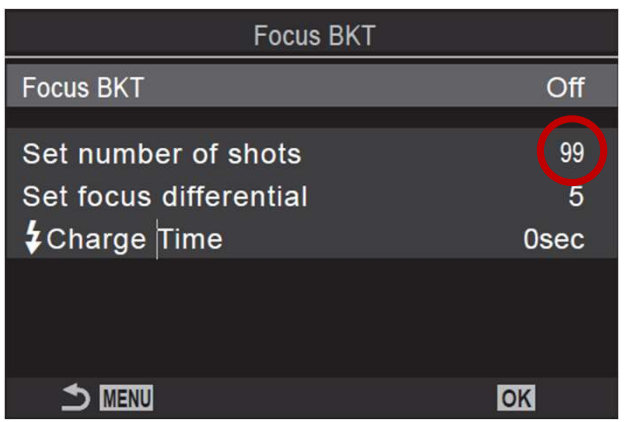
Search the web for reviews – the software changes as it develops.

Focus Stacking

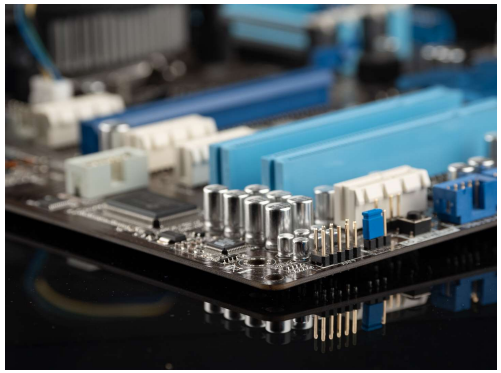
- Usually use **tripod**
- in camera
  - Focus **Stacking** blends limited number of images in-camera
  - Focus **Bracketing** takes set of images (not limited) for later stacking

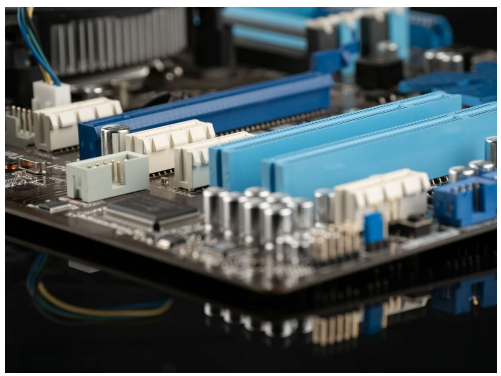
- post processing
  - software out of camera
    - Photoshop/Affinity/Neo/ON1 etc;
    - Helicon focus; Zerene stacker
      → specialist programs that may give better results

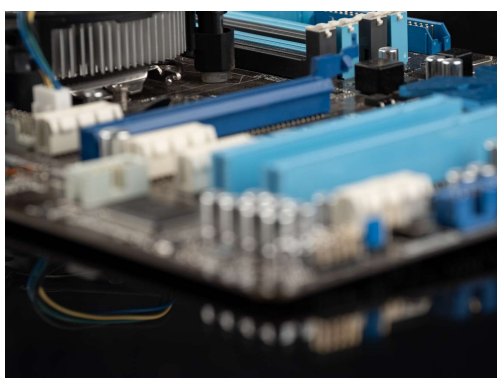




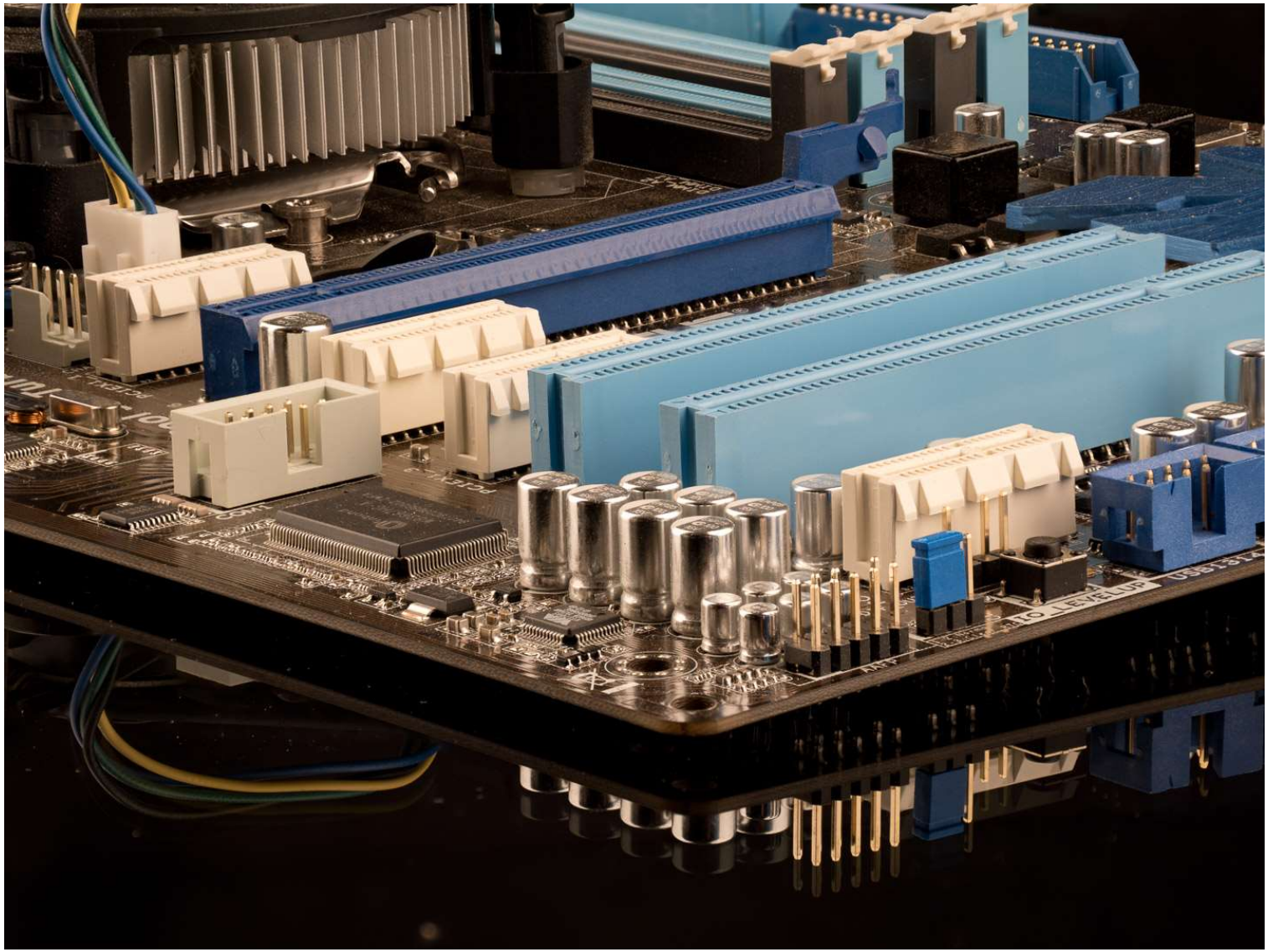
20 images @ f5.6 focus bracket







stacked



MFT
60 mm macro
ISO 100
1/20 sec

f 5.6

20 exposures
stacked in
Helicon Focus

Local adjustments
in Photoshop

Some final thoughts

Look for interesting angles

Look for the “small” in larger scenes

Zoom in close to find different viewpoints

Zoom in close to find different viewpoints

Macro textures

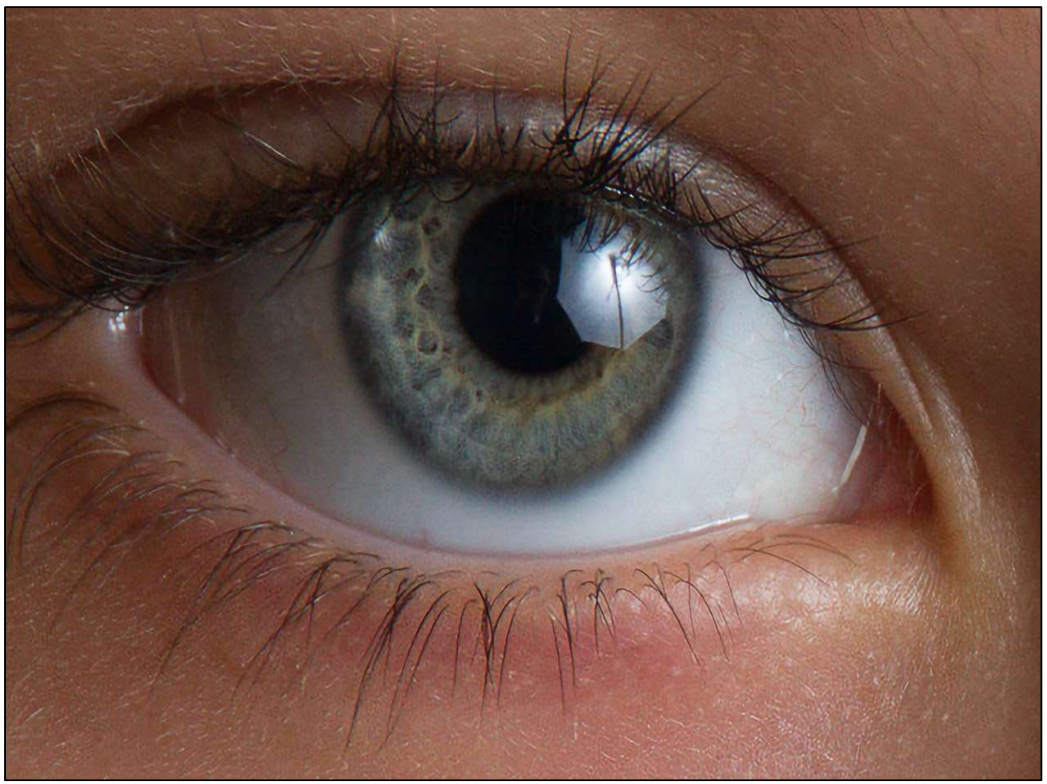
Everyday things

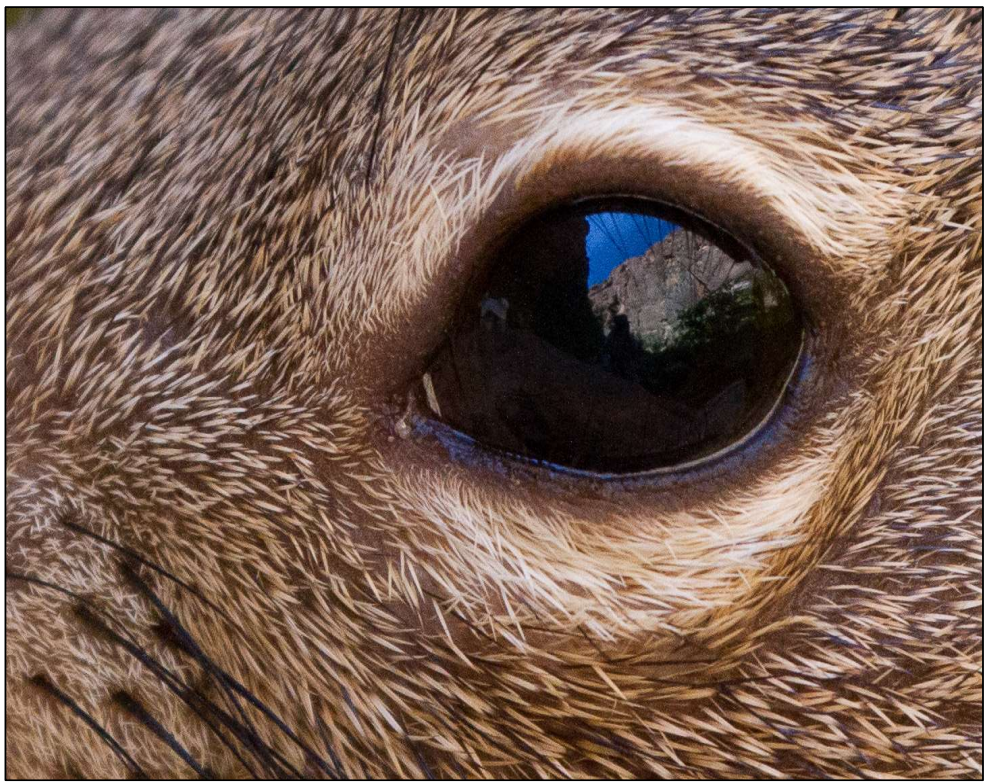
Small patterns

Contrasts in size add interest

Focusing on the close-up gives a different way to tell a story

practice seeing things with a close-up perspective





Extra things to consider

- check backgrounds
  - dark backgrounds are often best. Try to avoid cluttered backgrounds (shallow focus to blur)
- choose suitable shutter speed
  - at high magnification tiny movements of the subject / camera are magnified;
  - a tripod / flash can help
- subject movement may make it hard to get a good focus stack
  - the subject might look motionless, but look out or tiny movements of antennae etc.

Extra things to consider

- tethering your camera to computer or phone
  - larger screen to see the detail
  - control the camera without touching/moving it.

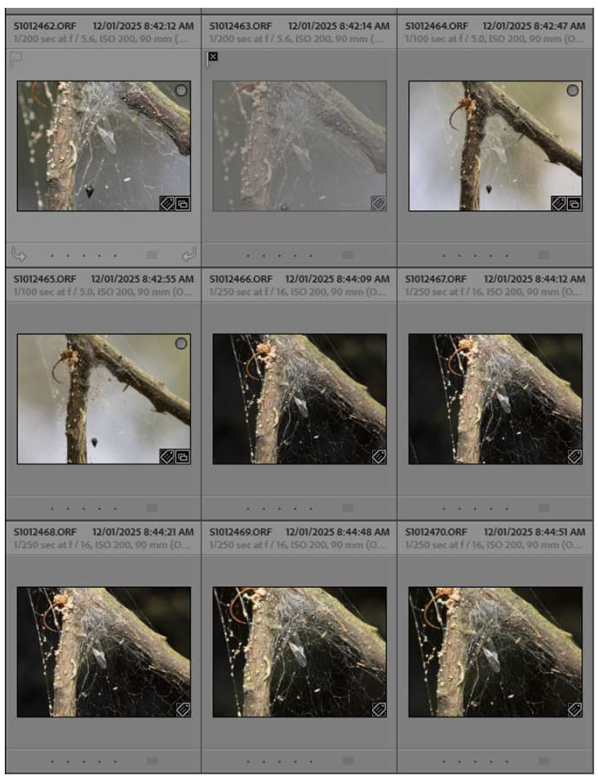
- be patient
  - perfecting that macro shot may take longer than you expect.

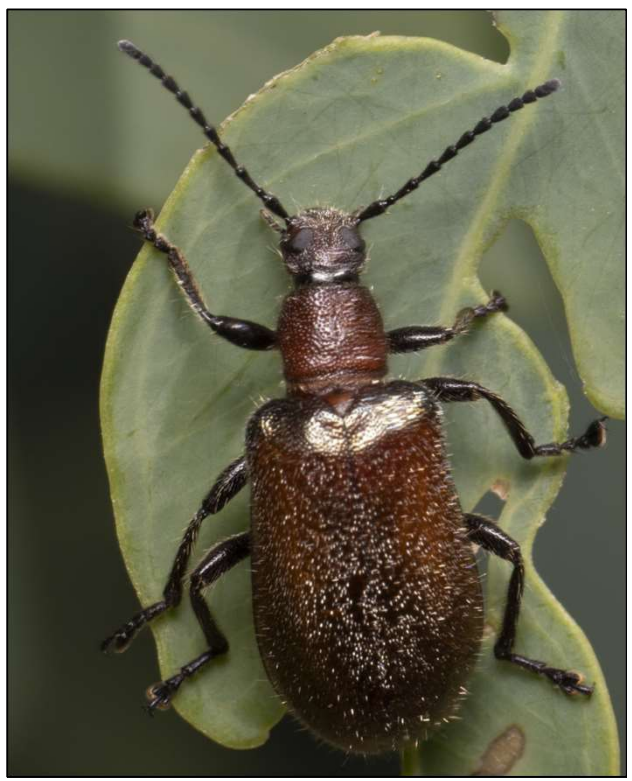
- **check your surroundings**.
  - Kneeling in an ant nest to get a photo of an orchid next to it might turn out to be a painful experience.
  - take care near cliff edges/water etc. it is easy to lose balance when you are concentrating on getting a macro shot.

Extra things to consider

- take photos then **review** to check if you are happy
  - composition
  - focus
  - lighting
  - background
  - motion blur
  - etc.

- take multiple images.
  - “film is cheap” your time isn’t

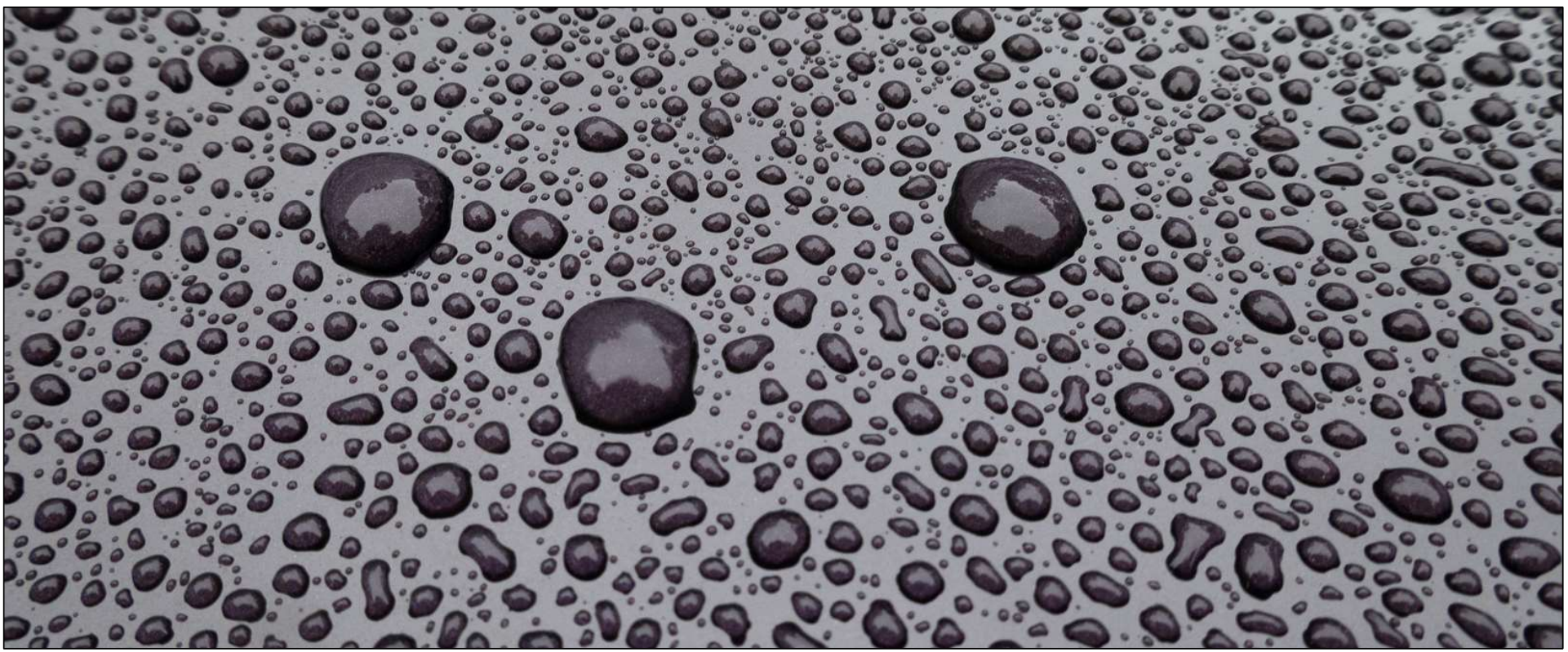




Dangers

Serendipity

Serendipity



Useful things

- small reflector/background (eg black/white matt board) – useful as a reflector (white) or behind subject (backdrop)
- string – useful to tie branches out of the way, or to stabilise branches in wind.
- kneeling pad – sealed cell foam or even just a plastic sheet.
- containers – in case you want to take something home to photograph in studio setups.
- blower – good to remove stray dust from subjects

Hands-on workshop: Monday 27 Jan

Bring

- camera(s) and appropriate lenses,
- a flash unit if you want to play with flash
- a tripod, especially if you want to try focus stacking (we will have some club tripods available too)
- a subject to photograph if you have anything on hand that you want to photograph

We will set up a selection of subjects to photograph in WH downstairs room

and/or (weather permitting) take a wander around the WH / community centre looking for suitable macro subjects

We will have some lighting rigs, tripods etc

I'll bring the kit I use for digitising 35 mm slides if anyone wants to see

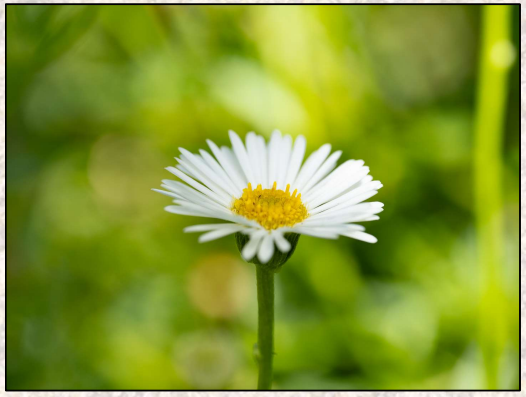
Maybe kit for water drops

Hands-on workshop: Monday 27 Jan

My 10 minute photoshoot around the community centre and Wadham House





Some links

- https://resources.waverleycameraclub.org/macro-and-close-up-photography/
- Ewen Bell: *A walk in the park gone wrong – In a good way* https://youtu.be/jjxKPgTk0N0?si=kWUO-lXCpiIjAfVE
- https://fixthephoto.com/macro-photography-ideas.html
- Geoff Shaw: *Nature in my neighbourhood* – made at the start of covid lockdowns. It's not specifically about macro, but macro is in there. https://youtu.be/-7R_lkYN9yQ?si=tfUWJEppfxxeyKoB
- http://extreme-macro.co.uk/